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FRUITS AND VEGETABLES IF PROPERLY DRIED ARE VERY DELICIOUS

The purpose of this folder is to outline a procedure for dehydrating foods successfully at home.

DRIED FOOD

Drying of food for home use is commonly practiced in rural areas. It usually consists of placing the prepared products in the sun, in the oven, over the stove, or in the attic until sufficiently dry for storage.

DEHYDRATED FOODS

The method of drying fresh fruits and vegetables in a specially designed, tight-fitting box, under controlled temperature, humidity and air flow, is called dehydration.

Dehydrated vegetables and fruits are of superior quality to those dried by other methods. In many instances dehydrated foods, such as corn, carrots, green beans, peas, apples, peaches, etc., approach or equal the quality of foods preserved by other methods.

ACKNOWLEDGMENT

Acknowledgment is given the University of Tennessee Agricultural Experiment Station, Georgia Agricultural Experiment Station, the Agricultural Engineering Department of Virginia Polytechnic Institute, the Appalachian Electric Power Company, and the Tennessee Valley Authority for providing research information that has helped to make this folder possible.

☆

A co-operative publication sponsored by the Southeastern Committee of Agricultural Extension Editors.

HOME DEHYDRATOR—KITCHEN MODEL WITH PEDESTAL FAN

CAPACITY—10 TO 25 LBS. FRESH WEIGHT

BILL OF MATERIAL

Paneling	1 — Pc. ½" x 48" x 96" — Fiber Board (lumber should be good grade soft wood thoroughly kiln dried)
Frame	1 — Pc. ¾" x 1½" x 8'-0"
Frame	6 — Pcs. ¾" x 2¾" x 10'-0"
	1 — Pc. ¾" x 7½" x 10'-0"
Heating Assembly	1 — Pc. ¾" x 9½" x 6'-0"
Dampers	2 — Pcs. ¾" x 2¾" x 9½"
Damper Runners	6 — lin. ft. ¾" x ¾" Mould
Tray Guides	48 — lin. ft. ½" x ¾" Stop Mould
Tray Frames	50 — lin. ft. ¾" x ¾"
	50 — lin. ft. ¾" x 1½"
Tray Glass	8 — Pcs. 12" x 18" double strength glass. If lattice trays are used add 100 lin. ft. ¾" x 1½" lattice and omit 50 lin. ft. ½" x ¾".

10" or 12" Fan.
Thermostat and Thermometer.
6 Porcelain Sockets with hidden terminals.
5 — 200 Watt Lamps, Wire, Plug, Hinges, Friction Catches, Nails, and Corrugated Fasteners.

HOW TO BUILD

1. Make side, top, bottom, back, and door frames. Use corrugated fasteners to assemble butted joints and nails for overlapping joints. Be sure to maintain inside dimensions if varying width lumber is used.
2. Assemble top, bottom, and side frames. Tack on temporary corner braces at front to hold box square.
3. Check frame dimensions and saw fiber board panels to fit (see layout as guide). Install panels in frames and nail with large head galvanized nails.
4. Trim back to fit snugly and fasten in place.
5. Remove corner braces and install guides.
6. Assemble and hang door.
7. Assemble removable heating unit. Cut hole in fan panel to fit snugly over fan guard of either a 10" or 12" fan. Maintain 1" dimension between bottom of fan guard and heating panel for either fan.

NOTES

Do not let bulbs (or heating elements) shine directly on thermostat or thermometer. Thermostat may be omitted. Heat then controlled by unscrewing bulbs as needed to keep temperature from getting too high.
A good thermometer with a range in excess of 180° F. must be provided.
It can be inserted through a hole in top of cabinet or laid on a tray.
If box is used for sulphuring, be sure to remove heating assembly and fan during treatment.
A bracket fan may be used in place of the pedestal fan.

HOW TO DEHYDRATE FOOD AT HOME

Co-operative Extension Work in Agriculture and Home Economics
UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
and the United States Department of Agriculture, co-operating
Thomas P. Cooper, Director. Acts of May 8 and June 30, 1914.
LEAFLET 35 APRIL, 1943



HOME DEHYDRATED FOODS

FROM GARDEN TO THE TABLE





1. SELECTION

Fruit should be ripe but still firm; vegetables in good condition for table use.

Dehydration does not improve quality. Consequently, if a good dried product is desired, the quality must be present in the fresh fruit or vegetable.

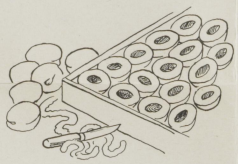
2. PREPARATION

For even drying, slices should be of uniform thickness.

Remove blemishes and bruised places.

Products may be dehydrated with edible peelings left on, although drying time is usually increased.

Note additional instructions in chart.



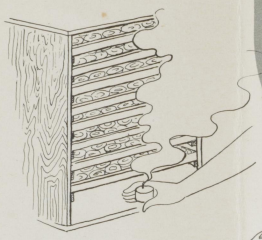
3. SULPHURING

Used for **fruits** only, to maintain quality and color.

After preparation, place on nonmetallic trays in a fairly tight box outdoors.

Light a sulphur candle or use loose sulphur in cup, with strip of paper protruding for applying match.

Put ignited sulphur in bottom of box. Sulphuring time: Note chart.



4. BLANCHING

Consists of cooking or partially cooking **vegetables** in water or steam, preferably the latter, to maintain quality and reduce cooking time.

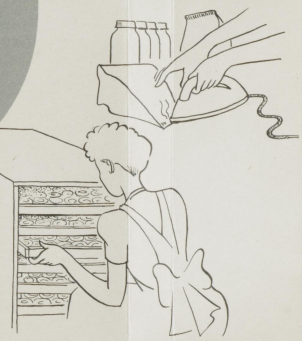
To steam, place product in cloth bag or perforated container. Rest bag or container on wire frame above boiling water. Place lid on pan. Follow instructions below.



5. DEHYDRATION

To shorten drying time preheat cabinet with dampers closed to 150° F., then put products into it. When products are heated to 150 degrees, partially open dampers. Exhausted air should carry sufficient moisture to dampen back of hand. Towards end of drying period open dampers more.

CAUTION: Control temperature with thermostat or by unscrewing bulbs, not by adjusting dampers. The dampers are for humidity control only. Spread products evenly on trays for uniform drying.



6. PACKAGING

Remove from dehydrator and package at once to avoid insect infestation.

Vapor-tight, heat-seal bags, glass jars, or metal containers with tight, sealed lids are satisfactory.

Package in small quantities sufficient for one or two meals. Remember that the refreshed product returns to about 85% of its original size.

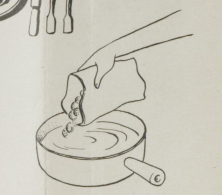


7. STORAGE

Keep in cool, dry place.

Protect transparent containers from light to keep product from turning dark.

Bags should be stored in tight insect and rodent proof containers.



8. REFRESHING

Pour boiling water on product at start of soaking period.

Proportions indicated in chart are only a guide; open-kettle cooking may require more water.

Soaking time may be increased if desired.

Cook the same as fresh products.

FRESH MATERIAL	STAGE OF MATURITY	PREPARATION	TREATMENT BEFORE DEHYDRATION		TRAY LOADING PER SQ. FT.	APPROX. WT. UNPREPARED PRODUCT NEEDED FOR 1 LB. DRY WT.	AVERAGE DRYING TIME HOURS	CHARACTERISTICS OF DEHYDRATED PRODUCTS	REFRESHING	
			KIND	APPROX. TIME MINUTES	POUNDS				PROPORTION OF PRODUCT TO WATER CUPS	MINIMUM SOAKING TIME HOURS
VEGETABLES										
Asparagus	When tips are tender	Cut only green tender tips	Steam*	4-5	0.6	14	7-9	Brittle, greenish-black	1 to 2¼	1½
Beans, lima	Tender	Shell and wash	Steam	until tender	1.0	6 (in pods)	8-10	Hard, wrinkled	1 to 2½	1½
Beans, green snap	Mature but not husky	String and break in 1" lengths	Steam	until tender	1.0	12	12-14	Brittle, greenish-black	1 to 2½	2½
Beets	Good condition for table use	Wash, trim, cook in steam 15 minutes, peel, and slice ⅛" thick	Steam	8-10	1.5	12	10-12	Tough to brittle	1 to 2¾	1½
Carrots	Good condition for table use	Wash, peel, trim, and cut in slices or strips	Steam	8-10	1.5	10	8-10	Yellow, tough to brittle	1 to 2¼	1
Cabbage	Good condition for table use	Trim, wash, and slice or shred	Steam	5-6	1.0	15	10-12	Tough to brittle	1 to 3	1
Corn	In milk stage	Husk, trim, cut from cob after blanching	Steam	15-20	1.7	7	8-10	Dry and brittle	1 to 2¼	½
Okra	Young pods	Wash, blanch whole pod and cut in 1" lengths	Steam	5-7	1.5	10	8-10	Brittle, green	1 to 3	½
Onions and Garlic	Good condition for table use	Trim, then slice or shred	Steam	½-1	1.2	8	10-12	Brittle, light color	1 to 2	¾
Peas, green	Full grown but before seed begins to harden	Shell, clean and grade carefully	Steam	5-7	1.0	10 (in pods)	8-10	Hard, wrinkled, green	1 to 2½	½
Potatoes, Irish	Good condition for table use	Peel, wash, slice, or strip, place on tray immediately	Steam	until tender	1.3	6	8-12	Brittle	1 to 2	1½
Pumpkin	Mature in good condition for immediate use	Wash, stem, cut open, remove seeds and cut in strips 1" to 2" wide, peel and cut in ½" slices	Steam	5-7	1.5	17	12-16	Tough to brittle	1 to 3	1
Soybeans, edible, green	When pods are filled and beans still green and tender	Blanch pods in steam 5 to 7 minutes, and shell	No further treatment		1.0	7 (in pods)	6-8	Hard and wrinkled	1 to 1¾	¾
Squash	Mature in good condition	Wash, steam, cut open, remove seeds and cut in strips 1" to 2" wide, peel and cut in ½" slices	Steam	4-6	1.5	11	12-16	Tough to brittle	1 to 1¾	1
Spinach	Tender, crisp (not fibrous) leaves	Trim off roots, wash and dry whole leaves	Steam	until wilted	0.5	17	8-10	Crisp	1 to 1	½
Sweet potatoes	Mature, good for table use	Wash, peel, trim and cut in ¼" slices	Steam	until tender	2.5	4	10-12	Hard and brittle	1 to 1½	½
Turnips and Rutabagas	Good condition for table use	Wash, peel, trim and slice	Steam	until tender	1.2	12	10-12	Tough to brittle	1 to 2	½
Turnip Greens and Other Greens	Good condition for table use	Trim, sort, wash whole	Steam	until wilted	1.0	14	8-10	Crisp	1 to 1	¾
FRUITS:										
Apples	Mature but not soft, free from discolored spots or bruises	Peel, core, and cut into ring slices, or pie slices	Sulfur	30	1.7	11	12-14	Springy feel	1 to 1½	½
Figs	Reasonably mature	Trim and place on tray whole	None		3.0	4	10-12	Glossy, dry skin, flesh slightly moist		
Pears	Ripe but firm	Remove stem, split or quarter, remove core and central woody tissue	Sulfur	25	1.7	10	12-14	Springy feel	1 to 1¾	1
Peaches	Fully ripe but fairly firm	Wash, peel, split in halves, remove pits, place on trays cut side up	Sulfur	35	2.5	9	14-16	Pliable and leathery	1 to 2	1¼

*Steam blanching is definitely superior to hot-water blanching, however if the latter is used the blanching time for immersion in boiling water can be reduced about ½.

HOW TO PLANT

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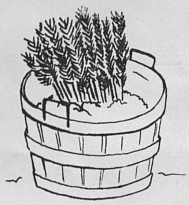
1. As soon as trees are received from nursery, open bundles and heel the trees in a trench deep enough to cover the roots. If soil is dry, water the trees.



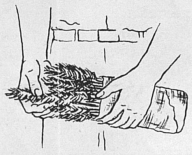
Don't let the roots get dry.



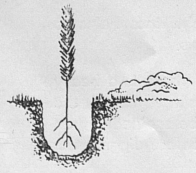
2. Transport the trees from heeling-in trench to planting site in a bucket or bushel basket containing enough moist dirt to keep the roots covered.

Don't let the roots get dry.

3. Carry trees along planting row wrapped in a wet burlap bag or in a bucket containing water and dirt.



Don't let the roots get dry.



4. With mattock or grub hoe dig a hole large enough to allow full spread of roots. Place the tree in the hole at the same depth it stood in the nursery.

Don't let the roots get dry.

5. Replace a small amount of topsoil around the roots and pack tight. Then push in the remaining loose soil.



WHEN TO PLANT

Tree seedlings are available at the state nursery in October, November, March, and April. They should be planted during these months when soil conditions are favorable. Don't plant when the soil is frozen or too wet.

SPACING

Plant trees 6 feet apart except in plantings to control gully erosion, when 2 to 3 feet is better spacing. Six-foot spacing requires 1200 trees per acre. Do not check row.

PROTECTION

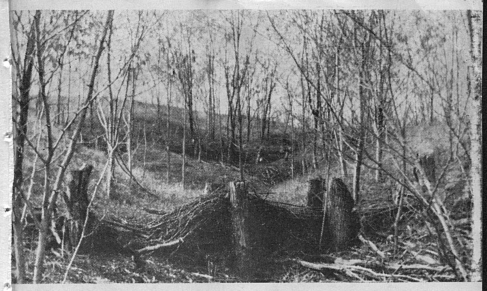
Unless trees are protected from fire and livestock, the time and effort spent in planting them will be wasted. If a fence is required, it should be built before the trees are planted.

WHERE TO GET TREES

Get from your county agent the order forms and any additional information you may need in reference to planting work.

Cooperative Extension Work in Agriculture and Home Economics: College of Agriculture and Home Economics, University of Kentucky, and the United States Department of Agriculture, cooperating. Thomas P. Cooper, *Director*. Issued in furtherance of the Acts of May 8 and June 30, 1914.

15M—1-46



101 - 200 55

Guide To Planting Forest Trees

By W. E. Jackson

For—

Gully Erosion Control

Posts and Timber

Building Up Worn Soil

Thickening Old Wood Stands

Leaflet 101

UNIVERSITY OF KENTUCKY

College of Agriculture and Home Economics

Agricultural Extension Division

Thomas P. Cooper, *Dean* and *Director*

Lexington, Kentucky January, 1946

29439

PLANTING CONDITIONS AND DIRECTIONS	KIND OF TREE TO USE
For Gully Erosion Control where topsoil is gone and subsoil is exposed 1. Construct one or more temporary, well-tied-down check dams of either brush, rock, mill slabs, fence wire, or some such material, across and at right angles to gully. 2. Break down ridges between gullies to a more even slope. 3. Spread ground limestone, 2 tons per acre, over area to be planted. 4. Plant the trees. Directions for planting: (a) Place 1 tablespoonful of phosphate in each planting hole. (b) Don't try to keep straight rows or a set spacing of trees. (c) Space the trees 2 to 3 feet apart. If necessary, the trees can be thinned after erosion is checked.	**Black locust** is the most generally satisfactory forest tree for gully erosion control in Kentucky. It is a legume with branching, interlacing roots, and it favors heavy growth of grass beneath it.
For Posts and Timber, where there are no gullies, but erosion is severe and no topsoil is remaining. Plant trees 6 feet apart.	**Black locust,** if limestone and phosphate are applied to the area as above — **Loblolly pine** or **Shortleaf pine** if no limestone and phosphate are applied to the area.
For Posts and Timber, where erosion is moderate, some topsoil is remaining and the subsoil is mellow. Plant trees 6 feet apart.	**Black locust** **Loblolly pine** **Shortleaf pine**
For Thickening Understory of Old Woods Stand run-down because of fire or grazing by livestock Plant trees 6 feet apart, taking trees now on area into consideration. About 500 trees per acre will be needed.	**White oak** **Red oak** **White ash** **Black walnut** **Yellow poplar** Where there are large park-like openings in woods — **Loblolly pine** **Shortleaf pine**

Further suggestions:

Don't use limestone or phosphate when planting pine trees.

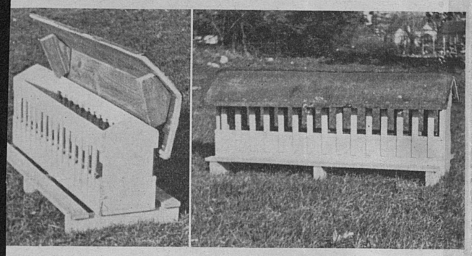
Hardwood trees (locust, oak, and so on) should not be planted in a mixture with pine. Such species of trees can be grown on the same area but should be planted in separate plantation blocks.

Where there are no gullies, plow furrows made 6 feet apart, running with the contour of the planting site serve as excellent planting rows. Deepen each planting spot with a digging tool if soil is hard.

Don't set trees in a straight line running up a slope. Avoiding such straight lines helps to prevent washing between rows.

If spot planting is used and there is a heavy sod or broom sedge cover on the ground, the sod or broom sedge should be scalped off an area 8 to 10 inches square before digging the planting hole.

FEEDERS AND FEEDING



Range feeders for a better feeding program

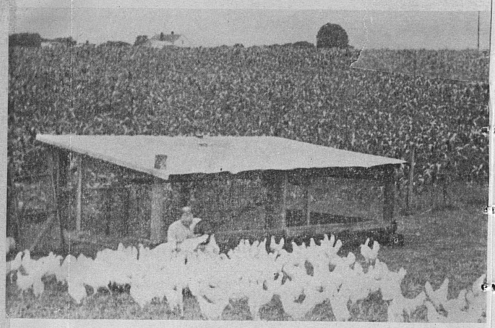
It is a big mistake to underfeed growing pullets. The object of full-feeding is to get pullets large enough to begin laying when they are about 6 months old. A good growing mash, grain, pasture, and water are necessary for rapid growth.

The feeders shown above are very good for feeding pullets on range. They hold a large amount of feed, protect it from the weather, and keep it from spilling on the ground. Use one of these feeders for each 50 pullets. Move the feeders each week to keep bare spots from forming on the range.

Growing mash contains the protein, minerals, and vitamins needed for quick growth. Without it, pullets grow slowly and take longer to reach laying size. Self-feed the growing mash to the pullets. Feeding grain and no mash during the summer is poor economy. Grain should be fed with the growing mash. Yellow corn is better than white corn and should be fed whole. Cracking it does not increase the feed value. Barley, wheat, and oats are very suitable grains to feed with corn. Feed them whole. Self-feed all grains.

For plans for making the range shelter, sun porch, feeder, and barrel waterer, see your County Agent or write to the College of Agriculture and Home Economics, Lexington.

SHADE



A cornfield in which the pullets can range makes good shade

Shade keeps the pullets comfortable in hot weather. Where there is no natural shade, place a shelter of some sort to provide it. Any framework covered with hay, straw, weeds, or corn fodder adds much to the comfort of the pullets. Placing the range shelter where the pullets can range in a cornfield helps.



An inexpensive artificial shade

Cooperative Extension Work in Agriculture and Home Economics: College of Agriculture and Home Economics, University of Kentucky, and the United States Department of Agriculture, cooperating. Thomas P. Cooper, *Director*. Issued in furtherance of the Acts of May 8 and June 30, 1914.

10M—4-46

GROWING good PULLETS

By Stanley Caton

- Cull slow-growing pullets; sell or eat them.
- Watch for disease outbreaks; get an early diagnosis.
- Vaccinate for fowl pox when the pullets are about 12 weeks old.
- Keep the pullets growing by feeding them well.
- Use labor-saving methods; make the job easier.

Pullets well grown out should be laying when about 6 months old.

Leaflet 102

UNIVERSITY OF KENTUCKY

College of Agriculture and Home Economics

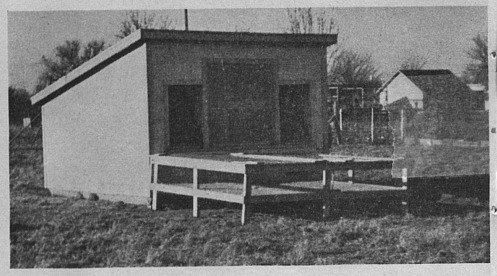
Agricultural Extension Division

Thomas P. Cooper, Dean and Director

Lexington, Kentucky

April, 1946

SUN PORCH



A sun porch; the beginning of good summer management

A sun porch is the beginning of a good summer management program. It keeps the chicks off the ground until they are ready to go on range. Healthy pullets put on a clean range will make husky layers in the fall. Make the sun porch large—8 ft x 10 ft for a 10 x 12 brooder house. Make the floor of ¾"-mesh hardware cloth or 1" x 2" wooden slats placed 1 inch apart. Don't let the pullets get on the ground until they are ready to go into the range shelter.

WATERER

The least expensive part of a feeding program, and a very important part of it, is water. Watering the growing flock can be made easier by using the barrel and float as shown here. The barrel can be put on a sled so as to make it easy to move when it needs filling. The wire guard over the drinking container helps keep the water clean.

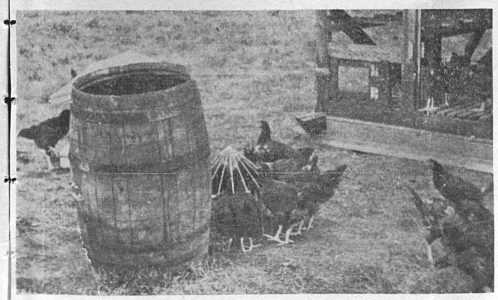
PASTURE



A good range; plenty of pasture, feeders, waterers, and shade

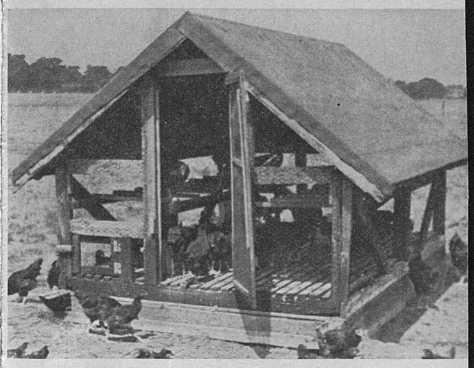
A good green pasture reduces the amount of feed eaten by growing pullets and provides some of the necessary growth elements. A permanent alfalfa and bluegrass pasture is best for year-round range.

Temporary summer pasture can be provided by sowing oats and rape for early pasture. Sudan grass sowed either in rows or broadcast makes a good hot-weather pasture. Turn the growing flock on it when it is about 8 inches tall. For best results mow the Sudan grass when it is 18-20 inches tall; this allows new green sprouts to form. Permanent pastures should be mowed to encourage new growth.



The barrel waterer is a labor saver

RANGE SHELTER



Range shelters make the job easier and more effective

A range shelter, made in the right way, is needed by pullets during hot weather, after they are out of the brooder house. Such a shelter, made on runners, can be moved with very little trouble. This makes it easier to have clean range for the pullets each summer. Pullets raised on clean range (where no chickens were the year before) lay more eggs and fewer of them die in the laying house, than among those raised on old range. To avoid bare spots coming on the range, move the shelter at least twice during the summer. When you move the shelter, scoop up the droppings under it and carry them away.

With slatted floor (as shown in the picture) or with 1"-mesh wire floor, the shelter does not need to be cleaned out. For a wire floor, either poultry netting or welded wire can be used. The slatted floor should be made of 1 x 2 inch slats nailed 1 inch apart. Be sure to board up the space between the runners at front and back so that the pullets cannot get under the floor of the shelter.

One range shelter 9 x 10 feet in size will shelter about 150 pullets.

hours per acre to pull tobacco from the sticks and place it in bulk. Use of the stick holder saves 10 percent of the time, one man doing the work.

STRIPPING

(Stripping is described in more detail in Leaflet 84, "Stripping Burley Tobacco.")

A stripping room attached midway along the side of the barn reduces the walking needed to get the tobacco from the tier rail to the stripping room. Still more time and energy are saved by having the door into the stripping room near the end of the bench on which the tobacco is to be laid. A second door near where the stripped stalks will be placed saves time in carrying out the stalks. For proper ventilation, ventilating doors are needed in the stripping room similar to those in the barn.

Having the stripping bench at the right height for the tallest workers, and then putting boards on the floor for the shorter workers to stand on so that the bench will be right for them also, saves much stooping or raising of arms and shoulders.

The following method of stripping was found to be the best of those observed:

1. Pick up the stalk just below the first leaf to be stripped so that the thumb and first finger grip the first leaf to be pulled.
2. Hold the stalk between the forearm and body so that the hand is free to pull leaves.
3. Strip with both hands (Picture 11).
4. Pass stripped leaves from right to left hand when the grade is completely stripped for each stalk.

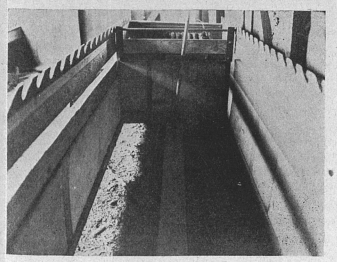


Stripping with both hands. *(Picture 11)*

5. Strip one grade only before passing the stalk to the next worker, unless most stalks have only one or two leaves of the next grade or unless the next grade is tips.
6. Pull the tip leaves on speared tobacco with one grasp of the hand after the leaves of the main grade have been passed to the other hand.
7. Make a hand of 50 to 60 leaves.
8. Pull a tie-leaf from the hand of leaves rather than placing a tie-leaf on the bench to be picked up when the hand is to be tied—unless tie-leaves are scarce because of low quality and case of tobacco.
9. Place each tied hand of tobacco directly on a stick held in the stripping bench convenient to the worker.

PRESSING

Wall presses and vertical and horizontal bed presses are the usual types used by burley growers. A horizontal bed press in which the sticks are pressed downward and held in line saves time in filling and emptying the press. Time is saved in that two, three, or more sticks can be placed in the press with one opening of the press, without removing any stick to make room for others. Further saving of time is possible because the press holds about the amount of tobacco that a crew of four capable

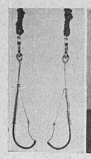


Horizontal bed press that holds 45 to 50 sticks of stripped tobacco. Door hinged at top to press tobacco both downward and back. *(Picture 12)*

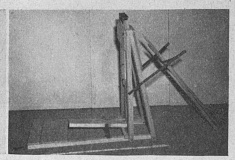
workers can strip in a half day. Thus twice each day men working as a crew remove the pressed tobacco and coop it. Time is saved because the tobacco is placed directly in the coop from the press and one man stays on the coop to place the sticks of tobacco.

CREW ORGANIZATION

A crew of four workers, systematically placed, stripped 880 pounds of tobacco in 8 hours, or an average of 220 pounds per worker. More tobacco was stripped per day by placing the fastest and most experienced workers at the bench to strip and place the tied hands on sticks. A worker who was less experienced in stripping but knew all grades, kept the workers supplied with tobacco from the bulk, placed the sticks of tied hands of tobacco in the press, carried out the stripped stalks, and kept a supply of empty sticks near each worker. He also stripped or picked up and tied leaves whenever a worker at the bench was unable to keep up. Crew organization of this type allows each worker to specialize in one phase of the stripping work, with the result that he becomes especially skilled.



Self-releasing hooks. *(Picture 13A)*



Stick holder. *(Picture 13 B)*

This leaflet is prepared from Leaflet 86, "Taking Down, Bulking, Stripping, and Pressing Burley Tobacco," by George B. Byers, Ernest J. Nesius, and Earl R. Young, and from further field data obtained by the author and Paul M. Pinney.

Lexington, Kentucky September, 1946
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Easier Ways To Do Farm Work

Preparing Housed Burley Tobacco for Market

RECD DEC 6 1946

By George B. Byers

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Tobacco lowered by one man. *(Picture 1A)* **One man bulking tobacco.** *(Picture 1B)*

Time-saving and labor-saving ways of taking down, bulking, stripping, and pressing burley tobacco are described in this leaflet. All the recommendations are based on careful records of crews at work on farms in central Kentucky.

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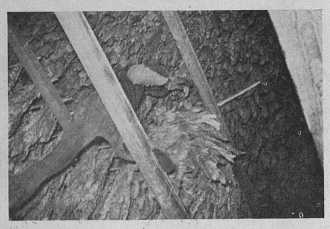
TAKING DOWN TOBACCO

Burley tobacco is taken down from the tier rail by dropping, passing from man to man, or letting down with a rope. When dropped or passed from man to man, the plants are pushed together by grasping the stick and pushing tobacco against the tier rail or by allowing the stick to slide through one hand as the stalks are pressed together (Pictures 2 and 3).



Bunching the plants on the stick by pushing against the tier rail. *(Picture 2)*

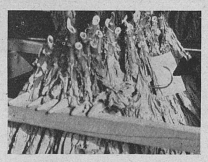


Bunching plants by pushing the stick through the hand. *(Picture 3)*

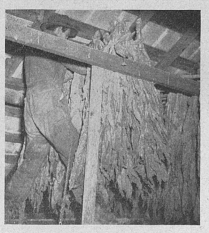
By using a self-releasing hook one man can lower tobacco from any height in the barn. In using the hook, pass it under 6 to 10 sticks, midway along the sticks, then lift the hook upward and pull it

toward yourself. This doubles back the releasing arm and leaves the throat of the hook open to hold the tobacco (Picture 4). At the same time you pull the hook into position, you bunch the 6 to 10 sticks ready to take them from the rail (Picture 5).

Turn the bunch of sticks parallel to the tier rails for lowering (Picture 6). The weight of tobacco



Self-releasing hook in position to hold the sticks of tobacco. *(Picture 4)*



Sticks bunched to take from rail for lowering. *(Picture 5)*



Bunch of sticks being turned parallel to rails for lowering. *(Picture 6)*

keeps the hook from releasing until the tobacco reaches the ground and the weight is released.

The hook is released as the tips of the stalks touch the ground, by allowing 6 to 8 inches of rope to pass quickly through the hand and then catching the rope firmly again just before the cut ends of the stalks reach the ground (Picture 7). The hook on the other end of the rope is then at the worker's hand ready to be used in lowering another bunch of sticks.



Hook released and tobacco in neat pile on ground. *(Picture 7)*

For the 5th and higher rails one man using the self-releasing hook can let down tobacco as rapidly as two men when one slips the tobacco in the rail and drops it to a second worker on the ground. Furthermore, when tobacco is lowered with rope and hook fewer leaves are lost than when it is dropped to the ground.

BULKING

Locating the bulk near the center of the barn means the least walking to carry tobacco to the bulk and later to the stripping room. In a 5-bent barn with two sheds 4 tier rails high there will be about 4 miles of walking in bulking the tobacco in one shed midway along the side of the barn. If the tobacco is bulked at one corner of the barn there will be about 5½ miles of walking. By bulking the tobacco for stripping near the center of a 60-foot by 40-foot barn, 1½ miles of walking may be saved when ½ rail of tobacco is carried at each trip.

By use of a tobacco stick holder in bulking, one man can do the job which otherwise usually takes two. When the stick holder is used in connection with the self-releasing hook in lowering, the tobacco is slipped on the stick by pushing the stick through the stick holder (Pictures 8 and 9). Then, as the worker pulls the plants off the stick, he steps on a rocker arm in the base of the stick holder and this forces a plunger upward against the stick to hold it tight.



Stick in position for bunching tobacco by pushing stick through throat of holder. *(Picture 8)*



Stick is gripped by holder as plants are pulled off the stick. *(Picture 9)*

As the plants are placed in the bulk (see cover page picture) the worker releases the stick, which slides into the stick rack on the back of the holder. When an armful of sticks are on the rack they are piled, as in Picture 10.

Records show that two men take a total of 4½



Piling the sticks in rick. *(Picture 10)*

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Prevention of Mastitis in Dairy Herds

By F. E. Hull and Ross Brown

Mastitis is any inflammation of the udder. Infectious mastitis is caused by a bacterial infection and may be either acute or chronic. This infection causes, on the average, a decrease in milk production of about 25 percent. It can best be controlled by the following measures:

1. Protect the udder by getting rid of all objects in barns, lots and pastures that would be likely to bruise or cut the udder.
2. Raise all replacements if possible.
3. Don't let calves or heifers of any age suck each other. Raise them in separate pens or muzzle them until all danger of sucking each other is past.
4. Don't permit a calf to suck a cow in the milking line.
5. Feed calves milk from healthy udders.
6. Thoroughly scrub, clean, and disinfect calf and maternity pens and equipment each time they are used.
7. Put cows that have diseased udders at one end of the milking line. Always milk them last.
8. Wash hands in soap and water before starting to milk each cow.
9. Use a strip cup to detect abnormal milk. Milk first two or three streams from each quarter into the cup at each milking.
10. Before milking, wash the udder in warm

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Lexington, Kentucky

October, 1946

water containing 200 parts of chlorine per million (200 ppm) changing this water after every 7 cows.

11. Dip the teat cups in clear water and then in chlorine water (200 ppm) after milking each cow.
12. Don't leave the milking machine on any longer than necessary, and run the machine according to the manufacturer's directions.
13. Don't milk on the floor or permit wet-hand milking.
14. Don't milk cows when you have running sores on your hands or "strep" sore throat.
15. Dip the teats in a freshly prepared chlorine solution (200 ppm) after milking.
16. Don't put Holsteins in stanchions built for Jerseys. Provide ample width and length of stalls depending upon the breed.
17. Clean the floor after each milking. Don't use lime or superphosphate as a substitute for cleaning.
18. Provide plenty of bedding and protect the udder from drafts and chilling.
19. Keep feed mangers, drinking cups, and other equipment clean.
20. Have barnyard properly drained and as clean and dry as possible.
21. Get rid of all water holes that cows may wade in.
22. Properly clean and disinfect all teat and udder injuries.
23. Don't use milking tubes or dilators, except under the supervision of a veterinarian.
24. Don't inflate the udder for milk fever except in emergencies.
25. Dehorn animals and get rid of all bossy cows.
26. Isolate all purchased replacements until you are sure they are healthy.
27. Have the herd checked by a veterinarian at least once or twice a year.

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4. If an old positive cow later proves to be a poor breeder the owner may sell her for slaughter only, after she is branded and permission is given. For such cow no indemnity is paid.
5. All vaccinated animals that remain positive after attaining the age of 2½ years, may be branded, tagged, and appraised and slaughtered under supervision within 15 days from the date of appraisal and indemnity will be received.
6. All bleeding and vaccination must be done by a B.A.I. veterinarian or authorized veterinarian. Authorization must be for each herd separately.
7. No animal should be bred for 6 months following vaccination.

Notes of Interest About Bang's Disease

1. Don't have the hog lot close to the cattle pasture or let the hogs run with the cows, because cattle will pick up swine Bang's disease.
2. Most infection from a positive cow is spread just before she calves, at calving, or just after her calving, and the infection is picked up by others when they get contaminated feed or water.
3. Properly vaccinated animals are not spreaders.
4. Just after abortions or calving, a positive cow may show negative. It is best to test 8 weeks after calving.
5. Not all positive cows will abort.
6. About 92 percent of the vaccinated animals will clear up after the third calf.
7. There is no medicine now known that will cure Bang's disease.

Lexington, Kentucky December, 1946

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State - Federal Plans For Control of Bang's Disease

By ROSS BROWN and F. E. HULL

The Kentucky Department of Agriculture, in cooperation with the U. S. Department of Agriculture, Bureau of Animal Industry, offers two plans to farmers to help control Bang's disease. If you decide to follow either of these two plans, get application and agreement blanks from your county agent, your veterinarian, or the State Veterinarian. Fill the blanks out, sign them, and send them to the State Veterinarian's office at Frankfort. Authorization will then be granted your veterinarian or a state or federal veterinarian, to start the herd under the program applied for.

Information about these two plans is given in this leaflet.

Test and Slaughter Plan

1. Owner must sign agreement.
2. He must furnish enough help for handling the animals.
3. He must assume all liability for injury to the animals, himself, or his help.
4. He must agree to and permit:
   (a) That all positive animals be tagged in the left ear with a reactor tag.
   (b) That all positive animals be branded with "B" on the left jaw.
5. He must sell for slaughter under supervision all positive animals within 15 days from date of appraisal.

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6. To obtain an accredited herd:

   (a) The herd must pass three successive negative or clean tests.

   (b) The owner must hold all animals in quarantine on his own premises and not add to the herd until it has passed two negative tests not less than 60 days and not more than 90 days apart.

   (c) Pregnant animals which have passed the test must be kept in isolation after calving for at least 60 days, without being rebred, at which time they will be tested and, if they are negative, added to the herd.

7. After the herd is accredited the owner must agree to have all animals tested once a year at his own expense.

8. Animals less than 6 months of age, other than the natural increase, may be added to the herd provided they have passed a negative test within 30 days prior to entering the herd.

9. At the end of each test disclosing reactors the owner must agree to clean and disinfect the premises.

10. Owner cannot pasture an accredited herd with one that is not accredited.

11. The owner may have his local veterinarian, at his own expense, to bleed the animals provided the veterinarian is authorized by the State Veterinarian to take the samples. Authorization must be for each herd, separately.

12. Example of testing:

    1st test (get rid of all reactors)
    30 days between 1st and 2nd test.

    2nd test (all animals negative)
    90 days between 2nd and 3rd test.

    3rd test (all negative)
    6 months between 3rd and 4th test.

    4th test (if all animals are negative the herd is accredited and must be tested once a year at the owner's expense).

13. Indemnity—Actual practice in paying indemnities depends partly on the extent of funds available for such payments. The general rule is as follows (as of November, 1946):

    (a) The state will pay on all positive animals 1/3 of the difference between the appraised beef value of the animal and the net proceeds from the sale of such animal, not to exceed $12.50 on grade animals and $25.00 on registered animals. The appraisal is made by a cooperative veterinarian and a disinterested tax payer.

    (b) The federal government will pay the same amount paid by the state, but will not pay on a grade bull.

    (c) Example of method of figuring indemnity: If a dairy cow was appraised at $75 value for beef and brought $60 when sold for slaughter, the difference would be $15. As indemnity the state would pay one-third of this difference ($5 in this case) and the federal government would pay the same amount. In this particular example, then, the total indemnity which the owner would receive would be $10. The total amount the farmer would receive for the cow would thus be $70 (sale price plus total indemity).

Calfhood Vaccination Plan

1. Owner must sign agreement, similar to that for test and slaughter except that the owner must keep accurate records of age of calves and quarantine all positive animals on the farm until permission is given to move them.

2. Must have entire herd tested. It is not necessary to get rid of all positive old animals, but they must have a reactor tag in the left ear. If all positive animals to each test are tagged. branded, and slaughtered under supervision within 15 days of appraisal the farmer will receive indemnity.

3. Have all calves 4 to 7 months inclusive tested. If the titer is 1-50, or below, the animal may be vaccinated. The animals are tested again at 6 months and again as soon as they freshen. After this they are tested once a year.

Under laboratory conditions vaccination has proved highly effective, although in some cases the immunity has not lasted long. Vaccination with inactivated Newcastle disease virus vaccines may be advantageous where exposure to infection has occurred very recently or is quite likely to occur soon.

Sale of hatching eggs and day-old chicks originating from flocks in which the disease has occurred should be suspended for at least 30 days after egg production in the flock has returned to normal and the premises have been properly cleaned and disinfected. The virus can be destroyed on contaminated surfaces by thorough cleaning and scrubbing with lye solution, followed by application of a saponified cresol disinfectant.

It is recognized that apparently recovered fowls may become carriers of the Newcastle virus. Poultry shows and egg-laying contests should be discouraged or prohibited in infected areas. Danger of shipment of diseased or exposed fowls, use of unsterilized, previously used feed bags and fowl and egg crates, indiscriminate admission of visitors from possibly infected premises, improper disposal of dead fowls, and uncontrolled movement of non-disinfected trucks and other public conveyances have been duly recognized.

Sale of recovered poultry for slaughter and then thorough cleaning and disinfection of the premises frequently is the best solution in handling an outbreak of Newcastle disease.

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20M—1-47

NEWCASTLE DISEASE OF FOWLS

(Pneumoencephalitis)

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By D. W. Bruner, E. R. Doll, P. R. Edwards, and Ross Brown

Within the past 20 years Newcastle disease has been recognized in at least 16 countries in widely scattered parts of the world. First reports of its occurrence came from the Dutch East Indies in 1926. The name is derived from an outbreak in Newcastle, England. Although this disease has been present in California for the past 10 years it was not recognized as Newcastle disease until 1944. By December 1946 it had been diagnosed in 30 of the 48 states. Its presence in Kentucky was definitely established in September 1946.

Cause of the Disease

The cause of the disease is a filtrable virus, one of the class of infectious agents which are presently of wide interest throughout the world. A filtrable virus is a disease-producing agent so small that it cannot be seen with a powerful microscope and

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can pass through a filter capable of holding back ordinary bacteria.

Fowls Susceptible to Newcastle Disease

The Newcastle disease virus attacks chickens of all ages, from baby chicks to laying hens. Turkeys are highly susceptible to infection and pigeons, geese, ducks, and other barnyard fowl can be infected. Wild birds are believed to develop this disease and spread it to free areas.

Symptoms of Newcastle Disease

Symptoms of Newcastle disease have been known to appear in exposed fowls within 2 to 14 days after exposure, but the average time between exposure and appearance of symptoms is 5 days.

Characteristics of the disease are its sudden appearance and rapid spread in the flock. In chicks the first symptom usually noticed is difficulty in breathing. They gasp for air, sneeze, and become visibly depressed. Within a few days, twitching and twisting of the head and neck, and marked weakness or paralysis, may occur. Generally the chick either recovers rather quickly or dies in a few days. In affected flocks observed, 10 to 60 percent of the chicks have died from the disease. Those surviving are slowed in growth and development.

In grown fowls the disease usually begins with respiratory symptoms. In the laying flock, egg production is almost completely stopped, and this loss may continue for 4 to 8 weeks. Paralysis of the neck and legs occurs less frequently. Fewer of the grown fowls than of the young chicks die.

Newcastle disease should be suspected when a respiratory disease in chicks is associated with or followed by nervous or paralytic symptoms. In the laying flock another significant symptom is a sudden and practically complete stopping of egg production.

Appearances in Fowls Killed by Newcastle Disease

Fluid is usually found in the windpipe. The air sac membranes are usually a yellowish, cloudy

color and there may be some enlargement of the spleen. However, some fowls which die of Newcastle disease do not show any of these recognizable lesions.

Diagnosis

The symptoms of Newcastle disease, in many cases, are very like those of other poultry diseases and, taken alone, are not conclusive evidence of the presence of this infection. A positive diagnosis depends upon isolation of the specific causative virus, or upon showing that the serum of recovered fowls will neutralize it. This requires the use of chick embryos in establishing the presence of the virus in a suspected flock. It involves a laboratory procedure which demands technical skill and experience. Recently sickened, living fowls are the best subjects for isolation of the virus and the spleen and brains are the best sources of the virus.

How the Disease is Spread

Newcastle disease is highly contagious and spreads readily. Chicks from an infected hatchery can carry the disease to their new quarters. Healthy chicks coming from a clean hatchery can pick up the infection through contact with diseased fowls on a public carrier. Visitors can carry the virus on their clothing from infected premises to clean areas. Eggs laid by recovered hens can transmit the virus to hatcheries and other chicks. Old and dirty egg crates, fillers, flats, and soiled feed bags which have been exposed to the virus can spread the disease. Recovered fowls, sold for slaughter, can harbor the virus and spread it. Offal from such poultry also is dangerous.

The role of wild birds is not definitely established in the spread of Newcastle disease.

Control of Newcastle Disease

It should be recognized that detection of infected flocks at the earliest possible moment is the first requisite for suppression of Newcastle disease and that primary diagnosis should be made only by laboratory procedure. Furthermore, transportation of fowls or carcasses for laboratory diagnosis should be only by private vehicle or private carrier.

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Prevent Tobacco Blue Mold

By Russell A. Hunt

BLUE MOLD will break out in many 2d-year plant beds this year. Whether it spreads and becomes general will depend entirely upon rainfall during the plant-bed season. Certainly growers should be prepared to combat the disease the day a warning is given that it is likely to develop. Fermate gives excellent control. For a bed 12 feet wide and 100 feet long, 1½ to 2 pounds should be enough for the season. Buy the Fermate now, while you can get it. If you keep it dry, it will keep indefinitely. Get your sprayer or duster, too, and have it ready.

When to Spray or Dust

For new beds, begin when the disease is first reported in the neighborhood or in the county to the south. Then apply twice a week and after every rain until setting is completed.

For second-year beds, begin when plants are the size of a dollar. Apply twice a week and after every rain until setting is completed.

Spray

3 level tablespoons Fermate, 1 gallon water
or
½ pound Fermate, 25 gallons water

Fermate is hard to mix with water. For small amounts, shake the Fermate thoroughly with a little water in a glass jar and add the mixture to the water in the spray tank. If some Fermate is still in the jar, shake again with more water. For large amounts, make a thin paste of Fermate and water in a bucket and add to the water in the spray tank.

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Thomas P. Cooper, Dean and Director

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Apply 4 to 6 gallons of spray to 100 feet of bed 9 feet wide, or to 75 feet of bed 12 feet wide, depending on the size of the plants. Remove the cotton before spraying.

Dust

A ready-mixed Fermate dust will be available this season. But if you want to mix your own, use 1 pound Fermate to each 5½ pounds of talc (or fresh fuller's earth, or pyrophyllite). Don't use lime.

Apply 2 to 3 pounds of mixed powder to 100 feet of bed 9 feet wide, or to 75 feet of bed 12 feet wide, depending on the size of the plants. Apply directly through the cotton.

How to Recognize Blue Mold

Blue mold may be confused with wildfire and fertilizer injury. To prevent fertilizer injury, don't use over 40 pounds of fertilizer on a steamed bed 12 by 40 feet, and not over 20 pounds of 20-percent superphosphate on a burned bed the same size. To prevent wildfire, apply bluestone-lime when the plants are just up and again 10 days later. If these are done, the indications of blue mold are small circular areas of yellow plants in the bed during dry weather, or large dead or yellow spots on the leaves during wet weather. Usually when there is blue mold a gray wooly growth of the fungus can be found on the underside of some of the leaves.

Equipment Needed

For spraying large areas of bed a power sprayer is desirable. For smaller areas a wheelbarrow sprayer or a 3- or 4-gallon pressure sprayer is suitable. For dusting, a good hand rotary duster is satisfactory.

Cautions

Avoid breathing Fermate spray drift or dust, as it is irritating. Fermate is inflammable and explosive; don't mix or handle it near flames or sparks.

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the brooder house and all of the equipment. Disinfectants are of little value unless cleaning is done first. Scrape and scrub the house and walks, and the feed and watering utensils. Then put one 13-ounce can of lye in 13 gallons of boiling water and scrub again with an old brush or broom. Take all the equipment out, place it in the sun, and give the house time to dry completely. If thoroughly done, this removes or kills the pullorum germs and makes the brooder safe for use again.

Control In Breeding Flocks

The key to control of pullorum disease is to keep carrier hens out of the breeding flocks. For ridding the flock of carriers the following suggestions are given.

1. Test all birds over 5 months old for the infection.
2. If the disease is found, retest the flock every 30 days, until report is negative. Multiple testing will help to dispose of carriers.
3. Remove every reactor, regardless of its value, and sell for slaughter immediately.
4. Thoroughly clean and disinfect the poultry house, yards, and equipment immediately after testing.
5. Burn all dead birds and the offal from dressed birds.
6. Don't use eggs for hatching until the flock has been tested and found free of the disease.
7. Don't feed fresh or infertile eggs from unknown or infected sources to chickens.
8. Don't buy chicks from untested or infected flocks.
9. Buy breeding stock from pullorum-disease-free flocks only.
10. Quarantine and test birds that have been entered in contests or shows, before they re-enter the flock.
11. Consider fowls other than chickens as a possible source of infection.
12. Clean and disinfect feed bags and other equipment that have been exposed to infection, before using them again.

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20M—5-47

Pullorum Disease In Chicks

By Ross Brown, F. E. Hull and E. L. Taylor

Pullorum disease, formerly called "bacillary white diarrhea," is an infectious disease of baby chicks and turkey poults caused by the germ *Salmonella pullorum*. Mature fowls may have the disease, but as a rule they show no symptoms. They are "carriers" of the infection, but this fact can be discovered only by blood testing.

Symptoms

Symptoms of pullorum disease in chicks are not always the same. Some chicks die so soon after hatching that no symptoms are shown. Chicks from infected eggs may be found dead in the incubator shortly after hatching. Sick chicks have a general lack of energy; they are droopy and stand "huddled up" as if cold, showing little desire to move. The eyes stay closed; the chicks frequently make peculiar, squeaky chirps and a few may gasp for breath. Some become pasted-up around the vent and may show a white diarrhea.

The death-rate may vary from none to almost 100 percent. It usually reaches a peak within five to ten days after the chicks hatch, and losses continue for a week or so thereafter. Some chicks recover but are usually stunted and, as adults, carry the disease.

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Appearance of Dead Pullorum Infected Chicks

When chicks die suddenly from Pullorum disease in the early stages of brooding, their internal organs may show no unusual changes. If the chicks live longer, however, changes in the internal organs are usually marked and easily recognized. The most common are in the liver, which may be enlarged, a dirty yellow to very deep brown in color, and usually covered with very small, gray or yellow spots. Small, grayish lumps or nodules often are seen on the surface of the heart, and the heart sac may be filled with a cloudy, pus-like fluid. Chicks may sometimes have pneumonia, usually the result of breathing infected chick down. In these cases small gray or yellow nodules are found in the lungs.

Diagnosis

Unusually high losses in baby chicks during the first two or three weeks suggest pullorum disease. It is not safe, however, to diagnose pullorum infection upon high death-rate alone, even when symptoms and lesions suggest the infection. Other diseases, over-heating, chilling, and faulty feeding may cause similar symptoms. The only sure method of determining pullorum infection is bacteriological examination. Chicks may be sent to the Agricultural Experiment Station, Department of Animal Pathology, at Lexington, for such examination. All chicks sent to this laboratory are carefully cultured and the trouble is not diagnosed as pullorum disease unless the germ *Salmonella pullorum* is found in the affected chicks.

Source and Spread

Pullorum disease may be passed from an infected hen, through the egg, to the chick before it hatches, and the newly-hatched chick will be literally "teeming" with the germs of pullorum disease. The down that covers the chick, its droppings, and even the shell from which it was hatched are covered with pullorum bacteria. The down, upon drying, becomes loose and fluffy and is scattered throughout the incubator by movement of the air within the incubator. Non-infected chicks breathe in, or possibly swallow these small bits of down and are thus exposed to infection before leaving the incubator. Chicks may also pick up infection from the droppings and egg shells. Thus, a few

infected chicks can spread the disease to the entire hatch.

Chicks may be free of pullorum disease when they leave the hatchery and then get it later from an infected brooder, feeder, or waterer. This can happen in a brooder in which there has been an outbreak of pullorum disease before, if the brooder was not properly cleaned and disinfected after use. Pullorum infection may be carried on equipment, feed, feed sacks, chick boxes, and on the clothing or hands of persons handling infected equipment or chicks. Great care must be taken to prevent spread of the disease by such infected equipment or persons.

Occasionally, there is an outbreak of pullorum disease in chicks hatched from eggs of supposedly pullorum-free flocks. This may occur when the flock is tested too far in advance of the hatching season or when there is not a thorough clean-up after the test. Thus, the infection is picked up between the time of the last test and the time that the eggs are gathered for hatching.

Control In Young Chicks

No drugs or remedies have proved of value in the treatment of pullorum disease. To avoid the disease buy baby chicks from a hatchery that is under a strict system of pullorum control. If an outbreak of pullorum disease does occur in a brood of chicks the following suggestions are recommended.

1. Remove, kill, and burn all sick chicks immediately. Destroying all sick chicks during the first week may save hundreds of others later.

2. Litter, feed, and water infected by the droppings of sick chicks are the principal sources of spread from the sick to the well chicks. Use deep, dry litter, and add about 1 inch each week. If the litter becomes wet, remove it and replace it with dry litter. To lessen the spread of infection in the drinking water, add 1 level teaspoonful of a 50-percent chlorine powder to each 2 gallons of the chicks' drinking water until the chicks are 3 weeks old. (Several commercial preparations are available for this purpose.) Change the chlorinated water twice daily. This is not a treatment for pullorum disease, only a means of reducing the spread of it.

3. Faulty brooding, especially chilling, increases losses from pullorum disease. Keep the brooder temperature so that the chicks appear comfortable.

4. Before new chicks are brooded, thoroughly clean

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Shipping Fever Of Cattle

By Ross Brown

SHIPPING FEVER, also called "hemorrhagic septicemia" and "stockyards pneumonia," is an infectious disease which attacks cattle that have been shipped through public stockyards. It ranks with mastitis in loss to the cattle raisers of Kentucky. At least one out of ten of the stocker cattle and "Tennessee Jerseys" shipped into the state and passed through stockyards dies of this disease and many more are stunted. Added to this loss is the time, labor, and money spent for treatment and care of the sick animals.

Occurrence

Cattle of all ages and types are attacked by shipping fever. It occurs most often in stocker steers and heifers shipped in from the West and South during the late summer and fall, and in the grade Jersey heifers shipped into Kentucky from Tennessee, Georgia, and other Southern states. Thin, weak animals, ill fed and suffering from parasites are most likely to get the disease.

Cause

Shipping fever is believed to be caused by bacteria, which become active when the body resistance of animals is lowered. These bacteria are ordinarily harmless to the healthy animal, but are able to pro-

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duce disease in run-down cattle. Several different kinds of bacteria have been found in the organs of animals that have died of the disease. This makes it difficult to develop a vaccine for shipping fever.

Whether or not the infection will spread to other cattle on the farm is questionable. However, as a safeguard, *keep all newly bought animals away from the rest of the herd for 2 or 3 weeks.*

Symptoms

The symptoms vary with the severity of the infection. Many animals are well along in the disease before they are brought to the sales ring at the stockyards, and the farmers who buy them often find them down by the following day. On the other hand, many animals which develop the disease appear practically normal at time of purchase.

First symptoms are a slight nasal discharge, occasional light cough, and watery eyes. After a few days the animal refuses to eat, grows depressed and weak, breathes hard, coughs, and grunts. In many cases pneumonia develops. Diarrhea is common; the ears droop, and the eyes grow dull and glazed. The animal becomes weaker and weaker, staggers when forced to move, and soon is unable to rise. Body temperature rises to 104-107° F. Death may come within a day or two, or the disease may linger for 2 or 3 weeks. Most animals that die of shipping fever have pneumonia.

Prevention

To keep shipping fever losses down (1) select cattle carefully for buying; (2) give them good feed and care; and (3) vaccinate.

Most of the cattle offered for sale at public stockyards have already undergone the exposures of shipment. Therefore select those that appear to be in best condition to resist infection. Thin, weak, and wormy individuals are poor risks. Next, give the cattle unusually good care. Provide dry, roomy, clean shelter, free from drafts, for at least 2 weeks. Keep them in the barn at night and during cold rainy weather. Give them plenty of clean, bright alfalfa, lespedeza, or mixed hay, and fresh clean water. Allow them to become accustomed to new pastures gradually.

Don't place too much faith in vaccination alone as a protection against shipping fever when buying cattle at the stockyards. Vaccination will be effective only when combined with proper care and feeding.

Two products are commonly used to vaccinate against this disease—bacterin and anti-serum. Bacterin is the killed suspensions of the bacteria that apparently cause shipping fever. It costs little, but requires 10 to 12 days to develop an immunity. Therefore it is practically useless in prevention of the disease unless it has been given at least 2 weeks before the cattle are shipped. Its use by buyers is seldom justified in an outbreak of the disease.

Anti-serum is prepared from the blood of cattle highly immunized against shipping fever. It brings about a high resistance at once. It is the best product for treatment and prevention of shipping fever. Anti-serum is expensive, and it must be given in large doses. When cattle prices are high, it usually pays to use it. Have the cattle vaccinated by a good veterinarian as soon after buying as possible.

In general, allow a period of 3 weeks between vaccination for shipping fever and for blackleg. Don't vaccinate against blackleg and shipping fever at the same time unless blackleg is present on the farm or in the neighborhood.

Treatment

If shipping fever is not too far along, anti-serum and sulfonamide drugs have definite value in its treatment. As has been mentioned, good nursing, care, and feeding are also necessary. Don't fail to get veterinary service at the first sign of illness.

The Spread of Johne's Disease and its Control

The infection spreads in a herd through contamination of feed and water by feces containing Johne's bacilli. In getting rid of the disease in a herd it is necessary to remove or completely isolate all infected and suspicious individuals. Since it seems highly probable that animals are most likely to get the infection during calfhood, the calf should be separated from its dam within 24 hours after birth and kept permanently isolated from adults until it reaches maturity. All manure from an infected herd should be promptly removed to fields not used for pasture. Pastures or feed lots must be selected which do not receive drainage from infected areas, barnyards, or fields. So far as possible, poultry, rats, dogs, and other animals should be prevented from going from infected to noninfected areas. After removal or isolation of diseased cattle, the premises need to be thoroughly cleaned before they are safe for healthy animals. Barnyards and stables should be sprayed and disinfected. All barn equipment, such as feed troughs, shovels, brooms, forks, and so on, should be thoroughly sterilized. Fundamentally, Johne's disease is controlled in cattle by preventing the contamination of feed and water by feces. There is at present no effective treatment for the disease.

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Johne's Disease of Cattle

(Paratuberculosis)

By D. W. BRUNER, F. E. HULL, and ROSS BROWN

JOHNE'S DISEASE (pronounced "Yon-ez") in Kentucky cattle was first diagnosed in 1916 in a herd of purebred Jersey cattle. Since then members of this Department have been called upon to examine several suspected cases each year. It appears that the infection was introduced into healthy herds in this state principally by the importation of cattle from the Channel Isles or from cattle that were in contact with Island importations. The disease has been observed in horses, sheep, deer, and goats, but it is of little economic importance in animals other than cattle (Picture 1).

Cause

A species of bacteria causes this disease. The bacteriologist calls them *Mycobacterium paratuberculosis* because they resemble the bacteria causing tuberculosis. They also are called "Johne's bacilli," after Johne, who first described them. These bacteria enter the digestive tract of cattle by way of the mouth and invade the lining of the intestines. As a result of the constant irritation which they produce, infected animals develop severe diarrhea. This usually lasts for months. The animals become extremely thin and then die.

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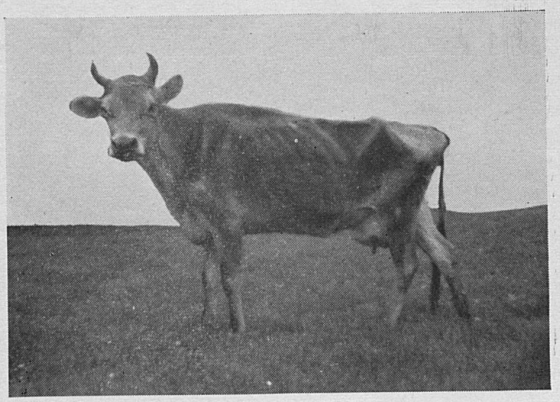


Typical appearance of cow in advanced stage of Johne's disease. Note the very thin condition but alert appearance.

(Picture 1)

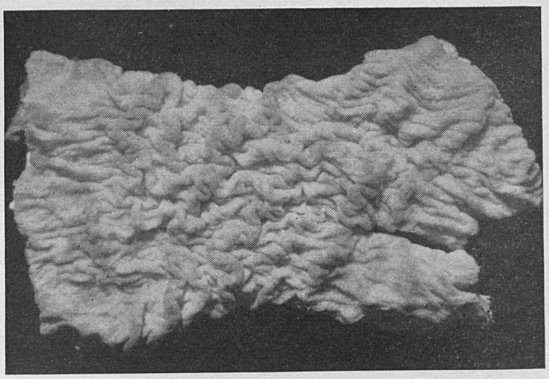
Symptoms

The incubation period for Johne's disease is from 6 months to several years. Frequent occurrence of the disease in cattle 2 and 3 years old strongly suggests that they become infected in calfhood.

Usually the first distinctive symptom is prolonged diarrhea. There is no loss of appetite. The animal remains alert, with bright eyes and normal temperature. Progressive loss of condition develops. The milk flow of an infected cow is decreased. In some cases the diarrhea may subside for a time and the ailing animal may gain in weight, sometimes even appearing to recover, only to suffer a recurrence of the attack weeks or months later. Often the disease becomes active after freshening. In rare instances the infected animal may live for years and apparently recover.

Effects of Johne's Disease as Seen in the Dead Animal

The body of an animal that has died of Johne's disease usually is extremely thin. The most important changes are in the intestines and their adjacent lymph glands. The intestinal walls are markedly thickened and the lining is thick, reddened, and thrown up in irregular folds (Pictures 2 and 3). These lesions are more definite at the lower end of the small intestine. The intestinal lymph glands are enlarged and moist.

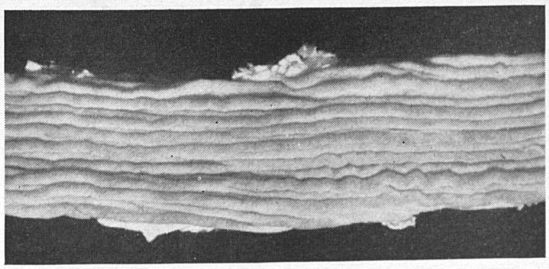


Transverse section of intestine (from the ileum)

(Picture 2)

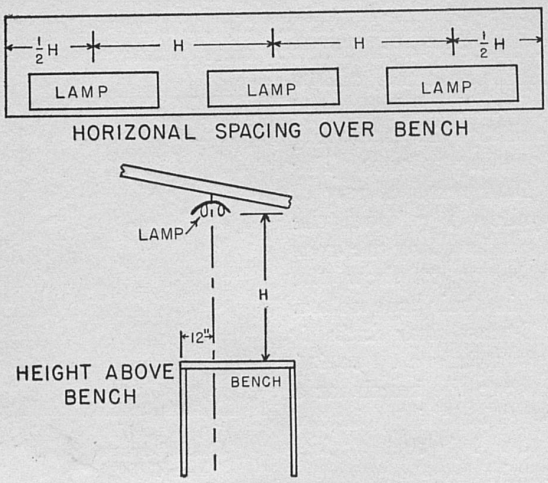
Diagnosis

The microscopic demonstration of Johne's bacilli in the lining of the intestine and in the adjacent lymph glands establishes the diagnosis in the dead animal. Persistent diarrhea associated with loss of condition suggests Johne's disease in the living animal. Sometimes the diagnosis can be made certain by finding Johne's bacilli in the feces or in a scraping made from the lining of the intestine. This can be done on rectal examination. There is also a test for discovering diseased animals. It is called the "johnin test," and is similar to the tuberculin test for detecting tuberculosis. The johnin for making this test is not yet (1947) widely available for use.



Longitudinal section of intestine (from the ileum)

(Picture 3)



Horizontal spacing of lamps should be equal height above the stripping bench

Horizontal spacing.—Space the lamps about as far apart (center to center) as the height of the lamp above the bench. Adjust this distance as needed to obtain uniform spacing of lights over the bench. Hang the lamps so that their centers are about 1 foot towards the wall from the front of the bench.

Skylights and windows.—When artificial lights are used skylights or windows are not needed and should be covered.

Wiring the Stripping Room

So that the lamps can be moved easily for use in other buildings at the end of the stripping season, the wiring should include double convenience outlets. A cord and plug attachment makes it easy to move the lamp or to disconnect one or more when the whole length of the bench is not in use. A wall switch to control lights and a fuse box are essential. *Caution*: Have your wiring done by a competent workman and inspected to eliminate fire hazard.

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Stripping Lights

By Earl G. Welch

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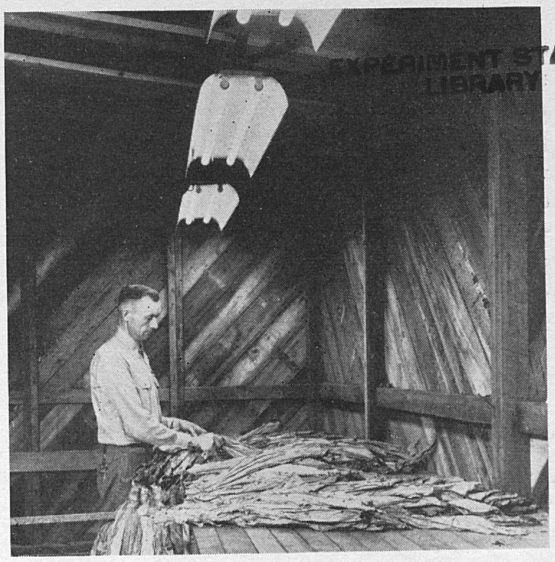

Fluorescent lamps for stripping tobacco

Leaflet 111

UNIVERSITY OF KENTUCKY

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Agricultural Extension Division

Thomas P. Cooper, Dean and Director

ACCURATE GRADING of tobacco at stripping time requires good light. Indirect daylight of course is ideal, but often in midwinter there is too little of it. Artificial lights are therefore needed. Ordinary electric lights are not satisfactory, chiefly because they give a false color to the leaves. Properly installed "daylight" electric lamps show the colors accurately. More and more Kentucky farmers are using these lights. This leaflet describes the lamps and gives directions for installing them.

Advantages in Use of Lights

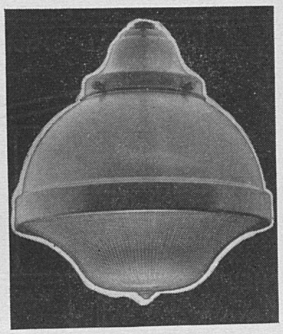
1. **Reduces cash cost.** By working a full day each day, regardless of sunlight, many farmers find that they need to hire less day labor.
2. **Shortens stripping period.** By working full days fewer days are needed. This frees time for other work, and permits getting the crop on the market earlier.
3. **Results in more uniform grading.** Uniform lighting over the stripping bench throughout the day means a better job of grading, and therefore usually a better average price for the crop.

Types of Daylight Lamps

Many types of daylight lamps have been used, including homemade fixtures. It pays, however, in terms of better grading and more income, to install the best type of daylight lamp obtainable.

Fluorescent lamps.— Most Kentucky tobacco growers who have used various types of daylight lamps prefer fluorescent lamps. One 40-watt "daylight" and one 40-watt "white" tube each 48 inches long in the same lamp show most nearly the true colors of tobacco. Two daylight tubes bring out more clearly the greenish tinges. Two tubes nominally rated at 40 watts each use about .09 kilowatt of electricity per hour, and their life is rated at 2,500 hours. Retail price of a fluorescent lamp and two 40-watt tubes is usually about $21 to $25 (January, 1947). Most electrical appliance stores carry these fixtures.

Shaded incandescent daylight lamp.— Daylight lamps made up of an ordinary clear incandescent bulb, a special reflector, and a blue filter, have been used successfully in stripping and grading tobacco. The blue filter removes part of the yellow rays from the light produced by the clear bulb so as to show the leaves in their true colors. A 200-watt clear bulb is used in a fixture up to 4½ feet above the bench, or a 300-watt bulb in a fixture between 4½ and 7 feet above the bench.



Shaded incandescent daylight lamp

Because of the growing popularity of fluorescent lights, production of incandescent daylight lamps has not yet been resumed since the war.

Daylight blue incandescent lamp and reflector.— Sometimes a 150-watt daylight blue incandescent bulb is used with a 14-inch shallow dome reflector. This type of lamp is less expensive than the other types, but not so satisfactory.

Suggestions for Installation

Amount of light.— Regardless of the type of lamp used, the amount of light on the bench should be about 15 foot-candles as measured with a light meter. The light should be nearly uniform over the whole length of the bench. Lamps installed according to the following recommendations will provide the right amount of light.

Height of lamp over bench.— Hang the lamps 7 feet (no higher) above the bench if the roof will permit. In most stripping rooms 4 to 5 feet will be the highest possible, if the bench is 3 to 3½ feet above the floor. More height can sometimes be obtained by moving the bench from beneath the roof's low side to its high side. Make the measurements from the top of the bench to the lowest part of the lamp.

the size of a silver dollar in the bottom of the drum and around the side, near the bottom. The bottom thus serves as a grate, while the holes in the side allow air to enter, and permit raking down the ashes. Set the drum on bricks or stones.

When fires are started and burning well, place a piece of sheet iron at least 3 feet square over the top of the homemade stove to spread the heat. Don't let the spreader rest directly on the top, but lay a piece of scrap iron at least 2 inches thick across the top of the drum to support the spreader. The use of the spreader is very important, as it helps greatly in distributing the heat. If a spreader is not used, the tobacco over the stove will become so hot that it may be injured. Most fire insurance policies specify the use of such a cover because of the danger of a stick of dry tobacco dropping in an unprotected stove and causing a fire.

Petroleum coke burns well without stoves, making it possible to maintain a number of small fires which give a good distribution of heat. Spreaders should be used over these small fires the same as over stoves. The coke may be burned on top of the ground, but it is better to burn it in narrow trenches 12 to 15 inches wide, 10 to 12 inches deep, and about 3 feet long. Though petroleum coke costs more than gas coke, the cost of firing with it is not much greater if the cost of stoves is included in cost of firing with common coke. Firing for 12 to 15 days costs about 1½ to 2 cents per pound of cured tobacco.

Heat must be well distributed through the barn

A big problem in firing tobacco, regardless of the type fuel used, is to get uniform distribution of heat throughout the barn. A number of small fires well distributed are better than a few larger fires. Have at least 2 stoves for each bent, and move the stoves each 6 to 8 hours. In extremely wide barns (more than 44 feet), 3 stoves to the bent are recommended.

Usually the side spaces of the bents, commonly called the sheds, are hung full of tobacco, so that it is impossible to use stoves under the tiers. This makes it necessary to keep the stoves in the center of the

bents. As a result the lower tiers of tobacco in the sheds get little heat and may damage. It is much better to leave spaces for firing in the sheds, so the stoves can be moved there at intervals. If necessary, the lower tiers in part of the center can be filled to compensate for the unfilled spaces left in the sheds.

If there is considerable wind, keep the stoves on the windward side of the barn.

Barn should be closed during firing

When firing tobacco, close all doors, and in unstripped barns close the side ventilators also. If the barn is stripped and very tight open the ventilators slightly when firing except in very wet weather.

Successful firing calls for close attention

It is not an easy matter to fire successfully; the work should be carefully supervised at all times.

The only purpose in firing is to dry the tobacco. No higher temperature should be used than is necessary to accomplish this.

Some growers fire continuously, regardless of weather, until the crop is cured. Unless one is in a hurry to finish the curing or the barn is over-crowded, firing in good curing weather is a useless expense, and may reduce quality.

Bulk the tobacco as soon as fully cured

To prevent darkening of the leaf, bulk the tobacco as soon as it is fully cured. In warm weather, however, don't bulk tobacco in very high order. If you do, it may damage severely. If it remains in very high order more than 2 days, start the fires to dry it. Also, in warm weather, make only small bulks. If the tobacco stalks are not fully dry, it is unsafe to leave tobacco in the bulk very long, because moisture from the stalk may enter the stem, causing stem-rot.

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How To Cure Burley Tobacco

By RUSSELL A. HUNT

Harvest when plants are fully ripe

For best curing, burley tobacco should be cut when the upper leaves are ripe and show a distinctly yellow color. Fully ripe tobacco cures faster, weighs more when cured, has a higher percentage of smoker leaves, and is less likely to damage during periods of bad curing weather. Also, ripe tobacco makes better quality leaf. However, if the lower leaves are wasting badly because of unusually dry or wet weather, and if priming will not be done, it may be better to cut the tobacco before the top leaves are fully ripe.

In an average season, if harvest is done by about September 10, it makes little difference in curing whether the stalks are speared or split. For tobacco harvested after mid-September, however, splitting has a decided advantage. If late tobacco is harvested by spearing, heat should be used in curing.

Let the plants wilt in the field or on scaffolds

Regardless of how the tobacco is cut, the plants should be put directly on the stick rather than on the ground to wilt. If sticks are sharpened on both ends, it is easy to jab one end in the ground, and then place the plants on the stick as they are cut. The tobacco may then be left in the field a day or two to wilt. If the leaves sunburn, the sunburn may be largely removed by leaving the tobacco in the field 3 or 4 days.

Leaflet 112

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Many farmers find that it pays to scaffold tobacco. Scaffolding aids in curing, especially when barns are small, the tier poles close together (under 4 feet), and ventilation poor. Two days on the scaffold is about equal to a week of curing in the barn. Generally, tobacco should not be left on the scaffold longer than 3 days; 2 days is safer. If it rains on the tobacco, more scaffolds must be built, and part of the tobacco moved, so that there will be plenty of space between sticks for drying. Scaffolds should be built near the barn so the plants will not need to be hauled from scaffolds to barn.

Allow for plenty of air flow through the curing barn

A curing barn is a place where the farmer can make the weather suitable for curing tobacco. How well the crop will be cured depends largely on how close the sticks are spaced, the width of the barn, the number of ventilators in the sides of the barn, and the size of the tobacco. Small plants permit closer housing than large ones. With the same amount of side ventilation, a narrow barn will hold more tobacco per rail than a wider barn. Barns 36 to 40 feet wide are best for housing tobacco.

The more cracks and ventilators in the side of the barn, the greater the amount of air that will pass through the housed tobacco and the closer the tobacco can be spaced. The curing barn therefore should have enough side ventilators for rapid change of air. Few old barns have enough side ventilators for best curing.

When repairing old barns, or building new ones, provide ample ventilators on the sides. In barns 36 to 40 feet wide, at least ⅓ of the boxing or siding should be hinged to permit opening and closing. In wider barns even more ventilation is needed. To make ⅓ of the side of the barn in ventilators, start at one end and nail 4 boards, hinge 2, nail 4, hinge 2 across the side of the barn. To have 40 percent of the side of the barn open, nail 3 boards, hinge 2, nail 3, hinge 2 across the side.

Ventilators are not needed at the ends of burley barns, and experiments by the Kentucky Agricultural Experiment Station have proved that ventilators in the roof are practically useless, even when firing is used.

In building a new barn it is best to locate it on a hill or ridge rather than in the valley.

Fill all tiers from top to botton with tobacco of the same cutting

Hanging new-harvested tobacco under plants harvested earlier may cause darkening of the earlier-harvested tobacco.

Leave the lowest rails unfilled

Curing conditions in the barn are improved if the entire lower rails are left unfilled. More sticks can then be housed on the high rails than on the lower ones. If heat is not to be used in curing, spacing on a 12-foot rail may be as follows: 20 sticks on the topmost rail, 19 on the next, 18 on the next, 17 on the next, and then 16 on the remaining rails, leaving the lowest empty. This way about the same number of sticks can be hung with the bottom rail left out, as would be hung with 16 sticks on each rail including the lowest. If heat is to be used, more sticks can be housed per 12-foot rail. Thus, depending on size of plants, there may be 22 to 28 sticks on the topmost rail, 21 to 26 on the next, 20 to 25 on the next, and then 18 to 22 on all the remaining rails, except the lowest, which is left empty.

When to open or close the ventilators

During August and September the air usually is drier during the day and wetter at night. Therefore the ventilators of the curing barn should generally be opened as soon as the dew dries in the morning, and then closed in late afternoon. To determine when to open and when to close the curing barn on days when it may be doubtful, put a few cured leaves in a sheltered place near the tobacco barn—for example, under an open shed. When these leaves are damp, and hang limp, the air is wet. In general, whenever these leaves feel drier than the tobacco inside the barn the ventilators should be open. But when the tobacco inside the barn feels drier than those leaves outside, then the barn should be kept tightly closed.

If no fire is used in curing, as much ventilation as possible should be provided until curing is nearly complete.

Know the curing conditions at various levels in the barn

If 4 or 5 cured leaves or flyings are placed in a piece of tobacco canvas and tied to a string threaded through a loop in the rafter, the leaves may be pulled up into the cured tobacco, and later lowered for examination. A number of these bunches of leaves throughout the barn make it possible to know curing conditions at all times.

Careful firing helps control curing conditions

Careful firing gives better control of curing conditions than is possible without use of fire. To avoid houseburn, heat should generally be used during damp weather as soon as the tobacco has begun to turn yellow. Firing should be started if the tobacco stays very damp longer than 24 hours, regardless of whether the weather is cool or warm. Use enough heat to dry off the leaves, but never enough for the temperature to go above 100° F anywhere in the curing tobacco. Especially before the tobacco is fully yellowed it is necessary to avoid high temperature, as the heat might fix the green color.

When the weather is such that the leaves dry out each day without fire, firing is a waste of fuel and time.

Coke is the most practical fuel for firing

There are two kinds of coke on the market—gas or byproducts coke, and petroleum coke. Most of the coke used for firing tobacco is gas or byproducts coke, which can be burned only in a stove. The stove may be either homemade or commercial. Commercial stoves are generally more efficient because they have a definite draft control, a spreader to distribute the heat, a heavy cast iron grate, and are easy to move around. Through savings in fuel, commercial stoves will quickly pay for themselves.

Stoves made from oil or grease drums are fairly satisfactory, and many of these are used. To make a stove from an oil drum, cut numerous holes about

So far as possible the permanent pasture should always be moderately grazed—never undergrazed nor overgrazed. If the pasture is undergrazed, mow it for hay or silage. One way to avoid overgrazing is to provide temporary pasture during winter and midsummer. Small grain, crimson clover, and vetch, are excellent winter pastures; sudan grass is the most productive temporary summer pasture.

Mowing

Mow permanent pastures once or twice each year to control bushes and weeds and to cut back excess pasture herbage in undergrazed spots.

Dragging and harrowing

Scatter animal droppings by occasional dragging or harrowing of the pasture.

Liming and fertilizing

If a permanent pasture is to be kept highly productive it will need more limestone and fertilizer after a few years. Broadcast these treatments on the pasture as needed. Nitrogen fertilizers, if used, should be applied a few weeks before extra pasturage is needed. Phosphate and potash fertilizers and limestone may be applied when most convenient to the farmer.

Reseeding

If the pasture sod becomes thin fertilize it as needed and disk or harrow it thoroughly and reseed. Don't graze the reseeded pasture for several weeks, until the new seedlings have made good growth. If the pasture has been overgrazed or if the fertility is low, it does very little good to reseed unless these conditions also are corrected.

Lexington, Kentucky September, 1947
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SUGGESTIONS for Starting and Managing Permanent Pastures in Kentucky

By E. N. Fergus
and Ralph Kenney

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Leaflet 113

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Good bluegrass pasture on a soil in west Kentucky that is kept productive by top-dressing with 200 pounds of 20-percent superphoshate per acre every 2 years. One ton of ground limestone is applied also every 8 to 10 years. The pasture was started with a treatment of 600 pounds superphosphate and 1½ tons ground limestone per acre. Beef production has been decidedly profitable on this treated pasture.

STARTING A NEW PASTURE

Preparing the seedbed

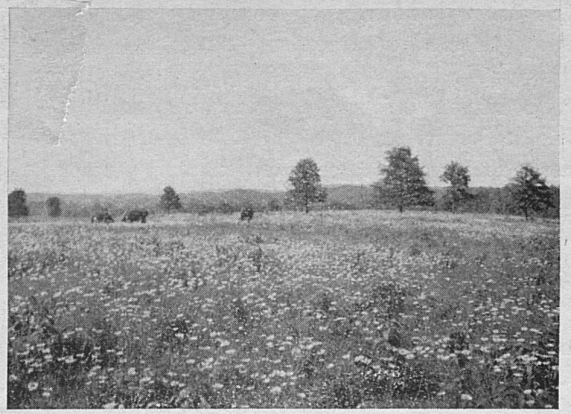
Late summer and early fall are in general the best times to start new pastures. Plow or disk the land a month or more before seeding time, and then fallow to kill weeds and to firm the soil. Apply limestone and fertilizer during this period.

Liming

Much of the soil in Kentucky needs 2 to 3 tons of ground limestone per acre to produce good pasture.

Fertilizing

A good pasture is possible only on a good soil. Much Kentucky land must have a phosphate fertilizer to make it productive. Apply the phosphate liberally before sowing the new pasture. Generally, at least 1,000 pounds of 20-percent superphosphate (or its equivalent) per acre should be applied. If ground rock phosphate is used, apply 100 pounds of 20-percent superphosphate per acre also at seeding to aid in establishing the seedlings. On soil low in organic matter, 100 pounds of ammonium nitrate (or its equivalent) per acre is also recommended. Ask your local county agent to help you in determining the exact soil treatment for each field.



Pasture on the same type of soil as the one shown in the preceding picture, but it has had no top-dressings of limestone and phosphate. Though it has been seeded with good legumes and grasses and has a fair stand of some of them, it produces very little forage. The vegetation is largely weeds.

Choosing the seeding mixture

Choose grasses and legumes on the basis of their adaptation to soil conditions. Use at least one grass and one legume in each mixture. Usually, at least two grasses and two legumes will make a better mixture.

Sowing the seed

Sow the seeding mixture at the rate of 15 to 25 pounds of good seed per acre. Sow the seed uniformly and cover it lightly.

See Kentucky Extension Circular 402 for directions on seeding pastures and lists of good pasture mixtures for various soil conditions in Kentucky. Get a copy from your county agent or write to the Bulletin Room, Agricultural Experiment Station Building, Lexington 29, Kentucky.

MANAGEMENT OF PERMANENT PASTURE

Intensity of grazing

Most permanent pasture seedings are made in small grain. The small grain crop should then be grazed rather than harvested for grain. During the remainder of the first year the pasture may be grazed moderately. It should not be grazed close.

from Tennessee or Florida and contains 30 to 33 percent P_2O_5. "Colloidal" or "pond phosphate," a by-product of the hydraulic mining of rock phosphate in Florida, also is sold in Kentucky as "Cal-phos" and perhaps under other brand names. This essentially is a low-analysis rock phosphate containing usually about 18 to 20 percent P_2O_5. It has the same value for use on the land as rock phosphate of equal phosphorus content.

Comparisons of rock phosphate and superphosphate

Early experiments.— Rock phosphate and superphosphate have been compared on limed soil and unlimed soil at soil experiment fields established in various parts of the state between 1913 and 1919. Before 1930, rock phosphate (32 percent) and superphosphate (16 percent) were used at rates of 1600 pounds and 800 pounds per acre, respectively, for each 4-year rotation, for two rounds. Applications were proportionately less for the 3-year rotation used at one field. After 1930, rates were reduced one-half. At these rates, about 4 times as much phosphorus was applied in rock phosphate as in superphosphate. This represented about equal money values of the two phosphates during most of this time, but there is less difference in the cost of phosphorus in the two phosphates now. The limed plots received a total of 4 to 5 tons per acre of ground limestone during the first two rounds of the rotation. This was too much limestone for best results from rock phosphate. Summarizing the results from these experiments from their beginning: On limed soil rock phosphate was as effective as superphosphate on all fields and more effective on most fields. On limed soil, rock phosphate was not as effective as superphosphate on any of the fields in the earlier years of the experiments, but in later years the effectiveness of rock phosphate has increased and on some fields it has gone ahead of superphosphate (experiments reported in Kentucky Bulletin 397).

At three of these fields, plots receiving the two phosphates were divided in 1930. The application was continued on one half of each divided plot and discontinued on the other half. On the rock phosphate plots, because of the large reserve of phosphorus built up in the soil, yields have held up well until the present time

on the halves where applications were discontinued, but on the halves of the superphosphate plots where the application was discontinued, yields have declined.

Later experiments.— Later experiments also were started at these fields to compare rock phosphate and superphosphate at several different rates of application. The rotation used is corn, wheat, and 1 or 2 years of legume-grass hay.

At the Western Kentucky Substation on Decatur silt loam (soil derived from limestone) rock phosphate and superphosphate have been compared with 3 times as much phosphorus applied in rock phosphate as in superphosphate. During 18 years crop response has averaged somewhat less on the rock phosphate plots than on the superphosphate plots.

In another experiment begun in 1940 on the same part of this farm, each phosphate has been applied at several different rates. As an average of the results through 1946, response of corn to the two phosphates has been equal when 3 times as much phosphorus was applied in rock phosphate as in superphosphate. Four times as much phosphorus in rock phosphate was required for equal response of legumes for hay, and response of wheat to rock phosphate was poorer even with the 4 to 1 ratio. In 1946, hay responded about equally to the two phosphates applied in the 3 to 1 ratio, but response of wheat to rock phosphate still was poorer even at the 4 to 1 ratio.

In still another experiment at the Western Kentucky Substation, on Tilsit silt loam (soil derived from sandstone and shale), rock phosphate used at a rate to supply twice as much phosphorus as the superphosphate treatments produced nearly equal crop increases as an average of 16 years. Crop yields should go ahead on these rock phosphate plots in the future because of the larger phosphorus reserve being built up in the soil. This experiment is reported in Kentucky bulletin 397, pages 348-49.

Good results also have been obtained from rock phosphate in an experiment started in 1930 on the Berea Experiment Field (unclassified gray silt loam). Plots formerly treated with limestone and manure were divided and rock phosphate was used on one half at a rate to supply twice as much phosphorus as was supplied by the superphosphate used on the other

half. Average crop yields were considerably less for rock phosphate than for superphosphate through 1936, but since then, doubtless due to the larger accumulation of phosphorus in the soil, average yields of corn and hay have been better for rock phosphate than for superphosphate. Wheat yields, however, still are somewhat poorer on the rock phosphate plots.

In all these later experiments, liming was such as not to be unfavorable to rock phosphate.

All Kentucky experiments.— The Kentucky experiments, considering all of them, clearly show that, in a suitable cropping system and when over-liming is avoided, rock phosphate is superior to superphosphate as the main source of phosphorus in a long-time soil-improving program on most Kentucky soils, when 3 times as much phosphorus is applied in rock phosphate as in superphosphate. In some of the experiments crop response to rock phosphate was as great as to superphosphate when only twice as much phosphorus was supplied by the rock phosphate as by the superphosphate. It is doubtful, however, if rock phosphate is much to be preferred to superphosphate (or other manufactured phosphate) for use generally on the low-phosphate soils of the state when less than 2½ times as much phosphorus is applied in the rock phosphate as in the superphosphate.

When superphosphate can be bought only in mixed fertilizer, the saving in cost of phosphorus by using rock phosphate is considerably greater.

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PHOSPHATE FERTILIZERS

Kinds and Relative Values

By P. E. Karraker
and J. F. Freeman

Deposits of rock phosphate are the main source of the phosphorus in fertilizers used in the United States. The chief deposits are in Tennessee, Florida, and in Wyoming and adjoining states. In Florida the deposits are large and in the western states very large; in Tennessee much smaller deposits now remain.

Superphosphates

Ordinary superphosphate is the phosphate most used, both alone and in making mixed fertilizers. It is made by treating rock phosphate with about an equal weight of sulfuric acid. This changes most of the phosphorus to water-soluble monocalcium phosphate. Gypsum, (calcium sulfate containing water of hydration) also is formed and makes up about half the weight of the fertilizer. Ordinary superphosphate contains usually 18 to 20 percent P_2O_5, the "phosphoric acid" of fertilizer formulas. (Chemically, phosphoric acid is H_3PO_4.)

A high-analysis superphosphate, variously called triple, treble, double or concentrated superphosphate, is made by treating phosphate rock with phosphoric acid (H_3PO_4). It usually contains 45 or 46 percent P_2O_5, and no gypsum. Monocalcium phosphate, as in

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ordinary superphosphate, is the main phosphorus compound. Most of the phosphoric acid used in making this high-analysis superphosphate is made by treating rock phosphate with more sulfuric acid than is used in making ordinary superphosphate, but some is made by heating a mixture of rock phosphate and sand (SiO_2) in a furnace. When so heated, the phosphorus in the rock phosphate is replaced by silicon from the sand and comes off as phosphoric oxide vapor. This is recovered in water as phosphoric acid. The triple superphosphate made by the Tennessee Valley Authority is made in this way.

Experiments have shown that ordinary superphosphate and triple superphosphate are equally effective on Kentucky soils when equal amounts of phosphorus are applied. To obtain even distribution, especially at low rates of application, more care may be needed in applying the triple superphosphate.

Some concentrated superphosphate is used to make the high-analysis mixed fertilizers—those which contain more than about 24 percent total of nitrogen, phosphorus, and potash. Also most of the 20-percent superphosphate on the market is made by mixing a small amount of high-analysis superphosphate with a lower-analysis ordinary superphosphate.

When a superphosphate is applied to the soil, the soluble phosphorus compounds in it change to insoluble compounds. The phosphorus is said to "revert" or become fixed in the soil. It must be made soluble again, mainly by soil acids, before plants can use it. In moderately acid to neutral soil much of the phosphorus is fixed as tricalcium phosphate and in strongly acid soil as iron and aluminum phosphates. The iron and aluminum phosphates become soluble less readily than tricalcium phosphate. Liming strongly acid soil therefore increases the availability of superphosphate to crops.

Fused tricalcium phosphate

The phosphate compound in rock phosphate is a chemical combination of tricalcium phosphate and a little calcium fluoride, 3 or 4 percent of fluorine usually being present. It is mainly the presence of the calcium fluoride which makes the phosphorus in rock phosphate much less available to plants than that in

manufactured phosphates. The chief gain in treating rock phosphate with acid to make superphosphate is to remove most of the fluorine. Merely heating rock phosphate in a furnace in the presence of steam volatilizes most of the fluorine and, by thus removing it, greatly increases availability of the phosphate. The fused tricalcium phosphate (or fused phosphate, containing 28 to 30 percent P_2O_5) of the Tennessee Valley Authority is made in this way. The phosphorus in the tricalcium phosphate thus prepared, is almost as available to plants as that in superphosphate. This has been shown in numerous field and greenhouse tests. (See Kentucky Agricultural Experiment Station Bulletins 420 and 413.)

Calcium metaphosphate

The Tennessee Valley Authority also makes a high-analysis phosphate called calcium metaphosphate, by passing phosphoric oxide vapor into rock phosphate heated in a furnace. It contains 60 to 65 percent P_2O_5. This fertilizer, not available commercially, has been tested experimentally in Kentucky. The phosphorus in it appears to be as available as that in superphosphate.

Slag (basic and calcium silicate)

Iron ores containing considerable phosphorus must have the phosphorus removed in the process of making steel. If enough phosphorus is present, the resulting "basic slag" can be pulverized and used as a phosphate fertilizer. The phosphorus in basic slag is almost as available to plants as that in superphosphate, but the percentage in most slags in the United States is too low for their use as a phosphate fertilizer. Very little basic slag is used in Kentucky. Calcium in basic slag, present mainly as calcium silicate, corrects soil acidity about as well as that in ground limestone. One hundred pounds of basic slag has the neutralizing value of about 80 to 90 pounds of calcium carbonate. A small amount of a calcium silicate slag is being made by the Tennessee Valley Authority as a by-product in making phosphoric acid. It is used primarily as a liming material, one hundred pounds having a neutralizing value of about 80 pounds of calcium carbonate. It contains about 1½ percent P_2O_5. This phosphorus is as available as that in basic slag and adds appreciably to the value of the material.

Ground rock phosphate

Rock phosphate can be ground fine and used as a phosphate fertilizer without further processing. The phosphorus in it, as already stated and for the reason given, is much less available to most plants than that in superphosphate and other manufactured phosphates. When rock phosphate is used in a suitable cropping system and in a long-time soil-building program, however, this disadvantage may be more than offset by the lower cost of phosphorus in rock phosphate.

Some plants are stronger feeders on rock phosphate than others. Most legumes, especially sweet clover are strong feeders on rock phosphate. Most nonlegumes are weak feeders. Corn, however, responds better than tobacco and small grains. Most nonlegume crops, however, benefit from rock phosphate mainly from phosphorus returned to the soil in residues of strong-feeding crops grown in the rotation. Land where rock phosphate is used should therefore be in legume or mixed grass-legume pasture and hay crops much of the time for a considerable period after use of rock phosphate is begun. Rock phosphate, also, should be effective in a 2-year rotation of corn and fall-seeded small grain with sweet clover and lespedeza seeded in the small grain mainly as a green-manure crop. If small grain is harvested, some superphosphate should be applied to this crop in getting the system under way. Only enough ground limestone should be used to get good sweet clover.

Rock phosphate is not so effective as superphosphate or other manufactured phosphate for direct fertilization of row crops, particularly tobacco. After the phosphorus content of the soil has been sufficiently built up by using rock phosphate, however, enough phosphorus is furnished for good growth of all crops without using other phosphorus fertilizer.

Rock phosphate should be used at a rate to supply much more phosphorus than when one of the more available phosphates is used. Apply 800 to 1,000 pounds, or even more, of rock phosphate per acre, and repeat the application at 3- to 6-year intervals until the supply of soil phosphorus is considerably built up. In addition, for a time after beginning to use rock phosphate, superphosphate or other manufactured

phosphate (about half the usual application) will usually be needed on row crops, small grains, and alfalfa, for maximum yields of these crops. The larger the first applications of rock phosphate, the smaller the supplementary superphosphate application needed and the sooner the soil phosphorus supply will be so built up that phosphate applications can be much reduced or even omitted for a time with no reduction in crop yields. At first, it will cost more to phosphate land in this way than to use only superphosphate, but over a period of perhaps 10 years or more this may be the cheapest way to apply the phosphorus needed for good crop growth.

Where ground limestone has recently been applied at more than a moderate rate, rock phosphate is usually much less effective than on land not so heavily limed. Calcium, however, slowly goes out of the soil, and the depressing effect of heavy liming on availability of rock phosphate should largely disappear after 5 or more years. Rock phosphate itself serves to some extent as a liming material, and on moderately to slightly acid land, use of rock phosphate may make liming unnecessary for lespedeza and some other legumes. On moderately to strongly acid land, however, some limestone also is needed. When land needs liming for legumes, usually not over 1 ton, or at the most 2 tons, of ground limestone should be applied per acre if rock phosphate is to be used.

Rock phosphate should be fairly well mixed with the soil. It may be broadcast and plowed under, or disked in well after plowing; also it may be used to reinforce farm manure before applying it to the soil. When land is to be both limed and treated with rock phosphate, it may be best to plow the rock phosphate under and to apply the liming material after plowing, and disk it in. Rock phosphate may be effectively applied to permanent pasture as a top-dressing. When it (or other fertilizer) is being applied liberally to build up the soil, obviously it is important to prevent loss of soil and fertilizer by erosion.

Much of the rock phosphate on the market is ground so fine that all passes a 100-mesh sieve and 90 percent a 200-mesh sieve. From experiments, there seems to be little or no gain in effectiveness from grinding finer than this. Rock phosphate sold in Kentucky comes

Eggs:
Raw — 1⅓
Whites — 7
Yolks — 2

NUTS, edible part (100-calorie portions)
Almonds — 12–15 nuts
Chopped — 2½ T
Cocoanut, prepared — 3 T
Hickory — 12–15 nuts
Chopped — 1¼ T
Peanuts — 20-24 single nuts
Chopped — 2 T
Peanut butter — 1 T (scant)
Pecans — 12 meats
English walnuts — 8–16 meats
Chopped — 1¼ T

SWEETS (100-calorie portions)
Sugar: Brown — 3 T
Granulated — 2 T
Powdered — 2¾ T
Corn sirup — 1¾ T
Hard sauce — 1 T
Honey — 1¾ T
Jelly — 2 T
Marshmallows — 5 (1¼″ D)
Molasses — 1½ T
Chocolate, unsweetened — ¾ of 1 square
Chocolate, milk, sweet — 1 piece 2¼″ x 1″ x ⅛″
Chocolate fudge — 1 piece 1½″ x ¾″ x 1″
Chocolate cream — 1 medium
Chocolate nut caramel — 1 piece 1″ x 1″ x 4/5″

CAKES AND COOKIES (100-calorie portions)
Angel cake (8 eggs) — 1 piece 1¼″ x 2″ x 2½″
Cookies, plain — 2 (2½″ D)
Cookies, oatmeal, with raisins and nuts — 1 cookie 3″ D
Cookies, molasses (1c molasses, ½ c fat) — 3 (2″ D)
Cookies, chocolate drop, 1½ (2¼″ D)
Doughnuts — ½
Fruit cake — 1 piece 1⅞″ x 1⅞″ x ⅜″
Gingerbread (1 c molasses, 1 c milk, ¼ c fat) —
1 piece 1″ x 2⅔″ x 2″
Gingersnaps — 6 (1¾″ D)
One-egg cake (½ c sugar, ¼ c fat, ½ c milk) — 1¾″ cube
Sponge cake (6 eggs, 1 c sugar) — 1 piece 1½″ x 1½″ x 2″
Sponge cake, hot water (2 eggs, 1 c sugar) —
1 piece 2″ x 2¾″ x ⅞″

PASTRIES, PUDDINGS, AND ICES (100-calorie portions)
Custard — ⅓ c, scant
Ice Cream — 2½–4 T
Plain pastry — ¼ of 1 crust 9″ D

Pies:*
Apple — 1 piece about 1½″ wide, outer edge
Cream, with meringue — 1 piece about 2″ wide, outer edge
Custard — 1 piece about 1 9/10″ wide, outer edge
Lemon, with meringue — 1 piece about 1″ wide, outer edge
Mince — 1 piece about 1″ wide, outer edge
Pumpkin — 1 piece about 2″ wide, outer edge
Raisin — 1 piece about 1″ wide, outer edge
Rhubarb — 1 piece about 1⅔″ wide, outer edge

* All pies 9 inches in diameter, with average sweetness and richness.

VEGETABLES (100-calorie portions)
Asparagus — 20 stalks 8″ long
Beans: Navy — 2 T (⅓ c canned)
Kidney — ½ c cooked
Lima, fresh — ½ c cooked
Lima, dried — 1/6 c cooked
String — 2½ c 1-inch pieces
Beets — 4 beets, 2″ D, 1⅓ c diced
Broccoli — 2⅓ c steamed
Cabbage — 1½ lb, 4–5 c shredded, 2½ c cooked
Carrots — 4–5 young carrots 3–4″ long, or 1⅔ c ½″ cubes
Carrots, grated — 1¼ c
Cauliflower — 1 small head 4½″ D
Celery — 4 c diced in ¼″ pieces
Corn: fresh — ½ c or 1 ear 6″ long
Canned — ⅓ c
Cucumbers — 2 cucumbers 9″ long
Greens (cooked):
Beet — 2¼ c
Chard — 1⅛ c
Dandelion — 2⅓ c
Kale — 2⅓ c
Mustard — 2½ c
Spinach — 2½ c
Turnip — 2½ c
Lettuce — 1½ lb, or 2 large heads
Onions, raw — 3–4 medium
Parsnips — 7 pieces 3½″ x 1½″ x ⅓″, or raw 1 parsnip
7″ long 2″ D at top
Peas — ¾ c canned
Potatoes — 1 medium
Mashed — ½ c (scant)
Creamed — 2/5 c
Scalloped — ⅝ c
Potato chips — 8–10 large
Pumpkin, cooked — 1⅓ c
Radishes — 3 doz red button
Sauerkraut — 2½ c packed
Squash: Hubbard — 1 c cooked
Summer — ½ squash 5″ D
Sweet potatoes — ½ medium
Tomatoes, canned — 2 c (scant)
Fresh — 2–3 medium
Turnips, raw — 2 c of ½-inch cubes

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100-Calorie Portions of Common Foods

Compiled by FLORENCE IMLAY
and PEARL J. HAAK

INFORMATION on 100-calorie portions of foods will be found useful by members of homemakers' clubs and others in studying the energy values of various foods.

The calorie is a measure of energy expressed in terms of heat. One calorie is the amount of heat required to raise the temperature of 1 pound of water 4° F. Strictly speaking, the calorie (so-called large or great calorie) is the amount of heat required to raise 1 kilogram of water 1 degree centigrade. Because of the small amount of most foods required for one calorie, it is customary to speak in terms of 100-calorie portions.

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ABBREVIATIONS USED

E.P. = edible portion
A.P. = as purchased
" = inches
D = diameter
T = tablespoon
t = teaspoon
c = cup

BEVERAGES (100-calorie portions)

Cocoa (dry) — 2½ T
Cocoa (1 c milk, 2 t cocoa, 2 t sugar) — 2/5 c (scant)
Grape juice — ½ c
Grapefruit juice — ½ c
Lemon juice — 1⅛ c
Milk: Whole — ⅝ c
Skimmed — 1⅛ c
Buttermilk — 1⅛ c
Orange juice — 1 c

BREADS, BISCUITS, AND CRACKERS (100-calorie portions)

Biscuits — 2 small
Bread: Rye — 1⅛ slice 3¼" x 4" x ½"
White — 2 slices 2" x 3½" x ½"
White, raisin — 1 slice 3¾" x 3½" x ½"
Whole wheat — 1⅛ slice 3" x 3¾" x ½"
Whole wheat raisin — 1 slice 3¾" x 3⅛" x ½"
Crackers: Graham — 2½ (2½" x 2¾" x ¼")
Soda — 6 (2" square)
Griddle cakes — 1 (4½" D)
Muffins: Cornmeal — 1 muffin (2¾" D)
Whole wheat — 1 muffin (2" D)
Rolls, French — 1 medium
Waffles — 1 (6" D)

CEREALS (100-calorie portions)

Corn flakes — 1¼ c
Cornmeal — 3 T (⅔ c, cooked)
Cornstarch — 3 T
Farina — 3 T (¾ c, cooked)
Grapenuts — 4 T
Hominy grits — 3 T (4/5 c, cooked)
Macaroni — 4 T (¾ c, cooked)
Oatmeal — 4 T (½-¾ c, cooked)
Popcorn — 1½ c
Puffed rice — 1⅔ c
Puffed wheat — 2 c
Rice — 2 T (¾ c, steamed)
Shredded wheat — 1 biscuit

DAIRY PRODUCTS (100-calorie portions)

Butter — 1 T
Buttermilk — 1⅛ c
Cheese: American pale — 1⅛" cube or 3 T grated
Cottage* — 5 T
Full cream — 1 slice 2" x 1" x ⅜"
Swiss — 1 slice 4½" x 3½" x ⅛"
Cream: Thin (18%) — ¼ c
Thick (40%) — 1⅔ T
Whipped — 2 T
Milk: Condensed, sweetened — 1½ T
Condensed, unsweetened — 3¾ T
Skimmed — 1⅛ c
Whole — ⅝ c
Dried, whole — 2¾ T

* Made from skimmed milk, no cream added.

FATS (100-calorie portions)

Bacon fat — 1 T
Beef drippings — 1 T
Butter, see "Dairy Products"
Cod liver oil — 1 T
Cream, see "Dairy Products"
Lard — 1 T
Margarine — 1 T
Olive oil — 1 T
Salad dressing: French — 1½ T
Mayonnaise — 1⅓ T
White sauce, medium — 3 T

FLOUR (100 calorie portions)

Rye — 3 T
White, unsifted — 3 T
White, sifted — 4 T
Whole wheat — 3 T

FRUITS (100-calorie portions)

Apple — 1 (3¼" D)
Baked with 2 T sugar — ½ apple (large)
Sauce — ⅔ c
Apricots: Canned — 3 large halves and 2 T juice
Fresh — 5
Dried — 7-9 halves (small)
Banana — 1 medium
Blackberries: Fresh — ½ c
Cooked, sweetened — ¼ c
Cantaloupe — 1 melon (4½" D)
Cherries, sweet — 20
Citron — 7 T
Cranberries: Fresh — 2 c
Sauce — ¼ c
Jelly — 2 T
Currants: Fresh — 1½ c
Dried — ⅓ c

Dates — 3-5
Figs, dried — 1½ large
Grapes: Concord — 1 large bunch
Malaga — 20-25
Grapefruit — ½ large
Grape juice, see "Beverages"
Lemons — 3 large
Oranges — 1 large
Olives, ripe or green — 6-8
Peaches: Fresh — 3 medium
Canned — 2 large halves and 3 T juice
Pears: Fresh — 2 medium
Canned — 3 halves and 3 T juice
Pineapple: Fresh — 2 slices 1" thick
Canned — 1 slice and 3 T juice
Shredded — ¼ c
Plums, fresh — 3-4 large
Prunes, dried — 4 medium
Raisins, seedless — 2 T (raw)
Raspberries, fresh — 1⅓ c
Rhubarb, fresh — 4 c 1-inch pieces
Strawberries, fresh — 1⅓ c (raw)
Watermelon — ¾ slice 6" D

MEATS, FISH, AND EGGS (100-calorie portions)

Meats:

Bacon, raw — 1½ slices 1½" x 4½" x ⅛"
Bacon, cooked crisp — 5 slices 3¼" long
Beef, hamburger — cake 2½" D, ⅞" thick
Beef, lean, uncooked — slice 2¾" x 1½" x ¾"
Beef, rib, lean, roasted — slice 5½" x 2½" x ¼"
Beef, round, lean, panbroiled — slice 2" x 3" x ½"
Beef, round, pot roasted — slice 4⅜" x 3½" x ⅛"
Beef, sirloin, medium fat, broiled — slice 2" x 1½" x ¾"
Chicken, cooked, diced — ¼ c
Roasted — 1 slice (without skin) 4" x 2½" x ¼"

Fish:

Halibut, cooked — 1 slice 3" x 1½" x 1"
Salmon, canned — ⅓ c
Sardines, canned — 4, 3" long
Tunny fish, canned in oil — ¼ c
White fish, fresh — 2½ oz
Frankfurters — 4/5 of 1 frankfurter 5¼" long, 1" D
Ham, lean, broiled — 1 slice 4" x 4" x ⅛"
Lamb, chop, broiled, lean meat — 2" x 1½" x ¾"
Lamb, leg, roasted, 1 slice 3½" x 4½" x ⅛"
Liver, uncooked — 1 slice 3½" x 2½" x ½"
Liver, panbroiled — 1 slice 3½" x 3½" x ⅜"
Mutton, leg, roasted — 1 slice 3½" x 4½" x ⅛"
Oysters — 6-15
Pork chop:
Medium fat, broiled* — ⅓ chop ¼" thick
Lean only, broiled* — ½ chop ½" thick
Pork sausage — 1⅔ sausage 3" long, ¾" D
Salt pork — 1" cube

* Fried pork chops would have a higher calorie value.

DAIRYING

In dairy cattle feeding, grain should be only a supplement for hay, pasture, silage, or other roughage. Much of the grain generally used in cow rations is mill byproducts and distillers' byproducts. These are not widely used for human consumption, but contain the protein needed by high-producing cows. Several ways of making the grain feed for dairy cows go farther are:

Cull the Low Producers and Feed Less Grain to Average Cows. High prices of feed and high meat value of cull cows make this a good time for culling. Feed heavy producers enough grain during the dry period and while they are producing to insure good production.

Plan Now for 1 Acre of Good Legume Hay Next Year for Each Cow in the Herd. Cut hay during the early bloom stage for highest feeding value. This is especially true of lespedeza hay, which loses ¼ to ⅓ its feeding value if not cut until after tobacco cutting.

Have Good Pasture from Early Spring to Late Fall. A well-managed permanent pasture will produce as much feed per acre as a good crop of corn. High-quality pasturage is ideal feed for milking cows. Use small-grain pastures in fall and spring to extend the grazing season.

Feed Grass Silage. If you don't have a silo, make a temporary or trench silo, and fill it with grass or legume silage. Cows like this silage. It will save grain and give better results than corn silage.

Feed Grain to the Younger Calves. Calves must have some form of calf meal until they are at least 4 months old. After this, most will thrive on good pasture and hay, with a very little grain. A dairy calf need not be kept in high condition, so long as it is healthy and growing.

HOGS

Sell all Poor-Producing or Diseased Sows. These waste feed and are unprofitable.

Produce Vigorous Pigs. Feed sows enough grain to make them gain ¾ to 1 pound daily during pregnancy. Feed ⅓ to ½ pound of protein supplement, or ½ to 1 gallon of skimmilk, to each sow daily during the last 6 weeks of pregnancy.

Cut Down Losses of Young Pigs. Each pig lost at birth means a waste of 140 pounds of feed, and each lost at weaning means a waste of 260 pounds of feed. Be on hand when the baby pigs arrive, to see that they nurse and to give any other help needed. Use farrowing houses with floors tilted 1½ inches to the foot, with a pig hover at the lower end. Use pig brooders during cold weather. These practices greatly reduce the number of young pigs lost. (See Leaflet 98.)

Keep the Pigs Healthy. Healthy pigs use 20 percent less feed than "wormy" pigs in reaching market weight. (See Ky. Cir. 368.) Where a good sanitation program has replaced the "wormy way" the same number of pigs can be raised from ⅓ fewer sows.

Raise Pigs on Pasture. An acre of good alfalfa or small-grain pasture is worth an acre of good corn in raising hogs. Hogs can be grazed practically all year in Kentucky. Keep the pasture short and tender. Feed alfalfa or other high-quality legume hay to all hogs not on pasture.

Self-Feed Balanced Rations, such as corn and tankage, skimmilk, or other supplement. One pound of tankage fed with corn to hogs on pasture saves 3 pounds of corn, or as much as 6 pounds of corn if fed to hogs in drylot.

Market Pigs at 200-225 Pounds. It takes about a bushel more grain to put the third hundred pounds on a pig than to put on the second 100 pounds.

POULTRY

There are several practices which poultry raisers can follow that will make grain go farther and also make a substantial saving in the total amount used. The cereal grains such as corn, wheat, and oats are usually fed as whole grain. These grains are also ground and used in liberal quantities in the mash, often making up as much as 35 to 50 percent of the mash mixture. Saving cereal grains therefore means saving both whole grain and mash. The following practices will help make the feed go farther:

Cull the Flock Closely to get rid of low-producing hens and nonlayers. Feed for these hens is largely wasted.

Sell all Male Birds unless the flock is to be used as a hatchery supply flock. Each rooster sold will mean about 60 pounds less grain needed for the year.

Keep Feed Wastage Low. Use feeders which have a "lip" to help keep hens from billing the feed out of the feeder. Good feeders are a good investment. Much less feed is wasted if the feeders are filled only ⅓ to ½ full at each feeding.

Follow the "All Pullet Flock" Program. Good pullets produce more eggs than old hens, and eat only about ⅝ as much feed per dozen eggs laid. Efficiently used feed is not wasted feed.

Make Full Use of Good Pasture and Leafy Green Legume Hay. Poultry lots should be seeded to quick-growing small grains for winter and early spring pasture. During the winter, alfalfa or Korean lespedeza hay fed in racks will make a substantial saving in feed.

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50M—10-47

GRAIN-SAVING WAYS of producing MEAT • MILK • EGGS



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Many Kentucky farmers are already using the "Feed Less Grain" methods in livestock production. These ways have proved practical and profitable. Adopt them now—and release grain to help meet the world-wide emergency.

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College of Agriculture and Home Economics
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Thomas P. Cooper, Dean and Director

THE KEY TO SAVING GRAIN

Greater use of high-quality forage and efficient use of all feeds are the key to saving grain in livestock feeding. Kentucky, with her large acreage of winter cover crops sown this year, her expanding program of pasture improvement, her developing use of grass silage, her open winters and long grazing season, and her large numbers of grazing livestock, is in excellent position to push these grain-saving measures. Kentucky farmers can do this with profit to themselves and the grain-export program.

Improve your Pastures. Any steps to improve grazing before next year's grain harvest will save grain for export this year. Reseeding thin spots in pastures, top-dressing with fertilizer or lime, clipping the weeds, scattering the droppings—all these will help. (See Ky. Cir. 402 and Leaflet 113.)

Make Full Use of Winter Pasture. Any permanent pasture ungrazed during September and October will furnish grazing during November and December. Small-grain pasture provides much grazing in late winter and spring. The main thing that can be done in late fall to provide more cover-crop pasture is to drill wheat or rye on lespedeza stubble or corn ground. (See Leaflets 81 and 82.)

Use Grass Silage. Every silo filled with grass or legumes instead of corn saves over 800 bushels of corn. Grass silage has about the same fattening power as corn silage, and contains much more protein, vitamins, and minerals. Make the silage from surplus early pasture or a hay crop threatened by bad weather. If you have no silo, build one or dig a trench-type silo.

Get Rid of Parasites. Flies, lice, ox warbles, round worms, and other parasites waste grain. Contented, healthy animals produce more meat, milk, wool, and eggs with less feed than those tormented by parasites. See your county agent for methods of getting rid of them.

Save the Feeding Value of Roughages. Hay damaged by rain loses up to half its feeding value. The new loft hay drier and improved hay-handling equipment help to prevent these losses. High-quality hay alone will often produce better results than poor hay plus a fair amount of grain. Feed out corn stover before January, to avoid excessive loss of feeding value from weathering.

Cull Out all Low-Producing, Barren, or Diseased Animals. Such animals waste grain, labor, and profits.

Don't Feed Rats and Weevils. A grown rat will eat nearly as much grain as a hen, and will spoil much more. Rat-proof the places where grain is kept. Use poisons, such as Antu and Red Squill. Follow the directions of the manufacturer. To reduce damage by stored-grain insects, clear the crib or granary of the remnants of the old crop, and while it is empty, spray the floor and walls with 5% DDT in oil.

Push the Livestock Enterprises That Use but Little Grain. Shifting from a livestock enterprise that uses much grain to one that requires little is one way of saving grain. Spring lamb production uses very little or no grain. We need to double our present sheep numbers and to reduce somewhat our numbers of livestock that are heavy grain eaters. Another desirable shift is toward greater use of good roughages and less grain in beef production.

BEEF CATTLE

Finish Steers with Little or No Grain. Steers weighing 700 to 800 pounds in October can be wintered mostly on cheap harvested roughages and winter pasture, and finished on pasture the next summer. They will weigh 1,100 to 1,200 pounds and grade good-to-choice by August or September. This plan saves 20 to 40 bushels of grain per steer. Although these steers will carry less finish and weight than if grain-fed, they will usually return more net profit, at less financial risk, to the producer.

Produce Beef by the Kentucky Cow and Calf Plan. Kentucky farmers who have plenty of good pasture and the ability to manage a breeding herd will find this plan a safe and profitable means of using large amounts of roughage. This plan will yield a 600 to 800-pound milk-fat baby beef at ten months of age, with a low investment and the use of little or no grain. (See Ky. Leaflet 95.)

Cull Breeding Herds Closely. Get rid of barren cows, shy breeders, poor milkers, and those that produce poor-doing calves. Select herd sires on the basis of type and production as well as on pedigree. Purebreds almost always prove better than grades and scrubs.

Control Warbles and Flies. Use rotenone spray, wash, or dust for ox warbles just before they emerge from the backs of cattle in March and April. Control at this time will mean no heel flies in May. (Ask your county agent for leaflet AWI-109 "Cattle Grub Control".) Two to four sprayings with a 2½-percent DDT suspension in water will keep your cattle free of flies. (See Ky. Cir. 438.) Fly-free cattle produce about 50 pounds more beef per season.

Use Grass Silage in place of corn silage and part of the hay. It will not only save grain for other purposes but will also produce better results.

SHEEP

Sheep require less grain than any other livestock. Some Kentucky flocks are successfully carried through the winter without any grain.

Some Grain May Be Needed During Late Pregnancy and the Early Nursing Period. The most critical period is during the last 3 weeks of pregnancy. Ewes must gain in flesh at this time to prevent ketosis or pregnancy trouble. Along with good legume hay, ½ pound of corn (or its equivalent in other grain) per day will generally prevent such losses. By using the cheaper roughages early in the feeding period, and plenty of good legume hay thereafter until plenty of pasture is available, it may be possible during mild winters to do a good job of feeding without using any grain.

Winter Pasture and Silage Save Both Grain and hay. Make full use of winter cover crops and permanent pasture that has made good growth in the fall. Grass silage has given excellent results with sheep in Kentucky. Feed a small amount of dry roughage with it.

Use Specially Built Troughs and Racks. Much feed, both grain and roughage, is wasted by not having properly built feeders. Troughs and bunkers should be so made as to prevent lambs or sheep from getting into the feed with their feet or otherwise befouling it, and to prevent waste of feed. Get plans from your county agent.

Don't Feed Grain to Parasites. Dose all sheep, both ewes and rams, with phenothiazine in November or December, but no pregnant ewes should be dosed within a month of lambing. Dose the flock again in the spring after lambing. From May 1 through September, keep the 1-to-9 phenothiazine-salt mixture convenient to the sheep in a feeder especially built to protect it from the weather.

Sheep infected with ticks or lice should be dipped or sprayed with DDT or other recognized dips.

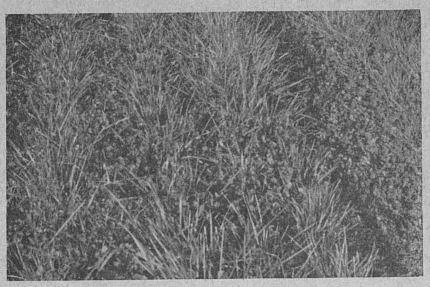
seed sowed in standing corn during July or August. Good stands also have been obtained by sowing the seed on lespedeza sods in early fall with only enough preparation of soil to provide a covering for the seed. In the mountains of Eastern Kentucky stands have been obtained on steep slopes when the seed was sowed in early spring in contour furrows every 4 to 6 feet around the hill.

Before sowing Ky 31 fescue seed on a prepared seedbed be sure that the soil is compact. Sow the seed with the usual seeding equipment such as a cyclone or horn seeder, or through seeder attachments of grain drills and cultipackers, and cover it very lightly. It may also be seeded through small-grain drills, or mixed with fertilizer and sowed through fertilizer drills. Sowing with the fertilizer is recommended especially when the grass is being used to improve old pastures.

Seeding rates. Seeding rates for establishing a good sod vary from 10 to 20 pounds of Ky 31 fescue seed per acre. For terrace outlets and sod waterways, heavier rates are used.

Sow legumes with Ky 31 fescue. Ky 31 fescue gives best results for pasture, silage, hay, or soil improvement if grown with a legume. The rapid growth of fescue calls for plenty of nitrogen. This is most economically supplied by inoculated legumes. Among the legumes that grow successfully with fescue are sweet clover, Korean and Kobe lespedeza, red clover, alsike, and white clover (either Louisiana white or Ladino). Probably the most popular mixture is Ky 31 fescue and Ladino or Louisiana white clover. This combination has produced an exceedingly large amount of excellent pasture on many Kentucky farms.

Because of the fast, dense growth of fescue it is necessary to start the legume and grass at the same time, except that if the fescue is seeded in the fall the legume should be sowed early the following spring. It is practically impossible to establish legumes in old sods of fescue. Sweet, red, and alsike clovers are short lived and do not survive many years in fescue. Korean and Kobe lespedeza can be maintained in fescue sods



Ky 31 fescue and Ladino clover provide excellent winter pasture. (Photograph in December, Lincoln county)

only where the fescue is closely grazed. Close grazing, however, seems to be always advisable with fescue. Old, fully-grown fescue becomes coarse, harsh, and unpalatable — as is true also of most other grasses. Therefore if it cannot be kept closely grazed, it is a good idea to keep it mowed.

Although fescue will grow on soils of low fertility, a more luxuriant growth and a more palatable and nutritious pasture will result if the land is properly limed and phosphated. Such soil treatment is usually necessary if legumes are to be grown with the fescue. When legumes are lacking in fescue pastures the yield of pasturage will usually be considerably increased by applying nitrogen fertilizer.

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KENTUCKY 31 FESCUE

Its Place in the Pasture and Soil-Building Program in Kentucky

By W. C. Johnstone and E. N. Fergus

Since 1942, when Ky 31 fescue was first recommended for general usage in Kentucky, seed production has increased from a total of 500 pounds to over a million pounds in 1947. A continued increase in seed production in the future will make the fescue available for extensive seeding over a wide area. This rapid increase in seed production, as well as the introduction of the fescue itself, has aroused much interest in the usefulness of this grass in Kentucky agriculture.

What Is Ky 31 Fescue?

Ky 31 fescue is a strain of tall fescue which has been growing in the mountains of Kentucky (Menifee county) for many years. Tests of it began at the Kentucky Agricultural Experiment Station in 1931. A long-lived perennial grass, it stays green practically all year in Kentucky. Though similar to orchard grass in habits of growth, and usually considered

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a bunch grass, it spreads slowly from short underground stems when it is closely grazed. Its shiny, dark green leaves are somewhat stiff and coarse, and sometimes grow to a length of 3 feet or more. Seed is produced in open heads on stalks 3 to 4 feet tall. In appearance the seeds are almost identical to ryegrass seed and similar to orchard grass seed. With present cleaning machinery ryegrass seed cannot be separated from fescue seed, and orchard grass seed can be separated from fescue seed only imperfectly.

Is It Widely Adapted?

Ky 31 fescue is a result of natural selection brought about by many years of growth under adverse conditions in the mountains of Eastern Kentucky. Consequently it is adapted to the climate of Kentucky and is highly resistant to disease. It has been reported very resistant to "rust" which attacks other strains of tall fescue.

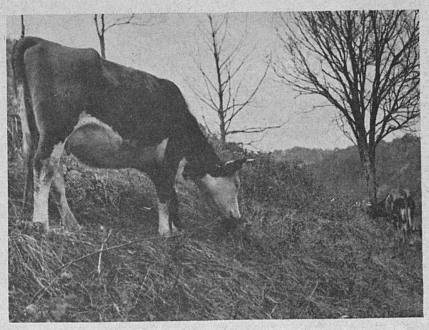
Ky 31 fescue grows so well in eastern Kentucky that it is sometimes called "mountain bluegrass." It is adapted to a wide variety of soils and climate. Though it seems to grow best on soils that are too wet for other good grasses, it is very productive on well-drained land. It makes a good cover on rather poor soil but it is most productive on good soil.

Though adapted to wet soil, Ky 31 fescue is one of the most drouth resistant of grasses, remaining green during the drouths so common in midsummer in Kentucky. It grows well during hot weather, yet makes substantial growth during moderate winter weather. In Kentucky, where winter temperature frequently drops to a few degrees below zero, Ky 31 fescue is entirely winter hardy. Of all the grasses, Ky 31 fescue is one of the most tolerant to shade.

Though Ky 31 fescue grows well in all parts of Kentucky, its place where Kentucky bluegrass, orchard grass, and redtop are well adapted remains to be determined. At present, the Experiment Station does not recommend substituting Ky 31 fescue for these other grasses where they are giving satisfaction.

What Is Ky 31 Fescue's Place in the Pasture and Forage Program?

Undoubtedly Ky 31 fescue is of greatest value as a pasture crop. It produces a large amount of leaf growth, grows almost the year round, and is satisfactory in nutritive quality and palatability. It produces new sods quickly, and these are heavy and



This field on the William Suiter farm in eastern Kentucky, where Ky 31 fescue has undergone natural selection for more than 50 years, furnishes year-round grazing and is well protected from erosion.

tough enough to support heavy livestock when the soil is wet. This grass should be very useful therefore in expanding the pasture area and in lengthening the grazing period. Another feature that should not be overlooked is the competition it gives undesirable weeds. A good stand of fescue suppresses the growth of weeds, especially wild garlic and sorrel.

Although it is now primarily a pasture grass, Ky 31 fescue may become important as a silage crop. Its long life, vigorous leafy growth, high yields, and freedom from rust should make it one of the best grasses for silage. When used for hay it compares favorably with other grasses, but is of course inferior to the legumes for hay.

What Is Ky 31 Fescue's Place in Erosion Control and Soil Building?

Ky 31 fescue has an important place in controlling erosion because of its ability to establish quickly a heavy year-round sod on steep land. It is useful in saving the soil as a permanent pasture crop, a cover crop after row crops, a gully stopper, and in terrace outlets and sod waterways. When grown with legumes and properly fertilized, Ky 31 fescue may also have an important place in soil building. The deep and extensive root system penetrates below the plow depth and, as it partially decays each year, adds organic matter to the soil, improving the tilth and increasing the water-holding capacity.

Cultural Practices

Seeding Practices. Sow Ky 31 fescue at that time of year which has proven best in the community for sowing other common grasses, such as timothy, orchard grass, redtop, and bluegrass. When the rapid increase of seed was the major consideration, the practice of sowing on a well-prepared seedbed in August and September was recommended. This practice, however, may or may not be the most practical under general farm conditions when the primary use of the grass will be for pasture. Where fall and winter pasture or a winter cover crop is needed, it will be advantageous to seed the fescue on a seedbed prepared at small cost after tobacco or soybeans are harvested.

Because Ky 31 fescue makes rapid growth after seeding, it may be sown without a nurse crop in late summer and early fall. Ladino, white and red clovers, and alfalfa may be sown with it. The usual recommendation to sow grasses in early fall with wheat, rye, or barley applies also to Ky 31 fescue. It may also be seeded in early spring, with or without small grain.

Still other practices in seeding Ky 31 fescue may become more common as the seed becomes more plentiful and the price cheaper. Several Kentucky farmers have reported successful stands from fescue

With Leftover Cottage Cheese or Cream

PICKLED PEACH SALAD

6 large pickled peaches
1 c cottage cheese
Mayonnaise
½ c nuts
Lettuce
Paprika

Cut peaches in halves and remove pits. Mix nuts with cottage cheese, soften with mayonnaise, and stuff centers of peaches. Arrange peaches on lettuce leaves, sprinkle with paprika, and serve.

SOUR CREAM DRESSING

½ c sour cream
2 T vinegar
Paprika
2 T sugar
⅛ t salt

Add sugar and seasoning to sour cream. Slowly add vinegar, beating constantly. (This makes a good dressing for cabbage slaw. Sweet cream may be used instead of sour.)

With Stale-Bread Crumbs

Stale bread can be dried and the crumbs used to replace part of the flour in cookies, cake, and muffins.

WHOLE WHEAT-CRUMB MUFFINS

⅔ c white flour
⅔ c whole-wheat flour
⅔ c toasted crumbs
1 egg
½ t salt
3 T melted fat
1 c sour milk
½ t soda
1½ t baking powder

Mix and sift all dry ingredients, except soda, into a mixing bowl and make a well in the center. Add well-beaten egg and melted fat to the sour milk. Mix soda with the water and add immediately to the liquid mixture. Pour liquid into the well of the dry ingredients and stir vigorously until all flour is dampened. Fill greased muffin pans at once and bake in a hot oven (425° F) about 20 minutes.

RAISIN CAKE

½ c sugar
½ c fat
1 egg
1 c raisins
1 t baking powder
½ t cloves
½ t allspice
1 t cinnamon
1½ c flour
½ c fine-rolled dry crumbs
1 t soda
⅔ c raisin liquid
½ t salt

Cook raisins until puffy. Drain; boil liquid to ⅔ cup; and cool. Cream the fat and add sugar gradually, then beat in the egg. Mix and sift the dry ingredients. Add a small amount of dry ingredients to fat mixture and stir until flour is dampened. Beat for a few seconds, add 2 tablespoons of raisin liquid, and gently stir the mixture. Repeat until dry ingredients

and liquid are all used, being careful to add dry ingredient last. Fold in cooked raisins. Bake in layers in a moderate oven (375° F) for 25 minutes.

SOUR-CREAM SPICE CAKE

1 c sugar
1 c sour cream
2 eggs
2 c flour
1 c raisins
½ t salt
1 t water
½ t soda
1 t baking powder
1 t cinnamon
¼ t cloves
¼ t allspice
½ t nutmeg

Mix and sift all dry ingredients except soda. Beat eggs until foamy and light. Add sugar gradually, beating constantly. Add cream and continue beating until mixture is thick and creamy. Dissolve soda in water and add to cream mixture. Fold in dry ingredients and floured fruit. Bake in layers or cup cakes in a moderate oven (375° F).

SUGAR-CRUMB COOKIES

½ c fat
1 c sugar
1 egg
2 t baking powder
1 c raisins
1 t vanilla
1⅓ c sifted flour
⅔ c fine-rolled dry crumbs
½ t salt
¼ t nutmeg

Cream the fat and sugar, add egg, and beat well. Add the vanilla, then mix and sift dry ingredients and add them to fat mixture. Place in refrigerator or a cool place to chill. Roll, cut, and bake in a hot oven (425° F) about 10 minutes.

BREAD PUDDING

2 eggs
⅓ c sugar
1 t vanilla or ¼ t cinnamon
¼ t salt
¼ c raisins
2 c scalded milk
2 slices of bread cut in small cubes

Beat eggs and add sugar, salt, and flavoring. Add raisins, then scalded milk. Mix well. Add bread, pour into buttered baking dish, and set in pan of hot water. Bake in moderate oven (375° F) for 50 minutes, or until knife inserted in center comes out clean. Serve with cream or lemon sauce. (If dry bread is used, more milk must be added.)

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Don't Waste Food!

By Florence Imlay and Pearl J. Haak

Preventing waste is always good business. During times of food scarcity and high prices, stopping the waste of food is doubly important. It makes the food supply go farther and it cuts food costs.

Even thrifty homemakers often fail to realize how important it is at such times to save small bits of food. For example, if *one* slice of bread is wasted each day by each family in Kentucky, the total waste per year would be about 17½ million loaves! If each family in Kentucky wasted only 3 tablespoons of flour a day, the total wasted in a year would be over 5,000 tons of flour, or about 194 freight-car loads. For an average family the stopping of food waste might seem to be a relatively minor matter. And yet, in times of high prices, when the food budget can hardly be stretched enough to provide an adequate diet for the family, keeping a close watch on waste of food may well mean the difference between enough food and not enough. Stopping the waste of 3 tablespoons of flour a day would amount to about 41 pounds in a year. The same relative saving on other foods would amount to a very substantial difference in yearly food costs.

What are the various guideposts in preventing waste of food? Some of the practical ways are as follows:

Plan Your Buying

Estimate the amount of money that can be spent for foods.

Keep a record of the cost of different foods and, at

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the end of the week or month, check for means of avoiding waste and saving on cost.

Figure the cost of foods per serving of edible parts. Often in some cuts of meat there is much waste in bone, gristle, and fat. Although canned fruits of various grades may have the same food value, the cheaper grades often contain less fruit and more sirup, and the cost per serving may therefore be more.

When selecting turnips, beets, cauliflower, and broccoli, choose those that have crisp, fresh leaves that may be used for greens. Leaves not crisp and fresh are usually wasted.

Join with other families to buy fruits and vegetables cooperatively. Savings of $1 to $3 per bushel often are possible in this way.

Prepare Carefully

Use standard measuring cups and spoons for measuring all ingredients. Unless measuring is accurate much food is wasted. For example, in making biscuits or flouring meats, don't use so much flour that some will be thrown away.

Roast meats at a low temperature (300° to 325° F) to prevent excessive shrinkage. Shrinkage increases the cost per serving.

Leave the skins on potatoes, carrots, apples, and pears for baking, boiling, or scalloping. For scalloping with peelings on, slice the pieces thinner than usual and the skins will not be noticeable.

Leave the skins on apples, pears, apricots, or carrots for use in salads.

Leave the crust on bread in making sandwiches.

Mix the leaves of such vegetables as cauliflower, broccoli, beets, and turnips with other greens.

Make cottage cheese, desserts, and beverages of surplus milk.

Use surplus sour cream in making breads, cookies, cakes, and salad dressing.

In making salads, cut or shred the vegetables and fruits just before serving, to prevent vitamin loss.

Dry celery, parsley, dill, mint, sage, thyme, and savory leaves for seasoning soups, sauces, salads, meat balls, and dressing.

Prepare at one time only the amount of food that can be eaten before it spoils.

Serve Economically

Leaving even small bits of food on the plate three times a day totals into considerable waste in a year. Give small servings, and then second servings if desired. Why not adopt the family "clean plate" slogan?

Serve only a few well-selected foods at each meal.

Cut slices of bread in half, and in fourths for children.

When serving a fruit salad or hot bread and jelly, don't serve dessert.

Serve Balanced Meals

Livestock farmers know that it is most economical and most efficient to feed a well-balanced ration. The same is true in human nutrition. One way to prevent waste of food, therefore, is to serve well-balanced meals. Plan ways to include, every day, the foods essential for health — milk, eggs, fruit, vegetables, meats, and whole-grain cereals. Unfortunately, it is these foods that often are skimped when prices are high. Most homemakers, however, can find ways to have these protective foods when they fully realize their importance. For example, more milk can be had for the same money by using some buttermilk, dried milk, and evaporated milk in food preparation.

Use Leftovers

Use leftover meat in meat loaf, sandwich meat, pies, stews, a creamed dish, or soup.

Use leftover cooked cereal sauted, in meat loaf, sandwich meat, or pudding.

Save all scraps of leftover bread, dry it, and roll it into crumbs for pudding, scalloped dishes, croquettes, meat loaf, cookies, muffins, and cakes.

Use all liquid in which vegetables are cooked for appetizers, or in soup, sauce or congealed salad.

Use liquid in which potatoes are cooked for making yeast bread and muffins.

Use the liquids in which fruits are canned for beverages, congealed salads, appetizers, and desserts.

RECIPES

With Leftover Roasts or Chicken

Tasty molded meat loaves can be made of leftover roasts or chicken seasoned with dried horseradish or celery leaves.

SANDWICH LUNCH MEAT

- 2 c ground beef or pork, cooked
- 1 c ground ham, cooked
- ⅓ c oats
- 2 T gelatin
- ¼ c cold water
- 2 T mayonnaise
- 1 T grated onion juice
- ¼ t grated horseradish
- 1 c boiling water

Add oats to boiling water and cook in a double boiler for 30 minutes. Soften gelatin in cold water. Remove oats from flame and add softened gelatin immediately. Stir until gelatin is dissolved. Add other

ingredients and pour into a greased mold to chill. Cut in thin slices. (Keep in refrigerator or cool place.)

CHICKEN SANDWICH LOAF

- 4 c ground cooked chicken
- 1½ c chicken stock
- ¼ c cornmeal
- 2 T gelatin
- ¼ c cold water
- ¼ c mayonnaise
- ½ t salt
- 3 T chopped parsley
- 2 T chopped pimiento or pepper
- ¼ c crushed dried celery leaves
- ¼ c cold water

Add cornmeal, celery leaves, and parsley to boiling stock and cook in a double boiler for 30 minutes. Soften gelatin in cold water. Add cornmeal mixture stirring until gelatin dissolves. Add other ingredients; pour into greased mold to chill. Cut in thin slices. NOTE: Fresh pork or veal may be used instead of chicken (Keep in refrigerator or a cool place.)

With Leftover Cooked Vegetables

Leftover cooked vegetables can be made into unusual and delicious dishes which all will enjoy.

VEGETABLE LOAF

- 2 c shredded raw carrots
- 2 c cooked peas
- 2 t chopped onion
- 1 c chopped peanuts
- 2 T chopped parsley
- 2 eggs
- 2 T butter
- 1½ T flour
- 1½ t salt
- 1½ c milk

Melt the butter in a saucepan, add the flour, and stir until well blended. Take saucepan from stove and slowly add the milk. Replace on stove; bring to boiling, stirring constantly, and cook for about 2 minutes. Add beaten eggs, vegetables, salt, and peanuts. Pour mixture into buttered casserole. Place casserole in a pan of hot water and bake in a moderate oven (350° F) for 45 minutes, or until inserted knife comes out clean. Serve at once.

SWEETPOTATO AND SAUSAGE LOAF

- 1½ pounds sausage
- 2 c mashed sweetpotatoes
- ¼ c milk
- 1 T butter
- 1 egg
- 1 t salt

While sweetpotatoes are boiling in their jackets, cook the sausage cakes until they are about two-thirds done. Drain off the fat and place the cakes in a baking pan. Mash the potatoes; add butter, salt, beaten egg yolk, and milk; and fold in the stiffly beaten egg white. The mixture should be light and fluffy. Cover the sausage cakes with a sweetpotato fluff and bake in a moderate oven (350° F) for 30 minutes. To serve, turn the loaf upside down on a platter and surround with baked or steamed apple halves. (White potatoes could be used instead of sweetpotatoes.)

laying house. Provide a 14 hour day by turning the lights on early in the morning.

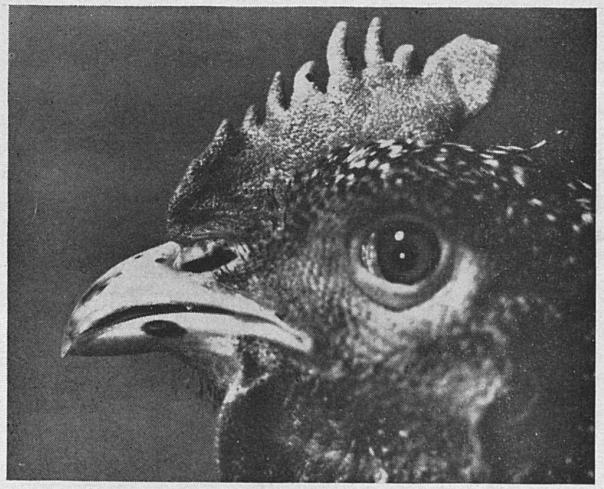
Keep a complete record, and know the flock.

Lexington, Kentucky
March, 1948

Cooperative Extension Work in Agriculture and Home Economics: College of Agriculture and Home Economics, University of Kentucky, and the United States Department of Agriculture, cooperating. THOMAS P. COOPER, *Director*. Issued in furtherance of the Acts of May 8 and June 30, 1914. 15M—3-48

THE ALL-PULLET FLOCK for Greater Poultry Profit

By Stanley Caton



An All-Pullet Flock is better than keeping old hens, because of—

1. More eggs per bird.
2. More eggs in fall and winter when prices are high.
3. Better control of disease.
4. All birds the same age in the laying house.

Leaflet 119

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Division
Thomas P. Cooper, Dean and Director

EIGHT IMPORTANT QUESTIONS AND ANSWERS

Which lay more eggs, pullets or hens?

Pullets. In a 5-year test at the Western Kentucky Substation at Princeton the pullets averaged **67 more** eggs per bird per year than the hens.

Which lay more eggs in fall and winter, when egg prices are highest, pullets or hens?

Pullets. In the same test at Princeton, from October 1 to February 1 the pullets laid **26 more** eggs per bird than the hens.

Do pullets live as well as hens?

Yes! In this same flock the annual mortality was 8 percent less for the pullets than for the hens.

Do pullet eggs hatch as well as hen eggs?

Yes! Eggs set from the pullets in the test at Princeton hatched 5 percent better than those from the hens.

Are chicks hatched from pullet eggs as strong as those from hen eggs?

Chicks hatched from the pullet eggs live as well as those from hen eggs.

How does the cost of growing a pullet to replace a hen figure in the plan of maintaining an all-pullet flock?

Extra eggs from the pullet plus the sale value of the hen more than offsets the cost of growing the pullet. During molting, when production is low, a hen eats about the same amount of feed as is needed to grow a pullet.

When should the hens be sold?

When they are no longer profitable; and always before the pullets are housed in the fall.

How does the all-pullet flock aid in control of disease?

Getting rid of all the hens prevents their passing diseases on to the pullets. This is especially true of colds and roup.

FIVE IMPORTANT PRACTICES

The success of the all-pullet flock depends on the following practices:

Buy Production-Bred Chicks

High egg production is inherited. Therefore, buy from a breeder or hatcheryman whose stock produces well. Aim for 60 eggs per pullet from September 1 to January 1.

Start Chicks Early

Start chicks in February or March. Start 3 chicks for each pullet needed.

Use a Disease and Parasite Control Program

The two main sources of diseases and parasites are: (1) Infected grounds or buildings and (2) adult stock. To prevent infections, clean and scald the brooder house before putting chicks into it, and equip it with a sun porch 8 feet by 10 feet in size. Use the same range for growing stock only one year in three. Do this by using a range shelter or moving the brooder house. Do not range growing stock with older chickens. Vaccinate the growing pullets for fowl pox when they are 8 to 12 weeks old.

Clean the laying house thoroughly before housing the pullets in the fall.

Follow A Good Summer Feeding Program

A good summer feeding program is a profitable investment. Keep grain, mash, and water before the pullets and cut feed costs by providing a good pasture for the growing flock.

Manage The Laying Flock Properly

Provide a comfortable laying house which is light, free from drafts, and properly ventilated. Don't crowd the pullets in the house, but allow 3½ to 4 square feet of floor space per pullet. Provide 1 foot of feeder space for each 4 pullets. Feed a good laying mash and grain. Keep plenty of water and oyster shell or limestone chips before the pullets.

Keep the flock in the house until noon every day. If you have electricity on the farm use it in the

depends on the success of the local cooperatives, it is most important that every local operates efficiently.

Mileage of technician must be kept to a minimum. For a local to operate economically, there must be a considerable number of cows in a fairly small area. The expenses of the technician depend chiefly on the number of miles traveled per cow bred. It is usually considered a sound policy not to sign up cows farther than 20 miles from some centrally located town where the technician resides. Some locals have a 15- or 10-mile limit, depending somewhat on the condition of the roads.

Technicians must be capable. Unless the technician is capable, reliable, and interested in his work, the interests of the breeding cooperative will suffer. Technicians employed by the local cooperatives must therefore have had special training in their work, and must have the approval, as qualified technicians, of the Dairy Section of the College of Agriculture and Home Economics at Lexington.

A large number of cows necessary. In each local cooperative there must be at least 1,200 cows signed up for breeding, and there must be at least 300 cows of each breed represented. If the roads are good and the mileage is not too great, a technician can easily attend to the breeding of 1,800 to 2,000 cows per year. These minimum requirements on mileage and number of cows help to assure the services of a well-qualified technician, and the general success of the association.

Organization Meetings

If there is enough interest in any county for artificial breeding, and if the conditions are favorable for the success of the program, the local county agent and field representatives from the University hold meetings to explain the details and to organize the association, and to sign up cows for breeding.

Each local cooperative is incorporated with a board of directors, a secretary, and treasurer. Each also has one director in the state organization. Full details on local organization are explained at the organizational meetings.

What Are the Costs of Artificial Breeding?

Among the various states having artificial breeding programs, there is only slight variation in the financial arrangement. In Kentucky there is a lifetime membership fee of $8 and a cow assessment fee of $1 for each cow signed up for breeding. These are both standard fees and are paid only once. If a farmer increases the size of his herd or wants to breed more cows than he originally signed up, he merely pays an additional $1 for each cow added.

At present, the breeding fee is $5 for each first service. If the cow does not become pregnant to the first service, she will be given, if required, two additional services free of charge. If, however, she fails to conceive to the third service then a fee of $2 is charged for each service after that.

What Are the Farmer's Obligations?

First of all, the farmer must be able to determine when a cow is in heat, and he must see to it that the technician is notified at the proper time. It is a waste of time and money to attempt to breed cows at the wrong time.

Other ways in which farmers can cooperate also help the technician. The cow to be bred should be identified properly and tied in the barn or some other convenient place when the technician arrives. Certain records, if properly kept, greatly help the technician's work. Records showing previous calving dates and heat periods are most useful. In the case of registered animals, the registration papers must be available when the technician arrives. The $5 breeding fee should also be ready.

In general, the success of artificial breeding in Kentucky depends on the abilities of the technicians, the soundness of operation of the local cooperatives, and the cooperation of the herd owners.

Lexington, Kentucky March, 1948
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10M—3-48

The Kentucky Artificial Breeding Program for Dairy Cattle

By Thomas M. Ludwick and Fordyce Ely

The dairy-cattle artificial breeding program in Kentucky has so far been very successful and has grown rapidly. In September 1946 the Kentucky Artificial Breeding Association began operation with 5 local or county organizations, 550 members, and about 5,000 cows signed up for breeding. As of January 1, 1948, the Association has about 3400 members with 32,000 cows signed up for service in 22 local cooperatives. These local cooperatives are in somewhat scattered areas in the state, as shown on the map on page 2.

This growth in Kentucky is in keeping with the rapid growth in artificial breeding of dairy cattle in the nation generally. The first artificial breeding association in this country was organized in New Jersey in 1938. Nine years later, on January 1, 1947, the U. S. Department of Agriculture reported 1,125,040 cows, in 140,571 herds, in the artificial breeding program. Many bulls have sired over 2,000 calves each.

What Is "Artificial Breeding"?

"Artificial breeding" is the breeding of cows by means of other than natural service by the bull. It involves the deposit of live sperm (male reproductive cells) in the female reproductive tract by artificial methods.

How Is An Artificial Breeding Program Carried On?

For artificial breeding to be practical on a wide scale, there must be adequate organization, equipment, and personnel to acquire and maintain good bulls, collect the semen, keep it in good condition,

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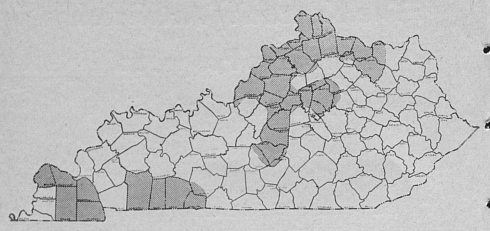


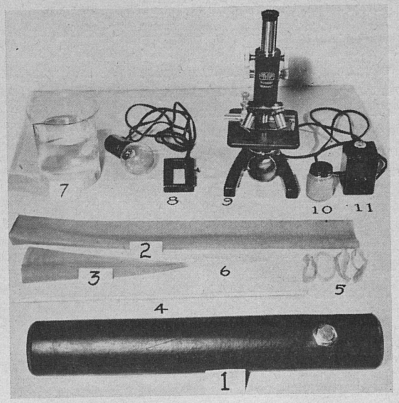
Areas where artificial breeding is now in operation in Kentucky

distribute it to the farms when needed, and attend to the breeding of the cows. The Kentucky Artificial Breeding Association maintains a bull stud near Louisville, at which place the semen is collected and from which it is shipped to the trained technicians of the local breeding cooperatives. It is believed that this one central organization can supply the needs of the entire state.

An average bull normally produces 1 to 2 billion highly active sperm cells per cubic centimeter of semen, each cell of which is capable of fertilizing the egg from the cow. This semen, when collected from the bull for use in artificial insemination, is diluted with a material not harmful to the sperm. When so diluted, the semen from a single ejaculate can be used to breed 400 to 500 cows. The diluted semen is cooled to prevent active motion of the sperm; is packaged and shipped when needed; and is injected into the reproductive tract of the cow by a skilled technician using a syringe and glass rod or some other similar method.

What Are the Advantages in Artificial Breeding?

1. Opportunity for farmers with small herds of cows to breed them to the best bulls at low cost is the chief advantage in artificial breeding. Such farmers, if depending on natural service, cannot usually afford top-quality bulls. Artificial breeding enables them to build up the productive capacity of their herds as well as dairymen with large herds have been able to do in the past.



Materials used in collecting and examining semen: (1) Artificial vagina, (2) rubber liner for vagina, (3) collecting cone, (4) glass rod for distributing lubricant jelly, (5) rubber bands for holding liner in position, (6) vial collecting tube, (7) hot water, (8) stage incubator to examine semen, (9) microscope.

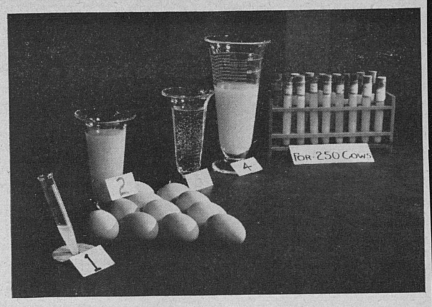
2. Breeding many more cows to top-ranking bulls than is possible with natural service is an advantage to dairying as a whole.

3. Avoiding the risk of injury from a bull is another advantage in artificial breeding. Most dairy farms are not equipped to handle bulls safely and conveniently, and all bulls are dangerous to handle.

4. Better control of breeding diseases — those which can be transmitted at time of service — can be attained by artificial breeding.

5. Control of breeding dates and adequate records of them go along with artificial breeding. Such control and records are necessary in efficient herd management.

6. At present another advantage in artificial breeding is that it is generally cheaper than owning a well-bred bull and housing, feeding, and otherwise taking care of him on the farm.



Materials used in the dilution of semen. (1) Semen, (2) egg yolk, (3) sodium citrate, (4) egg yolk-citrate dilutor.

How Sure Is Artificial Breeding?

Artificial breeding is about the same as natural service in number of services per conception. Generally, in ordinary herd operation with natural bull service, about half the cows conceive to the first service, half of the remainder to the second service, and again half of the remaining quarter to the third service. Over a period of several years, a herd manager who takes all precautions against breeding troubles, considers the herd to be breeding well if the average is less than two services per conception.

In a study made at the Nebraska Agricultural Experiment Station, for 22,684 conceptions among cows served naturally there was an average of 1.80 services per conception. For 5,539 conceptions among cows bred artificially the average was 1.63 services per conception. In both groups about 60 percent of the conceptions were on first service, and about 18 percent were on second service.

What Are the Conditions Necessary to Success of a Local Artificial Breeding Cooperative?

Although dairying is one of the leading agricultural enterprises in Kentucky, there are sections of the state where it would not be practical, at present, to promote an artificial breeding program. Certain precautions must be taken to assure the success of the program, and since the success of the state organization

Most Farmers Can Reduce Their Feed Requirements and Increase Their Profits.

An important problem always facing Kentucky livestock producers is the efficient use of available feed supplies. Three suggestions seem to be in order:

1. Cull diseased, nonbreeding, or low-producing animals from the breeding herds and flocks. Prevailing prices for fat cows, bulls, ewes, sows, and poultry offer an additional incentive for such culling now.

2. Increase your efficiency of feed utilization for all your livestock enterprises. Many farmers could produce as much as they are now producing with ¼ to ½ less feed if they would adequately control parasites and diseases, balance their rations, use selected stock, make full use of home-grown pastures and roughages, and use proper equipment and supervision.

3. Change from heavy-grain-consuming to minimum-grain-consuming fat-stock enterprises. Depending on the class of livestock to which it is fed, 100 pounds of corn properly supplemented with protein, good pasture forage, and harvested roughages will produce—

	20	dozen eggs
or	300	pounds of 4-percent milk
or	380	pounds of milk-fat heavy calf
or	118	pounds of spring lamb and 9 pounds of wool
or	100	pounds beef on a feeder calf wintered with grain, then grazed without grain
But only	26	pounds of pork on pasture
or	21	pounds of pork in drylot feeding
or	16	pounds of beef in drylot feeding

Good pastures save feed. Few Kentucky farmers are getting as much livestock feed from pastures as they should. Greater use of cover crops and of surplus forage on permanent pastures for winter grazing, should be practiced on every farm. Good year-round pastures save 20 percent of the feed for growing stock and laying hens. Suitable swine pasture will save at least 1/10 of the grain and more than 1/3 of the protein supplement for both fattening stock and breeding animals. Dairy cows can obtain over half of their feed from good year-round pasture. Sheep, beef cattle, and (on most farms) workstock can get three-fourths or more of their total feed from a well-planned pasture supply.

Better roughage saves feed.— Much feed value is lost each year on Kentucky farms through poor haying practices and wasteful use of hay. Top-grade legume hay has 6 times as much vitamin A, 1/3 more protein, and 1/10 more fattening value than the average legume hay now produced. Corn stover has a feeding value equal to that of average timothy hay when fed in early winter, but it loses half its feeding value by January 1 if left to stand in shocks in the field.

Balanced rations save feed.— The present high cost and scarcity of feed make it imperative that balanced rations be fed whenever possible. Tests show that one pound of tankage (or its equivalent) will save 6¼ pounds of corn with pigs fed in drylot. Faster gains, more eggs, and more milk also result from the feeding of balanced rations.

For PRINTED HELPS dealing with practices in feeding and feed production, see your county agent or write to the College of Agriculture and Home Economics, Lexington.

This leaflet was prepared by members of the Animal Industry Group.

Lexington, Kentucky February, 1949
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How Much Feed Does Your LIVESTOCK Need

Use this leaflet to estimate your feed needs, and to see how your feeding efficiency compares with that of the average farmer.

Leaflet 121

AGRICULTURAL EXTENSION DIVISION
College of Agriculture and Home Economics
University of Kentucky
THOMAS P. COOPER, *Dean* and *Director*

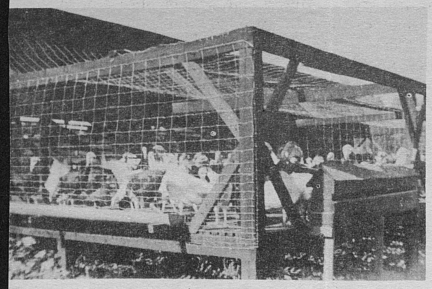
BALANCE YOUR FEED NEEDS WITH YOUR AVAILABLE SUPPLIES

List the number of units on your farm, and estimate the amount of feed you will need and the amount you are likely to have.

Feed requirements listed are approximate requirements per year, unless otherwise stated. These requirements assume the use of good management practices, including year-round pasture, balanced rations, control of parasites and diseases, and adequate equipment. Where such practices are not followed, the feed requirements will be 50 to 100 percent higher than those listed here. Suggestions for making allowance for different practices are given in the paragraphs at the right.

Fill in the figures for your farm here

Unit of livestock	Feed needed per unit			Number of units on farm	Total feed requirements			Additional information
	Corn	Protein supplement	Hay (legume or mixed)		Corn	Protein supplement	Hay	
	bu.	*lb.*	*tons*		*bu.*	*lb.*	*tons*	
Dairy cattle								Good legume hay is always preferable. Three pounds of silage will replace 1 pound of hay. On a weight basis, barley may replace corn. Wheat bran or ground wheat may replace up to ½ of the corn.
Milk cow or bull, over 2 yr.	27	300	2½					
Heifer or bull—1 to 2 yr.	10	50	1½					
Calf through first year	7	200	½					
Poultry								100 chicks started will produce 40 laying pullets; roosters sold, culls, and dead birds account for remainder. Protein supplement at present time usually a commercial mash.
100 chicks, pullets to laying	14	800	—					
100 laying hens	80	3000	—					
Sheep								If hay is poor, count on using 1/5 ton plus 20 pounds protein supplement. Control parasites with phenothiazine.
Ewe and lamb for year	1½	—	1/7					
Hogs								If good legume pasture is not available the corn requirements will be 1/10 greater and the protein supplement requirements will be nearly ½ greater. When good pasture is not in season, it is recommended that sows be fed green leafy legume hay in low racks.
Sow (gestation)	13	40	—					
Sow and litter (suckling)	14	85	—					
Pig (weaning to 225)	14	70	—					
Feeder pig, per 100 lb. gain	7	30	—					
Boar (1 year)	35	150	—					
Workstock								Ration should be adjusted to amount of work being done. Healthy horses freed from bots use less feed. At least half the hay should be green and leafy.
Horse or mule, medium size doing medium work	30	—	2					
Colt under working age	15	—	1½					
Beef cattle								Good to choice finish can be put on quality steers carried to 30 months of age on good pasture and home-grown roughage, with not more than 10 bushels of corn fed per steer during their first winter. Another 10 bushels per steer is required if steers are marketed younger, or if pasture is poor. The Kentucky cow-and-calf plan makes beef with a minimum use of grain.
Cow or bull	—	—	1½					
Wintering feeder calf	10	—	1					
Wintering and finishing quality yearling	10	120	1					
Drylot fattening, 2-yr-old, per 100 lb. gain	14	25	1/5					
TOTAL FEED REQUIREMENTS								One bushel of wheat, 1¼ bushels of barley, or 2 bushels of heavy oats are about equal to one bushel of corn.
TOTAL FEED SUPPLY AVAILABLE								



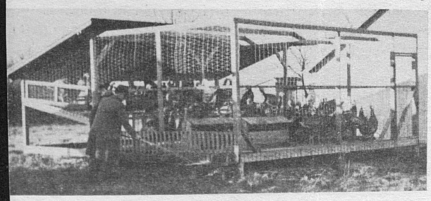
Picture 5

lb; wheat, 40 lb; and oats, 20 lb. This should be hopper fed. Turkeys do not eat very much corn until the weather gets cool, and for this reason oats are popular during summer.

Any good growing mash or pellets may be fed. Most growers feed commercial mashes; however, homemade mixtures have been fed with excellent results. If interested in mixing your own mash, see your county agent or write the Poultry Department, University of Kentucky, Lexington. A good growing mash should contain the proteins, minerals, and vitamins needed for proper growth and development. If turkeys are fed well throughout the growing period, there is no need for special fattening feed just before marketing. Under most range feeding conditions it will take about 4 pounds of feed to produce each pound of turkey up to 24 to 26 weeks of age.

Confinement

Where land is limited, turkeys can be raised in complete confinement. Pictures 5 and 6 show range shelters and sun porches in which the turkeys can be kept until they are ready for market. Note feeding



Pitcure 6

and watering arrangements outside the sun porch in Picture 5.

More care must be taken about the ration for turkeys grown in confinement. The principal advantages of confinement rearing are:

1. Less danger of loss from foxes and other prowlers and from stormy weather.
2. Disease losses, particularly blackhead, are lessened and parasites are held under better control.
3. Labor requirements are less, as feed and other necessities are centralized.

Some disadvantages are:

1. Cost of buildings is higher.
2. Feed cost per pound of gain is usually greater.
3. Droppings cause considerable odor and are often inconvenient to clean from shelters or pens.
4. Usually there are more breast blisters.
5. Unless feed is well balanced, more nutritional trouble develops.

These disadvantages need not be too much of a handicap if they are kept well in mind. For example, build the shelters high enough off the ground, or on a hillside, so cleaning under them is not difficult. Use wooden slats 2 inches by 2 inches for the floor instead of wire, to prevent most breast blisters. Building costs can be reduced by using scrap lumber or locust poles for framework.

Provide Plenty of Room

If confinement rearing is followed, be sure to allow enough room. At least 2 square feet of floor space and 3 or 4 inches of feeder space should be given each turkey up to 8 weeks. This should be increased until at 6 months of age, about 6 square feet per bird are provided. If wire is used on the bottom of the shelter, the heavy 16-gage, 2-by-2-inch welded kind is best. Regular fencing wire may be used for the sides, and 2-inch poultry netting will be all right on top of the sun porch.

Pox Vaccination

Vaccinate the turkeys against pox when they are about 10 weeks old. Those who practice semiconfinement usually vaccinate when moving to range. Use chicken-origin strain. See your county agent for details on vaccination.

Lexington, Kentucky March, 1949
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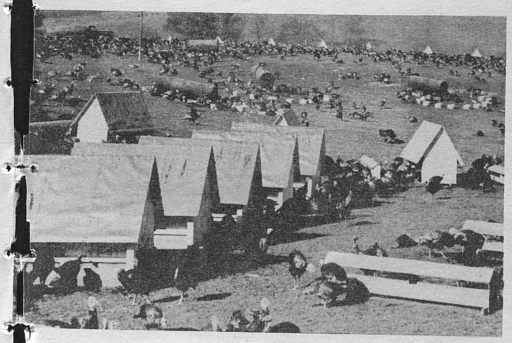
Growing Turkeys on Range

By J. E. Humphrey



Picture 1

In Kentucky turkeys are generally raised in semiconfinement. They are started in a brooder house on the floor and kept there and on a sun porch until 8 to 10 weeks old. Then they are moved to the range where they are kept until marketed. This leaflet tells what to do while they are on the range, or in confinement.

Leaflet 122

Agricultural Extension Division
College of Agriculture and Home Economics
UNIVERSITY OF KENTUCKY
Thomas P. Cooper, Dean and Director

Simple Range Shelter and Roosts

Some growers use simple range shelters, but others build roosts in the open and put the poults on them directly from the brooder house. This can usually be done when the poults are taken out after July 4th. Because of foxes and other predatory animals it is best to enclose the roosting place with a fence. Poultry fencing about 5 feet high, 2-inch mesh, and steel posts, are usually used. Growers who raise large numbers of turkeys often use guards, cannonball flares, and dogs as further protection.

Hawks, crows, and sometimes owls, cause considerable losses among turkeys. Flares or electric lights sur-

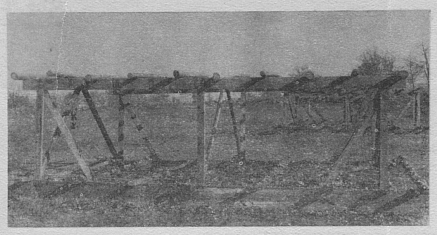


Picture 2

rounding the roost help to prevent such losses. Some use wire across the top of the yard or enclosure, with pieces of rag 25 to 30 feet apart hanging from the wire. An electric alarm arranged to awaken the caretaker may prove of value. To identify turkeys that might be stolen, tattoo marks can be made in the web of the wing.

Other Kinds of Roosts

The kind and height of roosts in Picture 2 are now preferred by most growers of large, broad-breasted turkeys. These roosts are only about 12 inches off the ground. Simple roosts can be made of poles, and these cost nothing except labor, as poles can be found on most farms. Roosts in Picture 3 are most convenient to move, built to go through a standard farm gate. Note the wire netting over runners and lower roosts to keep the poults out of the droppings. The roosts, of whatever type used, should be about 20 inches apart. Poles 2 inches by 3 inches thick, or half-round 2 x 4's, or round poles about the size of a man's forearm make the best roosts. Wire netting 2 by 2 inches, about 16 gage, nailed over the poles, is usually the best to use on the range shelters or outside roosts. Keeping tur-

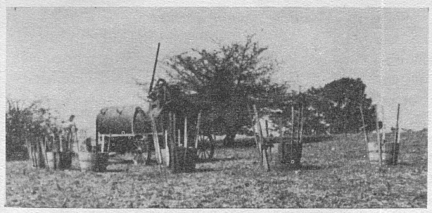


Picture 3

keys out of their droppings helps to keep turkeys free of worms.

Watering Equipment

Turkeys drink much water during the hot summer days. A grower is more apt to supply all the water needed if he has a large container nearby in which it can be stored, as in Picture 4. Note the hose through which water is run into washtubs. Washtubs make good waterers. A "teepee" over each tub keeps the water clean. This "teepee" can be built of about 10 bean poles or sticks tied together at the top and wired together about 6 inches below the top of the tub. In this illustration wooden half barrels are used, with slats nailed to the "tubs."



Picture 4

Semiconfinement

Under the semiconfinement plan on range, turkeys and equipment are moved once every 3 to 6 weeks to an adjoining clean range or area. The amount of green feed on the range, general condition of the turkeys, the weather, and space available govern how often they should be moved. The main thing to keep in mind is the welfare of the turkeys. Move them as often as necessary to maintain good health and proper

growth. Some growers move them once a week, returning to the first area later the same season. At least one month should elapse before going back to this area. However, it is best, where there is enough land, to use the same area only once in 3 or 4 years. This sort of rotation fits in well with other general farming operations. Then, too, the turkey droppings add considerable fertilizer to the ground so that excellent crops can be grown the next year.

Before moving the poults back be sure a good carpet of green feed is available on the range. Alfalfa and ladino clover make good pasture. So do Sudan grass, vetch, fall rye, and rape. Soybeans drilled in rows about 2 feet apart provide good green feed. If the land is too hilly to plow, let it rest from turkeys for 3 or 4 years. Of course, any bare spots should be reseeded and bluegrass included in the mixture. It is always best to sow a mixture of grass rather than one kind alone. A good pasture will reduce the feed cost about 20 percent. At the same time the turkeys will grow and develop more uniformly when ranging on good pasture.

Be sure that there is plenty of shade for the turkeys during hot summer months.

Feeders

A feeder holding up to 1 ton of feed is preferred by many growers of large numbers of turkeys. Such feeders are shown in Picture 1, left foreground. Note that this feeder is on runners, which permit it to be moved rather easily. Feed is put in through the drop door in the end of the feeder, near the top. Others prefer the kind at the right side of Picture 1. Regardless of the kind used, be sure that plenty of feeder space is provided. Each turkey should have about 3 inches of feeder space.

Plans for building this feeder or other pieces of equipment in this leaflet can be bought for 10c each from the Agricultural Engineering Division of the College of Agriculture and Home Economics, University of Kentucky, Lexington. Your county agent may have them.

Feeding Practices

During the growing period mash should be kept before the turkeys at all times. By the time they are taken to the range, turkeys are old enough to eat whole corn and whole wheat; many growers feed whole oats even earlier. A good grain mixture is whole corn, 40

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7 M-10-49

BLACKLEG OF CATTLE

BY ROSS BROWN

BLACKLEG, also called "black quarter," "quarter ill," "symptomatic anthrax," and "emphysematous gangrene," is an acute infectious disease that attacks young cattle, as a rule.

OCCURRENCE

Blackleg occurs in nearly all parts of the world and in all of the states of the United States. Calves and young cattle are susceptible to the disease from birth to 2 1/2 - 3 years of age. While the disease may occur at any season, it generally occurs in the spring or fall in pastured cattle, and it may occur in the winter in stabled animals.

CAUSE

The cause of blackleg is a microorganism known as Clostridium chauvei. This organism, which is shaped like a small rod, readily produces spores. These spores located in one end of the rod have a thick wall, and because of this are very resistant to heat, cold, drying, and chemical disinfectants. For this reason the

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spores of the blackleg bacteria may lie dormant in the pasture for several years, but when conditions are favorable they may germinate and produce the disease. An animal may become infected from pastures or water which is contaminated with the spores. Infection takes place when the spores enter the body through the digestive tract or through small wounds in the skin or in the lining of the mouth and tongue.

SYMPTOMS

The symptoms of blackleg are so characteristic that the disease is usually easily recognized, especially by a veterinarian. The incubation period is from 1 to 5 days with the onset being very sudden. The first symptom is usually lameness with or without fever, or there may only be signs of marked general infection such as depression, fever, and tremors.

Swellings are the most characteristic symptoms. These swellings develop in the muscles of the shoulder, hip, chest, back, or flank and never below the knee or hock. The swelling is at first painful and hot. In a few hours it is more extensive, less sensitive and soon becomes cool and painless. Finally the skin over the center of the swelling may become dry, dark and parchment-like, and when it is pressed slightly a peculiar crackling sound under the skin is heard. This is due to a collection of gas formed by the organisms as they multiply. The general symptoms are complete loss of appetite, marked prostration, muscle tremors, difficult breathing, and a high fever that may become subnormal just before death. In most cases the disease is fatal in 12 to 48 hours. A milder form with some recoveries sometimes occurs in older animals.

PREVENTION

Animals that have died of blackleg are the chief source of soil infection. They harbor the germs in large numbers and liberate them from all body openings. For this reason dead

animals should be promptly buried or burned. All equipment should be disinfected and the place where the animal died should be covered with a thick layer of straw and burned.

The most effective way to prevent blackleg is to make it a practice to vaccinate all young stock. If calves are vaccinated with Blackleg Bacterin when they are 1 to 4 weeks of age this gives them immunity until they are 6 months old. These calves should be revaccinated with Blackleg Bacterin again when they are 6 months old to give immunity for life. These two vaccinations are necessary to give immunity from birth.

If young cattle are purchased they should be vaccinated, as well as those raised on your farm.

Blackleg causes great loss in Kentucky each year. However the vaccine is so effective that if it were widely used this loss could be entirely prevented.

TREATMENT

After an animal shows symptoms of blackleg there is little you can do in the way of treatment.

Increased Income

1. **Yields of cash crops**
   - Varieties
   - Fertilization
   - Insect control
   - Disease control
   - Work done at the proper time
2. **Livestock**
   - High-producing animals
   - Pasture program
   - Feed program
   - Sanitation
3. **Balance**
   - Livestock with land use
   - Labor requirements with labor available
   - Labor distribution by months
   - Income to needs
   - Home use and sales
4. **Non-farm work**
   - Equal to diversification of cash farm income
5. **Home-grown foods**
   - Garden equals tobacco acre for acre in cash value
   - Most available market for farm products

What Can You Do About It?

In many ways you live in the best county of the State. In others your county is far down the list. What are your resources in terms of land, income, wealth, skills of the people? What do you consider your greatest needs?

Much Depends Upon Your Neighbor

1. His children marry your children.
2. Schools, churches, government, and clubs are impossible without his help.
3. The line fence keeps livestock on the right side but it doesn't stop insects, diseases, soil erosion, forest fires.
4. Electricity, roads, mail routes, school bus lines, telephone costs are determined by the number of families per mile.
5. Land values and living values depend on neighbors' farms as well as yours.
6. In times of trouble, your neighbors lend a hand.

Getting Together

1. **Talk it over**
   - At the post office
   - At the livestock sale
   - At the tobacco warehouse
   - As a definite part of the program of an organization
   - After church
   - Across the line fence
   - At the barber shop
   - At the garage
   - At the store

2. **Use the weekly newspaper**
   - Editorials
   - Letters to the editor
   - News items that point out the problem and point the way to solution.
3. **Find out what other communities have done**
4. **Consult community specialist**

Select A Few Goals (not over six)

1. Interested organizations and individuals agree on a few goals that can be met in a year or less.
2. Representative leaders set the goals, help make the plan and decide on procedure.
3. Whole community accepts goals and agrees to organize.

Ready? Let's Go!

1. Arrange a time schedule for meeting goals.
2. Hold leaders' meetings to exchange experiences and keep up-to-date.
3. Publicity to make it fashionable to be a part of the project.
4. Everybody has a part to play.
5. Public display of progress from week to week.

How Did It Work?

1. Publicize the success achieved.
2. Give credit to the workers.
3. Public exhibit at County Fair.
4. Small group of leaders evaluate the program and results; suggest changes for a new program.

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4M—1-50
4M—2-50

Communities Help Themselves

By Ralph J. Ramsey

A COMMUNITY is made up of the people living there. You and your neighbors acting together or separately determine whether your community is a good or a poor place in which to live. The fact that you live there now indicates that your community has many features you like.

Many communities have an improvement program underway. Your community can do the same thing. A community improvement program is not an ordinary, everyday occurrence. It makes news. Results can't be completed overnight or even in a month. But it is exciting for a group of people to decide what they want in their community life and to make an attempt to bring about their desires. Instead of hoping that Congress or the Legislature will do something, a community tackles its own problems.

What are the steps by which a community inventories itself, agrees on goals, and takes action, In every community there are organizations such as 4-H Clubs, PTA, fraternal lodges, luncheon clubs, Women's Clubs, and farmers organizations that are interested in community improvement and are looking for good club programs. These clubs can start the ball rolling or can sponsor one activity. In the early stages, the community begins to realize its needs by talking, thinking, discussing in group meetings. The

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following steps are suggested for community action and too will provide material for some bang-up club programs.

What Do You Believe?

1. If you like your community, you can find no fault with it.
   OR
   If you like your community, you want to make it better.
2. There are no changes taking place in community life.
   OR
   Community life has been changing, is changing, and will change in the future.
3. Community changes take place regardless of planning.
   OR
   You and your friends have the ability to guide and direct changes.
4. We are all doing the best we can.
   OR
   We can all do better if there is a need for it.
5. You can solve all your problems by your own efforts.
   OR
   Some problems are too big for you as an individual, but most problems can be solved by working with other people in the community.

What Are the Main Needs That You and Your Neighbors Recognize?

Services

1. Transportation

Farm to market roads	Autos
All weather roads	Busses
Attractive roadsides	Trains
Attractive mailboxes	Attractive fences

2. Retail stores and services

Electrical equipment	Clothing
Community canning	Hardware
Slaughter houses	Food
Frozen food lockers	Furniture
Farm equipment	Laundries

3. Health

Drug stores	Doctors
Water supply	Dentists
Sewage disposal	Nurses
Immunization	Hospitals
Ambulances	Insurance
County health unit	

4. Markets

Cash crops	Orderly market
Livestock products	Accessible markets
Livestock	

5. Community recreation

Picture shows	Swimming
Ball games	Bowling
Roller skating	Singing
Pie suppers	Tennis
Ice cream suppers	Badminton
Shuffleboard	Library
Picnic grounds	Parks
Folk dancing	Dramatics
Orchestras	Bands
Family reunions	Fairs
Hobby shows	Parties

6. Welfare

Preparation for marriage	Child care
Partly incapacitated	Old people
Public relief	Mental health

Institutions

1. Church

Mid-week prayer services	Resident minister
Young people's program	Observe:
Men and women's groups	Thanksgiving
Cemetery well cared for	Rural Life Sunday
Services weekly	Harvest Festival
Graded Bible School	Easter
Choir practice	Christmas

2. School

Teachers all college graduates	Active P.T.A.
Several community programs a year	Full 9 months
Adequate teaching materials	Health check up
High school with varied courses	Physical education program
	School lunch program
	Attendance 95 percent

3. Clubs (adequate number available for men, women, boys and girls, and young married couples)

Farm Bureau	4-H
Homemakers	FFA
Veterans organizations	Utopia
Church sponsored social clubs	Red Cross
School sponsored social clubs	Lodges

4. Government

Register and vote
Tax assessments fair and equal
Discussion of public questions
Citizenry work with elected officials
Provide police and fire protection

Conservation

1. Soil and water

Woodland on steep land	Contours
Pasture on slopes	Farm ponds
Build fertility on level land	Terraces
Winter cover crops	Wildlife cover

2. Buildings and equipment

Roof and foundations in good repair	Machinery housed
Clean up and paint	Machinery painted
	Machinery lubricated

3. People

Health and safety practices	Newspapers
Make a living	Magazines
Enjoy living	Books

4. Homes

Modern home equipment	Landscaping
Recreation center in home	Homes convenient
Family budgeting of time	Homes attractive
Family budgeting of income	Canning of food
	Family works together
Family budgeting of needs	Family plays together
Family makes decisions	

or on a piece of cheesecloth spread on a rack or colander. Draining may be hastened by changing the position of the cheese in the bag or on the cheesecloth.

Working and Seasoning the Cheese

After nearly all the water has been drained away, or at least has stopped running in a steady stream, the cheese should be removed to a clean dish and worked to an even texture with a spoon. Salt may be added to suit the taste either when the cheese is worked or when it is eaten. Usually about one level teaspoonful of salt per pound of cheese is enough. If some cream is available, a little of it will improve the taste of the cheese a great deal, altho it is not absolutely necessary.

Best When Fresh

Cottage cheese is rather perishable, and therefore should be made often and eaten while fresh. If it is desired to keep it for a short while, place it in a clean, scalded glass or earthenware vessel, cover, and keep in as cool a place as possible without freezing.

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MAKING COTTAGE CHEESE *at Home*

By Henry B. Morrison



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Thomas P. Cooper, Dean and Director

Making Cottage Cheese at Home

By Henry B. Morrison

Cottage cheese is a concentration of the protein or curd portion of milk, and is very high in nutritive value. It can easily be made in the farm home from surplus skimmilk that might not otherwise be used for human food. Especially where there are family cows, skimmilk is often available in such large amounts that it cannot all be used for drinking or cooking, and at least part of it can well be used in the form of cottage cheese.

When properly made from skimmilk of good quality, cottage cheese is not only a most desirable food alone, but forms delicious combinations with many other foods.

Equipment Necessary

Cottage cheese can be made at home in small amounts by using ordinary equipment found in every kitchen. The necessary equipment includes—

Kettle or pail of at least 8-quart capacity
Long-bladed knife to cut the curd
Large spoon with which to stir the curd
Dishpan or large kettle to be used as a double boiler in cooking the curd
Dairy thermometer to assure the proper temperature necessary in making the cheese
Cheesecloth or draining bag
Rack or some device for draining the whey from the curd

Setting the Milk

In order to make cottage cheese of good quality, the skimmilk must be of good quality, because any undesirable flavors that may be present in the skimmilk will probably be present in the cheese. The skimmilk should be kept at a temperature between 70° and 75° F. until it sours or clabbers. Sometimes this process may take as long as thirty hours. If desired, it may be speeded up by the addition of a small amount of clean-flavored sour skimmilk or natural starter.

Another and probably a better method is to pasteurize or heat the milk to 145° F. and hold it at that temperature for 30 minutes. It should then be cooled to 70° or 75° F. and inoculated with a small amount of commercial starter or clean-flavored sour milk. About ¼ pint of starter will be enough for 2 gallons of milk.

It is usually most convenient to add the starter in the afternoon and then the milk will be clabbered and ready to be cut by the following morning.

Cutting the Curd

One may tell when the proper time for cutting has been reached by the condition of the curd. If the curd breaks away from the sides of the vessel cleanly when depressed slightly with a spoon, the proper stage has been reached. The curd should then be cut (not broken) into pieces approximately one-half to one inch in each dimension. If the pieces are very small more moisture will be forced from them and a very dry cheese will result, while if they are very irregular the cheese will not be uniform in moisture content.

Heating the Curd

Heating or cooking the curd is accomplished by placing the vessel containing the clabbered milk in a larger vessel containing water at a temperature of 120° to 130° F. The curd should be stirred gently with a large spoon so as not to break up the pieces of curd too much. It should be heated to 100° to 110° F. and held at this temperature for about a half hour, stirring gently from time to time. One of the common mistakes in making home-made cottage cheese is heating to too high a temperature and for too long a time. High temperature causes the pieces of curd to contract, squeezing out too much whey and making the cheese too dry. After 30 minutes at 100° to 110° F. nearly all of the curd will have settled to the bottom of the vessel.

If much of the curd is floating, undesirable gas-producing organisms are very likely present, and these are apt to produce off flavor as well as gas.

Draining the Whey

When the cooking is done the whey may be poured or drained off and the curd washed with about the same amount of cold water as there was whey. This will wash a good deal of the acid from the cheese so that it will not taste so sour, and at the same time it will cool the cheese.

The water may be drained away either by placing the cheese in a small cheesecloth bag

nearly always provide suitable blood for testing. If respiratory infection is not followed by the development of nervous symptoms, wait 2 weeks after onset of the disease before sending in material for testing. Don't ship sick or recovered chickens by common carrier, as this might expose young chicks in transit.

Blood may be collected from the wing veins, packed in ice, and shipped to the diagnostic laboratory. For this purpose 3 to 5 cc (½ to 1 teaspoonful) from each of several chickens is required.

In laying hens the egg-yolk provides a source of the antibody which may be used for the HI tests. If eggs are submitted for testing, send only those collected after the flock starts coming back in production, 2 to 3 weeks after the outbreak occurs. Eggs collected during the first decline in production and immediately thereafter are not suitable for diagnosis of Newcastle disease.

Vaccinated Chickens and Chicks Hatched from Vaccinated Hens

A laboratory worker may find it difficult to determine the cause of respiratory infection in vaccinated chickens and in young chicks hatched from vaccinated hens. Some of the diseases similar to Newcastle disease are due to virus infections for which diagnostic procedures are not readily applied or have not been developed. Chicks hatched from immune hens may have enough antibody transferred through the egg to give them positive reactions in the HI test. Such chicks may undergo mild infection with Newcastle disease virus. In this event diagnosis must be made by isolation of the virus or by challenge exposure (injecting the chicks with Newcastle disease virus) on a group of chicks a few weeks after symptoms occur. The challenge exposure will determine whether an immunizing reaction against Newcastle disease virus has occurred from previous infection. Knowledge of the time since vaccination and a comparative study of positive HI test responses will provide information regarding respiratory infections in vaccinated chickens.

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5M—2-50

Diagnosis of Newcastle Disease in Chickens

By E. R. Doll

This leaflet describes the several different means by which Newcastle disease in chickens is diagnosed. The leaflet is prepared as an aid to veterinarians, hatcherymen, county agents, and flock owners in the selection of material for laboratory diagnosis of this disease.

Diagnosis Is Important

An accurate diagnosis of respiratory infections which resemble Newcastle disease is important, for several reasons. We need to know more about how widespread Newcastle disease is and the conditions under which it occurs, in order to develop control procedures and determine the value and uses of vaccines and vaccination procedures. Experimental challenge exposure (that is, the direct injection of chicks with the Newcastle disease virus) has shown extreme variation in the protection that young chicks have acquired through the egg, from vaccinated hens. This protection, which is called "yolk-transferred immunity," in young chicks must be evaluated mainly by determining the cause of respiratory infections occurring under field conditions. Also, experiments have shown that it may be possible for chickens vaccinated with living virus vaccines to become infected later on with Newcastle virus. Therefore all outbreaks of mild respiratory infection in vaccinated hens are worthy of investigation to determine whether there has been reinfection with Newcastle disease virus. Still another reason for diagnosis of respiratory infection in chickens is to provide valuable information on the prevalence and importance of respiratory infections other than Newcastle disease.

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There are several methods of determining whether an outbreak in a flock is Newcastle disease. The diagnosis may be made by clinical and postmortem examination of sick birds. Laboratory tests are more accurate, but their success depends on the type of material presented for examination. The material presented also influences which tests will be used.

Clinical Diagnosis and Postmortem Examination

Symptoms and lesions similar to, or identical with, those of Newcastle disease occur in a number of other diseases of chickens. Clinical examination alone (that is, the observation and examination of living subjects) is the least accurate means of diagnosing the disease. In some outbreaks of respiratory infection, clinical diagnosis will be quite accurate if the infection is accompanied with or followed by nervous symptoms. Often, however, in chickens 6 weeks of age or older, the expected symptoms will be lacking. Lesions observed on postmortem examination, cloudy air sacs and exudates in the air passages, are of little value for diagnosis because such lesions also occur in certain other diseases. A sharp drop in egg production accompanied by respiratory infection is typical of Newcastle disease, but also occurs in other poultry diseases.

The occurrence of symptoms suspicious of Newcastle disease should be a signal for seeking the aid of a diagnostic laboratory.

The Serum Neutralization Test

This procedure uses serum from sick or recovered chickens which is tested for neutralization of known Newcastle disease virus. The tests are performed in eggs containing embryos (embryonated eggs). A large number of eggs are required for the test, and one week or longer is necessary for its completion. Because this test is expensive and laborious, laboratory diagnosis is usually made by virus isolation or the hemagglutination inhibition test.

Diagnosis by Virus Isolation

In this procedure the Newcastle disease virus is cultivated in embryonated eggs and identified by neutralizing the infection in the embryo by specific immune serum. Also the virus may be identified by inhibiting chicken red cell agglutination with known immune serum. This operation requires embryonated eggs, and usually takes 6 to 12 days.

Isolation and cultivation of the virus in embryonated eggs is the only means available for making a positive diagnosis in the early stages of Newcastle disease. Ordinarily, isolation of the virus is successful only during the first 4 to 6 days after infection is acquired. For this reason living chickens are suitable material for virus isolation for only a short period after they become infected. Eight to 10 chicks should be selected immediately after they show the first symptoms and brought to the laboratory by private transportation, as shipping sick birds by common carrier may expose healthy chicks in transit.

Dead chicks are useful only for virus isolation tests. If they are obtained from among the early deaths in the outbreak, and if they are delivered to the laboratory before putrefaction begins, dead chicks may be used successfully for diagnosis by virus isolation. In our experience, virus isolation has been successful in less than half of the chickens examined. This low percentage has been due largely to unsuitable material presented for diagnosis. At 5 to 7 days after infection is acquired, it may not be possible to confirm a diagnosis with any of the available tests.

From the viewpoint of the research worker it is desirable to make the diagnosis of Newcastle disease by isolation of the virus. It is possible that variant types of the Newcastle disease virus may develop. Such an occurrence can be determined only by isolation and laboratory study of the virus.

The Hemagglutination Inhibition (HI) Test

The HI test is the most frequently used laboratory procedure for the diagnosis of Newcastle disease, as it may be completed within 1 to 2 hours. Living chickens, whole blood, blood serum, or eggs may be presented for diagnosis.

The reaction in the HI test depends upon the presence of antibody in the serum, which acts upon Newcastle disease virus and prevents the virus from agglutinating (clumping) red blood cells. After chickens are infected with Newcastle disease virus, a period of 6 to 12 days is required for enough of this antibody to develop to provide a positive test. This means that only chickens which have had the disease a week or more provide suitable material for the test. Chickens which have passed through the respiratory phase and have developed nervous symptoms

TREATMENT

Adult sheep known to be infected with tapeworms should receive two medications, the first at the onset of warm weather and the second by mid-June, unless treatment would interfere with lambing. Heavily infected lambs should be treated when they approach 40-pound size.

One of the drugs for treating tapeworm infection in sheep is lead arsenate. The most convenient way to give lead arsenate is along with the phenothiazine drench. Phenothiazine-lead arsenate mixture may be purchased in the liquid or powder forms. The dosage of the liquid mixture is 1 fluid ounce for lambs and 2 fluid ounces for adult sheep. The dosage for a lamb should not be more than one-half gram of lead arsenate and the dosage for an adult should not be more than 1 gram. The mixture of phenothiazine-lead arsenate should be shaken thoroughly before each lamb is drenched.

Do not overdose. Any drug which removes parasites has to be a poison, and if too much is given death will result.

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Control Of TAPEWORMS in Sheep

By
Ross Brown
A. C. Todd
M. F. Hansen

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College of Agriculture and Home Economics
UNIVERSITY OF KENTUCKY
Thomas P. Cooper, Dean and Director

Control of Tapeworms in Sheep

By Ross Brown, A. C. Todd, and M. F. Hansen

Among more than 30 species of animal parasites occurring in sheep in Kentucky, is the tapeworm *Moniezia expansa.* Phenothiazine does not control tapeworms even though it is so successful in removing roundworms in sheep. Widespread use of phenothiazine as the only worm treatment for sheep has led to neglect of treatments designed to remove tapeworms.

OCCURRENCE

Sheep of all ages and breeds may be infected by tapeworms, although greatest damages and losses occur in lambs. Postmortem records have shown infections throughout Kentucky. A seasonal peak occurs in spring and early summer.

The most common and most important species of tapeworm infecting sheep in Kentucky is *Moniezia expansa.* The worms are found in the small intestine, where they may reach a length of 10 feet and a width somewhat greater than a half inch. Each worm is attached to the inner lining of the small intestine by its "head." It gets its nourishment by absorption, directly through its body wall, of the digested and partly digested contents of the sheep's intestine. The tapeworm is grayish-white and is composed of a series of segments. The segments are not individual worms, but break off the main chain from time to time and pass to the outside in the droppings.

SYMPTOMS

The easiest way to tell whether your sheep have serious infections of tapeworms is to examine their droppings closely from time to time for segments of the tapeworms. So long as you find no segments, or

very few, on repeated examinations, it is not likely that your flock is heavily infected.

Sometimes sheep have both tapeworms and roundworms at the same time, but may show symptoms only of roundworm infection. The external symptoms of roundworm infection are loss of weight, dull wool, pale skin and mucous membranes, diarrhea in the earlier stages of infection, and edema. In the recovery period sheep may be constipated. None of these symptoms are typical of tapeworm infection except, in general, diarrhea. Under farm conditions where lambs may be infected with both roundworms and tapeworms, symptoms of tapeworm infection are generally hidden by symptoms of roundworm infection.

Sheep heavily infected by tapeworms have been known to die before symptoms were noticed. Many cases of diarrhea in sheep have been diagnosed as due to roundworm infection when actually the diarrhea should have indicated tapeworm infection. Heavy roundworm infection frequently results in constipation, the pellets being small, dry, and hard. Heavy tapeworm infection, on the other hand, results in scouring or softened feces. In cases where roundworms are not involved and where death occurs from tapeworm infection, the symptoms are usually stiffness in gait (the animal may even be down in the hindquarters), and diarrhea, except in acute cases where the animal dies suddenly and in good condition. Heavy infection in a flock may be accompanied by death losses.

PREVENTION

Prevention of infection with tapeworms depends on pasture rotation and medication. Sheep become infected when they eat the intermediate host, a small free-living mite which crawls up on vegetation. Pasture rotation, in prevention of tapeworm infection, means changing ewes and lambs to clean pasture at frequent intervals starting with warm weather.

EXAMPLE: How to Figure Cost of Tractor Operation

Machinery costs are "fixed costs" and "operating costs." Fixed costs include depreciation, interest, and housing. Considered on an annual basis they remain about the same regardless of how much the machinery is used. To find daily fixed costs, the annual cost is divided by the number of days the machinery is used. Therefore, the more use the machinery gets, the lower the daily fixed costs. Operating costs—fuel, oil, grease, and repairs—occur only when the machine is in use, and vary somewhat with different farming operations. Therefore total daily costs (fixed daily costs plus operating costs) can be reduced chiefly by increasing the use of the machine because this reduces daily fixed costs. That is why it is especially profitable for machinery owners who heretofore have not made full use of their machinery to exchange machine work or do custom work, provided the rates are fair and equitable.

Fixed costs.— *Depreciation* is a charge based on the life, first cost, and salvage-value of the machine. For example, a tractor costing $1,675 and lasting 10 years, with a "junk" value of $75, has an annual depreciation of $160.00; that is, 1/10 of $1,600.

Interest is a charge for the use of the money invested in a machine. It is calculated at a given rate on the average annual value of the machine during its lifetime. For example, a tractor costing $1,675 when new represents an average annual investment of $837.50. The annual interest charge for this tractor is 6 percent of $837.50, or $50.25.

Housing is a charge for sheltering the tractor. Figuring the cost of a shed 15 feet by 30 feet (tractor using one-fifth of the space) at $355, and estimating the annual charge for depreciation, repairs, interest, taxes, and insurance at 10 percent of the original cost, the housing charge is $7.10 per year.

Depreciation, interest, and housing charges are about the same for the year regardless of the number of days the machine is used. If the tractor is used 78 days during the year, the fixed cost per day of use is the annual fixed cost divided by the days of use, or, in this example, $2.79:

Depreciation	$160.00
Interest	50.25
Housing	7.10
Annual fixed cost	$217.35
Daily fixed cost (78 days' use)	$ 2.79

If the tractor were used only 30 days during the year, the daily fixed cost would be $7.24.

Operating costs.— The amount of fuel used by tractors varies according to size and condition of tractor, kind of work done, and skill of operator. The summary below gives the average daily fuel consumption for different kinds of work, found by the Kentucky Agricultural Experiment Station:

	Gallons of kerosene or distillate per 10-hour day
Plowing	20
Disking	20
Cultipacking	12
Cultivating	15
Mowing	15
Binding	15
Combining	14
Pick-up baling	10
Grain drilling	15

With this wide variation in daily fuel consumption it is necessary to figure fuel costs for each kind of work to be done.

Oil and grease consumption and repair charges, in addition to fuel, make up the operating costs. Oil consumption depends chiefly on the condition of the tractor, and may range from 1 to 6 quarts a day. Grease is a very minor cost, usually 65 cents to $1.30 a year, roughly a cent for each day of use. Repairs depend on care taken of the tractor, on its age, and general working conditions. Rocky, hilly land or tight clay soil is harder on a tractor than loamy soil and level land. On an average, repairs run about $40 a year, or about 51 cents per day of use.

For example, the daily (10-hour day) tractor operating costs for plowing can be estimated as follows:

Fuel (20 gallons at 13 cents)	$2.60
Oil and grease, for tractor in average repair	.78
Repairs	.52
	$3.90

Adding the daily fixed cost ($2.79 for the tractor used 78 days a year) the total daily tractor cost for plowing is $6.69. If the tractor is used only 30 days a year, the total daily cost ($3.90 plus $7.24) is $11.14. In increasing use from 30 days to 78 days annually, a farmer reduces his tractor cost by $4.45 a day. This cost does not include cost of labor for operator or daily cost charged to the tractor-plow.

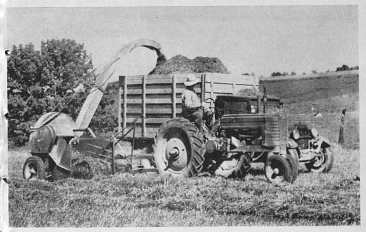
Costs for other farm machines can be figured the same way as tractor costs. For many other machines daily cost would be almost entirely fixed cost.

All parties benefit by increasing annual use of farm machines through exchange or custom work, thereby reducing daily cost of using the machines. The farmer owning the machine does his own work for less, by such cooperation. And at the same time neighbors who use his machines get their work done for less, provided "fair and equitable rates" are rightly established.

5M—9-51

COOPERATE
With Neighbors for better use of
FARM MACHINERY

By George B. Byers



Power machinery such as the field forage chopper shown here has increased on Kentucky farms. Sufficient volume of production is essential for efficient and economical use of this power machinery.

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Cooperate With Neighbors for Better Use of Farm Machinery

By George B. Byers

POWER MACHINERY does the work of many farm hands. One man with tractor machinery can take care of as many acres of corn as 4 or 5 men with horse-drawn tools. Kentucky farmers have increased their investment in power farm machinery since World War II. Sufficient volume of production is essential for efficient and economical use of this power machinery.

Effective use of power machinery by many Kentucky farmers is difficult because of the size of their farms. Some form of cooperative use, therefore, has an important place in the mechanization of the state's agriculture.

Because of the danger of spreading black shank of tobacco by tillage machinery, however, farmers who use machinery cooperatively should take all necessary precautions to prevent such spread. Black shank has spread very rapidly in the past few years.

Ways to Get Most Use From Machines

Do custom work.— Owner of machinery does his own work and also that of his neighbors, charging them a prearranged rate per acre or per hour.

Custom exchange of privately owned power machinery.— Larger volume of work annually can easily be obtained by having two or more farms on which to use the machinery. Prearranged plans for use and custom charge rates between two or more farmers allow each farmer to keep his machinery investment lower, while at the same time obtaining the benefits of fuller mechanization. Private ownership makes each farmer responsible for care and maintenance of his particular machine. Disagreements over repairs and maintenance are avoided.



However, a problem of *who is going to get work done when* still exists. A plan of working one day on one farm and the next day on another farm has been followed by farmers in western Kentucky. With adjoining farms and power machinery mounted on rubber tires moving from one farm to another causes only a small amount of difficulty.

Have joint ownership.— Two or more farmers jointly own one or more machines. Because of difficulty of dividing expenses of repairs and upkeep, and time of using the machinery, this method is not used as much as the other two mentioned.

Swap labor for machine work.— One farmer exchanges labor, or labor and horse work, with the owner of a power machine in return for use of the machine and its operator. In breaking ground, preparing seedbed, and cultivating crops, the power machinery can be operated in two 10-hour shifts per day. Use of machinery is thereby greatly increased.

Make Preseason Agreements

Before the work season begins, make necessary agreements with other farmers for cooperative use of machinery. Matters that should be agreed on are:

Machinery free from tobacco black shank.—In areas where there is much exchange of machinery and labor and where black shank has appeared, the disease has spread rapidly from farm to farm in dirt carried on machines and on the shoes of the workers. Machines used to plow or work land that has had black shank tobacco on it in the past two years should be thoroughly cleaned of dirt before going to another farm. Farmers who are using machinery and labor from other farms should insist that the machinery and workmen's shoes are free from dirt, particularly if the machinery is to be used to prepare a plant bed or a field for tobacco.

Method of cooperation.— Find which one of the above-mentioned four ways will get more use from machines available on the farms. A combination of these ways may best fit the farming to be done. Keep in mind the great need for increased farm production in the times ahead.

Who is to operate the machine.— More complex machines such as tractors, combines, and balers should be operated by the owner or an operator hired by him.

Work schedule.— Make a schedule for exchange of work in order to provide for as full use of the machine as possible. This will help avoid conflicting requests for it.

Rates of pay.— Decide on rates of pay and terms of exchange. In custom work, give attention to the time required for overseeing work, and make allowances for time and expense involved in moving from one job to another.

Time of settlement.— Frequent settlements according to the rates agreed on will help prevent misunderstanding.

How to Determine Rates of Pay for Custom or Exchange Work

One of the chief problems in working out plans for cooperative use of farm machines is determining rates of pay for different machines used for different farm operations. This is a problem each group must work out for itself. Certain average costs, found by the Kentucky Agricultural Experiment Station, are helpful as guides to farmers considering exchanging use of machinery. These averages adjusted to the 1950 price level are given in Table 1.

Suppose you wish to estimate the rate for plowing a field with a 2-bottom tractor plow from the averages in Table 1. Cost of the tractor is $6.69 per day; cost of the plow $2.33 per day. To this add the wage for an operator. If $5.00 per day is the average wage for this kind of work, the total cost of tractor, plow, and operator is $14.02 a day. The average number of acres plowed by 2-bottom tractor plows is 6.1 acres a day, (see Table 1) making the cost per acre $2.30.

Rates for harrowing and other kinds of farm work can be estimated in the same way. In arriving at exchange and custom rates, give careful consideration to kind of crop, size of field, general working conditions, and whether or not the machines are in good repair. All these directly affect operating costs.

Table 1.— Average daily cost for farm machines and cost per acre or per ton of work done by each machine[1]

Tractor and tractor machines	Average purchase price	Average life, years	Annual Cost: Percent of purchase price	Annual Cost: Total	Use per year, days	Cost per day[2]	Work done: Per year	Work done: Per 10-hr. day	Annual cost[3]
							acres	*acres*	*per acre*
Tractor (2-plow)	$1700	11	30.7	$521.90	÷ 78 =	$ 6.69	.....	.....	$ .38
Breaking plow (2-bottom)	220	13	15.9	34.98	÷ 15 =	2.33	92.0	6.1	.38
Disk harrow (6-foot)	205	13	15.0	30.75	÷ 16 =	1.92	230.0	14.3	.13
Disk harrow (7-foot)	235	14	15.9	37.37	÷ 15 =	2.49	240.0	16.0	.14
Cultipacker (4-foot)	115	23	8.9	10.50	÷ 2 =	5.25	50.4	25.2	.21
Cultivator (2-row)	200	13	10.9	21.80	÷ 9 =	2.42	186.0	20.7	.12
Mower (7-foot)	270	11	14.4	38.88	÷ 10 =	3.89	154.0	15.4	.25
Binder (8-foot)	395	12	13.7	54.12	÷ 4 =	13.53	74.5	18.6	.73
Grain drill (6-foot)	271	24	8.0	21.68	÷ 8 =	2.71	98.0	12.2	.22
Combine (motor mounted)	1790	7	26.6	476.14	÷ 24 =	19.84	214.0	8.9	2.23
Combine (power take-off)	1110	8	25.5	290.55	÷ 24 =	10.57	214.0	8.9	1.32
Corn picker	859	10	19.0	163.21	÷ 26 =	6.28	189.0	7.3	.86
							tons	*tons*	*per ton*
Pick-up baler[4]		10	17.2	286.72	÷ 19 =	15.09	328.0	17.2	.88
Field chopper (motor mounted)	1667	12	29.0	577.05	÷ 19 =	30.37	240.0	12.6	2.40
Field chopper (power take-off)	1094	10	19.2	210.05	÷ 20 =	10.50	110.0	5.5	1.91

[1] Adjusted to 1950 price level. [2] No charge included for the time of the operator. [3] Cost of baling wire not included. [4] Adjusted to 1950 price level.

RESERVOIR MANAGEMENT

(See Extension Circular 470 for details)

1. Do not plant pond lilies, cattails or other aquatic plants. They will eventually fill the reservior.

2. Copper sulfate, commonly known as bluestone, is used in large ponds for the control of algae, the green scum often seen on the surface of water. Applied to the water at the rate of 8 pounds to a million gallons of water, it is harmless to fish and livestock.

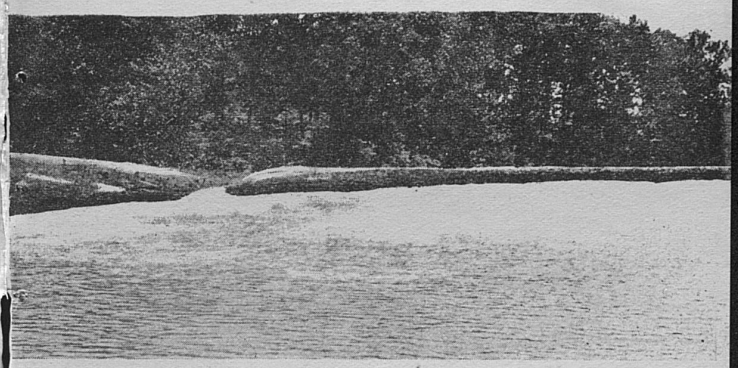
3. Crayfish around a pond may be killed with carbon disulfide. Use two tablespoonfuls per hole. Cover the hole with mud. Carbon disulfide is inflammable. Two and one-half tablespoonfuls of coal tar creosote emulsion to one gallon of water will also kill crayfish. Use one-half cup in each hole.

4. Minnows will keep a pond from becoming a breeding place for mosquitoes.

5. Soil containing 25% or more clay particles may be puddled with soda ash mixed with the soil at the rate of from one to two pounds per 20 square feet of surface area. Hogs or cattle may be used to puddle the soil in the bottom of a pond.

6. Sink holes in the bottom of a pond may be stopped by first excavating the hole down to the underground channel. Cover the opening at the bottom of the excavation with flat rock covered with concrete. Refill the excavation with tight soil tamped while moist. Treat the entire area around the hole with soda ash or bentonite to prevent the formation of other sink holes.

5M--9-51



FARM RESERVOIRS

Suggestions on Planning and Construction

By Earl G. Welch

GOOD WATER for livestock, at low cost, is the main reason for building farm reservoirs. Lack of a good water supply during drouth is a great handicap to livestock production. If the drainage area is free from pollution and if livestock are fenced away from the pond, a farm reservoir will provide good water. Also, a properly built farm reservoir is the cheapest source of water for livestock where there is no ample natural supply. Protected from silting, it lasts for many years without expense for pumping and without needing much attention from the farmer.

Aside from this main benefit of good water at low cost, a good farm reservoir provides other values. Stocked with fish, it gives both recreation and meat for the table. It is a place also for swimming and boating. If it is well constructed and well maintained, it definitely increases the sale price of the farm.

Leaflet 129

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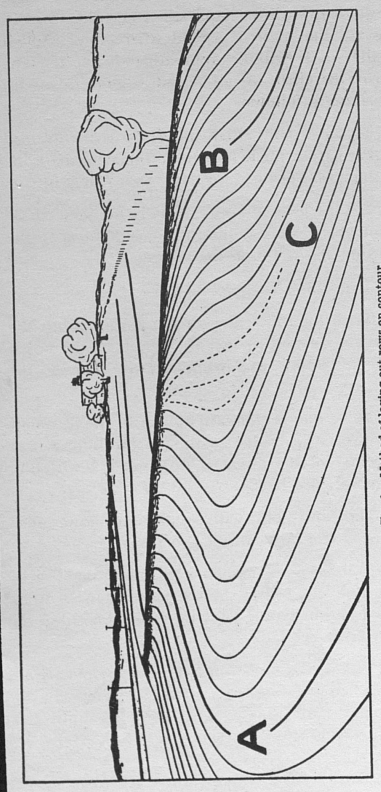


Fig. 1. Method of laying out rows on contour.

that part of the field not yet planted, and continue planting above this row until the first planting is reached. Fill in vacant space between the two plantings with short rows. Continue planting below B until the rows cease to be level. Locate other guide rows in the same manner and continue the procedure until the entire field is planted.

If guide rows are established for the preparation of a seed bed, a permanent contour line may be established by back-furrowing to the line of stakes, thus establishing a permanent line which may be used as a guide when the field is planted.

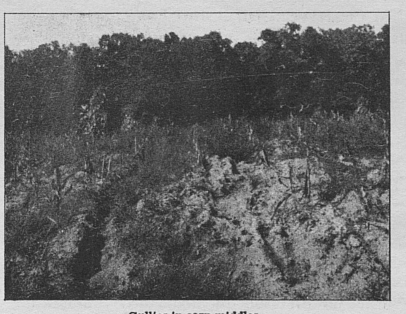
For further information, consult your county agent, or write the Department of Agricultural Engineering, Experiment Station, Lexington, Ky.



Corn planted on the contour.

1M—1-52

CONTOUR CULTIVATION



Gullies in corn middles.

Do Your Plowed Fields Look Like This?

•

CONTOUR CULTIVATION
Reduces Erosion
Conserves Moisture
Requires Less Power
in Plowing, Cultivating and Seeding

•

Leaflet 130

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Contour Cultivation

By EARL G. WELCH and JOHN L. McKITRICK

WHY CONTROL EROSION?

To Conserve Agricultural Land. Erosion depletes the fertility of uplands by the removal of soil which is deposited in stream channels and thus causes poor drainage of otherwise fertile bottom land.

To Conserve Plant Food. Erosion removes more plant food than do harvested crops and, unless controlled, makes impossible the economical maintenance of soil fertility.

To Save the Soil Itself. Centuries are required for nature to produce a fertile top soil. Plant food removed by crops or by leaching may be returned to the soil by man thru soil-building practices, but he cannot return the soil itself to an eroded slope by any practical measure.

WHY PRACTICE CONTOUR CULTIVATION?

To Reduce Erosion. In any crop rotation which includes intertilled crops such as corn and tobacco, by far the greatest soil losses occur between the time the ground is plowed and the time when an adequate vegetative cover has been established following the cultivated crop. Erosion experiments have shown that about 80 percent of the annual amount of erosion takes place during the planting and cultivating season.[1] Data from soil erosion experiment stations indicate that during this period soil losses frequently are as great as 60 tons per acre and seldom less than 6 to 10 tons per acre. On an average of all slopes ranging from 5 percent to 15 percent, about one-half as much soil was lost from slopes planted on the contour as from those planted with rows running directly with the slope.[2]

1 Missouri Research Bulletin No. 63.
2 North Carolina Soil Erosion Experiment Station Report.

The combination of terracing and contour cultivation is the most effective means of controlling erosion during a period of cultivation; but, if terracing is not practiced, contour cultivation aids greatly in reducing erosion during the period of a rotation when land is not occupied by a vegetative cover.

To Save Time and Power. Rows laid out on the contour not only conserve soil but also time in turning, because the average length of rows is usually greater than it would be if the rows were straight. Likewise, less power is required in cultivating around the hill than when the rows are laid out up and down the slope. Thus it is easier on both team and driver. The same is true in plowing, preparation of the seed bed, seeding and harvesting small grains.

HOW TO PRACTICE CONTOUR CULTIVATION

Surveying Equipment. In order that contour cultivation may be most effective in controlling erosion, guide rows should be established which are true contour lines. An inexpensive farm level with a telescope or a surveyor's level, and target rod are most convenient for establishing a guide row. Other leveling devices may be used but are less accurate and require more time.



Small grain on lespedeza sod. Planted on contour.

To Stake Out a Guide Row. In a small field with a uniform slope, one guide row usually is sufficient. In fields of less uniform slope, more than one guide row will be required. One guide row will serve all that part of a field where rows planted parallel to it will be approximately level. The steps to be taken in staking out a guide row with a level are as follows:

1. Select a point where the slope is the average for that part of the field and set a stake to mark the starting point of the guide row. See A, Figure 1.

2. Set the level at approximately the same elevation as the starting point and some 300 feet in the direction the row is to be staked.

3. Level the telescope.

4. With the rod at the starting point, adjust the target on the rod so that the center of the target coincides with the horizontal cross hair of the telescope.

5. Move the rod forward 50 feet in the direction of the row and locate a point on the slope where the center of the target again coincides with the horizontal cross hair.

6. Mark this point with a stake and locate other points 50 feet apart in the same way.

7. If it becomes necessary to move the instrument, hold the rod at the last point that has been located and move the level into a new position on the key row.

8. Adjust the target on the rod the same as was done when the line was started and continue in the same manner as at the beginning until the row is staked across the field.

Planting with a Guide Row. The first row, or guide row, is laid out on the line staked. Other rows are made parallel to it on both sides until they cease to be level, as at C, Figure 1. Locate a second guide row where the slope is average for

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What's the Outlook?

for

KENTUCKY AGRICULTURE IN 1952

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FOREWORD

The growing needs of our national security program combined with a continuing high level of consumer demand present a challenge to Kentucky farmers for increased agricultural production again this year.

It is believed that the appraisal of the economic situation of agriculture contained in the Agricultural outlook for Kentucky will prove of material benefit to Kentucky farmers in planning for a high level of production for 1952 despite certain obstacles which will make the job ahead not an easy one.

To supplement this analysis of the present status and probable future course of basic economic factors affecting Kentucky's agriculture, the College of Agriculture will provide current reports in the coming year in the form of press releases, radio broadcasts and the monthly "Notes on the Kentucky Agricultural Situation."

6M--1-52

1952 AGRICULTURAL OUTLOOK

The year ahead, 1952, is starting out in high gear. Civilian employment is the greatest ever, business activity is at a high level, consumer income is at record level, and industrial and farm production are keeping up with the boom economy.

Last year, 1951, saw an increase in total national production, an increase in civilian employment, an increase in consumers' income, a rise in the general level of prices, and increased governmental expenditures for defense.

An analysis of what's ahead leads to the conclusion that while the boom level likely will continue and perhaps at even a slightly increased rate, some "softening" may occur at different spots in the economy during at least a part of the year. This conclusion is based on the assumptions:

1. That proposed government spending for defense will be increased appreciably over 1951.

2. That consumers will be better adjusted to buying at a high price level and thus more careful and discriminate in how much they spend as well as in what they buy.

3. That the international situation will remain similar to that of the last half of 1951.

With anticipated strong consumer demand and a high level of business activity, large production and efficient farming are the keys to farmers' success during 1952. Some adjustments of prices among the different farm products are to be expected, as discussed in detail in the following sec-

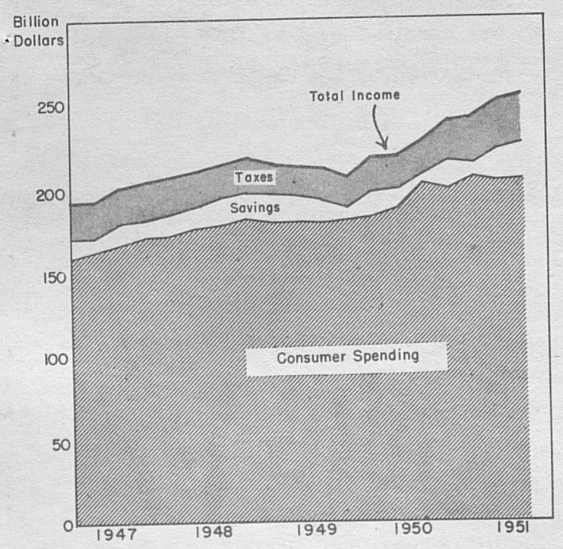
tions, but in general a continuation of the level of prices that prevailed in the last half of 1951 is expected.

Farm costs are expected to rise in 1952 in relation to farm prices so while gross income may be somewhat larger, net farm income may be about the same as in 1951. This statement also is based upon a somewhat possible higher level of total agricultural production in 1952 than in 1951.

THE DEMAND SITUATION

Consumers' incomes expected to continue at high level. --Consumers' incomes are expected to rise somewhat during the coming year, but with a higher tax rate than in the whole of 1951, the "disposable" income of consumers may not be much, if any, larger than during the last part of 1951. In recent months consumers have saved about 10 percent of their total in-

PERSONAL INCOME IN U.S. BY QUARTERS, 1947-1951

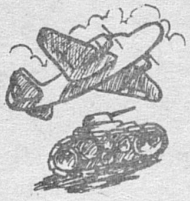


Source: U.S. Dept. of Commerce

come (see chart), a level exceeded only during World War II when there was a strong patriotic appeal to save. Should this rate of saving continue or go further upward, one inflationary force will be somewhat lessened. Past experience leads to the prediction, however, that demand for goods and services during the coming year will continue strong.

Another aspect of consumers' buying behavior that is worthy of mention, although data are less readily available to use in the analysis, is the change that occurred in the spending pattern in 1951. After consumers sharply increased their buying from mid-1950 to early in 1951, retail sales dropped to a more normal basis and continued in that manner the remainder of the year. Apparently consumers began to make adjustments to high prices, realized that their fears of major shortages largely were unfounded, and on the whole became more cautious in their buying. Continuation of such adjustments could well influence the price positions of some foods now high in relation to prices of other substitutable foods.

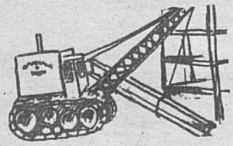
Government spending for national security to be larger. --Present governmental plans call for expenditures for national security to rise to an annual rate of 65 billion dollars in late 1952, as contrasted to a rate of about 41 billion dollars per year at the end of 1951. Already the effects of this large rate of expenditure has shown up in (1) smaller supplies of some raw materials for civilian products, making allocation of scarce materials necessary; (2) change-over from civilian to defense production in



some industries; and (3) an upward trend in employment and consumer incomes.

During most of 1951, government spending for national security was direc-rected largely toward constructing and equipping defense plants and some stock-piling of materials needed for defense. In 1952 a much greater part of defense spending will be for the manufactured products themselves--guns, ships, planes, tanks, and so on---and will therefore be increasingly competitive with civilian wants for both materials and labor. Inflationary pressures from this government spending will tend to increase as such spending rises and as shortages of some civilian goods are felt. It must be remembered, however, that our industrial capacity may be able to produce not only what we need for defense but most of the wanted civilian goods--particularly if our defense schedule were scaled down somewhat.

Investment in new construction and equipment will continue large in 1952. --- This past year saw 25 million dollars spent by business concerns (public utilities, private business concerns, and the like) for new plants and equipment, an amount substantially above that of 1950. Much of this expenditure was tied to the national security program. This year, while the demand for this type of expenditure continues strong, possible shortages of scarce materials such as steel, aluminum, and copper may limit any substantial increase over 1951. For less essential construction such as homes and public buildings, supplies and limitations on the use of materials will not favor as high a level of construction as in 1951.



Decisions made by government are becoming increasingly important as a factor affecting the outlook. --More and more, decisions made by government officials are affecting what happens to prices, to employment, and to the amount of consumers' income remaining for spending. As a factor in the outlook for 1952, plans for defense spending and the actual expenditures are two different things. Changes in the international situation which would substantially ease or tighten international tensions could bring about revisions in plans or a lag in the actual use of appropriated funds, as well as changes in plans of private industry for new production capacity. Such changes could be disturbing to the farm commodity markets.



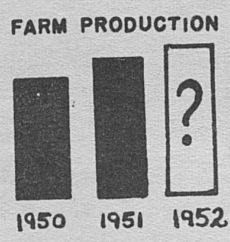
Foreign demand for agricultural products. --For cotton, tobacco, wheat, rice, and fats and oils, the foreign demand is of important influence. On the whole, such demand is favorable to continued exports of these products as the "dollar shortage" of the importing countries is expected to be improved.



The increased demand for the United States type of cigarette is in favor of continued exports of burley tobacco far above those of prewar levels. Availability of other types of tobaccos from other countries at a relatively lower price than U. S. Burley, limits any great increase in burley exports from the United States this year as compared with 1951.

SUPPLY OF FARM PRODUCTS

Given good weather, total farm production in 1952 should be large, perhaps even somewhat greater than the high level of 1951. National production goals call for a new record high level of total crop production. With both domestic and foreign demands indicating that this possible high production can be absorbed at favorable prices, there will be incentives for a high farm output. As mentioned later, however, supplies of several important production items may limit the extent of the increase.



Total agricultural production in Kentucky in 1951 was about 10 percent greater than in 1950, largely because of the substantial increase in tobacco production and some increase in the overall production of livestock. Total national farm production in 1951 was about 6 percent greater than in 1950. Farm output in Kentucky and for the nation in 1951 was materially greater than before World War II.

PRICES

Prices in general may average somewhat higher. --The sharp rise of prices following the outbreak of hostilities in Korea leveled off during 1951. The factors previously discussed plus the fact that inventories are now quite large leads to the conclusion that while inflationary pressures will continue, the price level during the first half of 1952 may be about the same as during the last half of 1951. With possibility of further



deficit government financing after mid-1952, it may be that the influence of the increased money supply will force prices to somewhat higher levels during the last half of the year, but as previously indicated possible changes in plans of the defense program and increased production capacity may "soften" any material price increases. What happens in wage negotiations in the steel industry and in other major industries will crystallize, to an important extent, the price-movement picture, unless manufacturers absorb possible increases in cost without corresponding price increases.

Not much change expected in farm prices. --Prices for farm products as a whole may not differ greatly in 1952 from those of the last half of 1951. Certainly some changes in price relationships among the different farm products may occur as changes in the relative supplies take place.

Price ceilings are in effect. -- The Defense Production Act of 1950 provided that, in general, ceiling prices for farm products may not be established at less than the highest of the following prices adjusted for grade, location, and seasonal differentials: (1) parity prices, (2) the highest price received by producers from May 24 to June 24, 1950. Amendments to the Defense Production Act in 1951 provided that no ceiling can be established or maintained for any agricultural commodity below 90 percent of the price received by producers on May 19, 1951. It was this provision which barred the beef and cattle price roll backs scheduled for August and October of 1951. Increases in pricing and marketing margins are possible under the new amendments to the Act. In general, only prices of meats, among agricultural

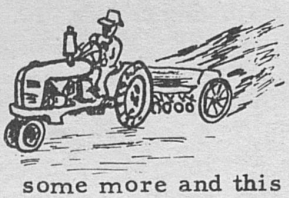
commodities, have come under the limitations of ceilings. Potatoes, however, are a new addition to the list.

Price supports operating under some provision as last year. --Price supports under the provisions of the Agricultural Act of 1949 are mandatory between 75 and 90 percent of parity for corn, wheat, rice, cotton, and peanuts. Tobacco support price at 90 percent of parity is mandatory if marketing quotas of tobacco are in effect. Certain designated non-basic commodities including wool, tung nuts, honey, Irish potatoes, milk, and butterfat received supports between 60 and 90 percent of parity.

As of mid-December, 1951, the parity ratio indicated that prices received by farmers averaged 107 percent of prices paid, including interest, taxes, and wage rates, by farmers.

FARM PRODUCTION COSTS

In 1951 total farm production expenses were from 12 to 15 percent above 1950. A part of this increase was due to a greater quantity of purchases but most of it was the result of higher prices paid. Farm production expenses in 1952 probably will increase some more and this will mean that for most farmers the price-cost squeeze may be more apparent than in 1951.



Farm machinery is now about 10 percent higher in price than in the first half of 1950 and likely will continue equally as high as at present or maybe go a little higher during 1952.

Feed prices are expected to increase some above present prices and may average as much as 5 percent above 1951. In total, farm production costs in 1952, are likely to average between 5 and 10 percent higher than during the past year.

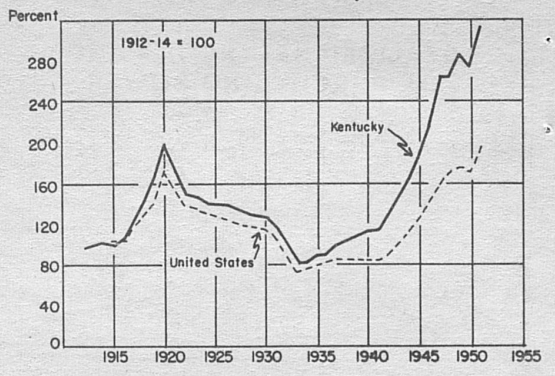
Fertilizer supplies likely will not be sufficient to meet the demand at present prices; phosphate particularly will be in short supply.

Supply of pesticides will be generally adequate and prices likely at about the same level as in 1951.

Enough seed should be available to meet this spring's needs.

Value of farm land in Kentucky and in the United States is now higher than in any period in the history of our country.

INDEX OF AVERAGE FARM LAND VALUE PER ACRE, KENTUCKY AND UNITED STATES, 1912-1951



In Kentucky, land values increased rapidly from 1941 through 1947, then slowed down until in 1950 when they again began to increase sharply (see chart).

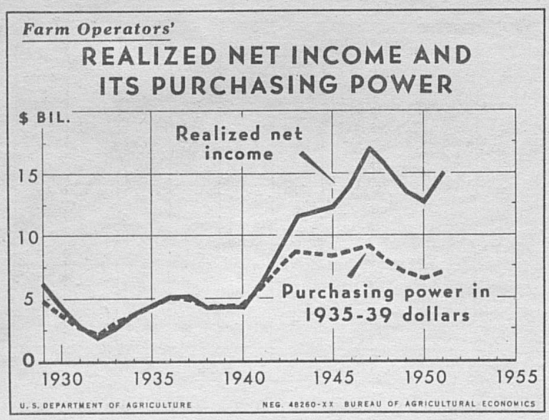
Farm real estate debts have increased rapidly since the outbreak of the Korean War. In Kentucky the debts have increased

more than 10 percent and in the nation an even greater increase has occurred. However, land and farm inventory values have increased at a faster pace than farm debts and farmers are generally in a relatively strong financial position at this time.

FARM INCOME

Cash farm income received from farm marketings in Kentucky in 1951 totaled around 570 million dollars, about 10 percent above the 518 million dollars received in 1950. Compared with the record cash farm income of 598 million in 1947, the 1951 income was about 5 percent less.

Net income data are unavailable for Kentucky for 1951. For the United States as a whole (see chart), net income has



been at a higher level in recent years, but what it would buy declined from 1947 to 1950 and increased only slightly from 1950 to 1951. Net income in 1952 likely will be at a good level in Kentucky, but what it will buy in terms of items for farm production and farm family living may be less than in 1951.

FEED SITUATION

Demand for feed during the coming months will be strong because, (1) more livestock units are to be fed than at this time last year, (2) total grain supplies and grain supplies per animal unit are smaller than last year, and (3) in areas of the country affected by drouth or too much rain last summer there is shortage of both grain and hay. Higher feed prices are in prospect for 1952 in both Kentucky and the United States as a whole.

In some areas of Kentucky drouth during the 1951 summer substantially reduced feed production. In the remainder of the state production of both grain and hay was more nearly normal. The extra cost of moving feed into the drouth areas is a cause for higher prices in those areas than normally exists in relation to other areas.

The total national feed grain production is about 7 percent smaller than last year and total national hay production is estimated to be about 6 percent larger than in 1950. With more livestock on farms in Kentucky and the country as a whole, the carry-over of feed at the end of this feeding season will be substantially less than was carried into the current feeding season.



CATTLE

A larger supply of slaughter cattle and continued good demand for beef are in prospect for 1952.

Total number of cattle on farms has increased each of the last four years in both Kentucky and the country as a whole. Cattle numbers in Kentucky, January 1, 1952, are estimated to be

about 1,876 million head, compared to 1,721 million head a year earlier, while cattle numbers January 1, 1952 are estimated to be between 90 and 91 million head compared to slightly more than 84 million head a year ago. Since the beginning of 1948 U. S. cattle numbers have increased about 12 million head. Numbers on farms are expected to continue to increase, but at a slower rate.

Total number of cattle slaughtered will be larger during the coming year than during the current year, because of the larger number of cattle on farms and ranches. Although present cattle numbers would make possible a substantial increase in slaughter next year, the record of past cattle cycles and the continued generally favorable price conditions in immediate prospect, point to only a moderate increase in slaughter and to further building up of numbers on farms.

Prices. If price controls of beef continue in force at about their present level the chief effect of larger slaughter, during the first half of the coming year, may be to relieve some of the pressure against ceilings. Ceilings on beef under the present laws are due to end by July 1, 1952. Even if the ceilings are not continued, price advances will be only slight to moderate if the expected rise in cattle slaughter materializes.

Prices of feeder cattle during the past fall were at a record high for the season and were closer than usual to the prices being paid for slaughter cattle. This means that returns from feeding will be no greater than average if slaughter prices during the next six months continue at the present level. At present prices of slaughter cattle returns from feeding will not be as favorable as those of the past

several years. Kentucky farmers who have improved pastures are in a relatively good position to keep production cost down to a minimum. Furthermore, home-grown feeds will be increasingly important in order to avoid high production costs.



HOGS

With continued increases in consumer incomes and demand for meat, it appears that the large supplies of pork during the first part of the year will be moved through retail channels without any appreciable lowering of prices.

Hog slaughter will be larger during the first half of 1952 than during the same period a year earlier because of the large pig crops of 1951. The volume of marketings during the latter part of 1952 is more uncertain. Hog producers in the U. S. now indicate that their spring pig crop will be about 9 percent smaller than that of 1951. Kentucky farmers indicate that they will reduce this spring's pig crop about 15 percent from that of a year ago. Another uncertain factor lies in the feed situation. Although the 1951 production of feed grains was relatively large there are more hogs and other grain-consuming livestock to be fed and the carry-over of grain was lower than usual. As a result the feed grain available per animal unit is lower than at this time in any of the last three years.

Prices may strengthen during the latter part of 1952, because of decline in hog slaughter, and are likely to average higher than during the last half of 1951. However, present ceilings on pork will limit the seasonal high in the first part of

the year and if the ceilings are extended to the last part of 1952 they will limit price advances on the smaller hog marketings during that period.



SHEEP AND LAMBS

The outlook for income from sheep and lambs in Kentucky is particularly bright when compared with other livestock enterprises.

Lamb marketings, both in Kentucky and the United States as a whole, are expected to be about the same as during the past year. Continued high demand for meat indicates that dressed lamb will continue to command favorable prices. Lamb production in Kentucky has declined about 20 percent since 1940 although sheep numbers have declined more than that. Sheep numbers were showing more tendency to increase in Kentucky until the drouth developed in several areas of the state last summer. Many orders for breeding ewes were cancelled and 1951 ended with no significant change in sheep numbers in Kentucky.

Price ceilings on lamb at wholesale and retail are indirectly limiting possible advances in prices of spring lambs. So long as ceilings are in operation at present levels, no great change in prices of lambs is to be expected.



WOOL

The wool market is likely to continue erratic during 1952, fluctuating with changes in the general level of international economy. Domestic wool production represents only about one-third of our total requirements; consequently domestic wool prices are influenced markedly by prices in foreign markets. Wool prices are not expected to reach the record peaks established last spring, but will very likely continue at about present levels during the early part of the year.



DAIRY

Demand for dairy products is expected to be strong in 1952, while supplies, on a per-capita basis, will probably be slightly smaller. For the past several years a larger and larger proportion of milk production has been absorbed by fluid milk markets. This is a result of higher consumer incomes and an increase in population. Since consumer incomes are likely to be larger both in total and per-capita in 1952 than in 1951, further increases in demand for fluid milk are to be expected.

Milk cow numbers have been declining in recent years but production per cow has gone up. This combination has resulted in a relatively steady milk production. In consequence, total milk production is not expected to be much different from that of the past year.

Prices. If demand for and supply of diary products develops as now seems in prospect, price will probably be above support levels but below the level at which ceiling prices would be required. Support levels for milk and other dairy products during 1952 will be somewhat higher than in 1951, reflecting higher parities. Thus prices received by farmers for dairy products are likely to average higher than in 1951, and cash receipts from dairy products may reach a new record high. The net income from dairying, however, will be about the same as in 1951 because cost of dairy farming will be higher.

POULTRY AND EGGS



In 1952 both a continued strong demand for poultry and eggs and a large production of each are in prospect. Prices received by poultrymen will probably average close to the 1951 level.

Eggs. Because of the late development of an unusually large percentage of the layers now on hand, together with some increase in total numbers of layers, a larger egg production is in prospect during the first half of 1952 than during the same period last year. Even so, prices may average about the same as in the spring of 1951.

Chicken meat. Commercial broiler production will probably continue to increase, but an expected reduction in the number of farm chickens raised next year would partly offset the larger broiler production. Thus, the total chicken meat supply is expected to be slightly larger than in 1951. It is probable, however, that total consumer demand for chickens and broilers this year will be strong enough to just about offset the increased supplies, and prices will average about the same as during the past year.

Costs. The same conditions of full employment and rising consumer incomes that will affect poultry product prices, will also affect poultrymen's production cost Feed prices, cost of equipment and the costs of hired labor are expected to rise during the year. Since these are the most important costs of poultry production, and no corresponding increases are expected in the price of poultry products, a decline in net returns from poultry is indicated.



TOBACCO

Demand for the 1952 crop of tobacco is likely to be strong and prices about the same as during the current marketing season. Costs of production, however, probably will be somewhat higher than in 1951.

Cigarette output probably will exceed the record of 412 billion estimated for 1951, which was 4 or 5 percent above that of 1950. The manufacture of smoking tobacco is expected to be practically the same as in 1951, or about 106 million pounds. The same is true of chewing tobacco and snuff, which ran about 87 million and 40 million pounds, respectively in 1951. Exports are not likely to increase in 1952.

Burley. The 1951 crop is estimated to be 583 million pounds or 84 million (17 percent) larger than in 1950. Stocks are down, however, so that total supply as of October 1 was only about 4 percent larger than a year earlier. Disappearance of burley apparently was down slightly from any of the last four years.

Fire-cured. -- Production of the Kentucky types of fire-cured tobacco in 1951 was nearly 8 percent larger than the short crop of 1950. Some improvement in disappearance, and the short crop, account for a reduction of 15 million pounds (8 percent) in total supply, as of October 1.

Dark air-cured. -- Larger production of dark air-cured tobaccos in 1951, than in 1950, was accompanied by increased disappearance as the result of somewhat larger exports. Total supplies of One-Sucker were about the same on October 1, 1951 as a year earlier but supplies of

Green River tobacco were 3 million pounds (7 percent) smaller.

Adjustments in production. - Marketing quotas for tobacco were proclaimed in November by the Secretary of Agriculture. For flue-cured, burley, fire-cured and dark air-cured the quotas provide for individual farm acreage allotments in 1952 about the same as in 1951.

Adjustments of future tobacco production to the economic outlook can be brought about by reduction in acreage, heavier fertilization to increase yield per acre, and changes the labor and care given the crop which may affect its average quality and price per pound. Whether or not growers make such adjustments depends, in part, on the comparative prices of other farm products. Table 1 shows how the prices of Kentucky types of tobacco compare with prices of several other farm products in their change from prewar prices. From the table it will be noted that the price of burley tobacco is about as much above the

Table 1

PRICES RECEIVED BY U.S. FARMERS

Tobacco	
Burley	2.3 times as high in 1951 as in 1935-39
Fire-cured . .	3.7 times as high
Dark air-cured	3.6 " " "
Corn	2.4 " " "
Soybeans	2.8 " " "
Eggs	2.3 " " "
Milk	2.5 " " "
Hogs	2.4 " " "
Beef cattle	4.5 " " "
Veal calves . . .	4.3 " " "
Lambs	4.2 " " "
Wool	4.0 " " "

(Wool at end of year was only 2.7 times as high as average 1935-39.)

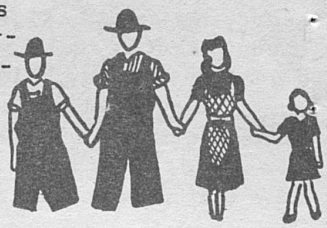
1935-39 level (prewar) as the prices of corn, eggs, milk, and hogs. Prices of dark tobacco are relatively much higher but are not as high as beef cattle, veal calves, and lambs.

Larger yields per acre usually are beneficial, but under present price comparisons there seems little inducement for Kentucky farmers to increase further the yield of burley, if it must be done at expense of other farm enterprises.

Since prewar, the "poorer" grades of burley, as classified by the U.S.D.A. have risen in price more than the "better" grades, but even so the "better" grades still are 75 percent higher in price than the "poorer" ones, so it doubtless will pay farmers to produce the best quality possible in 1952.

FARM FAMILY LIVING

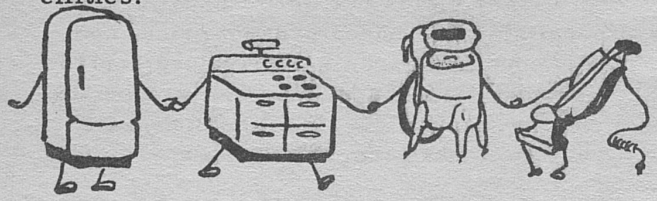
Prices for items needed in family living are likely to advance over present prices, especially after the middle of 1952.



Housing.--The average home builder will find it harder and harder to build during 1952. Construction in defense areas will get preference in allocation of materials and in credit. However, farm building will be favored over other less needed types of construction.

Nearly three-fourths of southern rural homes did not have running water in 1950, according to the census report. Many homes lack storage space sufficient for needs of the families. These important features add much to the livableness of a

home and promote home-management efficiency. As families become financially able to do so, they will no doubt add such conveniences as plumbing, central heating systems, and more adequate storage facilities.



Household equipment. -- At present, stocks of household appliances such as washing machines, refrigerators, and television sets are still relatively high in relation to sales. This reserve should offset restrictions that will limit their production during the coming months. As materials and labor go into high-gear defense production, shortages of some items will develop, substitutes will be used for scarce materials and prices will increase. If equipment is really needed this may be a good time to buy. However, the consumer should not let the prospect of moderate shortages scare him into buying when funds are not available or to take an item that does not entirely satisfy needs.

Buy equipment in a standard model and not the deluxe style if the budget is limited. It takes sales resistance to forego appealing features such as chromium trim, timer, and lamp on a range but these extras do not add anything to the durability of the product. Unless the consumer sees real use in the added features, they are not worth the additional cost.

As labor becomes scarcer in farm areas, the homemaker may have to do

more of the farm chores. Equipment that takes some of the drudgery from housework will free the homemaker to do more farm work. For example, a home freezer makes meal preparation and food preservation easier. The 1950 census report indicates that 7 percent of southern farm families have home freezers. A considerably larger proportion rent freezer locker space.

Clothing. -- Clothing will be plentiful. Retail prices are likely to stay near present levels. We may see a small reduction in the price of some cotton goods. Rayon has assumed importance in the manufacture of rugs and helps to ease the wool situation. Wool prices are tending downward very slowly. Sheets and blankets are plentiful. Recent declines in price are expected to stabilize around 10 percent to 20 percent above last year.



Furniture. --In general furniture supplies should be enough for needs. Prices may be somewhat higher.

Food. -- Food supplies are ample but high demand will keep prices up. The 1952 pack of fruits and vegetables, frozen, canned and dried - may be larger than the 1951 pack but prices, too will be a little higher.



The family has a tremendous influence in controlling inflation in the USA. Every dollar spent or saved speaks for or against inflation.

Agricultural Extension Division
College of Agriculture
and Home Economics
University of Kentucky, Lexington
FRANK J. WELCH, Director of Extension

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Giant foxtail in cornfield, tall as fence post — higher than corn ears. Foreground outside the fence was mowed several times.

tions in both crops because the mature stalks, when damp, wrap around the rollers and other moving parts of combines and corn pickers and require stopping the machine to remove them. Where stands of the grass are heavy in soybean fields it may be necessary to abandon the crop for seed purposes and harvest for hay instead. Soybean seed harvested from fields containing much giant foxtail sometimes has so much foxtail seed, with high moisture, that special cleaning may be necessary to prevent heating in storage.

Infested gardens may become giant foxtail patches in late summer.

In pastures it is not likely to prove so troublesome as in cultivated fields, because livestock graze it readily, especially in the early stages of growth, just as they do crabgrass and common foxtail grasses. Its large growth may add materially to pasture forage during late summer.

Giant foxtail is of notable value in preventing erosion and in adding organic matter to the soil. It is aggressive in its growth habits, a heavy seed producer, and especially suited to cover bare ground quickly where the soil has recently been disturbed.

Outlook

It appears probable that giant foxtail may become most troublesome on bottomlands where continuous culture of corn and soybeans is prevalent. It is much less likely to cause serious trouble in fields where a 3- to 5-year rotation is followed. On rotation land it is reported to be serious sometimes in grain stubble, where grass and clover were sowed in the grain. Mowing several times retards its growth and greatly reduces the amount of seed formed, but such frequent mowing also retards the young forage plants.

In counties where most of the farms are in pasture, with some tobacco, corn, and alfalfa, it is not apt to become serious on most of the cultivated land, and possibly not at all in pastures.

Suggested Control Measures

1. Use clean crop seed. Don't plant this weed in your fields.

2. Prevent seed production where the plants do occur. Hoe or pull scattered plants. Mowing reduces seed production, although it does not eliminate it entirely. Fence rows, roadsides, and borders of fields should be mowed frequently if they contain this weed. If cut or pulled plants have any seed heads, the material should be burned where it grew.

3. Graze with livestock. Giant foxtail is palatable to livestock in early growth stages.

4. Clean-cultivate corn and soybean crops. Check-plant corn and cross-cultivate where practical. Row-plant soybeans, instead of solid seeding, so they can be cultivated. Use rotary hoe in corn and soybean fields if grasses germinate while crops are small.

5. On badly infested small grain fields it may be best not to spring-seed legumes. Instead, plow or thoroughly disk the grain stubble during the summer and seed the legumes in August, on well prepared ground. If legumes are spring-seeded, the stubble should be mowed 5 or 6 inches high, during the summer, to reduce competition and to reduce the production of foxtail seed.

6. Use good crop rotations. Where crops are properly rotated there is much less opportunity for this weed to become troublesome in fields where row crops are planted.

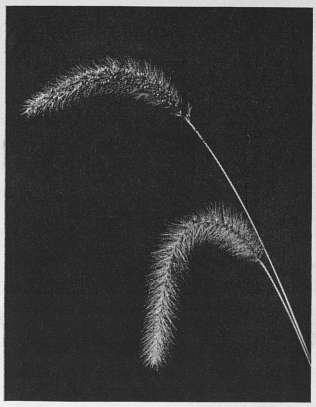
7. Use 2,4-D as a preemergence spray in late-planted corn. Applying 1.5 pounds of 2,4-D acid equivalent per acre on the soil 4 to 6 days after planting may prevent giant foxtail seedlings from emerging if there is enough moisture in the soil for weed seed germination.

The use of 2,4-D as a preemergence spray on soybeans is not recommended. However, preliminary results with chemical control of weedy grasses in soybeans is promising. In preliminary trials a preemergence spray of 4 to 6 pounds of chloro-IPC [isopropyl-N-(3-chlorophenyl) carbamate] per acre was effective in preventing the germination and growth of grasses in soybeans without injuring the crop. While this material is not recommended for general application by soybean growers, its use on a trial basis is suggested. Applications should be made by spraying this herbicide on the soil after soybeans are planted but before emergence of weeds and beans. A 4-pound rate is suggested for light soils and a 6-pound rate for heavier soils. If soybeans are planted in rows the chemical may be applied in 1-foot bands above the seeded row, using about one-third the rates suggested above on an acre basis. Weeds in the middles could be removed by cultivation. After soybeans treated with chloro-IPC emerge they may be somewhat stiff or brittle, and should not be cultivated with a rotary hoe until stems become flexible.

10M—4-52

GIANT FOXTAIL

By Ralph Kenney
J. R. Hansen
J. F. Freeman



Top head with green seed. Lower head mature and all seeds dropped.

Leaflet 132

Cooperative Extension Work in Agriculture and Home Economics
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
UNIVERSITY OF KENTUCKY
and the
U.S. DEPARTMENT OF AGRICULTURE, Cooperating
FRANK J. WELCH, Director
Issued in furtherance of the Acts of May 8 and June 30, 1914.

GIANT FOXTAIL

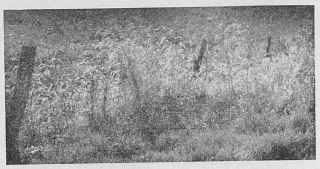
By Ralph Kenney, J. R. Hansen, and J. F. Freeman

Giant foxtail (*Setaria Faberii*), a weed new to most Kentucky farmers, has possibilities of becoming a serious pest in cultivated crops throughout the state, as it already has become in parts of Illinois and certain other corn-belt states. For several years it has been observed growing in scattered areas along main-traveled Kentucky highways, and recently in nearby cultivated fields. Because of the hazard of its further spread, Kentucky farmers should be able to recognize the weed, have information on how to control it, and prevent its spread to uninfested areas.

Description

Giant foxtail is an annual plant of much the same appearance as the common yellow and green foxtails; however, it grows three to five times taller, has heads two to five times longer and two to three times wider than common foxtails. As the seeds develop the heads become heavy, causing the stems to bend and the heads to droop over and often to hang straight down. One of the easiest ways to recognize the weed and note its presence is by the characteristic nodding heads during September, October, and November. It sometimes is called wild millet because it looks much like the cultivated foxtail millets; but one characteristic difference is the frequent branching of the taller plants of giant foxtail at heights of 2 or 3 feet from the ground. In fence rows it often grows as tall as the fence posts, and in cornfields the heads may be above the height of the ears at harvest time.

Giant foxtail was first reported in the United States in about 1932, when it was found in some millet seed imported from China. Another plant (*Setaria magna*) also known as giant foxtail was reported and described in 1864; but it grows in swamps and marshes of the east coast, and has stems measuring as much as 1 inch thick at the base and growing 4 to 16 feet tall.



Typical roadside occurrence of giant foxtail. Note heads taller than the fence

Although giant foxtail has been a serious weed for several years in the cash grain growing area of east-central Illinois, the first known observation of it in Kentucky was in 1938 or 1939, when it was found growing in a fence row alongside a cornfield in Warren county. A few scattered plants were observed in other counties during subsequent years, but no particular attention was paid to the weed until recently. In 1951, on a farm along U.S. Highway 60, at the eastern edge of Henderson county, giant foxtail was so thick in two soybean fields that, following harvest, their owner had the straw burned. This was a futile attempt to destroy the weed seeds which had already shattered. At the same time, heavy stands were present in two cornfields adjacent to the soybean fields. The present farm operator said that the weed was there as long as 8 years ago, and that it "had come since the 1936-37 flood." In another instance, an elderly farmer in Greenup county has reported an Ohio river bottom field which has been planted to corn almost every year for 50 years and in which giant foxtail is present. This farmer says that he "cannot remember when this grass was not there."

Giant foxtail begins to germinate after the soil warms up in early summer and may continue to sprout throughout the summer; consequently fields of corn and soybeans which are free of weeds at the last cultivation may have a heavy crop of giant foxtail start after cultivation and produce seed before frost.



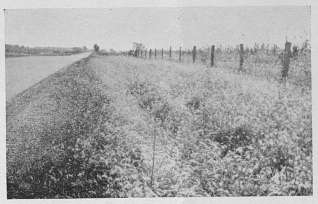
Solid stand of giant foxtail in cornfield, Henderson county. Corn has been harvested with corn picker and foxtail still stands 3 feet above the broken corn stalks.

Observations made in the fall of 1951 along Kentucky highways indicate that giant foxtail is present on the right-of-way in practically all counties of the state. The infestations varied from single plants at a place to areas 1 to 3 feet wide and 100 to 500 feet long. It was found within a few feet of the highway where it crosses Pine Mountain in east Kentucky, and in widely separated small areas in the bottomlands of the Green and Ohio rivers in west Kentucky. As yet, little of it has been found on the side roads. Apparently the weed is now in position to enter many fields from the roadsides and from fence rows where it is growing along the main highways.

If farmers are able to recognize giant foxtail when it is found growing on or near the boundaries of their farms they can do much to prevent its spread into their cultivated fields.

Means of Distribution

The present wide distribution of giant foxtail along the main traveled highways of the state leads to the assumption that the seeds were brought in from infested areas in nearby states, perhaps in mud or dirt attached beneath cars and trucks. Although it has been suggested that seeds of this grass may have been spread by flood waters, there is no evidence that such



Giant foxtail beside highway, October 1951. It was mowed several times during the growing season.

was the case. There is little chance for the seeds to be flood-borne because the plant matures and drops its seed by late fall, before the midwinter and spring overflows. The heavy seeds do not float readily. Because of their characteristics the seeds are not likely to be wind-borne for more than very short distances. Birds eat the seeds and thus may be a means of scattering them to uninfested areas. Hay, harvested in late summer or early fall, which contains partially mature giant foxtail is a likely means of spreading the seed from one part of the farm to another, and to other farms if the hay is sold and moved away.

Soybean combines and corn-harvesting machinery are ready means of spreading giant foxtail throughout a field or from farm to farm, since the small seeds of this grass are difficult to remove from these machines.

Soybean seed used for planting may contain some giant foxtail seed and thus serve as a start for this pest.

Economic Importance

The strong competition offered by giant foxtail to cultivated crops with which it is growing may seriously reduce crop yields. Corn and soybeans for grain are particularly susceptible to yield reductions. The presence of the weed greatly hampers harvesting opera-

of the infective larvae on the pastures will die before [susceptible] cattle graze there again. Since calves are more susceptible to the disease, they should not be pastured with older cattle, sheep, or goats.

Calves which are fed properly and are in good flesh are able to withstand the attack of stomach worms much better than thin calves.

The barn should be cleaned out regularly to prevent the calves from picking up great quantities of infective larvae. The feeding and watering equipment should be built and located in such a manner as to keep feces out of the feed and water.

Treatment

At present, phenothiazine is the most effective drug in the removal of stomach worms. Phenothiazine may be given in the liquid form with a dose syringe, or in the bolus form with a balling gun.

In treating young cattle for parasites it is advisable to treat not only the animals which are seriously affected but also the remaining younger cattle as well. It is sometimes necessary to repeat the treatment in three weeks to get the worms which were in the immature stage when the first treatment was given. It does little good to treat the animals and turn them back in the same infected pastures, as they will become infected again.

Cattle with some other diseases may show symptoms similar to those of stomach worm disease, and the use of phenothiazine for such cattle may actually be harmful. Therefore, it is advisable to consult your local veterinarian.

Lexington, Kentucky
September 1952

3M—9-52

STOMACH WORM DISEASE of CATTLE

By Ross Brown
and J. H. Drudge

Leaflet 133

Cooperative Extension Work in Agriculture and Home Economics
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
UNIVERSITY OF KENTUCKY
and the
U. S. DEPARTMENT OF AGRICULTURE, Cooperating
FRANK J. WELCH, Director
Issued in furtherance of the Acts of May 8 and June 30, 1914.

Stomach Worm Disease of Cattle

By Ross Brown and J. H. Drudge

Stomach worms cause greater losses of calves in Kentucky than any other internal parasite. The last few years the number of beef cattle and dairy cattle have increased greatly. In many cases the calves have been overcrowded and raised in unsanitary surroundings, causing an increase in stomach-worm disease. Adult cattle are not usually very seriously parasitized but may keep the infection alive on the farm. Severe cases are seen, for the most part, in young animals, particularly those between 4 and 18 months of age.

Cause

Several species of roundworms may occur in the true stomach (abomasum) of cattle. The two most often found are Haemonchus contortus and *Ostertagia ostertagi.* Haemonchus will infect cattle, sheep, and goats.

The twisted stomach worm *(Haemonchus contortus)* is ½ to 1½ inches long and about as thick as an ordinary pin. These worms are difficult to see with the naked eye unless they are present in great numbers.

The hairlike stomach worm *(Ostertagia ostertagi)* is less than ½ inch in length and as thick as a fine hair. These worms are more difficult to see than the twisted stomach worm.

The life cycles of these roundworms are essentially quite similar. Eggs of microscopic size produced by the female worms pass out in the feces. When weather conditions are favorable these eggs hatch in a few hours. The larvae which emerge from the eggs grow and molt, and under

favorable conditions, reach the infective state in 3 to 5 days or more. These larvae remain infectious for several months in mild weather. The infective larvae are taken into the body with food or water. In 2 weeks to 1 month after the infective larvae are swallowed the worms reach maturity and begin producing eggs.

Symptoms

In severe infections there is a lack of growth, loss of weight, rough hair coat, large abdomen, anemia, and diarrhea. The anemic condition is seen in the paleness of the skin and mucous membranes of the mouth and eye. There may be watery swellings under the lower jaw. This condition is sometimes called "bottle jaw." The droppings are usually dark in color and quite watery. Quite often the feces will accumulate on the tail and hind legs.

Diagnosis

A positive diagnosis may be made by microscopic examination of fresh feces to determine the presence of worm eggs.

On autopsy, an excess of fluid will be found in all of the body tissues. When the true stomach (abomasum) of an animal which has just died is opened one may see the worms or notice the movement of the stomach material due to the movement of great numbers of worms.

Prevention

Prevention of stomach worm disease hinges on proper management and medication. Permanent pastures should not be overstocked, and rotation of animals and pastures should be practiced. The object of rotation is to insure that many or most

16. The stickman drops the empty stick on the rack as he looks and reaches for the next stick of tobacco (Fig. 11).

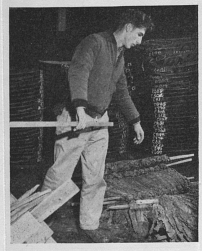


Fig. 11

Steps 3 through 16 are repeated with each stick of tobacco. As needed, half-sticks of tobacco are placed in the center to "tie" the pile together. They are placed with heads out, overlapping the tips of the tobacco already packed. Packing continues until the basket is ready to be capped.

17. The packer gets off the basket of tobacco and gets a duckbill.

18. The stickman places two cap sticks on top of the packed tobacco. He then withdraws the sticks, placing them on the stick rack.

19. The packer lifts the edge of the basket with the duckbill. The stickman holds the basket up, and together they load it on the duckbill.

20. The packer moves the packed basket to the waiting area.

21. The stickman, who now becomes the packer, gets an empty basket and places it and the stick rack ready for packing, as indicated in Step. 1.

22. The packer becomes stickman and moves into position, as indicated in Step. 2.

Tobacco that has not been sorted before being loaded at the farm is sorted into piles on the warehouse floor. Care in arranging the piles will add to ease and efficiency in packing. The piles of tobacco should be arranged so that the basket can be placed at ends of the sticks rather than at the side of the pile.

For rapid handling in the warehouse, tobacco is loaded on the truck according to the way it is to be packed on the baskets for sale. In unloading at the warehouse, the tobacco then is passed directly from the truck to the stickman who passes to the packer.

From a high load, the truckman passes each stick of tobacco directly to the stickman who divides it into two nearly equal parts as he passes it to the packer. (See picture on cover of this leaflet.)

When the stickman can reach it conveniently, the truckman lays the stick of tobacco at the edge of the load. The stickman then lifts one end of the stick and divides the tobacco as in step No. 3 (Fig. 12).



Fig. 12

When the load is low, the procedure may be changed so that the truckman passes directly to the stickman who divides the tobacco while each holds an end of the stick. This is easier for the stickman, but may result in loss of time if the stickman must wait for the truckman to hand the tobacco directly to him (Fig. 13).

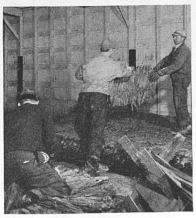


Fig. 13

Thus skillful workers plan their work before starting to pack tobacco. They place the empty basket and the stick rack close to a pile of tobacco to be packed and arrange them so the work can be done most easily. Having done this, both stickman and packer use only those movements which are necessary in passing and packing each stick of tobacco. By not walking back and forth with each stick of tobacco and by not making unnecessary movements in packing they are able to work more easily and still pack more tobacco than other workers.

Lexington, Kentucky
October, 1952

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Easier Ways To Do Work

PACKING BURLEY TOBACCO for SALE

By George B. Byers
Dana G. Card
Wendell C. Binkley



Receiving and Packing Burley Tobacco

THE METHOD described in this leaflet for packing burley onto sales baskets brings together the easiest and quickest ways used by skillful workers, as found in a study of work methods used in tobacco sales warehouses by the Kentucky Agricultural Experiment Station over the past four years.

Leaflet 134
Agricultural Extension Division
College of Agriculture and Home Economics
UNIVERSITY OF KENTUCKY
FRANK J. WELCH, Dean and Director

An Easier and Faster Way . . .

Waste motion and idle time must be avoided for rapid and skillful packing of tobacco on sales baskets. A stickman and a packer, using the work procedures explained here, pack an average of 7 to 8 sticks of tobacco per minute. The usual rate, by other methods, is about 4 sticks per minute.

The method described here is easier than other methods for both stickman and packer; it avoids waste motion and idle time of either; and it is simple and easy to learn.

How to Do It

1. The packer places an empty basket and a stick rack close to the truck OR pile of tobacco.

2. The stickman moves to his place midway between the tobacco and the basket (Fig. 1). The basket is far enough from the pile to allow the stickman to work without crowding but close enough to eliminate walking (usually 3 to 4 feet). The ends of the tobacco sticks point toward the basket. The rack is in front of the stickman and near the basket, where he can drop the sticks most easily.

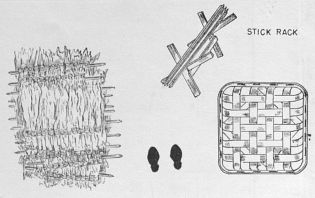

Fig. 1.— Tobacco, stickrack, and basket are within easy reach of the stickman.

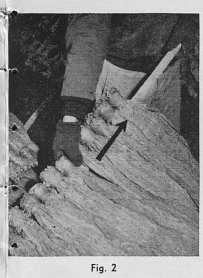

Fig. 2

3. The stickman grasps and lifts the end of a stick of tobacco with his hand which is nearest the pile. He prepares to divide the tobacco on the stick with his other hand (Fig. 2).



Fig. 3

4. The stickman pulls half of the tobacco toward the near end of the stick. He then grasps the middle of the stick with his thumb on top of the stick and away from his body (Fig. 3).



Fig. 4

5. The stickman swings the tobacco to a position above and near the spot where the packer is to place it on the basket (Fig. 4).



Fig. 5

6. The packer grasps half of the tobacco, fairly close to the stick, as the stickman swings the tips of the tobacco toward him (Fig. 5).



Fig. 6

7. The packer holds steady as the stickman pulls the stick from the tobacco. The packer does not pull the tobacco from the stick (Fig. 6).



Fig. 7

8. As the tobacco is lowered into position on the basket, the packer moves his hands together and toward the tips of the leaves. This serves to "fan" the heads of the hands of tobacco to form an arc and make a round basket of tobacco (Fig. 7).

9. The packer places tobacco in the proper position with one movement. He is then ready to reach for the next bunch of tobacco to be packed.



Fig. 8

10. The stickman, in passing the second half of the tobacco to the packer, releases his grasp on the end of the stick and turns the stick end for end with his other hand (Fig. 8).



Fig. 9

11. As he grasps the empty end of the stick, the stickman moves the remaining tobacco to a position above the spot where the packer is to place it on the basket. In some cases, with smooth sticks and tobacco which slides from the stick easily, it is not necessary to grasp the end of the stick (Fig. 9).

12-14. The packer and stickman then repeat steps 6, 7, and 8, with the second half of the tobacco.

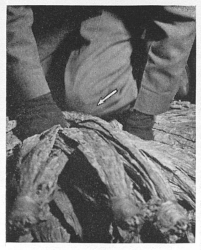

Fig. 10

15. After placing the second bunch of tobacco, and before releasing it, the packer moves his knee onto the tobacco just packed. To do this, he supports his weight on his hands and the foot near the center of the basket as he moves his other knee (Fig. 10).

Skilled packers, when the condition of the tobacco permits, make this move only after a full stick of tobacco has been packed.

weeks later, will pay, "splitting the middles," as by that time, the roots will "join."

PICKING. The most profit is made when the pickles are picked to the smaller sizes. A pickle that has been missed may grow to the next larger (and cheaper) size in just one day, and if it grows large enough for the seed to get hard, the plant may quit bearing, entirely. A good rule is to pick everything down to two inches EVERY DAY, in fast-growing weather, or at least every other day when growth is slower. While picking is being done, all spots, rots, nubs and overgrown pickles should be removed from the vines and destroyed, as they are of no use to anyone.

DELIVERY. It is best to deliver pickles the day they are picked. Immediately after they are picked, they start losing weight. If they must be held overnight, they should be put where they will lose field-heat and stay DRY. Else, they may become slick and worthless. To be sure, ask your wife if she'd use them.

Cooperative Extension Work in Agriculture and Home Economics; College of Agriculture and Home Economics, University of Kentucky, and the United States Department of Agriculture co-operating. Frank J. Welch, Director. Issued in furtherance of the Acts of Congress of May 8 and June 30, 1914.

5M-12-52

GROWING PICKLE CUCUMBERS

John S. Gardner

LAND. Because pickles are a garden crop, the land should be of garden quality. Sandy creek bottoms above flood danger are fine, or any land that has enough humus to keep it loose, and able to hold moisture. But heavy-type soil can be lightened by turning under a sod or a cover crop or manure.

Level land is best, but slight slopes can be used if they are tended on the contour. If a choice can he had, slopes facing north or east hold moisture better than the others. The land should not have been in pickles for two years before, to avoid disease. Pickles should follow only sod or well-tended crops, to escape extra trouble with weeds and grass.

LAND PREPARATION. Plowing should be as deep as the soil permits; 8 to 10 inches is fine. Thus a good moisture supply is assured for a quick start and steady growth later. Plowing should be done early as possible, to give the turned-under material time to rot for making humus. The seedbed is finished by disking deeply, then dragging "garden fine."

Leaflet 135

UNIVERSITY OF KENTUCKY
COLLEGE OF AGRICULTURE
AND HOME ECONOMICS
Extension Division
Frank J. Welch, Dean and Director

FERTILIZING. Pickles need the three plant foods; nitrogen for vine growth and fruit quality; phosphorus, for blooming and fruit-setting; and potash for helping the other two. They must be in correct balance, and here follow a few suggestions:

1. If manure can be had, plow under 10 to 15 tons per acre, and with each ton of manure, 50 lb of 20% superphosphate, broadcast on it.

2. Lacking manure but with the land covered with some growth (even weeds), broadcast and plow under 300-400 lb of calcium cyanamid and 500 lb of 20% superphosphate, per acre.

3. Lacking manure, but with land in good tilth, use complete fertilizer, 6-8-6 or 5-10-5, 1000 lb per acre. Half should be plowed under, and half disked in as the seedbed is being prepared.

ALSO, no matter what fertilizing scheme is used, drill in 100 lbs. of 6-8-6 or 5-10-5 fertilizer under the rows as they are being laid off.

PLANTING. Plant as soon after May 1 as the weather permits. The rows should be 6 ft wide, and the hills 4 ft in the row. One way to make hills is with a hoe, then dropping 6-8 seeds and covering with a hoe, 3/4 inch deep, gently firmed. The wide rows are for ventilation, for dews to dry, and avoid disease. Also, more walkway is provided for picking.

THE CUCUMBER BEETLE. There are two kinds: Green, with black spots and Yellow, striped with black. Both are the cause for poor stands at the start, and of plants dying later in the summer.

It winters in garden trash, coming to the patch at about the time the first seedlings break through. It dives down the soil cracks and there lays eggs that hatch out "worms" that destroy the roots of the plants, killing them. Some "worms" later become beetles that chew at the stems of the plants and kill them, too. Both are killed by dusting with 3% Purified DDT with 5% copper (for Mildew), ALWAYS in the MIDDLES of the hills. A sifter may be used, but a dust gun is better, that drives the dust where it should go. At each dusting, about 10 lb per acre is needed.

The first dusting is given when the first plants start, the rest of the hills being at "hump" stage. The second dusting follows in 3 to 5 days, when all the soil cracks are open for the dust to fall into them. Then 3 to 5 dustings are given, a week apart, at the bases of the plants, for protection from the beetles that come from "worms" that were not killed earlier, underground. For the season, an acre of pickles requires about 60 lb of dust.

CULTIVATION. For crops in general, the aim in cultivating is keeping the weeds in check, but for a crop as valuable as

pickles, the aim is keeping the patch CLEAN. As the roots lie close to the surface and run as wide as the tops, only shallow scratching should be done (with a 16-tooth harrow) but COMPLETE.

THINNING. When the plants are 6-8 inches tall, they should be thinned to TWO to the hill. If more are left, the extra leaves hide the pickles, and crowding may reduce the crop.

ROWING. Pickle runners go in all directions, and in such a patch the pickles are hard to find.

The remedy is "rowing," laying (not piling) the runners back into the row, starting just before they begin attaching themselves to the soil. There may have to be several rowings at the start, but when picking starts, rowing can be done at the same time. By rowing, valuable picking time and labor are saved.

NITRATING. By the time the pickles start setting, much of the nitrogen applied at the start is used up. To give the vines new life, 100 lb of Ammonium Nitrate or 200 lb of Nitrate of Soda or 6% nitrogen fertilizer should be side-dressed at both edges of the rows.

Nitrate of Soda finds its way into the soil, but the others should be covered. A SECOND nitrating, 2

What's the Outlook?

for

KENTUCKY AGRICULTURE IN 1953

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Leaflet 136

Cooperative Extension Work in Agriculture and Home Economics

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

UNIVERSITY OF KENTUCKY

and the

U.S. DEPARTMENT OF AGRICULTURE, Cooperating

FRANK J. WELCH, Director

Issued in furtherance of the Acts of May 8 and June 30, 1914.

FOREWORD

The Kentucky Agricultural Experiment Station and the Agricultural Extension Division are striving to provide Kentucky farmers with helpful information. The appraisal of the economic situation of agriculture contained in the Agricultural Outlook for Kentucky farmers is one of many types of information provided by the Extension Division.

It is believed that this Agricultural Outlook will prove of material benefit to Kentucky farmers in making plans for 1953.

The Agricultural Extension Division will supplement this analysis with timely information in the form of press releases, radio and television broadcasts, and the monthly "Notes on the Kentucky Agricultural Situation". This monthly publication on current outlook is available upon request.

Frank J. Welch
Dean and Director

AGRICULTURAL OUTLOOK FOR 1953

Drouth conditions plagued farmers in many parts of Kentucky in 1952, reducing the production of pasture, hay, and grain crops. Large numbers of Kentucky farmers were forced to begin feeding livestock in the summer. An unusually large volume of feed has been purchased, or livestock have been sold in unduly depressed markets. In contrast, prices received for milk and truck crops were higher as a result of the drouth. In some of Kentucky, growing conditions were fairly favorable to farmers.

In spite of drouth and lower prices for beef cattle and hogs, gross returns to farmers in Kentucky were higher in 1952 than in 1951. These higher gross returns resulted from larger marketings of farm products and relatively favorable prices received from livestock and tobacco early in the year. But, because of the necessity of feeding grain during the drouth, production costs have been high. At the same time the general level of prices received declined. Thus, net farm income was slightly lower in 1952 than in the previous year.

Many Kentucky farmers are likely to have a more profitable year in 1953 than they have had in 1952. Returns from dairying and poultry and eggs will be up during the first half of the coming year. Not much change is ex-

pected in returns from hogs, sheep, and lambs. Total returns from the 1953 burley crop will be reduced because of the 10 percent cut in acreage allotments. As costs of replacement cattle are much lower and a further sharp break in slaughter cattle prices is not anticipated, Kentucky farmers can expect a net profit in 1953. In the past year many farmers lost heavily in beef cattle.

Strong consumer demand will be offset by large agricultural marketings, tending to hold down prices of farm products, while high farm production costs will continue to squeeze farm profits.

Agriculture's outlook for 1953 is determined by the combined effects of several important economic factors--the amount of income consumers will have to spend for living, the volume of industrial and farm production, the level of business activity, and the quantities of exports.

Conclusions in this report are based on assumptions that:

1. The international situation will remain similar to that of the last part of 1952.

2. Proposed government spending for defense will continue to increase during the first part of 1953 and level off during the last part of the year.

3. Consumer savings out of income will average about the same as the last half of 1952, or about 7 percent of income.

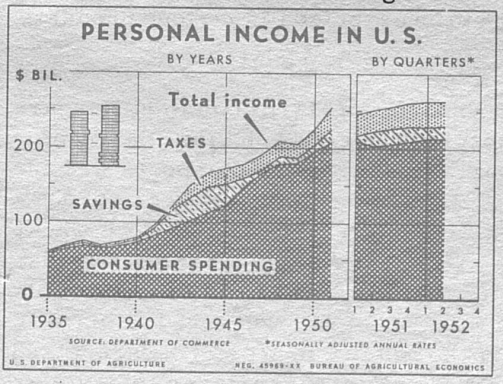
4. Weather conditions will permit normal crop growth in 1953.

5. There will be no strikes big enough to disrupt industrial production or alter the volume of consumer incomes.

THE DEMAND SITUATION

Domestic demand for farm products will continue at a high level in 1952. Consumer demand changes as the level of individual income changes. But it is expected that consumer incomes will rise slowly during the first half of 1953--they may level off during the last half.

The general level of wage rates is rising and is expected to continue upward during the next several months. Barring strikes, civilian employment is expected to continue near record levels. The rising wage rates full and employment will provide money for consumers to continue to increase their expenditures for living.



A continued strong demand for farm products resulting from a high level of consumer expenditures appears to be assured for the next several months by the slowly rising volume of government expenditures for defense, and by a continued high level of business output. But, if present plans are followed, government expenditures for national defense may be expected to level off about mid-1953. In addition, the volume of construction for business plants and private homes is likely to taper off late in the coming year.

These conditions lead to the conclusion that demand for farm products will continue strong during the first half of 1953, but that a leveling off, or even a slight decline, may occur in the general price level the last part of the year. With the volume of consumer expenditures for living continuing near the present level, changes in supplies of goods available for consumption will determine changes in prices that are to be expected for various products.

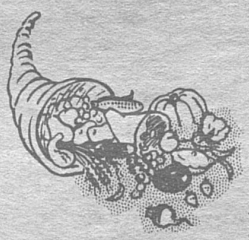
EXPORTS

Exports of farm commodities are expected to decline during the coming year. Reduced grain exports are indicated by a record wheat crop in Canada, and favorable production of farm products in Western Europe and the Near East. Shortages of dollar purchasing power, particularly in Great Britain, will result in smaller foreign takings of agricultural products.



PRODUCTION

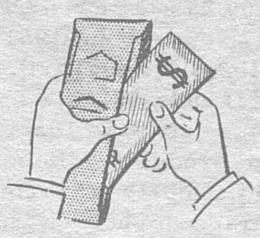
Industrial production is now about 2 percent above a year ago. New plants and new equipment have expanded industry's capacity to produce. More plants are being constructed and equipped. Because of these developments, output of industrial products in 1953 is expected to be larger than in 1952. A nation-wide strike could alter the supplies of manufactured products materially.



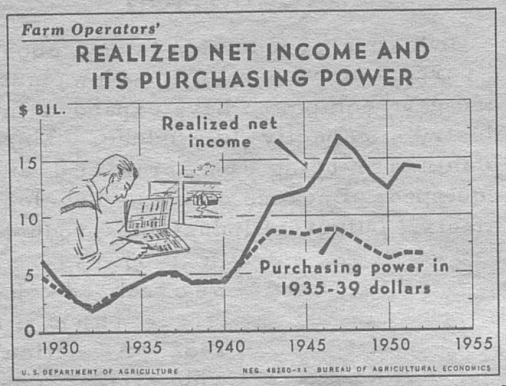
In spite of severe drouth in large areas in the United States in 1952, total agricultural production was estimated to be near record level. Farm production in 1953 will be maintained close to the 1952 level if growing conditions are favorable.

PRICES AND INCOME

A continued rise in consumer incomes, paralleled by a rise in industrial production and a record volume of agricultural products, suggests little change in the general level of all prices. Some farm product prices have dropped, and prices of the other



products in large supply may decline somewhat in 1953. However, we do not expect sharp drops in farm prices.



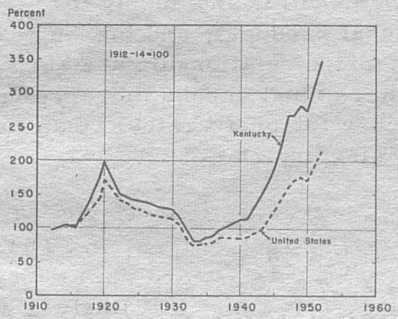
Because of the record volume of agricultural production in 1952, and the potentially larger marketings of farm products, gross agricultural income in 1953 will be about the same as that of the past year. But, a further squeeze between farm product prices and farm production costs in 1953 will result in a slightly smaller net farm income than that of 1952.

Net income data are unavailable for Kentucky for the entire year of 1952, but the gross income of January-August was above that of a year earlier. For the United States as a whole, net income has been at a higher level in recent years, but what this income would buy has declined each year since 1947, except in 1951 when it rose very slightly (see chart). Because most of Kentucky was affected by the serious drouth in 1952, marketings of farm products will be lower in 1953, while costs of farm production will average higher than those for the country as a whole.

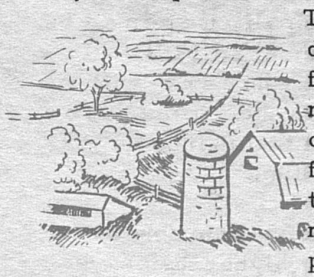
LAND VALUES

The value of farm land is expected to level off in 1953. Farm land values have continued to rise in 1952, but not as rapidly as in 1951. From July 1950 to July 1951 land prices in Kentucky, on the average, increased 20 percent, while the increase from July 1951 to July 1952 was only 8 percent. For the United States the increases in the same period were 17 percent and 5 percent, respectively.

INDEX OF AVERAGE FARM LAND VALUE PER ACRE, KENTUCKY AND UNITED STATES, 1912-1952



Volume of sales and value of rural property within commuting distance of rapidly developing industrial areas may be expected to increase in 1953. The most active development in the farm real estate market is the increased demand for small, part-time farms in many different parts of Kentucky.



Farm debts are likely to increase slightly in 1953. They now equal about 10 percent of all farm assets. Non-real-estate loans to farmers now exceed the total farm real estate debt, but there is likely to be some shifting to longer-term loans and an increase in real estate mortgage indebtedness in the years ahead. The increase in non-real-estate farm debts has resulted mainly from rising costs in farming and large expenditures for the purchase of farm improvements, equipment, and livestock.

FARM PRODUCTION COSTS

Demand for and supply of agricultural products, and the present cost-price relationship are such that farmers must depend more upon efficiency for profit rather than on increasing prices.

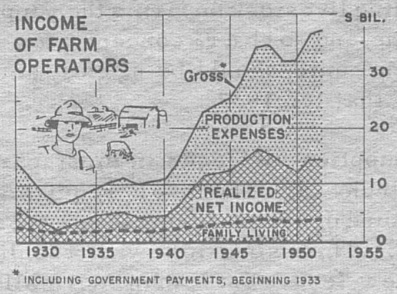


Costs of new farm machinery and power in 1953 will likely be higher than in 1952. As a result of increased costs of materials and labor to the manufacturer, farmers may expect a small increase in farm machinery prices in 1953. Demand for farm machinery will be strong in 1953, with the farm labor force declining and farm income expected to continue high.

Feed costs in the nation now average about 9 percent higher than a year ago. In Kentucky supplies of most feeds will be smaller than a year ago

and prices will be higher than the national average.

The decline in farm labor supply is likely to continue in 1953, and farmers in Kentucky can increase profits by using farm labor more efficiently. The main problem of the Kentucky farm operator who hires farm labor will be maintaining skilled workers. Farm wage rates in 1952 were about 7 percent higher than 1951 and will likely trend upward about 5 percent in 1953.



Supplies of fertilizer will be larger for 1953 than 1952 and prices in Kentucky will probably remain at about the same level as 1952. Supplies of nitrogen fertilizer for 1953 will be up about 11 percent; phosphate up 10 percent; and potash up 17 percent.

Supplies of most grass and legume seeds will be adequate and prices will remain about the same as in 1952. But because of the 1952 drouth larger quantities of seeds will be needed by Kentucky farmers, and a larger than usual proportion of farming expenses will go for seeds.

Prices of building materials will likely remain about the same as in 1952, and price of fencing materials will likely increase up to 5 percent.

Feeder cattle purchased by farmers in Kentucky during the fall of 1952 cost from 20 to 30 percent less than similar cattle a year ago.

FEED SITUATION



The total supply of feed grains and other concentrates is slightly smaller than at this time a year ago, in spite of near record production of crops in 1952. With a slightly larger number of grain-consuming livestock on farms the supply of grain and other concentrates per animal unit should be slightly smaller than that for 1952.

Supplies of feeds in most parts of Kentucky are short of requirements because of drouth during the past summer. This situation will result in higher feed costs than normally in those areas. This will put those drouth areas in a relatively unfavorable position in relation to other areas where feed is plentiful. National levels of prices of feed grain and hay may not differ much from those of 1952.

CATTLE



Prices of slaughter cattle are expected to average lower during the coming year than during 1952 because of an expected 10 to 15 percent increase in slaughter. The expected strong demand for beef during the coming year likely will not be sufficient to offset the price-depressing influence of increased supplies of slaughter cattle. Since prices of low-grade slaughter cattle declined more sharply during 1952 than did the prices of better quality cattle, the expected decline in 1953 will affect prices of higher quality cattle greatest and result in some narrowing of price spreads.

Cattle numbers in the United States continued to increase during 1952, and are expected to reach a new record of about 93 million by January 1, 1953. This will be an increase of about 5 million head over the past year. This increase in number of cattle on farms will make it possible to increase cattle slaughter from 10 to 15 percent without slowing the rate of increase in cattle numbers during 1953.

Prices of stocker and feeder cattle are expected to be more stable than prices of slaughter cattle during 1953. Demand for stockers and feeders is expected to be strong during 1953 in view of the near-record corn crop in the heavy feeding areas of the corn-belt, and the need for animals to utilize the grain. Increased demand for replacement cattle likely will just about offset the increased supply, resulting in prices which may average about in line with those during the fall of 1952. This would result in a somewhat narrower spread between prices of stocker-feeder cattle and prices of slaughter cattle during the last half of 1952.

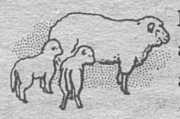
HOGS



Hog prices are expected to average about the same during 1953 as in 1952. Although hog marketings will be smaller during the first half of the year, which would normally indicate some strengthening of prices, this will be offset by increased competition from larger supplies of beef and a weak lard market. Smaller marketings next year will reflect a decrease of 9 percent in the 1952 spring pig crop, an earlier marketing of hogs from the spring pig crop, and an anticipated decrease in the 1952 fall pig crop.

As the hog-corn ratio during the latter part of 1952 was slightly below the long-time average, a small reduction would be expected in the number of sows to farrow next spring. On the other hand, the record size corn crop in much of the commercial hog producing area of the corn-belt favors an increase in farrowings next spring. Comparing these factors indicates a 1953 spring pig crop of about the same size as that for 1952. With no change in the size of the pig crop next spring, with added competition from the prospective large beef supply, and with a continued weak lard market, hog prices during the last part of 1953 are likely to average lower than those during the fall months of 1952.

SHEEP AND LAMBS



Lamb prices during the Kentucky lamb marketing season next year are expected to average about the same as during the 1952 marketing season, and somewhat higher in the last half of 1953 than during that period of 1952. Marketing of sheep and lambs from farm flocks will be down only slightly from marketings in the early season of 1952, while marketings from range states later in the season will be sharply lower. Increased competition from other meats and poultry will offset partly the decreased supply of lamb.

Numbers of sheep on farms declined in 1952 in contrast to increases during the past two years. This reduction was caused largely by drouth in Texas and in other parts of the country. Sheep numbers in Kentucky declined slightly, as many farmers cancelled replacement orders both in 1951 and 1952 because of drouth conditions. With more normal weather conditions, it is likely that sheep numbers in Kentucky during 1953 will show some increase, because sheep seem to be in a more favorable position than other meat animal enterprises for Kentucky farmers.

WOOL



The price of domestic wool is likely to continue at about the present level during most

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of 1953, unless the wool support price is changed.

World production of wool has been above consumption in each of the past two years, and as a result stocks of wool are increasing, This situation is expected to continue through 1953, with wool prices in foreign markets slightly lower than during most of 1952.

Domestic mill consumption of wool in 1953 should be slightly larger than during the past year, but available foreign wool at prices somewhat lower than those for deomestic wools will cause a larger use of foreign wool. Wool production in the United States will be smaller in 1953 than during either of the past two years.

DAIRY


Milk cows

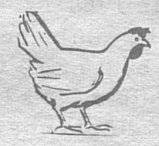
Prices of dairy products and cash receipts from marketings probably will be a little higher in 1953 than in 1952. Net income from dairying in 1953 will be about the same as that of the past year.

Consumer demand for milk will continue strong in 1953. The proportion of milk used as fluid milk has been trending slowly upward since 1941, but has not kept pace with population growth. Continued rise in population and a high level of consumer incomes will mean more people drinking milk and a further shift away from butter production. Milk cow numbers did not

change in 1952. With favorable pasture and feed conditions in 1953, milk production will be larger than that of the past year when drouth cut into production. A large proportion, if not all, of any increase in milk production will be used for bottling purposes.

Cost of machinery, equipment, supplies, and farm labor in 1953 will be higher than in 1952. Much of the gain from improved milk prices will be offset by increased production costs, especially where hired labor is involved. Over the years, dairying has proved to be the most stable of all farm enterprises and the development of a well-bred, high-producing herd appears to be a sound investment a farm family can make.

POULTRY AND EGGS





Income from eggs and poultry in Kentucky may not differ greatly from that in 1952. The outlook for eggs indicates a generally strong demand. Prices in the first half of the year are expected to be somewhat higher than last year. Surplus farm chickens and broilers from commercial farms may be expected to sell at fluctuating prices. These prices may not average as high as last year.

On October 1 there were about 10 percent fewer pullets on farms than

a year earlier. But a larger than normal carryover of old hens will mean that only 4 percent fewer hens will be in laying flocks this winter. Thus, it is anticipated that egg production will be down during the first part of 1953. On the other hand, broiler production may continue to expand and, in the face of increased competition from red meats, broilers will sell at somewhat lower than peak prices of 1952.

While the outlook for poultry does not seem to encourage expansion involving a major cash outlay for building and equipment, the industry will continue to show profit to efficient producers. For those who want to realize the highest possible return from egg sales, early chick placement is to be recommended.

TOBACCO



Demand for tobacco products in 1953 is expected to be influenced favorably by large industrial output, relatively full employment, and high consumer income. These factors usually apply especially to the cigarette kinds of tobacco, in contrast to those types used more extensively in pipe smoking and cigars.

A steady growth in the use of cigarettes in this country is one of the most important factors in the tobacco situation. Consumption of tobacco products per captia, for people 15 years old and over, apparently remained relatively constant at 8 to 9 pounds for

many years prior to 1940. Declines in the use of chewing tobacco, smoking tobacco and cigars, about offset the increase in cigarettes. With World War II, however, the use of cigarettes increased more rapidly than the others declined, U.S. consumption in 1952 is estimated to be 12.6 pounds per capita. Per capita use of cigarettes doubled from 1940 to 1952, while use of smoking and chewing tobacco was cut in half.

Cigarette output in 1953 probably will be more than the 430 billions estimated for 1952, which in turn is 3 percent larger than the 1951 output. Output of smoking tobacco in 1953 probably will be about the same as in 1952, but somewhat below the 1950 output of 101 million pounds. The use of chewing tobacco continues its downward trend and seems likely to be slightly smaller in 1953. The total consumption of snuff remains surprisingly constant at 39 to 40 million pounds annually.

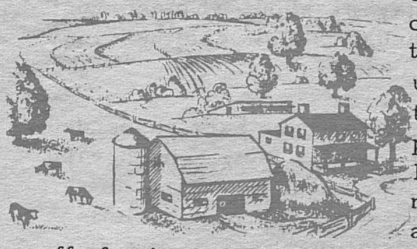
Burley. The 1952 crop of Burley is estimated to be 607 million pounds, or 71 million pounds more than disappearance during the year ending October 1, 1952. Yearly production during the past 10 years has averaged 12 percent larger than disappearance and stocks have accumulated to the largest amount on record. Disappearance has increased to an estimated 536 million pounds, but total supplies of 1,668 million are larger than normal in relation to disappearance. To bring production more nearly in line with disappearance, marketing quotas for next year have been reduced 10 percent. Acreage allotments, therefore,

will be reduced on farms which had 1952 allotments of 7 tenths of an acre or more.

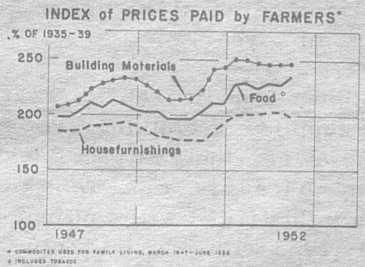
Fire-cured. Production of fire-cured tobacco, estimated to be 56 million pounds, is the smallest crop on record. Yields per acre are above the 10-year average, despite drouth in much of the fire-cured areas, but acreage in 1952 is 5 percent below that of 1951 and is only two-thirds of the average acreage for the past 10 years. Disappearance of types 21-24 has been larger than production in each year of the last four, and now may be stabilized at about 70 million pounds annually. Price-support loans assure reasonably good prices for the crop, but the government still holds about 30 percent of the fire-cured tobacco acquired under the loan program during the last five years. On the whole, long-time prospects are not bright for fire-cured tobacco.

Dark air-cured. Production of dark air-cured tobacco has been moderately less than disappearance in each of the past four years and stocks have been reduced about 10 percent. Domestic use of dark air-cured tobacco is mostly in chewing tobacco, so disappearance is likely to continue its downward trend. About one-fifth of the tobacco placed under loan from the 1946-50 crops, remained in government stocks on September 30, 1952. Prices for the 1953 crop doubtless will be well maintained through the price-support program.

FARM FAMILY LIVING



Living costs may continue to creep up during the first part of 1953. After mid-year a leveling off of prices may occur with a possible drift downward for some items. Supplies of goods that families want to buy will be plentiful, but variations in supplies will be reflected by price changes among different items. Differences in price movements for food, house furnishings, and building materials may be seen in the accompanying chart.



Housing. High prices for materials and rising wage rates will keep building costs up. However, lumber and most building materials will be easier to get. Nevertheless, some slowing up in the rate of homes being constructed is expected in the latter part of 1953.

Household appliances. Supplies of both furnishings and appliances are

adequate to meet demand. As may be seen in the chart, prices of house furnishings declined in 1952 and will probably stay at about the current level, although slight declines may occur late in 1953.

Ceiling prices have been suspended on radio, television sets, phonograph records, floor coverings, and metal beds. Also, removal of restrictions and more installment credit has made it possible for consumers to increase their purchases of house furnishings and appliances. Since the lifting of "Regulation W" installment credit in the country rose a total of fifteen billion dollars by the end of August 1952. Total volume of installment credit may be expected to increase, as more farm and urban families will take advantage of this type of credit in the coming year.

Clothing and Household Textiles. Ample supplies of clothing are available; however, the general level of clothing prices is rising slowly. Probably this trend will continue into early 1953 with a leveling off later. Prices of cotton materials are leading the upward movement.

World supplies of wool are increasing, and in spite of the drouth, domestic cotton supplies are adequate for current needs. In addition to the natural fibers and older synthetics, a whole new array of fibers is not being used in blends. One of the consumers' problems is that of identifying the blend as well as knowing the qualities of the fiber. Labels frequently give only a partial identification of the blends for synthetic

fibers, although they do give wool content.

Food. Per capita supplies of most foods are adequate for current needs, but higher processing and marketing costs coupled with continued strong demand will help keep food costs high.

The 1952 pack of canned fruits and vegetables was down, but with the carryover from the previous year prices are likely to stay about where they are. Supplies of both canned and frozen fruit juices are low and prices may advance. Retail prices of eggs, milk, and fresh fruits are likely to be higher this winter than last, while most kinds of meats are expected to adjust downward during the months just ahead.

Top-dressings of lime and fertilizer

Most permanent pastures will need to be top-dressed with limestone and fertilizer to keep them productive. In general, 2 tons of limestone should be applied each 10 years. Pastures outside the Bluegrass Region should be top-dressed every few years with enough fertilizer to add at least 25 pounds each of phosphoric acid and potash per acre per year. Potash is often needed in the Bluegrass Region also. Nitrogen fertilizers, if used, should be applied a few weeks before extra pasturage is needed. Phosphate and potash fertilizers and limestone may be applied whenever most convenient to the farmer.

Renovation

If the pasture sod becomes thin, fertilize it as needed and disk or harrow it thoroughly and reseed. Don't graze the reseeded pasture for several weeks, or until the new seedlings have made good growth. If the pasture has been overgrazed or if the fertility is low, it does very little good to reseed unless these conditions also are corrected.

Lexington, Kentucky
January, 1953

10M—1-53

Starting and Managing Permanent Pastures in Kentucky

By E. N. FERGUS

See Kentucky Extension Circular 402 for directions on seeding pastures and lists of good pasture mixtures for various soil conditions in Kentucky; also Kentucky Experiment Station Circular 70 for more complete fertilizer recommendations than are given in this leaflet. Get copies from your county agent or write to the Bulletin Room, Agricultural Experiment Station Building, Lexington, Kentucky.

Leaflet 137

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UNIVERSITY OF KENTUCKY
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U.S. DEPARTMENT OF AGRICULTURE, Cooperating
FRANK J. WELCH, Director
Issued in furtherance of the Acts of May 8 and June 30, 1914.



Good bluegrass pasture on a soil in west Kentucky kept productive by top-dressing with 200 pounds of 20-percent superphosphate per acre every 2 years and one ton of ground limestone every 8 to 10 years. The pasture was started with a treatment of 600 pounds superphosphate and 1½ tons ground limestone per acre. Beef production has been decidedly profitable on this treated pasture.

STARTING A NEW PASTURE

Preparing the seedbed

Late summer and early fall are in general the best times to start new pastures. Plow or disk the land a month or more before seeding time, and then fallow to kill weeds and to firm the soil. Apply limestone and fertilizer during this period.

Liming and fertilizing

Most land in Kentucky needs 2 to 3 tons of ground limestone per acre to produce good pasture, but some soil needs no lime.

A good pasture is possible only on good soil. Almost all soils outside the Bluegrass Region, and some in this region, must have phosphate fertilization to make them productive. Apply the phosphate liberally before sowing the new pasture.

On low phosphate soils, about 750 pounds of 20-percent superphosphate, or the equivalent of other phosphate fertilizers, should be applied per acre. If rock phosphate is used, apply 1,000 to 1,500 pounds per acre and use in addition 200 pounds of superphosphate per acre as an aid in establishing seedings. Land low in available potash should receive at least 125 pounds of muriate of potash per acre. An application of 100 to 150 pounds of ammonium nitrate per acre or the equivalent of other nitrogen fertilizers, is recommended for soil low in organic matter. When a complete fertilizer is used, an application of about 1,000 pounds per acre of 4-12-8 mixed fertilizer will provide about the proper amount of plant food.

If there is doubt whether lime is needed, ask your county agent about having a chemical test of the soil.

Choosing the seeding mixture

Choose grasses and legumes on the basis of their adaptation to soil conditions. Use at least one grass and one legume in each mixture. Usually, at least two grasses and two legumes will make a better mixture.

Sowing the seed

Sow the seeding mixture at the rate of 15 to 25 pounds of good seed per acre. Sow the seed uniformly and cover it lightly.

MANAGEMENT OF PERMANENT PASTURE

Intensity of grazing

Most permanent pasture seedings are made in small grain. The small grain crop should then be grazed rather than harvested for grain. During the remainder of the first year the pasture may be



Pasture on the same type of soil as the one shown in the preceding picture, but it has had no top-dressings of limestone and phosphate. Though it has been seeded with good legumes and grasses and has a fair stand of some of them, it produces very little forage. The vegetation is largely weeds.

grazed moderately. It should not be grazed close.

So far as possible, permanent pastures should be moderately grazed—never undergrazed or overgrazed. Fescue pastures should be closely grazed. Undergrazed pastures should be mowed for hay or silage. One way to avoid overgrazing is to provide temporary pasture during winter and midsummer. Small grain, crimson clover, and vetch are excellent winter pastures; sudan grass is the most productive temporary summer pasture.

Mowing

Mow permanent pastures once or twice each year to control bushes and weeds and to cut back excess pasture herbage in undergrazed spots.

Dragging and harrowing

Scatter animal droppings by occasional dragging or harrowing of the pasture.

caution to divide the seed and sow the two portions 10 days to 3 weeks apart.

Many pastures that survived the drouth last year contain very few legumes. Legumes should be resown in these fields. If the sod is short, good results can usually be obtained by broadcasting the seed in late winter or early spring without attempting to cover them. Results are likely to be better, however, if the seeding is done with a disk drill set to cut the sod. Disking the sod lightly before or after seeding is usually successful. A mixture of legumes is likely to give better results than one legume. Legume seeds should always be inoculated before seeding.

In making pasture or meadow seedings at any time it is very important to get the young plants firmly established with deep roots before the next critical season. This makes it very important to sow in good time and to fertilize for fast, vigorous growth. Young grass and clover can compete with weeds only if plant food is abundant.

Grazing the New Seeding

New seedings of permanent pastures should not be grazed until they become well rooted and have made good growth. Unless other spring grazing is provided, it may not be easy this spring and early summer to delay grazing of these seedings in this manner, but results are quite apt to be about in proportion to how well it can be done.

2-53-10,000

RENOVATING DROUTH-DAMAGED PASTURES

By Lyle B. Leonard and
E. N. Fergus

The very severe drouth of 1952, aided in some instances by grasshoppers, grubs, and low soil fertility, damaged Kentucky pastures badly. The damage was generally least in the mountain area, and greatest in some of the northern and western counties. In many fields stands are entirely lost. Lespedeza formed very little seed, and therefore little natural reseeding will occur this spring. White clover may volunteer but is not apt to produce the needed pasture. Obviously the pasture situation in 1953 will be very serious in many places unless steps are taken to renovate or re-establish the permanent pastures and also to sow temporary spring pastures where other early spring pasture will be inadequate. Even these steps will, of course, provide the needed pasture only if weather is favorable or the fields can be irrigated. (See Ky. Agr. Ext. Cir. 402 for suggestions on seeding new pastures).

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Fertilization

The soil should be tested to determine treatments needed. This can be done in county laboratories directed by county agents, or it can be done by the Experiment Station at Lexington. Limestone, phosphate, and potash fertilizers should then be applied in amounts indicated by the tests. Nitrogen fertilizer should usually be applied also in amounts to supply about 35 pounds of nitrogen per acre. This will give the new seeding a quick and vigorous start. Mixed fertilizers or individual carriers may be used.

Early Spring Pasture

Because of damage done to permanent pastures in 1952, special seedings for early spring pasture should be made on many farms in Kentucky this spring. Otherwise, livestock is likely to be turned on permanent pastures that should be protected until they have recovered or been re-established. Seeding should therefore be made for spring grazing if weather is favorable. In fact, seeding should be made in anticipation of favorable weather.

Spring oats sown at about 3 bushels per acre will usually make more early grazing than any other spring-sown crop. The land should either be plowed or disked thoroughly during the winter when it is in suitable condition. Rape sown with the oats at about 6 pounds per acre would extend the grazing season, especially for sheep and hogs. Rye-grass also may be sown for early grazing but will furnish less grazing than oats, especially if the weather is somewhat drouthy. It should be sown at the rate of about 25 pounds per acre.

Spring seedings should be used in place of permanent pastures as long as they produce satisfactory grazing. After that the land should be plowed or disked, fertilized, and seeded with Sudan grass for summer pasture, or otherwise used to best meet the needs of the farming enterprise. Orchard grass, Ky 31 fescue, or redtop and clover may be sown with the oats in an effort to start a new permanent pasture. It may or may not be successful, depending largely upon the weather.

Re-establishment of Permanent Pasture

Dead or severely damaged permanent pastures may, of course, be disked or plowed and sown with oats for early grazing as an intermediate step in their restoration as permanent pasture. In most cases these sods should be sown back into permanent pastures this spring. Most of these sods other than Kentucky bluegrass are actually in as bad condition as they appear to be. Kentucky bluegrass pastures may be in better condition than they appear. It is likely that they will gradually recover, especially if top-dressed with fertilizer. Legumes should be sown in these bluegrass sods. Red clover, Korean lespedeza, alfalfa, and white clover are suitable. Ladino clover ought not be used because it would likely prevent satisfactory recovery of the bluegrass.

Sods that are to be seeded to grass this spring should be disked or plowed early enough for the soil to become firm before seeding. Fertilizer should be applied ahead of seeding and worked into the soil.

Mixtures for sowing this spring will consist principally of grasses and legumes that start off quickly and grow vigorously, but slower growing grasses and legumes may be included if desired. To a considerable degree the kind of seed sown will be determined by the supplies available. Certain kinds of seeds are scarce; while others are abundant. Kentucky bluegrass, timothy, and redtop seeds are somewhat scarce. Kentucky 31 fescue seed, on the other hand, is very plentiful, and the supply of orchard grass is adequate. Smooth bromegrass seed supplies also are above normal. It is likely that the grass portions of most seedings made this spring will consist largely of Ky 31 fescue and orchard grass.

Supplies of legume seeds also are quite variable. There is not nearly enough Korean seed to meet the demand. Supplies of red clover, alfalfa, ladino, white clover, and sweet clover seed are plentiful. One or more of these legumes should be used in the mixture. Kenland red clover, and Atlantic, Buffalo, and Ranger alfalfa varieties should be used where seed can be obtained. Much of the red clover available is of no particular variety, but it can be used to good advantage in pasture seedings, particularly if it is homegrown seed.

In general, seeding rates will consist of 8 to 12 pounds, of grass seed and an equal amount of legume seed, except ladino clover. Perhaps not over one-half pound of ladino clover seed should be sown per acre. Heavier seeding rates may provide a stand of ladino too thick for young grass. With both grass or legume seedings it is a good safety pre-

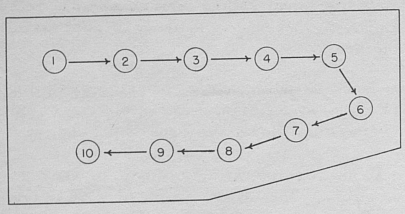


Fig. 2 - Diagram showing how to take a composite sample from a field when only 10 samplings are made.

If the field varies in soil-type, fertility, or slope, or if crop growth varies in different parts of the field, or if fertilizer and lime treatment on various parts of the field have varied during recent years, a composite sample of 10 or more borings should be taken from each area.

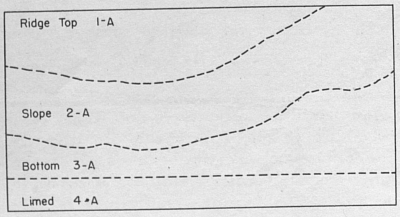


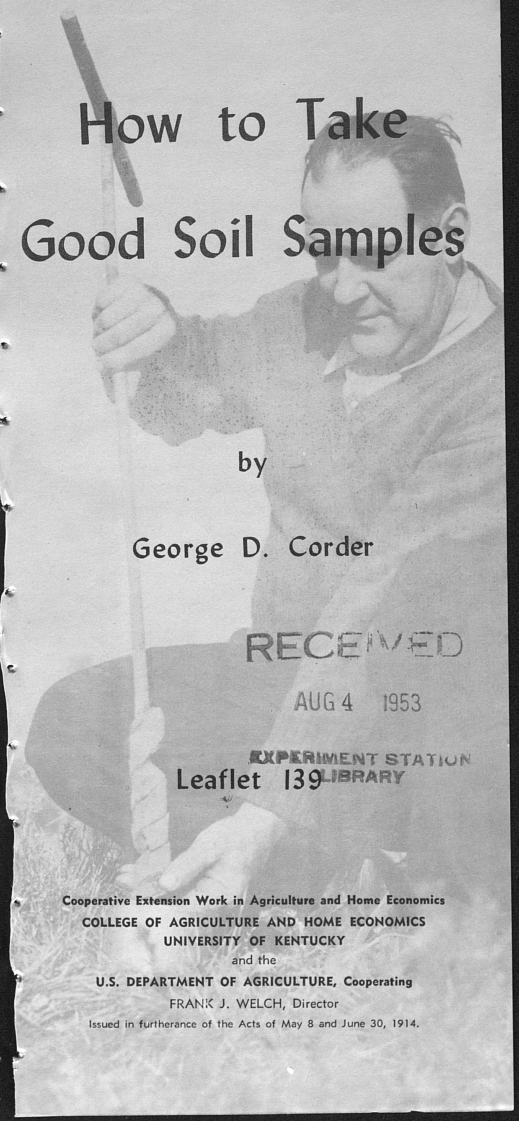
Fig. 3 - The diagram illustrates a field with many variations and the numbering of the samples from the areas. Four composite samples should be taken from this field.

Old house sites, small garden plots, and places where lime or manure have been piled in a field should be avoided. If a larger field has a fertile basin or a poor knoll that is so small that a farmer cannot afford to change his fertilizer application when he comes to that area in his operations, they should be avoided in sampling. If the basins or knolls are large enough in area that they should be fertilized separately, a composite sample should be taken from them and one from the remainder of the field.

Before limestone and fertilizer recommendations can be properly made, past cropping-history, soil treatments, and future cropping plans must be known by the county agent. This knowledge of the field is supplied when the farmer fills out the information sheet correctly.

5M-6-53

How to Take Good Soil Samples



by

George D. Corder

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How to Take Good Soil Samples

By George D. Corder

If Kentucky farmers are to get the best results from the soil-testing program and from fertilizing according to the recommendations made, soil samples must be taken properly and delivered to the soil-testing laboratory in good condition. They must be representative of the area if the results are to represent the level of fertility to the area. The technician who makes the tests, and the county agent who is responsible for the program and makes the fertilizer recommendations, exercise a great deal of care in processing the soil sample. The farmer or other person who takes the sample from the field or area, should use equal precautions if maximum reliability in the results are to be obtained. It is to be remembered that test results and fertilizer recommendations are no better than the sample taken and delivered to the laboratory.

Soil Sampling Tools

The three tools most commonly recommended for taking soil samples are soil-sampling tubes, augers, and spades. A clean bucket should be at hand for mixing the samples, and clean, heavy paper bags should be used to deliver the samples to the laboratory.

A wood auger (brace and bit) and a spade can be found on nearly every farm in Kentucky and these are good tools for sampling soils if used properly. Soil-sampling

tubes and soil augers are available to farmers in a few counties in the state. Some farmers find it convenient to use an iron pipe. This can be made more useful by cutting out one side with an emery wheel, making it similar to a sampling tube.

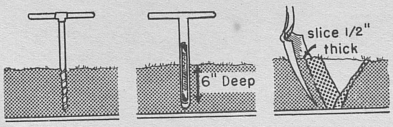


Fig. 1 - Methods of taking soil samples with an auger, soil-sampling tube and spade.

Taking Soil Samples for Tests

The sample is best taken from the field when the soils is dry enough to plow. While it can be done when the ground is wet, it is then much more difficult to mix the soil so the portion sent to the laboratory is representative. It is also more difficult to prepare for analysis.

If the soil is not dry when it is taken from the field, it should be air-dried and all lumps crushed before the sample is delivered to the soil-testing laboratory. Do not dry the soil over a stove or radiator.

A sample can be taken more quickly and easily when a soil-sampling tube or

auger is used rather than a spade, and usually it will be more likely to represent the area.

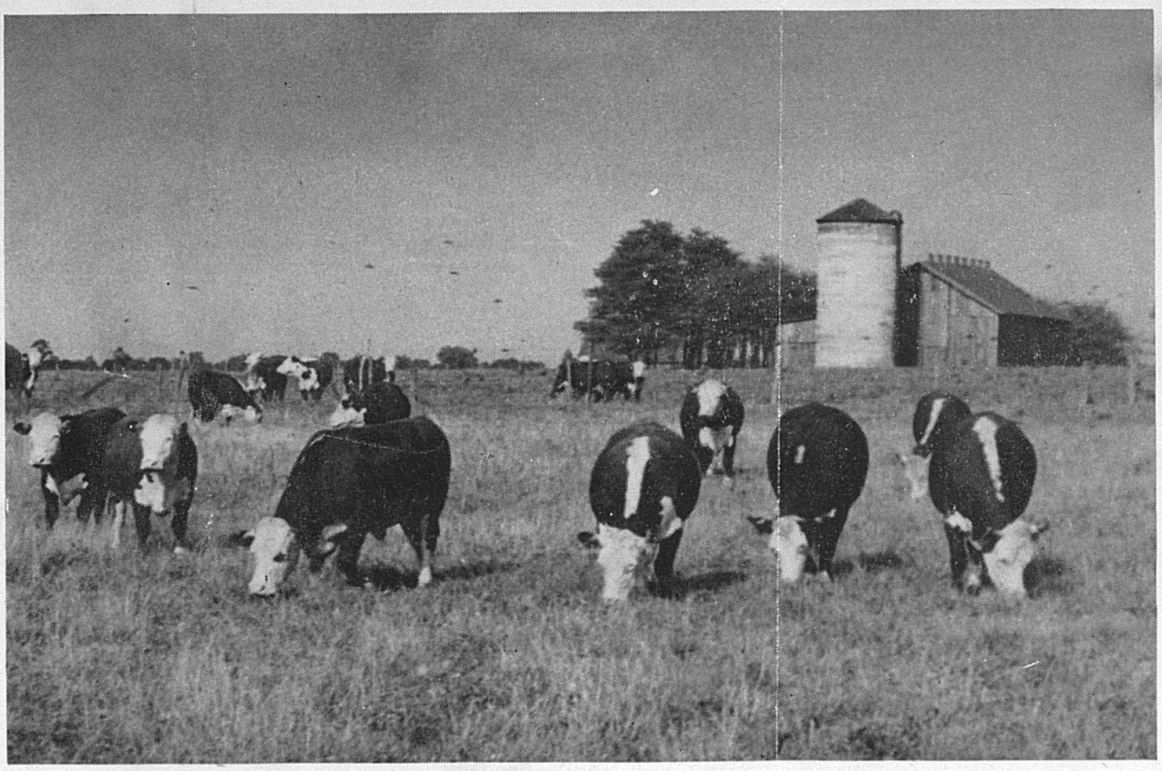
When using an auger or soil-sampling tube, make a boring 6 inches deep, or no deeper than the soil is usually plowed, and pull up the soil. When a spade is used, dig a V-shaped hole 6 inches deep, or deeper, and cut a thin slice from the side of the hole. The boring or slice of soil removed should consist of a sample extending from the surface to a depth of 6 inches, or plow-layer depth. All grass and trash should be removed from the surface before a boring is made, or before the slice is collected with the spade.

There should be 10 or more samplings taken with the auger, sampling tube, or spade from each field or area. All samplings should be placed in a clean bucket or box as they are taken in the field. Mix them thoroughly, then place a pint of this soil in a clean paper sack as the sample to be tested for that area. Mark the sack with the field name or field number from which it was taken, plus the farmer's name and address.

If a field is uniform in soil-type, fertility, slope, and crop growth, and if fertilizer and lime treatment have been the same over the entire field, one composite sample of 10 or more samplings is sufficient.

Guides To Balanced Grassland Farming

By Harry M. Young, Jr.



How much forage your livestock will need at certain times of the year comes first in planning economic production and use of pasture. The kind and number of livestock you usually produce determine how much and when summer forage will be needed.

Leaflet 140

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College of Agriculture and Home Economics, University of Kentucky
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FRANK J. WELCH, Director
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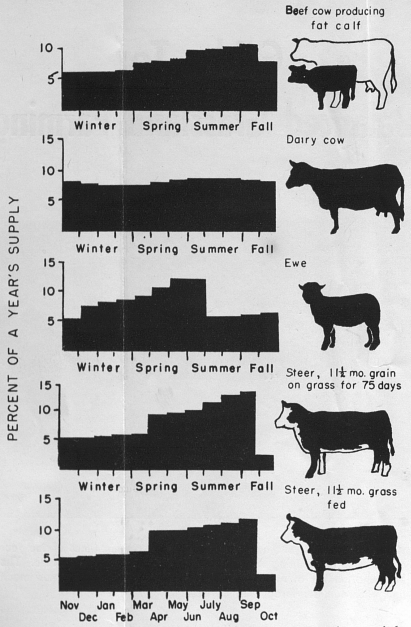
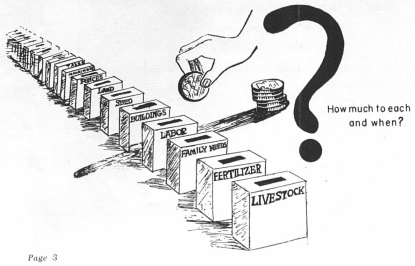


Beef cows that are producing fat calves have an increasing need for feed until the calves are marketed. A dairy herd's demand for feed is fairly constant throughout the year. The demand of sheep for summer feed fits closely to the supply of bluegrass pastures, making sheep a near-ideal enterprise for farms relying heavily on bluegrass for summer forage. Fattening cattle have an increasing demand for feed until they are sold.



Your decisions about kind and number of livestock to be produced determine how much pasture they will need and when it will be needed. These decisions must be made before you can know much about the actual supply of summer forage.

How you figure costs and returns may heavily influence the way you divide your time, money, and other resources among the parts of your farm business—for you will want to place your resources so as to gain the best returns. A realistic accounting method will aid you in avoiding an uneconomical division of time, money, machinery, management, and other resources among the parts of your farm business.



How much to each and when?

How much Flexibility?

How rapidly can you change your business if you need to?



Cash outlays for pasture before beginning of crop year.



Cash outlays for pasture after beginning of crop year.



Cash outlays on row crops before beginning of crop year.



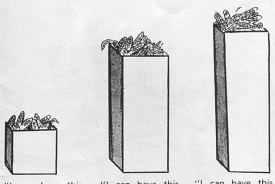
To be spent on row crops after beginning of crop year.

Most of your cash outlays for pasture come before summer production—and when once made these cash outlays are fixed for any one year. This contrasts with your row crops, such as tobacco or corn, where most cash outlays come while the crop is being produced. If the costs of your farm enterprises are mostly fixed costs, usually you will have less opportunity to make large changes in your business. This inflexibility may be partly offset, however, by greater stability of income over a period of years. The type of livestock using the pasture also may help determine the amount of flexibility in a pasture program.

Your farm business is different from another's in amount and kind of land, amount and availability of capital, market opportunities, amount and quality of labor, efficiency of management, amount of risk you are willing and able to bear, and your likes and dislikes. These factors will determine the most profitable enterprise combinations for your farm, and for other farms.



"HOW MUCH OUTPUT PER ACRE SHOULD I TRY TO GET?"



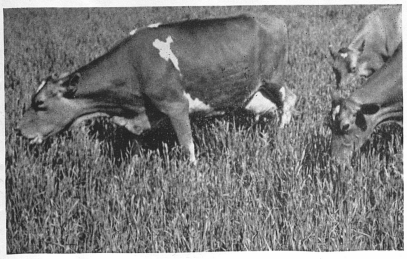
"I can have this much production if I do nothing to improve yields."

"I can have this much production if I give careful consideration to the effect of each dollar spent for improved production."

"I can have this much production if I try to get the highest possible production."

Try to combine the parts of your business, and the things you use in production, so that whatever the nature of the season, you will be in best position to get the most net value from each acre. Giving careful consideration to the effect on the farm business of each dollar you spend will help you attain the most net income from your production. If you are not financially able to buy all that may be needed for most profitable production on all your pasture land, you should spend your available money on those things which give highest, and usually the quickest, net returns.





A longer effective pasture season is the goal of many farmers. Pasture should be used to provide forage for your livestock up to the point where cost of producing a unit of pasture is equal to the cost of producing a corresponding unit of harvested forage on your farm. It is best to consider winter pasture only as a help in your regular winter feeding. Pastures all the year will be profitable, generally speaking, if the following are true: (1) if a larger than usual amount of livestock production results from a limited amount of forage, as for example when grass stimulates milk production; and (2) if another product is produced from the same land and same cultivation; for example seed, summer forage, or grain after fall and winter pasture.



Supplemental pastures are a part of some pasture programs. Total costs are increased if you attempt to provide protection against drouths and to control variation in pasture production. These additional costs must be paid for by increased returns from a more uniform distribution of forage and a reduction in your risks.

PRODUCTION

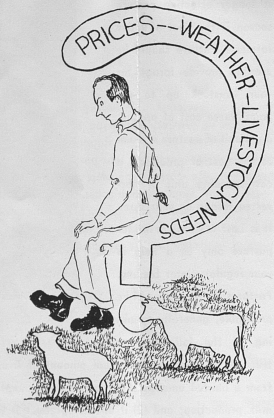
Choose livestock to fit usual supply of pasture.
Choose market dates to avoid most probable drouth periods.
Choose an arrangement of pasture mixtures for good distribution of pasture over all seasons.
Supplemental pastures.
Mow pastures.
Apply fertilizer.
Apply fertilizer at special times.
Rotate use of pasture.
Irrigate pastures.

INVENTORY

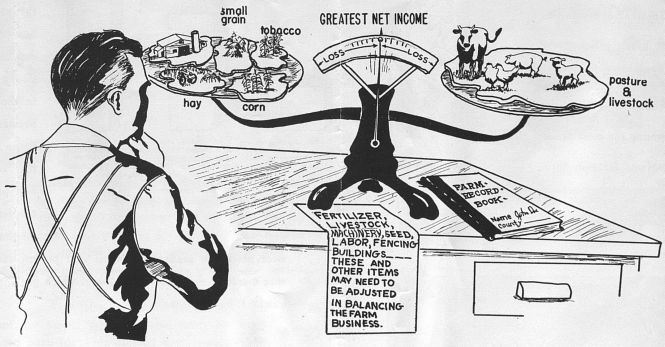
Fewer livestock (understocking).
Hold back grain for feeding in dry periods.
Hold back hay or harvest early hay for feeding in dry periods.
Grass silage for summer feeding.
Hold back an emergency pasture.

CASH RESERVES

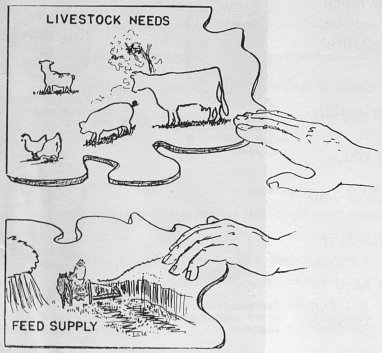
Cash reseres to buy feed when needed, or to buy more livestock if there is a surplus of grass.



With your livestock demands for pasture largely determined before any pasture is produced, you must provide optional plans which you can follow when bad or unusually good weather occurs. Some of the alternatives shown above would be difficult, or impractical for you to follow. Practices used successfully on one farm may not be suitable for your farm. *Some facts to consider:* A serious drouth occurs in about one year in ten, on the average; most pasture costs are fixed for any one crop year; less flexible business with heavy pasture program; differences in production greater within years than between years; "dollars and sense" side of the whole farm business must be considered; livestock must use pasture to provide cash returns from pasture.



In deciding whether to increase or decrease your acreage in pasture, it is practical to follow the policy of determining the most likely effect an increase or decrease would have upon your immediate and long-time net income. The task is made difficult by ever-changing, uncontrollable circumstances influencing your many decisions.



Fitting together your supply of pasture and livestock needs for feed is a key problem in planning for economic production and utilization of pasture. The dollar value of your pasture, in general, can be realized only when the forage is consumed by livestock. The chart on page 2 shows the problems of seasonal demands of livestock for feed. In fitting together pasture supply and livestock needs, each decision you make must be considered from the viewpoint of the effect of that decision on your whole farm business.

How much forage do your livestock need, and when?

What should you consider the dollar value of pasture to be?

How do pasture costs affect your farm business?

How can you best fit together your pasture and your other farm enterprises?

What level of production should you try to reach?

What can you do toward controlling variation in your forage production?

These and other economic questions probably are influencing your farm-business decisions. The guides to balanced grassland farming in this folder may be useful to you in answering them.

For more complete information see Kentucky Circular 498, "Planning for Economic Production of Pasture"; Kentucky Bulletin 568, "Allocation of Farm Resources for Economic Production of Pasture Forage"; and Kentucky Bulletin 575, "How Farmers Make Pasture Plans to Meet the Uncertainty of Weather."

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14M—1-54

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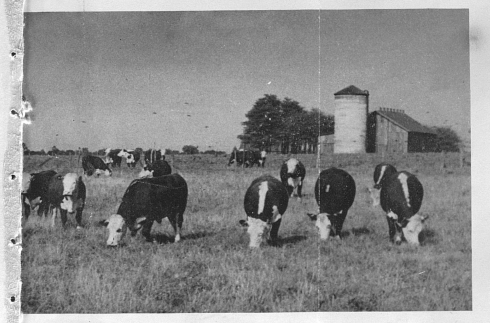

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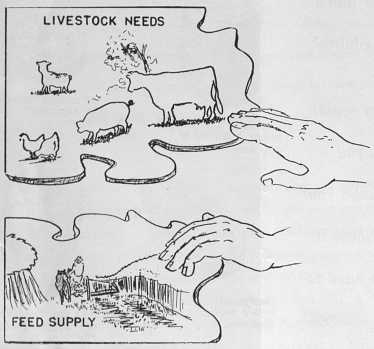

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What's the Outlook?

for

KENTUCKY AGRICULTURE IN 1954

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FOREWORD

The agricultural outlook for 1954 is not depressing, though not so rosy as in several recent years. Individual initiative, industry, and sound farm management will continue to pay off well. The greatest squeeze, as always, will be on inefficient farmers--but it will also fall heavily on those who suffered greatly in last year's drouth.

The problems of management become more acute in times like this when farm costs are high in relation to farm prices. It is hoped that this Agricultural Outlook will provide information which will assist Kentucky farmers in making wise management decisions in the year ahead.

The Agricultural Extension Division will supplement this analysis with timely information in the form of press releases, radio and television broadcasts, and the monthly "Notes on the Kentucky Agricultural Situation". This monthly publication on current outlook is available upon request.

Frank J. Welch
Dean and Director

AGRICULTURAL OUTLOOK FOR 1954

Highlights of the 1954 agricultural outlook for Kentucky farmers are: (1) a continuation of the cost-price squeeze caused by relatively stable prices of industrial products bought by farmers and slightly lower prices received for farm products, (2) some added costs resulting from the 1953 drouth, and (3) few, if any shifts in the pattern of production of the past few years which means with normal weather, a large agricultural output.

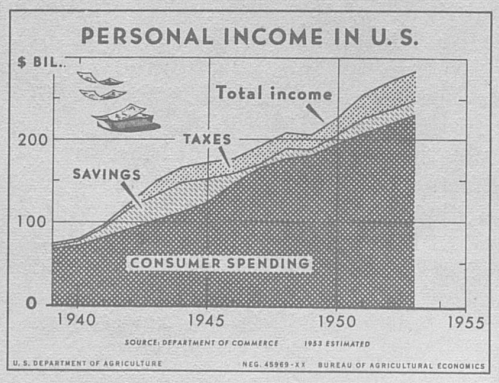
THE DEMAND SITUATION

Export Demand Exports of agricultural products in 1954 are expected to be a little smaller than those of 1953, both in volume and in value. Favorable farm production in many foreign areas, domestic prices higher than world prices for many farm products, and a continued dollar shortage in many foreign countries are conditions which are expected to result in a decline in exports.



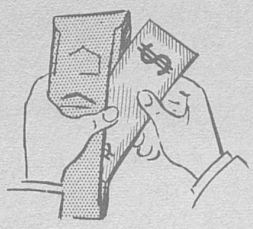
Domestic Demand Domestic demand for agricultural products will continue strong in 1954, and changes in supplies will largely determine changes in price. This expectation is based upon continued high individual incomes, although the level of such incomes may not be as high as last year. The total amount of individual income depends largely upon the number of people employed, the average number of hours worked per week, and

wage rates. The trend in total personal income since 1939 is shown in the accompanying chart.

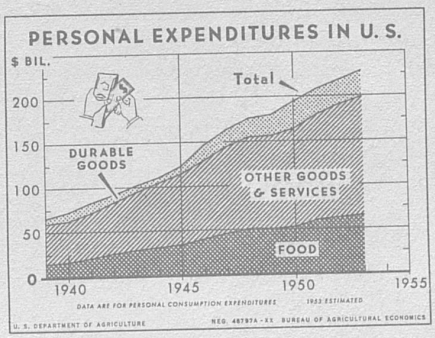


Individual incomes in 1954 are expected to total slightly less than last year. There will be about the same total number of workers employed in the United States, but the average number of hours worked per week will be lower, as a result of less overtime and in some cases fewer days worked. Reduction in average number of hours worked per week can be attributed to: (1) lower government spending for national security; (2) less construction, fewer housing starts as well as less industrial plant expansion, and (3) lower output of some manufactured products, such as farm machinery.

Reduction in hours worked per week is expected to more than offset any increases in wage rates and higher levels of take-home pay resulting from reduction in individual income taxes. Nevertheless, the volume of consumer expenditures in 1954 probably will be about the same as in 1953, as the slightly reduced personal incomes will be supplemented with an increase in installment credit.



The proportion of personal income spent for agricultural products is expected to be about the same as in the past year. Personal expenditures since 1939 for durable goods, food, and other goods and services are shown in the accompanying chart. Since there is nothing to indicate otherwise, it is anticipated that in 1954 individuals will spend for agricultural products about the same as in 1953.

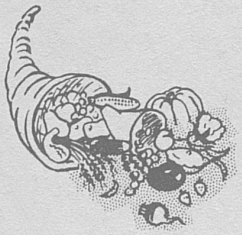


PRICES AND INCOME

Prices received by U. S. farmers in 1954 are expected to average slightly lower than in 1953, but no sharp decline in the general level of farm prices is expected. A near-record volume of agricultural products suggests some further price reductions for products in large supply during the year ahead.

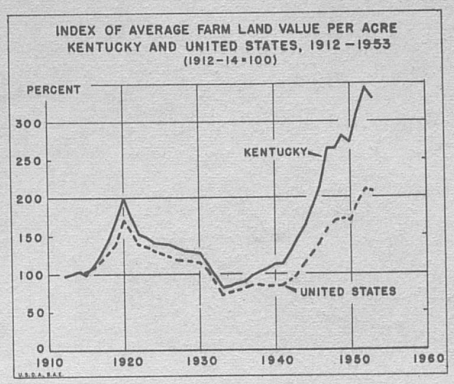
National gross farm income in 1954 is expected to be only a little smaller, if any smaller, than that of the past year. Higher production costs, however, may mean less net farm income. Many farmers hit by drouth in 1953 may expect higher net incomes in 1954 if rainfall is normal.

Marketings of farm products by Kentucky farmers in 1954 will probably be somewhat less than in 1953, but costs of farm production will likely be higher, with a further squeeze on net farm incomes. Income data for Kentucky are not available for the entire year of 1953, but cash receipts from marketings are estimated at 560 million dollars. Cash receipts for the first ten months of 1953 were 13 million dollars less than in 1952. Because of drouth-stricken pastures, many farmers were forced to feed winter rations during late summer and fall, and costs of livestock production will continue high until pastures become available. The costs for most production items, including labor and farm equipment, are expected to continue at about present levels.



LAND VALUES

The price of farm land in Kentucky is expected to decline slightly in 1954. Changes in farm land values tend to lag behind changes in prices of farm products, but the general level of prices received by farmers has moved downward since early 1951, declining a little over 8 percent within the last year. Adjustments in prices of land are not likely to be uniform over the state. In areas where burley tobacco is the major source of income, the price of land will most likely be maintained, while in areas where sharp declines have occurred in prices of the major sources of farm income, some further decline in land values may be expected.

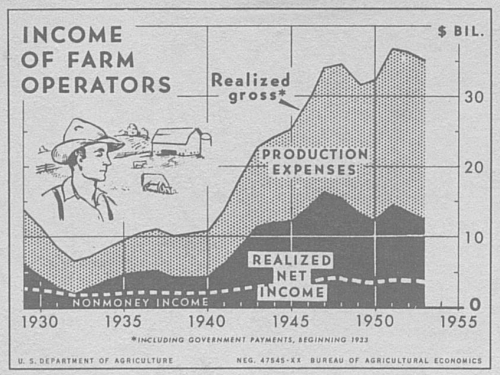


Total farm debts in the United States are expected to continue to rise during the coming year, but farm debts are still at a low level when judged from the past. They now amount to about 10 percent of all farm assets, not including Commodity Credit Corporation loans. In addition to a rise in total farm indebtedness during 1953, a shift also took place in the type of debts. Farm debts as a whole increased but nonreal estate loans decreased. Farm mortgage debts now slightly exceed other kinds of farm debts. Farm real estate mortgages are likely to increase in 1954, due largely to a continued shift from short-term credit to longer-term mortgage loans.

FARM PRODUCTION COSTS

Because of the cost-price squeeze on net farm income, high levels of net income will be dependent upon good farm management. As may be seen in the accompanying chart, in recent years a larger proportion of the gross income of farm operators in the United States has been going for production expenses. This trend will likely continue during the year ahead.

There may be a slight increase in the over-all supply of farm labor in the year



ahead, but the supply of experienced farm workers will continue tight. In view of the prospective level of farm income and the supply of farm labor, little change is to be expected in wage rates for farm labor in 1954.

Costs of commercial feeds are expected to average lower nationally in 1954 than in the past year. In Kentucky feed prices are expected to follow the national pattern, but, because of the 1953 drouth, heavier rates of feeding will be required during the early part of the year if the output of livestock products is to be maintained. Feed costs per animal unit are therefore likely to be high in Kentucky, relative to the national average.

With the exception of Kentucky bluegrass and redtop, the important legume and grass seeds will be somewhat lower in price than a year ago. Bluegrass and redtop seed are in short supply with current prices the highest on record.



Established prices of farm machinery in 1954 probably will be near current levels, but price concessions on the part of dealers

may be more general and liberal. The demand for farm machinery in 1954 will reflect the declining trend in net farm income and the change in the farm labor supply. More complete and efficient use of farm machinery will materially help the profit position of Kentucky farmers.

Little change is expected from the present level in the price of fertilizer. Supplies will be larger than in the past year by about 13 percent. It is estimated that the supply of nitrogen will be up 11 percent, phosphates about 12 percent, and potash about 15 percent. The supply of high anaylsis fertilizers is expected to be ample to meet the demand. Farmers who apply fertilizer in accordance with recommendations based upon soil tests will very likely gain the largest returns from fertilizer in relation to cost.

Prices of building materials and fencing will likely remain about the same as in 1953. Supplies are expected to be adequate to meet demand.

FEED SITUATION



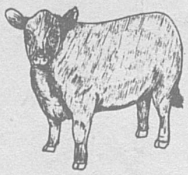
Total national supplies of both feed concentrates and hay are large, although supplies vary sharply by areas. Feeds in most parts of Kentucky are short as a result of the severe 1953 drouth. Feeding costs will therefore be high, and farmers in the drouth areas will be in a relatively less favorable position than those in areas where feed is plentiful.

Total supply of feed grains and other concentrates in the United States is slightly larger than in the past two years, and there are somewhat fewer grain-con-

suming livestock on farms. The general level of feed concentrate prices will therefore probably average somewhat lower than in 1953. Feed grain prices in Kentucky are expected to be in line with the national feed price level.

U.S. hay supplies also are a little larger than last year, both in total and per animal unit. Hay supplies in Kentucky, however, are somewhat smaller than a year ago. Furthermore, pastures last summer and fall were very poor over most of the state, making it necessary to feed more hay than usual as a supplement to these poor pastures. Because of the necessity of shipping in relatively large volumes of hay, prices in Kentucky will average higher than the national average, but prices are expected to be higher than those a year earlier.

CATTLE



Prices of slaughter cattle are expected to average about the same during 1954 as during the last half of 1953. Cattle marketings may be as large or slightly larger than the 36.1 million head marketed in 1953. However, this may mean no greater supply of beef for consumption, because the average weight of cattle marketed is expected to be lower. Consumer demand for beef is expected to continue strong during the year ahead.

Numbers of cattle are likely to be reduced a little during the coming year but no sharp reduction in numbers is expected. Slaughter slightly in excess of 36 million head is about equal to the current rate of production. In previous cattle cycles, when cattle numbers start to decline, the annual slaughter and beef

output remains high for the next year or two. This anticipated stability in supplies of beef should bring stability of price unless there is a widespread drouth or an unexpected weakening of consumer demand.

The composition of market receipts during 1954 is likely to differ somewhat from that during the past year. On the upswing of cattle numbers, marketings of steers exceeds the marketings of heifers and cows. On the downswing the reverse is true. Cattle marketed during 1954 probably will contain a larger proportion of cows than in 1953. If this proves correct, prices of fed cattle can be expected to remain at about present levels, while prices of lower grades, especially canners and cutters may be weaker than during late 1953. This situation would result in a comparatively wide margin between prices of fed cattle and those of lower grades of slaughter cattle.

Prices of stocker and feeder cattle may fluctuate somewhat less than prices of slaughter cattle during 1954. The volume of feed grains in the country suggests a strong demand for replacement cattle, but the unfavorable and uncertain returns from cattle may tend to make cattle feeders cautious. Furthermore, many potential cattle feeders who produce large corn crops are likely to prefer the certainty of corn prices, which will be available through price supports, to the uncertainty of returns from cattle feeding. This would reduce the demand for stockers and feeders.

HOGS

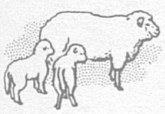


Prices of slaughter hogs are expected to continue strong during the first six to eight months of 1954, but somewhat lower in the last part of the year than during the corresponding months of 1953.

Marketings of hogs in the first half of 1954 will continue relatively small because the fall pig crop was smaller in 1953 than in 1952. Also, early fall farrowings were lighter, while later farrowings were larger. This indicates low early marketings, with increased volume as the season progresses.

The 1954 spring pig crop is expected to be 5 to 10 percent larger than that of 1953 because of the favorable hog-corn ratio during the breeding season. The hog-corn ratio during late 1953 averaged 14.8, or about 2.5 points above average. The anticipated increased 1954 spring pig crop will begin to arrive on the market in the last quarter of the year. Hog prices, during that period are expected to reflect the increased marketings and average lower than during the corresponding period of 1953.

SHEEP AND LAMBS



Prices of spring lambs may not reach as high a peak as in 1953, but, for the season as a whole, the average should be about as high. Although fewer lambs are expected to be marketed dur-

ing 1954, the increased competition from other meats, especially beef and poultry, may tend to offset any decrease in numbers marketed. Prices are thus not expected to reflect fully the smaller production of lamb meat and mutton.

Sheep numbers on farms and ranches declined during the past year. Larger marketings during 1953 were the result of (1) the largest lamb crop since 1947, (2) the failure of western sheepmen to keep as many ewe lambs for replacement purposes, and (3) more lambs entering the slaughter trade because of weak demand for feeders and stockers. Reduction in numbers in the drouth areas more than offset some increases in numbers in the Eastern states. It thus appears that older breeding flocks are being retained, but are not being built up by the addition of ewe lambs, nor are the older ewes being replaced with younger stock.

The changes in the production pattern indicate larger marketings of early lambs and smaller marketings from the late-lamb states. Kentucky lamb producers may find keener competition from other producing areas in 1954 than in the past several years.

WOOL



The 1954 domestic wool crop should be priced about the same as that of 1953, or average slightly above the price support program. On December 9, 1953, the U.S. Department of Agriculture announced a national average wool support price for the 1954 marketing season of not less than 52.1 cents per pound, grease basis. The support price reflects 90 percent of the estimated parity price as of the beginning of the 1954 marketing year.

Domestic wool production in 1954 will be lower than a year earlier because of the reduction in sheep numbers. World wool production is expected to show a slight increase, but with stocks of wool slightly lower, the wool available for consumption in 1954, will be about the same as in 1953. Wool consumption, both in this and foreign countries, has been rising during the past two years and is expected to continue this upward trend in the year ahead. These conditions suggest that both the domestic and foreign wool prices are likely to remain relatively stable during the coming year.

DAIRY



Milk cows

Prices received by farmers for milk and cream may average somewhat lower in 1954 than in 1953, although consumer demand for milk and milk products is expected to be about as strong this year as last. In spite of somewhat lower milk prices, dairymen are likely to be in a relatively favorable position, provided that support prices are maintained at present levels.

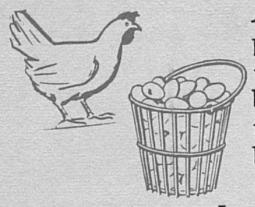
Total milk production in 1954 is expected to be as large as last year, or perhaps a little larger. Furthermore, carry-over stocks of manufactured dairy products are at high levels. Total supply of milk and dairy products will therefore very likely be somewhat larger this year than in 1953, although milk production may be only a little larger. The level of milk production is expected to continue high, as more cows are now in the milking herds. The downturn in cash receipts from other enterprises has apparently

induced farmers to milk more cows. Milk cow numbers also have increased because of the sharp decline in the value of cull cows. Should price supports be lowered, the selling of cull cows would be expected to increase as dairy incomes were reduced.

The amounts of milk used for different purposes will affect the prices farmers receive for milk. Because of increasing population, demand for fluid milk will continue strong and consumption of fluid milk can be expected to increase somewhat. On the other hand, less milk is expected to be used in butter, and about the same amount as last year in making cheese and nonfat dry milk. During 1953 the production of butter, cheese and nonfat dry milk averaged well above a year earlier, and large carry-over stocks were accumulated. Government purchases of butter, cheese, and nonfat dry milk during the year equaled about 5 percent of the total milk production in 1953. These conditions indicate that the spread between prices of fluid milk and of milk for manufacturing purposes will be unusually wide.

Since feed prices are expected to decline more than milk prices, dairymen are likely to be in a relatively favorable position during 1954. The favorable milk-feed ratio will be modified because other production costs, including machinery and farm labor, will continue high. It is important to note, however, that in the past 12 months, retail prices of dairy products have declined only slightly, while prices received by farmers for milk dropped 13 percent.

POULTRY AND EGGS



As feed costs are expected to decline during the coming year both egg and broiler production will probably continue profitable, even at the expected lower prices. Income from sale of eggs and farm chickens probably will decline somewhat in 1954. Total income from Kentucky broilers will be larger because a substantially larger production will more than offset the expected slight decline in broiler prices.

Consumer demand for eggs in 1954 will probably be about the same as 1953. More eggs will be produced because of an increase in both the number of hens and the rate of lay. This increase in egg supply will be reflected by lower prices. In Kentucky, many chicks were bought late in 1953 and will come into egg production in late spring. At that time egg prices, in local markets, may be depressed more than usual.

Broiler-feed price ratios are expected to continue relatively favorable during the coming year. Nationally lower broiler prices are expected to reflect a small increase in production during 1954. During the past year broiler prices have been relatively steady at about the level as in 1952, in spite of an increase in production of about 6 percent. Broiler production in Kentucky will probably be up more than the national average in 1954 as many new houses have been built in recent months. Kentucky broiler producers need to be sure of a dependable market outlet before investing heavily in production equipment.

TOBACCO



Burley Growers of burley tobacco face the 1954 crop season after a 1953 crop 5 to 10 percent larger than disappearance during the 12 months ending October 1, 1953; and 10-percent larger stocks on hand than the record figure of a year ago.

Because the use or disappearance of burley tobacco remains high, the large stocks are not particularly burdensome. Total supply (stocks plus production) on October 1, amounted to 1,161 million pounds and was equal to about 3.2 times annual use or disappearance. The supply increased less than 2 percent from October 1952 to October 1953. As these supplies are somewhat larger than normal, acreage allotments of over .7 acre will be reduced about 8 percent for 1954.

Price supports for the 1954 crop may be somewhat lower than those for 1953, because of a reduction in parity prices.

Tax-paid withdrawals of cigarettes during the first 9 months of 1953 were 1.6 percent lower than in the same period of 1952. Withdrawals of plug tobacco were down 4 percent and those of smoking tobacco down 9.7 percent in the same period. These figures suggest some slackening in the use of burley tobacco, but the amount of disappearance seems to have held up well. The use of burley tobacco in 1954 probably will not differ materially from that of 1953.

Fire-cured Production of all types of fire-cured tobacco in 1953 is estimated to be about 51 million pounds, compared with 58 million in 1952. As carry-over

stocks are relatively unchanged, the total supply is reduced from 205 million to 198 million pounds. Total disappearance declined slightly, from 59.9 million pounds to 58.8 million in the year just past. Exports usually account for about half of disappearance of these types of tobacco.

Individual types differ from this pattern somewhat. Production of Western fire-cured (Type 23) was reduced more than that of Eastern fire-cured (Type 22), and total supply of Type 23 is down sharply from that of 1952 while the total supply of Type 22 is up sharply. Disappearance of Type 22 increased from 29.7 million pounds to 32.1, however, while Type 23 disappearance dropped from 18.8 million to 16.1 million pounds.

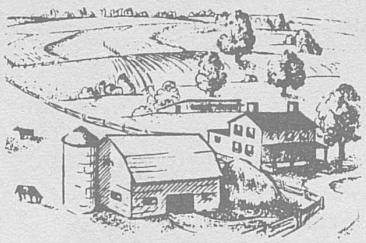
Allotments for acreage of fire-cured tobacco in 1954 will be about 10 percent less in 1954 than in 1953. Prospects for exports in 1954 look about as good as exports in 1953, or around 30 million pounds.

Dark air-cured Production of both One Sucker (Type 35) and Green River (Type 36) was reduced sharply in 1953, but disappearance of each type was nearly as large for the year ending October 1, 1953 as for the previous 12-month period. For One Sucker, the production of 16.2 million pounds slightly exceeded the disappearance of 15.0 million. In Green River, however, production was 8.4 million compared with disappearance of 10.2 million pounds. As a result the total supply of Type 35 was increased 1.2 million pounds while that of Type 36 was reduced by 1.7 million.

Exports during the past year were the smallest since World War II, only 6 million pounds. The outlook for dark air-cured tobacco is not favorable although

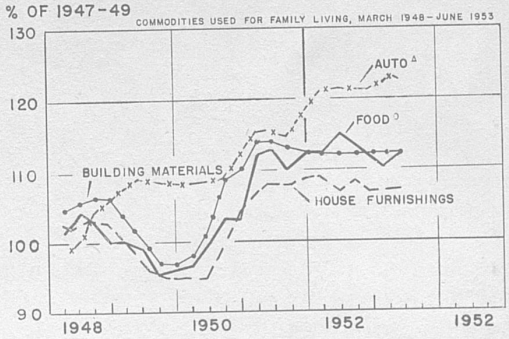
disappearance seems to have stabilized at about 30 million pounds. Acreage allotments for 1954 will be about 20 percent less than those of 1953.

FARM FAMILY LIVING



It is likely, in the year ahead that the overall picture of family living costs will continue to be one of stability. The consumer price index has increased by 4 percent in two years.

INDEX OF PRICES PAID BY FARMERS

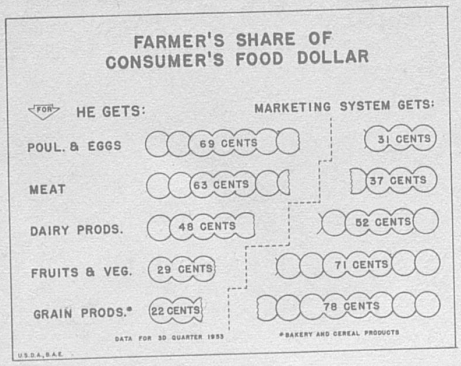


Retail prices for food will probably average about the same as in 1953. Food expenditures will probably stay at present high levels. In recent years U.S. consumers spent around 27 percent of their disposable income for food.

Food supplies are expected to be amply large to permit U.S. per-capita consumption to remain 12 percent above the 1935-1939 average. Seasonally larger supplies of meats, eggs, potatoes, sweet

potatoes, and some fruits are likely to bring the food price index down a little. Prices of bread and other bakery products, coffee, rice, shortening, lard and sugar will be a little higher because of increases in processing and other marketing costs. In 1954 we may expect increased per-capita consumption of shortening, frozen fruits, juices and vegetables, sweet potatoes, chickens, and some dairy products.

The savings the farm family can make if they grow and use their own food supply instead of buying at retail are shown in the accompanying chart. Costly marketing makes this saving possible.



Housing Major housing improvements and new house construction are likely to decrease somewhat because of income uncertainties, the decline in farm income, and the credit situation.

The supply of materials does not present obstacles to home building and improvement. Supplies of building materials are adequate. Prices of building materials have declined slightly since the high point reached in 1951 and will probably stabilize at the 1952 level.

House Furnishings and Equipment A slight decrease in cost of house furnishings and equipment is foreseen. Manufacturer's and retailer's inventories are again on the increase. Purchasers may be able to get attractive trade-in allowances and discounts.

Clothing Prices for clothing, including shoes, are likely to continue on the slight downward drift started in 1952. Families may find it advantageous to buy at sales if they have a knowledge of quality.

Services The costs of medical care, public transportation, telephone, and gas rates, laundry, dry cleaning, household help, and urban rents are increasing steadily. Costs for these services have risen more than for many commodities that families buy.

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grubs by growing a cultivated crop on it at least two years before setting strawberries. But even with this precaution grubs, wireworms, aphis, ants, and other insects in the soil will sometimes do a great deal of damage.

All of these can be controlled by using 8 pounds of actual chlordane or by using 15 pounds of the 50% chlordane per acre. This material can be applied several different ways so that the job is made easier for the grower. It can be mixed with the fertilizer, or can be applied as a dust or spray. The ground should be disked immediately after the chlordane is spread on the land. Once in the ground the material is reputed to be effective for two or three years. Chlordane will not affect the plant growth. Consult your county agent about its use.

HARVESTING AND MARKETING

Picking:

Start picking the first day you can find a red strawberry.

Picking for the most part, is a job that lasts two or three weeks. It is a job that must be planned for and will require some organization on the part of the farmer, for when berries are ready there must be no delay in getting them to market. Other farm jobs should be planned so that there will be nothing urgent during picking season.

Available labor is usually no problem. The problem is having the labor at the right time and place. Children from 8 to 16, as well as adults, make good pickers with a little supervision. Twenty-five cents per gallon is a fair picking wage.

The number of pickers needed will depend on the productiveness of the plants and how often they are to be picked. For a basis, a high-yielding field of 200 crates per acre, will take about 15 workers, one-half day, every other day, to pick. During hot weather pick over the patch every day.

Grading:

Berries sent to the market should be closely graded by the grower since No. 1 berries sell much higher than No. 2's and culls. When No. 2's and culls are mixed with No. 1's this brings the No. 1's down into their class.

As in tobacco, federal graders are located at the

market to classify your berries and they are sold accordingly.

Grading by the grower is done during the picking or immediately after picking and just before packing. A grading pan is very helpful in doing this job for it avoids handling berries individually. Beginning growers should attend a picking, grading, and packing demonstration. See your county agent.

Packing:

Packing is the process of filling the quart cups and placing them in the crates. Each crate holds 24 quarts. There are 8 quarts in each layer. For each crate there are 3 dividers that separate the layers. One divider goes on top before the lid is nailed on. Only 2 nails, one in each end, are placed in the lid.

In filling the quart cups they should be rounded over with berries so that when the crate is filled they will be sufficiently pressed that they will not move around in transportation. Neither does anyone want to buy a partly filled cup when it gets to market.

Shipping:

In thinly populated areas strawberry marketing is limited and one crate too many will "break the market." To avoid such a condition the person having any sizable quantity to sell should plan to ship his berries to large markets. Marketing in such areas is unlimited and all we need is the berries to supply them.

All crates that are shipped should be plainly marked with the grower's name, address, and grade of berries. A rubber stamp is much more suitable than a pen or pencil.

STAYING IN THE STRAWBERRY BUSINESS

Second and third setting:

A year after the first setting a second setting should be made if you are to continue producing strawberries. To complete the process a third setting should be made two years after the first.

After two or three years of production the first setting is then plowed up and this area planted to such other crops as corn, tobacco, truck crops. In other words, follow a crop rotation, probably coming back to strawberries after a few years.

Where new land is available, clear new ground each year for your berry planting.

Care after first harvest:

Most commercial fields in Kentucky are fruited two years and some are carried over for the third harvest. The success of the second year's crop depends largely on the treatment given after the first harvest. Some fields are given no care, and the resulting yield is generally low and the berries small.

The first operation should be immediate mowing of the patch, cutting all weeds and berry tops back to within 2 inches of the ground. Broadcast 800 pounds of a complete fertilizer such as a (6-8-6) on top of the row. Then the "rastus", nine or five tooth harrow, or double shovel, is used to clean out the middles, leaving a row about 20 inches wide.

After this is done you will continue use of cultivator and hoe, just as you did the first year after planting.

Chemical weed control:

In trial tests over Kentucky in 1952 and 1953 a product known as "Crag Herbicide 1" gave some encouragement to the weed control problem. Full knowledge of what this material will or will not do is not yet known.

It is being mentioned here, for its future looks very promising. Talk to your county agent about this material and if you plan to try it, above all, follow the directions given to you.

WHAT CASH RETURN CAN BE EXPECTED

A yield of 150, twenty-four quart crates (900 gal.) per acre on strawberries is comparative to a crop of Burley tobacco that will make 1500 pounds per acre. This is assuming the berries are planted on land as good as that of the tobacco and fertilized about the same. U. S. No. 1 strawberries have not sold under $1.00 per gallon on the wholesale markets for the past 5 years. Growers selling strawberries to the processor (for freezing) the past few years have received from 17 to 19 cents per pound, which is equivalent to the above mentioned price received for fresh berries. Production yields of over 300 crates per acre for berries are as common as ton per acre yields of tobacco.

8M—2-54

Commercial Strawberry Growing

By W. W. Magill and R. H. Fike

"PAYDAY IN MAY" is a popular farm slogan in many Kentucky counties.

The mere fact that everybody likes to eat strawberries, combined with the fact strawberries have always sold at a fair price considering other farm prices, has caused many farm families to consider growing a commercial patch of strawberries as a cash crop.

Keeping crabgrass out of the berry field during June, July, and August has long been considered the limiting factor in producing strawberries in Kentucky. Throughout the state, experience has shown that a half dozen geese per acre, pastured in the berry field during the first growing season, will economically help eliminate the crabgrass hazard. Also, we have observed when strawberries are planted on good tobacco land and properly cared for, they pay off similar to tobacco.

ESTABLISHING THE STRAWBERRY FIELD

Varieties

Blakemore and Tennessee Beauty varieties are recommended for Kentucky, for the home planting and commercial sales. Both varieties are excellent for fresh use, processing, or freezing. Both varieties yield well. Tennessee Beauty has the advantage of blooming a week later than the Blakemore, and thus it may avoid injury some years from a late spring frost. Tennessee Shipper is also a good commercial berry, same season as Blakemore.

Leaflet 142

Cooperative Extension Work in Agriculture and Home Economics
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
UNIVERSITY OF KENTUCKY
and the
U.S. DEPARTMENT OF AGRICULTURE, Cooperating
FRANK J. WELCH, Dean and Director
Issued in furtherance of the Acts of May 8 and June 30, 1914.

Land Selection and Preparation

Land where good tobacco or corn was grown last year makes an excellent strawberry field. The reason is that much fertility is already there and weeds were kept under control. Pasture or sod land can be used if treated with chlordane for grub worm control.

New ground is excellent for weed control and if properly fertilized will make a high yield of berries.

In preparing the land it should be broken in late fall or very early spring and thoroughly worked down. Some harrowing may be necessary just before planting time. If the land is sloping the rows should be planted on the contour.

Fertilizing

First year:

Like all other crops, strawberries produce more on fertile ground than on poor ground. A sound basis for fertilizing is to have a soil test made. If a test is not made the soil fertility should be the same as for tobacco.

During the first year, nitrogen may be used in the form of manure or in complete fertilizer, such as 600 to 800 pounds of a 6-8-6 (often called tobacco or truck garden fertilizer) per acre applied broadcast or with a drill in advance of setting the plants. Another method of making the application would be to side-dress on each side of the berry row with a fertilizer distributor.

Fertilizing during the picking year:

Regardless of how much fertilizer and manure are used during the spring and summer of the first growing year, broadcast 800 pounds per acre during February or March, of the picking year, using an (0-20-20). Please keep in mind this spring application does not include any nitrogen.

Planting

Time:

Strawberry plants should be set out between March 1 and April 10. Plants set out after April 10 are usually slow in starting growth and, therefore, runner formation is delayed. Highest yields of berries, the season after planting, are made when runners develop early in June and July.

Planting distance:

In order for the row to become completely matted the first year, the plants should be set 3 feet apart, in rows 4 feet wide. Some prefer to set the plants 2½ feet apart. When set 4′ x 3′—about 4000 plants per acre will be needed. When set 4′ x 2½′—about 4500 plants are needed.

Receiving plants:

As soon as the plants arrive, they should be unpacked and planted immediately, if possible. If they cannot be planted at once, they should be heeled in. If left in the original package, they are likely to heat and be seriously injured. For heeling in, select well-drained soil, dig a V-shaped trench about 6 inches deep, cut down the bundle and spread out the plants in the trench, fill in with moist, loose soil so that it comes in contact with all roots, and firm the soil about the roots.

Setting the plants:

Set the plants by hand, using a trowel, spade or hoe. Make a hole large enough for the roots to be spread out fan-shape, and set the plants so that the bud, or top of the crown, is slightly above the ground level. Then firm the soil around the plants well, so that no air pockets are left. If air pockets are left the roots may dry out and the plants die. A tobacco setter is also good for strawberries.

Remove the Bloom Stalks

Plants should not be permitted to bear fruit in the same year they are set. Removing bloom stalks as soon as they appear encourages earlier and heavier runner formation. The runners produce the plants that will bear the following year. Several trips over the patch are required to get all the blossoms. You may save a lot of work by pinching off the entire bloom stalk instead of taking off individual blossoms as they appear.

Cultivation

Success or failure of a strawberry crop depends very much on cultivation. Work with a plow and hoe should begin soon after the plants are set and continue until about the middle of August. Experienced growers find that at least eight cultivations and three hoeings are needed.

Strawberries, unlike tobacco and corn, cannot be "laid-by." Keeping the weeds out is a job up to the first frost.

When cultivating, comb the runners back in the row so they will take root in between the original set plants. This will help to develop a matted row and also keep the runners out of the center of the balk. Keep cultivating the balk between the rows occasionally, even through October, so as to keep a picking space left between the rows. This is very important.

Use of Geese

It has been said that every goose in a strawberry field saves $15 to $25 in labor. This may be an exaggeration but does point to the fact that geese are very much worth while in controlling weeds.

Geese do not need water to swim in, but need plenty to drink. Some grain feeding is necessary, especially after the cultivation. Some shelter must also be provided. They will stay in the shade from about 10 a.m. to 5 p.m., and eat grass during the early evening and moonlight nights.

A fence 2 to 3 feet high will hold them in. An electric charged single wire 10 inches above the ground will also hold them in.

Moving the places of feed, water, and shade around the outside of the fence will help in getting the geese to cover the field. The shelter, feed, and water should be located at least 30 feet from the berry rows; otherwise the geese will tramp out a small area of the berry plants.

Five to seven geese are desirable per acre. Goslings, the size of a pigeon, are as good weeders as old geese.

They should be turned into the new planting starting about June 1 and pastured in the field until frost. If you wait until crabgrass "takes" the berry field you will not get results with geese.

They are also useful in the field after harvest of the berries until after frost again in the second year. Where cheat, rye, wheat, or barley develop after mulching, the geese can be used to a great advantage during January and February.

Mulching

Mulching means to cover the ground with straw and should be done in early December. Whenever there are temperatures of 10 to 12 degrees F., or colder, with no snow on the ground, unmulched strawberries suffer. The blossom clusters, crowns, or roots are injured to such an extent that many plants fail to bloom at all. Early December mulching helps to prevent this winter injury.

In addition to winter protection, the mulch keeps the berries clean at harvest, which is a most important point, and it holds moisture, helps to keep down weed growth in the early spring, and controls erosion.

Materials commonly used in mulching are: baled wheat, oats, or rye straw, broomsedge cut in July before the seed develops, pine needles, and sawdust.

When baled straw is used for mulching, the bales should be taken to the patch in September and the wires clipped so that the straw will soak up the fall rains and germinate any seed before the mulch is spread. This prevents infesting the field with rye, wheat, or cheat. If broomsedge is to be used, let it cure a few days, rake it, haul it to the new berry field, and pile it in shocks so it will be handy when mulching time comes.

Sawdust is something new for this job and complete knowledge on how to use it is not known. Tests so far indicate a ¾-inch mulch is best. It is known that it is much better to pick berries in such a field after the dew or rain has dried off. Dry sawdust and dry berries will not stick to each other as they will do when wet.

Mulching strawberry plants is as important as canvas on a tobacco bed.

Insects and Diseases

There are certain insects and diseases that injure strawberry plants, but fortunately they can be controlled.

White grubs and other soil insects:

The large, horse-shoe grubs of several kinds of May beetles injure strawberry plants by eating the new tender roots during the growing season and gouging out the crowns. Land can be nearly cleared of white

What's the Outlook

For KENTUCKY AGRICULTURE IN 1955?

By G. P. Summers, Department of
Agricultural Economics

LEAFLET 143

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FOREWORD

The Agricultural Outlook for 1955 is presented with the hope and expectation that Kentucky farmers, who study it, will find its contents helpful in planning their future farm production and marketing. The prudent manager will, I am sure, study the facts presented here as well as from other available sources and use this information in adjusting his farm operations to the conditions found on his farm and in the market place.

The outlook for agriculture, while not as bright as in some recent years, certainly is not gloomy. The coming year will offer many opportunities to efficient farmers for profitable farming. On the other hand, new conditions will call for greater emphasis on efficient production and marketing if farm profits are to be maintained.

The Agricultural Extension Division will supplement this Outlook report with other timely information reports to the press and radio and through the monthly market newsletter entitled "Notes on the Kentucky Agricultural Situation," which is available upon request.

We, here at the College of Agriculture and Home Economics, are interested in your production and marketing problems and urge that you feel free to call upon us whenever we may be able to furnish you information that will be helpful.

FRANK J. WELCH
Dean and Director

OUTLOOK SUMMARY

Domestic demand for farm products in 1955 is expected to be strong, about the same as during the last half of 1954. The outlook for general economic activity appears good, with consumer incomes and expenditures at or near an all-time high.

Exports of farm products will increase substantially in the year ahead.

The general level of prices received for farm products is not likely to improve, however, in spite of the strong domestic and foreign demand, because of large carry-over stocks and another prospective large output.

Cattle marketings will continue large in 1955, with cows making up a large proportion of the receipts. Prices of fed steers are likely to improve while prices of cows and stockers and feeders will probably average lower than in 1954.

Look for lower hog prices, but about the average ratio between price of hogs and price of corn the coming year.

Lamb prices by spring of 1955 will be higher than at the close of 1954, but will not reach as high a peak as in the spring of 1954. Fewer lambs are expected to be marketed during 1955, but strong competition from other meats will tend to offset the effect of decreased marketing.

Kentucky prices for milk and cream in 1955 will be about the same as in 1954. Total demand for milk and milk products is likely to be stronger, as a result of programs to remove surpluses.

Prices for eggs, broilers, and fowl are expected to continue low, as a result of heavy marketing, until late summer or early fall of 1955.

Lower tobacco marketing quotas will mean lower total income for Kentucky farmers. Prices received

for the various types of tobacco will be influenced by quality of crop and level of price supports as well as shifts in demand. These changes are not predictable.

The general level of prices paid by farmers for production items or for items used in farm family living is expected to change little if at all. Problems of management become more accute in times like these when costs are high in relation to farm prices.

It is assumed, in making the foregoing predictions, that no major outbreak of hostilities will occur in 1955.

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Agricultural Outlook for 1955

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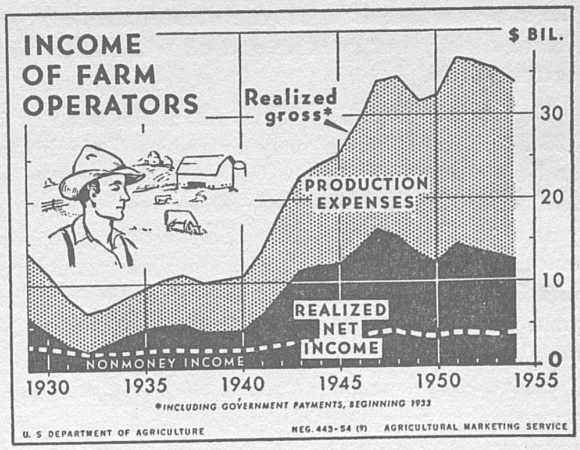
FARM PRODUCTION COSTS

Farm production costs in general will stay high in 1955. Cost rates for various production items will fluctuate much less than the prices received for individual farm products. Farmers will still be in the "price-cost squeeze" in the year ahead, and profits in farming will depend a great deal on production efficiency and timeliness in marketing.

Net income to farmers reached its highest point in 1947 (as shown on the following chart) and then fell off steadily to a postwar low of 12.4 billion dollars

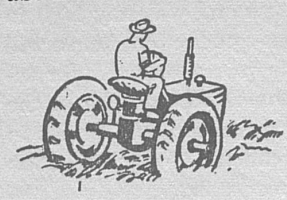


in 1950. In 1951, as a result of demand caused by the Korean War, it rose to 14.5 billion dollars, but declines in each of the past three years have about cancelled the gain made in 1951.

Farm labor during the last half of 1954 was adequate in supply. Farm wage rates eased off slightly in 1954 (declined 1 percent) and probably will go

down some more in 1955. Continuation of a certain degree of industrial unemployment will likely slow down still further the movement of farm workers to industry. However, skilled and experienced farm workers will very likely continue to be scarce.

Prices of farm machinery and equipment will be about the same as in 1954. Price concessions, such as higher allowances on trade-ins, have been made by many dealers recently and will no doubt be continued. Used or rebuilt machinery and equipment will continue to be available at substantial price reductions. Output of farm machinery was about one-third less in 1954 than the record volume of 1951, and in 1955 will likely be about the same as in 1954. Farmers will purchase approximately the same amount as in 1954. Prices of tires may increase slightly but gasoline and oil will remain near current levels.



Feed prices in 1955 will run about the same as in 1954. Cottonseed meal may average a little higher and soybean meal slightly lower. Total supplies of feed concentrates are up 4 percent compared to a year ago. The corn crop is smaller, but there is more of other feed grains. The supply of hay per animal unit for the country as a whole is up some from last year, but in Kentucky the 1954 crop was limited by the drouth.

Seed prices in general were about 6 percent less in 1954 than in 1953, and this decline may continue in 1955. For a given crop, however, the supply of seed for that crop will determine the price. Seeds that are shortest in supply are Kentucky bluegrass, vetch, timothy, and redtop. The supply of clover seed, except crimson, is less than a year ago. Grass seed supply, except common and perennial ryegrass, is slightly smaller than last year.

More fertilizer was used in 1954 than ever before, and in 1955 the trend is likely to continue upward.

Supplies will be adequate and prices will remain about the same as in 1954.

Building and fencing materials will be adequate in supply in 1955, and prices will likely be about the same as in 1954.

In price of pesticides no change from the current levels is anticipated.

Interest rates in 1955 for chattel and real-estate loans will probably be about the same as in 1954.

State and local taxes will likely continue to rise in 1955. Farm real-estate taxes paid in 1955 are expected to be up about 5 percent. Taxes on personal property of farmers may decline during the period, and it is expected the rate of decline will be about 3 percent because of decline in inventory value of livestock.

Insurance costs in 1955 should be close to the same as in 1954, though there may be a slight decline due to reduction in assessed value of livestock and depreciation of buildings and machinery.

FEED SITUATION

Feed grain prices in the 1954-55 feeding season are expected to continue near present levels. A near-record supply of feed grains and other concentrates is available in the nation for the 1954-55 feeding season. Nationally, this supply is 4 percent larger than that of last year. Although, because of drouth, supplies vary sharply by areas, both in Kentucky and the United States as a whole, most parts of Kentucky have a more nearly adequate supply than a year ago. Therefore, feed prices in the state are likely to be nearer the national levels than they were last year when shortages made it necessary to import large quantities from other states.



In spite of the larger national volume of feed grains, the supply per grain-consuming animal unit will be about the same as last year because of the prospective

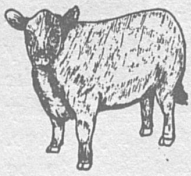
increase in grain-consuming livestock. If the rate of feeding per animal unit is about the same as the 1947-51 average, the 1954 crop of feed grains would about equal total disappearance this year. With normal production in 1955, this would leave a carry-over into 1955-56 even larger than the record of 31 million tons of this year.

The total national supply of high-protein feeds for 1955 is expected to be about the same as that of the past year. Production of soybean cake and meal may be nearly a million tons larger than the 5 million tons produced this year, but supplies of cottonseed meal and dried milk products for feed will be smaller.

Nationally, the supply of hay is slightly larger than last year but is somewhat below average in relation to the number of livestock to be fed. Because of the larger production of hay in Kentucky in 1954, the need for hay imports from other parts of the country will not be as great as last year. Hay prices in Kentucky are likely to average somewhat lower in most parts of the state than last year when it was necessary to pay relatively large transportation costs in addition to the price of hay.

BEEF CATTLE

With continued strong consumer demand and little change in amount of beef produced, average cattle prices during 1955 may not differ much from the average in 1954. Somewhat more cattle may be marketed than in 1954, but a larger proportion of cull and low grade cows is expected, about the same proportion of fed cattle, and a lower proportion of medium grade stock.



Slaughter of cows under federal inspection in 1954 was some 16 percent and of heifers some 22 percent more than in 1953. As a result the upward trend in size of breeding herds should level off. With the expected large marketings of cows and heifers during

1955 it is probable that cattle numbers on farms will be reduced somewhat during the year.

Fewer steers will be on farms at the beginning of 1955 than a year earlier because of the large slaughter of young stock during the past year. In spite of this, the number of cattle on feed January 1, may equal or exceed the number in feedlots last January. During the year as a whole somewhat fewer cattle are expected to be on feed than during 1954.

Prices of fed cattle can be expected to remain at about present levels or even a little higher if, as has been indicated, a large proportion of cattle marketings in 1955 are cows and a smaller number are fed cattle. Prices of lower grades, however, especially canners and cutters, may continue weak. The price spread between choice and prime slaughter cattle and the lower grades is expected to widen slightly.

Prices of stocker and feeder cattle are likely to average slightly lower in 1955 than during the fall of 1954. Stocker and feeder prices during late 1954 averaged $2 to $3 per hundred higher than a year earlier. Demand for replacement cattle is usually stronger following a profitable feeding season than after one with limited profits. With farmers paying prices for stockers and feeders that are very close to fed-cattle prices, and with feed prices continuing stable, lower profits than last year are expected. This suggests lower demand for stocker and feeder cattle, and lower prices next fall, with a wider spread between prices of stocker and feeder cattle and of fed cattle.

HOGS

Prices of slaughter hogs are expected to average slightly lower during the first half of 1955 than those of early 1954, but about the same during the last half of 1955 as during the latter part of 1954. The strong consumer demand for meat coupled with a somewhat lower supply of the better grades of beef should offset a small prob-



able increase in hog marketings during the last half of 1955.

About 4 million more hogs are expected to be marketed for slaughter in 1955 than in 1954, but about 7 to 8 million head fewer than in 1951 and 1952. From farrowing reports in the fall of 1954 it is estimated that slaughter during the late winter and spring of '55 will be 10 to 12 percent larger than a year earlier. In the fall and early winter of '55, hog marketings are expected to be only a little larger than in the same period in 1954.

From these prospective increases in hog slaughter it appears that prices of hogs and profits from feeding them will be lower in 1955 than in 1954, but that the relationship between price of hogs and price of corn will be about the same as the average of recent years. The hog enterprise will not be as profitable as in the past year, neither is it likely to be unprofitable except in areas where feed supplies are short and high in price.

SHEEP AND LAMBS

Prices of spring lambs in 1955 are expected to be much more stable than in 1954, and to average slightly higher than at the close of 1954. Fewer lambs are expected to be marketed during 1955, but competition from other meats is likely to be strong. Lamb prices usually bear a fairly stable relationship to prices of steers, and with only a small improvement in steer prices in prospect, lamb prices will not fully reflect the lower volume of lamb slaughterings.



Number of sheep on farms and ranches declined again in 1954, for the third consecutive year. In contrast, annual production of lambs has increased in each of the last 4 years, from a low of 17.9 million lambs saved in 1950, to 20.2 million in 1954. The number of stock sheep has fluctuated less than 2 million head, 1952 was the peak year, with 28 million head.

Changes in the production pattern in recent years point to larger marketings of early lambs and smaller

marketings from the later-lamb states. Kentucky lamb producers in 1955, may find keener competition from other producing areas.

WOOL

Prices received for domestic wool are likely to be very closely related to the national wool support program. It has been announced that the national average support level for wool shorn on or after January 1, 1955, and sold during the marketing season April 1, 1955, through March 31, 1956, will be 62 cents per pound, grease basis, to the grower. This is 106 percent of the September 15, 1954 parity price for shorn wool. Under the 1955 program, producers' returns from shorn wool will be supported by means of payments based on the percentage needed to bring the average return per pound up to the national average support level.



Domestic production of wool is likely to be slightly smaller next year because fewer sheep are expected to be on farms and ranches. However, the world supply of wool is expected to be larger in 1955 than during 1954. The total carry-over stocks are about the same as a year ago.

DAIRY

Farmers may expect about the same prices for milk and cream in 1955 as in 1954. Demand for milk and milk products is likely to be a little stronger, while volume of milk production and costs of feed will probably differ but little from the levels of the past year.



New high milk production totals were reached in 1953 and again in 1954 (124 billion pounds), despite severe, widespread drouths in both years. If about the same number of cows are milked in 1955, normal pasture and crop conditions could

result in another new record high production. Nevertheless, with a total milk production no larger than that of 1954 and a large carry-over of dairy products, the total supply available for consumption will be larger in 1955 than in the past year.

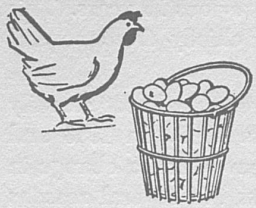
Domestic consumption of dairy products probably will increase as a result of programs provided for in the Agricultural Act of 1954. One provision of the Act authorized the expenditure of up to 50 million dollars per year for the next two years to increase the consumption of milk among school children. A second provision authorizes the Department of Agriculture to assist in increasing consumption of milk and dairy products in armed services. It has been estimated that these two programs will increase fluid milk used by about 750 million pounds a year.

Various programs to increase consumption of dairy products may bring about a significant shift in the pattern of milk utilization. It looks as if more milk will be used in fluid form, and smaller proportion for butter, cheese, nonfat milk solids, and such. If this proves correct, surplus stocks of dairy products may be reduced somewhat during the year ahead. Continued efforts on the part of the government to move existing stocks into foreign trade also may be a factor in the reduction of stocks in storage.

Use of a larger proportion of milk production in fluid form would tend to strengthen the prices received by farmers. However, a revised basis for computing the parity equivalent for manufacturing milk, announced last April, could give a slightly lower support structure for the marketing year which begins April 1, 1955, if support is continued at the 75-percent level. Morover, since there will still be surplus dairy products, the prices of milk and butterfat are likely to be at or near support levels much of the time.

POULTRY AND EGGS

Prices received for eggs, broilers, and fowl are expected to continue relatively low until late summer or



early fall of 1955. Because of the large number of potential layers now on farms and the trend toward higher production per layer, egg production is likely to be at record levels until heavy culling takes place in the summer of 1955. Demand for eggs to go into cold storage next season probably will be down somewhat.

Broiler production probably will continue to increase slowly. Broiler-feed price ratios are expected to continue near current levels. Broiler production continued to rise during most of 1954 in spite of the fact that broiler prices were generally high enough to cover only out-of-pocket production expenses. Total broiler production in 1954 was 8 percent above that of 1953. One reason for expecting continued large broiler output lies in the specialized nature of the enterprise: buildings and equipment for broiler production have few other uses.

The poultry and egg enterprise has wide variations of opportunity in Kentucky. In some areas of the state local production of both eggs and broilers is likely to be quite profitable. Such areas are those where the local volume of output does not satisfy local demand and in-shipments are necessary. In such areas, prices are generally higher than the national market price. In other sections of Kentucky, poultry and egg output is large and prices are closely related to the national market prices. Market opportunities should be carefully considered when plans are being made to adjust the poultry enterprise of an individual farm.

TOBACCO



Burley.— The 1954 crop of burley tobacco apparently exceeds domestic use and export by over 85 million pounds, and burley producers face a reduction of nearly 10 percent in acreage allotments for next year. Production was larger

than disappearance in 8 of the previous 10 years. This relative overproduction results chiefly from several causes:

1. The use of cigarettes increased almost steadily for more than 30 years prior to 1953. In 1953 and 1954, however, there seems to have been a change in rate of growth. There doubtless are several reasons for this slowing down in cigarette consumption. Increased per-capita consumption could hardly be expected to go on indefinitely, publicity as to possible harmful effect upon health may have discouraged smoking to some extent, and the pronounced shift to king-size and filter-tip cigarettes may have affected smoking habits. Another plausible explanation is that the distribution of U. S. population in age groups is changing so that proportionately fewer people are in the ages 20-39 when cigarette consumption probably is highest. If this latter is the dominant cause, it will be only a few years until cigarette consumption begins to rise again.

2. A second reason why supplies are large relative to disappearance, results from aging, which is inherent in the process of manufacturing cigarettes. So long as the sale of cigarettes was increasing, current production had to be larger than current consumption in order to provide for later enlarged consumption after the tobacco was aged. When consumption stabilizes or declines, such future needs do not exist. It would seem, therefore, that present production should be about in line with present disappearance instead of somewhat larger, as it has been in recent years.

3. Yields per acre have continued to increase and partially offset the effect of acreage reductions. Acreage allotments, based on previous yields, have not been fully effective in obtaining scheduled production. The yield of burley per acre in 1954 is estimated at a record of 1,528 pounds.

While the situation outlined above is somewhat disturbing, it is not cause for alarm. Cigarette consumption still is larger than in any year prior to 1951, and the manufacture of chewing and smoking tobacco fell

off no more than in other reecnt years. The 1953 crop of burley sold at a price more than 2 percent above parity, and support prices for the 1954 crop are lowered only slightly from 1953. The effect of tobacco upon health has been a public issue on more than one occasion in the past, with only temporary effect upon its use. Until serious detrimental effects are established more definitely than at present, possible results from smoking cigarettes are likely to affect their consumption only temporarily.

Fire-Cured.— Production of fire-cured tobacco in 1954 is up somewhat from the very short (drouth affected) crop of 1953, and seems to be about equal to disappearance during the past year. Production of Eastern fire-cured is about 2 million pounds less than disappearance, while that of Western fire-cured is about 2 million pounds more than disappearance. Stocks of both types were reduced somewhat during the year, and total supplies on hand at the opening

PRODUCTION, STOCKS, AND DISAPPEARANCE OF TOBACCO
(Million pounds)

Year ending October 1	Production	Stocks, October 1	Disappearance	Market price *(cents)*	Support price[1] *(cents)*
Burley Type 31					
1948-52	586	984	529	48.3	45.5
1953	564	1,163	548	52.5	46.6
1954	617	1,198	529		46.4
Eastern fire-cured Type 22					
1948-52	37.5	94.2	39.0	35.1	34.2
1953	30.8	94.3	38.9	34.9	35.0
1954	36.2	86.3	38.8		34.8
Western Fire-Cured Type 23					
1948-52	14.0	37.5	17.9	30.3	34.2
1953	8.9	23.3	10.7	27.9	35.0
1954	12.6	21.5	10.7		34.8
One Sucker Type 35					
1948-52	19.1	40.3	19.1	29.5	30.4
1953	16.4	46.1	15.0	26.2	31.1
1954	18.7	45.7	16.7		30.9
Green River Type 36					
1948-52	10.4	31.9	11.0	28.3	30.4
1953	7.3	29.1	10.2	22.8	31.1
1954	8.9	26.4	10.0		30.9

[1] Average support prices are given for fire-cured and dark air-cured tobacco without respect to types within the class.

of the 1954 crop marketing season are about the same as a year ago. Declining demand for fire-cured tobacco throughout the world keeps the outlook for these types unfavorable. They doubtless will continue to lean heavily upon price support programs and government-sponsored sales abroad.

Dark Air-Cured.— Production of One Sucker tobacco during 1954 is about 2 million pounds larger than disappearance, while that of Green River is about a million pounds less than disappearance during the past year. While disappearance of these types is running between 25 and 30 million pounds per year, stocks on hand remain unusually large, being almost three times disappearance. More than a year's supply is held in government loan stocks alone. Roughly one-fourth of the crop has been placed under loan during the past three years. The outlook for these types is discouraging.

FARM FAMILY LIVING

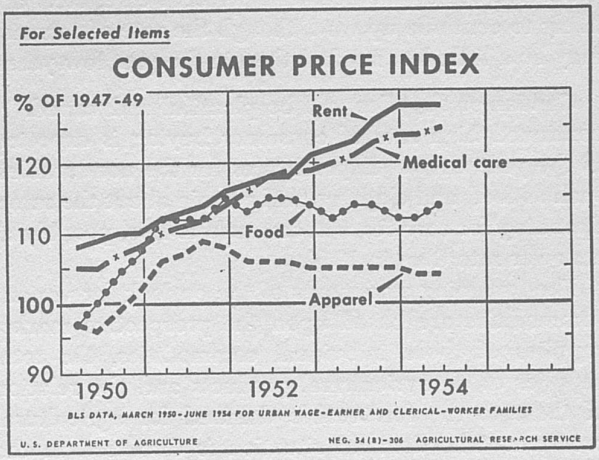
Little or no change is expected in average family living costs in 1955.

For three years the average cost of commodities and services used in family living have changed but slightly, drifting upward an average of about 1 percent per year. In the following chart it may be noted that prices of many items have been moving downward while others slowly climbed upward since 1950.



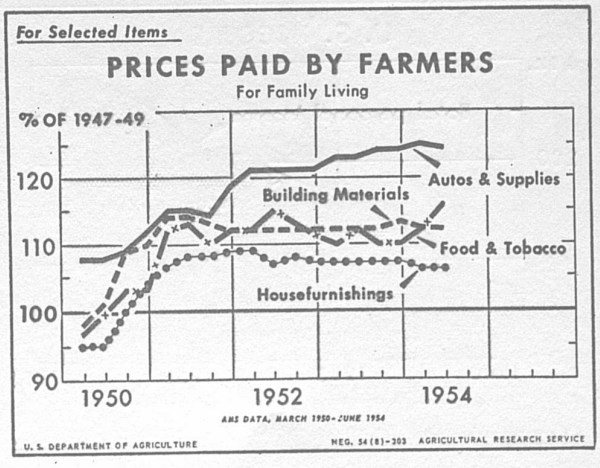
Food prices are expected to be slightly lower in 1955 because of larger supplies of meat, eggs, fats, oils, fresh fruits, vegetables, milk, other dairy products, and poultry.

Prices of clothing will remain near present levels for the next several months. Prices for most items of



clothing have declined gradually, but prices of shoes and rubbers have increased about 2 percent within the last year. Costs of clothing manufacture, increased cost of cotton and synthetic fabrics, and low stocks on hand all indicate a halt in the trend toward lower prices for apparel.

Prices for household furnishings and equipment are not likely to be lower in 1955 than in 1954. Prices of household textiles may increase slightly.



Service costs (medical and personal care, etc.) are likely to continue upward, though the rate of increase may be a little less marked than in the past few years.

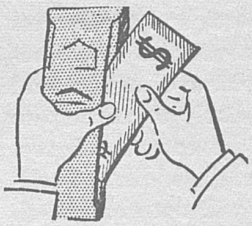
Consumer supplies will be plentiful and varied. A continued high rate of consumer buying is expected in the year ahead. Expenditures for the nondurables, such as food and clothing, will remain about the same. Spending for services will continue to rise, possibly at a slower rate than in 1954.

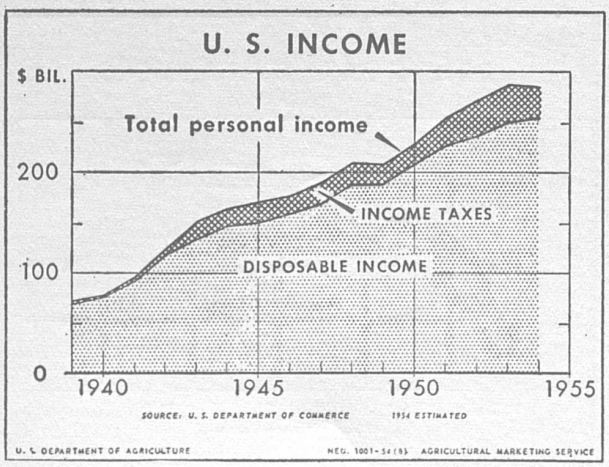
The foregoing statements of the outlook for various commodities are based upon the prospective market supplies of those individual commodities, the total supplies of all agricultural products and the relation of these to the foreseeable demand for agricultural products. The demand situation is discussed in the following section.

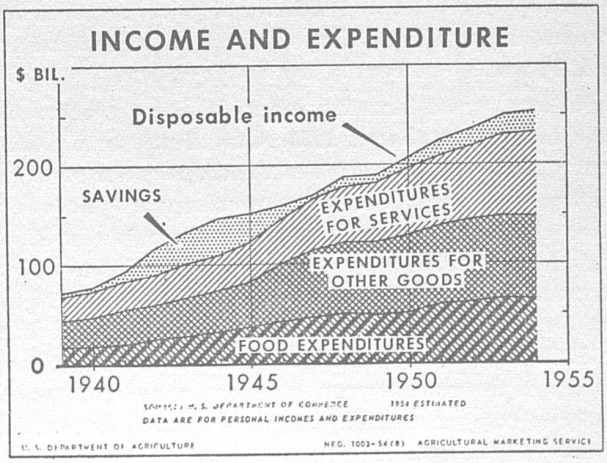
THE DEMAND SITUATION

Domestic demand.— Domestic demand for farm products should continue at least as good in 1955 as in the past year. This expectation is based upon the likelihood that expenditures of consumers and business will continue near present levels while total government expenditures may decline slightly. The level of consumer incomes, after taxes, has been maintained at record rates as a result of a high level of employment, rising wage rates, a reduction in income taxes, and the offsetting effect of unemployment compensation. These have been strong enough to more than offset the slight reduction in employment and an average shorter number of hours worked per week. The trend in total personal income since 1939 is shown in the accompanying chart.

Consumer incomes and consumer spending are expected to continue fairly stable in 1955. This expectation is based upon the prospect for a continued high level of construction, both public and private, a growing stability of business inventories, and an increase in investment outlays. The influence of these favorable factors will be partially offset by a slight reduction in total government expenditures. Thus, in the year ahead, the domestic demand for food and other farm products should continue as strong as, or stronger than, last year, with consumers continuing to spend an average of about 25 percent of their disposable income for food. Personal expenditures since 1939 for food, other goods, services and savings are shown in the accompanying chart.







The level of business activity thus is expected to be at least as high in 1955 as in 1954, and the general level of prices is expected to continue relatively stable in 1955.

Export demand.— The value of agricultural products exported is expected to be about 10 percent larger in 1955 than in the past year. Growing gold and dollar reserves in foreign countries will provide a basis for some increase in agricultural exports, and the success of our surplus disposal programs will also be an important factor determining the volume of agricultural exports. The commodities most likely to participate in the overseas sales expansion are cotton, tobacco, wheat, grain sorghums, barley, rice, fats, oils, and oilseeds. Increased export demand will not exert much influence on Kentucky-produced farm products except dark tobacco.

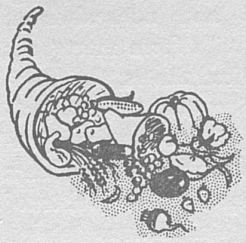


PRICES AND INCOME

The general level of prices received by farmers in 1955 is expected to average close to the levels prevailing late in 1954, because of prospects for continued large supplies in 1955. The index of prices received by farmers in the United States during the third quarter of 1954 was 3.5 percent below a year earlier.

National gross farm income in 1955 is expected to be a little below that of 1954. Curtailment of production is in prospect for some of the crops under acreage allotments, and with slightly lower support prices for some controlled crops, farmers' cash receipts in 1955 may be somewhat lower than in 1954. However, as farmers are likely to make downward adjustments in production expenses, their realized net farm income in 1955 may nearly equal the estimated 12.5 billion dollars of the current year. Reduced expenses are not likely to compensate fully for the expected decline in gross farm income.

Marketings of farm products by Kentucky farmers will probably be a little larger in 1955 than in 1954, and if (as is probable), there is little change in prices received, the Kentucky farm gross income will be above that of 1954. Income data are not available for the entire year of 1954, but cash receipts of Kentucky farmers during the first three quarters of 1954 were about 8 percent below that of 1953, or down nearly 24 million dollars. Also, because of the severe drouth of 1953, the production expenses of Kentucky farmers in 1954 were unusually high. The average rate of production costs, including labor and farm equipment, is expected to continue at about the present level.



LAND VALUES

Farm land values are expected to decline slightly in 1955. However, barring unusual new developments, the decline may be less than in 1954. From the record reached in July 1952, land values declined 13 percent by July 1954; for the year ending July 1954, they declined 5.8 percent, on the average. Farm land values in Kentucky in 1954 have been at about the same level as they were in the early part of 1951. Three years of dry weather and reduced farm production in many parts of the state have decreased the savings of many potential buyers of farm land and have discouraged the purchase of land. Despite these conditions however, there have been very few distress transfers and only a slight reduction in prices paid for the better grades of farm land.

An increase in the number of farm transfers may be expected in the early part of 1955, compared with the same period in the last two years. In recent years the number of voluntary sales of farm land have been only half the number in the peak year, 1946, and in 1953 the volume of sales was lower than any year since 1939.

Total farm debts in the United States are expected to be increased further during the year ahead. In Kentucky, both farm-mortgage and nonreal-estate debts are expected to increase, with farm mortgages increasing the most. For the United States, the farm-mortgage debt totaled $7.7 billion and the nonreal-estate debt for farmers totaled $6.9 billion on January 1, 1954. In Kentucky, farm-mortgage debts totaled $145.2 million while nonreal-estate debts of farmers to the principal lending institutions totaled $74.4 million, with both types of debts totaling $219.6 million. Nonreal-estate bank loans to farmers, excluding loans guaranteed by Commodity Credit Corporation, increased from $52.6 million to $54.9 million during the year 1954. Similar increase occurred for farm-mortgage loans. The total farm-mortgage debt was about 8 percent of the total value of farm land and buildings on January 1, 1954, as compared to a low of 5.3 percent in 1946.

Lexington, Kentucky
January, 1955

10M—1-55

accustomed to receiving their grain allotments at a specific time. If this feeding time is changed by either skipping it or changing the time of day, the birds will become upset and may go out of production. The advantages of this system are that it is easier by this method to adjust the grain and mash intake to varying conditions. Probably the biggest advantage is that this method requires closer supervision, more trips to the laying house, and closer watching of the hens' conditions, all of which in themselves tend to foster higher production.

The ALL-MASH SYSTEM involves the use of an all-inclusive mash, generally of a 16- or 18-percent protein content. This method is well adapted for the poultryman who uses hired labor because the all-mash system requires less skill in feeding. This system is often more expensive than the other two systems, especially on farms where some grain is grown. However, if a poultryman has to buy all of his grain, this system may be economically feasible.

SUPPLEMENTAL FEEDING

The use of supplemental feeds is of value when hens begin to drop in feed consumption. Often this drop in consumption is due to the hens losing interest in their regular ration or to changes in weather conditions. The use of supplemental feeds, which gives them something different in the feeding program, often stimulates their appetites and steps up production. The most widely used stimulators are pellets, wet mashes, condensed milk products, and changes in grains. Many poultrymen like to feed these supplements as a noon lunch, although a few feed them at night at roosting time. It should be remembered that the chief value of supplements is to stimulate appetite and interest in feed during difficult periods when increased feed intake is necessary. If, for example, hens have come to regard pellets as a regular part of the feeding program, the poultryman will have to use some other method to stimulate feed intake.

RECORDS

The efficient poultryman cannot run his operation without some type of records. The records should be as simple as possible yet be effective in telling the whole story. A good set of records should tell the poultryman whether his flock is profitable; they should tell whether he should expand or contract his operation. Records will enable the poultryman to discover the weak spots in his management program and serve as a measure of progress. Good records should serve as management guides. Through them the poultryman can tell whether or not his hens are increasing or decreasing in feed consumption, body weight, and egg production. They will also tell what proportion of grain and mash is being consumed daily. The importance of the mash-to-grain ratio cannot be overstressed. Much of the low production of meat-strain hens can be traced to over-feeding of grain. If the poultryman knows these things about his flock he can adjust his management practices to suit his flock's needs.

ATTITUDE

Some poultrymen seem to have a lot of luck. They have plenty of eggs when prices are high; diseases, though sometimes present on their farms, seldom are a costly factor. Fellow poultrymen call them lucky; some also say that, in addition, they are good chickenmen. Why do some farmers consistently meet with success?

The human factor in poultry farming is one of the important elements in success. Such a philosophy is not easily accepted by everyone. A person's wants are apt to be considered first. The so-called lucky poultrymen are those who have come to consider their flock first in the total picture. They work for and with their poultry. They really know their flocks; their wants, their environment, their peculiarities. They have developed and fostered an art of anticipating and knowing the demands of their flocks. Such demands often require that self be forcibly relegated to the background and the birds' requirements be made paramount.

Stand back and look over your operations completely and in an unbiased manner. Do you meet your flock's requirements? Do you know your birds and their day-by-day condition? They will usually perform for you, if you are careful with the detailed husbandry they require. If the birds could tell their side of the story of their life under your care, and you met their requirements, you too might be a lucky poultryman. Take a positive attitude concerning your poultry, work for them, and they will usually more than meet your expectations.

Lexington, Kentucky February, 1955
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10M–2-55

Efficient Management *for* MORE EGGS

RECEIVED

By John J. Begin and John W. Tuttle
Poultry Section

MAR 7 1955

EXPERIMENT STATION
HOUSING LIBRARY

In general, we recommend the gable-type laying houses in 30- to 40-foot widths and as long as you need to build them. Probably a 30′ x 50′ house is as small as should be built if one is to have an economically sized operation of 300 to 500 hens.

FLOOR SPACE

We recommend a minimum of 3 square feet per bird in the larger houses. In houses 20′ x 20′ or smaller a minimum of 4 square feet per bird should be allowed.

LITTER

We recommend 8 to 12 inches of built-up litter on the floor. Corn cobs, planer shavings, sawdust, peat moss, peanut hulls, or cane pulp can be used satisfactorily as litter. It should be added, 2 inches at a time, until the desired depth is reached. New litter deeper than this will cake.

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service
FRANK J. WELCH, Dean and Director

LEAFLET 144

ROOSTS

Many poultrymen have found that they can manage a flock of hens without roosts. If you do use roosts, use screened dropping pits that are not more than 18 inches in height, and also provide for a minimum of 50 feet of roost space per 100 hens.

VENTILATION

Ventilation is probably one of the biggest problems in poultry management. Usually wet litter indicates lack of ventilation. In the 30 foot and 40 foot wide laying houses the minimum amount of ventilation should be provided through the use of windows 3 feet high, extending along each side of the house.

FEEDER SPACE

Adequate feeder space is necessary if every hen is to get equal treatment. This often helps to prevent cannibalism. A minimum of 40 linear feet per 100 hens of trough-type feeders should be provided when the free-choice feeding system is used. This amount is also adequate when using the limited-grain system provided the grain is fed in the litter. A total of 48 linear feet should be provided for birds being fed the all-mash and the limited-grain system when the grain is fed on top of the mash. If mechanical feeders are used follow at least the minimum requirements of the manufacturer of the feeder.

WATER AND WATERERS

One hundred hens need a total of from 5 to 8 gallons of water per day. Water is probably one of the most important nutrients because it dissolves food particles so they can pass through the walls of the intestines into the blood. It carries waste materials out of the body tissues and out of the body itself. It helps control body temperature and acts as a lubricant for many body movements.

A minimum of one 8-gallon waterer per 100 hens or one 6-foot automatic waterer for 300 hens is required. Additional water space should be provided in the laying house during the summer months. All waterers should be protected against freezing temperatures, and they should be cleaned daily.

LIGHTS

Light stimulates the reproductive system of hens. A 14- to 16-hour day with 1 watt of illumination per

4 square feet of floor space is usually sufficient. As the hens drop off in production, light intensity may be increased to 1 watt per 2 square feet of floor space.

DISEASE (Prevention and Control)

Some mortality will occur in the laying house even though the hens have the best of care and management. Excessive mortality must be controlled and can be by the use of these means: (1) Start with disease-free birds; (2) Practice common-sense cleanliness which includes having a clean, dry house, no mud holes, trash piles, lumber piles, brush piles, manure piles or sewer drainage either on the range or around the laying house. Provide complete isolation from other chickens, ducks, geese or turkeys. This is one of the best controls for leukosis. Do not permit visitors to enter the house. Dispose of sick and dead birds. Keep out free-flying birds, rats or mice; (3) Vaccines may be used to prevent newcastle, fowl pox, laryngotracheitis and bronchitis; (4) Drugs may be used to help control losses from coccidiosis, pullorum, cholera, coryza, paratyphoid, fowl typhoid, and internal parasites; (5) Antibiotics are being used with some success on respiratory diseases; (6) Insecticides are used to control external parasites, flies and mosquitoes. External parasites will cause a sharp drop in production if not controlled; (7) Cannibalism and feather picking may be stopped by debeaking the birds; (8) Completely adequate nutrition will solve many of the mortality problems in the laying flock.

CULLING

Strict day-to-day culling will help keep production percentages high. It will also increase income through the sale of cull birds and will reduce the loss from mortality.

EGG STORAGE ROOMS

To produce quality market or hatching eggs, proper storage space must be provided that will keep the eggs above 45 degrees and below 60 degrees the year round.

FEEDING METHODS

Any one of several different feeding systems can be used successfully. Regardless of the method used, more eggs will be obtained if a high feed intake can be maintained. It is up to the poultryman to use

every scheme available to encourage his hens to eat. Such practices as stirring up the mash on each trip through the house, adding fresh feed at least once daily and the use of supplemental feeds are all conducive to increasing feed consumption. It is very important that a good quality breeder mash be fed if high quality hatching eggs and sturdy chicks are to be produced.

The three most widely accepted systems are: the cafeteria system, the limited-grain system, and the all-mash system. Each has advantages and disadvantages. The system to use depends on certain management factors, and the poultryman must choose the method that best fits his own plans.

The CAFETERIA OR FREE-CHOICE SYSTEM is widely used, especially with the smaller flocks. Grain such as corn, wheat and oats, or a mixture of these grains and a good 20 percent laying mash are kept before the birds at all times. This method assumes that a laying hen, if she has her choice of grain and mash, will eat about 50 percent of each, thus balancing her diet at about a 15 percent protein intake. The chief advantage of this system is that no regular feeding schedule need be maintained. The disadvantage is that with most commercial meat strain laying flocks, the hens will over-eat on grain, thus throwing their diets out of balance and lowering egg production.

The LIMITED-GRAIN SYSTEM is probably more suitable for maintaining high production with meat-strain hens than is the cafeteria system. Under this method a 20 percent laying mash is kept before the hens at all times and the grain is rationed out to the hens in quantities varying with season and percent production. As a general rule, an intake of 60 percent mash and 40 percent grain is best for high production. In hot weather the grain should be further reduced to force more mash consumption. The amount of grain fed daily depends on several factors; the breed, rate of lay, and the amount of supplemental feeding. As a rule, between 10 and 15 pounds of grain per 100 hens per day is enough. Approximately ¼ of this daily amount should be fed in the morning and the remaining ¾ in the evening before the birds go to roost. In hot weather the morning feeding can be eliminated. The chief disadvantage of the limited grain method is that chickens are creatures of habit, and after a few weeks on this system they become

out the crowns. Land can be nearly cleared of white grubs by growing a cultivated crop on it for at least 2 years before setting strawberries. But even with this precaution grubs, wireworms, aphids, ants, and other insects in the soil will sometimes do a great deal of damage.

All of these can be controlled by using 8 pounds of actual chlordane or 15 pounds of the 50% chlordane per acre. This material can be applied several different ways so that the job is made easier for the grower. It can be mixed with the fertilizer, or it can be applied as a dust or spray. The ground should be disked immediately after the chlordane is spread. Once in the ground the material is reputed to be effective for 2 or 3 years. Chlordane will not affect the plant growth. Consult your county agricultural agent about its use.

HARVESTING AND MARKETING

Picking:

Start picking the first day you can find a red strawberry.

Picking for the most part, is a job that lasts 2 or 3 weeks. It is a job that must be planned for and will require some organization on the part of the farmer, for when berries are ready there must be no delay in getting them to market. Other farm jobs should be so planned that there will be nothing to conflict with strawberry picking.

Available labor is usually no problem. The problem is having the labor at the right time and place. Children from 8 to 16, as well as adults, make good pickers with a little supervision. A fair wage for picking is 25 cents per gallon.

This will help you estimate the amount of labor needed: To pick a field yielding 200 crates per acre will require about 15 persons working one-half day every other day. During hot weather the patch should be picked over every day.

Grading:

Berries sent to the market should be carefully graded by the grower since No. 1 berries sell for a much higher price than do No. 2's and culls. Mixing No. 2 berries and culls with No. 1's causes the No. 1's to be put into a lower grade.

As is true in tobacco marketing, federal graders at the strawberry markets classify the berries before they are sold, and they are priced accordingly.

Grading by the grower is done during the picking or immediately after picking and just before packing. A grading pan is very helpful in doing this job for it avoids handling berries individually. Beginning growers should attend a picking, grading and packing demonstration. See your county agent.

Packing:

Packing is the process of filling the quart cups and placing them in the crates. Each crate holds 24 quarts. There are 8 quarts in each layer. For each crate there are three dividers that separate the layers. One divider goes on top before the lid is nailed on. Only two nails, one in each end, are placed in the lid.

In filling the quart cups, they should be rounded over with berries so that when the crate is filled the berries will be sufficiently pressed that they will not move around in transportation. Another reason for amply filling the cups is that no one wants to buy a partly filled cup when it gets to market.

Shipping:

In thinly populated areas strawberry markets are limited, and one crate too many will "break the market." To avoid such a condition a person having any sizable quantity to sell should plan to ship his berries to large markets. There the marketing opportunities in such areas are unlimited and all we need is the berries to supply them.

All crates shipped should be plainly marked with the grower's name, address, and grade of berries. A rubber stamp is more suitable than a pen or pencil.

STAYING IN THE STRAWBERRY BUSINESS

Second and third setting:

A year after the first setting a second setting should be made if you are to continue producing strawberries. To complete the process a third setting should be made 2 years after the first.

After 2 or 3 years of production the first setting is then plowed up and this area planted to such other crops as corn, tobacco, truck crops. In other words, follow a crop rotation, probably returning to strawberries after a few years. Where new land is available, clear new ground each year for berry planting.

Care after first harvest:

Most commercial fields in Kentucky are fruited for 2 years and some are carried over for the third harvest. The success of the second year's crop depends largely on the treatment given after the first harvest. Some fields are given no care, and the resulting yield is generally low and the berries small.

The first operation should be the immediate mowing of the patch, cutting all weeds and berry tops back to within 2 inches of the ground. Broadcast 800 pounds of a complete fertilizer such as a 5-10-10 on top of the row. Then the "rastus," nine- or five-tooth harrow, or double shovel, is used to clean out the middles, leaving a row about 20 inches wide.

After this is done you will continue use of cultivator and hoe, just as you did the first year after planting.

Chemical weed control:

In tests over Kentucky in 1952 to 1954 a product known as "Crag Herbicide 1" gave some encouragement to the weed control problem. Full knowledge of how this material acts is not yet known. It is being mentioned here because its future looks very promising. Talk to your county agricultural agent about this material, and if you plan to try it by all means follow the directions given.

POSSIBLE CASH RETURN

A yield of 150, twenty-four-quart crates (900 gallons) per acre of strawberries is comparable to a crop of burley tobacco that will make 1,500 pounds per acre. This is based on the assumption that the berries are planted on land as good as that which has been used for growing tobacco and similarly fertilized. U. S. No. 1 strawberries have not sold under $1.00 per gallon on the wholesale markets for the past 5 years. Growers selling strawberries to the processor (for freezing) the past few years have received from 17 to 19 cents per pound, which is equivalent to the above-mentioned price received for fresh berries. Production yields of over 300 crates per acre for berries are as common as a ton-per-acre yield of tobacco.

Lexington, Kentucky

February, 1955
10M to 3-54
18M—2-55

"Payday in May" from Strawberries

By W. W. Magill and James K. Stacey

"PAYDAY IN MAY" is a popular farm slogan in many Kentucky counties.

Because everybody likes to eat strawberries, combined with the fact that strawberries have always sold at a fair price as compared with other farm products, many farm families have considered growing a commercial patch of strawberries as a cash crop.

When strawberries are planted on good tobacco land and properly cared for, the returns are similar to those from tobacco.

ESTABLISHING THE STRAWBERRY FIELD

Varieties

Blakemore and Tennessee Beauty varieties are recommended for home planting and commercial sales in Kentucky. Both varieties are excellent for fresh use, processing or freezing, and both yield well. Tennessee Beauty has the advantage of blooming a week later than Blakemore, and thus it may avoid injury some years from a late spring frost. Tennessee Shipper is also a good commercial berry, ripening at the same time as Blakemore.

Leaflet 145

(This replaces Leaflet 142)

Cooperative Extension Work in Agriculture and Home Economics
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
UNIVERSITY OF KENTUCKY
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U. S. DEPARTMENT OF AGRICULTURE, Cooperating
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Land Selection and Preparation

Land on which good tobacco or corn was grown the previous year makes an excellent strawberry field because much fertility is already there and the weeds have been kept under control. Pasture or sod land can be used if treated with chlordane to control grub worm.

New ground is excellent for weed control and if properly fertilized it will make a high yield of berries. The soil acidity should be between 5.5 and 6.5. If you are in doubt, have a soil test made.

In preparing the land, it should be broken in late fall or very early spring and thoroughly worked down. Some harrowing may be necessary just before planting time. If the land is sloping the rows should be planted on the contour.

Fertilizing

First year:

Like all other crops, strawberries produce more on fertile ground than on poor ground. A sound basis for fertilizing is to have a soil test made. If a test is not made the soil fertility should be the same as for the growing of tobacco.

During the first year use a complete fertilizer, such as 600 to 800 pounds of a 5-10-10 fertilizer per acre, applied broadcast or with a drill in advance of setting the plants. Another method of making the application is to sidedress on each side of the berry row with a fertilizer distributor.

Fertilizing during the picking year:

Regardless of how much commercial fertilizer and manure is used during the spring and summer of the first growing year, broadcast 800 pounds of 0-20-20 per acre during February or March of the picking year. Please keep in mind this spring application does not include any nitrogen.

Planting

Time:

Strawberry plants should be set out between March 1 and April 10. Plants set out after April 10 are usually slow in starting growth and, therefore, runner formation is delayed. The highest yields of berries during the season after planting are made when runners develop early in June and July.

Planting distance:

In order for the row to become completely matted the first year, the plants should be set 3 feet apart, in rows 4 feet wide. Some prefer to set the plants 2½ feet apart. When set 4′ x 3′—about 4,000 plants per acre will be needed. When set 4′ x 2½′—about 4,500 plants are needed.

Receiving plants:

As soon as the plants arrive, they should be unpacked and planted immediately, if possible. Otherwise, they should be heeled in. If left in the original package, they are likely to heat and be seriously injured. For heeling in, select well-drained soil, dig a V-shaped trench about 6 inches deep, cut away the wrapping material around the bundle and spread out the plants in the trench, fill in with moist, loose soil so that it comes in contact with all roots, and firm the soil about the roots.

Setting the plants:

Set the plants by hand, using a trowel, spade or hoe. Make a hole large enough for the roots to be spread out fan-shape, and set the plants so that the bud, or top of the crown, is slightly above the ground level. Then firm the soil around the plants well, so that no air pockets are left. If air pockets are left the roots may dry out and the plants die. A tobacco setter is also good to use for setting strawberries.

Remove the Bloom Stalks

Plants should not be permitted to bear fruit in the same year they are set. Removing bloom stalks as soon as they appear encourages earlier and heavier runner formation. The runners produce the plants that will bear the following year. Several trips over the patch are required to get all the blossoms. You may save a lot of work by pinching off the entire bloom stalk instead of taking off individual blossoms as they appear.

Cultivation

Success or failure of a strawberry crop depends very much on cultivation. Work with a plow and hoe should begin soon after the plants are set and continue until about the middle of August. Experienced growers find that at least eight cultivations

and three hoeings are needed. All cultivations should be shallow, 1½ inches or less, and not too close to the berry plant.

Strawberries, unlike tobacco and corn, cannot be "laid-by." Weeding is a job that must be continued up to the first frost.

When cultivating, comb the runners back into the row so they will take root in between the originally set plants. This will help to develop a matted row and also keep the runners out of the center of the space between the rows. Keep cultivating the balk between the rows occasionally, even through October, so as to keep a picking space left between the rows. This is very important.

Use of Geese

It has been said that every goose in a strawberry field saves the grower $15 to $25 in labor. This may be an exaggeration, but it does indicate that geese are very much worth while in controlling weeds.

Geese do not need water to swim in, but need plenty of it for drinking. Some grain feeding is necessary, especially after the strawberry plants have been cultivated. Geese will stay in the shade from about 10 a.m. to 5 p.m. and will eat grass during the early evening and on moonlit nights.

A fence 2 to 3 feet high will hold them in. An electrically charged single wire, 10 inches above the ground, will also hold them in.

Moving the places of feed, water, and shade around the outside of the fence will help in getting the geese to cover the field. The shelter, feed, and water should be located at least 30 feet from the berry rows; otherwise the geese will trample out a small area of the berry plants.

Five to seven geese are desirable per acre. Goslings, the size of a pigeon, are as good weeders as old geese. They should be turned into the new planting, starting about June 1 and pastured there until frost. If you wait until crabgrass "takes" the berry field you will not get the desired results from the use of the geese.

Again, in the second year, they are also useful in the field after harvest of the berries until after frost. If such plants as cheat, rye, wheat, or barley develop after mulching, the geese can be used to a great advantage during January and February.

Mulching

Mulching means to cover the ground with straw, and this should be done in early December. Whenever there are temperatures of 10 to 12 degrees F., or colder, with no snow on the ground, unmulched strawberries suffer. The blossom clusters, crowns, or roots are injured to such an extent that many plants fail to bloom at all. Early December mulching helps to prevent this winter injury.

In addition to providing winter protection, the mulch keeps the berries clean at harvest, which is a most important point. Also, it holds moisture, helps to keep down weed growth in the early spring, and controls erosion.

Materials commonly used in mulching are baled wheat, oats, or rye straw, broomsedge cut in July before the seed develops, pine needles, and sawdust.

When baled straw is used for mulching, the bales should be taken to the patch in September and the wires clipped so that the straw will soak up the fall rains and any seed will germinate before the mulch is spread. Also, many berry growers prevent contamination following mulching by unloading the bales of straw in a pond or a stream in August or September. After a couple of days, they pull the bales out on the bank to dry. Doing this causes the seeds to germinate and die. This prevents infesting the field with rye, wheat or cheat. If broomsedge is to be used, let it cure for a few days, rake it, haul it to the new berry field, and pile it in shocks so it will be handy when mulching time comes.

The use of sawdust as a mulching material is relatively new and complete information on how to use it is not available. Tests so far indicate a ¾-inch mulch is best. In fields where sawdust has been used, it is preferable to pick berries after the dew or a rain has dried off. Dry sawdust and dry berries will not stick to each other as readily as they will do when wet.

Mulching strawberry plants is as important as putting canvas on a tobacco bed.

White Grubs and Other Soil Insects

The large, horse-shoe grubs of several kinds of May beetles injure strawberry plants by eating the new tender roots during the growing season and gouging

cal means available for the control of tapeworms. Lead arsenate is regarded by many parasitologists as the most effective agent for this purpose. A copper sulfate-nicotine sulfate ("cu-nic") mixture is also active in removing these tapeworms. Phenothiazine does not remove tapeworms.

The dose of lead arsenate is 1/2 gram for lambs, and 1 gram for adult sheep. Lead arsenate is generally available in commercial preparations as a mixture with phenothiazine. If one uses the lead arsenate-phenothiazine mixture, he can treat his animals for both tapeworms and roundworms at the same time.

The "cu-nic" solution is made up by dissolving 1 ounce of copper sulfate (bluestone) in 1 gallon of soft water or rain water, and adding 1 1/4 ounces of nicotine sulfate (Blackleaf 40). The solution should be prepared in glass or earthenware containers and used immediately. The dose of this solution is 1 ounce per 20 pounds of weight, with no dose exceeding 4 ounces. Thus, animals weighing 80 pounds or more should receive the maximum dose of 4 ounces. At the foregoing rate, the doses are: 1 ounce for 20-pound lambs, 2 ounces for 40-pound lambs, and 3 ounces for 60-pound lambs.

Several points should be borne in mind when treatment is undertaken. The entire flock (i. e., the apparently healthy as well as the visibly ailing animals) should be treated at the same time. Avoid overdosing because toxic reactions may result. Following treatment, the animals should be moved to a fresh pasture.

Adult sheep should be treated at least three times a year to minimize pasture contamination and exposure of the lambs. The first treatment should be given at the beginning of warm weather after lambing, the second during the latter part of June, and the third during the late fall months.

During May lambs usually show signs of being infected and should be given the first treatment then. Treatment should be repeated at 3- to 4-week intervals during the grazing season, depending on the degree of infection in the flock.

Pasture rotation should be practiced whenever possible, as an additional means of controlling tapeworms. During the warm months a pasture should not be grazed by infected animals for longer than 6 weeks and then not re-grazed by calves or sheep until the following grazing season.

Lexington, Kentucky
February, 1955

5M-2-55

SHEEP TAPEWORMS

By J. H. Drudge, S. E. Leland, Jr., and R. F. Behlow

Two kinds of tapeworms, the fringed (Thysanosoma actinoides) and the common (Moniezia expansa), may occur in the gastro-intestinal tract of sheep in Kentucky. Fringed tapeworms are located in the gall bladder, bile duct, and anterior small intestine, and have been found only in sheep that have been shipped in from the western states where this infection regularly occurs. Failure of the fringed tapeworm to become established in native sheep in Kentucky is believed to be due to the lack of a suitable intermediate host in this area.

Moniezia expansa is a very common parasite of sheep throughout Kentucky. Cattle and goats may also be infected with this worm. It is regarded by many as being one of the most harmful of the more than 30 species of internal parasites infecting sheep in Kentucky.

LEAFLET 146
(Replaces Leaflet 127)

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The following discussion concerns only the common or double-pored ruminant tapeworm (Moniezia expansa).

OCCURRENCE

Sheep of all breeds and ages may be infected by tapeworms. The greatest damage and loss occurs in lambs. Infections are generally light and relatively harmless to older animals, but these infections serve as important sources of infections for the lambs.

Post mortem records of the Department of Animal Pathology show a seasonal peak in tapeworm infection to occur in the spring and early summer. Generally, heavy infections in the lambs are first seen during the latter part of May.

Tapeworms are found within the sheep's small intestine where each worm is attached by its head to the intestinal lining. The worms are grayish white to yellowish white, about one-half inch in width, and may reach 15 feet in length. Nourishment is obtained by the worms through use of the food material in the sheep's intestine. Each worm is composed of a series of segments. After the segments have matured and are filled with eggs, they tend to break off at the posterior end of the "chain". The eggs may remain in intact segments or be freed in the intestinal contents. In either event, the eggs are passed to the outside of the sheep's body in the droppings. On the ground outside, in pastures, lots, and

elsewhere, the eggs must be eaten by free-living mites for a period of development before the infection can be spread to other sheep. The development in the mites generally requires 6-8 weeks during the summer. These mites are almost universally present on pastures. The mites are eaten while the sheep are grazing. After the infected mites are swallowed by the sheep, the small tapeworms are freed in the intestine. About 5 weeks are required for the worms to mature and thus start to discharge the egg-containing segments which then completes the life cycle.

Pastures which have become infested with tapeworm eggs and the intermediate stages in the mites have been observed to remain infective for periods of as long as 2 years after tapeworm-infected animals have been removed. However, it is generally believed that after one year the great bulk of the pasture infestation will have perished.

SYMPTOMS

Tapeworm infection can be diagnosed by finding the characteristic segments in the droppings. The segments resemble grains of rice, both in size and color. The droppings from a number of animals should be examined closely from time to time. If no segments, or very few, are found on repeated examinations, it is likely that the flock is not heavily infected.

Under farm conditions lambs generally become infected with both roundworms

(stomach worms) and tapeworms. In such mixed infections, symptoms of tapeworm infection are frequently hidden by symptoms resulting from the roundworms. The external symptoms of roundworm infection are loss of weight, dull wool, pale skin, pale mucous membranes, and swelling caused by accumulation of water in tissues. Although constipation in which the droppings are small, dry, and hard is not uncommon in roundworm infection, scouring or diarrhea also occurs.

Tapeworm infection presents none of the foregoing symptoms of roundworm infection except for the scouring and a loss of condition. In heavy tapeworm infections, the scouring may vary from severe to a more moderate softening of the feces.

Sudden deaths, at a time when the lambs are seeminly in good condition and showing no symptoms, frequently result from heavy roundworm infections. Sudden deaths have also been reported in heavy tapeworm infections. In the acute tapeworm infections, stiffness in gait and convulsions have been the only symptoms noted.

Other diseases may produce symptoms similar to the foregoing, and it is advisable to consult your local veterinarian for a specific diagnosis.

CONTROL

Periodic treatment for the removal of the worms from sheep is the most practi-

Harvest Ripe Tobacco

Allow the plants time to ripen in the field, and harvest only ripe tobacco. Ripe tobacco cures quicker than green tobacco, and is in better demand on the market.

Manage the Barn For Good Curing

Cure your tobacco for high quality. Have at least one-third of the side-wall area of the barn hinged for use as vertical ventilators so that as much as possible of the curing will be air-curing. Have heating equipment on hand for use in poor curing weather.

Build Your Soils For Better Tobacco

Use rotations of tobacco and grasses and legumes to build soils for better burley. Soils that now are low to medium in fertility can be made more productive through use of crop residues, farm manure, phosphate and potash fertilizers, liming, growing grasses and legumes. Good crops of burley are more certain on land so improved, and only moderate amounts of fertilizer are needed when such land is in burley. Don't wait until tobacco comes around in the rotation to add the fertilizers needed to enrich the soil. A better plan in any soil-building program is to apply enough fertilizers to the pasture, hay, and grain crops that they will improve the soil rather than deplete it. So managed, the land will be in such shape for tobacco that only enough fertilizer for the tobacco crop itself will then need to be added.

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50M—3-55

Your

BURLEY TOBACCO CROP THIS YEAR

How to Produce the Kind of Burley Tobacco That the Manufacturers Can Use

No product for sale ever stays popular and profitable very long unless it pleases its customers. Cigarette smokers and cigarette manufacturers want a milder tobacco than most of the burley now grown. They want a tobacco like the burley grown before World War II.

Much of the burley tobacco we grow today is not "burley" at all—not the same in chemical composition as the leaf which made a reputation for "White Burley" tobacco of earlier years. The industry was built on growing burley only one or two years on a piece of ground, following several years of sod, with limited

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use of commercial fertilizers. Since World War II farmers have changed from sod rotations to growing burley year after year on the same ground and fertilizing heavily with nitrogen. The result has been a heavy-bodied, harsh tobacco, high in nicotine.

Manufacturers mix burley with other tobaccos in making cigarettes. But they can't use as much present-day burley as they would like and still make a cigarette with 2 percent nicotine—which is the kind the smokers are accustomed to smoking.

This leaflet is written for farmers who decide to grow burley of lower nicotine content that can be used more freely in cigarettes. It does not go into the complex questions of control programs and pricing, but it does tell how to produce the kind of tobacco the customers want. The recommendations given are based on research findings of the Kentucky Agricultural Experiment Station.

Choose a "Lower Nicotine" Variety

Burley varieties differ in average nicotine content, but none is low enough to produce a satisfactory crop if over-fertilized or closely suckered.

Of the Kentucky varieties, the experimental wildfire-resistant WF 12-53 seems lowest in nicotine. Ky 41A, Ky 35, and Ky 58 are somewhat higher, but still are lower nicotine varieties. Ky 16, Ky 57, and Ky 26 are still higher.

Use of the lower nicotine varieties is helpful, but cultural practices that keep nicotine content low must also be used in order to raise a mild, thin-bodied crop.

Plant On Fertile Sodland If You Have It

The best soil for burley production is deep-well-drained, and fertile, and is plowed from a good sod. Land that has been in sod has better soil structure than land which has been row-cropped several years. Better soil structure means more rapid plant growth.

Don't Over-fertilize With Nitrogen

Apply as much phosphorus and potassium as are shown by soil tests to be needed. Apply only enough nitrogen for good yields. Don't apply more nitrogen than is needed for normal growth. This means that the plants should use up the supply of nitrogen by topping time, or very near that time. Tobacco that runs out of nitrogen too soon is of poor quality and low in yield. But if it has too much nitrogen it is heavy, dark, high in nitrogen compounds, and produces a harsh smoke. Providing the right amount of nitrogen calls for careful planning and knowledge of the particular soil where the crop is to be grown.

Where good sod of grass and legumes is turned under for tobacco, only about 60 pounds of nitrogen per acre is needed from commercial fertilizer or manure. This amount is contained in 1,200 pounds of 5-10-15 fertilizer, or in 10 tons of manure, or in about 200 pounds of ammonium nitrate.

Where the sod is mainly grass, with little or no legumes the year before plowing for tobacco, about 80 to 100 pounds of nitrogen is needed per acre.

Where the sod is poor—mainly weeds—the need for nitrogen to be applied in commercial fertilizer or manure is 100 to 120 pounds per acre.

On land which has been in tobacco several years, where the fertility has been built up to a high state, and where a good cover crop of small grain and legume is turned under, it is easy to have too much nitrogen for good tobacco. As there is no satisfactory soil test for nitrogen, each farmer must decide for himself what the needs for nitrogen are, on the basis of the past treatment of the soil and the appearance of the cover crop before plowing. This is where real skill enters in.

In general, if the soil has been heavily manured and fertilized in past years, and if the cover crop is dark green up to the time of plowing, little or no more nitrogen will be needed for burley this year. If the cover crop is yellow at plowing time, 80 to 100 pounds of additional nitrogen per acre in fertilizer or manure

should be enough. In average farm manure there will be about 6 pounds of nitrogen in each ton of manure, available for the crop this year.

Cultivate Shallow

Cultivate deep enough the first time after planting to break up the ground packed by the machinery used in setting. All cultivation after that should be shallow enough not to disturb the tobacco roots. Each time any roots are disturbed or pruned off, the growth of the plant is slowed and the leaves tend to thicken.

Top When Three-fourths of Plants Are In Bloom

Topping at this stage catches a few plants in the late-bud stage. But it is better to top all the plants at one time, even though a few are in the bud stage, in order that the field will mature evenly.

Hold Suckering To a Minimum

Let the two top suckers grow, and do no more suckering of the rest of the plant than is necessary to prevent damage. For example, in a recent test on a highly fertile piece of sod the nicotine content of tobacco handled in this way was 3.39 percent, while tobacco of the same variety in the next row, topped and closely suckered, had a nicotine content of 4.46 percent. The earlier tobacco is topped and the more times it is suckered, the heavier and less desirable the leaf and the higher the nicotine content.

Priming Saves Valuable Leaves

Priming the lower leaves saves valuable tobacco which usually is lost if not primed. Priming also usually means better quality of the rest of the leaves—for when the valuable lower leaves are saved the rest of the plant can be left in the field until all the leaves are fully ripe before harvesting.

total production by 39 percent. Again in 1927 they reduced their acreage 30 percent and their production 39 percent. These were severe adjustments, but they were effective.

In 1934, growers signed contracts with the Agricultural Adjustment Administration and cut their acreage almost 40 percent and their production 38 percent.

After each of these setbacks the use of burley again turned upward and helped take up the slack.

Does the most useful tobacco bring the highest price?

Not always, under the present grading and pricing system.

The trouble is that chemical make-up of the tobacco has become more important in determining the usefulness of the tobacco in recent years, but present grades do not fully reflect chemical make-up of the tobacco.

Present grades are based on the way tobacco leaf looks and feels. No practical system of grading has yet been worked out which would take into account the chemical make-up of the leaf. This, with pricing adjusted to it, presents a real challenge which the tobacco industry must face and solve.

What can individual farmers do to help the situation?

Each farmer can set his sights on producing the kind of tobacco manufacturers want: bright-colored, thin-bodied, ripe tobacco. He can then strip it carefully and offer it for sale in piles of uniform grade and quality. (See Ky. Leaflet 147, "Your Burley Tobacco Crop This Year.")

Farmers raise tobacco for the income it brings them. They therefore try to produce the kind of tobacco which they think will bring the most net income, and they change production practices to meet market needs when they know what those needs are, and when those needs are reflected in market prices.

How important is tobacco in Kentucky agriculture?

Tobacco furnishes about 40 percent of Kentucky cash farm income. It is a crop that brings high total income per acre and uses a large amount of man labor per acre.

Welfare of the burley tobacco industry is of very serious importance to the prosperity of Kentucky agriculture—and therefore of the Kentucky economy as a whole.

This leaflet is one of three published by the University of Kentucky to give farmers and others information on the current situation in burley tobacco. The others are Leaflet 147, "Your Burley Tobacco Crop This Year," and Leaflet 149, "The Burley Control Program: Acreage Allotments and Price Supports, 1955." Ask for copies at your County Extension Office.

Lexington, Kentucky April, 1955

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50M—4-55

ECONOMICS OF BURLEY TOBACCO

QUESTIONS AND ANSWERS ON THE SITUATION IN 1955

by DANA G. CARD, Department of Agricultural Economics

How serious is the burley tobacco problem? What can be done about it?

These are the big questions facing farmers, businessmen, and government throughout the burley-producing area.

This leaflet gives factual answers to some of the economic questions in everyone's mind about this situation. Though these questions and answers have a bearing upon policy of government and of growers in dealing with the situation, the purpose of this leaflet is not to deal with policy but to give background information on the economic questions involved. (See Ky. Leaflet 149, The Burley Control Program, 1955.)

What is the problem?

Too much burley tobacco on hand, plus the fact that in spite of acreage reductions total production of burley has continued to go up.

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What are the supplies on hand?

About 1.8 billion pounds of burley tobacco at the beginning of 1955. This was enough to last about 3½ years at present rates of use. A normal supply is enough to last about 2½ to 3 years. This means that the oversupply, or surplus, is around 400 million pounds.

The reason why a supply to last 2½ to 3 years is considered normal is that cigarettes are made from aged tobacco rather than from the current crop. Stocks must be large enough for a given year's crop to be kept in storage at least two years before it is used.

Is the present surplus burdensome?

Yes, especially in view of the downward trend in use of cigarettes during the past two years.

Not all burley is used in cigarettes, but most of it is. When more and more cigarettes were being used each year, a certain amount of "overproduction"—that is, production in excess of current disappearance of tobacco—was desirable in order to take care of heavier demands in the future. But since 1952 the use of cigarettes has fallen off nearly 8 percent. In a falling market an oversupply is always troublesome.

What is the effect of the surplus on prices?

Under a price-support program an oversupply is prevented from lowering prices much below the support level. Tobacco which buyers do not want at the support price is placed under government loan. That is, it "goes to the pool." About 222 million pounds of the 1954 burley crop (about one-third of the crop) was placed under government loan.

Without a price-support program, a burdensome surplus of a farm product almost invariably brings drastically low prices.

If the present surplus were entirely in private hands instead of being largely in government-held stocks, it would very likely depress prices more. Unless the tobacco control program is abandoned or conditions change materially, the government-held stocks are not likely to be offered for sale at less than 90 percent of parity.

Government-held stocks permit dealers and manufacturers to supplement their own stocks by purchasing from a common pool of stored tobacco. This ought to help keep prices stable.

Why did so much burley go to the pool this year?

The crop was the biggest on record, and manufacturers already had large stocks on hand. They tried to buy only the kind of leaf they thought would best fill their needs—bright-colored, thin-bodied, ripe tobacco.

Just the same, the companies bought only 5 percent less than in 1953 and 10 percent less than the average of the past nine years.

Why have such large supplies built up?

In 9 of the past 11 years, farmers have produced more burley tobacco each year than was used that year. This meant a gradual accumulation of stocks, but was not considered serious because use of cigarettes was going up each year. It was when use of cigarettes fell off for the second year in a row that the situation became alarming.

The main reason for the large build-up was the striking increase in acre-yields from year to year. Even though acreage allotments were reduced 10 percent in 1953 and 8 percent in 1954, the total production of burley in 1954 was the greatest ever—some 665 million pounds. Average acre-yields have increased from about 1,000 pounds in 1940 to 1,600 pounds in 1954.

Why have acre-yields gone up?

With acreage limited, farmers have tried to produce all they could on the acreage allowed. They tried to offset reduction in acreage by increasing yields, to maintain income.

Improvements in varieties and more attention to cultural practices, especially heavy fertilization, have led to the higher yields.

Are heavy yields per acre harmful?

No, if not overfertilized with nitrogen. Heavy yields of a kind not wanted by manufacturers will of course

lead to greater surpluses and further reduction of acreage. Heavy use of manure plus heavy fertilization (especially with nitrogen) make a heavy-bodied, undesirable tobacco.

What are the prospects for use of burley in future?

Demand for burley tobacco is closely tied in with use of cigarettes. If cigarette smoking continues to fall off, still less burley is likely to be used. If smoking of cigarettes goes up again, more burley can be used.

Not much burley tobacco is exported, and the amount used in chewing and smoking tobacco is far less than it used to be.

Will cigarette consumption go up again?

No one can say for sure, or when.

Undoubtedly the use of cigarettes has been affected by the possibility that cigarette smoking may be related to health (lung cancer). Apparently no one knows the answer to this as yet. Extensive scientific studies are under way which should give more conclusive evidence, one way or the other. If smoking of cigarettes is proved to be harmful to health, the results could be serious for tobacco growers.

Another influence on cigarette consumption is the number of people in the total population between the ages of 20 and 44. People of this age are probably the heaviest smokers. During the next five years the total population of the United States is expected to increase about 12 percent, but the number of people between 20 and 44 will change very little. Increasing total population will therefore probably not bring much immediate relief to the cigarette industry.

What has been the experience in the past in dealing with surplus stocks of tobacco?

In 1920, 1926, and 1933 tobacco growers faced particularly critical times because of a slowing down in the use of tobacco and a piling up of stocks. These threats were met for the most part by cutting down acreage *and* production.

In 1921, before acreage allotments were in use, burley growers voluntarily cut acreage by 36 percent and

expectation of building up a production history which would aid in obtaining larger individual allotments in future years. That is what happened in 1939. However, the situation now is different. Acreage allotments will still exist for purposes of the ACP program even though the marketing quotas are rejected in the April 28 referendum. Therefore the new law prohibiting use of plantings in excess of allotments for building up future allotments would apply even though the quotas were rejected. This would mean, under the terms of the present law, that "defensive plantings" would be useless so far as future allotments are concerned.

What would be the likely consequences if the quota is approved in the referendum?

Approval of the quota would mean continuing the control program with price supports at 90 percent of parity. The average support price as announced for the 1955 crop is $46.20 per 100 pounds.

Continuance of the program would mean an opportunity to work out orderly solutions to the various problems and weaknesses of the program, such as the emphasis which the program now gives to the producing of pounds rather than of quality in burley, and the excess of actual production over allotted production because of the use of 5-year average yields in determining acreage allotments. The recent amendments to the burley control law were mostly emergency or stop-gap measures. More thought and time are needed to work out a truly effective program.

Another important effect of continuing the program would be that burley tobacco growers would have the continuing confidence and respect of Congress and of the American public for their ability to control the production of burley tobacco in line with demand. This might have extremely important effects in the future.

Is the program fair to all?

This is a question which cannot be answered to the full satisfaction of everyone. Each grower has his own idea of fairness. Each is affected personally by the program and by any changes in it, and the tendency very naturally is for each to view the program

in terms of its effect upon him. He tends to judge the fairness of the program in that light.

However, it is well to remember that the legislation under which the control program operates was brought about and has been amended from time to time by democratic processes. Such legislation almost always embodies compromises among the desires and interests of various groups. Under a workable program involving, for example, growers with large acreages and growers with small acreages, there seems always to be necessary a certain amount of give and take on both sides.

The question of any inequalities which may exist in the program, however, is one for consideration in future modification of the program. Congressmen have called upon the U. S. Department of Agriculture for study of alternative methods of control of burley tobacco production. Farmers also need to give thought to the modifications needed in the program over the years.

The question to be voted on, however, is not one of modification of the program. The only question involved in the referendum is whether growers are willing to accept the proposed cuts in acreage along with guaranteed price supports at 90 percent of parity, or whether they will choose uncontrolled production and no price support.

This is one of three leaflets issued by the University of Kentucky on the current problem in burley tobacco. The others are Leaflet 147, "Your Burley Tobacco Crop This Year," and Leaflet 148, "Economics of Burley Tobacco: Questions and Answers on the Situation in 1955." Ask your county agent for copies of them.

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Burley Tobacco Control Program

The Issues Involved, 1955

by ROBERT W. RUDD
Department of Agricultural Economics

Last fall a 10-percent reduction in the 1955 marketing quota for burley tobacco was announced by the Secretary of Agriculture. Now, under a recent amendment, a new quota has been determined and announced by the Secretary, calling for a total reduction of about 25 percent in acreage allotments for 1955. This new quota will be voted upon by growers in a referendum on April 28.

What is at stake?

Tobacco is the only basic commodity for which no price support is available if the growers turn down the marketing quota. The choice is therefore between acreage control with price supports at 90 percent of parity, on the one hand, and no price supports and no acreage controls on the other. The support price for the 1955 crop has already been announced at an average of $46.20 per 100 pounds if the marketing quota is approved.

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What changes are provided in the new legislation?

Five changes have been made in the law regarding the burley control program. These are:

1. Redetermination of the marketing quota for 1955 is provided, subject to approval of the growers.
2. Penalty for red-card tobacco is increased from 50 to 75 percent of the previous year's average price.
3. Use of red-card or excess plantings as a means of obtaining increased acreage allotments will no longer be permitted.
4. Unreported plantings by a grower will be deducted from his next year's allotted acreage.
5. The minimum allotment will be 0.5 acre, instead of 0.7. However, reduction from 0.7 acre or from 0.6 acre will not be more than 0.1 acre in any one year.

Are all these amendments to the law to be voted on by growers?

No. None of these amendments to the law are to be voted on. All the amendments are now law and are part of the program. The only question growers will vote on is whether or not they are in favor of the re-determined marketing quota for 1955 as announced by the Secretary of Agriculture.

Why are growers asked to vote on another marketing quota now?

The 10-percent reduction announced last November was based on an estimated 1954 burley tobacco crop of 582 million pounds. Actually the crop was much larger than expected, and totaled 665 million pounds. A 1955 crop reduced only 10 percent below that of 1954 would therefore still be larger than needed and would add further to the present oversupply.

We already have enough burley on hand to last about 3½ years at present rates of use. This is a larger supply than normal. An adequate supply, according to the Commodity Stabilization Service, is enough to last 2.8 years.

Why has the control program not kept supplies from getting so far out of line with demand?

One reason is that farmers have been permitted to market all the tobacco they could raise on their allotted acreage. When acreage has been reduced, many

farmers have tried to raise as much tobacco on the reduced acreage as they raised before the reduction. In 1954, for instance, farmers produced the largest burley crop ever grown, even though acreage had been reduced 18 percent in two years.

The manner in which acreage allotments have been figured from the national poundage quota has also been a factor leading to excess production. In figuring acreage allotments to produce the poundage called for in the marketing quota, the yield figure used has been a 5-year average. This average has been lower than the current yield, because yields have been going up year by year. As a result, actual production has been greater than the allotted production in seven of the past nine years. However, as long as cigarette consumption was rising, as it was until 1953, the excess of actual production over the quota caused only minor difficulties. It was when use of cigarettes fell off that the real trouble came.

"Red card" tobacco has been part of the problem, but not the major part. In 1954 red-card tobacco (raised without allotment) was grown on some 10,000 acres out of a total of over 400,000 acres harvested. Assuming average yields, some 16 million pounds of red-card tobacco was grown—which was only a small part of the 135 million pounds by which the 1954 crop exceeded the amount used during the year.

Still another fact bearing upon this question has been a change from rather general underplanting of allotted acreage in the forties toward overplanting in recent years. In 1945 only 85 percent of the allotted acreage was grown, while in 1954 over 100 percent was grown.

Considering past cuts in acreage, has the program really been worth while to growers?

The price-support feature of the program has brought a very definite gain to growers. During 1945-49, for example, it is estimated that the price benefits from the program averaged about 90 million dollars a year. In other words, about one-third of the price received for burley tobacco was due to acreage control and price support.

For an individual farmer the effects may be estimated in this way: Suppose a grower had 11½ acres

in 1939, the last year when growers voted down the quotas and there were no price supports. If this grower produced average yields and got the average price, he received about $1850 for his crop. By 1954 his acreage under the program would have been 7.7 acres. With average yield and average price for burley, he would have received $6314 for his crop. Even when allowance is made for the fact that prices of all sorts were much higher in 1954 than in 1939, the grower still grossed over one-third more for his crop under the program than without it. A grower under the minimum acreage provisions which came into the control picture somewhat later, has also been better off under the program than without it, as his reductions have been less.

What consequences would be likely if the quota is rejected?

The first consequence would be the withdrawal of all price supports for burley tobacco. This would be certain. Almost equally certain, in view of the present large supplies, would be substantially lower prices for burley. Acreage planted in 1955 would very likely be equal to, or larger than, that of 1954.

Our last experience in rejecting quotas and marketing a crop without price supports was in 1939. Conditions then were sharply different. The main dissatisfaction then was with low prices and a poundage system of quotas. Consumption then was rising; now it is falling. No severe cut in acreage was in prospect then. Supplies on hand then, while large, were not so large as now in relation to annual use. But even under those more favorable conditions, the price of burley without government support in 1939 dropped 10 percent.

Informed persons in the tobacco trade have estimated that without price supports the 1954 crop of burley would have averaged less than 25 cents a pound. There is little reason to believe that, without price supports, it would be any higher than 25 cents in 1955—and would likely be even less if 1955 production is large.

Another consequence of voting the quota out might be a wave of "defensive planting"—that is, planting above the allotted acreage of recent years with the

(inoculated) or sudan grass. At the time of plowing after small grain, if it seems likely that few or no live rootstocks remain in the soil, the land may be planted to a clean-cultivated crop such as corn. Then if Bermuda grass plants show up during the summer they may be destroyed by spot spraying with TCA as already described.

Bermuda grass in solidly infested fields may be greatly reduced by close summer grazing, followed by shallow fall plowing, leaving the rootstocks exposed to winter freezing. Use of early-planted soybeans as a smother crop the next summer will further reduce the infestation, if not eradicate it.

Lexington, Kentucky
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5M-4-55
5M-6-55

Control of Bermuda Grass

By J. F. Freeman

Bermuda grass is a long-lived perennial with a spreading habit of growth. It propagates by creeping stems, which root at each node that touches the ground, and by underground rootstocks which send up new shoots from the nodes. No viable seed is produced in Kentucky. The creeping stems branch freely and soon form a dense ground-covering mat. These stems may reach a length of 3 or 4 feet in a season. At the same time, Bermuda grass spreads by sending out thick white rootstocks which form a dense underground mat. These rootstocks live from year to year and serve the plant as food storage organs. New shoots may arise from each node or joint of the underground rootstock.

In the South, Bermuda grass is considered an excellent permanent pasture plant, but its growth habits make it a weed in cultivated fields. Once established, it is very

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difficult to eradicate. Soil-sterilizing chemicals may be used to get rid of it in small areas or patches, but owing to the expense of chemical treatments cultural practices are considered more practical for controlling the grass on large areas or in solidly infested fields.

USE OF CHEMICALS

Either of several chemicals may be used to kill Bermuda grass, but TCA (sodium trichloroactetate) is one that is satisfactory for most conditions. Apply 4 ounces of the TCA salt in water as a spray or drench to 100 square feet of area (110 pounds per acre). The TCA should be dissolved in the amount of water needed for good coverage and applied with a pressure sprayer or through a sprinkling can. The area treated should extend 2 or 3 feet beyond all visible plants in the patch so as to kill the root parts that extend beyond the surface growth. The chemical is more effective applied on the soil than applied on the top growth. Where possible, plow, disk, or chop up the infested area before treating the soil. Such cultivation weakens the plant so that its rootstocks are more readily killed by the TCA. Treatments can be made at any time of year, but usually they are more effective at a season when moderate rains are likely to occur shortly after treatment, because water is required to move the chemical down to the root zone. Under some conditions heavy rains may move the TCA too deep for most effective action. TCA used at the rate suggested kills all vegetation and sterilizes the soil for 90 days or longer so that no crops can

be grown on the treated areas. Trees, shrubs, and other plants growing close by may be injured or killed if their roots extend into areas treated with TCA. Handling precautions printed on the containers in which TCA is purchased should be read and carefully followed.

RETREATMENT

Usually some rootstocks or stems will survive chemical treatment and start new growth. In a control program, this growth should be killed by spot treatment whenever it starts.

CULTURAL CONTROL

For fields solidly infested with Bermuda grass, plowing about July 1, followed by clean cultivation at 2 week intervals throughout the summer for one or more years is the most practical method of eradication. Close pasturing of the grass for one or more seasons before the land is plowed weakens the plants so that they are more easily killed by the summer cultivations. Frequent cultivation with disk harrow, spring-tooth or field cultivator during the summer will prevent growth and gradually weaken and starve the rootstocks. Following the final cultivation near mid-September, sow winter barley or rye to be either winter-grazed or combine-harvested. After the small grain crop, the land should be plowed again. If some live Bermuda grass rootstocks remain in the soil at plowing time the land should either be clean-cultivated, as during the preceding summer, or solid-planted to a smother crop such as soybeans

not be used afterward for application of insecticides or fungicides to plants because traces of 2,4-D may injure susceptible species.

Livestock are not harmed by grazing on 2,4-D-treated forage crops, but sometimes poisonous plants growing in sprayed pastures are more attractive to animals for a few days after treatment.

Lexington, Kentucky
April, 1955

5M-4-55

Control of Wild Garlic with 2,4-D

By J. F. Freeman

Wild garlic (often miscalled wild onion) can be controlled fairly well in pastures, lawns and grass seed fields by the proper use of 2,4-D sprays without causing serious permanent harm to the grass crops. However, clovers and other legumes growing with the grasses are likely to be killed. Since 2,4-D kills only the growing garlic plants and not the ungerminated bulbs and bulblets lying underground, it is impossible to rid land of the weed with a single treatment. In fact, if all plants appearing in successive years were killed before they produced new bulbs probably three years of treatment would be required for complete eradication. In small grain crops, which are more susceptible to 2,4-D injury than grasses, most of the

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top bulblets can be prevented from forming and some garlic plants killed by the smaller rates of 2,4-D which cause only a slight reduction in grain yield. (See "small grains" below.)

PASTURES AND GRASS SEED FIELDS

A single treatment during the latter part of March will slowly kill most of the growing garlic plants and largely prevent top-bulblet formation. This treatment is adapted for use on garlic-infested grass fields from which seed is to be harvested.

Two spray treatments each year, one in early November and the other in late March, are suggested if eradication is the aim. The object of the late fall treatment is to kill the garlic plants which started in late summer or early fall before new underground bulbs have begun to form; that of the early spring treatment is to kill those which started during the winter and before the formation of new underground bulbs or top bulblets has begun. Complete control is usually desirable in dairy pastures and in lawns. Reseeding of legumes may be safely made in a few days after the late march treatment. Top dressing with nitrogen fertilizer encourages quick recovery of 2,4-D treated grasses. Two treatments a year during 3 or more successive years may be required. The first treatment may be made either in fall or spring.

KIND AND AMOUNT OF 2,4-D

The ester form of 2,4-D is more effective than the amine or sodium salt forms. Use at least 2 pounds per acre of 2,4-D acid in the ester form or 2 1/2 pounds in the amine form. These amounts are supplied by 4 pints of an ester concentrate containing 4 pounds acid per gallon or 5 pints of an amine concentrate of like strength. In spraying lawns or fields near tobacco beds it is safer to use the amine form or to substitute a low-volatile ester for the ordinary form. Fumes of the ordinary form may injure susceptible ornamental plants or tobacco plants.

AMOUNT OF WATER

Mix the proper amount of 2,4-D liquid with water to make the amount of spray solution which the spray equipment to be used delivers per acre. The use of fan-type weed nozzles, rated at 10 gallons or more per acre, is preferred to the 5-gallon nozzles usually furnished as original equipment on manufactured weed sprayers. Larger amounts of solution, up to 20-25 gallons per acre, will give better coverage and more effective kill if there is heavy growth of the crop being sprayed.

FOR LAWNS

For lawns or spot spraying elsewhere a 4-gallon pump-up sprayer with cone-type nozzle may be used. For small quantities of spray, mix 4 or 5 tablespoons of amine 65%, 2,4-D to each gallon of water and apply only enough spray to moisten the

wild garlic plants. This treatment will also kill most broadleaved weeds.

SMALL GRAIN

Apply 2,4-D in late March or early April. Small grains should not be sprayed in the fall. Use ester or amine formulations of 2,4-D at acre rate of not more than 1/2 pound acid equivalent, the amount in 1 pint of a liquid concentrate which contains 4 pounds acid per gallon as indicated on the label. This small rate kills only 25 to 50 percent of the wild garlic but prevents formation of top bulblets on the remaining plants or distorts the plants so that the combine harvester will miss most of them if the small grain is not lodged. Legumes already seeded in the small grain crop will be killed by 2,4-D at this rate and wheat and rye grain yields may be slightly reduced. Barley and spring oats are less tolerant to 2,4-D than wheat or rye; therefore, yields of these crops will be reduced more than wheat or rye. 2,4-D should be used after the winter grains stool, after the five-leaf stage in spring oats, and before the boot stage in all the grain crops.

CAUTION

Tobacco, many ornamental and garden plants, grape vines, and other plants are very susceptible to 2,4-D injury. Use care in spraying near such plants to avoid drifting spray. Fumes from ester spray applications may injure such plants. Spray equipment used for 2,4-D should

SOCIAL SECURITY

Old Age and Survivors Insurance Benefits

for

Farm Families

By JOHN H. BONDURANT
Department of Agricultural Economics

LEAFLET 152

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service
FRANK J. WELCH, Dean and Director

Old Age and Survivors Insurance Benefits

This leaflet is written to help explain the 1954 amendments to the Social Security Law as they affect farmers and farm workers. Answers are given to several of the more common questions about the law. If you have questions which are not answered you should contact the nearest office of the Social Security Administration. (See page 9, table 4, for location of district offices.)

Social security old age and survivors insurance coverage is extended to farm operators and part-time hired help, beginning with 1955 income. The 83rd Congress amended the Social Security Law to include farm operators and part-time hired farm workers along with several other occupational groups. Also, the benefit rates may be eventually extended for regular farm workers already covered. (See question 1, below.)

The minimum benefit for a retired worker was increased from $25 to $30 per month. Maximum benefits were also raised; see Table 1. For a single worker the maximum benefit was increased from $85 to $108.50. Also, the maximum family benefits may eventually be increased from $168.75 to $200 per month, for a widow and two children.

Under the new law farm operators and part-time farm wage workers in 1955 and 1956, or their survivors, who are eligible for benefits may become entitled to them as early as April 1956.

Earnings up to $3,600 a year can be counted toward social security from January 1951 through 1954; for 1955 and thereafter earnings up to $4,200 per year can be counted. Benefits based on the increased amount may first be made payable in 1956, provided the individual earnings are at an annual rate of at least $4,200 in both 1955 and 1956.

QUESTIONS AND ANSWERS

The following questions and answers plus examples for various situations may help in understanding the law and in determining the amount of your payments.

1. *For what farm people does the Social Security Law now provide insurance coverage?*

TABLE 1—OLD AGE AND SURVIVORS' INSURANCE BENEFITS FIGURED UNDER THE 1954 BENEFIT FORMULA (Based on Earnings After 1950)*

Average Yearly Earnings*	Retirement Benefits Age 65 and over: Worker's Monthly Benefit	Retirement Benefits Age 65 and over: Worker and Wife	Survivors Benefits Widow, and Children: Widow, 65 or child	Survivors Benefits Widow, and Children: Widow and 1 child	Survivors Benefits Widow, and Children: Widow and 2 children
$ 400.00†	$ 30.00‡	$ 45.00	$ 30.00	$ 45.00	$ 50.20
1200.00	55.00	82.50	41.30	82.60	82.60
1320.00	60.50	90.80	45.40	90.80	90.90
1440.00	62.50	93.80	46.90	93.80	96.00
1560.00	64.50	96.80	48.40	96.80	104.00
1680.00	66.50	99.80	49.90	99.80	112.00
1800.00	68.50	102.80	51.40	102.80	120.00
1920.00	70.50	105.80	52.90	105.80	128.00
2040.00	72.50	108.80	54.40	108.80	136.00
2160.00	74.50	111.80	55.90	111.80	144.00
2280.00	76.50	114.80	57.40	114.80	152.00
2400.00	78.50	117.80	58.90	117.80	157.10
2520.00	80.50	120.80	60.40	120.80	161.20
2640.00	82.50	123.80	61.90	123.80	165.10
2760.00	84.50	126.80	63.40	126.80	169.20
2880.00	86.50	129.80	64.90	129.80	173.10
3000.00	88.50	132.80	66.40	132.80	177.20
3120.00	90.50	135.80	67.90	135.80	181.10
3240.00	92.50	138.80	69.40	138.80	185.20
3360.00	94.50	141.80	70.90	141.80	189.10
3480.00	96.50	144.80	72.40	144.80	193.20
3600.00	98.50	147.80	73.90	147.80	197.10
3720.00	100.50	150.80	75.40	150.80	200.00
3840.00	102.50	153.80	76.90	153.80	200.00
3960.00	104.50	156.80	78.40	156.80	200.00
4080.00	106.50	159.80	79.90	159.80	200.00
4200.00	108.50	162.80	81.40	162.80	200.00

* Up to 5 years of lowest or no earnings may be omitted in figuring average earnings.

† The earnings or wages necessary to qualify for minimum benefits are $400.00 a year for a farmer or farm worker.

‡ This is the minimum monthly benefit.

(a) All farm operators, people farming for themselves who have as much as $400 net earnings a year, beginning January 1, 1955, or in a taxable year after 1954.

(b) Farm employees—people doing farm work for others. In addition to the hired workers already covered, the law now applies to any worker who earns as much as $100 in cash from any one farmer during a calendar year regardless of whether the work is regular or not.

(c) Old age and survivors insurance benefits can be received by you if you are entitled to them even

though you receive other income. An unlimited amount of income may be received if it is not income from labor. Also, if you are employed you can earn up to $1,200 a year from actual work and still receive old age benefits. After you are 72 years old you may receive payment of benefits, in accordance with previous earnings, regardless of your current income from any source.

2. *What are the old age and survivors insurance benefits under the Social Security Law?*

(a) Retirement payments may start at age 65 provided you have qualified and made the proper amount of tax payments to be eligible.

(b) Old age benefits vary for an individual, depending upon the size of his or her income during previous working years. Wives age 65 or over get half as much as do retired husbands. (For a complete schedule of old age retirement benefits, see Table 1.)

(c) Survivors benefit payments vary with the size of income previously received by the deceased worker of whom the survivors are beneficiaries. For example, a widow and two children may receive from $50.20 per month to $200 per month. (See Table 1.)

(d) A lump sum payment is made at the time of the insured person's death at any age. Amount of this payment is 3 times the worker's monthly benefit, but is not to exceed $255.00. For example, if the deceased person's average monthly earnings were $100, he would have been entitled to a $55 monthly benefit. Three times the $55 would be $165, the amount of the lump sum death payment.

3. *How and when will older persons benefit?*

Farmers and farm workers who are now near or over the age of 65 whose earnings are sufficient to qualify may receive old age retirement benefits after making Social Security Tax payments for one and one-half year's work. Only earnings from self-employment, such as operating a farm, or from wages are counted in figuring the benefit payment.

For example, a person 63½ years old on Jan. 1, 1955, whose net earnings or wages averaged $100 a month for one and one-half years beginning on that date, would be entitled to receive benefit payments of $55.00 a month for as long as he lives, if he retired July 1, 1956 or later. Also, when his wife reached age

65, their combined monthly benefits would be $82.50 a month. All farmers and farm workers whose net earnings or wages are high enough for them to qualify are required to pay a Social Security tax. Self-employed farm operator's taxes are due and payable for taxable years ending after 1954, and at the same time the federal income tax is due. Calendar year 1955 federal income tax payments are due on or before April 15, 1956.

Beginning in 1955, a person under the age of 72, entitled to old age and survivors insurance benefit payments, can earn as much as $1,200 a year and still receive all his benefit payments. After a person reaches age 72 he may receive benefit payments regardless of the amount of his earnings from self-employment or wages. Each person, however, will continue to pay the social security tax on his net earnings, or wages if covered under the law.

4. *What are the survivors insurance benefits after the death of an insured person of any age?*

Survivors benefits are paid to a widow 65 years old or older, unmarried children under 18, a widow regardless of age with children under 18 of the deceased, or a divorced woman with her deceased husband's unmarried children under 18 provided her former (deceased) husband was supporting them. In some cases dependent parents 65 or over of a person who dies are eligible for monthly benefits.

The minimum monthly benefit to an eligible, sole survivor is $30.00 a month. However, a widow with two children under 18, for example, would receive a minimum of $50.20 a month, and up to a maximum of $200.00 a month. This maximum benefit could be paid if the deceased person had received prior to his death annual net earnings from self-employment and, or wages of $4,200 and had paid Social Security taxes for the period required under the Social Security law as amended in 1954.

5. *Is participation in the Social Security Program and payment of the Social Security tax voluntary?*

No. It is part of the federal law, and all self-employed farmers and farm wage workers whose earnings are such as to come within the provisions of law must report and pay social security taxes as specified in the law.

6. *How are the Social Security taxes calculated for farmers and farm workers?*

They are calculated as a percentage of net earnings for farmers and as a percentage of cash wages for farm wage workers. Both the employer and wage worker pay social security taxes for the wage worker. The different bases for calculating the payments (taxes) are shown in Table 2. The rates of payment are scheduled to increase gradually and be double the current rate by 1975.

TABLE 2—SOCIAL SECURITY RATES OF PAYMENTS (TAXES) AS PROVIDED BY THE PRESENT LAW

Period	Farmers Percentage of Net Earnings	Farm Workers Percentage of cash wages paid by Employer	Worker
1955-59	3	2	2
1960-64	3¾	2½	2½
1965-69	4½	3	3
1970-74	5¼	3½	3½
1975- and after	6	4	4

7. *When and where do I report my self-employment earnings and pay my Social Security Tax?*

Early in 1956, if you make a report of your 1955 earnings on a calendar year basis; you pay the tax on them at your nearest Internal Revenue Service office. If you report your earnings on other than a calendar year basis see your nearest Internal Revenue Service Office for time of payment.

8. *What is the first thing to do?*

Unless you already have a social security card in your possession you can get your original or a duplicate from the nearest social security district office. (See page 9). You may be able to obtain an application form for your social security card at any post office. After you get your card put it away in a safe place and always record your social security number on your tax reports, as that number identifies your individual account and makes it possible to credit your account correctly. If you work for some one for wages always show your account card to your employer. This is very important as your benefits are figured from this account.

9. *What is the second thing to do?*

You should keep a record of your farm receipts and expenses, beginning in January 1955. These receipts and expenses are generally the same as those included in a federal income tax report. For farm operators this is Form 1040 F.

10. *What is the amount you report in calculating your social security payments or taxes?*

If your gross farm income for a year is $1,800 or less, you have two choices. You may report your actual net farm earnings, or you may report half your gross income. Either choice must calculate to a minimum of at least $400.00.

If your gross farm income for the year is over $1,800, you must calculate your net farm earnings by subtracting your expenses from farm receipts. If your net earnings are less than $900, you also have two choices. You may report the actual amount of your net earnings if they are $400 or more, or you may report $900 and thereby build up your social security benefits.

The "gross farm income" item for social security tax purposes as mentioned above corresponds to and is identical with the "gross profits" item in the "Summary" of federal income tax Form 1040 F. The net farm earnings item referred to above, for social security tax purposes is calculated in the same manner and is the same figure as the "net farm profit" on page 1, line 10 of federal income tax Form 1040 F entitled, "Schedule of Farm Income and Expenses".

PART-TIME FARMERS

The farm earnings of a part-time farmer are also subject to the Social Security tax as an aid in providing social security. If a person's wage or salary job is an occupation covered by social security, his wage or salary is considered first and then the balance, if any is needed, up to a combined total of $4,200 may come from his farming operations, provided his farm income is sufficient to come within the provisions of the law. These provisions include net farm earnings of at least $400 a year or, as explained in question 10, half your "gross farm income" provided it amounts to at least $800 and is no more than $1,800. If the part-time farmer's gross farm income is over $1,800 the net farm earnings must be calculated. However, if his net farm

earnings are less than $900, and his gross farm income is over $1,800, he can report either the actual amount of net farm earnings if they are $400 or more, or $900. These net farm earnings, figured in the various ways based on the amount of gross farm income, may be added to wages or salary and social security taxes paid on them up to a maximum of $4,200 from both wages and farm earnings.

TYPES OF BENEFIT PAYMENTS

As previously mentioned, there are two types of benefit payments—old age, 65 and over, retirement benefit payments and survivors benefit payments. For the people covered by the Social Security Law, the individuals who may receive each type of old age and survivors benefit payments are shown in Table 3.

TABLE 3—TYPES OF BENEFIT PAYMENTS

RETIREMENT PAYMENTS

Monthly payment to—
- You as a retired worker

And monthly payments to your—
- Wife, 65 or over
- Child under 18
- Wife, regardless of age, if caring for child entitled to benefits.
- Dependent husband

SURVIVORS PAYMENTS

Monthly payments to your—
- Widow 65 or over
- Widow or dependent divorced wife (regardless of age) if caring for child.
- Child under 18
- Dependent widower 65 or over
- Dependent parent 65 or over

Lump-sum payment to your—
- Widow or widower, or to the person who paid your burial expenses (may be made even though monthly benefits are also payable).

SOME OBSERVATIONS

The old age and survivors insurance program of the social security law is a means by which a small percentage of the income from employment during a person's working life is withdrawn and reserved for old age (65 or older), provided he or his wife lives long enough, after working and paying social security taxes for the necessary period of time. It also provides survivors benefits to the worker's widow only after she reaches age 65, unless there are unmarried children of the worker under 18 at the time of his death. With one or more children, the widow will receive survivors benefits until the youngest of the worker's children reaches age 18. *In other words, a worker's widow under* 65 *with no children under* 18 *will receive only the lump-sum death payment and no monthly survivors benefit payments until she reaches* 65. Furthermore, his children will receive no benefits if they are age 18 at the time of his death, of after they reach 18 following his death. (See Table 3.)

Thus, Social Security old age and survivors insurance supplements to some extent but does not take the place of life insurance or disability insurance of private companies. It may supplement but it does not replace group retirement programs provided by: (1) private organizations for their employees, (2) by state and local governments, or (3) by the federal government for special employee groups.

In brief, the old age and survivors insurance provided by federal law for farm families is an aid in establishing more economic security for old age and for dependent children.

TABLE 4—LOCATION OF SOCIAL SECURITY DISTRICT OFFICES

Old Age and Survivors Insurance

City	Counties Covered
Ashland 340 14th St. Tel. 2205	Boyd, Carter, Elliott, Floyd, Greenup, Johnson, Lawrence, Lewis, Magoffin, Martin, Morgan, Pike, Rowan
Bowling Green State St. Bldg. 814-16 State St. Tel. 8844	Adair, Allen, Barren, Butler, Christian, Clinton, Cumberland, Edmonson, Green, Hart, Logan, Metcalfe, Monroe, Russell, Simpson, Todd, Warren
Corbin 307 S. Main St. Tel. 760	Bell, Clay, Harlan, Knox, Laurel, McCreary, Pulaski, Wayne, Whitley
Covington New P.O. Bldg. Tel. Hemlock 5274	Boone, Bracken, Campbell, Carroll, Gallatin, Grant, Kenton, Pendleton
Frankfort Morris Bldg. Tel. 4-8618	Anderson, Boyle, Casey, Franklin, Henry, Marion, Mercer, Owen, Taylor, Washington, Woodford
Hazard P.O. Bldg. Tel. 572	Breathitt, Knott, Lee, Leslie, Letcher, Owsley, Perry, Wolfe

Owensboro 113 E. 3rd Tel. 4-1469	Breckinridge, Daviess, Grayson, Hancock, Henderson, Hopkins, McLean, Muhlenberg, Ohio, Union, Webster
Paducah P.O. Bldg. Tel. 2-2100	Ballard, Caldwell, Calloway, Carlisle, Crittenden, Fulton, Graves, Hickman, Livingston, Lyon, McCracken, Marshall, Trigg
Lexington Bank of Commerce Bldg. Main and Cheapside Tel. 4-0038	Bath, Bourbon, Clark, Estill, Fayette, Fleming, Garrard, Harrison, Jackson, Jessamine, Lincoln, Madison, Mason, Menifee, Montgomery, Nicholas, Powell, Robertson, Rockcastle, Scott
Louisville 605 Fed. Bldg. Tel. Jackson 1361	Bullitt, Hardin, Jefferson, Larue, Meade, Nelson, Oldham, Shelby, Spencer, Trimble

Lexington, Kentucky
May 1955

Cooperative Extension Work in Agriculture and Home Economics: College of Agriculture and Home Economics, University of Kentucky, and the United States Department of Agriculture, cooperating. Frank J. Welch, Director. Issued in furtherance of the Acts of May 8 and June 30, 1914.

7.5M—5-55

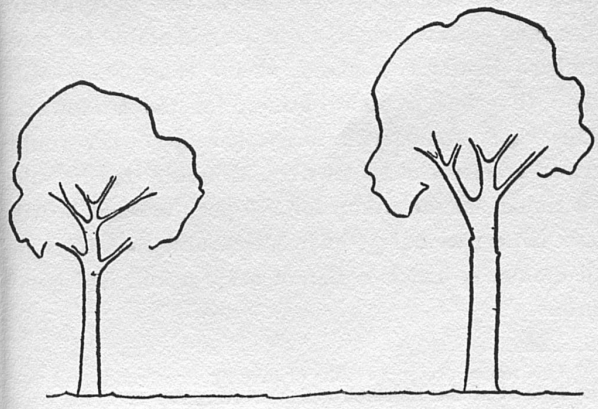
On any specific sale, individual tree values would vary markedly from the figures given above because of differences in tree taper, tree defects, merchantable length, scaling method, and sale price. However, the differences in value shown here do not even take into account the greater merchantable length the larger trees usually have and the higher quality wood they contain.

Growth studies in the central states show that average sawtimber-sized trees are increasing a little more than 2 inches in diameter every 10 years. But vigorous, healthy trees on good sites are growing much faster, often as much as 4 inches in 10 years. This means that fast-growing 12-inch trees, now worth about 90 cents apiece, are likely to double their value in 10 years. In contrast, it usually takes at least 35 or 40 years to grow the tree to the 12- or 14-inch diameter size.

From these facts it is evident that timber owners, when they make sawtimber sales, can increase their income by keeping the vigorous, fast-growing, well-formed 12-and 14-inch trees. These trees may be recognized by their large, dense, well-balanced crowns; their sound, straight trunks; and their general appearance of health and vigor compared with other trees of the same size. Owners can make a start at managing their woodlands and increasing their timber income by selling for sawlogs only the large, mature trees (18-inches diameter and larger) which are ready for harvest and those smaller trees which are not likely to make good growth in the future because of poor form, rot, or other defects.

Lexington, Kentucky May, 1955
Cooperative Extension Work in Agriculture and Home Economics College of Agriculture and Home Economics, University of Kentucky, and the United States Department of Agriculture, cooperating. Frank J. Welch, Director. Issued in furtherance of the Acts of May 8 and June 30, 1914.
5M—5-55

Growing TREES GROW DOLLARS



$1.30

This 14-inch, 40-year-old tree, worth only about $1.30 today . . .

$2.35

. . . can be an 18-inch tree worth $2.35 or more in 10-15 years.

Money does grow on trees!

By

KENNETH QUIGLEY

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UNIVERSITY OF KENTUCKY

College of Agriculture and Home Economics
Agricultural Extension Service

FRANK J. WELCH, Dean and Director

LEAFLET 153

Growing Trees Grow Dollars*

A source of income for many a Kentucky farm-woodland owner is the occasional sale of trees for sawtimber. Knowing when to sell his trees is important if he is to realize maximum returns.

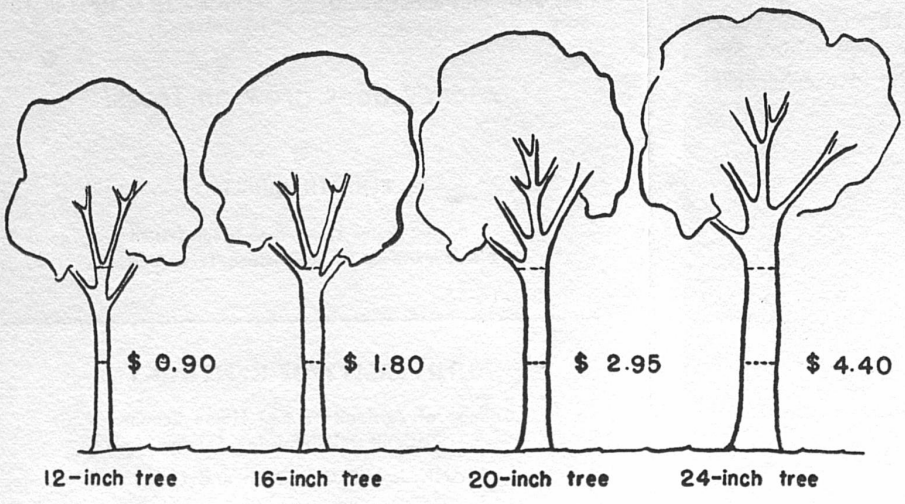
Farm-woodland owners and small-sawmill operators usually consider hardwood trees 12 and 14 inches in diameter (breast height) to be merchantable for sawtimber. However, a glance at the chart below will show that this is poor business for the landowner. This chart compares returns that an owner could expect from various-sized trees, assuming that he sold his timber on the stump for $10 per thousand board-feet (International ¼-inch Scale), and that trees of all diameters had two 16-foot sawlogs and had good form.

* This report presents results of investigations conducted under Title II of the Research and Marketing Act of 1946.

If logs rather than standing trees are sold, an even greater difference in value between the large and small trees is apparent. If a timber owner received $40 per thousand board-feet (International ¼-inch Scale), his returns from the various-sized trees would be as follows:

Tree diameter (inches)	*Log value per tree** (dollars)
12	3.60
14	5.20
16	7.20
18	9.40
20	11.80
22	14.80
24	17.60

* If the timber owner sells by the commonly used Doyle rule, the sale of large trees is even more advantageous. For example, a similar 12-inch tree sold at the same price per thousand board feet but scaled by the Doyle rule would be worth only $1.90. An 18-inch tree would be worth $7.20, and a 24-inch tree would have a value of $16.00. As can be seen from the above, the Doyle rule particularly underscales the smaller diameter logs.



Comparative stumpage value of trees of different diameters. Dotted lines indicate sawlogs.

The first crop should be cut early for hay, or it may be grazed off quickly and the field clipped to even the stubble.

Sudan grass seed crops should be cut when most heads appear ripe but before they begin to shatter. A small grain binder or corn binder should be used and the sheaves put into small shocks. After the shocks are thoroughly dry the crop may be threshed from the shock or it may be stacked for later threshing. Shocks should be protected with covers; otherwise the threshed seed will seldom have the bright color of high quality seed. Standing cropsmay sometimes be combined with fair success. The green threshed material should be cleaned of trash as soon as possible and the seed handled in such a way as to prevent heating.

Sudan grass seed crops should be planted 60 to 80 rods from sorghum to prevent crossing. Also, there should be no volunteer sorghum plants and no Johnson grass in Sudan grass seed fields.

Lexington, Kentucky
June 1955

(This publication supersedes A. Mim. 226)

3M-6-55
2M-11-55

Sudan Grass

E. N. Fergus and
Robert C. Buckner

Sudan grass is a warm-season annual grass that grows usually to a height of 5 to 6 feet. It has leafy, solid stems usually 1/8 to 1/4 inch in diameter. Sudan grass is closely related to sorghum and Johnson grass. It and Johnson grass are similar in appearance, but Johnson grass has large underground stems and is winter hardy in Kentucky, whereas sudan grass has no underground stems and is killed by heavy frost.

Sudan grass is drouth-resistant, palatable, nutritious, and produces large yields of hay and pasture, even on moderately productive soil. For these reasons it is an excellent supplemental and emergency crop for general summer use in Kentucky. It is much more useful, of course, during drouthy years than during seasons of normal rainfall, but there are few livestock farms in Kentucky that cannot use at least a small area of Sudan grass during practically every summer.

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Cooperative Extension Work in Agriculture and Home Economics
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
UNIVERSITY OF KENTUCKY
and the
U.S. DEPARTMENT OF AGRICULTURE, Cooperating
FRANK J. WELCH, Director
Issued in furtherance of the Acts of May 8 and June 30, 1914.

Sudan grass should be seeded 2 weeks after corn planting time or later. The proper time for seeding may be determined largely by the time at which the crop may be desired. Crops seeded in highly productive or well fertilized soil will be ready for pasturing in 4 to 6 weeks and may be cut for hay or silage in 8 to 12 weeks.

Unless the soil to be seeded to sudan grass is highly productive, it should be fertilized with 400 to 500 pounds per acre of 10-10-10 or other high nitrogen complete fertilizer. It is also advisable to follow Sudan grass with liberal applications of a complete fertilizer at the time of sowing the subsequent crop.

Seeding rates for Sudan grass are 3 to 5 pounds per acre when sown in wide rows and 20 to 40 pounds when broadcast or sown with a grain drill. A wheat drill set to sow 2 packs of wheat per acre will sow from 20 to 25 pounds of seed, a satisfactory amount for most solid seedings.

Tift and Piper varieties are recommended for sowing in Kentucky. Both are high yielding and resistant to leaf diseases. Piper is said to have a low prussic acid content.

Apparently prussic acid is rarely found in Sudan grass in Kentucky, at least in sufficient amounts to be dangerous to stock. Nevertheless, the poison may develop in crops grown under unfavorable conditions of weather or soil productivity. Therefore, the crop should be fertilized, if necessary, and it should not be pastured if it becomes stunted or frosted. In general, pasture crops only after they are at least 15 inches tall.

To get the most from Sudan grass pasture, two areas of it should be grazed alternately. In this way, one area is allowed to make new growth while the other is pastured. However, the grass is highly productive even when pastured continuously. Two or three head of cattle can be grazed per acre.

Sudan grass for hay should be cut when the heads begin to appear. It may be cured wholly in the swath, but hay of better color is obtained if it is wilted in the swath, then raked into the window to complete curing. Sudan grass cures more slowly than other grasses because of its solid stems, and it may seem ready for the barn or stack before the stems are sufficiently cured to store safely. Yields of hay vary from 1 1/2 to more than 3 tons per acre.

Growing Sudan Grass Seed

For a seed crop, Sudan grass should be drilled in rows spaced at from 7 to 24 inches. About 25 pounds should be sown per acre when seeding in 7-inch rows and 8 pounds in 24-inch rows. If possible the seeding should be done before June 1 so that the first growth can be removed early and the second harvested for seed. If the crop is managed in this way there will be less stem growth to handle when saving the seed than if the first crop is cut for seed.

5. Apply the fixative. The fixative material usually recommended is a mixture of two solutions—Solution A consists of vinylite resin dissolved in acetone; Solution B consists of vinylite resin dissolved in methyl isobulyl ketone. A half-and-half mixture is good for general use, or either may be used alone. The acetone solution evaporates more quickly, resulting in less penetration in very compact samples, but it sets more quickly—an advantage when working with loose, porous samples such as those high in sand. The ketone solution will penetrate further owing to slower drying properties. Therefore, a common practice is to use more of Solution A with sandy soils and more of Solution B with higher clay content. If the soil is damp the acetone may be drawn out of Solution A by the water before the solution has entirely penetrated the sample, leaving resin material as a translucent film on the surface. Another disadvantage of treating moist samples is that later drying may cause cracking or separation of the individual sample blocks. If the soil is already set by the plastic very little can be done about it, unless a little additional soil material from the right depths has been saved to add. Fixation after drying is well along will soften the soil material enough for a short time to permit a limited amount of "working together" of the soil material. Fixative material should be applied plentifully and fast enough to keep the soil thoroughly wet as long as it will penetrate. One good way is to submerge the soil in the solution. Spraying does not produce very deep penetration, ordinarily. If more fixative is added after the first application has dried, it will be left as a shiny deposit on the surface.
6. Mount the profile samples in a display board as shown in Fig. 8. In this way comparison can easily be made between different soils.

EQUIPMENT AND MATERIALS

The materials used in the collection of miniature soil monoliths are listed below.

1. *Sampling Cutters*—These may be made from about 14 to 18-gage metal. They should be about 1¾″ deep. Mr. Arneman, who developed this method, recommends five cutters in sizes 2″ x 3″, 2″ x 1½″, 2″ x ¾″, 2″ x ½″, and 2″ x ¼″. The experience of others indicates that a set of three, in sizes of 2″ x 2″, 2″ x 1″ and 2″ x ½″ are reasonably satisfactory for sampling Kentucky soils. The details of construction are shown in Figs. 1 and 2.
2. *Sample Trays*—These may be constructed of any kind of thin material such as plywood, masonite, or sides of fruit boxes. The inside size is 2″ x 12″, with a depth of ⅜ to ¾″, depending on whether the surface of the soil sample is to be made flush with the sides of the tray.

USING MINIATURE SOIL MONOLITHS

HOW TO INTERPRET THE INFORMATION

Miniature soil monoliths can be collected by anyone using the method outlined above. However, to make maximum use of them a clear understanding of the factors responsible for soil profile formation is essential. The characteristics shown in a soil profile are the result of climate, native vegetation, and relief acting on the parent or underlying material over a period of time.

Keeping these factors in mind, some of the differences in the soil that are reflected in the soil profile are: (1) differences between a wooded soil and a prairie soil developed from the same kind of parent material on similar slopes, (2) differences in soils formed from different parent materials under the same native vegetation, (3) differences in soils formed in different climatic zones of the United States, and (4) differences in soils from the same kind of parent material brought about by differences in slope.

WHO CAN USE SOIL MONOLITHS?

The use of soil monoliths is not limited to soil classification alone. Many agricultural workers find them useful as a visual aid in studying soils. County agricultural agents may use them to demonstrate various soil properties such as drainage, structure, color, and surface soil depth to farmer groups and 4-H club members preparing for land judging contests.

Soil conservationists find soil monoliths useful when discussing with neighborhood farm groups those soil properties which must be considered in working out a sound conservation program on the farm. Soil extension specialists find these samples very helpful when discussing at group meetings the use and management of soils of a certain area of the state.

Agriculture instructors in high schools and in veterans' training programs benefit by having samples such as these on display in their classrooms for use in teaching soils to their students. College instructors in soils also find these monoliths very useful in classroom and laboratory instruction.

Lexington, Kentucky June 1955
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MINIATURE SOIL MONOLITHS

- HOW TO MAKE THEM
- HOW TO USE THEM

An adaptation by Lyle Leonard of Folder S-34, "Miniature Soil Monoliths," by H. F. Arneman, published by the University of Minnesota Agricultural Extension Service.

LEAFLET 155

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics ● Extension Service
FRANK J. WELCH, Dean and Director

Miniature Soil Monoliths

Many kinds of soils exist in the world, and most of them can be characterized by a typical soil profile. A soil profile is a cross section of the soil from the surface down to a depth of several feet.

Most soil profiles are made up of several layers called soil horizons. The properties of each of these horizons are studied in detail when a soil profile is examined in the field. The kind of profile and the number and depth of horizons can be related to the landscape and often to the type of agriculture in an area. Thus a study of soil profiles can lead to a better understanding of the soil itself.

For this reason it is helpful to have some way of representing a soil with a profile of natural appearance so it can be studied and observed away from the field. To do this, shallow strip samples of soil profiles a few inches wide and 4 feet deep, called soil monoliths, have been used and have proven to be an excellent method of displaying the soil away from the field.

The greatest objection to this method of sampling a soil is that the monoliths are bulky, cumbersome, and expensive. In order to overcome these objections a method has been simplified by taking the soil monoliths in miniature.

MAKING MINIATURE MONOLITHS

In general, a miniature soil monolith is made by taking representative samples of soil proportional in depth to the layers under study. These samples are mounted in a container in the order they occur in the soil. The details of the method are as follows:

SAMPLING THE SOIL

1. Select a site representative of a soil type.
2. Expose the soil profile by "dressing back" a road cut or by digging a pit to expose a fresh vertical cut from the surface to a depth of 4 feet.

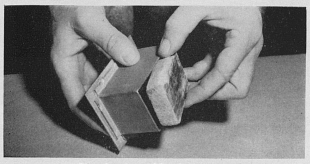

Fig. 1. Assemble the cutter.

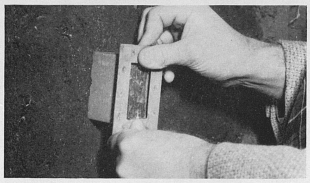

Fig. 2. Force the cutter into soil layer.

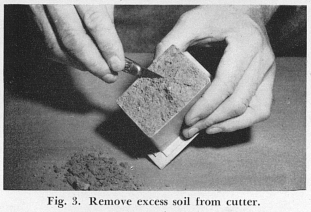

Fig. 3. Remove excess soil from cutter.



Fig. 4. Pour adhesive into sample tray.

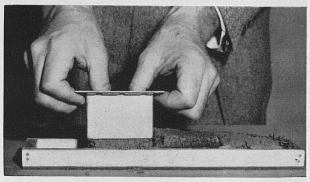

Fig. 5. Carefully force sample into tray.

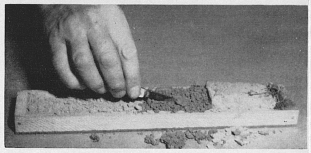

Fig. 6. Remove excess soil; make surface flush.

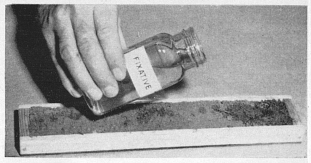

Fig. 7. Apply fixative.

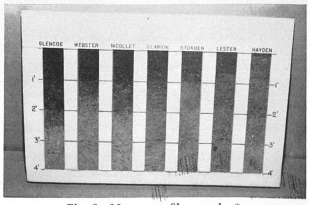

Fig. 8. Mount profile samples.*

* The soils shown here are found in Minnesota.

3. Mark off the profile into layers from which samples are to be taken.
4. Choose a cutter or combination of cutters having a length one-fourth that of the layer to be sampled. Quite often a better blend can be made by taking a sample from a layer with two cutters, one from toward the top of the layer and the other toward the bottom. Take the layers in order from either top or bottom. Assemble the sampler as shown in Fig. 1, with the plunger fitted in the metal cutter.
5. Force the cutter into the smooth surface of the cut at the point where the appearance indicates the most representative sample of the layer can be obtained (Fig. 2). At times it is necessary to use a hammer or mallet.
6. After the sampler is full of soil, remove it. It is usually helpful to loosen the soil around it and beyond it somewhat with a screwdriver or narrow trowel. Surplus soil can be broken away or removed with the help of a knife (Fig. 3).

ASSEMBLING AND MOUNTING THE SAMPLES

1. Pour undiluted nitrate wing dope, or other liquid adhesive, into a soil sample tray to a depth of about $\frac{1}{8}$ inch (Fig. 4).
2. Force the sample carefully from the sampler into the tray by applying pressure to the back side of the plunger (Fig. 5). Take great care not to mutilate the sample.
3. Carry out the same procedure for each layer to be sampled for the entire 4-foot depth of the soil profile. A 4-foot depth of soil now has been condensed to a 1-foot monolith with all layers represented. Samples should be placed in very tight contact, for they will shrink depending on clay content.
4. Use a knife blade to pick off carefully the excess soil extending above the sample tray until the soil surface is approximately flush with the side of the tray (Fig. 6). Take great care in "dressing down" the sample so that the original soil structure of the profile is preserved. If the transition between the layers appears to be too abrupt, blend it in now. For some types of exhibit it may be more desirable to leave the soil surface above the side at the tray.

Doubtless the best way to harvest ryegrass seed crops to prevent heavy loss from shattering is to cut them with a binder when the seed is in the late dough stage. The sheaves should be shocked at once in small shocks. Threshing should be done as soon as the material is dry because shattering in the shock is likely to be serious.

Combined seed should be taken at once to a floor where the sacks can be emptied and the seed dried out thoroughly in a few days' time. To prevent heating it will likely be necessary to turn the seed several times.

Lexington, Kentucky
July, 1955

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RYEGRASS

by E. N. Fergus

Two kinds of ryegrass are grown in the United States. One kind, perennial ryegrass, is a short-lived perennial where it is well adapted, but it usually does not maintain good stands in Kentucky more than 2 or 3 years. It is used little if any in Kentucky and perhaps would be of little value as a crop in this state. However, it is an important pasture grass in northern Europe, and there is evidence that it may be useful in the cooler parts of the United States. The second ryegrass is Italian, which has been grown considerably at times in Kentucky and may be quite useful for special situations.

Italian ryegrass, commonly called ryegrass or sometimes domestic ryegrass, is a cool season annual bunch grass that grows to a height usually of 2 to 2 1/2 feet. It is a vigorous-growing leafy plant and, therefore, is especially useful for emergency pasture, cover crop and temporary lawn and other turf seeding. Ryegrass seed germinates quickly if soil moisture is adequate. Consequently, seedlings of this plant gererally produce a heavy growth in 2 to 4 weeks after seeding.

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Ryegrass may be sown in August, September and March in Kentucky, but the summer and early fall seedings are the more useful because fall and spring weather in Kentucky is more favorable than summer weather for its growth. Ryegrass has been seeded successfully in corn at the last cultivation, but it is doubtful that the soil moisture is usually sufficient for a majority of such seedings to be successful.

Seeding rates for ryegrass vary from 10 to 25 pounds per acre. The lighter rates are used where other crops, especially longer lived grasses and legumes, are sown with it. The heavier rates are for pastures on wet land or pastures that will be used during winter, and for cover crop on steep slopes. Ryegrass and crimson clover seed sown at rates of 10 pounds each per acre, produce excellent pasture for later spring and early summer.

Ryegrass is useful for seeding in many situations. Consequently, it is seeded in a number of ways. Much is sown on specially prepared seedbeds. These seedings may be broadcast and the seed covered by harrowing or disking. Sowing with a drill or cultipacker seeder will usually be better if the soil is dry enough for using these tools. Ryegrass is also useful for seeding in lespedeza stubble for fall to spring pasture and in thin permanent pastures for increasing the grazing temporarily. These seedings are best made with a pasture renovator, though the disk drill will usually do a reasonably good job of seeding. If the land is hard disking may be necessary before seeding.

Though ryegrass is grown on soil of medium productivity, it will pay to use a complete fertilizer on crops sown on all but highly productive soil. Nitrogen is especially important. Perhaps 200 to 300 pounds of 10-10-10 fertilizer would be satisfactory, but the county agricultural agent should be consulted if in doubt.

Ryegrass pastures are palatable and nutritious. The crop is also useful for hay and silage. For these purposes the crop should be cut when the seed is in the early dough stage of development. Hay yields are usually about 2 tons per acre.

Once land has been seeded to ryegrass, the grass will volunteer indefinitely as scattered plants. These plants are not objectionable, however, except in seed drops of Kentucky 31 fescue and orchard grass. Consequently, ryegrass should not be sown on land on which seed crops of these two grasses are to be grown later.

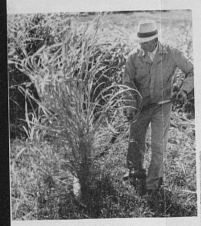
Harvesting Ryegrass Seed

Ryegrass seed yields will average about 400 pounds per acre in Kentucky. Somewhat over 1,000 pounds per acre have been obtained.

Ryegrass seed shatters very easily; therefore, much care should be taken to harvest it at a proper stage of ripening. It may be necessary to let the first ripened heads shatter while the major portion of the crop matures.

How to Kill It in Small Patches (cont'd)

ounces to the hundred square feet in the amount of water necessary for uniform coverage of the soil. A hand sprayer or a sprinkling can may be used to apply the solution. Good results are dependent on favorable moisture conditions to move the chemical into the soil where it can reach the Johnson grass rootstocks. It sterilizes the soil against plant growth for 90 days or longer. Usually retreatment of the spots later is necessary to destroy plants which were not destroyed by the first treatment and to kill plants coming from seed.



In small patches, first cut and remove the plants . . .



. . . then apply a soil-sterilizing chemical as a powder.



. . . or apply the chemical as a spray to kill the rootstocks.

HOW TO CONTROL IT IN LARGE AREAS

● To control Johnson grass in large areas or solidly infested fields, cultural methods are more practical than the use of chemicals. One good method is to remove the Johnson grass for hay in July when the first flowerheads appear, then plow the stubble and clean-cultivate every 2 weeks until late September when a small grain crop such as barley can be planted for combine harvesting the next summer.



In large areas, cut Johnson grass for hay when the first flowerheads appear . . .



. . . then plow and clean cultivate the area through one or more summers.

As soon as the small grain has been harvested plow the stubble and clean-cultivate the land as was dane the previous summer; then seed small grain again as winter pasture or for harvest. During two years of clean summer fallow practically all of the rootstocks and much of the live Johnson grass seed in the soil can be destroyed provided wet summers do not occur. It is difficult to kill Johnson grass by cultivation in wet seasons. Clean-cultivation during summer as described, for one year instead of two, sometimes will control Johnson grass so that cultivated crops may be grown on the land for one or more years before the treatment needs to be repeated.

On heavily infested overflow bottoms where fresh Johnson grass seed is frequently brought in by floodwater, eradication of the weed is so difficult that control instead of eradication often is a more practical approach.

JOHNSON GRASS HAS FORAGE VALUE

● The grass should not be sown for pasture or hay as it is a noxious weed. However, fields that are heavily infested may be pastured to advantage, or the grass may be used for hay or silage. Cattle or sheep should not be grazed on Johnson grass before it is 24 inches tall or after unfavorable growing conditions such as after drouth, cold weather or frost. Early growth or stunted plants are more likely to cause prussic acid poisoning, as is true of sudan grass or other sorghums. If used for hay or silage, Johnson grass should be cut before the seed develops, to prevent scattering of seed in hay and to produce feed of better quality.

Lexington, Kentucky September, 1955
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One of Kentucky's worst weeds—Johnson grass

Controlling JOHNSON GRASS

By J. F. FREEMAN

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service
FRANK J. WELCH, Dean and Director

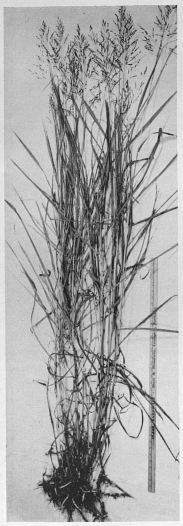
LEAFLET 157

Save Valuable Farm Land — FIGHT JOHNSON GRASS!

● Johnson grass, a perennial noxious weed in Kentucky, is becoming widely spread throughout the state. Thousands of acres of fertile bottom land are practically abandoned to this weed, and each year it is further encroaching on the upland soils. Heavily infested fields are practically worthless for the growing of row crops. Even where it is possible to eradicate the weed, the cost is from $50 to $75 an acre.

HOW TO RECOGNIZE IT

● Johnson grass is a sorghum which closely resembles sudan grass. The average height of mature plants is about 6 feet. The stems are about the size of a lead pencil, and the leaves are ½ to ¾ inch wide with a light green-colored midrib. The plant usually grows in bunches with several stems arising from each root crown. The seed heads formed at the top of the stems are branched and become reddish when nearing maturity. The seeds are oblong, about half the size of sorghum cane seed, and are red or dark brown. Established plants have large fleshy rootstocks, often as much as ½ inch in diameter, which live over winter. These rootstocks enable one to distinguish Johnson grass easily from Sudan grass.



Johnson grass resembles sudan grass. It usually grows in bunches, with several stems growing from each root crown. The weed spreads by the underground rootstocks as well as by seed. Several methods used to control the weed are described in this leaflet.



This corn field is so badly infested with Johnson grass that the crop is threatened.



Unless checked by mowing, Johnson grass frequently flourishes on road and ditch banks.

HOW TO AVOID SPREADING IT

● Often Johnson grass shows up first on a farm as a single plant or in small patches. Such small infestations can be destroyed readily by digging or spot-treating with chemicals, thus preventing the spread of the grass into nearby cultivated fields. The weed spreads by underground rootstocks as well as by seed.

The seed on established plants usually matures in July, but on plants starting from seed or from regrowth of clipped plants, the seed matures later in the summer. Plants should never be allowed to mature seed because birds, livestock, wind, and drainage waters can spread it to infest adjacent fields. Usually three close cuttings a year, each time as the plants put out flower heads, will prevent seed production. Cutting as described should be done on road and ditch banks, fence rows, and waste lands, as well as in fields and pastures until the grass can be destroyed.

To avoid spreading the rootstock pieces from infested spots in cultivated fields raise the breaking plow or cultivating tools while passing through such spots because new plants can start from the nodes or joints of any rootstocks that are moved and dropped in clean soil. Disk harrows can be used without much danger of spreading the rootstocks, but spike-tooth harrows and drags are likely to move the pieces and encourage a rapid spread. Crop seeds sown should be free from Johnson grass. Straw and hay from infested fields should not be brought to the farm or moved to clean fields. Combines and other farm machinery in which seeds might lodge should be cleaned before being moved from infested fields to clean fields.

HOW TO KILL IT IN SMALL PATCHES

● Dig out Johnson grass with a grubbing hoe or similar tool if only a few plants are starting, being certain to get all the rootstocks. For larger areas, cut and remove the plants, and treat the soil and stubble with soil-sterilizing chemicals. Chemical treatments are expensive, but they are practical and effective for controlling small infestations. Two chemicals which have been extensively used and proved satisfactory are sodium chlorate and TCA (sodium trichloroacetate.)

If sodium chlorate is used apply the dry material uniformly over the infested area at the rate of 1 pound to the hundred square feet. It can be spread broadcast by hand, sprinkled on from a fruit jar with small nail holes punched in the metal top or by use of other spreading devices. *Caution:* The use of sodium chlorate causes a fire hazard. The material should be stored in the original metal container, and the precautions mentioned on the label carefully observed and followed. It is safer and easier to use in the dry form than as a water spray or drench. Its use at the rate mentioned will prevent growth of all vegetation in the soil for one to two years.

If sodium TCA is used it must be applied in water as a spray or drench. Use at the rate of 4

from the front to the back of the border. The front, or lawn side, of the border is always arranged in a curved line with long, easy, graceful curves. The back is usually a fence which produces a more or less straight line.

Medium-sized trees, such as pin oak or maples, may be used; they may be placed at one end or in the center of the border. They should always be in the background. The smaller kinds of trees like dogwood and redbud may be used at the opposite ends or away from the larger trees. The shrubs are then arranged around and even under the trees, and good effects are secured.

By careful planning and grouping it will be possible to have a succession of bloom of different colors at successive times during the summer. Also, it is possible to select shrubs that have different kinds and colors of foliage which will add to the attractiveness of the planting.

It will not be necessary to remove all the sod when making the planting, but a hole should be dug for each plant. As the plants grow they will soon shade the ground enough to kill the sod.

The native shrubs found growing in many parts of Kentucky provide excellent material to mix in with the shrubs that will be bought.

Lexington, Kentucky
November, 1955

10M-11-55

HOW TO PLANT A SHRUB BORDER OR SCREEN PLANTING

By N. R. Elliott

Practically every farm home, as well as many in towns and cities, needs a planting that will screen some unattractive object or view, or perhaps provide privacy. The shrub border, when carefully planned, becomes one of the most satisfactory plantings for screen purposes. It can become very naturalistic, and if one uses plants with different kinds of foliage and color of bloom, the border will present an ever-changing scene that will be interesting at all times of the year.

The shrub border can be made up of medium- and small-sized trees and shrubs. Evergreens usually are considered too attractive to be hidden or partly hidden in the border, and when used they are placed just inside the border nearest the lawn. In this way they are close to the border but still retain their individuality. Native red cedars are an exception and may be placed toward the back of the border because they lose their lower branches as they grow older; in this position only the evergreen tops are seen.

LEAFLET 158

Cooperative Extension Work in Agriculture and Home Economics
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
UNIVERSITY OF KENTUCKY
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U.S. DEPARTMENT OF AGRICULTURE, Cooperating
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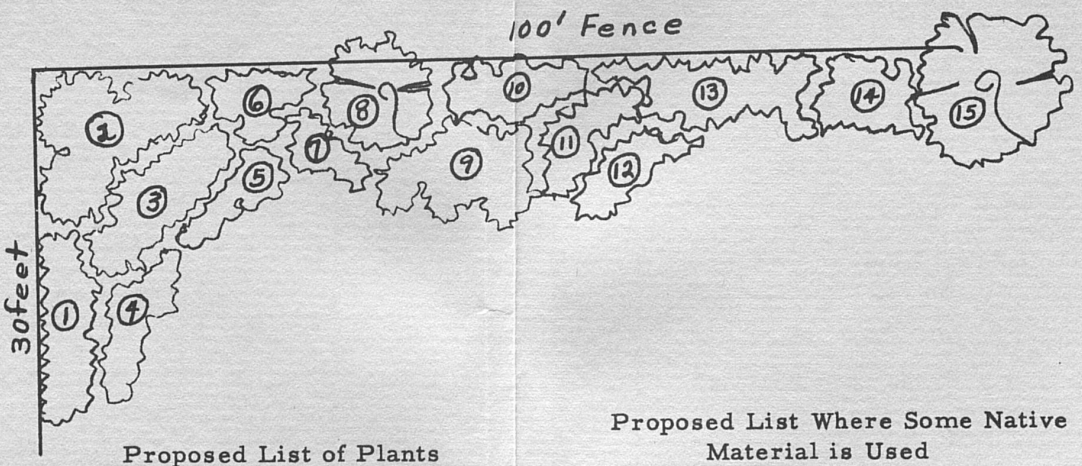

Proposed List of Plants

Group I.

		Plants
1.	Spirea Vanhouttei	4
2.	Mock Orange	3
3.	Red Barberry	5
4.	Anthony Waterer Spirea	6
5.	Deutzia Gracilis	6
	Slender Deutzia	6
6.	Althea, same color	3
7.	Euonymus patens	4
8.	Redbud or dogwood tree	1
9.	Spirea arguta, narrow-leaf spirea	6
10.	Pride of Rochester Deutzia	3
11.	Butterfly bush	3
12.	Japanese Barberry	3
13.	Drooping Forsythia	4
14.	Five-leaf Aralia	5
15.	Maple tree	1

The above sketch shows how a shrub border 100 feet long on one side and 30 feet on the other might be laid out. This is just a suggestion; many other combinations might be worked that would be just as good or better looking.

Proposed List Where Some Native Material is Used

Group II.

		Plants
1.	Spirea Vanhouttei	4
2.	Sumac (clumps)	5
3.	Wild currant	4
4.	Buckbush)	30
5.	")	
6.	Witchhazel or Deciduous Holly	4
7.	Wild Hydrangea	5
8.	Redbud or dogwood tree	1
9.	Spirea arguta	6
10.	Pride of Rochester Deutzia	3
11.	Wahoo	3
12.	Japanese Barberry	4
13.	Elderberry	6
14.	Spicewood	7
15.	Maple tree	1

Shrubs should always be placed in groups of three or more of a kind. This grouping gives a good effect and makes for a more natural appearance. The taller-growing kinds should be in the back of the border, the medium-sized ones in front of them, and the small ones in front of the medium. By this arrangement there is a gradual increase in height

usually balanced, having the same number of the same kind of plants on either side of the entrance.

Quite often there are banks on either side of the entrance driveway. These banks present a problem. If they are too steep to maintain a good sod of grass on them, use such ground covers as Vinca minor or the creeping roses, Max Graf, which blooms pink in June and July, or Wichuriana, which blooms white in June, with red fruits in the fall. Either the Vinca minor or trailing roses will be good to cover these bare banks. It will not be necessary to mow either one of them. Neither of these plants will spread and cause any trouble like the honeysuckle vine.

5. MAILBOX

Every farm entrance should have the mailbox set on a good post. Both the post and mailbox should be painted white, and the name of the farm owner should be painted in black letters on both sides of the mailbox.

Attention to these five things will mean much toward the improvement of the entrance drive to the farms of Kentucky.

Lexington, Kentucky September, 1955

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2M—9-55

FARM ENTRANCES

By N. R. ELLIOTT

Since the entrance to the farm drive represents, in a way, the front door of the farm, it should be made as attractive and inviting as possible. Practically all farm entrances have possibilities for improvement, and in most instances the improvements can be made at a minimum cost. At least the cost will be small in comparison to the advantages gained. The best looking farm entrance is the one that is comparatively simple in design and plan, yet which shows evidence of having been carefully planned.

THINGS TO CONSIDER

There are really only five things to consider in planning a good looking farm entrance:

1. GRADE

The grade or slope, connecting the farm drive with the main road or highway should be as nearly level as possible. The less slope there is the easier it is to stop and start cars entering and leaving the farm. It will be better to grade the road down to where it will be almost level, even if that means having banks or slopes on each side.

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FRANK J. WELCH, Dean and Director

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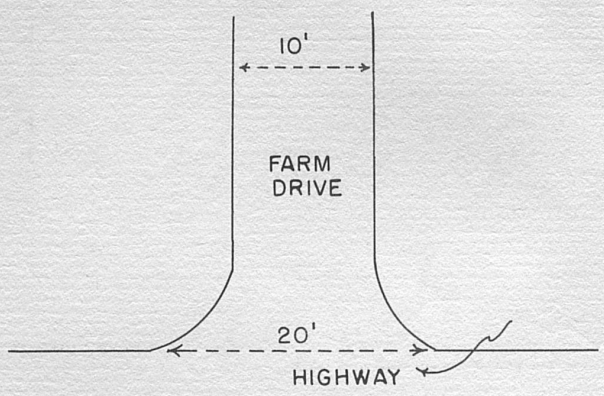
2. ENTRANCE CURVE

The entrance curve on either side should be sufficiently wide to enable cars to enter or leave from either direction without being forced to make a short turn. This will mean that if the farm drive is 10 feet wide, the entrance curves that join the main road should be at least 20 feet wide. (See sketch.)

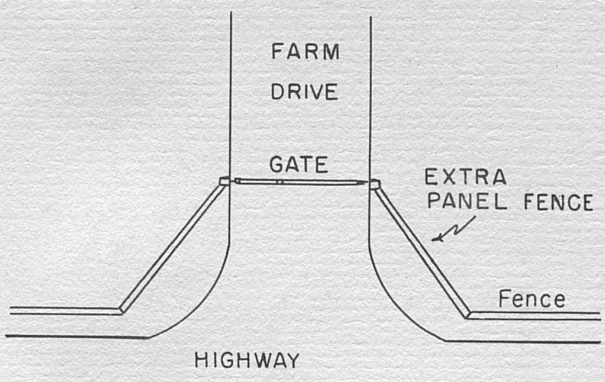


3. GATE

Naturally, the gate is one of the most important parts of the farm entrance and the type used will very largely depend on individual conditions. The regular farm gate that is well made, painted white and hung on two good, strong posts is the one that will most often be used. The pit gate is the newer type and enables one to enter or leave the farm without having to stop to open or close the gate. Plans for the pit gate may be secured from the Department of Agricultural Engineering, Experiment Station, Lexington, at a cost of 10 cents. If it is necessary for farm teams to use the main entrance gate, the pit gate must have bridging.

If the regular type of gate that swings from a post is used it should be located so that cars

turning in off the main highway will clear the road before they are stopped to open the gate. This may require building an extra panel of fence on either side of the entrance, but it means much from the standpoint of safety. (See sketch.)



Columns made of stone, brick or concrete are often used at entrances and they are all right when they are well proportioned and not too conspicuous. Well constructed columns can serve as extra good gate posts for supporting the gate.

4. PLANTINGS

The plantings at the entrance should be appropriate but not overdone. For example, medium-sized trees such as Pin Oak, Sugar Maple, or Yellowwood, may be planted at least 30 feet apart on either side of the entrance drive. Some entrances may have a large tree, such as the elm, black walnut, or sweetgum, growing on one side of the entrance driveway. A planting of a group of small trees such as dogwood, redbud, red haw and black haw, might be used in a group on the opposite side to partially balance the large tree. Evergreens make appropriate entrance plantings. They are

insecticide mixture, or he may use the proper amount of fertilizer without added insecticide and apply the insecticide separately. This may be done as a spray or dry application used at the same rates per acre as used in the fertilizer-insecticide mixtures given above (10 lb chlordane-5 lb aldrin-5 lb heptachlor).

The best method to apply the insecticide separately is probably with a spray boom, using the emulsion concentrate form of the insecticide. The granular form may be easily applied with a fertilizer spreader. For small fields or where the foregoing equipment is not available, hand sprayers, dusters and small fertilizer spreaders may be used. Care must be taken to assure an even coverage.

All of these materials are best applied after plowing and are disked in. *Directions for use of insecticide—and fertilizer—containing insecticide should be followed closely.*

Fall Nitrating

Frequently strawberries may benefit from fall applications of a nitrogen fertilizer. Several studies show that where moisture and temperature are not limiting factors, the number of flower clusters and flowers and the size of berries are dependent on the nutritional conditions within the plant the preceding fall and winter and are virtually independent of soil fertility during the spring and at time of fruiting.

It has been shown that the size of fruit is determined by the number of pistils per flower, which in turn depends on the nutritive condition during fruit bud formation in the fall. Other investigators have found that nitrogen-starved plants will set as many flowers per plant as those having adequate nitrogen, if a nitrogen application is made at least 3 weeks before fruit bud formation.

Still others have found that nitrogen applications in the fall had little effect on yield. The reports are conflicting because of the wide differences prevailing in different soils and the response by different varieties. Some soils have adequate nitrogen and others do not. Therefore, it is impossible to make a general recommendation. Strawberry plants that are small with

light yellowish green foliage and show a reddening of the leaves and petioles are likely to be deficient in nitrogen. Consequently, an application of from about 150 to 200 pounds of ammonium nitrate or its equivalent in other nitrogen fertilizer should be made August 15-September 1, which is about 3 weeks before fruit bud formation.

The fertilizer should be applied when the plants are dry and should be brushed off the foliage immediately. Otherwise, a serious burn will result.

Do not apply nitrogen in the spring of the fruiting year. To do so, will seriously cut yields.

Late Winter Fertilizing

Many growers in areas where the available phosphorous and potassium are low, or even medium, have had excellent results from the application of 600 to 1000 pounds of 0-20-20 or its equivalent per acre. The material should be broadcast over the rows in February or March of the fruiting year. The fertilizer should be brushed from the foliage immediately.

Fertilizers at Rejuvenation Time

Nitrogen is needed at this time to stimulate new growth and to aid in decomposing mulching materials and leaves. Some growers use as much as 50 to 60 pounds of nitrogen per acre at this time. Use 150 to 200 pounds of ammonium nitrate or its equivalent. If phosphorous and potash are needed, a complete fertilizer should be used instead. About 500 pounds of 10-10-10 or 12-12-12 should be used, since considerable nitrogen is needed at this time. If a late winter application of phosphorous and potash was made use only the nitrogen fertilizer.

College of Agriculture and Home Economics, University of Kentucky, and the United States Department of Agriculture, cooperating. Frank J. Welch, Director. Issued in furtherance of the Acts of May 8 and June 30, 1914.

10M—1-56

LEAFLET 160

FERTILIZERS for STRAWBERRIES

By C. E. CHAPLIN

Green Manure Crops

Before strawberries are planted, an excellent practice is to plow under a green manure crop on the site. Such a crop adds nutrients and organic matter, which greatly improve the structure and water-holding capacity of the soil.

Research shows that the type of green manure crop used before strawberries are grown has a marked effect on the vigor of the plants and whether they will have root rot. In experiments various types of green manure crops were incorporated into the soil, and the soil of one plot was sterilized by steam before the strawberries were planted. Steam sterilization caused the strawberry plants on that plot to have the healthiest roots. Soybeans plowed under were ascribed to have had the next best effect on strawberry roots and were by far the best green manure crop used. The other treatments, in order of decreasing vigor of plant

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service
FRANK J. WELCH, Dean and Director

and incidence of root rot, were: barnyard manure, corn, red clover, timothy and untreated soil.

The microbiological population, which includes fungi, nematodes and bacteria, is changed by the type of green manure used. Such crops as soybeans, which undergo a carbohydrate breakdown, shift the microbiological population in a way that is favorable for strawberry growth, while crops such as red clover, which undergo a putrefactive breakdown, do not have as much beneficial effect.

Soils with a high organic matter content require less commercial fertilizer. They certainly do not respond so much as soils lower in organic matter.

Organic Plus Inorganic Fertilizers

Usually the best results are obtained with a combination of barnyard manure and green manures plus inorganic fertilizers. Ten tons of barnyard manure will furnish plant nutrients equivalent to approximately 1,000 pounds of 10-5-10 fertilizer. Since manure is low in phosphorous, a fertilizer high in this element should be applied. One such as 4-12-8 may be used. If the test indicates that the soil is high in potassium, only phosphate need be added.

Recommendations for Fertilizer to be Applied Before Strawberries Are Planted, Based on Soil Tests

Soil Test*		Pounds of Fertilizer to be Applied				
P	K	5-10-10**	4-12-8**	5-10-15**	20% Superphosphate	Muriate of Potash
VL	VL	1400				
VL	L		1400			
VL	M		1300			
VL	H		1200			
VL	VH				800***	
L	VL			1200		
L	L	1200				
L	M		1100			
L	H		1000			
L	VH				600***	
M	VL			1000		
M	L			900		
M	M	1000				
M	H	900				
M	VH				500***	
H	VL			1000		
H	L			800		
H	M	900				
H	H	800				
H	VH				400***	
VH	VL					250***
VH	L					200***
VH	M					150***
VH	H					125***
VH	VH					

* KEY TO SOIL TESTS:
VL — Very low
L — Low
M — Medium
VH — Very high
H — High

** Use suggested grades or their equivalent in higher analysis grades.

*** Use 50 pounds of nitrogen, such as 150 pounds of ammonium nitrate or its equivalent in other forms.

Commercial Fertilizers

It is recommended that soil tests be made and fertilizers added according to Table 1.

If the soil is low in phosphorous but only medium in potash, 4-12-8 may be used. If the soil is low in potash and medium in phosphorous, a fertilizer such as 5-10-15 may be used. If phosphorous and potassium are both lacking, use 5-10-10 or 6-12-12. Where soil tests are not made, use 800 to 1400 pounds of 5-10-10 or 700 to 1200 pounds of 6-12-12 or its equivalent. The lower rate may be used on soil known to be in a high state of fertility and greater amounts on soils of lesser fertility.

Soil Insecticides in Fertilizer*

Soil insecticides (chlordane, aldrin or heptachlor) should be used on all soils known to be infested with grubs or wireworms. It is recommended that soil insecticides be used on all fields that have not been treated for 3 years.

Some fertilizer plants mix soil insecticides with fertilizers. Enough insecticide is added to each 1,000 pounds to treat one acre. Where chlordane is used, it is mixed at the rate of 1-percent by weight of actual insecticide or 10 pounds of actual chlordane per 1,000 pounds of fertilizer. Aldrin and heptachlor are mixed at ½ of 1 percent, or 5 pounds of the actual insecticide per 1,000 pounds of fertilizer. If the soil test indicates that more nutrients are needed, fertilizer without the insecticide may be added. If less is indicated, the grower may do one of two things—he may go ahead and apply the full 1,000 pounds of fertilizer-

* The recommendations for the use of soil insecticides were prepared by Dr. J. G. Rodriguez.

What's the Outlook

For KENTUCKY AGRICULTURE IN 1956?

By the Department of Agricultural Economics

LEAFLET 161

Cooperative Extension Work in Agriculture and Home Economics
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
UNIVERSITY OF KENTUCKY
and the
U.S. DEPARTMENT OF AGRICULTURE, Cooperating
FRANK J. WELCH, Director
Issued in furtherance of the Acts of May 8 and June 30, 1914.

FOREWORD

The outlook for Kentucky agriculture for 1956 cannot be viewed with a great amount of optimism; present indications are that the cost-price squeeze will continue. However, Kentucky farmers must not adopt a "wait and see" attitude. The efficient farm manager will appraise his farm operation in light of all available outlook information and make adjustments that are likely to maintain or increase his net farm income. These adjustments may be in the form of expanding profitable enterprises while cutting back less profitable ones or starting new enterprises, but above all he should use the farm's available resources (land, labor, and capital) in the most profitable manner.

In view of the above, the Agricultural Economics Department has prepared this outlook material to assist farmers in making their managerial decisions for the year of 1956.

The Agricultural Extension Service will supplement this Outlook report with other timely information reports to the press and radio and through the monthly market newsletter entitled, "Notes on the Kentucky Agricultural Situation," which is available upon request.

FRANK J. WELCH
Dean and Director

OUTLOOK SUMMARY

Domestic demand for farm products in 1956 will increase slightly over the levels attained in 1955. The levels of general economic activity, consumer income, and consumer spending are all expected to rise about 3 percent above the records of 1955.

Exports of farm products may increase slightly in 1956.

Farm production costs will be slightly higher this year.

Farm income will be slightly below that of the past year as the cost-price squeeze will continue to increase in 1956.

Cattle marketings in 1956 will continue large, or at slightly below the 1955 rate. Marketings of cows should decline slightly, while marketings of fed steers and heifers are expected to be as large. Prices of the better grades of fed steers are likely to average about the same for the year, slightly lower during the first part and higher later in the year. The price of cows and stockers and feeders may average slightly higher than in 1955.

Hog prices are expected to average lower during the winter and early spring months than during the corresponding period of 1955, but should recover during the latter part of the year. An average, or slightly better than average, hog-corn ratio is anticipated during most of the year, unless unfavorable crop conditions develop next summer.

Lamb prices should show some slight improvement by the spring of 1956, but will not reach as high a peak as in 1954. Fewer lambs are expected to be marketed during 1956, as numbers of breeding ewes on farms is expected to be lower than a year earlier. Strong competition from other meats is expected to offset, at least partially, the decline in marketings.

Wool prices in 1956 should average about the same as those paid producers in the spring of 1955.

Farm prices for milk and cream in 1956 will be about the same as in 1955. Demand is expected to continue strong. Although production may increase slightly, profits are expected to remain favorable, because of lower feed costs.

Prices paid for poultry and eggs probably will average lower in 1956 than in 1955. Egg production is expected to increase, and a further expansion of commercial broiler numbers is likely in some areas.

Smaller acreage allotments in 1956 have been announced for all Kentucky types of tobacco but later legislation may change this situation.[1] Present supplies are large and the exceptionally good quality of the 1955 crop of burley tobacco may not be repeated in 1956.

[1] Legislation restoring the acreage awaiting presidential action as this leaflet goes to press.

Prices of strawberries are expected to be lower this year. Production of strawberries should be approximately 19 percent over last year.

These predictions are based on the assumption that no major changes will occur in the national economy in 1956.

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Agricultural Outlook for 1956

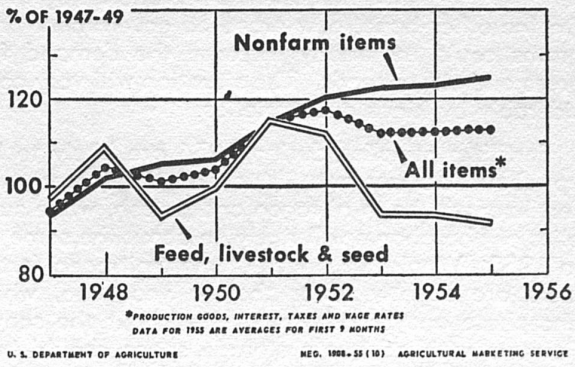
By the Department of Agricultural Economics

FARM PRODUCTION COSTS

The cash cost of farming is up and is expected to climb slightly higher in 1956. Farmers are now spending about four times as much each year for non-farm goods and services as they spent during 1935-39. Price increases account for about half of these additional expenses. As cash costs increase, it becomes all the more important for farmers to improve their management ability. Because of the more rapid turnover of capital, it is easier for a farmer to get into financial difficulty than was true a few years ago. The trend of increase in farm cash costs is likely to continue.

Prices of farm-produced cost items are down, while most nonfarm items are up. This is shown on the following chart:

Prices of Farm-Produced Cost Items Down—Most Others Up



Prices paid by farmers for feed, livestock, and seed now average lower than in 1949. Prices of nonfarm items, such as machinery, motor supplies and fertilizer now average some 15 percent above the 1949 level. This spread between nonfarm items and farm-produced items will continue in 1956 and likely will widen in future years.

Farm wage rates in 1956 will equal or may be a little higher than in 1955. In certain areas of Kentucky, farmers face keen competition for farm labor because of nonfarm employment opportunities at higher wages.

Machinery prices will likely rise some in 1956, as compared with 1955, because of higher labor costs and higher prices for materials. There may be less used or rebuilt machinery available in 1956 than in 1955, but some will be available at attractive prices. There will also be concessions from the list price, and high allowances for trade-ins will likely be continued. The use of labor-saving machinery and equipment on Kentucky farms has increased rapidly during the past 10 years. A large part of these purchases was made for the purpose of replacing farm labor and work animals, in order to maintain or increase farm production.



Seed prices in the first half of 1956 are likely to average somewhat lower than in 1955, if no material expansion is made in conservation programs. On the other hand, new proposed government programs could materially increase the demand for grass and clover seeds. The situation will vary considerably by kinds and varieties.

Fertilizer supplies during 1956 are likely to be up about 2.5 percent. Much of the increase in fertilizer will be in nitrogen and potash, while supplies of phosphorus will likely be about the same as in 1955. Wholesale prices of most nitrogen fertilizers are slightly lower than a year ago, while phosphate and potash prices are about the same. Farmers with adequate storage space should buy fertilizer early to take advantage of the better selection of the kinds that are needed.

Building and fencing materials, especially those made of steel, are expected to average slightly higher this year.

Prices of farm supplies, such as baler twine, wire and containers, are expected to average about the same in 1956 as in 1955.

Average prices for pesticides will be about the same as in 1955. Prices of some pesticides, such as nicotine sulfate and copper sulfate, may be higher than a year ago, while some insecticides may be lower.

Interest rates in 1956, for both chattel and real estate loans, will be near the 1955 level.

FEED SITUATION

Feed grain prices may rise slightly more than seasonally from the low levels reached in late 1955. However, prices in 1956 will likely remain from 5 to 10 percent below their 1955 levels until there is some indication of the size of the new crop. The total supply going into the current feeding year was 11 percent more than last year, an all-time record both in total and per animal unit. The number of grain-consuming animal units is about 2 percent higher, but with a normal rate of feeding the carryover of feed grains into the next feeding year will increase still further.



Kentucky feed grain prices may not rise so much as nationally since production in 1955 was at high levels. Kentucky had a record corn yield, and the total corn production was 8 percent above average, with the total oat production being 94 percent above average. Both in Kentucky and nationally, the acreage planted to feed grains other than corn has been increasing as allotted acres for some other crops have been cut.

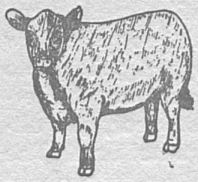
A seasonal rise in prices of protein feeds is expected; however, last year prices dropped in the latter part of the feeding season. Prices are expected to remain from 5 to 15 percent below the 1955 levels. The total supply is expected to be about 5 percent above the 1955 supply and the supply per animal unit about 3 percent higher. The increased supply of high-protein feeds is in large part due to the larger production of soybean meal from the record-breaking 1955 soybean crop.

Hay prices in the first half of 1956 will be considerably lower than in previous years and par-

ticularly so in Kentucky where production in 1955 was about 30 percent above that of 1954. Less than a seasonal rise in price is expected in most parts of the state. For the nation as a whole, a record crop of hay was produced from a record-breaking yield per acre. Including the carryover of hay, the total supply is the largest on record and the supply per roughage-consuming animal unit exceeds 1955 by about 5 percent.

BEEF CATTLE

A small reduction in slaughter along with undiminished consumer demand for meat would indicate a possible beginning of a cyclical upturn in cattle prices. Since indicated changes in the number of cattle to be marketed during 1956 are small, compared with 1955, prospective price changes should be rather limited. Steer slaughter during the coming year should be about the same as during 1955, but slaughter of both cows and heifers will probably show a small decrease.



Slaughter of cows under federal inspection in 1954 was 16 percent, and of heifers some 22 percent, larger than in 1953. Again in 1955, slaughter of both cows and heifers was up by about 10 percent over 1954. As a result, the size of breeding herds has probably leveled off. The calf crop in 1955 was not affected materially by the larger marketings of cows as the cows were not sold until after calving. In 1956, however, the decreased cow herd indicates a decrease in the calf crop.

Calf slaughter increases, along with cow and heifer slaughter, at the early stages of a typical down-swing of the cycle of cattle numbers. So far this has not occurred, and it is doubtful if calf slaughter in 1956 will be any larger, if as large as during 1955.

The strong demand for beef and adequate feed have given cattle feeding unusual support during the past couple of years. Strength on the cattle feeding side of the enterprise has resulted in an especially strong demand for young feeder stock. This situation is likely to continue during most of

1956, especially if feed crops turn out well during the year.

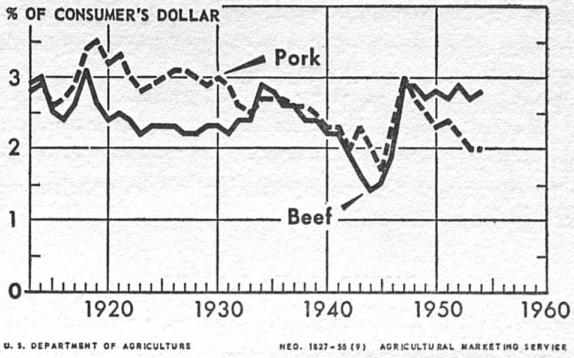
Prices of fed cattle will be slow to advance during the early part of 1956, since a large slaughter of those classes, as well as all cattle, is likely. Although some improvement in prices may come in the late winter, it is expected, however, that they will remain below prices of a year ago.

Strong demand for meat, rising supplies and declining prices of feed, coupled with the relatively higher prices of fed cattle than other classes have contributed to the record feeding operations the past three years and should keep them large throughout 1956.

Prices of stocker and feeder cattle are likely to average slightly higher in 1956 than during 1955. The strong demand for these cattle and the slightly strengthening prices of finished cattle in prospect, coupled with the possibility of a smaller calf crop, are factors indicating somewhat higher prices for stocker and feeder cattle during much of 1956.

With a decrease in marketings of cows and heifers, prices of these classes of slaughter stock may show some improvement during 1956. They have been depressed to a greater extent than prices of other classes during the past year. This will cause a narrowing in the spread between the better grades of fed cattle and prices of the lower grades.

Share of Income Spent for Beef Steady, Lower for Pork



U. S. DEPARTMENT OF AGRICULTURE NEG. 1827-55 (9) AGRICULTURAL MARKETING SERVICE

HOGS

Prices of hogs during the first half of 1956 are expected to remain near their present level, averaging below prices received during the first half of 1955. The last half of 1956, hog prices should average higher than prices for the corresponding period of 1955.



The 1955 fall pig crop, which will be marketed beginning in February, is 12 percent larger than the previous fall pig crop. This large supply of hogs, coupled with the increased number of fed cattle to be marketed during the spring, indicates that prices of hogs will be substantially below those received a year ago.

The December 1 report of farmers' intentions for spring farrowings (December 1, 1955-June 1, 1956) shows that Kentucky's spring pig crop will be up 12 percent while that of the country as a whole will be down 2 percent from the 1955 spring pig crop. Expected spring farrowings throughout the South are up primarily as a result of the large corn crop, with the South Central states including Kentucky showing 11 percent increase. Farrowings in the eastern Corn Belt will be about the same as last spring. Farmers in the western Corn Belt and western states have indicated their intentions of reduced spring farrowings.

Although prices during the last half of 1956 are expected to average higher than a year earlier, Kentucky farmers probably can expect their prices to be relatively lower than the normal spread between prices at the northern terminals and southern markets as a result of the indicated increase in the spring pig crop for the South.

Highest prices in 1956 can be expected to occur in late June as a result of the seasonal decline in farrowings during November and December which in turn, causes the seasonal decline in marketings during the summer.

SHEEP AND LAMBS

Indications are that lamb prices in 1956 will show little if any decrease, with the possibility of some



increase as compared with lamb prices in 1955. Lamb prices are closely connected with prices of other meat animals, especially slaughter steers. Consequently, with but little change anticipated in prices of fed steers, lamb prices are expected to remain fairly steady throughout the year. Slightly fewer lambs are expected to be marketed during 1956 than during the preceding year, but the decline is expected to be minor.

The number of sheep on farms and ranches declined again in 1955, for the fourth consecutive year. The lamb crop, however, has not declined in the same proportion because the percentage of lambs saved has increased. Ninety-five percent for 1955 was the highest on record.

Sheep production is gradually moving eastward from range to farm flocks. This shift in production is significant as far as Kentucky producers are concerned, as it indicates larger marketings of early lambs and smaller marketings from the later lamb-producing states. This will provide keener competition early in the season when the bulk of Kentucky lambs are marketed.

WOOL

Prices received for domestic wool are expected to be considerably below the announced support price of 62 cents for 1956. This was the case in 1955 when wool averaged about 45 cents per pound. Open market prices this year should be closely in line with those of 1955.

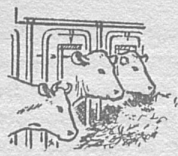


The 1956 wool incentive program is very similar to the one followed in 1955. Producers will receive an incentive payment based on the percentage needed to bring the national average return per pound up to the national average support level. This uniform percentage rate will be applied to the price received by producers for their wool in figuring the payments due them. Thus, allowances are made for the prices paid for different grades of wool.

Domestic wool production in 1956 will probably be slightly smaller than during 1955 because fewer sheep are expected to be on farms and ranches. World supply, however, is expected to be about in line with last year's supply.

DAIRY

Prices received by farmers for milk and cream are likely to average about the same in 1956 as in 1955. Consumer demand is expected to continue strong, especially for the fluid products, while total milk production may exceed the record level of the past year. Despite the prospects for a slight increase in production, farmers are likely to be in a relatively favorable position, because of lower feed costs.



For the third straight year, milk production in 1955 set a new record at approximately 124 billion pounds. If the trend in cow numbers continues upward, as in the last few months of 1955, the result in 1956 could establish another new record high production. However, even with some increase in milk production on farms, the total supply of dairy products available for consumption may not be as great in 1956, as in 1955 because of a considerable reduction in the carryover of storage stocks acquired by the government in former years under the provisions of the price-support program.

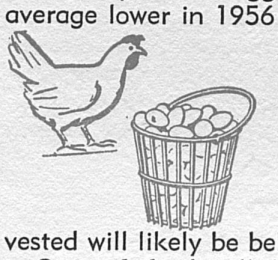
Consumption of dairy products, especially fluid milk, may improve somewhat in 1956, particularly if increased efforts are put forth to expand utilization through such outlets as the Special School Milk Program, the Armed Services, and foreign aid. Added emphasis on these programs to increase the consumption of fluid milk may result in a significant change in the pattern of utilization. The use of a greater proportion of the total milk production in the higher valued fluid products would tend to strengthen the prices of milk received by farmers. This, together with lower feed costs in prospect, could make dairying a little more profitable in 1956 than in 1955.

On the other hand, lower cash receipts anticipated from other farm enterprises may encourage farmers to milk more cows this year than last. The

fact that milk production in the last 3 months of 1955 was about 3 percent higher than for the corresponding period a year earlier indicates that cow numbers already have started increasing, even allowing for some increase in production per cow. If this should turn out to be a definite trend, it could mark the beginning of another buildup of surplus dairy products, which would be a depressing factor on farm prices. Under such circumstances, prices received by farmers would be dependent largely upon support levels, which will be continued at current levels for the marketing season beginning April 1, 1956 unless Congress changes the present law.

POULTRY AND EGGS

Prices paid for eggs and poultry probably will average lower in 1956 than in 1955. Egg production is expected to increase and a further expansion of commercial broiler numbers is likely in some areas. Increased output will help maintain the poultry income but profits per dollar invested will likely be below those of 1955.



Cost of feed will be lower, while equipment, building materials, supplies and most manufactured items will cost more. Because of the continuation of a price-cost squeeze, poultrymen who are already established will be in a more favorable position than new producers who must make a major investment. Careful attention to details in production and management are essential to profit from the poultry enterprise.

Egg production in the year ahead will be increased and even though demand continues strong, somewhat lower average prices are expected. The trend toward increased efficiency in egg production will continue. Nationally, egg production per layer which is now about 180 eggs will remain high. It now takes about a third less feed to produce a dozen eggs than was required 30 years ago. The high rate of lay, increased efficient use of feed, and lower feed costs will be favorable factors in the year ahead.

Efficiency factors in the production of broilers will also be important in the year ahead. It took 14 to 16 weeks and from 12 to 13 pounds of feed to produce a 3-pound chicken in 1930. The average today is around 10 weeks with 9 pounds of feed. Estimates based on broiler placements indicate record production in the year ahead. The volume of output in the first part of 1956 will be heavy, and prices are not expected to reach the 1955 levels in the first half of the year. In the last part, prices may be around the 1955 levels, but average profits per bird in 1956 will be lower than those of a year earlier.

In a number of areas close to the larger cities, the demand for graded eggs is growing. Production on a commercial scale that can capitalize on the fall egg shortage and graded outlets is to be recommended. There are also opportunities for broilers in some areas, but an assurance of satisfactory market outlets and adequate financing are essential to success in commercial production. Accordingly, market outlets and opportunities should be carefully considered and made a part of the poultry production plans in the year ahead.

TOBACCO

Burley.—The situation in **burley** tobacco at the beginning of the 1956 season is somewhat confusing. Total stocks in the hands of dealers, manufacturers, and the government are near record levels and a reduction of 15 percent in acreage allotments for 1956 has been announced, but later legislation may change this situation.[1] On the other hand, stocks of some grades of burley tobacco are lower than they have been in either of the last two years. Average prices received for the 1955 crop are about 16 percent above parity, as well as around 8 cents per pound higher than a year earlier.



The upturn in average price from the 1954 crop, doubtless is the result of several factors; (1) the size of the crop of burley tobacco being marketed has more effect upon prices than does tobacco storage. The 1955 crop is fully 160 million pounds smaller than the 1954 crop. (2) The 1955 crop is

[1] Legislation restoring the acreage awaiting presidential action as this leaflet goes to press.

one of excellent smoking quality—far superior to the 1954 crop in this respect. (3) The number of cigarettes manufactured in 1955 is about 2.4 percent greater than the number made in 1954, thus strengthening the demand for tobacco suitable for cigarettes. Most of the 1955 crop seems to be of that kind.

Reductions of from 3 percent in the manufacture of smoking tobacco and of 6 percent in plug tobacco, on the other hand, would tend to depress prices.

Although total stocks of burley tobacco on hand Oct. 1, 1955 were 12 percent larger than in 1954 and 16 percent larger than in 1953, some grades of burley were in shorter supply. Reported stocks, when adjusted for stemming losses, show the following changes from Oct. 1, 1954 and Oct. 1, 1953, respectively:

Bright Leaf and Tips—Up 38%—Up 61%
Red Leaf and Tips—Down 5%—Down 21%
Lugs—Up 12%—Up 13%
Flyings—No Change—Up 10%

Changes in prices, from the 1954 crop to the 1955 crop, for similar grades, are about as follows:

Leaf and Tips	
Tan Colored Grades	UP 1 to 12 cents per pound
Red and Reddish Tan	" 8 to 21 " " "
Dark Red and Green	" 15 to 23 " " "
Lugs and Flyings	
Buff and Tan Grades	Down 0 to 2 " " "
Red Grades	Up 3 to 9 " " "
Nondescript	Up 6 to 20 " " "

Better smoking quality of the dark grades of the 1955 crop is reflected in these prices. The favorable growing conditions of 1955 may not be repeated in 1956; consequently, if burley growers are to have tobacco of good smoking quality to sell next winter they should follow the best practices known for producing such tobacco.

Fire-Cured.— Large yields per acre of both eastern and western fire-cured tobacco resulted in larger production of both types in 1955 than in 1954, even though acreage allotments were reduced 10 percent. Disappearance of the two types com-

PRODUCTION, STOCKS, AND DISAPPEARANCE OF TOBACCO

(Million pounds)

Year ending Oct. 1	Production	Stocks Oct. 1	Disappearance	Market price *(cents)*	Support price *(cents)*
Burley Type 31					
1948-52	586	984	529	48.3	45.5
1953	564	1,163	548	52.5	46.6
1954	667	1,198	529	49.8	46.4
1955	510*	1,348	517	57.5*	46.2
Eastern fire-cured Type 22					
1948-52	37.5	94.2	39.0	35.1	34.2
1953	30.8	94.3	36.1	34.9	35.0
1954	37.6	86.3	38.9	40.8	34.8
1955	38.4*	84.7	39.1	40.6*	34.6
Western fire-cured Type 23					
1948-52	14.0	37.5	17.9	30.3	34.2
1953	8.9	23.3	12.1	27.9	35.0
1954	14.0	21.5	10.7	32.4	34.8
1955	14.7*	25.5	9.7	32.0*	34.6
One Sucker Type 35					
1948-52	19.1	40.3	19.1	29.5	30.4
1953	16.4	46.1	15.0	26.2	31.1
1954	20.2	45.7	16.7	34.1	30.9
1955	19.5*	48.3	17.7	32.6*	30.8
Green River Type 36					
1948-52	10.4	31.9	11.0	28.3	30.4
1953	7.3	29.1	10.2	22.8	31.1
1954	10.6	26.4	10.0	34.7	30.9
1955	10.1*	28.5	8.6	30.0*	30.8

* Preliminary

bined was about 2 percent smaller in 1955 than in 1954, so that the present total supply of these types is slightly larger than it was a year ago. Acreage allotments for 1956 call for a further reduction of 15 percent for fire-cured tobacco in an effort to bring supplies more nearly in line with market requirements unless changed by pending legislation. Supplies of western fire-cured tobacco are about 4 times annual disappearance, while those of eastern fire-cured tobacco are about 3.1 times present annual use. The outlook for the fire-cured tobaccos remains discouraging.

Dark Air-Cured.— Production of One Sucker and Green River tobacco in 1955 changed little from that of 1954, despite smaller acreage allotments. Disappearance of One Sucker tobacco increased slightly, while that of Green River tobacco decreased from 1954 to 1955. As a result, total supply of the

two types on Oct. 1, 1955 was about 3 percent larger than on the same date a year earlier. The domestic consumption of these types in 1954-55 was the smallest on record, but exports increased so that total disappearance was well maintained. Exports were favored by the foreign currency program. Declining use and foreign competition continue to depress the outlook for dark air-cured tobacco. Present total supply is about 4 times annual disappearance and acreage allotments for 1956 call for a further reduction of 20 percent unless changed by pending legislation.

STRAWBERRIES

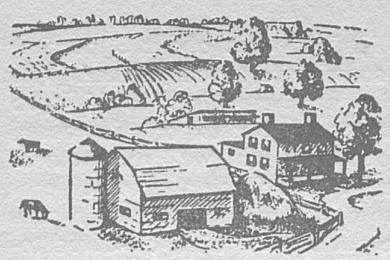
Prices of strawberries are expected to be lower this year. However, the increased popularity of frozen strawberries, coupled with an increase in national income, probably will cause the demand for strawberries to strengthen some. This strong demand should help to offset price lowering pressure exerted by increased production. In order to meet competition from other areas and get top prices, Kentucky farmers need to concentrate more than ever on producing high quality fruit and on doing an exceptionally good job of grading.

Nationally, the production of strawberries is expected to be up 19 percent over last year. Not only has the total acreage increased, but yield per acre has been increasing the past few years. If weather conditions are favorable enough, this potentially could be a record production year despite the fact that total acreage this year will be approximately 55,000 acres below the record 184,000 acres harvested before the war.

Kentucky farmers have, in the past, grown as many as 10,000 acres of strawberries, but with the coming of World War II, high labor costs and labor shortages caused many to shift to other enterprises. In 1954 the state harvested 2,100 acres; in 1955, 3,700 acres; and in 1956, 6,000 acres are expected to be harvested commercially. This is a 62-percent increase in acreage over 1955.

FARM FAMILY LIVING

In the year ahead, prices are expected to remain relatively stable with prices for some items weaken-



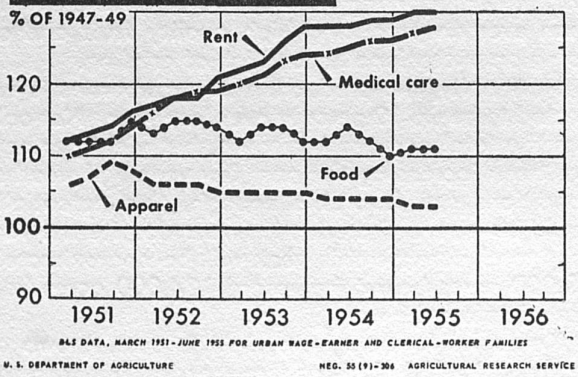
ing, others remaining strong.

In the following charts it may be noted that prices of many items have been moving downward while those of others have climbed upward since 1950.

Food prices are expected to be slightly higher, reflecting shifts toward more prepared foods and choices of better quality foods at higher prices.

Clothing prices will likely remain at present low levels until spring when there will be an upturn. For example, a number of mail order houses have announced that their spring 1956 prices will be up about 3 percent. Prices of shoes may be increased as much as $1.00 to $1.50 per pair this spring.

Prices Paid by Urban Consumers for Selected Items



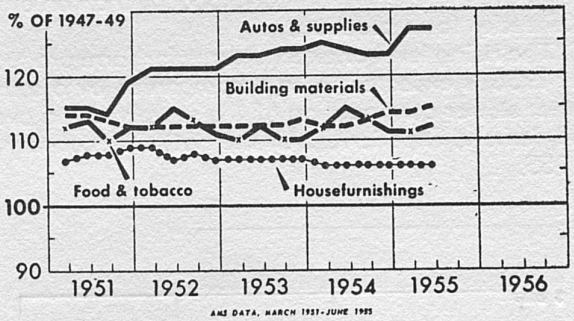
BLS DATA, MARCH 1951-JUNE 1955 FOR URBAN WAGE-EARNER AND CLERICAL-WORKER FAMILIES

U. S. DEPARTMENT OF AGRICULTURE NEG. 55(9)-306 AGRICULTURAL RESEARCH SERVICE

Household furnishings and equipment prices are not likely to be lower in 1956. Prices for textiles may increase slightly; however, prices appear to be at a standstill at the present time. On the whole, consumers' prices for major household durables appear to reflect; (1) some rise in material prices and in wage rates on the one hand offset by (2) a narrowing in distributive margins and services, and (3) a gradual increase in the efficiency of production.

The increases in sales by department stores have accompanied vigorous merchandising including special sales and promotions featuring discounts from list prices, stepped up advertising and liberal credit terms.

Prices Paid by Farmers for Selected Items Used in Family Living



AMS DATA, MARCH 1951-JUNE 1955

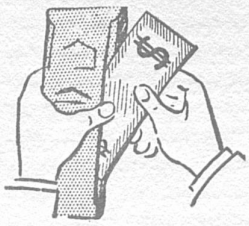
U. S. DEPARTMENT OF AGRICULTURE NEG. 55(9)-303 AGRICULTURAL RESEARCH SERVICE

Service costs for medical, personal care and others will no doubt continue upward much as they have in the past few years. However, the rate of increase may be less marked.

Consumer supplies both plentiful and varied are in prospect.

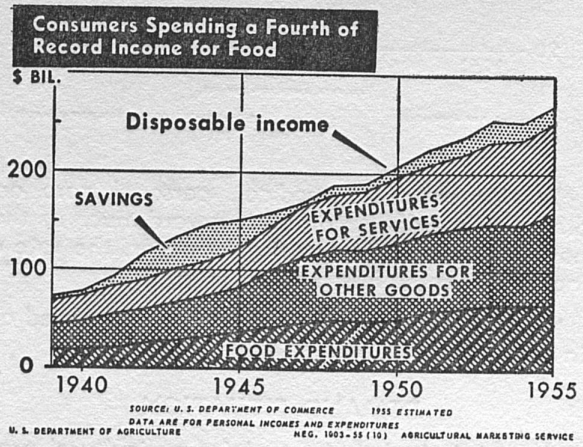
DEMAND SITUATION

A slightly higher demand for agricultural products is expected in 1956. The anticipation that expenditures will be higher is based on the expectation that personal incomes will increase 2 to 3 percent and that population will continue its upward climb. Disposable income in hands of consumers is expected to be higher since the number of people working and their incomes will exceed the record rates of 1955. Any tax reduction, if voted by congress, will result in additional increases in disposable incomes.



Export demand for United States agricultural commodities may increase slightly above the improved levels attained in 1955. Export demand will continue to be encouraged by improved business conditions in most foreign countries plus programs by our government to stimulate exports. Agricultural production in foreign countries has been increasing rapidly and competition for sales in foreign markets is very strong. A stronger export demand will have more effect on dark tobacco than on other Kentucky farm products.

The rising level of expenditures for farm products in 1956 is expected to be accompanied by a somewhat slower continuation of the steeply rising overall demand experienced by the nation's economy in 1955.

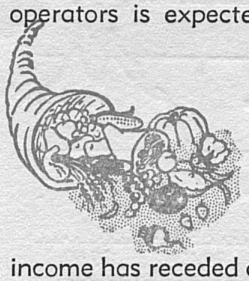


Total spending by consumers may show additional gains in 1956, especially for services, food, and other nondurable goods. But, expenditures for automobiles are expected to be about 10 percent less. Some further expansion of the high level of consumer credit is expected. The most optimistic reason for a higher level of business activity lies in the plans for a substantial increase in business spending for new plants and equipment. Spending for accumulation of inventories appears likely to continue through 1956, but attempts to liquidate inventories may touch off some decline in business

activity as early as 1957. An upturn in government spending will also be a strengthening factor on the national economy in 1956. Increased government spending appears likely for defense purposes, new roads and schools, and possibly for increased assistance to farmers.

DECLINING FARM INCOME

A slight further downturn in farm income to farm operators is expected in 1956. The expected increase in demand for agricultural products will likely be more than offset by increased supplies as has been the situation over the past few years. As a result, farm operators' incomes have been constantly declining since 1951. Net farm income has receded about 38 percent from the peak reached in 1948. However, net income per farm has fallen only 28 percent from the postwar high since there has been a decline of about 14 percent in the total number of farms. If the number of farms continues to shrink in 1956 as seems likely, the decline in income per farm from farm operations may be small.

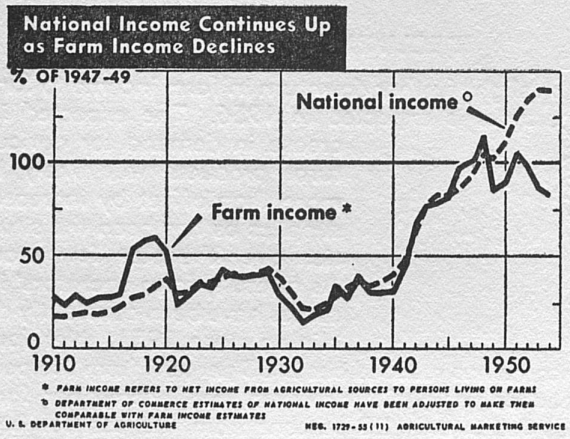


Kentucky farm income in 1955 probably did not decline to the same extent as did national farm income but it may decline proportionately more in 1956. A larger than usual share of the 1955 tobacco crop was sold in 1955 at record prices. Furthermore, production costs are expected to be slightly higher in 1956.

The 1956 prospective decline in total farm income derived from farming may be somewhat offset by increased government aid to farmers. An increasing number of farm people have been and probably will continue to supplement their incomes from nonfarm work. Income received from nonfarm sources has remained about the same over the last few years and it may increase slightly in 1956 if a full employment economy is maintained.

Why farm income has been declining.— Since 1951, farm income has fallen sharply while national income has continued upward. These di-

vergent trends are illustrated in the accompanying chart. What are the reasons why agricultural income has become increasingly depressed while the economy as a whole has seen a rising level of income and prosperity?



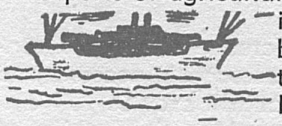
1. **Farm surpluses.**— The present stock of so-called surpluses had been accumulating since the relaxation of the Korean emergency, which is the same period that farm income has been declining. The increasing supplies in government hands have been a depressing factor on farm prices and consequently farm income.

2. **Less of consumers' incomes spent for food.**— Farm income in recent years has failed to benefit as much as in previous periods from a rising level of consumer income. In previous years, about one-fourth of disposable income in the hands of consumers was spent for food. However, recently a smaller share has been spent for food out of the additional amounts of income received by consumers.

3. **Farmers' share of consumers' food dollar.**— Out of the proportion of consumers' incomes spent for food, the farmer now receives about 19 percent less than in 1951. The farmers' share of the food dollar has fallen from 48 cents in 1951 to about 39 cents in late 1955. The farmers' share of the food dollar rose rapidly during the war period as marketing costs rose slower than farm prices. In the post-war period marketing charges have constantly climbed upward due mainly to increasing wage rates. The farmers' share of the consumers' food dollar has also declined because consumers are demanding an ever increasing amount of food processing. However, the tailoring of food products to consumers' liking may serve to increase demand in some instances.

4. **Prices paid have remained high.**— The prices paid by farmers for items used in production have remained close to the all time highs reached in 1952. Prices received by farmers have declined about 29 percent from the record high received in 1951, resulting in the so called price-cost squeeze.

5. **Exports of farm products down.**— The volume of exports of agricultural commodities fell sharply in 1952 and has remained below the levels reached in the period after World War II.



FARM LAND VALUES

The national farm real estate situation shows signs of continued optimism among farmers. More than two thirds of the farms sold last year were bought by farmers and 90 percent of the farms and tracts of land purchased by active farmers were for operation by them.

About one-third of the parcels of land transferred in 1955 were added to existing farm businesses. This represents an expansion in farm business. The sharpest upturn in land values occurred in the Corn Belt and in the winter wheat area. It appears that adjustment toward a larger farm acreage is necessary to get sufficient volume to carry the cost of modern equipment and utilize labor efficiently.

New debts, secured by farm mortgages, increased during the first half of 1955 by 29 percent. The number of loans increased by 9 percent and the average size of loan increased by 18 percent. Although farm mortgages are increasing, only about 30 percent of all farms have a mortgage debt. Eighty percent of the farms have a debt load of less

than 50 percent of the market value and more than one half of all mortgaged farms have a mortgaged debt of less than 30 percent of the market value.

In Kentucky, farm land values rose only 2 percent from July 1954 to July 1955, while in the nation, the rise was about 5 percent.

Most farm owner-operators were covered by Federal Old-Age and Survivors Insurance (Social Security) for the first time in 1955, and some will be eligible for benefits early in 1956. A farm operator who is age 65 or over and who has planned to sell his farm, may find it advantageous to delay the sale in order to qualify for old age benefit payments. This may mean that fewer than the usual number of farms were offered for sale in 1955 and that this situation will continue through most of the year 1956. If so, then in the latter part of 1956 and in 1957, as these farmers qualify for retirement benefit payments, the supply of farms on the market may increase.

As mechanization and acreage allotments continue, an increasing farm acreage is necessary to have a size of business that will provide full employment for a farm family. Also, the number of farm families needed to provide food and fiber for an increasing population will decline if new technology and mechanization continue to increase at the present rate. These conditions suggest that prices of farm land may remain relatively high in 1956.

Lexington, Kentucky
January, 1956

5M—2-56

bags and taken to storage houses to await cleaning. Some is baled rather than bagged.

Cleaning rough-cured Kentucky bluegrass seed is necessarily a rather complicated procedure. Each bluegrass seed has at its base a number of fine cottony fibers. These must be broken from the seed, to prevent the seeds gathering into small bunches or clusters. Consequently, the cleaning process consists of threshing, rubbing and beating rough cured seed in somewhat variable types of assemblies of screens and air currents that gradually break the cottony fibers from the base of the seed and remove it and other foreign material from the seed.

Other Methods of Harvesting

Other methods of harvesting Kentucky bluegrass seed have often been tried. Sometimes they have been successful. In general, efforts to combine the standing crop have been disappointing, perhaps partly because of wide differences in degree of maturity of heads and partly because the stems are not readily cut unless the sickle bar sections and guards are sharp. Combining out of the windrow has been done successfully in some years. To harvest in this way the crop may be mown high and windrowed when damp, or it may be cut with a self-windrowing header. The windrows are not likely to need turning unless they are so large that they become hot. They should be disturbed as little as possible because the mature seed shatters easily.

No precise directions can be given for operating the combine in threshing bluegrass seed. Directions provided by the manufacturer of the combine will be helpful. In general, it may be said that all or nearly all of the air should be cut off and the chaffer adjusted and sieves selected to do a rough job of cleaning. This seed can then be cleaned with conventional cleaning mills and machines.

Marketing Rough Kentucky Bluegrass Seed

Because it is essentially impossible to harvest marketable bluegrass seed by conventional methods, there is much variation in the marketing of rough bluegrass seed. Perhaps most of this seed is harvested, cured, and processed by operators of cleaning plants. Much rough seed, however, is sold as green seed or as rough-cured seed. Perhaps most of this is acquired sooner or later by the operators of cleaning plants. Yet considerable amounts are cleaned on a custom basis and are marketed independently of the cleaning plants.

Lexington, Kentucky February, 1956

Cooperative Extension Work in Agriculture and Home Economics: College of Agriculture and Home Economics, University of Kentucky, and the United States Department of Agriculture, cooperating. Frank J. Welch, Director. Issued in furtherance of the Acts of May 8 and June 30, 1914.

4M–2-56

How to Produce High-Quality Kentucky Bluegrass

IN KENTUCKY

By E. N. FERGUS, ROBERT BUCKNER and J. F. FREEMAN
Department of Agronomy

In earlier years great quantities of seed of Kentucky bluegrass were grown in Kentucky. In recent years many farmers have been discouraged by low quality and low yields. However, those who have followed recommended practices in producing the seed have usually had high yields and good quality. Kentucky farmers could very likely recapture much of the market they have lost to other states, for Kentucky bluegrass seed.

Choose Good Sods for Seed

As a rule it will pay to harvest only good sods of Kentucky bluegrass for seed, and it will pay to harvest these only if they are properly treated for seed production. Thin sods are usually weedy and even with the best treatment they produce relatively few seed heads. Good sods, on the other hand, are less weedy, and if properly treated they rarely fail to produce high yields of high-quality seed. Without proper treatment even good sods are almost certain not to produce profitable yields of seed.

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service
FRANK J. WELCH, Dean and Director
LEAFLET 162

Grazing Bluegrass Seed Fields

For good yields of seed, the amount of leaf and stubble on bluegrass seed fields in the spring should be light. Grazing is a good way to clean these fields. Spring grazing also firms the soil, and this is usually beneficial. If a field cannot be grazed clean, it should be mowed and raked thoroughly before early spring. Rolling the sod may be helpful if the sod has been loosened during winter.

Fields to be harvested for seed should not be grazed closely after the first of April, though enough sheep may be left in the fields to graze out weeds. The sheep should be removed before the fields are sprayed for control of insects. After fields have been stripped of seed, livestock may be turned into them again with little or no danger of poisoning, especially if aldrin was the insecticide used.

Use Fertilizers

In general, properly made applications of nitrogen fertilizers more than double bluegrass seed yields. But to obtain these results the nitrogen applications must be timely and in right amounts. Most Kentucky bluegrass seed fields should be treated with about 30 pounds of nitrogen per acre *in late February or early March,* or with 30 pounds in the fall and again in late February or early March.

On some soils 30 pounds of nitrogen per acre may be too much and may cause the seed crop to lodge. However, on other soils, 30 pounds of nitrogen per acre may not be enough to produce highest yields. Only by experience can one learn exactly how much is best on a given farm or field for bluegrass seed production.

All kinds of nitrogen fertilizers are apparently equally effective for seed production if they are used at rates to supply the same amount of nitrogen per acre.

Phosphate and potash fertilizers have less effect than nitrogen fertilizers on bluegrass seed yields. However, available amounts of both elements should be maintained at medium to high levels for good bluegrass

seed yields. The quick soil test may be used as a guide to the need for these elements. Where needed, they may be applied before or along with the nitrogen fertilizer.

Spray to Control Insects

Two bluegrass plant bugs, *Miris dolabratus and Amblytylus nasutus,* have caused serious decline in yields of cleaned bluegrass seed in Kentucky in the last 15 years. These are sucking insects that feed on the flower and developing seed. One or both insects are usually present in large numbers in most bluegrass fields before and during seed formation. Either insect, when abundant at and after blooming, damages the seed crop badly. If infested fields are sprayed properly with insecticides, clean-out and yield of seed are greatly improved—usually more than doubled.

DDT, chlordane, aldrin, toxaphene, lindane, and rothane are equally effective in controlling these bugs. However, the residues from aldrin and lindane last only a short time, and those sprays are therefore recommended. Aldrin applied at the rate of 6 ounces per acre of the actual material has given excellent control. Lindane has given good results when applied at the rate of 4 to 6 ounces per acre of actual material. The amount of insecticide indicated should be mixed in 5 to 10 gallons of water and applied with low-pressure sprayers as soon as the insects become abundant after the bluegrass heads come out of the boot. Usually this is between May 1 and 12.

It May Pay to Use Herbicides

Heavy infestations of weeds are destructive to bluegrass sods and are troublesome during seed harvesting operations. If they produce seed they add to the cost of seed cleaning. Some weeds produce seeds that are very difficult if not impossible to remove. Most broad-leaved weeds can be controlled or seed formation prevented by using 2,4-D acid in the ester form at the rate of ¾ pounds per acre, or 1 pound per acre in the amine form. Double these rates may be required for killing wild garlic plants. For best results the weeds should be sprayed between March 15 and April 15.

Seed yields of bluegrass are not likely to be reduced if spraying is done before the plants are in the boot stage of growth.

Old plants of curled dock and sour dock (sheep sorrel) are not effectively controlled with 2,4-D but seedling plants are killed by it. Isolated patches of this weed can be killed with sodium chlorate or Atlacide.

Stripping Bluegrass Seed

Practically all the bluegrass seed produced in the Central Bluegrass region of Kentucky is harvested with power-drawn strippers. These machines strip and pull the seed heads.

Stripping when the stems are turning straw color under the heads produces the best yield of good seed. Seed is inferior if harvested when the heads are definitely green, and much seed may be lost from shattering if harvesting is delayed especially if wet, windy weather occurs. However, it is seldom possible to harvest a crop when all heads are at the proper stage of maturity, because the crop ripens unevenly. Furthermore, if there is considerable acreage to be harvested, some of it must be harvested too green and some too mature.

Curing and Stripped Seed

The stripped seed is sacked in burlap bags as it is stripped. These are taken immediately to the curing yards or floors. Curing yards are well drained, closely mowed bluegrass sods. Curing floors are mostly in loose-leaf tobacco warehouses. Here the bags are emptied and the seed spread in a layer 6 to 8 inches deep and kept stirred to prevent heating. After it has lost much of its moisture it is put into high narrow windrows until it is thoroughly dry. These windrows must be turned, as necessary, to prevent heating. If the temperature of stripped seed exceeds 120°F. for a few hours all seeds are likely to be killed. Thus careful curing of stripped seed is most important.

Cleaning Rough-Cured Bluegrass Seed

When the seed on the curing yards and floors is thoroughly dry, it is usually put into large burlap

Threshing

Threshing is done with a stationary threshing machine or with a small combine used as a stationary thresher. Adjustments of air, chaffers, and sieves are very important because much of the seed can be lost if the adjustments are faulty. Manufacturer's directions furnished with the thresher or combine may need some modification for each crop. As a rule the aim should be to save all the seed rather than to obtain clean seed.

Don't let threshed seed become hot

Orchard grass seed harvested with a binder and threshed after curing in the shock seldom heats in storage. It should be examined frequently, however, for several days. If it begins to heat, spread it on a dry floor and stir it frequently. Or, put it through a fanning mill and then dry it on a floor.

Seed harvested directly with a combine is almost certain to heat in the bag or bin if not dried well after threshing. The heating will lower or destroy its germination. It is best to put the seed through a fanning mill to remove the larger pieces of foreign material, most of which will be wet, and then to dry the seed by spreading and stirring it on a dry floor, or handling it in some manner which will dry the seed to a safe moisture content.

Mow the Stubble

Considerable stubble and leaf growth are left on orchard grass seed fields after harvest of the seed. This should be mown and removed. It makes reasonably good roughages for winter feeding.

Lexington, Kentucky 6-M-3-56
2-M-4-56

PRODUCING ORCHARD GRASS SEED

By E. N. FERGUS, ROBERT BUCKNER and J. F. FREEMAN
Department of Agronomy

Fertilize for high yields

Proper nitrogen fertilization usually doubles the seed yields of orchard grass. As a general rule it pays to get part of this nitrogen fertilization by growing alfalfa, red clover, or annual lespedeza with the orchard grass. Fields should be limed enough to grow the legumes.

In general, about 60 pounds of nitrogen should be applied per acre about March 1. If the soil is high in nitrogen or the field contains a high proportion of legumes, 60 pounds would be too much and would cause the crop to lodge seriously. On the other hand, if the soil is low in nitrogen as much as 100 pounds of nitrogen per acre will pay.

Applications of nitrogen in early February increase seed yields but may cause the crop to come on too early and be damaged by late freezes. Nitrogen applied in late March or early April is likely to cause the crop to lodge badly or have too much leaf growth.

Cooperative Extension Work in Agriculture and Home Economics
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
UNIVERSITY OF KENTUCKY
and the
U.S. DEPARTMENT OF AGRICULTURE, Cooperating
FRANK J. WELCH, Director
Issued in furtherance of the Acts of May 8 and June 30, 1914.
LEAFLET 163

Phosphate and potash fertilization has much less effect than nitrogen on yields of orchard grass seed, but the available amounts of those two elements in the soil should be maintained at medium to high levels. Quick soil tests show the need for those fertilizers.

Grazing the seed fields

Orchard grass fields may be grazed moderately with cattle until about April 1 without reducing yields of seed. Light grazing with sheep until the grass has headed is usually helpful as it removes clover and weeds from the crop.

Control of weeds

Objectionable weeds may be pulled by hand just before harvest if there are not many in the field. Wild garlic (wild onion), ox-eye daisy, curled dock, and cheat interfere with harvesting or contaminate the seed with weed seeds that are difficult or impossible to remove in cleaning.

If wild garlic and broadleaved weeds are too numerous to pull, spray the field with 2,4-D before the grass stems are in the boot stage. Spray preferably on a warm, clear day. Use 1.5 pounds of the actual 2,4-D acid per acre if in the ester form, or 2 pounds in the amine form. These amounts will prevent the formation of wild garlic seed. If no wild garlic is in the field, use only half as much of the 2,4-D to kill the other weeds.

To use the 2,4-D, mix with water and apply with a power sprayer. About 5 to 10 gallons of water per acre is enough if applied with a low-pressure sprayer.

No herbicide will control cheat without injuring the orchard grass seed crop.

Time and method of harvesting

In some areas of Kentucky where orchard grass seed is produced a grain binder is used in harvesting the seed. In other areas a combine is used. Each method has its advantages and disadvantages.

For harvesting with a binder, the crop is ready to cut as soon as a few seeds shatter when a small bunch of heads is struck across the hand. At this time the lower parts of the heads are beginning to turn brown. Cutting often is done in early morning while the heads are "in case," to reduce shattering.

For harvesting with a combine the heads must be allowed to ripen. However, cutting must not be delayed after the crop is ripe, because the ripe seed shatter easily. Windy, rainy weather may shatter practically all the ripe seed.

Orchard grass that is cut with a binder should be tied in small bundles and from three to five bundles shocked together. Tie the shocks tightly at two places near the top to prevent blowing over and to reduce shattering. After 10 days to two weeks of drying weather the crop is usually in condition for threshing. Great care is needed to prevent loss from shattering. It is best to lift the entire shock to a tight wagon bottom for hauling to the thresher, or to turn the shock onto a canvas and then load the bundles separately.

Chemical weed control does not completely eliminate cultural practices. It does greatly reduce the labor ordinarily required in weeding and should be used to supplement the regular weed control program. Unless there is excessive rainfall, Crag Herbicide will give more than 80% weed control most years.

Summary

1. Weed thoroughly before each treatment.
2. Apply Crag Herbicide at the rate of 3 pounds per acre.
3. Base rate of application on actual area to be treated.
4. Uniform coverage of the treated area is important.
5. Shake sprayer frequently so material will not settle.
6. Do not make first application until at least 10 to 14 days after setting.
7. Repeat treatments when re-growth of weeds appear, not more often than at 4-week intervals during April, May, and early June and at 6-week intervals during late June, July, and August followed by fall applications of 4- to 6-week intervals as needed.
8. After rejuvenation of old patch, follow same recommendation as used for the first year.
9. Unlike some other herbicides, Crag Herbicide can be washed from spray equipment with water. This should be done immediately following each use.

Lexington, Kentucky
February, 1956

5-M-2-56

Control of Annual Weeds in Strawberries

By J. W. Herron and Carl E. Chaplin

Weed control is one of the most important limiting factors in the production of strawberries. With the expansion of the strawberry industry, a considerable amount of interest in use of herbicides has been developed among the growers throughout the state.

At present, Crag Herbicide-1 is the material considered most satisfactory for control of annual weeds throughout the growing season.

Crag Herbicide is different in its action from most weed control chemicals. It does not become active until it comes in contact with the soil. The material is then taken into the plant through the root system. Crag Herbicide is effective in controlling germinating seeds or seedlings not more than 1/4 inch tall.

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Cooperative Extension Work in Agriculture and Home Economics
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Crag Herbicide should be applied at the rate of 3 pounds in not less than 40 gallons of water per acre. The rate is based on actual area to be sprayed; thus, if the strawberry plants are set in rows spaced 4 feet apart and the entire area is to be treated, 3 pounds of Crag Herbicide per acre is required. However, if the material is applied in bands over the rows, less material is needed. For example, a 2-foot band treatment would require only one-half as much material, or 1 1/2 pounds per acre. If a band only 1 foot wide is sprayed, the amount of material used per acre is one-fourth the amount required for the entire area. Most growers in Kentucky use the band method and cultivate the balk.

Small areas can be treated with knapsack sprayers. The amount of water necessary to obtain uniform coverage will depend upon the available equipment. The following information will aid in calculating the amount of water needed for use with a knapsack sprayer.

1. Fill sprayer with water.
*2. Depending upon the treatment width desired, use one of the following:
   a. Spray 120 feet of row 24 inches wide, or
   b. Spray 180 feet of row 18 inches wide, or
   c. Spray 240 feet of row 12 inches wide.
3. Measure the amount of water remaining and subtract that figure from the original amount.
4. To the amount of water needed for the application, add 1 tablespoon of Crag Herbicide.

*The different widths are calculated so the grower may use the narrower widths early in the season and the wider widths later as the row widens.

Since Crag Herbicide is effective in controlling only germinating seeds and very young seedlings, it is important to have the area to be treated thoroughly weeded before each treatment.

The first application should not be made until at least 10 to 14 days after setting of the strawberry plants. Additional treatments with the same rate of material should be made when re-growth of the weeds occur, not more often than 4- to 6-week intervals. Best weed control is obtained when the soil is moist.

There have been reports of some inhibition of rooting of runner plants when the material is applied during the period of runner development. However, in tests conducted at the Kentucky Agricultural Experiment Station, treatments at 6-week intervals throughout the growing season with Crag Herbicide at the rate of 3 pounds per acre did not significantly reduce the number of runners or the production of fruits the following year. Since there have been reports of runner inhibition, it is advisable not to apply Crag Herbicide more often than at 6-week intervals during late June, July, and August.

Environmental conditions such as rainfall and soil type are factors that influence the residual effect of the material. During periods of average or little rainfall Crag Herbicide may give good control for periods of 4 to 6 weeks; however, if the rainfall is excessive satisfactory weed control may be obtained for much shorter periods.

After the normal procedures of renovating old patches have been followed, Crag Herbicide can be used at the rate and manner recommended for new plantings.

The bundles ought to be small, and not more than 5 or 6 bundles should be put into a shock. The shocks should be tied about the top and again about half-way to the base. The crop is ready for threshing when the bundles are dry in the center.

Combining and threshing

Heads of fescue that ripen on the stem thresh easily, but other heads do not thresh clean even though dry. Therefore, it is usually possible to obtain substantial amounts of seed by rethreshing straw behind the combine or from straw piles. The value of the seed obtained, however, may not pay for the extra threshing.

Shocked fescue may be threshed with stationary grain threshers or with the combine used as stationary thresher. The shocks and bundles must be moved carefully and hauled on tight wagonbeds or canvassed to prevent serious loss of shattered seed.

Exact adjustments of combine and threshing machines for threshing fescue seed cannot be given because these vary with the crop and weather. Manufacturers' directions will be approximately correct but probably will need some modification for most crops. It is possible in most cases to produce quite clean seed from the thresher and combine if air blasts, chaffers, and sieves are properly adjusted.

Keep threshed seed from heating

Fescue seed that is combined directly is almost certain to become hot if placed in storage without drying. It is essential therefore, in almost all cases, that seed so harvested be dried immediately after combining. This may be done by spreading the seed thinly on a dry floor and turning it until it is thoroughly dry. Grain or hay driers may be used, of course, provided the seed is not overheated if heated air is used.

Mow the stubble

Much leaf growth and stubble are left on fescue fields after seed harvest. This should be mown and removed. It makes acceptable winter roughage.

Lexington, Kentucky
March, 1956

7-M-3-56

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Producing Ky 31 FESCUE SEED in Kentucky

By E. N. FERGUS, ROBERT BUCKNER and J. F. FREEMAN
Department of Agronomy

LEAFLET 165

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service
FRANK J. WELCH, Dean and Director

Fertilize for high yields

Practically all fields of Ky 31 fescue decline rapidly in seed yield after the second year unless high proportions of legumes are maintained in the sods or nitrogen fertilizer is applied liberally.

In general, legumes will not supply as much nitrogen as the fescue needs for best seed yields. Consequently, nitrogen fertilizer usually is profitable on fields that contain no legumes.

As a rule fields without legumes should be top-dressed at the rate of 60 pounds of actual nitrogen per acre. On highly productive soil the rate should be lower, but more should be used on soil low in nitrogen -- perhaps as much as 90 pounds per acre. If fields contain legumes, lower rates of nitrogen fertilization are necessary, but there is no measure by which the exact amount may be determined.

Nitrogen fertilizer may be applied any time between October 1 and April 1 with about equal effect on seed yield. In experiments no advantage has been gained in using split applications.

Phosphorus and potassium fertilization have little effect on the immediate seed crop fertilized with these elements. Yet over a period of years, nitrogen fertilization does not produce best seed yields unless the soil contains at least medium amounts of available phosphorus and potassium. Higher amounts are essential if legumes are to be grown with the fescue.

Liming is not often needed for good fescue seed yield, but is usually necessary for a companion legume.

Quick soil tests will be helpful in determining needs for phosphorus, potassium, or lime.

Grazing fescue fields

Any heavy leaf growth on fescue seed fields in the spring should be removed by grazing or by mowing and raking, before April 1, and preferably before applying fertilizer. Light grazing with sheep after April 1 may be helpful if there are tall weeds or legumes in the field.

Controlling weeds

New fields of Ky 31 fescue are likely to be somewhat weedy, but older sods seldom contain weeds in objectionable amounts. Small numbers of wild garlic, ox-eye daisy, curled dock, or other objectionable broad-leaved weeds may be removed by hand. If they are too numerous for hand weeding the field ought to be sprayed with 2, 4-D to prevent weed seed formation.

Spraying should be done before the fescue stems reach the boot stage and on a warm clear day if possible. Use 1.5 pounds of the actual 2, 4-D per acre if the ester is used, or 2 pounds if in the amine form. These amounts will prevent seed formation of wild garlic. If no wild garlic is present in the field, only half as much 2, 4-D is needed. To use these materials, mix with

water and apply with a power sprayer. About 5 to 10 gallons of water per acre is enough if applied with a low-pressure sprayer.

Cheat, which is often present in large amounts in new fields of fescue, cannot be controlled with any herbicide that will not injure the fescue.

Time and method of harvesting

Nearly all of the fescue seed crop of Kentucky is harvested directly with a combine. A little is cut with a grain binder, or mowed and windrowed or cut with a self-windrowing header.

An advantage of harvesting with a binder or a windrower is that the seed is likely to be dry enough when threshed to store without danger of heating. This is important because fescue seed that contains more than about 14 percent moisture is almost certain to be damaged by heating unless special precautions are taken for drying the seed.

For direct combining, most of the fescue heads should be ripe, though, many will still be more or less green. To delay harvest until these green heads are ripe results in shattering of the heads that ripen first. These earlier heads usually contain the better seed.

For harvesting with a binder the crop should be ripe enough for a bit of seed to shatter. It should be cut at such height that just enough stem is taken to make a bundle that the binder will tie properly.

3. Pickles may be hidden when the vines run. Rowing is very important to prevent this. Vines should be gathered into the row all during the season. Rowing prevents "lost" pickles, vine damage and makes cultivation and nitrating easier. Rowing may be done during picking.

Careful supervision of labor is required.

Nitrating

There are two kinds of blossoms on the cucumber plant, male and female. Female blossoms produce the fruit, and these blossoms appear only when new leaves are formed. The only way to keep new leaves and female blossoms coming all season is to keep the roots well supplied with nitrogen.

To get the highest yield, nitrating is very important. A side-dressing of 100 pounds of ammonium nitrate to the acre should be applied to the edges of the row at blossoming time. After 3 weeks of harvest, another 100 pounds of ammonium nitrate should be applied.

If rowing was properly done, sidedressing will be very little trouble.

Delivery

The highest prices will come to the grower who makes his delivery to the receiving station as soon as possible after harvesting. Early morning harvesting and delivery will get the pickles to the station in best condition. Pickles should be handled carefully to prevent bruising and spoilage.

Summary

To get the highest profit in growing cucumbers for pickling:

1. Buy fertilizer early, store in a dry place.
2. Select well drained "new" pickle land.
3. Plow under manure and one-half of 5-10-10 fertilizer, 3-4 weeks before planting.

4. Mix second half of 5-10-10 fertilizer into a fine, deep seedbed just before planting.
5. Treat seed with seed treater if not already treated.
6. Plant as near May 1 as possible.
7. Control beetles and plant lice.
8. Keep the patch free of weeds.
9. Highest prices are paid for small pickles. Start picking early and pick every day or every other day.
10. Keep vines rowed for easy cultivating, nitrating and picking.
11. Sidedress at blossoming time and 3 weeks later with 100 pounds per acre of ammonium nitrate each time.
12. Make delivery as soon after picking as possible. Do not bruise pickles in field or during delivery to receiving station.

Lexington, Kentucky March, 1956

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LEAFLET
166

Growing PICKLING CUCUMBERS IN KENTUCKY

By

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and

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UNIVERSITY OF KENTUCKY
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Agricultural Extension Service
FRANK J. WELCH, Dean and Director

Growing Pickling Cucumbers In Kentucky

The production of cucumbers for pickling can be a good source of income for the farm family in areas that have a market outlet. Pickles are a short-season crop. Little cash and equipment are needed to grow the crop, and quick returns are possible.

Soil Selection

For the best results, the soil should be well drained and rich in humus. Level land is best, but sloping land can be used if planted on the contour. Do not plant cucumbers on land that has had cucumbers, squash, pumpkins or watermelons for the last two years. These crops are subject to the same diseases, and the soil may carry over the organisms for several years. Land that warms early in the spring is important; so avoid heavy clay soils and heavily shaded areas.

Soil Preparation and Fertilizing

Cucumbers do best in a deep seedbed, rich in organic matter. Plowing should be deep, about 8-10 inches, and should be followed by disking when the field is prepared. Manure is very important in pickle production.

The fertilizer plan a grower should follow depends a great deal on the amount of manure available to be plowed down.

Plan "A" should be followed if 5 to 10 tons of manure to the acre is to be plowed down:

1. Spread manure, and broadcast 250-300 pounds of 5-10-10 fertilizer to the acre. Plow deep, 8-10 inches, and disk. This should all be done 4 weeks before planting time if well rotted manure is used, or 5-6 weeks before planting if strawy-manure or a heavy cover crop is turned under. A good stand of a cover crop may be substituted for a coat of the manure.

2. At planting time apply another 250-300 pounds of 5-10-10 fertilizer to the acre. Work up a fine seedbed.

Plan "B" should be followed if less than 5 tons of manure per acre is used.

1. Spread manure, if available, and broadcast 500-600 pounds of 5-10-10 fertilizer to the acre. Plow deep, 8 to 10 inches, and disk. This should all be done 4 weeks before planting time if well rotted manure is used, or 5-6 weeks before planting if strawy-manure is used.

2. At planting time apply another 500-600 pounds of 5-10-10 fertilizer to the acre. Work up a fine seedbed.

Planting

It is very important to plant the seed as near May 1 as possible, provided the soil is warm and can be worked. Frequently, pickle stations are closed before the picking season of late plantings is completed. These stations cannot afford to stay open for a few late pickle growers. The pickle worm advances to Kentucky in late July. By planting early you can get most of your crop picked before the pickle worm becomes a serious pest. Higher yields can be expected with early plantings because usually there is more soil moisture in the early part of the season.

If not already treated, seed should be dusted with a seed treater before planting. The dust contains a poison with a fungicide to control seed rot and an insecticide to control soil insects. Shake the seeds and some treater in a closed quart jar for about a minute. Wash your hands after treating and handling the seed.

Seeds should be planted ¾ to 1 inch deep in the hills. The hills should be 4 feet apart in the row and the rows about 6 feet apart. Wide rows allow the leaves to dry quickly and keep leaf mildew at a minimum. Six to 8 seeds should be firmed into a hill and later thinned to the best two plants.

Cultivation

Cucumbers should be cultivated just deep enough and often enough to keep the weeds out. It is very

important to keep weeds down because they steal fertilizer and moisture, and harbor insects and diseases.

Deep cultivation destroys the long lateral feeding roots of the cucumber and cut yield. Use shallow cultivation only.

Insect Control

Cucumber beetles over-winter in the soil and attack seedling cucumbers as they come up. Beetles damage cucumber roots and carry the wilt disease. Dust the plants with 3% purified DDT as the first ones come up, and again 4 to 5 days later. Repeat the dusting every week until one week before picking begins. The 3% purified DDT dust will also control flea beetles. Dust the center of the hill where the main insect damage starts.

Melon aphids can be controlled with a 5% malathion dust, but if many aphids or pickle worms occur during harvest time, the grower must follow this plan:

1. Pick the patch completely clean.
2. Apply the 5% malathion dust to the leaves of the infested plants.
3. Do not harvest until 3 days after dusting.

Harvesting

There are three main facts about harvesting that every pickle grower should remember:

1. Picking the first pickles when the season starts is most important. If the small pickles are removed, the vines will bear 35-50 pickles, whereas if the pickles are allowed to grow to larger sizes, the vines will bear only 5-12 pickles. The whole harvest season profit depends on picking the small-sized fruits.

2. The fewer the pickles that are allowed to become full grown, the more the vines will produce. The older pickles prevent plant food from getting to the blossoms and new fruit can't form. The biggest profit is in the smaller sizes. Pick the patch clean EVERY DAY in fast growing weather, and every other day when growth is slower.

row with soil and lapped over the wicket by about 4 inches. A 3-foot width of plastic will be necessary for protecting either large or tall plants. The sheets are drawn tight at the top so that the lap stays closed and are pinned with a 5-penny nail at each smooth wicket. It is essential to use a 3-by 4-inch piece of 0.003-inch plastic as a reinforcement at the point of pinning. The sheets are not pinned where they are supported by the notched wickets. It is at these places that the operator can pull open the plastic to provide ventilation, let in rain, or work with the plants. At those times the plastic is tucked into the notches provided in the wickets. Afterward the plastic can be pulled out of the notches, and it will resume its former position over the top of the wicket, making the lap virtually air tight again. Every third space can be left open at all times except on frosty nights when all should be shut. More spaces can be opened on exceptionally hot, sunny days. If the soil is dry all can be opened before a rain.

Plastic Held Down by Soil

If the soil is placed correctly on the edges of the plastic and the laps are pinned securely to hold the plastic firmly to the wickets, no damage from wind and rainstorms can occur. The soil under the edge of the plastic is dug out with a tile spade and then put on top of the edge of the plastic. By tramping on this soil, one presses it onto the plastic, which helps the soil to hold the plastic firmly. When pinning the plastic or placing the soil, one should keep the plastic stretched. This is aided by fastening the last wicket in each row to a stake driven beyond the end of the row. The wicket is drawn to the stake by short wires and is thus able to keep the ends of the plastic taut.

Two things help to provide insulation which will protect the crop on the colder nights. These are the use of exposed packed soil on each side of the row and providing for dead air space. Research has shown that heat in the soil near plants is transferred more readily if there is an area of packed, firm soil near the zone where the plants are growing.

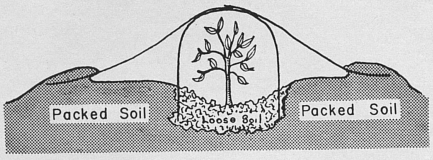

Fig. 3.— Packed soil next to the plant-growing zone helps to provide insulation and is essential for successful use of plastic for protecting plants outdoors.

Dead-air space is provided by the use of another layer of plastic pinned over the top of the first layer. The first layer is allowed to sag slightly, and the second or outside layer is stretched tightly. The two layers are needed only when one wishes to protect tender plants when severe frosts are expected. Such protection was effective at a temperature of 25°F. at Lexington. Setting tomato plants in a trench about 8 to 10 inches deep below the wickets also helps prevent frost damage.

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Lexington, Kentucky March, 1956

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5M—3-56

Plastic Row Covering For Producing Extra-Early Vegetables Outdoors

By E. M. EMMERT

Low-cost polyethylene plastic enables growers to plant outdoors despite 25-degree temperature; crops marketed several weeks ahead of regular plantings

UNIVERSITY OF KENTUCKY

College of Agriculture and Home Economics
Agricultural Extension Service

FRANK J. WELCH, Dean and Director

LEAFLET 167

Plastic Row Covering for Producing Extra-Early Vegetables Outdoors

By E. M. EMMERT

Growers are aware that vegetables of good market quality can be produced in low-cost polyethylene plastic greenhouses, and many are using such houses. Recent work at the Kentucky Agricultural Experiment Station shows, however, that it is possible to produce the vegetables much cheaper in the field with the use of plastic row covering.

Though one cannot grow crops outdoors in severe winter weather a plastic row covering can protect crops from temperatures down to 25°F. Consequently, growers are enabled to put plants outdoors earlier and market their crops several weeks in advance of regular outdoor plantings.

Tomatoes

Last summer during the period June 5-15, tomatoes were marketed from the Experiment Station farm at higher prices than those grown in greenhouses, and the extra returns paid many times for the cost of the plastic row covering. In a similar test in northern Kentucky, tomato plants were set in the field on April 5 and were protected from a subsequent low temperature of 25°F. by the use of plastic row covering. These plants each bore at least a pound of fruit in June, a month before the regularly planted outdoor tomatoes were ripe. The major part of the crop was harvested by the time the outside plants were in peak production. Though the total yield of the plastic-protected plants was less than that of the outside-grown plants the profit was far greater because the fruit was marketed when prices were higher and its quality was exceptionally high.

Lettuce

Early planted leaf and Bibb lettuce, protected from frost by plastic row covering, has been produced at Lexington and Ludlow in April and has brought as much as 30 and 60 cents a pound, respectively, on the Cincinnati market. As was true of the tomatoes, the quality of the lettuce was exceptionally high. In contrast, the regularly planted frame and outside leaf and Bibb lettuce reached the market much later and brought only from 7½ to 10 cents a pound.



Fig. 1.— A field scene, showing use of plastic to protect horticultural crops. The plastic is supported over the plants by wickets (left). Some of the wickets have notches into which the plastic can be tucked.

How to Apply the Plastic

Three things are essential for the success of plastic row coverage. One must provide for ventilation, prevent wind and storm damage, and promote insulation against cold.

Either 0.0015 or 0.002 inch plastic may be used as row covering. Two kinds of wire wickets, similar to those used for playing croquet, are used to support the plastic over the plants. One is a smooth wire in the form of an oval, while the other kind is fabricated so as to have two notches into which the plastic can be tucked. The two types are placed alternately, at intervals of about 2½ feet. The plastic may be applied either as a wide, continuous sheet, extending over the wickets and held down at the edges by soil, or as two single strips, secured similarly at the edges and lapped together over the wickets.

Slits Permit Inspection of Crop

If the continuous sheet method is used, the operator cuts slits about 15 inches long in the plastic where it goes over one of the notched wickets. This is done to permit inspection and ventilation. To prevent the slits from being torn larger by wind or use, at the ends of the slits the plastic is folded laterally and small, 4-inch squares of plastic are doubled and pinned to each fold. Ventilation is obtained by tucking the sides of the slit into the notches of the notched wickets, as shown in Fig. 2. This method seemingly provides more protection from high winds than the other.

If the two single sheets of narrow plastic are used, they are secured to the ground on each side of the

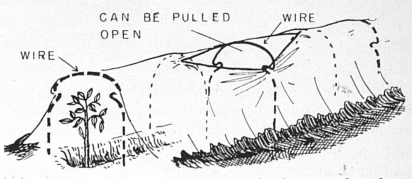

Fig. 2.— Wire wickets support the plastic over the plants. Notches in the wickets permit the plastic to be tucked back, permitting ventilation and inspection.

seeding may be made with a small grain drill, blocking out the number of holes necessary to give the desired row width.

The rate of seeding will vary depending on the variety grown as well as the size of the seed and the stand desired. Varieties that tiller profusely are generally spaced farther apart in the row. Usually from 3.5 to 8 pounds of seed will be sufficient. It is well to remember that field germination often averages only 50 percent of the laboratory germination.

Row spacings of 14 inches are being used by many growers with good results. Caution should be exercised on these closer spacings as weed problems, low fertility, and the use of present machinery could cause production difficulties. Fourteen-inch rows may be seeded with a grain drill, with every other drill stopped.

Importance of Using Good Seed

It is important to obtain good seed for planting. Certified seed has been field inspected for trueness to type, freedom from disease and inseparable weeds, and for proper isolation. Tall-growing, forage sorghum plants, which seriously interfere with combining, occur frequently in fields planted ed with uncertified seed.

Fertilizers

The fertilizer requirements for grain sorsorghum are about the same as those for corn. These requirements will vary with the natural fertility of the soil and with past cropping and management practices.

Harvesting and Storage

Silage - Grain sorghum should be harvested for silage when the seed are in the dough stage. At this stage of maturity it should not be necessary to add water to the silage and the seed will be more completely digested by cattle.

Fodder. Harvest when the seed are hard, but not dry enough to be harvested for grain. Bundles should be bound loosely to permit free circulation of air. They may be stacked against a fence, 2 bundles deep on each side or in shocks of 10 to 12 bundles each.

Grain. Grain sorghum may be harvested by hand or by combining if not too tall. The combine should be adjusted to cut off the heads, leaving as much of the stalk standing in the field as possible.

When grain sorghum is to be harvested with a combine, the heads should be dry enough for the grain to be rubbed out easily by hand. Usually the grain will contain about 15 percent moisture. It must be stored temporarily in an open shed or barn until it has reached a 12-percent moisture content.

Grain sorghum with a moisture content of more than 12 or 13 percent is likely to heat and should be checked at regular intervals. For that purpose, an iron rod may be inserted in the grain and removed twice a day. If the rod feels warm, the grain should be stirred.

5M-5-56

GRAIN SORGHUM PRODUCTION

By J. F. Shane and S. H. Phillips

The Place of Grain Sorghum on Kentucky Farms

Grain sorghum has been grown in the drier regions of the United States for over a century. Recent prolonged drouths in Kentucky have created a strong interest in the crop in the state. Farm experience and studies by the Kentucky Agricultural Experiment Station indicate that it may have an important place among the grain crops grown in Kentucky, especially in dry years.

Because grain sorghum is drouth-resistant and quick-maturing, it is more likely to make a good crop in dry seasons or when planted late than is corn. It should be grown in addition to corn and not as a substitute for corn. Grain sorghum may be planted where corn planting has been delayed or where corn stands are failures.

Uses of the Crop

Grain sorghum is grown principally for grain, most of which is used for feeding all

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classes of livestock. The grain (either whole or ground) is about equal to corn in feeding value. On the average, the grain is slightly higher in protein and slightly lower in fat content than corn, while the carbohydrate content is about equal. The varieties having the lighter or white seed coats are the more palatable, owing to a lower tannic acid content. Sorghum should be supplemented with other feeds to supply the necessary amounts of protein, calcium, and vitamins A and D. The grain should be ground for all classes of livestock except sheep and poultry.

Grain sorghum may be used for temporary grazing, for cutting and feeding green, and for making silage. However, silage yields are lower than those of late- maturing sweet sorghums. It is advisable, if at all possible, to avoid grazing or feeding grain sorghum because it often contains prussic acid, especially in drouthy years. This poison is likely to occur also in young plants and young suckers, in side branches above the base of the stalk, in frosted plants, and in new growth from stubble. If grain sorghum is to be grazed or fed green, the livestock should be watched closely and pasturing or feeding discontinued at once if they show evidence of sickness or tend to avoid feeding on the sorghum. Sorghum stover, fodder and silage contain little if any, prussic acid, even though it may have been present in the green plants.

Grain Sorghum Varieties

Several combine-type varieties have been tested for 3 years at Lexington and 2 years at Hopkinsville. Of these, Early Hegari,

Midland, Plainsman, Martin and Redbine-56 have performed satisfactorily and are recommended for use in the state.

Early Hegari and Midland are eligible for certification in 1956. When the variety purchased is one of the hegaris and is to be used for grain production every effort should be made to obtain seed of combine-type hegaris.

Midland is a combine-type variety, with a semi - compact head and reddish-brown seed. It grows to an average height of about 4 feet and is quite resistant to lodging. Extension of the head above the top leaf is fair to good.

Early Hegari is a white-seeded variety with a medium-compact head. This variety will normally grow 6 inches to a foot taller than the Midland variety. It is not quite as resistant to lodging as Midland.

The grain sorghums make good wildlife cover and are utilized as such by conservation agencies. Birds will begin feeding on the grain as soon as it begins to harden, and they will continue to feed as long as grain is available. In localities where transient birds are numerous, sorghum grain crops may be almost a total loss.

Seed Treatment and Diseases

Poor stands of sorghum often occur because of attacks of soilborne, seed-rotting fungi. Treatment with a dust fungicide, such as Spergon, Arasan or New Improved Ceresan, is recommended at the rate given on the container. This treatment will also

control both loose and cobered smut in sorghums. Never plant sorghum seed which has not been properly treated. Most materials used for treating seed are poisonous to man and farm animals and should not be used as feed.

Soil Preparation

The land should be broken and harrowed into a good seedbed before planting. When sorghum follows small grains, the straw and stubble should be covered well before planting. An additional harrowing with a spike-tooth harrow or rotary hoe before planting will help in weed control.

Time of Planting

For best results, grain sorghums should be planted about 2 weeks after the normal time for planting corn. The date of planting will vary considerably depending on weather conditions in the spring.

Seed should be covered from 1 to 2 inches, depending on moisture conditions.

Spacing and Rate of Seeding

Grain sorghums are usually planted with a corn planter equipped with sorghum plates. The rows are ordinarily 3 to 3 1/2 feet apart with the plant spacing in the row varying from 3 to 10 inches. Six to 10-inch plant spacings in the row are preferable for grain fodder. Where sorghum is planted for fodder and a corn planter is not available the

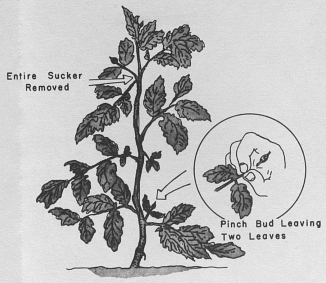
petroleum gas is as cheap and much more convenient. However, in large installations a hot water boiler is best.

Tobacco-curing gas stoves with 3-inch down pipe spreaders seem to be quite economical and efficient. However, the heat is not spread so evenly as with regular pipe and fin-radiation.

It has been found that by using electric exhaust fans that the heat from gas stoves can be distributed quite evenly. The best distribution has been obtained by forcing the heat through aluminum-covered plastic ducts. These are cheap and keep the soil warm. These ducts can be made by using wire wickets. They need to be only 4 inches wide and 6-8 inches high. The wickets are spaced every 18 to 24 inches and the plastic put over them and into a 3-4 inch trench on each side, and the soil firmed back. Stove pipe is used to get the heat into the ducts and to exhaust to the outside. Be sure all the heat is radiated before exhausting to the outside.

Pruning-Training - Insect and Disease Control

Pruning-Training: The same kind of pruning and training of tomatoes should be done under plastic as under glass. Instead of pruning out all suckers entirely, it is well to pinch the centers out of each sucker after two true leaves are formed on the sucker (see illustration). This allows additional leaves to enlarge which will feed the fruit clusters on the main stem. Thus the suckers should be pinched when they are several inches long. Some of the small suckers toward the top of the plant can be completely pinched out to prevent too many secondary branches from arising in the primary pinched suckers.



Pruning of the tomato plant

A well supported wire should center over each row. Binder twine should be tied at the base of each plant in a slip knot (never a hard knot), and after the string is wound around the plant a few times, it should be tied to the wire over the row. The framework of the house should not be used to support the overhead wire since the house may be pulled out of shape. Posts and 2" x 4"s should be set independent of the house framework to support the overhead training wire.

Insect and Disease Control: Most insects can be controlled by spraying or dusting with parathion and manzate. One and one-half pounds (0.15 pound per gallon) of parathion (15 percent) and 2 pounds of manzate (0.2 pound per gallon) to 100 gallons should be applied as a spray every week to 10 days. Care must be taken with parathion in the greenhouse, but it is not dangerous if precautions are taken. Malathion, a less dangerous compound to the operator, may be used instead of parathion. Parathion should not be used within 10 days of harvesting tomatoes. Dusting in a plastic house is effective, owing to the fumigating effects when all vents are closed. A 1 percent parathion and 7 percent manzate dust in talc is effective.

Sometimes slugs are found in the soil. Parathion will not affect them, but metaldehyde baits will kill them. These baits can be obtained under several trade names.

Yields

Tomatoes grown in the fall generally set fruit less satisfactorily than those grown in the spring. A conservative yield for the fall can be expected to be around 5 pounds per plant, whereas yields in the spring should average from 8 to 10 pounds per plant. To obtain these yields, it is necessary that the grower observe closely all the rules for optimum growing and fruit-setting conditions

Greenhouse tomatoes are harvested with the stem remaining on the fruits. Care should be taken in harvesting to prevent bruising and cracking. These tomatoes are noted for high quality and command a high market price.

Activated Hormones

It has been found that hormones activated with boron and sugar help to set under adverse weather and help to size up fruits and make them meaty and almost seedless under all conditions.

For additional information on growing hot house tomatoes, write to the Department of Horticulture, University of Kentucky, Lexington, Kentucky.

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Growing Tomatoes in Plastic Greenhouses

By E.M.EMMERT

Varieties, Soil Preparation and Growing Tomato Transplants

The requirements for growing tomatoes in a glass greenhouse apply also to tomatoes under plastic. Varieties such as Valiant, Spartan Hybrid, Ohio-Michigan Hybrid and Early Giant Hybrid produce good crops under glass. Early Giant Hybrid and Valiant have given good yields at the Kentucky Agricultural Experiment Station. Because a greenhouse variety must be trained to a string or stake, a common field variety, such as Rutgers, makes a poor greenhouse variety.

The plants should be planted in sterilized soil, rich in organic matter. A mixture of 2 parts field soil, 1 part sand, and 1 part compost makes an ideal soil for seeding tomatoes. A regular hotbed or space in the plastic greenhouse may be prepared for seeding. About three times as many seed should be planted as the number of plants required. Seed should be covered to a depth of about 1/4 inch.

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About 10 days to 2 weeks after seeding, the plants should be transplanted in 3 x 3 inch spacings. Use the same type of soil for potting transplants as is recommended for seeding. Small clay pots or plant bands may be used for growing individual transplants. These are recommended since plants may be moved to the greenhouse soil with a minimum destruction of roots. The transplants are ready to be planted in the greenhouse soil bed in about 40 to 45 days. Care must be taken to keep the soil moist and to control insects and diseases.

Soil Sterilization

A good way to obtain good disease - and insect-free soil for seeding and potting is to select a clean spot of good field soil. Place a layer of well rotted leaves 4-5 inches deep over it. Sprinkle ammonium nitrate on the soil at the rate of 400 pounds per acre (10 pounds per 1,000 square feet). Stir the area thoroughly. This could be done with a spade, but a rototiller is much better. Incorporate the fertilizer into 4-6 inches of soil. Throw this into a low ridge. Cover with 2-mil plastic and fumigate with methyl bromide at the rate of 1 1/2 pounds to each 100 square feet, according to instructions coming with methyl bromide. The greenhouse soil itself needs only one pound of methyl bromide per 100 square feet.

Fertilizing

Tomatoes are particular about their fertilizer requirements at various stages of growth. In the greenhouse it is easy to induce vegetative growth at the expense of fruit set. Consequently, if the soil is high in nitrogen, no application of nitrogen should be made at the start, and 1,000 to 1,500 pounds (25-37 pounds per 1,000 square feet)

of 20-percent superphosphate (one-half of this amount if 43-percent treble superphosphate is used) and 200 pounds (5 pounds per 1,000 square feet) of potassium sulfate per acre should be incorporated. If the amount of nitrogen is not high, care should be taken not to add too much. About 100 to 200 pounds (2.5 to 5 pounds per 1,000 square feet) of ammonium nitrate is all that should be added, even on fairly low-nitrogen soils. If the soil is such that there is a possibility of phosphorus deficiency due to fixation, an application similar to the starting phosphorus application should be made when 3 or 4 clusters are in bloom. When about three clusters have set small tomatoes, a heavy nitrogen application should be made, even if the natural supply of soil nitrogen was ample at the start. This is because greenhouse plants are set close and require large quantities of nitrogen to mature fruits of good size. As much as 400 pounds (10 pound per 1,000 square feet) of ammonium nitrate per acre should be applied now and perhaps 200 pounds (5 pounds per 1,000 square feet) every 10 days until most fruits are sized. If it is suspected that the amount of potash may get low, 100 pounds of potassium sulfate may be added with the nitrogen applications. This fertilizer should be spread 6 to 8 inches away from the base of the plant and watered into the soil.

The greenhouse ground bed should be loose, pliable and fertile. Addition of 10 to 15 tons per acre of manure (500 to 750 pounds per 1,000 square feet) to a field soil makes an ideal green house tomato soil. If you use manure, be sure to have sufficient phosphorus. It is usually best to mix 200 pounds of 20-percent superphosphate with

each ton of manure applied. If you are sure your soil is exceptionally high in phosphorus, this may not be necessary.

Transplanting

After the soil is pulverized and sterilized and the plants are of proper size, they may be moved to the soilbed. They should be transplanted to the depth of the first true leaves. A starter solution may be added to one pint of water for each plant. Follow the directions on the starter-solution container label. About 7 teaspoonfuls of 5-10-10 or 12-12-12 (if nitrogen is low) per 10 quarts of water makes a good starter solution. Use one pint per plant in transplanting. Allow about 3 square feet of space for each plant. Wider spacing is a waste of valuable area. A spacing 3'x1' has been found ideal. This 3-foot spacing between rows allows space for training and pruning.

Watering and Mulching - Heating and Ventilating

Watering: The proper application of water is a must. It is better to water thoroughly, keeping a constant supply of moisture. Thorough watering saves labor and reduces danger of disease. The best way is to attach a hose to a long mop or broom handle and hold the end of the hose just a few inches off the ground. This keeps water off the foliage and prevents spattering. A plastic hose with holes in it, with the pressure reduced, does well, but any system of throwing water in the air and on the foliage increases disease. Watering should be done from 9:00 a.m. to 11:00 a.m. on clear days. In the case of plastic houses, special care must be taken since the plastic holds in the water, and the relative humidity tends to be

high. This causes cladosporium leaf mold. Watering only on sunshiny days in the morning is almost a must.

Mulches: Disease spread can be lessened by using mulches in furrow, especially such types of mulches as aluminum foil and plastic. These mulches hold in moisture, making watering less frequent and also prevent spattering which causes disease to be carried to plant leaves. These mulches are being tried out now at the Agricultural Experiment Station. Mulching prevents evaporation of water and allows for a more even distribution of moisture for plants over the growing season. Growth cracks, blossom-end rot and malformed tomato fruits sometimes result from an uneven supply of water at critical growing periods.

Heating: An even heat is important. This is obtained best by hot water fin-radiation. Steam carries better, but is not so even a source of heat. Both of these require boilers, circulators and pipes. Any kind of fuel may be used since it is burned outside the plastic house. A much cheaper system as far as overhead costs go, is to burn gas in the plastic house. So far, only liquid petroleum gas has been found satisfactory. Most natural gases contain harmful substances, although reports have shown that some types of heaters can be used safely. Liquid petroleum gas is safe because only CO_2 and water are given off. In fact, the CO_2 stimulates faster growth. The water causes high humidity and, hence, reduces the need for watering, but makes ventilation necessary.

Considering overhead on boilers and handling costs of coal, it seems that liquid



Fig. 2.— Use of "gated" irrigation pipe permits regulation of the amount of water supplied the snap beans protected by the plastic mulch.

the closer should be the slits, varying from about 3 feet on a 1-percent slope to 1½ on a 10-percent slope.

Soluble fertilizer can be easily washed through the slits by irrigation water. Complete fertilizer, put in ahead of the laying of the plastic, is utilized better under the plastic than in uncovered soil. There is more soil moisture to make it available to the plants and less leaching. Roots grow to the surface under the plastic so that the fertilizer does not need to be applied deep to be utilized.

Black polyethylene plastic costs ½ cent a square foot; thus an acre can be covered for about $200. On a yearly basis, the cost would be about $50 because the material lasts for 4 years. On wide-row crops only about one-third or one-fourth of the area needs to be covered, which reduces the annual cost to $12-16.

This leaflet is a reprint of an article which appeared in *Kentucky Farm and Home Science*, Vol. 2, No. 1, pp. 8-9, Winter, 1956, published by the Kentucky Agricultural Experiment Station, University of Kentucky.

Lexington, Kentucky April, 1956

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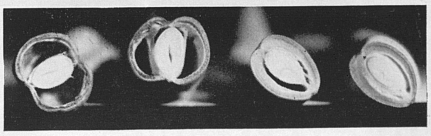
Fig. 3.— Plastic mulch between rows of snap beans. The slits in the center permit water to enter the soil. The steeper the slope, the closer should be the slits. If desired, soluble fertilizer can be added to the irrigation water.

Plastic Mulch for Vegetables

By E. M. EMMERT



Cross section of snap beans grown (left) without mulch and unirrigated and (right) with mulch and irrigated.

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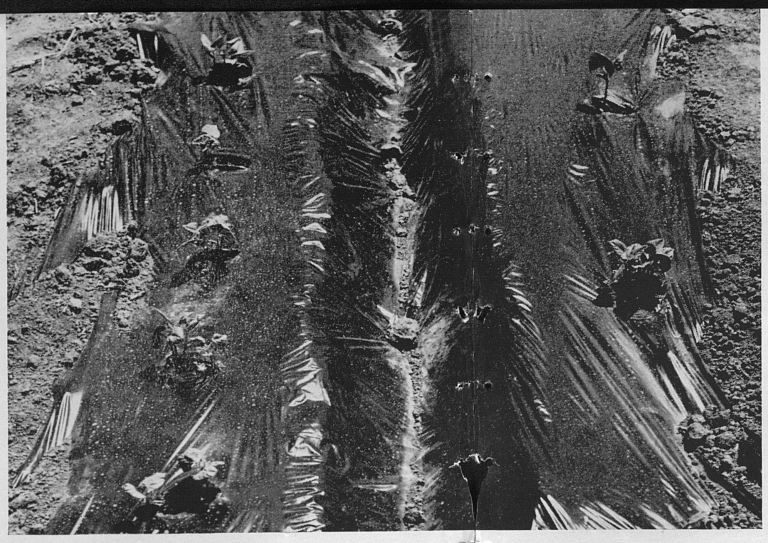

Fig. 1.— Snap bean seedlings emerging through slits in the black plastic mulch. The seed was planted with a corn jobber. Note the condensed moisture droplets on the undersurface of the plastic.

Plastic Mulch for Vegetables

By E. M. EMMERT

Either dry weather or heavy rains call for mulching around vegetable plants. In the first instance, the purpose is to conserve moisture; in the second, to prevent packing of the soil and ground-spotting of the fruits. In addition, mulching helps to control weeds.

Paper has been found effective as a mulching material, but it is too costly and fragile. Also, it often deteriorates and becomes useless before the season is over. Though aluminum foil does not deteriorate so fast as paper, it too is fragile and costly. Laminated aluminum foil on plastic is a mulching material well suited to hot summer weather because it reflects heat and cools the soil temperature. It is long-lasting but considerably more expensive than black polyethylene plastic, which has been tried successfully at the Kentucky Agricultural Experiment Station. (Recently announced is the development of a plastic impregnated with aluminum particles, which also holds promise as a mulching material.)

The 0.0015-gage black polyethylene plastic is the cheapest and most efficient mulch yet tried on vegetables at the Kentucky Station. Kentucky Wonder beans yielded nearly 200 bushels per acre more with the use of the black plastic and were marketed earlier than beans grown on the check plots. Tomatoes also produced larger and earlier yields, and ground spotting was reduced. It seems logical to expect the production of good, non-spotted fruits in wet seasons without staking and without the cracking and sunburning which occurs when tomatoes are staked.

The black polyethylene plastic is tough and stays in position satisfactorily if soil is placed along the edges and, in the case of wide sheets, at intervals in the center. With the use of a corn jobber, large seed can be planted readily. The edges of the punctured opening spring back as soon as the jobber is withdrawn, leaving only a narrow slit. Shoots from the planted seed can emerge through the slit, but those from weeds present in the soil do not. Consequently, no weeding is necessary in the row. Techniques have yet to be devised for the planting of small seed under plastic. If desired, plants can be easily set through holes made in the plastic, and the plastic will spring back, encircling the stems and smothering out weeds. It is possible that a machine could be developed which would drill in fertilizer, lay the plastic and job in the seed or place plants, all in one operation.

Weeds Easily Controlled

Weeds growing along the edges of the plastic are controlled satisfactorily with the use of a rototiller, though other types of cultivators could be used.

When irrigation is practised, the furrows are covered with plastic and T-shaped slits are made in the plastic, with the stem of the "T" towards the direction from which the water is flowing. The steeper the slope

The Balance Sheet: Black Plastic as a Mulching Material

ADVANTAGES

1. Controls weeds effectively in the row, with no danger to crops such as may result from use of herbicides.
2. Increases soil temperature 5-10 degrees, forcing seeds to germinate faster and plants to grow faster because of increased nitrification and heat.
3. Reduces crusting and packing of the soil, resulting in less seed rot and a much better stand under adverse weather conditions.
4. Greatly lessens water loss. Permits furrow irrigation on porous soils. Only about one-third as much water needed as for rotary sprinkler irrigation.
5. Reduces disease because of less spattering of soil-laden water on the plants. Plastic-covered rows prevent ground-spotting of fruits or pods.

DISADVANTAGES

1. More expensive than herbicides if one considers the cost of the plastic and the labor for laying.
2. Soil may become too warm during summer with subsequent injury to seeds.
3. Necessary to make slits before planting or seeding; a hand corn planter (jobber) has been used effectively.
4. Necessary to take up before plowing next year. Plastic can be re-used.

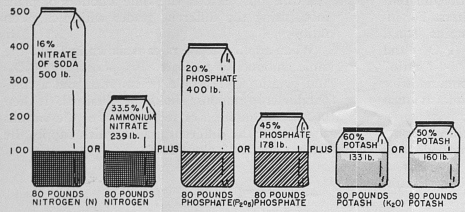

Fig. 4. An application of 80 pounds of each plant food per acre applied in a straight fertilizer would require the amount of three of the straight fertilizers shown in this sketch.

land should be considered in deciding whether to purchase mixed or straight fertilizers. The farmer must make this decision. Figures 3 and 4 show the amounts of straight and mixed fertilizers required to supply the equivalent amounts of plant food.

In the manufacture of mixed fertilizers, various straight materials are put together in such proportions as to give the desired analysis. The total amount of plant food that can be put into a mixed fertilizer will depend on the analysis of the straight materials used in preparing the mixture, as shown in Fig. 5.

It is obvious from Fig. 5 that a much higher analysis fertilizer can be made when 45-percent superphosphate is used as a source of phosphate than when a 20-percent superphosphate is used. When 20-percent superphosphate is used in making a 3-12-12 grade fertilizer, the carriers for the nitrogen (N), phosphate (P_2O_5), and potash (K_2O) make 95 of the 100 pounds. Five pounds of some conditioner or make-weight material such as dolomite, sand, organic wastes, etc., is added to give the desired weight. If a 45-percent superphosphate is used to supply the phosphate, a 4-16-16 grade (a higher analysis 1-4-4 ratio fertilizer) can be made, using material as shown in the illustration. The carriers for the plant food used in preparing the 4-16-16 would total 82.4 pounds and 17.6 pounds of a conditioner or make-weight material would have to be added to give the desired weight. Three hundred pounds of the 4-16-16 would supply the same amount of nitrogen (N), phosphate (P_2O_5) and potash (K_2O) as 400 pounds of a 3-12-12. In Fig. 5 ammonium sulfate is used to supply all the nitrogen in the fertilizer; however, in practice, solutions would be used to supply part of the nitrogen. It is apparent from Fig. 5 that mixed fertilizers containing only 27 pounds of plant food may contain only a small amount of conditioner or make-weight material.

A small amount of a conditioner is desirable in fertilizer to improve the physical properties of the material. There is no objection to conditioning materials so long as they do not increase the cost of the plant foods; however, excessive amounts will usually increase this cost due to the extra handling, bagging and shipping charges.

To obtain the maximum return on the money invested in fertilizer those plant nutrients deficient in the soil must be purchased. Furthermore, the cost of these plant foods applied to the soil must be used as a basis in buying material rather than the cost per bag or ton of fertilizer so the importance of knowing what is contained in the fertilizer bag cannot be overemphasized. Wise selection and purchase of plant foods will contribute greatly toward a more efficient agricultural program.

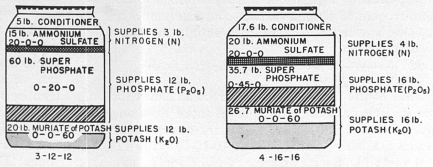

Fig. 5. The amount of materials required in the manufacture of two fertilizer mixtures.

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15M—6-56

What's in the Fertilizer Bag?

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service
FRANK J. WELCH, Dean and Director

LEAFLET 171

What's In The Fertilizer Bag?

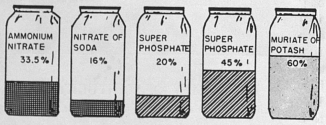
By HAROLD F. MILLER

For you to evaluate properly a particular fertilizer, you must know the amounts of plant food it contains. This is because fertilizers vary considerably in the total amount and the kinds of nutrients they carry. Usually the fertilizer that costs the least per bag or ton is the most expensive when calculated on the basis of the plant food it contains. Since fertilizers are applied to supply plant nutrients deficient in the soil, the primary consideration in their purchase should be the cost of the plant foods rather than the cost of the material.

Commercial fertilizers will supply nitrogen, phosphorus and potassium, the three plant foods most commonly deficient in Kentucky soils. A fertilizer containing only one of these plant foods is referred to as a "straight" fertilizer. "Mixed" fertilizers contain two or all three of the common plant foods.

The amount of each of the plant foods contained in a fertilizer is printed on the bag as a percentage present, which simply means the pounds of a particular plant food contained in each 100 pounds of material.

The materials shown in Fig. 1 are only a few of



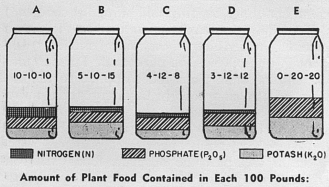
Amount of Plant Food Contained in Each 100 Pounds:

33.5 Pounds Nitrogen	16 Pounds Nitrogen	20 Pounds Phosphate (P_2O_5)	45 Pounds Phosphate (P_2O_5)	60 Pounds Potash (K_2O)

Fig. 1. Straight fertilizers contain only one plant food.

the straight fertilizer materials sold in Kentucky and are used for illustrative purposes. You will note that only one plant food is contained in each material and that they vary considerably in the amounts of the particular nutrient carried. Ammonium nitrate contains over twice as much nitrogen as does an equal weight of nitrate of soda. The 45-percent superphosphate contains 2.25 times as much P_2O_5 as an equal weight of 20-percent superphosphate.

Only a few of the many grades of material offered for sale in the state are shown in Fig. 2, but every



Amount of Plant Food Contained in Each 100 Pounds:

	(A)	(B)	(C)	(D)	(E)
Lb. Nitrogen (N)	10	5	4	3	0
Lb. Phosphate (P_2O_5)	10	10	12	12	20
Lb. Potash (K_2O)	10	15	8	12	20

Fig. 2. Mixed fertilizers contain two or three plant foods.

bag of mixed fertilizer on the market must have the analysis printed on the bag. The first number indicates the pounds of nitrogen (N) contained in each 100 pounds of material. The middle figure refers to the amount of phosphate (P_2O_5), while the last figure shows the pounds of potash (K_2O) in each 100 pounds of a particular fertilizer. By referring to these numbers printed on the bag, you can tell what plant foods are contained in the material, as well as how much of each.

As is true of straight fertilizers, mixed fertilizers vary considerably in the total amount of plant foods they contain. In addition, there is considerable variation in the proportion of the different plant foods contained in mixed fertilizers. For instance, the 10-10-10 fertilizer contains equal amounts of nitrogen (N), phosphate (P_2O_5), and potash (K_2O) and is referred to as "1-1-1 ratio" fertilizer, while a 5-10-15 fertilizer contains twice as much phosphate (P_2O_5) and three times as much potash (K_2O) as it does nitrogen (N); consequently, it is referred to as a "1-2-3 ratio" fertilizer. Some mixed fertilizers contain only two plant foods, such as the 0-20-20 which contains equal amounts of phosphate (P_2O_5) and potash (K_2O) but no nitrogen and is an 0-1-1 ratio.

An Analysis for Particular Needs

Mixed fertilizers of different ratios make it possible to select an analysis that will most nearly supply the additional plant food needs of a particular crop growing on soils which vary in the amounts of available nutrients. After you consider the plant food needs of the crop to be grown and the availability of plant nutrients in the soil, and it seems that about equal amounts of each of the three plant foods are needed, then you would select a 1-1-1 ratio fertilizer to supply equal amounts of each plant food. Should you decide that about 40 pounds of nitrogen (N), 120 pounds of phosphate (P_2O_5) and 80 pounds of potash (K_2O) should be applied per acre, then you would select a 1-3-2 ratio mixed fertilizer for supplying the plant foods in the desired proportion $\left[\frac{40\text{-}120\text{-}80}{40} = 1\text{-}3\text{-}2\right]$.

In top-dressing legumes, if it is recommended that no nitrogen, 60 pounds of P_2O_5 and 120 pounds of K_2O be applied a 0-1-2 ratio to supply the plant food $\left[\frac{0\text{-}60\text{-}120}{60} = 0\text{-}1\text{-}2\right]$ would be required.

Most of the ratios of fertilizer recommended for use in Kentucky are available in more than one grade. In the 1-1-1 ratio there are at least four grades available—namely, 8-8-8, 10-10-10, 12-12-12, and 14-14-14. By varying the rates of application,

you can apply exactly the same amounts of plant food, using the different grades within a given ratio.

When applied at the rates as shown in Fig. 3 the same amounts of nitrogen (N), phosphate (P_2O_5) and potash (K_2O) would be supplied and a comparable crop response should be obtained. It then becomes a question of relative cost of the various amounts of the different grades which supply the same amount of plant food.

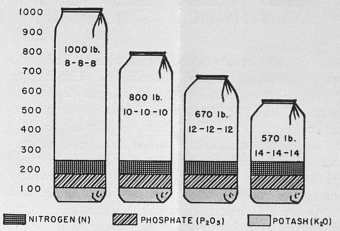


Fig. 3. An application of 80 pounds of each plant food per acre, applied in a mixed fertilizer, would require the amount of one of the mixed fertilizers shown in this sketch.

How to Apply a Straight Fertilizer

Straight fertilizer materials can be used to supply the same amounts of plant food as are applied in mixed fertilizers and will give just as good a crop response. When only one plant food is needed, a straight fertilizer containing only that particular nutrient should be bought. If more than one plant food is needed, the additional elements can be more economically supplied by straight fertilizers than by mixed fertilizers, owing to certain additional costs in manufacturing the latter. The straight fertilizers, however, must be properly mixed or applied by going over the land several times. The cost of the plant foods *applied to the*

entire lawn will do wonders. If this renovation in started in the early spring, before the middle of March, the entire lawn may be fertilized by using 15 pounds of a high grade fertilizer on each 1000 square feet of surface. White Dutch clover may be sown in late March, sowing 2 ounces to each 1000 square feet. A seeding of good bluegrass, one pound to each 1000 square feet, should be made in September.

Another application of fertilizer should be made in November, using 15 pounds to 1000 square feet.

The grass should be left 1 1/2 inches high at all times when cutting.

The good looking lawn demands a regular program, and at definite times of the year the following things must be done to carry out schedule.

1. Every September, regardless of how good the sod may be, some extra good bluegrass seed should be sown. Usually, one-fourth to one-half pound of seed to each 1000 square feet of area will be sufficient. Bare spots should have more seed.

2. In November, the lawn should be fed, using a good, high grade fertilizer at the rate of 15 pounds to each 1000 square feet.

3. In early March another application of fertilizer should be made.

4. The mower should be kept set to cut the grass at least 1 1/2 inches high.

CONTROL OF WEEDS

Every lawn will have some weeds in it, but the broad-leaf kinds may be controlled by digging if there are just a few, or by using one of the chemical weed killers or herbicides. Directions should be carefully followed when using these materials.

Although the most practical method for crabgrass control is good lawn management as previously mentioned, some degree of control can be obtained by using herbicides.

Several chemicals are now being used as the active ingredient in "crabgrass killers" sold under various trade names. Some of the materials most commonly used at present are potassium cyanate, phenyl mercuric acetate and disodium methyl arsonate.

Since it is quite improbable that eradication of crabgrass will be obtained in one or two seasons, our only hope is to control this pest as much as possible and stimulate the growth of desirable lawn species of plants.

Any herbicide should be purchased from a reliable dealer, and the directions on the label of the container should be followed closely.

Chemical weed control should not eliminate the necessity of good lawn management or cultural practices of weed control, but should be used as a supplement to them. For this reason, reseeding and fertilization in the fall should follow any treatment used for crabgrass control.

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THE LAWN

By N. R. ELLIOTT

Every home owner wants a good looking lawn, one that is properly graded and covered with velvety green grass because all other landscape plantings rest on the basis of a good lawn. It provides a setting, adds to the beauty of the trees, evergreens, shrubs, and flowers. A good lawn involves an investment of time, labor and a certain amount of expense. However, the expense need not be excessive if a well defined program of lawn management is followed.

PLANTS FOR KENTUCKY LAWNS

Kentucky bluegrass is the best grass to use on Kentucky lawns, and wherever it can be grown it should be used. There are a few sections in the state where it may be necessary to use Bermuda grass. White Dutch clover is the small companion plant used mostly as a filler for the bluegrass on the lawn. This little plant grows native all over Kentucky, and many persons will not even bother to sow the seed.

For shady sections of the lawn, either Colonial Bent grass or Red Chewings fescue are most often used for additional ground covers where the bluegrass may be light.

LEAFLET 172

Cooperative Extension Work in Agriculture and Home Economics
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
UNIVERSITY OF KENTUCKY
and the
U.S. DEPARTMENT OF AGRICULTURE, Cooperating
FRANK J. WELCH, Director
Issued in furtherance of the Acts of May 8 and June 30, 1914.

THE NEW LAWN

A new lawn should be properly graded, the soil prepared to a depth of at least 4 inches and worked until it is in excellent condition, free from clods, trash of any kind, etc. Then the soil should be tested to determine if lime, phosphate and potash are needed. If any or all of these materials are needed, they should be applied immediately and worked into the top 2 or 3 inches of soil. Finely ground limestone is the best to use for supplying the calcium. If the fertility of the soil is not too high, a complete fertilizer (one containing nitrogen, phosphate and potash) should be applied and worked into the soil with the lime. Ten to 15 pounds to each 1000 square feet of surface will be the amount to apply. Your county agricultural agent should be consulted for information relative to the amount and method of application of these materials.

After the lime and fertilizer have been applied and worked into the soil, the lawn is ready for the first seed. Should the lawn be ready for seeding at any time except the first part of September, it is recommended that quick-growing cover crops be used to prevent erosion and to provide a ground cover. The two plants recommended for this are annual Rye grass and Redtop. Both of these will germinate in a few days, produce a good ground cover and may be kept clipped just like a bluegrass sod.

The rye grass should be sown first, at the rate of 2 1/2 to 3 pounds to each 1000 square feet. The lawn should be raked lightly to give these seed some cover.

After the rye grass has been seeded, and the surface raked, the red top should be sown. The amount to use is 2 to 3 ounces for each 1000 square feet of surface. To sow this small amount of seed and get an even distribution, the seed should be mixed with a half-gallon of sand or dry soil. The lawn should not be raked after the redtop has been sown; however, it should be rolled with a lawn roller weighing about 400 pounds. The roller firms the soil and hastens the germination of seed.

As soon as the rye grass is about 5 inches high, it should be clipped, and the mower set to cut at least 2 inches high. It should be clipped as often as necessary to keep the lawn looking good.

About the middle of September the seeding of Kentucky bluegrass should be made, sowing one pound to each 1000 square feet of surface. The lawn should be clipped just before sowing, and if the growth is heavy it should be raked and the clippings removed. Raking should not be done to loosen the soil. The very best bluegrass seed that money can buy is the kind to use. The seed should weigh at least 21 pounds to the bushel and have a germination of 85 percent or better.

In November the new lawn should be fed, using 15 pounds of a good, high grade fertilizer to each 1000 square feet of surface. If straw is available for mulching the lawn, one bale should be used to each 1000 square feet of surface. The mulch should be applied just after the bluegrass has been seeded.

Not later than March 15, another application of fertilizer should be made, using the same amount as was applied in November. Clipping should begin when the grass is about 5 inches high, but the mower should be set to cut at least 2 inches high and be kept that way all the time.

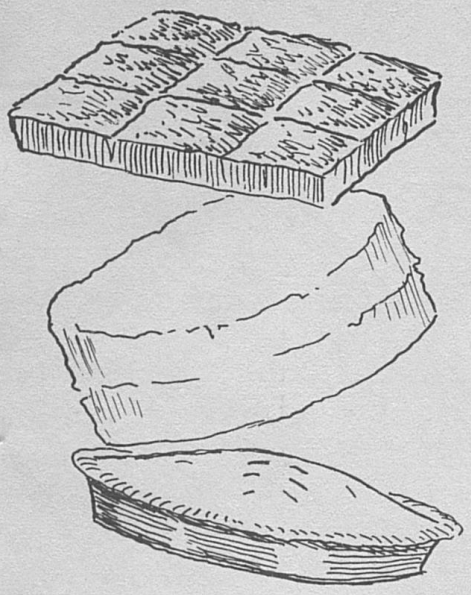
If White Dutch clover is desired in the lawn, about 2 ounces of seed should be sown to each 1000 square feet of surface. The seed should be mixed with sand or dry soil and sown the last of March.

The following September another seeding of Kentucky bluegrass should be made, sowing one-half pound to each 1000 square feet of area.

THE OLD LAWN

The old lawn that has been neglected for years should be given attention. It should not be plowed or disked because these tools always damage walks and plants. All dirt and trash should be raked up and removed and if there are saw briars and big weeds, they should be dug up. If the old lawn has depressions or mounds, the depressions should be filled by bringing in soil from a field, and the mounds should be leveled. A smooth, even surface is what is wanted. It will take several years to reclaim and rejuvenate an old lawn that has been neglected.

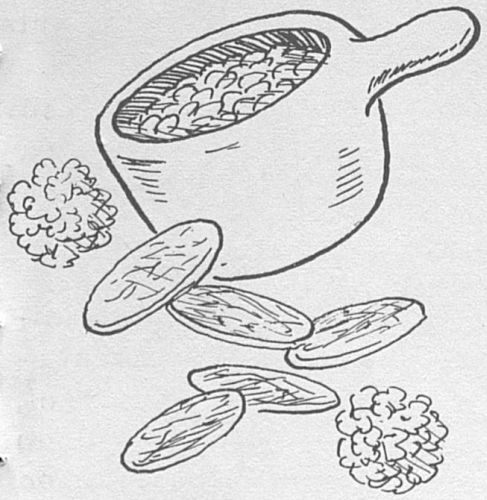
If the sod is very light and there are bare spots, the soil should be loosened with a steel garden rake and some redtop scattered over the loosened soil. A light application of top soil scattered over the



LEAFLET 173

KENTUCKY *Sorghum* RECIPES

BY WINNIFRED A. SHANE



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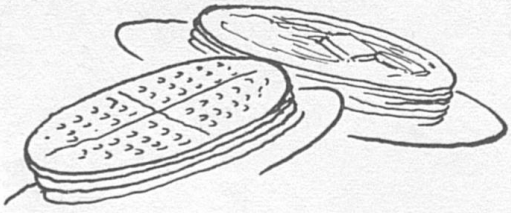

Abbreviations Used in Recipes

c----------cup T------- tablespoon
t----- teaspoon lb----------pound

All recipes have been tested by the author in the School of Home Economics, University of Kentucky.

Kentucky Sorghum Recipes

BY WINNIFRED A. SHANE

Here are recipes using sorghum. Some are new, others are old favorites.

Sweet sorghum sirup is known as sorgo sirup, sorghum, or sorghum molasses. The term "molasses" does not fit because sorghum sirup is made by evaporating the extracted plant juice or sap without the removal of any sugar. Molasses is the liquid which remains after part of the sugar has been removed, as in the manufacture of sucrose from sugar cane.

Sorghum is a member of the grass family, sorghum vulgare. Its stalk resembles that of sugar cane but the two are not closely related.

Good sorghum or sorgo sirup is made from pure sorgo juice; it has a clear amber color with a pleasing, characteristic sorghum flavor.

SORGHUM A "BONUS" FOOD

Sorghum is a nutritious food for people of all ages and is reasonable in cost.

Wise cooks are glad to use a food bargain like sorghum because it is more than a sweetener. Sorghum is a "bonus" energy food. It is composed of sucrose, simple sugars, iron, calcium, phosphorus, and traces of riboflavin and niacin.

Sucrose and simple sugars supply heat and energy. Sorghum is easy to digest because the simple sugars are already in the form that can be absorbed by the body.

The minerals - iron, calcium, and phosphorus - are especially needed by children and adults for growth, body repair, and general good health. The traces of vitamins do add to the diet.

COOKING WITH SORGHUM

All measurements in the recipes are

into the measuring cup or spoon, or dip out with another spoon. Sorghum is thick and will cling to the underside of the measuring cup if it is dipped directly into the sirup.

Since sorghum "rounds up" on the surface, it is handy to use the plain rim-type measuring cup for dry ingredients, then level off the top with a spatula. If a "liquid" measuring cup is used, have the measuring line at eye level. To save on dish washing, measure shortening first, then sorghum, using the same measuring cup.

Sorghum is slightly acid but gives excellent results with either baking powder or soda as a leavening agent. To get the most action from the leavening agent, add it with the flour, as called for in the recipe directions.

Sorghum that has crystallized or sugared should have the crystals dissolved to give the best results in cakes and cookies. Warm it over low heat until the crystals disappear. Cool before using.

Cakes and cookies made with sorghum keep very well and remain moist when stored in a covered container. Sorghum makes delicious fruit cake.

Serve sorghum sirup daily. Use it as a spread, either plain or mixed with butter or margarine.

Children will love "Brown Cows" made by stirring one tablespoon of sorghum in each glass of cold milk. For a family treat, serve hot "Brown Cows" with a dash of cinnamon.

Use sorghum in bread pudding, baked apples, applesauce, and custards. Remember sorghum is a "bonus" food the whole family can enjoy for its flavor as well as for its food value.

GINGERBREAD

1/2 c shortening
1/2 c sugar
2 eggs, beaten
1 c sorghum
1 c boiling water
2 1/2 c sifted flour
1 t ginger
1 1/2 t baking powder
1/2 t soda
1/2 t salt

1. Beat shortening, sugar, and eggs together thoroughly.
2. Mix sorghum and water.
3. Sift dry ingredients and add alternately with the liquids to the egg mixture.
4. Stir just enough to combine.
5. Pour into a well-greased cake pan, 12 x 7 x 2 inches.
6. Bake at 350°F, moderate oven, for 45 minutes or until done.
7. Makes about 18-20 servings.

UNCLE SAM'S GINGERBREAD*

2 c sifted flour
1 t ginger
1 t soda
1 t salt
1/2 c melted shortening
1 c sorghum
1/2 c boiling water

1. Sift dry ingredients into mixing bowl.
2. Add melted shortening, sorghum, and boiling water. Stir until well mixed.
3. Pour into a well-greased pan 8 x 8 x 2 inches.
4. Bake at 350°F, moderate oven, for 25 minutes or until done.
5. Makes 16 two-inch squares.

*A gingerbread recipe used during World War I when sugar was scarce. It is easy on the budget and much better than you may think.

SORGO BROWN BREAD

2 eggs, beaten
2 T melted shortening
3/4 c sorghum
1 c buttermilk or sour milk
1 c sifted flour
2 c graham flour
1 t baking powder
1 t salt
1 t soda
1 c seedless raisins

1. Combine eggs, melted shortening, and sorghum.
2. Measure white and graham flour and combine with baking powder, soda, salt, and raisins.
3. Add buttermilk and dry ingredients alternately to egg mixture. Stir well.
4. Fill five greased No. 2 tin cans 2/3 full.
5. Cover with two thicknesses of waxed paper and fasten with a string.
6. Steam for three hours in a steam cooker.
7. Makes five loaves.

OATMEAL BREAD

1 c oatmeal
1 c boiling water
1 c scalded milk
1/2 c sorghum
1 1/2 t salt
1 T shortening
1 pkge dry yeast or one yeast cake dissolved in 1/4 c lukewarm water
4 1/2 c sifted flour

1. Pour boiling water and milk over rolled oats.
2. Add sorghum, salt, and shortening.
3. Cool to lukewarm and add yeast mixture.
4. Stir in flour to make a soft dough. Dough will be sticky.
5. Let rise until double in bulk. Beat thoroughly with a spoon.
6. Turn into two greased bread-pans. Let rise again.
7. Bake in moderate oven 350°F for 1 hour. If a less moist bread is desired, add enough flour in the beginning to make a stiff dough. Knead and shape into loaves in "Step" 5.
8. Makes two medium-sized loaves.

KENTUCKY STACK CAKE

1 c sorghum
1 c butter or margarine
1 c sugar
4 c sifted flour
2 t baking powder
1/2 t salt
1/2 t cloves
1/2 t soda
1/4 c milk
4 large eggs (1 c)

1. Cream sorghum, butter and sugar until well blended.
2. Combine milk with well beaten eggs.
3. Sift dry ingredients together. Add to creamed mixture alternately with egg-milk liquid. Stir only until smooth.
4. Divide batter into 6 equal amounts, about 1 cup of batter in each.
5. Spread batter in well-greased 9-inch cake pans. Makes 6 layers.
6. Bake at 350°F for 12-15 minutes.
7. Stack layers with apple sauce on each layer. Use about 3 cups of apple sauce sweetened and spiced to suit your family's taste.
8. Cake is better if stored in a tight container for a few days before using.

Serve plain or with whipped cream.

This is a cooky-dough-type stack cake, sometimes called a quick fruit cake. Dried apples, cooked to a thick sauce and seasoned with cloves, made the filling for stack cakes of old. The dehydrated apples on the market today make a good filling. Make the sauce as smooth as possible, as the cake cuts better.

Try using dried peaches or apricots. For those who love to be different, try apple butter between the layers.... good.

MINCEMEAT SQUARES

1 9-oz. package dehydrated mincemeat
1 c water
3/4 c shortening
3/4 c sugar
1/3 c sorghum
2 c quick rolled oats (oatmeal)
1 1/2 c sifted flour
3/4 t salt

1. Break mincemeat into small pieces and place in a quart sauce pan.
2. Add water and bring to a boil, stirring constantly.
3. Lower heat and simmer for three minutes.
4. Remove from heat and cool.
5. Cream shortening, sugar, and sorghum.
6. Add flour, salt, and rolled oats to mixture and blend thoroughly.
7. Press firmly half the rolled oat mixture into a greased square pan (9 x 9 x 2 inches).
8. Spread all the mincemeat evenly over the pressed layer.
9. Cover the mincemeat with the remaining rolled oat mixture.
10. Bake at 350°F for 35-40 minutes.
11. Cool. Cut in squares.
12. Makes about 16 two-inch squares.

1 2/3 cup of prepared mincemeat, well drained, may be used in place of the dehydrated mincemeat.

Mincemeat squares make a company dessert when topped with ice cream. They are favorites for school lunch or snack time.

SOUTHERN FRUIT CAKE

1 c shortening
1 c sorghum
1 c sugar
3 eggs
1/2 c buttermilk
3 c sifted flour
1 t salt
1 t cinnamon
1/4 t nutmeg
1/2 t cloves
1/2 t allspice
1/2 t soda
1/2 c currants
1 c seedless raisins
1 c nuts

1. Cream shortening, sorghum and sugar thoroughly.
2. Add eggs one at a time, beat well.
3. Combine and sift dry ingredients. Add alternately with buttermilk.
4. Plump* currants and raisins; add to mixture.
5. Pour into a 9 x 3 1/2 inch tube pan lined with well-greased heavy wrapping paper.
6. Bake at 300°F (slow oven) 2 1/2 to 3 hrs., or until a toothpick inserted in cake comes out clean.
7. Cool. Wrap in waxed paper or aluminum foil. Store in air-tight container in cool place.

*To plump seedless raisins and currants, wash and spread out flat in a pan. Cover. Heat in a 350°F oven until wrinkles come out and fruit is puffed.

Cakes and cookies should be thoroughly cooled before being stored. Fruit cakes made with sorghum are noted for their keeping quality as sorghum helps to retain the moisture.

The flavor of sorghum-made products is always good even after a period of storage.

SPICE CAKE

1/2 c shortening
1/2 c sugar
1 c sorghum
1 egg, beaten
2 1/2 c sifted flour
1 t baking powder
1/2 t soda
3 T cocoa
1 t allspice
1 t cinnamon
1/2 t cloves
1/2 t ginger
1 c milk

1. Cream shortening, sugar, and sorghum.
2. Add egg and beat well.
3. Combine and sift dry ingredients. Add to creamed mixture alternately with the milk, beating until smooth after each addition.
4. Pour in two well-greased and floured 9-inch cake pans.
5. Bake at 350°F for 30-35 minutes, or until done.
6. Cool. Frost with Sorgo Caramel Icing.
7. Makes a 9-inch two-layer cake.

Considering the food value of sorghum, one can almost "eat his cake and have it too."

SORGO CARAMEL ICING

1/4 c melted butter
2 T sorghum
2 c sifted confectioners sugar
2 T milk
1 t vanilla

1. Combine butter and margarine, blending thoroughly.
2. Add half the sugar. Stir well.
3. Add milk, vanilla and remaining sugar. Beat until smooth.
4. Spread on cake. Frosts two 9-inch layers, or two dozen cupcakes.

FROSTED SORGO BARS

1/2 c shortening
1 c sorghum
1 beaten egg
1/2 c strong hot coffee
1 1/2 c sifted flour
1/2 t salt
1 1/2 t baking powder
1/2 t soda
1 t cinnamon
1/2 t cloves

1. Cream shortening and sorghum.
2. Add egg and beat well.
3. Add sifted dry ingredients alternately with the coffee, stirring until smooth.
4. Turn batter into a well-greased and floured cake pan (9 x 13 inches).
5. Bake for 20-25 minutes at 350°F.
6. When cool, frost with Sorgo Caramel Icing, cut into bars and serve.
7. Makes about 1 1/2 dozen bars.

OLD-FASHIONED SORGO COOKIES

2/3 c shortening
1 c sorghum
1 c sugar
3 eggs, well beaten
1/2 c hot water
5 c sifted flour
1/2 t salt
3 t soda
Spices if desired

1. Cream shortening, sorghum, and sugar.
2. Add eggs and beat well.
3. Combine dry ingredients and add to creamed mixture along with the hot water.
4. Add more flour if needed to make a stiff cooky dough. Chill for rolled cookies for 4 hours or over night-less time if used for drop cookies.
5. Roll on floured board. Cut with 2 1/2 inch floured cooky cutter, or drop from teaspoon.
6. Place on ungreased baking sheet 1 inch or more apart.
7. Bake at 350°F for 10 minutes.
8. Frost with Sorgo Caramel Icing. Makes 5 1/2 dozen 3-inch cookies or about 100 drop cookies.

SORGO-PEANUT BUTTER COOKIES

1/4 c shortening
1/2 c peanut butter
1/2 c sugar
1/2 c sorghum
1 egg
1 1/4 c sifted flour
1/2 t baking powder
3/4 t soda
1/4 t salt

1. Cream shortening, peanut butter, sugar, and sorghum until fluffy.
2. Add egg and beat well.
3. Combine sifted dry ingredients with creamed mixture until blended.
4. Chill dough until firm.
5. Roll into balls the size of walnuts.
6. Place 3 inches apart on a lightly greased baking sheet.
7. Flatten each ball with a fork dipped in flour to prevent sticking.
8. Bake at 375°F (quick moderate oven) 10-12 minutes or until cookies are set.
9. Makes about 4 dozen 1 1/2 inch cookies.

GINGERSNAPS

1/2 c shortening
1/2 c sugar
1/2 c sorghum
1 egg
2 c sifted flour
1 t soda
1/2 t salt
2 t ginger

1. Cream shortening and sugar.
2. Blend in sorghum.
3. Add egg and beat well.
4. Stir dry ingredients into creamed mixture. Dough will be stiff, so be sure to mix thoroughly.
5. Chill for one hour in the refrigerator.
6. Roll out on a floured board. Cut with lightly-floured cutter.
7. Place on a greased baking sheet.
8. Bake at 350°F (moderate oven) for 12-15 minutes.
9. Makes about 4 dozen 1 1/2-inch gingersnaps.

Makes fine gingerbread "men" and "women."

SORGO BROWNIES

1/3 c shortening
1/3 c sorghum
1/3 c sugar
2 eggs, well beaten
1 c sifted flour
1 c nut meats
1/4 t salt
1/2 t vanilla

1. Cream shortening, sorghum, and sugar until well blended.
2. Add eggs and beat thoroughly.
3. Stir in flour, nut meats, salt, and vanilla.
4. Pour in well greased and floured 9-inch square cake pan.
5. Bake at 350°F for 20 minutes or until done. Makes 16 two-inch squares. To make CHOCOLATE BROWNIES add 3 tbsp. of cocoa to flour.

RUTH'S SORGO COOKIES

1/4 c sorghum
1/4 c peanut butter (crunchy if desired)
1 1/2 c crisp rice cereal
1/4 c nonfat dry milk

1. Cream sorghum with peanut butter.
2. Add cereal gradually. Stir until well mixed.
3. Add nonfat dry milk. Stir well.
4. Mold into balls the size of walnuts.
5. Roll in confectioners sugar to coat.
6. Top with a raisin if desired. Makes 15 balls.

This recipe was made by a young cook. So easy because there is no baking. Children love the flavor, and the cookies are nutritious, too.

OATMEAL COOKIES

1 c sugar
1/2 c sorghum
1 c shortening, melted
2 eggs
1/4 c milk
2 t cinnamon
1/2 t soda
2 c sifted flour
1 c chopped raisins with 2 T flour
2 c rolled oats

1. Cream sugar, sorghum and shortening.
2. Add eggs and beat well.
3. Add sifted dry ingredients and milk. Mix well.
4. Drop by teaspoonfuls on greased cooky sheet.
5. Bake at 375°F until lightly browned.
6. Makes about 4 dozen medium cookies.

SORGO DESSERT WAFFLES

1/2 c shortening
1 c sorghum
1 1/2 c sifted flour
2 t baking powder
1/2 t salt
1 t cinnamon
1/2 t nutmeg
1/2 t cloves
1/2 c milk
1/2 c black walnuts
1 c heavy cream, whipped

1. Cream shortening and sorghum.
2. Add eggs, one at a time, beating well after each.
3. Sift together dry ingredients and add alternately to creamed mixture with milk.
4. Bake in medium-hot waffle baker. Makes 6 waffles.
5. Sweeten whipped cream with sorghum to taste.
6. Serve waffles topped with whipped cream. For a very special dessert, sprinkle top of whipped cream with black walnuts.

Double the recipe and freeze the extras.

PUMPKIN PIE

2 c prepared pumpkin
1/4 c sorghum
2 eggs, well beaten
1/2 c sugar
1/2 t salt
1 t cinnamon
1/2 t ginger
1/4 t nutmeg
3/4 c milk
unbaked pastry

1. Combine all ingredients in the order listed.
2. Mix well and pour in a 9-inch pie pan lined with unbaked pastry.
3. Bake at 450°F for 10 minutes. Reduce heat quickly to 325°F and bake for about 30 minutes. Pie is baked when knife inserted in filling midway between center and edge comes out clean.
4. Cool. Serves 6-8.

Use this same recipe for SWEET POTATO or SQUASH PIE and omit the pumpkin.

PECAN PIE

3 eggs, well beaten
3/4 c sorghum
3/4 c sugar
1/4 c butter melted
1/3 t salt
1 t lemon or orange juice
1 c pecan halves

1. Beat together with a rotary beater all ingredients except the pecans.
2. Stir in pecans and pour into pastry-lined 9-inch pie pan.
3. Bake at 350°F for 40-45 minutes or until filling is set.
4. Cool and serve. Makes one 9-inch pie.

For SORGHUM PIE, omit the pecans and serve with sorghum sweetened whipped cream.

DATE PUDDING

1 c sorghum
1/3 c butter, melted
1 c milk
3 c sifted flour
4 t baking powder
1/2 t salt
1/2 t each of cloves, allspice, nutmeg
3/4 lb cut-up dates

1. Mix sorghum and melted butter.
2. Add sifted dry ingredients alternately with milk, beating thoroughly after each addition.
3. Coat dates with a small amount of flour and add to mixture.
4. Pour into well greased 2-quart mold.
5. Steam 2 1/2 hours. Serve hot.
6. Makes 12 servings.

INDIAN PUDDING

2 1/2 c milk
1/2 c yellow corn meal
1/4 t salt
1/2 t cinnamon
1 T butter
1/2 c sorghum

1. Heat to boiling 1 1/2 cups milk in saucepan.
2. Add the cornmeal mixed with 1 cup cold milk to the hot milk.
3. Cook until slightly thick, stirring constantly.
4. Remove from heat. Add salt, cinnamon, butter and sorghum. Stir well.
5. Pour in well-greased 1 1/2 -quart baking dish.
6. Bake in slow oven (325°F) for 40 minutes.
7. Serve hot or cold with cream. Makes 6 servings.

BROWN BETTY

1/4 c melted butter
2 c bread-crumbs
2 c sliced apples or other fruit
1/2 c fruit juice or water
1/2 c sorghum
Cinnamon or other spices

1. Pour melted butter over crumbs. Stir until well coated.
2. Arrange layer of buttered crumbs and fruit in a greased baking dish.
3. Combine sorghum with water or fruit juice and pour over the top of crumb mixture.
4. Bake at 350°F for 45 minutes or until apples are tender.
5. Serve either hot or cold with cream.

SORGO MUFFINS

1 egg, well beaten
1 c milk
1/4 c soft shortening
1/4 c sorghum
2 c sifted flour
3 t baking powder
1/2 t salt

1. Mix egg, milk, shortening, and sorghum. Beat well.
2. Add sifted dry ingredients. Stir just enough to combine. Batter may be lumpy.
3. Spoon batter in well-greased and floured muffin tins.
4. Bake at 400°F for 20-25 minutes.
5. Makes 12 medium-sized muffins.

Serve with sorghum and butter for a cold morning treat.

SCOTCH GRIDDLE CAKES

2 eggs, beaten
2 c buttermilk or sour milk
2 T sorghum
1/2 c sifted flour
1 t soda
1 t salt
1 1/2 c quick rolled oats (oatmeal)
1 T melted shortening

1. Combine beaten eggs, buttermilk, and sorghum.
2. Add dry ingredients, stirring until well mixed.
3. Add melted shortening (batter will be thin).
4. Bake on a hot, lightly-greased griddle.
5. Makes about 16-18 three-inch griddle cakes.

Serve with sorghum and butter.

SORGO-GRIDDLE CAKES

1 egg, beaten
2 c milk
1 T sorghum
2 c sifted flour
1 t salt
4 t baking powder
2 T melted shortening

1. Combine beaten egg, milk and sorghum.
2. Stir in dry ingredients until batter is free of lumps.
3. Add melted shortening.
4. Bake on a lightly-greased griddle.
5. Makes about 18-20 four-inch griddle cakes.
6. If thinner cakes are desired, add a little more milk.

Good with sorghum and sausage.

BAKED BEANS

3 c navy beans
1 medium-sized finely cut onion
2 t salt
1/4 c sorghum
1 t mustard
1/4 lb salt pork or 3 T bacon drippings

1. Wash and soak beans in cold water overnight.
2. Simmer gently in same water for 1 hour.
3. Combine onion, salt, sorghum, and mustard with some of the hot liquid and add to beans.
4. Pour into baking dish or bean pot.
5. Cut salt pork into small pieces and bury in beans.
6. Bake in slow oven (250°-300°F) for about 6 hours
7. Add boiling water as necessary during baking.* Makes 10-12 servings.

* 1/2 cup tomato juice, catsup or chili sauce may be added in place of water if desired.

HURRY-UP BAKED BEANS

2 cans (1 lb) baked beans
1 T finely cut onion
2 T sorghum
2 T tomato catsup or chili sauce
6 bacon slices

1. Combine beans, onion, sorghum, and catsup.
2. Pour into 2-qt. baking dish. Top with bacon slices.
3. Bake in hot oven, 400°F, for 25-30 minutes, or until bacon is browned. Serves 6.

Try American cheese cut in 1/2-inch strips in place of bacon.

CANDIED SWEET POTATOES

1/4 c butter
3/4 c sorghum
1 t salt
1/2 c orange juice (canned peach, apricot, or pineapple juice)
8 cooked sweet potatoes

1. Melt butter in a heavy skillet.
2. Add sorghum, salt, and fruit juice. Bring to a boil.
3. Cut sweet potatoes in half lengthwise and place in sirup mixture.
4. Simmer for 15-20 minutes. Baste potatoes with sirup. Turn once.
5. Serve hot. Makes 6-8 servings.

GLAZED HALF-HAM

1/2 c sorghum
1/4 c orange juice
1/2 ham, cooked
40 whole cloves

1. Combine sorghum and orange juice.
2. Remove skin from hot cooked half-ham.
3. Score fat and place a whole clove in center of each section.
4. Place ham on rack in shallow pan and pour sorghum mixture over surface.
5. Bake in slow oven 325°F for 1 hour, basting occasionally until well glazed.

SORGO RAISIN SAUCE

1 T corn starch
1/2 c sorghum
1/4 t salt
1/2 c orange juice
1/2 c water
1/2 c raisins
2 T butter

1. Mix cornstarch, sorghum, and salt with water and orange juice.
2. Cook, stirring constantly, until mixture boils.
3. Add raisins and butter. Simmer for a minute. Serve over ham slices or canned luncheon meat.

QUICK BARBECUE SAUCE

1 medium onion, sliced
1 T shortening
1 1/2 t salt
1/2 c catsup or chili sauce
1/8 t cayenne pepper
1/4 t chili powder
1/2 t mustard
2 T sorghum
1 c water

1. Brown onion in shortening.
2. Add remaining ingredients. Simmer 5 minutes.
3. Pour over meat before cooking or baste as it cooks. Makes 1 1/2 cups barbecue sauce.

Wonderful with chicken.

SORGO BARBECUED SPARERIBS

3 lbs spareribs cut in serving pieces
1/4 c prepared mustard
1/4 c sorghum
1/4 c soy sauce
3 T vinegar
2 T Worcestershire sauce
2 t hot pepper sauce

1. Place ribs in shallow baking pan.
2. Combine remaining ingredients and pour over ribs
3. Bake in moderate oven 350°F for 1 1/2 hours, basting occasionally.
4. Turn ribs once during baking for even browning. Serves 4.

Try sorghum in your own favorite barbecue recipe.

SORGHUM CANDIES

Candy made with sorghum has a delicate flavor and a smooth texture. The amber color of sorghum taffy or caramel fudge makes it look as good as it tastes. Try a family get-together with an old-fashioned "taffy pull", or let the whole family help make popcorn balls.

Since sorghum contains some moisture, it is necessary to cook the candy mixtures somewhat longer than plain sugar mixtures. The test in cold water and the temperature have been suggested in the recipes. On damp days, all candy mixtures may absorb moisture from the air, so be sure to cook long enough to get a good test in cold water.

CARAMEL FUDGE

1 3/4 c sugar
1/4 c sorghum
2/3 c milk
1 T butter
1 t vanilla
1/2 c nutmeats (optional)

1. Combine sugar, sorghum, and milk in a large saucepan.
2. Cook over low heat to 240°F or until candy forms a soft ball when dropped in a cup of cold water.
3. Remove from the fire. Add butter.
4. Cool until lukewarm (110°F).
5. Add flavoring and beat until it begins to thicken and loses its high gloss.
6. Add nutmeats and pour in well-buttered cake pans.
7. Cool. Cut in squares. Store in a covered container in a dry place. Makes about 1/2 pound.

CHOCOLATE FUDGE

Use the same recipe as for CARAMEL FUDGE but add 4 tablespoons of cocoa to the sugar mixture and cook as suggested.

SORGO BUTTER CRUNCH

1/2 c butter
2 c sugar
1 c sorghum
3 T vinegar
1 c nutmeats

1. Mix all ingredients except the nutmeats.
2. Cook slowly over low heat until candy forms a firm ball when tested in cold water (265°F). Stir occasionally to prevent scorching.
3. Add nuts and pour on well-buttered cooky sheet.
4. Break in pieces when cool. Store in a covered container.

To make BUTTERSCOTCH, omit the nutmeats. Drop by teaspoonfuls on buttered cooky sheet.

QUICK SORGO CANDY

Children love to make this, as there is no cooking.

1/4 c peanut butter
1/4 c sorghum
1/2 c nonfat dry milk
1/4 c currants (optional)

1. Blend peanut butter and sorghum.
2. Add nonfat dry milk. Mix well.
3. Add currants. Mold into a roll.
4. Wrap in waxed paper. Chill.
5. Slice thin.

SORGO CHOCOLATE BARS- Shape the quick candy given above into bars and dip in melted sweet chocolate. Cool and wrap.

SORGHUM TAFFY

1 c sorghum
1 c sugar
1 T butter
1 T vinegar
1/8 t soda

1. Mix all ingredients except soda and cook slowly to 254°F or until sirup will form a hard ball in cold water. Stir occasionally to prevent sticking.
2. Just before removing from fire, stir in soda.
3. Pour into buttered pans.
4. When cool enough to handle, butter hands slightly and pull candy until light and firm. (Some prefer to use cornstarch or flour on their hands, instead of butter.)
5. Draw into sticks. Cut into pieces with scissors dipped in cornstarch. Wrap pieces individually in waxed paper.
6. Makes about 1 1/2 pounds of taffy.

POPCORN BALLS

1 c sorghum
1 c sugar
1/4 c butter
1/2 t salt
1 T vinegar
1 t soda
3 qts popped popcorn

1. Mix sorghum, sugar, butter, salt, and vinegar together in a 1 1/2-qt. saucepan.
2. Boil over low heat to 270°F or until sirup forms a hard thread when dropped from the spoon.
3. Remove from heat. Stir in soda.
4. Pour over popcorn and shape into balls.

Makes 20 loosely-packed 2 1/2-inch popcorn balls.

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and tenants to settle up each year on the income from their tobacco crop.

If a farmer, on the other hand, sold less than his allotted amount of tobacco as a result of crop failure, or for any other reason, he would be paid an underage bonus of so much per pound. Money for such payments would come from the overage fee of other growers. This could serve as a sort of crop insurance and might reduce the urge to produce to the limit in order to be sure of fulfilling the farm quota.

All of these plans are tentative in nature and need to be discussed by farmers and legislators from the tobacco states. No perfect program has been discovered yet for adjusting tobacco production to market needs, but thorough discussion of the pros and cons of such programs can help in approaching that ideal.

An Example

One plan for an acreage-poundage combination which incorporates many of the features mentioned here, is illustrated in the following tables. It has been discussed by many farm groups in recent months and has been favorably received by them. This plan permits the sale of all tobacco in the marketing year for which it was grown, without penalty. Allotments, both in pounds and acres, would be adjusted in the following year to offset the over production or under production on each farm. The plan does not provide for the handling of excess tobacco in too small amounts to be translated into acreage allotments. Allotments made in units of .01 acre would overcome this problem fairly well, however.

The accompanying tables illustrate how acreage and poundage allotments might work for two separate farms. In each case, it is assumed that the acre base is taken from the present farm allotment and that the base yield per acre is arrived at from the farm history, with adjustments for special circumstances. Changes from year to year in allotments are shown as they would be made in trying to keep production in line with the desired amounts. These are changes in individual farm allotments.

Example A. With No Change in National Quotas and Changes for the Farm in Tenths of an Acre

Base or Allotment for the farm	1st Year	2nd Year	3rd Year	4th Year
Base acreage	2.0	2.0	2.0	2.0
Base yield per acre,	1400	1400	1400	1400
Base production, pounds	2800	2800	2800	2800
Annual acreage allotment	2.0	1.8 1/	1.9	2.1 3/
Annual poundage allotment	2800	2520 2/	2660	2940 4/
Actual yield per acre	1540	1478	1326	
Actual total sales	3080	2660	2520	
Overage or underage				
Pounds	+280	+140	-140	
Acre equivalent	+.2	+.1	-.1	

1/ Base acres minus overage in acre equivalent (2.0 - .2 = 1.8)
2/ Base pounds minus overage in pounds (2800 - 280 = 2520)
3/ Base acres plus overage in acre equivalent (2.0 + .1 = 2.1)
4/ Base pounds plus overage in pounds (2800 + 140 = 2940)

Example B. With One Change in National Quotas and Changes for the Farm in Hundredths of an Acre

Base or Allotment for the farm	1st Year	2nd Year	3rd Year	4th Year
Base acreage	1.3	1.3	1.43 3/	1.43
Base yield per acre, pounds	1725	1725	1725	1725
Base production, pounds	2242	2242	2467	2467
Annual acreage allotment	1.3	1.17 1/	1.37 4/	1.60 6/
Annual poundage allotment	2242	2014 2/	2360 5/	2758 7/
Actual yield per acre	1900	1813	~~1588~~ 1510	
Actual total sales	2470	2121	~~2176~~ 2069	
Overage or underage				
Pounds	+228	+107	-291	
Acre equivalent	+.13	+.06	-.17	

1/ Base acres minus overage in acre equivalent (1.3 - .13 = 1.17)
2/ Base pounds minus overage in pounds (2242 - 228 = 2014)
3/ Base acres increased by 10 percent as the result of an increase in the national marketing quota. (A decrease would have lowered the base acreage for the farm.)
4/ (1.43 - .06 = 1.37)
5/ Base pounds minus overage in pounds (2467 - 107 = 2360)
6/ Base acres plus underage in acre equivalent (1.43 + .17 = 1.60)
7/ Base pounds plus underage in pounds (2467 + 291 = 2758)

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LEAFLET 174

Acreage - Poundage Allotments for Burley Tobacco

Some Pros and Cons

By Dana G. Card and Wilmer Browning
Department of Agricultural Economics

The accumulation of excess stocks of burley tobacco, in spite of attempts to adjust production through acreage allotments, has created much interest in some plan which would add more specific controls in marketing. In countries which have government monopolies this could be done by contracts to buy only specified amounts from each producer. In the United States, however, attempts are being made to see why the present control program has not been completely effective and to discover changes in the program to make it more satisfactory.

The present tobacco adjustment program attempts to balance production with consumption through control of the acres planted. Total production, however, results from the yield per acre as well as from the acres planted. In the five years 1935-39, just before World War II and

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soon after the Agricultural Adjustments Program started, the average yield of burley tobacco was 839 pounds per acre, In the past five years, 1951-55, the average yield was 1,440 pounds per acre, an increase of over 70 percent. If the use of burley tobacco had remained unchanged it would have required a reduction in acreage of nearly 60 percent to keep production in line with consumption. As it was, total allotted acres were reduced less than 10 percent between the two periods. Clearly, adjustments in acres alone does not control production so long as yields per acre can be increased.

What can be Expected of a Control Program

If farmers are to have limitations put on their tobacco production and the government is to maintain an organization for operating the program, both farmers and government have a right to expect results such as these:

(1) That the program will bring about the given volume of production and marketing that is judged to be needed in the light of market demands.

(2) That such production will be allotted fairly among tobacco growers.

(3) That the program can be so operated as to encourage consumption both at home and abroad and maintain stable market conditions of supply and demand.

(4) That administration of the program can be as simple and economical as possible.

(5) That in general the provisions of the program may be acceptable to tobacco growers and the general public.

Shortcomings of Present Acreage Allotments

Failure of the present program to keep marketings in line with domestic use and exports probably stems largely from the following:

(1) Inadequate inspection and enforcement to assure acreage compliance. Shortcomings in this respect appear now to be largely eliminated, provided the more strict enforcement of the past year can be maintained.

(2) Average yields per acre of earlier years, which are used to determine acreage allotments, have been somewhat unrealistic for any current year because of the upward trend in normal yields.

(3) No limit has been set on the amount of tobacco which could be sold from an acre of ground, so farmers considered it to their advantage to grow as many pounds per acre as possible.

Combined Acreage and Poundage Allotments

To overcome shortcomings of the allotment of acreage alone, proposals have been made to limit the amount of tobacco which could be sold from such acreage. This would be done by allotting to each grower the number of pounds he would be permitted to sell and the maximum amount of land on which such tobacco could be grown.

Some Advantages of Combined Acreage and Poundage Allotments--

(1) Enforcement could be more effective because of two kinds of compliance--acreage in the field and pounds on the market.

(2) Poundage allotments could be made in line with market need, so errors in estimating yields per acre would be less serious.

(3) In striving for the greatest income, growers would be stressing quality rather than quantity. With a restriction on acreage, however, any tendency to market only the best grades from enlarged acres would be limited.

Some Difficulties of Acreage-Poundage Allotments--

(1) A grower is unable to produce an exact number of pounds of tobacco, even though he tries to do so. Some way of taking care of honest over-and under-production, therefore, is necessary. (Some possible ways of doing this are suggested below):

(2) A fair and equitable base yield per acre for individual farms must be established at the start of such a program and changing yields with the passage of time must be recognized.

(3) More records must be kept for each farm.

(4) Equitable adjustments between landlords and tenants must be provided, if carry-overs from year to year are allowed.

(5) Protection against the fraudulent use of marketing cards or the actual counterfeiting of such cards is needed.

(6) Growers would tend to over-produce and select the highest-priced grades for sale.

Possible Solutions for These Difficulties

The two difficulties named first probably are most serious.

Equitable Base Yields Per Acre--

It may not be possible to solve this difficulty to the satisfaction of everyone. Each farmer will want the highest possible yields for himself, but low base yields for other farmers would be to his advantage. A history of yields on each farm is a matter of record. This seems to be a logical basis to use if provision is made for adjustments due to partial or complete crop failure and for yields which seem excessive in the light of yields on other farms in the neighborhood. The present program permits wide differences in yields between farms, and undoubtedly that would be true under any change in the program.

Allowance for Over or Under Production--

This may be the most difficult problem to solve. It involves questions of law as well as of equity. Some proposals follow:

(1) A tolerance or permission to sell a given percentage over allotted poundage. This is not likely to be practicable because every grower would plan to sell all that he was allowed, and the original problem would arise again but at a higher level of yield per acre.

(2) Carry-over of allotted pounds. If an excess is produced in one year the farm allotment for the next year could be reduced by that amount. If less tobacco was sold than the allotment permitted, the next year's poundage could be increased by a corresponding amount. This would tend to favor heavy production the first year because all tobacco produced could be sold. Growers might hope that in some way the next year they would be permitted to grow their full allotment or they might even take a chance on growing tobacco outside of the program. The carry-over of allotments also raises an interesting problem of equitable settlement between landlord and tenant when the tenant moves from one farm to another, leaving behind him a share in a right to grow more tobacco, or a limitation on the amount to be grown the next year.

(3) Carry-over of market value. An alternative to the method just suggested would be to hold in reserve the money which excess tobacco brings and pay it out to producers only when future sales of tobacco are less than allotments. This would involve record keeping and difficulty in keeping up with the movements of both landlords and tenants. The settlement of estates, in case of death, also would be a problem.

(4) Overage fee and underage bonus. Still another possibility is to charge a fee or penalty on all tobacco sold in excess of allotment. This probably would be a fixed amount per pound and would be high enough to discourage excess marketings but low enough so that growers would net some return. It would permit landlords

of herbicides is necessary also. In Kentucky, applications of 4 to 6 pounds of a 10-10-10 fertilizer per 1000 square feet in the fall and spring should maintain a good bluegrass lawn. Clipping should be at 2 1/2 to 3 inches and watering should be such as will soak the soil to a depth of 6 inches before the grass wilts.

Producing Seed of Kentucky Bluegrass

An average of about 18 million pounds of clean Kentucky bluegrass seed is produced in the United States annually. Most is harvested in two districts. The Kentucky District centers about Lexington (and includes areas in southern Ohio and Indiana.) The Western District is a large area extending from Western Missouri-eastern Kansas northward into Canada.

Nearly all Kentucky bluegrass seed is harvested from bluegrass pastures. Most receive little management for seed production except more or less restriction of grazing. However, in the last 6 years an increasing number of farmers in Kentucky are managing their bluegrass fields specifically for seed production. They are getting high yields and are marketing large quantities of very high quality seed. With reduced tobacco acreage, production of bluegrass seed offers some farmers an excellent means of recovering some of the loss of farm income.

Management of Kentucky Bluegrass Field for Seed Production in Kentucky. To obtain high yields of high quality bluegrass seed in Kentucky it is necessary to remove from the bluegrass fields the residue of leaf and stubble from the previous year's growth, fertilize properly and control insects that attack the developing seed.

Harvesting Bluegrass Seed. Practically all bluegrass seed is harvested by stripping.

Curing the Stripped Seed. The stripped seed is sacked in burlap bags as it is stripped and taken immediately to the curing yards or floors where the seed is spread in a layer 6 to 8 inches deep and kept stirred to prevent heating. After it has lost much of its moisture it is put into high narrow windrows until it is thoroughly dry.

Cleaning Rough-Cured Bluegrass Seed. When the seed on the curing yards and floors is thoroughly dry, it is usually put into large burlap bags and taken to storage houses to await cleaning.

Cleaning rough-cured Kentucky bluegrass seed is necessarily a rather complicated procedure. It consists of threshing, rubbing and beating rough-cured seed in somewhat variable types of assemblies of beaters, screens, air currents and mills that gradually break the cottony fibers from the base of the seed and remove it and other foreign material from the seed.

Marketing Rough Kentucky Bluegrass Seed. Because of the special harvesting, curing and cleaning processes required to produce marketable Kentucky bluegrass seed, most of the seed is handled by operators of clearing plants. However, some farmers prefer to harvest their own seed and either sell it to processors in green or rough-cured state or have the seed custom cleaned and sold independently. There is considerable price uncertainty in bluegrass seed marketing.

The following publications contain additional information on Kentucky bluegrass and may be obtained from your county extension office or the University of Kentucky Agricultural Experiment Station, Lexington:

Pasture in Kentucky - Extension Circular 510
Fertilizers--Their Purchase and Use on Field Crops in 1956 - Misc. 10
How to Produce High-Quality Kentucky Bluegrass Seed - Extension Leaflet 162
Starting and Managing Permanent Pastures in Kentucky - Extension Leaflet 137
The Lawn - Extension Leaflet 172

25M-9-56

Kentucky Bluegrass For Home and Farm

By E.N.FERGUS

Importance of Kentucky Bluegrass

Kentucky bluegrass is the most important pasture grass in the United States, but that fails to suggest the total value of Kentucky bluegrass. It is also the most important turf grass. Try to imagine how lawns, parks, playgrounds, airfields, golf courses, roadsides, cemeteries, campuses and other grounds would be without their carpets of bluegrass. One then begins to appreciate its importance in everyday living.

Why the Name "Kentucky Bluegrass"

How does it happen that this grass is named blue grass since it is green rather than blue? The answer is not known. Perhaps the most likely reason is that the name was transferred to it from Canada bluegrass which has rather bluish leaves.

Again why is this grass Kentucky bluegrass? One suggested answer is that Kentucky bluegrass seed was carried or sent

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from Kentucky farmers to friends in other states and that the state name was prefixed by the recipients. Another suggestion is that the name was given in recognition of the excellent pastures of bluegrass in Kentucky.

Adaptation to Soil and Climate

Though Kentucky bluegrass grows on moderately productive soil, it is actually well adapted only to soils that are rather well drained and highly productive. Limestone soils are especially favorable for it.

Kentucky bluegrass is a cool season grass, yet it is quite heat- and drought-tolerant.

Growing Kentucky Bluegrass for Pasture

Sowing. Fall seeding is particularly advisable for Kentucky bluegrass. In Kentucky, September 1 to 20 may be regarded as the most favorable time. Seedings made in February and early March are often successful if the spring and summer temperatures are cool or moderate and rainfall is normal.

Preparing the Seedbed. The land should be plowed or thoroughly disked a month or more before seeding time, and then fallowed to kill weeds and to firm the soil. Apply limestone and fertilizer during this period.

Liming and Fertilizing. Most land in Kentucky needs 2 to 3 tons of ground limestone per acre to produce good bluegrass pastures. Almost all soils outside the Bluegrass Region, and some in the region, must have phosphate fertilization to make them productive. Often nitrogen and potash are also needed. It is advisable to be guided by soil tests as to treatments needed.

Sowing the Seed. High quality seed should be sown in any way that gives an even distribution and a light covering. Rates of seeding vary from 5 to 20 pounds per acre, generally the heavier the rates the quicker the pasture is established.

Nurse Crops. Sowing Kentucky bluegrass with one of the small grains is generally a wise practice in Kentucky principally to protect the soil against erosion. Pasturing the small-grain crop largely prevents it from damaging the young bluegrass. On highly productive level land, Kentucky bluegrass sown alone in the first part of September will usually make enough growth to protect the land and control weeds, particularly if high quality bluegrass seed is sown.

Sowing a Legume in the New Kentucky Bluegrass Pasture. The best bluegrass pastures contain a legume and one should be sown with it in the spring. Red clover has long been used for this purpose and it is especially useful where bluegrass seed is to be harvested as soon as a good sod is established. The Kenland variety is recommended.

Managing Kentucky Bluegrass Pastures. These pastures should be grazed moderately -- never close enough to expose much bare soil -- and they should be limed and fertilized regularly as may be necessary to keep the grass vigorous.

Growing Kentucky Bluegrass for Lawns and Other Kinds of Turf

The seedbed for lawns should be of uniform grade, smooth, firm and fine in texture. Seedbeds for more extensive types of turf areas should be as good as time and expense will permit.

Soil and Fertilization. If possible, the top soil should be removed from the lawn area and piled nearby until grading has been finished, then spread over the lawn for the seedbed. While preparing the seedbed apply 100 to 150 pounds of ground limestone, and 10 to 15 pounds of a high analysis fertilizer per 1,000 square feet.

Sowing. Late August and early September seedings are preferable for lawns. Divide the amount of seed into two equal parts, sowing one part in one direction and the other part at right angles to it.

Lawns should be sown at the rate of 1 to 1 1/2 pounds of bluegrass seed to each 1000 square feet. After the seed is sown, rake it in lightly. Then roll or otherwise compact the surface of the soil.

Only the highest quality seed of Kentucky bluegrass should be sown for lawns. It should be 90 percent or better in both purity and germination and should contain no noxious weed seeds. Examine the Experiment Station tag to determine these qualities.

Nurse Crops for Kentucky Bluegrass Lawn Seedings. No nurse crop may be necessary but if the lawn area slopes, it is advisable to sow a quick-germinating nurse crop to prevent soil washing. Annual ryegrass is widely used. Sometimes one of the small grains is preferred. Nurse crops should be seeded lightly.

Caring for the New Kentucky Bluegrass Lawn. Summer and fall seeded lawns should be treated in the late fall or winter with a nitrogen fertilizer to supply 1/2 to 3/4 pounds of nitrogen per 1000 square feet. The lawn should be well watered after the fertilizer is spread.

Let the young grass grow until it is 5 or 6 inches tall and then cut it 2 1/2 inches or 3 inches tall. Keep the grass clipped thereafter to hasten the development of a good sod.

Care of Old Kentucky Bluegrass Lawns. Good bluegrass lawns are usually maintained by proper fertilization, clipping, and watering. Sometimes weeding or use

Chemical weed control in asparagus has proven profitable in many states. Consult your county agricultural agent if this method is to be followed.

6. Insect Control

Asparagus beetle and cutworms are the most serious pests of asparagus. The beetle overwinters in rubbish, emerges in the spring and lays eggs on the spears. Asparagus beetles may be controlled by dusting with 0.75 percent rotenone as soon as the insects are noticed on the plants and continued as often as required. Ordinarily, about two applications about a week apart are needed for satisfactory control. Control beetles on the fern growth, after the cutting season, with 3 pounds of 50 % WP DDT to the acre in 75-100 gallons of water.

Cutworms can be controlled by use of poisoned bait containing 1 peck or 5 pounds of dry bran, 1/4 pound of paris green and about 3 quarts of water to moisten. The bait should be distributed near the plants or in the row, and should be put out late in the evening to prevent drying out. Approximately 15-30 pounds of the wet bait per acre is enough for one application. Several applications at 2-day intervals may be necessary.

7. Disease Control

Asparagus rust is the only disease of asparagus of great economic importance. The most effective control measure is to plant varieties known to be resistant. Martha Washington is more rust resistant than Mary Washington, but is not so early or productive of large spears.

Wild asparagus plants should be eliminated from near the cultivated fields as these plants frequently serve as sources of disease infection.

8. Harvesting

Under Kentucky conditions, asparagus should not be harvested during the first 2 years after

setting the crowns. Asparagus should be cut for only 2 weeks during the third year, and only 6 weeks during the fourth year. The cutting period for the fifth and following years is usually 6-8 weeks. A great number of small spears should indicate to the grower that he has overcut the previous year.

Asparagus for the fresh market is usually cut just below the surface of the soil with a special long-handled knife. Asparagus for the freezer or cannery is frequently snapped off above ground by hand.

Asparagus for the fresh market is usually 9-10 inches long of which about three-fourths should be above ground. Young spears developing below ground will not be injured if the knife is inserted almost straight down beside the shoot and then tilted a little to make the cut.

Asparagus loses its quality rapidly after it is cut, especially at high temperatures. It is essential that cut asparagus be moved from the field, bunched, packed and placed in a cool place as soon as possible. The spears should be stood on end in water or damp moss and be kept at a near freezing temperature.

For the fresh market asparagus should be trimmed to a uniform length and tied in bunches of 1-1 1/2 pounds. Only large, straight, unbroken spears with tight heads should be used for market purposes. The market prefers spears of one-half inch or greater in diameter.

9. Economic Outlook

Gross returns per acre from asparagus production vary with the type of market outlet, seasonal supply and the efficiency of operation of the grower. The U.S. average yield for fresh market is 81 crates (30 pounds per crate) per acre. The 1955 U.S. average price per

crate was $4.03, resulting in a gross of about $325 per acre.

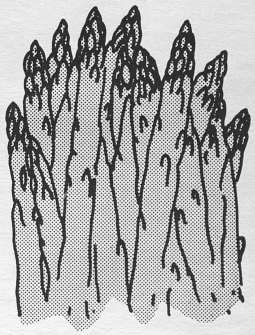
The U.S. average yield for cannery production is about 1 ton per acre at $226 per ton. It should be pointed out, however, that these figures are averages and are, by no means, an indication of the returns a good grower should realize.

Lexington, Kentucky
January, 1957

College of Agriculture and Home Economics, University of Kentucky, and the United States Department of Agriculture, cooperating. Frank J. Welch, Director. Issued in furtherance of the Acts of May 8 and June 30, 1914.

5M—1-57

ASPARAGUS PRODUCTION IN KENTUCKY



By George A. Marlowe, Jr.

LEAFLET 176

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service
Lexington

ASPARAGUS PRODUCTION IN KENTUCKY

By George A. Marlowe, Jr.

Asparagus, which can be grown successfully in Kentucky, ranks high in dollar value as a canned, frozen or fresh market crop. The demand for it has increased steadily in the last 10 years. It is a simple crop to grow and, if given the proper care, a planting may remain productive for 15 to 20 years.

Asparagus may be started from seed or from one-year-old roots called crowns. A grower of a large acreage may find it profitable to produce his own crowns, but for those having a small acreage the convenience of purchasing good crowns from a reliable seedman may be preferred.

A. Producing Crowns from Seed

Secure large, plump seed of the Mary Washington or Martha Washington variety from seedmen specializing in asparagus. Three to five pounds of seed are needed to produce plants for an acre and to make allowance for careful crown selection. The seedbed should be deep, mellow, weed free, and of above-average fertility. A test should be made to determine how much fertilizer and ground limestone are needed to bring the soil up to approximately the following levels: 20 pounds per acre of nitrogen, 60 pounds of phosphate and 60 pounds of potash, with a pH of 6.0 to 6.5. The soil should be rich in organic matter for good crown production. The use of green manure crops and barnyard manure well in advance of seeding is very important. Crown production is poor in compact soils, and the roots are more easily damaged when removed than when grown in loose, friable soils.

To speed germination, the seed should be soaked in water in a temperature of 80 to 85°F for 3 or 4 days before planting. Then drain off the water and sow the seed in moist soil on or about April 1 in Kentucky if the season permits. Rows should be 24 to 28 inches apart, with 10 to 12 seeds per foot of row at a depth of 1 to 2 inches depending on soil type and moisture conditions. Asparagus seed germinates slowly. It may take 4 to 6 weeks for the plants to appear above ground.

Asparagus seedlings are very poor competitors with weeds for moisture and nutrients. Weeds must be kept down, but cultivation must be shallow to prevent injury to the developing roots. Thinning the plants to three or four per foot of row should be done with great care to prevent root disturbance.

Plants should be allowed to remain in the ground until digging and planting time the following spring. With proper soil preparation before seeding, little care is needed by the developing crowns except weed control.

Crowns should be dug carefully to insure as little root pruning as possible and protected from drying. Crowns may be dug by hand, with a moldboard plow or potato digger. Small or damaged crowns should be discarded. Large crowns with large buds are preferred, such as U.S. No. 1 crowns, which have a root spread of about 15 inches and weigh about 125 pounds per thousand. The period between digging and permanent planting should be as short as possible.

B. The Crop from Crown Setting to Harvest

1. Soil Selection

Soils rich in organic matter with good air and water drainage, and having high native

fertility should be selected for the permanent planting. Heavy soils that crust badly should be avoided as low yields and poorly shaped stems or spears will result. Soils that have had successful green manure crops turned under for two consecutive years before setting the crowns should be selected.

2. Soil Preparation

A clover crop one year followed by a summer buckwheat-winter rye planting the next year will prove very profitable. Very early in the spring the rye should be turned under along with about 800-1000 pounds per acre of 5-10-10 fertilizer or its equivalent. The soil should test between pH 6.0 and 6.5. A heavy coat of manure (8-10 tons per acre) with 60-80 pounds of superphosphate can be turned under in substitution for the foregoing green manure plan.

The soil for crown setting should be well worked as early in the spring as possible. Rows should be marked off at a 5-foot spacing, and a wide bottom furrow should be made. The furrows should be 6-8 inches deep on light soils and 4-6 inches deep on heavy soils.

3. Setting the Crowns

Carefully selected asparagus crowns or roots should be set in the field between March 15 and April 15, and 15-18 inches apart in the furrow. The roots should be spread out with the buds facing up and covered with 1-2 inches of soil. Additional soil should be worked into the furrow as growth progresses until the furrow is filled, usually by the middle of June or about 6 weeks after setting.

4. Fertilizing

Asparagus plantings should be fertilized every year. One-half of the total amount of

fertilizer should be applied in the spring before growth starts and the other half at the end of the cutting season. The fertilizer should be applied in an 18-inch band over the row and worked into the soil if equipment is available; otherwise, it should be broadcast with a grain drill or commercial spreader.

The first two years in asparagus production are not productive years commercially, and the amount of fertilizer applied need not be so great as when heavy harvesting takes place. During the first 4 years of asparagus production the plants should be heavily fertilized with complete fertilizer, but the amount may be reduced after that time if soil tests indicate a reserve. The following plan is presented for convenience, but should be tempered with judgment regarding specific soil types and the amount of manure used each year. The rates listed apply to light soils and should be reduced 25 percent for heavy soils and about 35-50 percent with heavy manure applications (10 tons or more to the acre).

	Approximate Annual Fertilizer Application (pounds per acre)				
Years from Crown Setting	Nitrogen	Phosphate	Potash	OR Comp.	Fertilizer
1st and 2nd years	40	75	110	750	5-10-15
3rd, 4th, 5th and 6th years	75	150	225	1500	5-10-15
7th and remainder	60	120	180	1000	5-10-15

For home gardeners, an annual application of 12-15 pounds per 100-foot of row of 5-10-15 fertilizer should be used

5. Cultivation

Serious injury to the developing roots may result from deep cultivation. Cultivation should begin soon after the crowns are planted and should continue at intervals, frequently enough to keep down weeds. Weed control is very important with a perennial crop like asparagus.

A water suspension of the materials may be prepared in a pint of water to make a smooth slurry. This is poured over the seed in a mixing drum or over a layer of seed on the floor and thoroughly mixed. Or, the dry materials may be applied to the seed by revolving in a mixing drum or shaking in a closed container. If the dry treatment is employed, regular Arasan instead of Arasan SP (wettable) should be used. DO NOT INHALE THE DUST.

Halo blight of beans has been successfully controlled by spraying with the antibiotic streptomycin at the rate of 200 to 500 parts per million. Promising results in control of common blight with the same material have been obtained. Spraying should start with the appearance of the first water-soaked spots on the leaves and repeated at 7-day intervals.

HARVESTING: Snap beans for the fresh market should be harvested before pod maturity is reached. Growers should test their fields often to determine when to pick. Beans should be picked when they reach their full size but before the seeds have begun to mature. Pods are usually ready for harvest within 10 to 14 days of first bloom. During a normal season about 50 percent of the crop is harvested at the first picking, about 30 percent at the second picking, and the remainder at the third picking. This yield pattern varies with the variety and the season.

All beans of market maturity should be picked, but only marketable beans should be brought in from the field to go to market. Graded beans command the highest prices on most markets and should be graded and packed to meet the market demand. Snap beans lose their quality rapidly, so extreme care in handling, holding for shipment, and shipping

should be taken. Move the beans to market as quickly as possible. Beans should be as clean as possible, but if washed should not be packed damp as heating and rapid rotting will result.

ECONOMIC OUTLOOK: The U.S. average yield per acre for snap beans is 113 bushels (30-pound bushels). The average price received in 1954 was $2.42 a bushel. These yields at this price per unit resulted in a $273 per acre gross return to the grower. It should be remembered that an average figure is not a goal. Good growers should expect double this gross figure in a normal year.

Lexington, Kentucky
December, 1956 5-M-12-56

Growing Snap Beans for Fresh Market in Kentucky

By George A. Marlowe, Jr.

The snap bean, one of the most important truck crops in the United States, can be grown profitably in almost any section of Kentucky. Highest prices are paid for the highest quality beans. Producing high quality produce is not difficult if recommended practices are followed.

SOIL SELECTION: Snap beans grow well on both light and heavy soils if good drainage exists. Light soils are preferred for the early market crop as beans mature earlier in light soils than they do in heavy soils. Soils ranging in pH from 5.5 to 6.0 are best for beans. Over-liming should be avoided. A soil test is of great benefit in soil selection and in the planning of a proper fertilizer program.

Rotation should be practiced to avoid soil-borne diseases. Beans should not be grown in the same soil more often than one out of three to five years.

SOIL PREPARATION: Soil preparation should be thorough, leaving the seedbed

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smooth and firm but not packed. Deep plowing several weeks before planting should be followed by deep disking and dragging just before seeding. Proper preparation makes seeding, cultivation and weed control easier.

VARIETIES: Many excellent snap bean varieties are well adapted to Kentucky. The two most prominent are Wade and Topcrop. Topcrop is a Tendergreen round-pod-type bean which matures in 50-57 days. Wade is also of the Tendergreen type, but is a smoother, darker green than Topcrop. Wade matures in 51-58 days. Topcrop becomes over-mature very rapidly and must be harvested with care to prevent a faded, knuckled pod. The average yield of snap beans for the U.S. is 113 bushels per acre, but good growers should expect three times this amount.

SEED SELECTION: Certified western-grown seed should be used to avoid many of the seed-borne diseases frequently found in eastern-grown bean seed. Seed older than 2 years is not recommended as bean seed loses vitality quickly. Bean seed should be handled carefully. Dropping or thumping bean seed reduces germination. Seed should be used at the rate of 40-50 pounds per acre. Higher rates may be used, but this range is suggested. About 1 pound of seed is required for a 100-foot of row in the home garden.

Seed should be treated, especially that intended for the cool-season early crop, to protect against both insects and diseases. Seed treaters consisting of a combination insecticide-fungicide mixture are available commercially. Manufacturers directions should be followed exactly.

PLANTING: The snap bean is a tender crop that will not withstand frost. Extremely hot,

cold or rainy weather at blooming time may result in excessive pod or blossom fall. Early market growers often take chances on frost damage by planting prior to the last killing frost, but in general beans are not planted until after the soil has become fairly warm (50°F) in the spring.

Beans are normally planted in rows about 3 feet apart with an average of 6 plants to the foot of row. Seed should be placed about 3/4 inch deep in heavy soils and about 1 to 1 1/2 inches deep in light soils.

FERTILIZING: Beans should have about 25-30 pounds of nitrogen, 60-70 pounds of phosphate, and 60-70 pounds of potash to the acre for high yields. Soil test results help to determine how much of this fertilizer need be added. The high figures apply to the lighter soils. (A 600-pound application of 5-10-10 fertilizer to the acre, or about 4 pounds to the 100-foot garden row, will give the above amounts.)

To avoid fertilizer burn, fertilizer should be placed in bands about 2 inches below and 2 inches to the sides of the seed. If this suggested method is not used, the total amount should be broadcast and disked thoroughly into the soil before seeding.

Beans grown under irrigation are generally fertilized heavier than un-irrigated beans, and a side-dressing of complete fertilizer or nitrogen (20-25 pounds of N) has proved profitable under some conditions. Beans should be side-dressed when the plants are 3 to 4 weeks old, if this method is followed.

CULTIVATION: Many of the most important feeder roots of the bean plant are very

close to the surface of the soil. Cultivating should be shallow and only as often as necessary to control weeds. Chemical weed control is practical. For details, consult your county agent well in advance of planting time.

INSECT CONTROL: The prevention of insect damage begins with seed treatment before planting, as outlined in seed selection. Stop Mexican bean beetle, mites and aphids as soon as they first appear with whole plant coverage sprays of Malathion: 2 pounds of 25 percent wettable, or with 1 1/2 pints emulsifiable concentrate in 100 gallons of water. Dusting with 5 percent Malathion is also effective at the rate of about 30-50 pounds to the acre. Beans should not be harvested in less than 72 hours after the last application of Malathion.

DISEASE CONTROL: Some of the serious diseases of beans can be controlled by rotation, use of disease-free seed, seed treatment and good cultural practices. The importance of certified seed cannot be emphasized too strongly. A 3 to 4-year rotation avoids some soil-borne diseases.

Seed of early crop beans may be protected against both insects and diseases with a combination fungicide-insecticide mixture. These mixtures are available commercially or the ingredients may be purchased separately. For treating large quantities the following may be used per bushel of bean seed:

Fungicide: 2 ounces of chloranil (Spergon), or thiram (Arasan SP), or captan (Orthocide 75).

Insecticide: 1 ounce of Lindane 25% WP, or Chlordane 50% WP, or Dieldrin 25% WP.

yields. Soils that are too acid or improperly fertilized produce low yields. If the pH test is 5 or lower, lime must be applied. As do all legumes, soybeans respond greatly to lime when needed. The lime should be worked in the soil prior to seeding time.

The general fertilizer recommendation for soil low in available phosphorus and potassium is 80 pounds P_2O_5 and 80 pounds K_2O per acre. These amounts will be supplied by proper rates of mixed fertilizers of 0-1-1 ratio, such as 400 pounds of 0-20-20, 270 pounds of 0-30-30, etc. On highly productive land or soils which have been adequately fertilized for crops in the rotation ahead of soybeans, direct applications to the soybean crop probably will not pay. To avoid injury of soybean seedlings in direct fertilization of the crop do not apply fertilizer with the seed. Broadcast before plowing or after plowing and disk in.

HARVESTING

The combine must be properly adjusted and soybeans must be at proper moisture content if a good job of harvesting is to be done. Combining should start when moisture content of beans is 13 percent. Considerable cracking of beans occurs when the moisture gets down to 10 percent or less. For every 36 to 40 seeds per square yard left on the ground after harvesting there is a harvesting loss of one bushel per acre. Adjust the cutter bar close enough to the ground so that no pods are left on the stubble. If five or six pods are left per foot of row a loss of one bushel per acre is occurring. Chemical defoliation has created widespread interest. Chemicals used sufficiently early to hasten maturity will decrease soybean yields significantly.

STORAGE

Soybeans stored above 13 percent moisture may result in damaged beans. Bins should be clean, dry, with condensation losses from concrete floors and walls prevented by a layer of paper or other similar material.

FOR HAY

Soybeans for hay are not recommended in Kentucky because of difficulty in curing. The hay varieties most commonly used include Wilson Black and Virginia Brown, both of which are black seeded. If grain varieties of beans are used heavy rates of planting should be used to reduce size of stems. The stage to cut soybeans for hay varies from the time pods begin to form up to three-fourths to full grown. Earlier cut hay will yield less with later cutting becoming more woody and losing more leaves. Soybeans will not compete with alfalfa or clover hay but may be used as an emergency hay crop.

Lexington, Kentucky January, 1957
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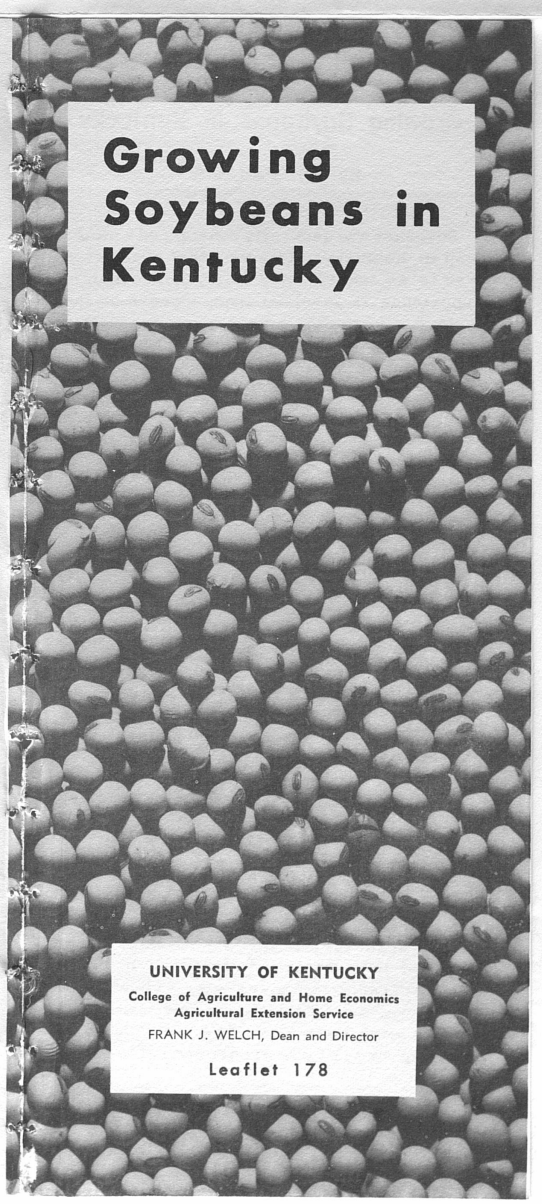

Growing Soybeans in Kentucky

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service
FRANK J. WELCH, Dean and Director

Leaflet 178

Growing Soybeans in Kentucky

By S. H. PHILLIPS

Soybeans are generally considered a minor crop in Kentucky; however, the production area is so concentrated that more economic importance is involved than appears on the surface. Normally, a near 5-million-dollar crop places soybeans 4th in the ranking of cash crops according to value of production.

VARIETIES

Variety recommendations on soybeans are given on an area basis owing to the difference in the growing season. The varieties recommended are: northern and eastern Kentucky - Wabash and Lincoln; southern and western Kentucky - Clark, Perry and Ogden. Varieties and their description are listed in order of maturity below:

1. Lincoln - the earliest recommended variet . A yellow-seeded soybean with excellent milling qualities. Pods are well above ground level. Erect growth. Matures about 6 days earlier than Wabash. Resistant to frog-eye leafspot. Shatters if left too long in field.

2. Wabash - of the earliest variety of beans recommended for Kentucky. A yellow-seeded soybean with a high oil content, tall, erect-growing. Pods are well above ground level. Resistant to frog-eye leafspot.

3. Clark - a new high-yielding, high-oil content soybean, similar to Wabash in maturity and in resistance to frog-eye leafspot. Plant characteristics are very similar to Lincoln, but Clark is slightly taller and about a week later in maturity. This outstanding variety is recommended for Kentucky.

4. Perry - a high-yielding, high-oil content, erect-growing, yellow-seeded soybean, about 3 days later in maturity than Wabash. It is a full-season variety for most of Kentucky and is about 30 days earlier than Ogden.

5. Ogden - a very popular bean in western Kentucky with a greenish seed. Very late maturing, tall-growing type bean. Oil content will be lower than any variety other than S-100. This variety is recommended only in western Kentucky.

TIME OF PLANTING

The relative time of seeding soybeans will have a great deal of influence on stands and yields. The soil temperature should be around 65° for the most ideal conditions and the day length should be 14 hours or greater. In general after corn planting, the soil will be near ideal planting temperature and day length is sufficient.

When weed problems are likely to develop, delayed planting and continued working of the soil until planting time will pay dividends.

RATE OF PLANTING

This will be determined by row spacing and drill rates in the row. The row spacing will be influenced by variety and equipment available. Early-maturing varieties, such as Lincoln and Wabash, will yield well in 28"-30" rows. Perry and Clark will require 32"-36", and Ogden or other late varieties will require 36" rows. For 28 to 32" rows, grain drills with three drills closed can be used. Cultivation and harvest equipment should be considered also in selecting row width for planting.

The rate in the row should be from 8 to 14 viable seed per foot with adjustment for poor seedbed, low-germinating seed or other factors. Three to five pecks of seed per acre will be required. Beans should be drilled in rows to allow cultivating for weed control purposes. Row planting will also be beneficial in crusted soil conditions as each germinating seed assists the other in breaking through.

DEPTH OF PLANTING

The depth to plant is based on moisture conditions. A good general rule will be to plant as shallow as possible yet deep enough for moisture. One inch deep is ideal unless moisture is deeper. Seeds should be packed by drill wheels or cultipacker. If hard rains occur and soil crusts, a rotary hoe or spike-tooth harrow will help beans break through and will also be valuable in weed control.

INOCULATION

Soybeans should be inoculated with a commercial culture of nitrogen-fixing bacteria, when placed on soils that have not had an inoculated soybean crop within the past 3 years. When inoculating do not use chemical seed treatment as such fungicides may also kill the inoculating bacteria. Unless soybeans are inoculated they should receive nitrogen fertilizer the same as corn. Use a good commercial inoculant according to instructions.

CULTIVATION

Cultivate shallow and only to control weeds. Use the rotary hoe or spike-tooth harrow when the beans are small. If regular row cultivators are used for the first cultivation, work as close to the beans as possible. Regular row equipment use should be started when beans are 8 to 10 inches high.

FERTILIZATION

The correct use of lime and fertilizer is absolutely necessary for profitable bean

of these pests can be obtained by soil applications of dieldrin or heptachlor (2-3 pounds actual per acre) or chlordane (8-10 pounds actual per acre).

DISEASE CONTROL

The principal diseases of potatoes are early and late blight. Both can be effectively controlled with a 10-5-100 bordeaux mixture, nabam-zinc sulfate-lime spray or zineb, used at the manufacturer's label recommendations. It is extremely important to completely cover the potato foliage for both insect and disease control. Virus diseases, and ring rot can be effectively controlled by planting certified seed free from these diseases, and by controlling aphids which transmit virus diseases. Soil scab can be controlled by planting in soil with a pH of 5.0-5.5 while soil rhizoctonia (black surf) cannot be controlled except by seed treatment.

HARVESTING

Potatoes should be harvested after the vines have been dead for approximately 2 weeks to "set" the skins and minimize losses due to late blight. If tubers are to be dug while the vines are still green, the vines should be killed with a chemical spray or mechanical beating, about 2 weeks prior to harvest. It is sometimes advisable to harvest the crop before the skins are "set" to take advantage of a high market price. Potatoes should be quickly removed from the field or shaded during periods of bright sunlight and high temperature to avoid the danger of sun-scald and bacterial soft rot affecting the tubers. Care should be taken to avoid bruising of the tubers at all times.

STORAGE

With proper care, potatoes can be stored for 6-8 months. The most important factor is storage temperature, 40°F being ideal. However, other important factors include maintenance of high humidity (80-90%), proper ventilation, and having the tubers free of disease when placed in storage. It is important to harvest the tubers after a cool weather period and transfer them into a cool storage until the winter temperatures are adequate to maintain 40°. Chemicals which inhibit sprout growth are available for commercial use, including maleic hydrazide (MH) and tetra-chloro-nitrobenzene (TCNB). For use of these materials, consult your county agent.

GRADING AND MARKETING

Potatoes are marketed in many different packages. Growers should be acquainted with the local market demands. In general, the consumer prefers clean, medium-sized tubers with bright skins, free of grade defects. Small quantities, 5-15 pound size, packaged in open-mesh cloth or plastic to show the potatoes are popular. A high quality pack is extremely important to insure rapid sales and obtain the maximum price.

Lexington, Kentucky 6M -1-57

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Potato Production in Kentucky

By Donald J. Cotter

The potential value of Kentucky-produced potatoes is very high. Large volumes of potatoes are shipped in annually for fresh consumption and processing. Although the Kentucky average yield per acre is approximately 90 bushels, yields of 200-500 bushels are possible if a few simple principles are practiced.

SOIL SELECTION

Although potatoes will grow well in a variety of soils, a well drained, loose, fertile, sandy loam is ideal. Lighter soils are usually too dry and lose nutrients rapidly, while heavier soils can result in misshapen tubers and often cause a large percentage of rot, because of poor aeration and drainage.

As a general rule, potatoes should not follow sod crops because of the danger of wireworm and grub damage to the tubers. Soils of medium acidity (pH 5.0 to 5.5) are desirable for effective control of scab organisms. Potatoes produce good yields at this low pH.

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SOIL PREPARATION

If the top soil is deep enough, the soil should be plowed to a depth of 10 inches. Care should be taken in plowing to bury all trash and cover crop residue for easy planting and to prevent growth of volunteer plants. A winter cover crop of barley or rye (2 bushels per acre) or rye and vetch (1 1/2 bushels and 35 pounds per acre) is recommended for controlling erosion, conserving nutrients, and maintaining spil organic matter.

VARIETIES

The recommended varieties for Kentucky climatic conditions include Kennebec, and Irish Cobbler. Kennebec, a new blight-resistant variety with large elliptical-to-oblong, shallow-eyed tubers, is suitable for late crop plantings. Irish Cobbler, an early variety with a round, deep-eyed, medium-sized tuber, is suitable for both early and late plantings. Pontiac, a red variety, is recommended for early and late plantings.

SEED

For maximum crop security, only firm northern-grown, certified seed potatoes should be planted. The seed should be treated to control diseases such as scab and rhizoctonia carried on the tuber. A number of materials are satisfactory, including corrosive sublimate, hot formaldehyde and commercial organic mercury compounds. Consult Circular 307, Potato Growing, for details of seed treatment. Cut seed should be uniformly blocky, contain at least one eye per seed piece, and be about 1 1/4 -1 1/2 ounces in size. On the average, it takes 14 to 15 100-pound sacks to plant an acre when planted in 3-foot rows and spaced

12 inches in the row. Closer spacing of the rows and seed pieces in the row may result in a profitable yield increase under good growing conditions. Ten to eleven pounds of seed per 100 foot of row is recommended for home garden planting. The depth of planting ranges from 2 to 4 inches at the early planting to 5 to 6 inches at the late planting.

PLANTING DATE

The best planting for the early crop is between March 15 and April 10. For late potatoes, the crop should be planted between June 15 and July 15.

FERTILIZER

Potatoes require large amounts of fertilizer nutrients for high yields. It is difficult to make a general fertilizer recommendation because nitrogen and potash are likely to be deficient in light soils, while phosphorus may be deficient in heavy soils. However, a fertilizer high in phosphorus is usually satisfactory. Fertilizers supplying between 50-100 pounds of nitrogen and 100-200 pounds of phosphorus and potash are recommended. Fertilizer amounts of 1000-2000 pounds of 5-10-10, 5-10-5, or 10-10-10 will supply the proper amounts. The amounts added to a specific potato planting will depend on a yearly soil test, the available soil moisture and the soil type. Applications of 7 pounds of fertilizer per 100 feet of row are generally satisfactory for home garden plantings.

When applying larger amounts of fertilizer (2000 pounds per acre), higher yields can be obtained by dividing the application, plowing down one-half and applying the remainder in two bands 3 inches to the side and 1 inch below

the seed. Generally, manure is not recommended for potato production. However, well rotted manure, supplemented with 50-60 pounds of superphosphate per ton and applied at the rate of 10 tons per acre, is satisfactory.

WEED CONTROL

Cultivation should be done only often enough to control weeds. Since many of the plant roots are within 3 inches of the soil surface, serious yield losses can result when deep cultivation is practiced. Recently, successful weed control has been obtained by the use of certain chemicals. Further information can be obtained from your county agent or from the Kentucky Agricultural Experiment Station.

INSECT CONTROL

The principal insects injuring potatoes include the Colorado potato beetle, black flea-beetle, leafhopper, tobacco worm, blister beetle and aphids. DDT will control all these insects except aphids. Use it at the rate of 1-1 1/2 pounds of 50 percent wettable powder per acre in 100 gallons, beginning as the first flea-beetles appear (plants about 4 inches high) and continuing for several weeks at 10 to 14-day intervals. Malathion at the rate of 3-5 pounds of a 25 percent wettable powder per acre in 100 gallons is effective in controlling aphids. The number of days allowed between the last application of insecticide or fungicide and harvest are included on the manufacturer's label. This information should be followed exactly to avoid excessive accumulations of the pest control materials based on U. S. Food and Drug official tolerances. If large populations of wireworms or white grubs are present in the soil, potatoes should not be planted. However, effective control of moderate populations



Irrigation as a means of overcoming the ill effects of drouth periods has been practised for several years in Kentucky. The development of centrifugal pumps, lightweight portable pipe with automatic couplers, and rotary sprinklers has made possible the successful irrigation of rolling land.

tribution of forage supply throughout the season. All of these alternatives are practiced by farmers and, like irrigation, constitute a cost. It is important that these alternatives be considered particularly when scarce capital has other productive uses.

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MANY FACTORS REQUIRE STUDY IN MAKING

Profitable Irrigation Investment

By JOHN C. REDMAN

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service
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MANY FACTORS REQUIRE STUDY IN MAKING

Profitable Irrigation Investment

By JOHN C. REDMAN

The principles involved in making a decision to invest in irrigation are no different from those used in deciding on how much fertilizer to use on what crops, or how much and what combination of feed to give a dairy cow. The prospect for profitable investment depends on a very careful observation and analysis of all related factors as to the need for a system. Some of the questions which must be answered include: (1) Is irrigation the best available use of capital? (2) Will the benefits from irrigation exceed the costs? (3) Are there any other methods for counteracting the effects of a drouth?

Farmers who are limited in capital should use it on various alternatives in such a way that net farm returns will be greatest. Some who have highly developed farms may find irrigation the most productive investment, while others, particularly those farmers on relatively unimproved farms, may find a number of alternatives more profitable, such as more fertilizer, improved seed, more productive livestock, etc.

Uncertain Rainfall Distribution

For some farmers, benefits from irrigation may be only a reduction in the variation of yield due to drouths, while for others the benefits may include an increase in yield over that from a normal rainfall. Much of the benefit from reducing variation in yield is subjective in nature as the farmer may not feel that he is in position, owing to fixed obligations, to risk possible reduction in income. The decision in this case depends upon the ability and willingness of the farmer to risk the uncertain rainfall distribution and its effect on his income.

When seeking an increase in yield over that from a normal rainfall one needs a good knowledge of the response to water as well as a knowledge of fertility and other factors influencing plant growth. Experimental data are somewhat lacking to guide these decisions, but many farmers have an idea of what they could produce with adequate water. These benefits must be worth the cost of obtaining them.

Costs of Irrigation

Costs may arise from having made the investment or from earnings foregone from other possible uses for the money involved. Monetary outlays depend on several factors, such as: (1) cost of establishing a dependable source of water, (2) size and design of system, (3) acreage and crop to be irrigated, and (4) operational costs. About 40 to 50 percent of the investment can be saved if water can be obtained legally from streams. In 1954 a system capable of applying a total of 240 acre-inches of water on 60 acres at one inch per acre setting, with an investment of $2,814 for equipment and $2,000 for reservoir, cost $1.97 per acre-inch for overhead, $2.50 per acre-inch for operating costs, or a total of $4.47 per acre-inch.

The alternatives to irrigation in handling the ill effects of a drouth are often overlooked. To reduce variation in farm income or to increase yields, farmers can: (1) maintain flexibility in the farm business so changes can be made without undue costs through changes in livestock program, maintaining a sizeable reserve of feed, emergency crops, or maintaining a cash or credit reserve, (2) operate livestock program below the capacity of the farm to avoid being forced to take drastic action during a possible drouth, (3) substitute more plentiful feeds for the scarce feed, (4) use the natural rainfall more efficiently through building up the water-holding capacity of the soil by adding organic matter, fertilizer, etc., and (5) diversify plant population to provide a more uniform dis-

trate plus 50 pounds of sulphate of potash are recommended. For the home garden, 7 to 8 pounds of 5-10-10 and two-thirds of a pound of side-dressing fertilizer per 100 foot of row is equivalent to the foregoing recommendations. Cabbage is a heavy user of sulfur, but the supply of this element in the soil is usually adequate. It is advisable, however, to disk in from 15 to 20 pounds of borax per acre with the broadcast fertilizer.

IRRIGATION

Cabbage responds well to irrigation, especially on lighter type soils. On the other hand, in most seasons and on most soils, Kentucky rainfall is sufficient to produce satisfactory yields without supplemental water.

CULTIVATION

Cultivation should be shallow and only as often as needed to control weeds. Many of the plant roots are within 2 inches of the soil surface so deep cultivation, especially close to the plant, should be avoided. There are no recommended chemical weed killers for the cabbage family.

INSECT CONTROL

Several insects attack cabbage and the grower must be prepared to combat them. Early and frequent examination of plantings is important for detecting insect infestations. It is always easier to control insects before their population builds up, and early control will be reflected in higher yields and quality. Watch especially for aphid infestations soon after transplanting. A sprayer of sufficient capacity to cover the acreage in a reasonably short time should be available. The amount of water used as a carrier can vary from 25 to 150 gallons per acre, but the spray

concentration must be made so that the proper amount of insecticide is applied. Mechanical agitation in the spray tank is essential when using wettable powders. Control measures for the most common insect pests are as follows:

Cabbage Maggot: A broadcast pre-planting treatment of 3 pounds per acre of actual Dieldrin or Heptachlor can be worked into the top 3 inches of soil just before planting; or 1/4 pounds of actual Dieldrin or Heptachlor can be added to each 50 gallons of transplanting water.

Worms: (Imported cabbage worm, cabbage looper, etc.) - Use the following rates per acre (emulsifiable concentrate or dust formulations on an equivalent basis, can be substituted, if preferred):

DDT	- 2 lb 50% wettable powder* or
Methoxychlor	- 4 lb 50% wettable powder or
Parathion	- 2 lb 15% wettable powder or
Malathion	- 4 lb 25% wettable powder or
Rotenone	- 6 lb 5% wettable powder

(* Note: Do not apply DDT after the heads begin to form.)

Aphids: Parathion or Malathion as for worms - or TEPP - 1/2 pint - 40% Formulation per acre, or Systox - 1 pint per acre (no later than 21 days before harvest)

In all cases use enough water to provide thorough plant coverage. A spreader-sticker should be used to assure uniform spray deposits. Always consult the manufacturer's label for precautions on handling insecticides and for information on timing of sprays. Parathion, TEPP, and Systox are highly poisonous and should not be used by the home gardener. READ and FOLLOW the label directions for safe handling and use.

DISEASE CONTROL

Field sprays for cabbage diseases are rarely needed. The use of disease-free seed, sterilized plant beds, resistant varieties, field sanitation, and crop rotation will prevent serious outbreaks of disease.

HARVESTING AND MARKETING

Early cabbage is cut as soon as the heads are large enough and firm enough for use. The risk of head splitting increases as the crop reaches maturity. Late cabbage should be grown until fully mature and can be left standing in the field until danger of a freeze. In harvesting, the head is bent over and cut off with a heavy knife just below the wrapper leaves. Early cabbage is usually shipped with 4 to 7 green wrapper leaves attached, while late cabbage is trimmed to 4 or less close fitting wrapper leaves. Wrapper leaves showing damage from insects or disease should be removed.

Cabbage is one of the easiest vegetable crops to handle, requiring little in the way of grading except to sort out obviously defective heads. Care should be taken, however, to avoid excessive bruising.

The grower should have his market fairly well determined before he starts the crop. Good coordination with the market outlets will aid in selection of varieties most desirable for that particular market. The market may also advise growers as to what size heads are most desirable for his particular harvesting season, and what type of package to use.

ECONOMIC OUTLOOK

The U. S. average yield of cabbage for fresh market use in 1954 was 7.92 tons per acre, with an average price of $27.86 per ton. Thus, the gross return to the grower was $221.00 per acre. However, in a normal year and with good management, a grower should expect yields ranging from to 12-18 tons per acre with a correspondingly higher gross return.

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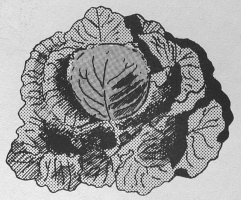
Growing Cabbage for *Fresh Market* in Kentucky

By Dudley C. Martin



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GROWING CABBAGE FOR FRESH MARKET IN KENTUCKY

By Dudley C. Martin

Cabbage is a crop that can be grown well in nearly all parts of Kentucky and should be seriously considered as one of the crops in a vegetable production program. It is one of the most important vegetables in the United States, with a 1954 production of nearly 160,000 acres and a farm value of $32,000,000. Approximately 90 percent of this production went for fresh market use. Cabbage is not a difficult crop to grow when recommended practices are followed. Two of the most important steps in production are soil preparation and growing plants for transplanting.

SOIL SELECTION

Cabbage will grow on a wide range of soil types, provided they are deep, of good texture, and relatively fertile. Lighter soils, such as a sandy loam, should be selected for the early crop, because they can be worked sooner and warm up more quickly. The soil should hold ample moisture but be well drained. Cabbage will not grow well on soils with poor internal drainage. Fall crops should be planted on heavier soils to take advantage of their greater moisture holding capacity.

A pH range of 5.5 to 6.5 is most suitable. It is a wise investment to have a soil test made, not only to determine the soil acidity, but also as a basis for planning the fertilizer program. Cabbage or related crops (broccoli, cauliflower, kale, brussel sprouts, etc.) should not be grown oftener than every three years on any particular field. With a rotation of this sort, most soil-borne diseases can be avoided or held to a minimum.

SOIL PREPARATION

Careful preparation of the soil prior to transplanting is very important. The land should be plowed several weeks before the anticipated time of transplanting. For early cabbage production, fall plowing is desirable if the land is in sod. Disking once or twice at 2 to 4 week intervals will aid in weed control. The final cultivation just before transplanting should produce a deep, level, and firm but not packed seedbed to receive the transplants.

VARIETIES

There are many good cabbage varieties. Several have been developed with resistance to cabbage yellows, and it is recommended that these be used. For the early crop, Resistant Detroit and Marion Market are the best suited for Kentucky conditions. Both produce round heads weighing from 2 to 4 pounds, the most desirable type for the early market. Resistant Detroit is ready for harvest 65 to 70 days after transplanting, and Marion Market is usually a week later. Wisconsin Hollander and Wisconsin All-Seasons are the most promising for the late crop. Both are high-yielding, yellows-resistant varieties, with globular to slightly flattened heads weighing from 6 to 8 pounds. They require from 90 to 100 days between transplanting and harvesting.

PLANT GROWING

If greenhouse or hotbed space is available, many growers have found it profitable to grow their own plants. It enables them to control more exactly the time of planting, to harden-off the plants correctly, and to keep a reserve of plants for replacements, if necessary. About 10 percent more plants should be grown

than actually needed, to allow for culling out the weaker plants at transplanting time. Select good seed from a reliable seed source. Western-grown or hot-water-treated seeds are preferred in order to avoid the possibility of black-leg disease.

Plants For The Early Crop

Allow 5 to 7 weeks for growing plants of suitable size for field setting. The usual planting date will be between mid-January and mid-February, depending on the season and location in the state. Sow seed in flats containing sterilized sand or vermiculite in rows 2 inches apart. There should be about 10 seeds per inch, planted 1/4 to 1/2 inch deep. Four ounces of seed will produce enough plants for one acre of cabbage. One-eighth ounce is ample for a 100-foot row. Keep the sand or vermiculite moist and hold it at a temperature of 65-70°F. After the seedlings have emerged, a day temperature of 60-65°F, and night temperature of 50-55°F is sufficient.

As soon as the first true leaves have formed (2 to 3 weeks) the plants should be transplanted into other flats containing a soil-manure compost or a mixture of equal parts of top soil, sand, and well rotted manure. This soil mixture should be sterilized by steam heating or chemical gas treatment. Consult your county agricultural agent for directions. Space the plants at least 1 1/2 by 1 1/2 inches and set them 1/2 to 1 inch deeper than they grew in the seed flat. Ample soil moisture should be available at all times, but thorough, less frequent watering is better than frequent light watering. It is best to water in the morning on clear, bright days, when the plants and soil surface will dry quickly.

About 10 days before the plants are to be set in the field, begin hardening them by

gradually subjecting them to outdoor conditions. This can be done by lowering the temperature and withholding water. Plant growth should be slowed down, but not completely checked. Properly hardened plants are better able to withstand the shock of transplanting into the field and are more resistant to frost damage when planted early. A properly grown and hardened plant ready for field setting should be stocky, 4-5 inches tall, and have 5-7 leaves.

Plants For The Fall Crop

These may be grown in outdoor plant beds, allowing 4 to 6 weeks for growth. Select a site that is moderately fertile and free of weeds. Do not use land that has grown any member of the cabbage family in the previous three years. Plant 10-12 seeds per foot, 1/4 inch deep. Row spacing can be varied, depending on the cultivation equipment available. Plant about 8 ounces of seed for each acre of cabbage to be grown. For small plantings allow 1/8 to 1/4 ounce of seed for a 100-foot row. Shallow cultivation to control weeds will be necessary and, in some years, irrigation will be needed to obtain uniform emergence and continuous growth.

TRANSPLANTING

Plants should be carefully lifted from the flat or plant bed to retain as much of the root system as possible. Do not allow the roots to dry out during the transplanting operation. Select plants of uniform size and vigor, discarding the weaker ones. For small acreages, hand setting is probably the most practical. Larger acreages require the use of a mechanical transplanter.

Early cabbage can be set as soon as the danger of a hard freeze is over and the soil

can be properly prepared. This will usually be from March 1 to April 1 in the Jackson Purchase area and from March 10 to April 1 in the rest of Kentucky. Late cabbage should be set between July 1 and July 20.

Plant spacing depends upon the variety, the size of head desired, and the soil fertility. Early season varieties are usually planted 12-18 inches apart in rows spaced 24-30 inches. Late-season varieties, which grow for a longer time and produce larger heads, should be 20-26 inches apart in the row, with rows 36-38 inches apart.

Starter solutions are of considerable benefit in getting the plants established. High-analysis, all-soluble fertilizer with an approximate ratio of 1-2-1 (15-30-15, for example) is added to the transplanting water at the rate of 3 pounds per 50 gallons or 1 ounce per gallon. One-half to one pint of this solution is applied to each plant.

FERTILIZATION

Cabbage is considered a heavy feeder and does not produce well unless ample nutrients are available. One-hundred to 120 pounds each of nitrogen, phosphate and potash per acre should be available for high yields. On most soils, from 1000 to 1200 pounds of 5-10-10 or its equivalent should be used. Half of this may be plowed down and the other half disked in prior to planting. If manure is available, 10 to 15 tons per acre may be plowed down and the 5-10-10 fertilizer reduced to 400 to 500 pounds. Part of the fertilizer may be placed in a band 3 inches to the side of the plants and 3 inches deep. In some cases, a side dressing of nitrogen and potash when the plants are one-third grown will be of benefit. Side dressings such as 100 pounds of potassium nitrate or 50 pounds of ammonium ni-

When a heavy application of any form of nitrogen is in close contact with seeds or growing plants, a poor stand or burning of the plants may occur. To prevent injury to plants or seeds, calcium cyanamide should be applied 7 to 10 days ahead of a new seeding; it should be top-dressed in the late fall or in spring before growth starts, or it should be side-dressed at least 8 inches from the growing plant.

Function of Nitrogen in Plants

Ample supplies of nitrogen promote rapid vegetative growth of dark green color; produce succulent crops, crisp tender leaves in vegetables, increase the protein content of grains and leaves, promote flowering, and enable crops to resist drouth.

If too much nitrogen is available, or if phosphorus and potassium are inadequate, plants will be susceptible to disease and slow to mature; the stems may be weak and fall down; they may fail to set fruit or the fruit may be watery and of poor quality; and the plants are less resistant to drouth and winter killing.

If not enough nitrogen is available, plants will be pale and yellow, grow very slowly, be dwarfed in total growth, and fire up as is often seen in corn.

Other Sources of Nitrogen

The nitrogen supplied in commercial fertilizers represents only a small part of the total amount that is added to Kentucky soils annually. Legumes grown in the state probably add four times as much nitrogen as is added in fertilizers. For instance, a good growth of red clover, properly inoculated, well supplied with lime, phosphate, and potash, will probably fix 150 to 200 pounds of nitrogen per acre.

The 15-million tons of barnyard manure and the 5-million tons of crop residues from corn, small grain, and tobacco produced annually in Kentucky, contain 5 times as much nitrogen as is purchased in commercial fertilizers. When these materials are properly cared for and returned to the soil, the nitrogen in them is released to succeeding crops. Also, millions of tons of organic matter are produced annually by other crops which, whe properly returned to the soil, preserve and release nitrogen to succeeding crops.

Efficient Use of Nitrogen

Even though there has been a tremendous increase in nitrogen consumption in recent years, Kentucky farmers could have used three times the 1955 amount profitably on grain crops and grass fields. However, for nitrogen fertilizers to pay, adequate phosphorus and potassium must be available for good crop growth. Since it is more expensiv to supply nitrogen fertilizers for crops than to supply phosphorus and potassium, farmer should be sure that adequate amounts of thes nutrients are in the soil or are applied along with the nitrogen to insure its full use. Because nitrogen is readily available to the cro and since it may leach in large amounts from the soil, it should be applied only for the cur rent crop; whereas sufficient phosphorus can safely be applied at one time to last several years. Inasmuch as potash leaches to some extent, and since crops may take up more than they need, it should be applied for the current crop except for the first year of hay following small grain, or on land too rough for annual applications to be practical.

Chemical soil tests serve as good guides as to the need for phosphorus and potassium, while the need for nitrogen is estimated from cropping and fertilizer history, the supply of organic matter and the type of soil.

10M-1-57

NITROGEN FERTILIZERS

By George D. Corder and Harold F. Miller

Nitrogen Consumption

In Kentucky the use of nitrogen plant food in fertilizers increased 11 1/2 times from 1940 to 1955. In 1940, Kentucky farmers used 2,458 tons of actual nitrogen in mixed fertilizers and straight goods, while in 1955 they used 28,149 tons. A similar increase in the use of nitrogen has been noted in other states.

Nitrogen Fertilizer Materials

With this tremendous increase in nitrogen used came widespread manufacture and use of several different forms of nitrogen fertilizers, especially since 1950.

The three major forms of nitrogen fertilizers on the market today are the dry or solid materials, the liquid, and the gaseous forms.

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The dry or solid nitrogen fertilizers include - ammonium nitrate, ammonium sulfate, ammonium nitrate limestone, nitrate of soda, calcium cyanamide, and urea. These materials are purchased in dry form in composition bags, either as straight fertilizers or in mixed goods, and can be applied to the soil with common fertilizer spreaders or drills.

The liquid forms of nitrogen include the solutions which are transported and stored in tanks and which are applied in the liquid form on the surface of the soil, using tanks and boom spray equipment or airplanes, or under the surface using tanks and sub-surface applicators. Either pressure or gravity flow may be used in application.

Aqua ammonia, a liquid which contains free ammonia, is handled in sealed tanks, and applied 4 to 6 inches deep in the soil to prevent loss of ammonia, the same being true of any liquid nitrogen containing free ammonia.

Anhydrous ammonia is a gaseous form of nitrogen fertilizer at atmospheric pressure and normal temperature. It is handled as a liquid under pressure, and is transported and stored in tanks. It is applied under pressure by a sub-surface applicator with an attachment to close the furrow behind the applicator boot.

The table on the next page gives some information on the common nitrogen fertilizers. Nitrogen fertilizers differ somewhat in their availability to crops, in their tendency to leach from the soil, and in their residual effect on increasing or decreasing soil acidity; but in general, all are equally effective on crop growth, pound for pound of nitrogen applied.

You will note in the table that some nitrogen fertilizers contain only ammonium nitrogen, others contain only nitrate nitrogen, while others contain both. When nitrate nitrogen in any fertilizer is applied to the soil it goes im-

Common Nitrogen Fertilizers

Materials	Total Nitrogen %	Ammonium Nitrogen %	Nitrate Nitrogen %	Volatile Ammonium Nitrogen %	Other Plant Nutrients %
Ammonium nitrate	33.5	16.75	16.75	-	-
Ammonium sulfate	20.6	20.6	-	-	Sulfur 23.0
Ammonium nitrate limestone	20.5	10.25	10.25	-	Ca. 5.7 Mg. 4.2
Calcium cyanamide	21.0	21.0*	-	-	Ca. 15-20
Nitrate of soda	16.0	-	16.0	-	Sodium 27.0
Urea	45.0	25.0*	-	-	-
Anhydrous ammonia	82.0	82.0	-	82.0	-
Aqua ammonia	24.6	24.6	-	24.6	-
Liquid nitrogen	21.0-41.0	21.0-41.0	-	-	-

* The nitrogen in calcium cyanamide and urea is neither ammonia or nitrate nitrogen but when these materials are applied to the soil, ammonium nitrogen is quickly formed.

mediately into the soil solution (soil water) where it is available for crop use. It will also leach out of the soil. When ammonium nitrogen in any fertilizer is applied to the soil, it remains in the ammonium form until soil microbes change it to the nitrate form. This process is rapid if the soil temperature is above 57 to 60°F but slows down as the soil gets cooler and practically stops during the winter months. Nitrogen does not readily leach from the soil as long as it is in the ammonium form. Some crops use this form of nitrogen fairly well, but most crops use nitrate nitrogen much more readily. Ammonium

nitrogen or nitrate nitrogen acts the same in the soil regardless of the carrier in which it is applied; for example, ammonium nitrogen from either anhydrous ammonia or ammonium sulfate acts the same in the soil. Conversion to nitrate nitrogen is somewhat slower in calcium cyanamide.

There is no advantage to using one form of nitrogen fertilizer over another so far as the nitrogen itself is concerned. Farmers should determine their nitrogen needs, buy the form of fertilizer that will supply the cheapest plant food, and will be most convenient to apply to the soil.

Applying Nitrogen Fertilizers

The dry or solid forms and the liquid forms of fertilizers that contain no free ammonia may be applied below the soil surface, on the surface and left there, or worked into the soil. No nitrogen is lost by evaporation into the air when the material is left on the surface. It may be lost, however, in run-off water. This is also true of phosphate and potash fertilizers.

Anhydrous ammonia is released under pressure from an applicator tank. Upon release a gas is formed. Therefore the gas must be placed in the soil, preferably 4 to 6 inches inches deep, and be well covered to prevent loss into the atmosphere. This form of nitrogen cannot be used as top dressing.

Aqua ammonia, or any of the liquid nitrogen fertilizers containing free ammonia, must be applied in the soil (preferably 4 to 6 inches deep) and be well covered to prevent the loss of ammonia.

Any of the nitrogen fertilizers can be applied immediately ahead of a crop, at seeding time, or as a side-dressing without fear of causing damage to the crop if applied properly.

Harvest Ripe Tobacco

Allow the plants time to ripen in the field, and harvest only ripe tobacco. Ripe tobacco cures quicker than green tobacco, and is in better demand on the market.

Manage the Barn For Good Curing

Cure your tobacco for high quality. Have at least one-third of the side-wall area of the barn hinged for use as vertical ventilators so that as much as possible of the curing will be air-curing. Have heating equipment on hand for use in poor curing weather.

Build Your Soils For Better Tobacco

Use rotations of tobacco and grasses and legumes to build soils for better burley. Soils that now are low to medium in fertility can be made more productive through use of crop residues, farm manure, phosphate and potash fertilizers, liming, growing grasses and legumes. Good crops of burley are more certain on land so improved, and only moderate amounts of fertilizer are needed when such land is in burley. Don't wait until tobacco comes around in the rotation to add the fertilizers needed to enrich the soil. A better plan in any soil-building program is to apply enough fertilizers to the pasture, hay, and grain crops that they will improve the soil rather than deplete it. So managed, the land will be in such shape for tobacco that only enough fertilizer for the tobacco crop itself will then need to be added. Fertile land plowed from sod can be expected to produce a good yield of burley of desirable quality, useful to the manufacturer.

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Your Burley Tobacco Crop *for 1957*

How to Produce the Kind of Burley Tobacco That the Manufacturers Can Use

The narrow price range among grades of burley tobacco on the 1956 market has created the impression that there has been a drastic change in the type of tobacco needed by cigarette manufacturers. Although there appears to have been some shift in the kind of tobacco which manufacturers can use, the 1955 and 1956 sales still indicate a strong demand for ripe thin leaf. The nearly ideal weather conditions during both seasons have resulted in the production of useful tobacco from the bottom to the top of the plant. The

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1953 and 1954 crops were entirely different, producing much less thin, mild, highly useful leaf.

Excessive nitrogen fertilization, low topping, close suckering, and other practices that tend to produce thick, harsh, high-nicotine tobacco can be detrimental to the competitive position of burley, especially if 1957 should be average or below in the amount and distribution of rainfall.

Until there is better evidence to the contrary, growers will do well to follow recommended practices which usually result both in good quality and good yields of burley tobacco.

Choose a "Lower Nicotine" Variety

Burley varieties differ in average nicotine content, but none is low enough to produce a satisfactory crop if over-fertilized or closely suckered.

Of the Kentucky varieties, the wildfire-resistant Ky 61 seems lowest in nicotine. Ky 41A and Ky 58 are somewhat higher, while Ky 35, Ky 16, Ky 57, and Ky 26 range higher, in the order given.

Use of the lower-nicotine varieties is helpful, but cultural practices that keep nicotine content low must also be used in order to produce a mild, thin-bodied crop.

Plant On Fertile Sodland

The best soil for burley production is deep, well-drained, and fertile, and is plowed from a good sod. Land that has been in sod has better soil structure than land which has been row-cropped for several years. Better soil structure means more rapid plant growth which nearly always results in a useful crop of burley.

Don't Over-fertilize With Nitrogen

Apply as much phosphorus and potassium as are shown by soil tests to be needed. Apply only enough nitrogen for good yields. Don't apply more nitrogen than is needed for normal growth. This means that

the plants should use up the supply of nitrogen by topping time, or shortly thereafter. Tobacco that runs out of nitrogen too soon is of poor quality, and the yield is lower than necessary. But if it has too much nitrogen it remains dark green after topping, is heavy, dark, high in nitrogen compounds, and produces a harsh smoke. Providing the right amount of nitrogen calls for careful planning and knowledge of the particular soil where the crop is to be grown.

Where good sod of grass and legumes is turned under for tobacco, only about 50 pounds of nitrogen per acre is needed from commercial fertilizer or manure. This amount is contained in 1,000 pounds of 5-10-15 fertilizer, or in 10 tons of manure, or in about two 80 pound bags of ammonium nitrate or four 80 pound bags of sodium nitrate.

Where the sod is mainly grass, with little or no legumes the year before plowing for tobacco, about 80 pounds of nitrogen is needed per acre.

Where the sod is poor or mainly weeds, 100 to 125 pounds per acre of nitrogen may be needed.

On land which has been in tobacco several years, where the fertility has been built up to a high state, and where a good cover crop of small grain and legume is turned under, it is easy to have too much nitrogen for good tobacco. As there is no satisfactory soil test for nitrogen, each farmer must decide for himself what the needs for nitrogen are, on the basis of the past treatment of the soil and the appearance of the cover crop before plowing. This is where real skill enters in.

In general, if the soil has been heavily manured and fertilized in past years, and if the cover crop is dark green up to the time of plowing, little or no more nitrogen will be needed for burley this year. If the cover crop is yellow at plowing time, 80 to 100 pounds of additional nitrogen per acre in fertilizer or manure should be enough. In average farm manure there will be about 6 pounds of nitrogen in each ton of manure, available for the crop this year.

Cultivate Shallow

Cultivate only deep enough the first time after planting to break up the ground packed by the machinery used in setting. All cultivation after that should be shallow enough not to disturb the tobacco roots. Each time any roots are disturbed or pruned off, the growth of the plant is slowed and the leaves tend to thicken.

Top When Three-fourths of Plants Are In Bloom

Topping at this stage catches a few plants in the late-bud stage. But it is better to top all the plants at one time, even though a few are still in the bud stage, in order that the field will mature evenly.

Hold Suckering To a Minimum

Let the two top suckers grow, and do no more suckering of the rest of the plant than is necessary to prevent damage. For example, in a recent test on a highly fertile piece of sod the nicotine content of tobacco handled in this way was 3.39 percent, while tobacco of the same variety in the next row, topped and closely suckered, had a nicotine content of 4.46 percent. Suckering once between topping and cutting time can increase nicotine content materially. The earlier tobacco is topped and the more times it is suckered, the heavier and less desirable the leaf and the higher the nicotine content.

Priming Saves Valuable Leaves

Priming the lower leaves when a lemon yellow color saves valuable tobacco which usually is lost if not primed. Priming also usually means better quality of the rest of the leaves—for when the valuable lower leaves are saved the rest of the plant can be left in the field until all the leaves are fully ripe before harvesting.

maining 500 pounds should be disked in to form a fine seedbed.

SIDEDRESSING

Early tomatoes should be sidedressed with nitrogen during the fruit-sizing period. About 100 pounds of ammonium nitrate per acre should be applied when the first fruits are the size of a quarter, followed by another 100 pounds of ammonium nitrate when fruits on the first cluster are full size.

CULTIVATION

Cultivation should be shallow and only as necessary to control weeds.

STAKING

Pruning tomato plants is not recommended. The plants should be tied to a stake, such as a tobacco stake, when the vines have branched. The stake should be set 4 inches away from the plant.

IRRIGATION

Farmers who have been able to irrigate have found that during periods of drouth the yield and quality of tomatoes have been improved. Irrigation should be matched with an adequate fertility program.

DISEASE AND INSECT CONTROL

Good pest control is essential for early market tomatoes. A regular spray schedule is the best insurance against diseases and insects. However, in some seasons it may not be necessary. If the weather is rainy or dews are heavy, spray applications should be made weekly and after heavy rains. In drier weather the interval between applications may be lengthened to 2 weeks. A combination of malathion and zineb or maneb is a good general spray material. The manufacturers' directions should be followed. Complete coverage of the plant with the spray

is essential. Spraying is preferred to dusting, but some growers have applied the same chemicals as dusts with success. The addition of TDE to the spray program is necessary to control fruit worms. Manufacturers' directions should be followed exactly as written.

Nematodes, especially root-knot nematodes, are likely to be introduced in plants from the southeastern states. They can damage tomatoes severely. Nematodes are microscopic round worms that damage plant roots, causing stunting and wilting. Root-knot nematodes produce swellings in the roots. Early tomatoes may escape severe damage. After harvest the roots of several plants should be examined to determine whether any abnormalities are present. If there are, the field should not be used for tomatoes in the future.

Plants should be observed frequently and closely, especially the lower leaves and stems. At the first signs of disease or insect infestation, identification of the trouble should be sought. If the symptoms are unfamiliar, specimens should be sent to the plant pathologist, Department of Agronomy, Kentucky Agricultural Experiment Station, Lexington.

Entire plants should be sent if possible. If this is not possible, parts of plants showing active development of the disease should be sent. Some soil should be included with specimens of roots. All specimens should be enclosed in plastic bags and sent or brought immediately to the Experiment Station.

Blossom-end rot occurs frequently. It is first noticed as a water-soaked area under the fruit wall at the blossom end. The injury

rapidly develops into a blackened, sunken, leathery lesion. This disease is caused by a deficiency of calcium in the fruit. It is most likely to develop during periods of rapid growth and during periods of excessive rainfall or drought. Plants should be watched closely for the first sign of the disease and if it appears, they should be sprayed with calcium chloride at the rate of 4 pounds per 100 gallons of water. The calcium chloride may be added to the fungicide-insecticide sprays. Applications as frequent as twice a week may be needed to keep the disease in check. Sometimes in hot weather calcium chloride may cause some leaf scorching. Heavy fertilization with superphosphate which contains considerable calcium has been found helpful.

HARVESTING

Tomatoes should be harvested at the proper stage of maturity. Tomatoes that are harvested every day should be picked when about one-half of the fruit is pink at the blossom end. Tomatoes harvested every other day should be picked when one-fourth of the tomato on the blossom end is pink. Whenever possible, the tomatoes should be harvested in the morning. The tomatoes should be graded and packed for shipment that afternoon to reach the market in the best condition. Grading and packing should comply with the market demand.

February, 1957 - 6M Lexington, Kentucky

Growing Tomatoes for Early Market in Kentucky

by Clyde Singletary

Leaflet 184

Cooperative Extension Work in Agriculture and Home Economics
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
UNIVERSITY OF KENTUCKY
and the
U.S. DEPARTMENT OF AGRICULTURE, Cooperating
FRANK J. WELCH, Director
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GROWING TOMATOES FOR EARLY MARKET IN KENTUCKY

By Clyde Singletary

The soils and climate of Kentucky are suitable for producing early market tomatoes. It is not uncommon for the better tomato growers to harvest from 4 to 7 tons of tomatoes per acre during the month of July when the price is the highest. There is no secret or magic in attaining good yields. Successful production, as with most other food crops, depends on following a number of rather simple but sound cultural practices.

VARIETIES

Valiant is perhaps the standard of early market varieties in Kentucky. It produces a heavy early crop. Fruits of Valiant are subject, however, to severe cracking when the soil moisture is not constant. Most growers of this variety find it necessary to irrigate.

Early Giant Hybrid and Morton Hybrid are promising early market varieties. They mature their first fruits about the same date as does Valiant. The yield of these hybrids generally exceeds that of Valiant.

SOIL

Tomato and tobacco belong to the same family. A soil that grows good tobacco is suitable for tomatoes. A deep, well drained, fertile soil should be selected. Since light soils warm up earlier in the spring than do heavy ones, the light soils will produce earlier tomatoes. Tomatoes do best on soils with a pH between 6.0 and 6.5.

ROTATION

Some tomato diseases live over in the soil, and these diseases will attack such closely related crops as potatoes, peppers, and eggplants. Generally, these crops should be grown only once in 3 or 4 years on the same land.

PLANT GROWING

Most early market tomato growers have found it profitable to grow their own plants in preference to buying southern-grown plants. The cost for growing good quality transplants has been made reasonable with the introduction of plastics in the construction of greenhouses, hotbeds, and cold-frames. Most growers grow good transplants successfully. Disease control, convenience of plants, and trueness of variety are some of the advantages of growing one's own plants.

The following steps are listed for the grower who is growing plants for the first time:

(1) Select good seeds from a reliable source.

(2) Plant the seed about 45 days before field transplanting time. Sand has been found to be excellent for starting seedlings. However, a mixture of one-third each of rich top soil, sand and well rotted compost or manure is probably the most popular.

(3) Sterilize the soil. Soil for raising seedling and transplants may be sterilized in one of several ways. In all cases it should be friable and moist.

Steam may be used to heat the soil to a temperature of 160°-180°F for 10 minutes. The temperature should not be allowed to rise above 180°F. Seed may be planted as soon as the soil is cool enough.

Methyl bromide gas may be used at the rate of 2 pounds per 100 square feet when the soil is 50°F or warmer. The gas must be released under a plastic cover in order to be confined to the soil. The cover should be left in place for 24 to 48 hours. Seed may be planted 48 hours after the cover is removed.

Vapam has been used successfully and is worth trying. One pint of Vapam in a

sprinkling can full of water should be applied unformly over 50 square feet. Enough water to penetrate the soil to a depth of 4 inches should then be applied to the treated area. Seed may be planted 14 to 21 days after treating. If the temperature of the soil is below 60°F much of the time after treating, an interval of 30 days is necessary between treating and planting.

Certain precautions must be observed with all the chemical treatments. They should not be used near living plants or in a greenhouse containing living plants. The vapors of these materials are poisonous so all the manufacturers' precautions and instructions should be followed faithfully.

(4) Plant the seed in narrow rows, about 3 inches apart. The depth of the small furrows should be no more than 1/4 inch. The seed are sown in the row at a rate of 6-8 seed per inch. The seed are covered 1/4 inch with sand or soil mixture. The sand or soil should be kept moist at a temperature around 65° to 70°F.

(5) Transplant the seedlings about 10 days to two weeks after seed were sown, or when first two true leaves are formed. They may be transplanted into hotbeds or greenhouse bed of treated soil. The plants should be spaced a minimum of 3 by 3 inches. If space is available, a 4-by 4-inch spacing is preferred. The soil should be rich and well drained. A mixture of soil, sand and manure, as described above, makes an excellent plant bed. Equal amounts of top soil and manure without the sand makes a good plant bed. Plants started in pots or flats are easily transplanted without severe root damage but require more labor than the bed method.

(6) Begin a hardening process about one week before field planting time, by gradually exposing the plants to outside conditions and withholding moisture without causing injury

to the plants. This will help the plants to withstand the field transplanting with less shock.

FIELD TRANSPLANTING

The plants may be transplanted in the field after danger of frost in the early spring. This date may vary from April 15 in the southern part of Kentucky to May 10 in the northern sections. Growers differ in transplanting methods. Some growers transplant by hand, removing the plants from the bed with as much soil as possible and plant in the field with a minimum of plant root disturbance. This method requires considerable labor but it is profitable. Other growers use tobacco setters. The plants are removed from the soil by lifting rather than pulling and then set with as little disturbance to the plant roots as possible. This method is generally followed where the operation is large. One-half to 1 pint of transplanting water containing a soluble fertilizer is added to each plant in either operation. A fertilizer solution made of 1 pound of 5-10-5 or 6-12-6 in 10 gallons of water is suitable. Commercial starter solutions containing high-analysis, soluble fertilizers are available.

SPACING

Plants that are staked should occupy about 15 square feet of space. A spacing of 5 feet between rows and 3 feet in the row is generally recommended. From 20 to 25 square feet is required for unstaked plants. When rows are 5 feet apart, spacing between plants should be 4 to 5 feet for unstaked plants.

SOIL PREPARATION AND FERTILIZING

A deep soil is important for vigorous root growth. Deep plowing to about 10 inches is worth while. Approximately 1000 pounds of 5-10-10 fertilizer is recommended per acre. The grower should plow down 500 pounds about 3 weeks before planting and leave the land in the rough. At planting time, the re-

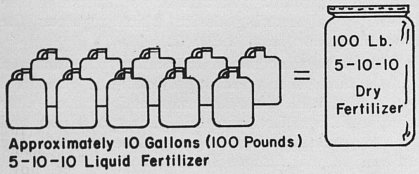

Fig. 2.— Equivalent amounts of plant food in liquid and dry fertilizer.

Foliar Spray

Plan foods, when sprayed on the leaves, can be taken in and used by the plant. Foliar spray is recommended for certain of the minor nutrients in areas where minor elements are deficient. However, foliar spray of the major elements (nitrogen, phosphorus, and potassium) is not recommended for field crops. Serious leaf burning may result when foliar sprays are improperly applied.

Comparison of Liquid and Solid Fertilizers

In 1953, at the Campbellsville experiment field, a liquid nitrogen fertilizer (a 32-percent nitrogen solution containing a mixture of ammonium nitrate and urea) was compared with ammonium nitrate (33.5 percent nitrogen) as a source of nitrogen for a spring top dressing on wheat. When either of the materials was applied at rates to supply 30 pounds of nitrogen per acre the wheat yields were increased over 100 percent. The ammonium nitrate plots produced slightly higher yields than those treated with the nitrogen solution. There was a slight burning of the foliage on the plots treated with the nitrogen solution immediately after treatment, but the plants recovered quickly.

At the same time a fescue sod was treated with the liquid nitrogen fertilizer at rates to supply 60 and 120 pounds of actual nitrogen per acre. There was a slight burning of the foliage on the area treated at the 60-pound rate, with severe foliage burning on the area receiving the 120-pound application. After several weeks the plants on the area receiving the 120-pound application recovered and made excellent growth.

In an experiment at Lexington, bluegrass was top dressed with ammonium nitrate and liquid nitrogen fertilizer at rates to supply 30, 60, and 90 pounds of actual nitrogen per acre. There was some burning of the bluegrass foliage where the nitrogen solution was applied at rates to supply 60 and 90 pounds of nitrogen per acre. The 60- and 90-pound rates of nitrogen yielded significantly higher than either no nitrogen or the 30-pound rate for each of the sources of nitrogen. Although the yield differences in these experiments were consistently in favor of the ammonium nitrate as compared with the nitrogen solution, the differences were small and not significant when the materials were applied to furnish the same amount of nitrogen.

Based on the results of these tests and those from other experiment stations, a pound of nitrogen, phosphate, or potash in solid fertilizer is equal to the same amount in the liquid form. It then becomes a question of the cost per unit of plant food applied to the land that should influence the farmer in his decision as to the material he buys.

SUMMARY

1. Plant food can be supplied in solutions, and when properly applied, should give the same results as an equal amount of the same plant foods applied in solid form.
2. Liquid fertilizers eliminate the cost of bagging, and less handling is required since the solutions can be moved through a hose, reducing the amount of labor required.
3. Additional equipment will be required for storing and applying the liquid fertilizers. The amount of additional equipment required will be determined by the solutions being handled.
4. Some of the liquid fertilizers are very corrosive. Consequently, the storage containers and applicator equipment should be made of durable metal.
5. The final decision as to whether to use liquid or solid fertilizers should be based on the cost per unit of plant food applied to the soil.

Lexington, Kentucky February, 1957

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5M—2-57

LIQUID FERTILIZER



A tractor-mounted anhydrous ammonia applicator equipped with a pump-type metering device and five spring-tine mounted applicators.

UNIVERSITY OF KENTUCKY

College of Agriculture and Home Economics
Agricultural Extension Service

FRANK J. WELCH, Dean and Director

Leaflet 185

Liquid Fertilizer

By Harold F. Miller

In some areas of Kentucky plant food can be purchased in either the dry or liquid form. Most farmers are familiar with the dry forms of fertilizer; liquid fertilizers, however, are relatively new. It is the purpose of this publication to discuss briefly that type of fertilizer as a source of plant food.

Any liquid which contains one or more available plant foods is known as a liquid fertilizer. As is true of solid fertilizers, a number of different kinds of liquid fertilizers are on the market, but all can be put into two general classes; namely, those containing only one plant food and those containing more than one. The liquid nitrogen fertilizers and anhydrous ammonia supply only nitrogen, while other solutions may contain all three of the major plant foods (nitrogen, phosphorus, and potassium).

Anhydrous Ammonia

Anhydrous ammonia is ammonia gas which is handled in liquid form under high pressure. It contains 82 percent nitrogen. When the anhydrous ammonia is released from the applicator tank, where it has been stored under pressure, it immediately changes to a gas. The ammonia gas must be injected into the soil and immediately covered to prevent loss of the gas to the atmosphere. Special equipment is essential for handling and applying anhydrous ammonia since it must be constantly kept under pressure until it is released in the soil as a gas. Equipment used to inject the ammonia into the soil is shown on the cover and in Fig. 1.

When the ammonia is released in the soil as a gas it reacts with the clay and organic matter and is chemically held. Some plants use ammonia nitrogen fairly well, but most crops use nitrate nitrogen much more readily. The soil microbes change ammonia nitrogen to nitrate nitrogen. This process is rapid during warm weather, slower in cool weather, and practically ceases during the winter. More detailed information on the use of anhydrous ammonia will be found in Kentucky Extension Circular 519, "Use of Anhydrous Ammonia as a Nitrogen Fertilizer."

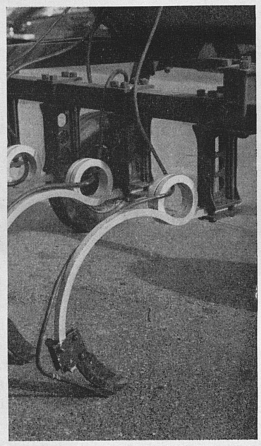

Fig. 1.— Details of a spring tine, the mounting of the applicator or chisel, and the hose and discharge nozzle for conducting the ammonia from the tank to bottom of furrow.

Nitrogen Solutions

A number of different liquid nitrogen fertilizers are on the market, such as a water solution of ammonia (15-25 percent N), a solution of ammonium nitrate (21 percent N), solutions of mixtures of ammonium nitrate and ammonia (37-49 percent N), and a solution of ammonium nitrate and urea (32 percent N).

Any of these liquid nitrogen solutions containing free ammonia must be applied below the surface of the soil to prevent loss of nitrogen (in the form of ammonia gas) to the atmosphere. When properly injected into the soil, the free ammonia in nitrogen solutions is chemically held by the soil until used as ammonium by the plant or changed over to nitrate by soil microbes.

Any solution containing no free ammonia can be sprayed on pasture, small grain, or the soil without loss of nitrogen to the atmosphere. Boom-type sprays with nozzles can be used to apply these materials. Other applicators have a number of rubber or plastic hose attached to each of the boom openings. These hose drag on the soil, allowing the solution to flow

out on the ground. The rate of application is controlled by a metering device which regulates the flow of solution from the tank.

It must be remembered that anhydrous ammonia and the nitrogen solutions supply only one plant food —nitrogen. With these materials, as is true of other straight-nitrogen fertilizer, the yield response obtained for the application of nitrogen will be influenced by the amount of nitrogen furnished by the soil. On soils low in available nitrogen, obviously a greater crop response will be obtained from an application of nitrogen than would be expected from the same amount of nitrogen on soils with a larger amount of available nitrogen. Another factor that must be considered when using straight-nitrogen fertilizers is the amount of the other plant foods and moisture available to the crop. A proper balance of the other plant nutrients must be maintained if the maximum response is to be obtained for nitrogen applications. Since nitrogen is the most expensive of the three plant foods normally purchased in commercial fertilizer, it is unwise to apply nitrogen to soils deficient in available phosphorus or potassium unless these deficiencies are corrected.

Liquids Containing Nitrogen, Phosphorus and Potassium

In addition to anhydrous ammonia and the nitrogen solutions there is available on the market liquid fertilizers containing two and even all three of the major plant foods—nitrogen, phosphorus, and potassium.

The amount of plant food contained in liquid fertilizers is stated in percentage by weight of the nitrogen (N), available phosphate (P_2O_5) and potash (K_2O) just as in solid fertilizer materials. A gallon of 5-10-10 liquid fertilizer, weighing approximately 10 pounds, would contain 0.5 pound of nitrogen (N), 1.0 pound of phosphate (P_2O_5) and 1.0 pound of potash (K_2O). It would require approximately 10 gallons or 100 pounds of this liquid to supply as much plant food as is contained in 100 pounds of 5-10-10 dry mixed fertilizer or approximately 200 gallons or 2000 pounds of the liquid fertilizer to supply as much plant food as a ton of 5-10-10 dry mixed fertilizer. (See Fig. 2.)

crop is too old. The grower should make this test daily when ears seem to be approaching maturity. Generally two harvests are required for most varieties.

Sweet corn loses quality rapidly with warm temperatures. The ears should be harvested during the very early morning hours to avoid field heat. Sweet corn of proper maturity, harvested at day-break, iced and shipped to market immediately will bring the highest prices. The ears should be snapped from the stalk, leaving all wrapper leaves and a short shank. The shanks of all ears should be of uniform length. A grower should have a production goal of 1000 dozen ears or more per acre.

INSECT AND DISEASE CONTROL

Seed Corn Maggot and Rots - Cold, wet weather in early spring, which delays germination of seed, promotes injury from the maggots. Treating seed with a commercial insecticide preparation, such as lindane or dieldrin, gives good control of the maggots. A fungicide such as Thiram or captan, used in combination with the insecticide, helps to keep the seed from rotting in the soil.

Bacterial Wilt - Controlled best by resistant varieties. All varieties in the recommended list are resistant.

European Corn Borer - When egg masses or "shot holes" appear on or in the leaves, use a spray treatment of 1 1/2 pounds of DDT (3 quarts of 25 percent emulsion concentrate) per acre. The corn borer appears most frequently in June and August.

Corn-ear Worm - This worm must be controlled. Many markets will not accept sweet corn damaged by the ear worm. Worm-free sweet corn can be expected from the following recommendation:

Materials: Mix 3 quarts of 25 percent emulsion concentrate of DDT and 5 quart of white mineral oil (70-80 second Saybold Viscosity) in 25 gallons of water. Apply this mixture to one acre.

Application: Apply first spray when 10 percent (10 out of 100) of the plants show silks. Make 3 additional sprays at 3-day intervals.

A hand sprayer is satisfactory for small plantings. Constant agitation and maintenance of pressure as high as possible are required. To make a small quantity of spray, mix 8 tablespoonsful of DDT emulsion concentrate and 15 tablespoonsful of mineral oil with one gallon of water.

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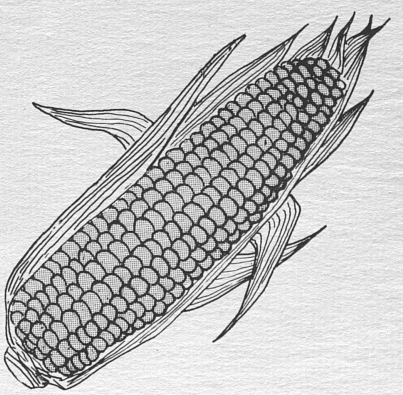
5M-2-57

SWEET CORN PRODUCTION IN KENTUCKY



By Clyde C. Singletary
and George A. Marlowe, Jr.

LEAFLET 186

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service

SWEET CORN PRODUCTION IN KENTUCKY

By Clyde C. Singletary
and George A. Marlowe, Jr.

Sweet corn is among the leading truck crops for fresh market use. There is generally a market for good quality sweet corn. High quality depends on freedom from insect damage, size, color, shape, maturity, freshness and fullness of ear. Farmers who grow high yields of field corn should be able to grow sweet corn equally well.

VARIETIES

There are early, medium, and late varieties, with as much as 10 days between the different types. The days required for maturity of a variety is determined largely on temperature. Varieties mature quicker in hot weather. The early and medium varieties are recommended only for spring planting, to mature for the early market. These varieties generally do not compare in quality with the later varieties. A recommended early variety is Early Adams with Carmelcross, a good medium variety. Golden Security, Tempo, Golden Hybrid 2057 and Prosperity are recommended late varieties.

PLANTING SCHEDULE

The first planting of sweet corn may be made when weather conditions permit following April 15. This planting should include early, medium, and late varieties. The next planting should be made 2 weeks later with only late varieties, with the last planting not later than July 20. This type of planting schedule should be followed:

1. To obtain the earliest possible harvest.
2. To obtain the highest quality sweet corn during the regular season by planting late varieties.

3. To harvest sweet corn throughout the growing season to avoid entire crop failures, to develop a continuous supply for the market, and to prevent a complete loss due to market gluts.

A SUGGESTED PLANTING PLAN - 4-ACRE UNIT*

Planting Date	Variety Type	Amount of Area to Plant	Expected Harvest Date in a Normal Season
April 15**	Early	1/3 acre	June 25
	Medium	1/3 acre	July 5
	Late	1/3 acre	July 15
May 1	Late	1/3 acre	July 25
May 10	Late	1/3 acre	August 5
May 20	Late	1/3 acre	August 15
May 30	Late	1/3 acre	August 25
June 10	Late	1/3 acre	September 5
June 20	Late	1/3 acre	September 15
June 30	Late	1/3 acre	September 25
July 10	Late	1/3 acre	October 5
July 20**	Late	1/3 acre	October 25

* This 4-acre suggested unit may be enlarged to 8, 12, 16, or more acres.

** There is an element of risk from early frost on April 15 planting and late frost on the July 20 planting.

SOIL SELECTION, PREPARATION AND ROTATION

A program suitable for high yields of field corn has been found satisfactory for the production of sweet corn. When possible, a light, sandy loam soil should be selected for the early planting.

FERTILIZATION

A fertilizing practice which produces 100 bushels or more of field corn will give good results. Soil tests should be made. Sweet corn requires at least 25 pounds N, 50 P_2O_5, and 50 pounds of K_2O per acre. These demands can be met by a complete fertilizer or individual materials. Row application generally results in more efficient use of the fertilizer. A sidedress of 100 pounds of ammonium nitrate per acre when the plants are about knee high often gives good results, particularly on soils low in organic matter. A rotation practice which returns to the soil a great amount of organic matter is preferred. (For home gardeners 6 to 10 pounds of 5-10-10 with sidedressing of 1 to 2 pounds of ammonium nitrate is recommended for each 100 feet of row.)

PLANTING

Growers should consult Ky. Misc. Pub. 73, "Recommended Seed List" for the amount of seed per acre and seed source. The seed should be drilled to give a stand of plants 8 to 12 inches in rows spaced 36 to 42 inches. The closer spacing is suggested for irrigated plantings. Field corn planters may be adjusted to meet these spacings.

CULTIVATION

Shallow cultivation is necessary for profitable sweet corn production, particularly to insure early yields. Chemical control of weeds by the use of 2, 4-D is the same as for field corn.

IRRIGATION

Irrigating sweet corn during dry weather may give increased yields, quality and profit.

HARVESTING

Sweet corn must be harvested at the peak of market maturity. The peak maturity is the milk stage, which may be detected by the thumb-nail method. When the thumb nail can be pushed into well-filled kernels in the middle of an ear and a milky material pops out, the proper stage of maturity has been reached. If the kernel is watery, the crop is too young; if the kernel is doughy, the

Limitations of the Soil Test

One of the first and greatest limitations in the soil-testing program is in the soil sample submitted for analysis. The sample must be representative of the field from which it is taken. The laboratory technician can only analyze the sample submitted to the county agent. If the sample is not representative of the area to be fertilized, the results of the test and the recommendations based on these results will be misleading. To take a good soil sample, follow carefully the instructions set forth in Ky. Ext. Leaflet 139 "How to Take Good Soil Samples." Copies of this leaflet are available at your county agent's office.

Plant roots absorb elements out of the soil slowly for several months, while in soil tests the chemical reagents are in contact with the soil for only a few minutes. Another consideration is that different plants vary in their ability to remove nutrients from the soil. Some plants will be able to remove more nutrients from a particular soil than others.

A soil may test acid (showing need for lime) and yet may have been adequately limed within the past year. This soil would not need additional liming, as the lime applied recently will continue to increase in effectiveness. Here again the importance of accurate information on past fertilization history is emphasized.

It is obvious that with the chemical soil test, the amounts of plant nutrients available to any one crop during the growing season cannot be determined exactly. Nevertheless, when the limitations and values of these tests are recognized, soil testing is valuable as a guide to more efficient fertilization. The soil test, along with past fertilizer and cropping history, enables the county agent to recommend a fertilization program that should give greater returns on the fertilizer investment.

Physical Properties Must Be Considered

On many of the soils in the state, poor physical conditions of the soil may limit plant growth as much or more than a lack of plant foods. Some soils may be supplied with an abundance of plant nutrients, but may be too wet for crops to produce profitable yields. Other soils may be so shallow or have such poor physical condition that sufficient water cannot be stored and a lack of moisture may limit the plant growth. There may be a compact subsoil below the surface that roots cannot penetrate, thus limiting root growth and crop production. Sandy soils will not retain moisture and plant foods as well as heavier soils. The information sheet aids in determining the physical limitations of the soil tested thus enabling county agents to consider them when recommending fertilizers.

Soil Sample Information Sheet

In view of the limitations of the soil and since nitrogen recommendations must be made on the basis of the past fertilization and cropping history, the importance of supplying accurate information along with a good soil sample cannot be overemphasized. County agents having this information and the results of a soil test can make much better recommendations than where only the soil test results are considered.

Select Recommended Fertilizer Ratios

Because the exact amount of plant food that the soil itself will furnish to a crop varies with seasonal and other unpredictable conditions, small differences in the rate of application of plant foods are unimportant. Select a fertilizer from the recommended list of grades and ratios as shown in Ky. Ext. Misc. Pub. 10 or straight fertilizer materials that will supply the approximate amounts of plant foods recommended. Where only one plant food is required, a straight fertilizer that will supply that particular plant food should be purchased and used.

Purchase Fertilizer on Basis of Plant Food Cost

The cost of plant food in fertilizer rather than the price per ton determines its value. Usually the higher analysis fertilizers which cost more per ton furnish plant food cheaper than low analysis materials. For instance, 3 tons of 5-20-20 contain just as much plant food as 5 tons of 3-12-12. The total cost for 3 tons of 5-20-20 will be 10 to 15 dollars less than 5 tons of 3-12-12, even though the lower analysis fertilizer costs much less per ton.

Summary

Although the exact nutrient requirement of a soil cannot be determined by the chemical soil test, it is an excellent guide for more effective utilization of lime and fertilizers. Recommendations based on results of soil test and past fertilizer and cropping history should mean greater returns on the annual lime and fertilizer investment and make for a more prosperous agriculture in the state. In order to get the most accurate test and the maximum net return the farmer must:

I. Submit a soil sample representative of the area to be fertilized.

II. Supply accurate information as to past fertilization and cropping history.

III. Apply the lime and fertilizer at rates to supply the approximate amounts of plant food recommended by the county agent.

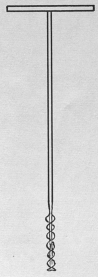
IV. Purchase the recommended plant food on the basis of cost of plant nutrients rather than the cost per bag or ton of fertilizer.

10M-3-57

SOIL TESTING

A Guide for More Efficient Fertilization

by Harold F. Miller
and George D. Corder



Leaflet 187

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SOIL TESTING: A Guide for More Efficient Fertilization

By HAROLD F. MILLER and GEORGE D. CORDER

A fertile soil, capable of producing high crop yields, is the first step toward greater efficiency in farming. Unfortunately, most of the soils in Kentucky do not contain sufficient amounts of available plant nutrients to produce high crop yields. Deficiencies of these plant foods must be corrected through the use of lime and commercial fertilizer before production can be brought to an efficient level.

It is the purpose of this publication to discuss the values and limitations of soil testing as a guide for most efficient use of lime and fertilizer materials.

Proper Balance of Plant Nutrients is Essential

Kentucky farmers are now spending nearly $40 million annually for fertilizer and limestone. This money must be spent for plant nutrients which are actually needed if the most profit is to be realized. A proper balance of plant foods must be maintained for most efficient crop production. Too much of a particular kind will not give an immediate return on the investment, and excessive amounts of certain nutrients may harm the crops. Therefore farmers must choose the kinds and amounts of plant food to be applied for a particular crop. The purpose of the soil-testing program is to help farmers make the best decision.

Soil Variation

Before we can determine what plant food to apply, we must consider the amounts of plant food already available in the soil. Soils vary widely in the amount and kinds of available plant nutrients they contain. One reason is that the soils in the different geographical regions of the state vary considerably in their capability to supply the essential plant foods. Of much greater importance is the fact that there may have been different fertilization and management practices on various fields within any one farm. No two fields on the same farm may require the same amounts of lime and fertilizer. The soil-testing program in Kentucky has been developed to assist as a guide in determining the need for limestone and fertilizer materials on a particular field or area within a field.

Availability of Soil-testing Service

Of the 120 Kentucky counties, 107 now have soil-testing laboratories operated on a non-profit basis. Those counties not having laboratories have made arrangements with nearby counties to test soil samples. Anyone can have his soils tested by taking samples to the county extension agent's office. There is a nominal fee charged for testing soils.

Lime Test

The degree of acidity of a soil is conveniently expressed in terms of "pH" values. The complete pH scale is divided into 14 divisions or units numbered from 1 to 14. Soils with a pH value of 7.0 are neutral. Soils with a pH value below 7.0 are acid or "sour", while those above pH 7.0 are alkaline or "sweet." Soils also may be described as "strongly acid", "moderately acid", "slightly acid", or "not acid". The pH range adapted for these categories in Kentucky is as follows:

Below pH 5.3	-	strongly acid
pH 5.3 - pH 6.0	-	moderately acid
pH 6.1 - pH 6.7	-	slightly acid
Above pH 6.7	-	not acid

Most of the soils in Kentucky, except some of those in the Eden Hill section, and some of the overflow bottomland soils, are acid or sour having a pH below 7.0. Some of the soils that were originally moderately or strongly acid have had liberal applications of ground limestone, which have neutralized the acidity. Additional limestone applications on such soils would not be profitable until the neutralizing effect of the limestone has been lost by leaching and by removal of the calcium and magnesium by crops. Excessive liming should be avoided since little can be done in a short time to correct overliming. On the other hand, deficiencies can be easily corrected by applying the proper amount of a liming material. Results of a soil test, along with the liming history of the particular field, enable the county extension agent to make better liming recommendations.

Nitrogen Test Not Made

A test for available nitrogen is not used in the Kentucky soil-testing program. Since available nitrogen is dependent on soil organic matter and soil micro-organism activity, it fluctuates greatly. The past fertilization and cropping history information is used by the county agent as a basis of estimating the nitrogen-supplying power of the soil. Therefore, accurate information is essential if the county agent is to make a recommendation for efficient use of nitrogen fertilizer. The level of available nitrogen in the soil can be quickly built up with nitrogen fertilizer, manure and legumes, or it can be depleted by not fertilizing and by removing high yields of non-legume crops. Nitrogen fertilizer has nearly all its effect on the immediate crop. Excessive nitrogen should be avoided since it may result in poor stands of grasses and legumes seeded in small grain, cause the grain to lodge, or lower the quality of burley tobacco.

Phosphorus Test

The amount of available phosphorus in many of the soils in the state is the limiting factor in plant growth. Even in the central bluegrass area where most of the soils have an abundance of available phosphorus, there are areas where additional phosphate is needed. Much of the overflow bottomland along the Ohio and Kentucky rivers is high in available phosphorus, and no response is obtained for phosphate applications. Also, some soils originally low in available phosphorus have had heavy applications of phosphate fertilizers over a period of years. The residual effect from these heavy applications has built up the available phosphorus to the level where yields are not increased by adding more phosphate. The available phosphorus level in some soils may have been high enough that no response was obtained for phosphate application a few years ago, but the removal of phosphorus in crops has lowered the level to a point where phosphate fertilization would now be profitable.

The testing procedure used for available phosphorus in our laboratories was developed after extensive tests of soil samples from the outlying soil fertility experiments. The testing procedure has certain limitations. On fields where rock phosphate has been applied recently, the extracting solution dissolves more of the phosphorus than is available to the plants. Hence this information should be supplied on the soil sample information sheet. Where light applications of available phosphate fertilizer have been applied, the soil tests may show a greater need for phosphorus than would be indicated by crop response. County agents are aware of these limitations and take them into consideration when making recommendations by considering both the soil test results and the past fertilization history. Research workers are trying to develop better reagents and methods. However, the present procedure is the best guide available for more efficient phosphate fertilization when properly interpreted.

Potassium Test

Even though most of the soils in the state contain considerable amounts of total potassium, there may not be enough in the available form to meet crop needs. This is especially true where the soil management system is such that large amounts of crop residues and farm manure are not returned to the soil. Crops such as tobacco and the legume crops are heavy feeders on potassium and rapidly deplete the soils of the available supply. Some soils in the Eden Hill section originally contained an abundance of available potassium. However, on many of these soils after being heavily cropped to alfalfa for a number of years, the available potassium supply has been lowered to a level that alfalfa can no longer be produced efficiently without the addition of potash fertilizers.

A soil test is helpful in determining whether potash needs to be applied to a particular soil. Where a deficiency of potassium is limiting plant growth, potash applications will pay big dividends.

No Test for Minor Elements

The county soil-testing laboratories do not analyze soil for the secondary and minor elements. With the exception of boron on red clover for seed production and on all alfalfa, research has indicated little need for minor elements on the soils of Kentucky. In recent years some corn grown on fields having a high pH has shown zinc deficiencies. However, research results do not indicate the need for widespread use of zinc on corn at this time. With the higher crop yields and the continued removal of minor elements in crops, deficiencies of other minor elements may develop.



State agricultural experiment stations and the U.S. Department of Agriculture spend thousands of dollars annually in breeding better crop varieties, as shown in this picture of burley tobacco breeding plots.

These improved strains can easily become mixed through ordinary methods of planting and harvesting or by cross pollination.

Seed certification is a means of protecting this investment.

How is Seed Certified?

1. The grower applies for membership in the Kentucky Seed Improvement Association.
2. He plants Foundation, Registered or Certified seed.
3. He plants this seed on clean, isolated land.
4. The field is inspected for crop mixtures, diseases, and objectionable weeds.
5. The seed is harvested properly and is processed in an approved processing plant.
6. A representative sample is taken for laboratory analysis.
7. The sample is analyzed by the Kentucky Agricultural Experiment Station or other approved seed laboratory.
8. A certificate and certification tags are issued when all requirements have been met.

Don't take a chance in buying your seed—

Be sure it's Certified

Lexington, Kentucky
March 1957

15M—6-57

What Is CERTIFIED SEED—?



Leaflet 188

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COLLEGE OF AGRICULTURE AND HOME ECONOMICS
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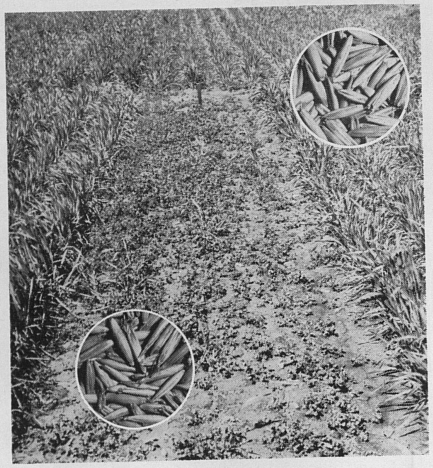
Certified Seed Insures Varietal Purity



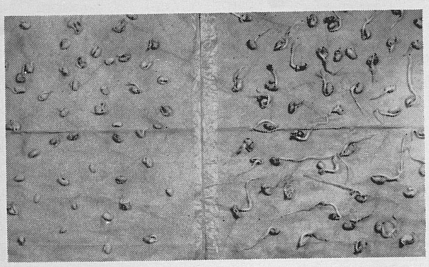
Few varieties are distinguishable on the basis of seed appearance. Also, many are difficult to identify from the appearance of the growing plant. Some of the newer varieties differ in only their resistance to a disease or even races of a particular disease. Lack of winterhardiness caused the loss of the oat stand shown in the center of the photograph.

Certified seed is produced **only** from:

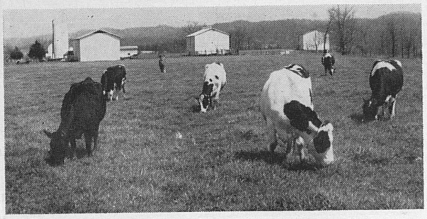
1. Foundation Seed
2. Registered Seed
3. Certified Seed

Requirements for different crops and varieties differ. In all cases proof of seed origin is the first step in seed certification.

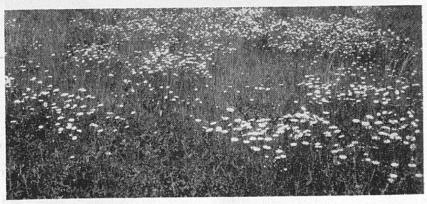
Certified Seed Insures High Germination and Freedom from Noxious Weed Seed



Poor germination, as shown on the left, results not only in poor stands but lack of vigor in many plants that do grow.



To have a clean pasture, half the battle against weeds is won by planting weed-free seed.



Note the presence of the noxious weed Oxeye daisy in this weedy pasture.

Certified Seed Helps Reduce Losses from Some Diseases



Plant diseases cause millions of dollars of loss each year. Loss from some of these diseases can be reduced by planting certified seed. Field inspection of wheat fields is done to detect loose smut, shown above. A normal wheat head is on the left.

The Kentucky Seed Improvement Association

In Kentucky, as in many other states, the authority for certifying crop seeds is vested in the Director of the University of Kentucky Agricultural Experiment Station.

The Kentucky Seed Improvement Association has been officially designated by the Director to carry out the function of certifying crop seeds. It is a non-profit, self-supporting corporation composed of grower and processor members with a board of directors elected by the membership. It is financed by membership and inspection fees.

ROWING

Vine training or rowing is very important in successful cucumber production. This is done by turning back into the row all vines that have started across the middle of the row. There will be less damage to the vines during harvesting, dusting, spraying and sidedressing if vines are kept rowed. Harvesting will be easier and quicker, and insect control materials may be applied more effectively when all vines and fruit are together in the row.

SIDEDRESSING

There are two kinds of blossoms on the cucumber plant—male and female. Female blossoms produce the fruit, and these blossoms appear only **when new leaves are formed.** The only way to keep new leaves and female blossoms coming all season is to keep the roots well supplied with nitrogen.

To get the highest yield, nitrating is very important. A sidedressing of 100 pounds of ammonium nitrate to the acre should be applied to the edges of the row at blossoming time. After 2 weeks of harvest, another 100 pounds of ammonium nitrate per acre should be applied.

If rowing was properly done, sidedressing will be very little trouble.

HARVESTING

Vines that have been properly rowed are the easiest to harvest. Many growers waste time hunting for pickles. The following method is suggested for easier and more efficient picking:

Gently roll the vines over to one side with one hand. This will allow the pickles to hang down where they can be more readily seen and picked. After the pickles are removed, the vines should be rolled back into place. Pickles should be harvested three or four times a week. Most growers prefer to pick every other day.

There are two main facts about harvesting that every pickle grower should remember:

1. **Picking the first pickles when the season starts is most important.** If the small pickles are removed, the vines will bear 35-50 pickles, whereas if the pickles are allowed to grow to larger sizes, the vines will bear only 5-12 pickles. The whole harvest season profit depends on picking the small-sized fruits.

2. **The fewer the pickles that are allowed to become full grown, the more the vines will produce.** The older pickles prevent plant food from getting to the blossoms and new fruit cannot form.

Note: CAREFUL supervision of labor is required.

DELIVERY

Cucumbers lose weight very quickly after they are removed from the vine. This loss in moisture can mean less money to the grower and lower quality to the receiver. Early morning harvesting and delivery will get the pickles to the station in best condition. Pickles should be handled carefully to prevent bruising and spoilage.

SUMMARY

To get the highest profit in growing cucumbers for pickling:

1. Buy fertilizer early; store it in a dry place.
2. Select well drained "new" pickle land.
3. Plow under manure and one-half of 5-10-10 fertilizer, 3-4 weeks before planting.
4. Mix the second half of 5-10-10 fertilizer into a fine, deep seedbed just before planting.
5. Treat seed with seed treater if not already treated.
6. Plant as near May 1 as possible.
7. Control beetles and plant lice.
8. Keep the patch free of weeds.
9. Highest prices are paid for small pickles. Start picking early and pick every other day.
10. Keep vines rowed for easy cultivating, nitrating and picking.
11. Sidedress at blossoming time and 2 weeks later with 100 pounds per acre of ammonium nitrate each time.
12. Make delivery as soon after picking as possible. Do not bruise pickles in field or during delivery to receiving station.

Lexington, Kentucky March, 1957
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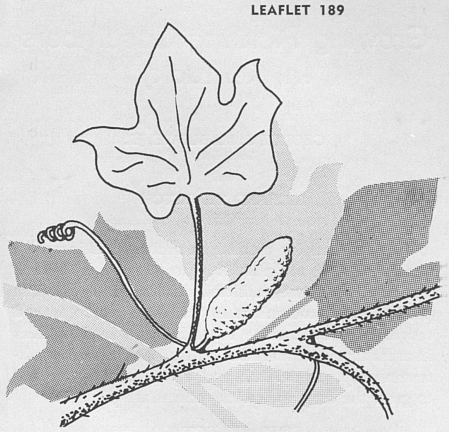
LEAFLET 189



Growing PICKLING CUCUMBERS IN KENTUCKY

By
GEORGE A. MARLOWE
and
RICHARD THURSTON

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service

Growing Pickling Cucumbers In Kentucky

By

GEORGE A. MARLOWE, JR.
Horticulture

and

RICHARD THURSTON
Entomology

The demand for pickled cucumbers has increased steadily during the past 10 years. Pickles now rank first among those vegetables sold in cans and jars. The production of cucumbers for pickling can be a good source of extra income for Kentucky farm families in areas that have a market outlet. Pickles are a short-season crop. Little cash and equipment are needed to grow the crop and quick returns are possible.

SOIL SELECTION

For the best results, the soil should be well drained and rich in humus. Level land is best, but sloping land can be used if planted on the contour. **Do not plant cucumbers on land that has had cucumbers, squash, pumpkins or watermelons** for the last 2 years. These crops are subject to the same diseases, and the soil may carry over the organisms for several years. Land that warms early in the spring is important; so avoid heavy clay soils and heavily shaded areas.

SOIL PREPARATION AND FERTILIZING

Cucumbers do best in a deep seedbed, rich in organic matter. Plowing should be deep, about 8-10 inches, one month before planting, followed by disking when the field is prepared for planting.

A soil test should be made to determine how much fertilizer and lime need be added. High yields require about 40-50 pounds of nitrogen, 80-90 pounds of phosphate and 100-120 pounds of potash to the acre. When a soil test has not been made, growers should apply a total of about 800-1000 pounds of 5-10-10 or 5-10-15 fertilizer to the acre when no manure is used; 600-800 pounds when 3-5 tons of manure per acre is used, and 400-500 pounds when 5-10 tons of manure per acre is applied.

All of the manure and one-half of the total fertilizer should be broadcast and turned under when the field is plowed. The remaining half of the total fertilizer should be disked-in when the seedbed is prepared.

Pickles do best when the soil is only slightly "sour" (pH 6.0) and well supplied with magnesium. If lime is needed, it is recommended that *dolomitic* lime be applied at the time the seedbed is prepared.

VARIETIES

Most pickling cucumbers are grown under contract in Kentucky. Therefore, the pickle manufacturer generally specifies the variety and supplies the growers with seed. The variety Ohio MR-17 produces high yields of excellent quality under Kentucky conditions.

PLANTING

It is very important to plant the seed as near May 1 as possible, provided the soil is warm and can be worked. Frequently, pickle stations are closed before the picking season of late plantings is completed. These stations cannot afford to stay open for a few late pickle growers. The pickle worm advances to Kentucky in late July. By planting early you can get most of your crop picked before the pickle worm becomes a serious pest. Higher yields can be expected with early plantings because usually there is more soil moisture in the early part of the season.

If not already treated, seed should be dusted with a seed treater before planting. The dust contains a poison with a fungicide to control seed rot and soil insects. Shake the seed and some treater in a closed quart jar for about a minute. **Wash your hands** after treating and handling the seed.

Cucumbers may be grown in rows or hills, but the row method is preferred because of the greater ease in harvesting, cultivating and controlling insects.

a. **Row Method**—Seed should be planted ¾ to 1 inch deep, 4-6 per running foot, in rows spaced 6 feet apart. Plants should be thinned to one plant every 18-24 inches when the plants are about 5-6 inches high.

b. **Hill Method**—Seeds should be planted ¾ to 1 inch deep in the hills. The hills should be 4 feet apart in the row and the rows about 6 feet apart. Wide rows allow the leaves to dry quickly and keep leaf mildew at a minimum. Six to 8 seeds should be firmed into a hill and later thinned to the best two plants.

INSECT CONTROL

CUCUMBER BEETLES: Cucumber beetles overwinter as adult beetles in plant debris and attack the seedling cucumbers as they come up in the spring. The adult beetles also carry bacterial wilt disease of cucumbers, and the larvae feed on the cucumber roots. Treat with one of the following materials as the first seedlings break through the soil, again 3-5 days later, and repeat the treatments at intervals of 5-7 days until one week before picking begins:

1. 3-percent purified DDT dust
2. 50-percent methoxychlor wettable powder—2 pounds in 80-100 gallons of water.

Treat the entire plant lightly and the ground around the base of the plant.

MELON APHIDS: Melon aphids, plant lice, can be controlled with a 5-percent malathion dust or with 6 pounds of 25-percent wettable powder malathion in 80-100 gallons of water. Malathion should not be used before the plants start to vine or when the plants are wet, because of the danger of injury to the plants. Do not harvest malathion-treated plants until 3 days after dusting or spraying.

SQUASH BUGS: Infestations of squash bugs, before picking has started, can be controlled with a 2-percent dieldrin dust. After picking has started, malathion can be used as recommended for the control of melon aphids.

PICKLEWORMS: Malathion, as recommended for melon aphids and squash bugs, can be used against pickleworms but 3 days must elapse between treatment and harvest. A ¾- to 1-percent rotenone dust will give only partial control of pickleworms, aphids, and cucumber beetles but pickles may be picked the day after treatment.

CULTIVATION

Cucumbers should be cultivated just deep enough and often enough to keep the weeds out. Deep cultivation destroys the long lateral feeding roots of the cucumber and reduces yield. **Use shallow cultivation only.**

tilizer applications should vary widely from field to field. Therefore, farmers will have to go over their land twice -- once to apply the right amount of insecticide and again, to apply the additional plant nutrients that may be needed. Most, if not all, the economic advantage of a mixture would be lost.

B. If broadcast and plowed under, the insecticide will be ineffective because of the depth of placement and limited distribution in the soil.

2. If a farmer plans to apply fertilizer broadcast for disking in at least 2 weeks before setting plants, he may find it convenient and economical to have the insecticide custom mixed in the required amount and kind of fertilizer.

STRAWBERRIES

INSECTS TO BE CONTROLLED	MATERIALS AND RATES PER ACRE
Ants (tending strawberry root aphid)	(Use only one material)
Strawberry crown borer	Aldrin 4-5 lb actual
Grape colaspis	Heptachlor 4-5 lb actual
Strawberry rootworm	Chlordane 8-10 lb actual
White grubs	
Wireworms	

FORMULATION, METHOD, AND TIME OF APPLICATION

Emulsion concentrate - sprayed broadcast and disked in at least 1 to 2 weeks before setting plants.

Granular - broadcast evenly and disk in at least 1 to 2 weeks before setting plants.

Fertilizer - insecticide mixtures - Broadcast and disked in at least 1 to 2 weeks before setting plants.

1. The Horticulture Department suggests that insecticides be mixed only with fertilizer of 1-2-2, 1-2-3, and 1-3-2 ratios.
2. Soil analysis, along with past cropping and fertilizer history, is recommended for determining fertilizer needs.
3. It is convenient to use 1,000 pounds of a fertilizer-insecticide mixture if the soil test shows a need for approximately 1,000 pounds per acre of any of the foregoing ratios.
4. If the fertilizer requirement is substantially different from 1,000 pounds, it is best to apply the fertilizer and insecticides separately, unless the fertilizer formulator is prepared to custom-mix the amount of fertilizer needed with the amount of insecticide indicated in column 2.
5. When a soil analysis is not made, apply 1,000 pounds of fertilizer-insecticide mixture of the ratio which is thought to be best suited to the soil.

20M-4--57

FERTILIZER-INSECTICIDE MIXTURES

By J. G. Rodriguez, R. Thurston, C. E. Chaplin and G. D. Corder

Fertilizer-insecticide mixtures for use on corn, tobacco, and strawberries have received increased emphasis in the past few years. This leaflet presents a brief summary of research findings on the use of these materials, which should enable farmers and others to evaluate the advantages and disadvantages of such mixtures.

Farmers may find it convenient and economical, in some instances, to apply fertilizer and insecticides as mixtures on corn and strawberries, but they should expect no better results than if the two materials were applied separately.

In general, fertilizers for strawberries are broadcast and disked in; therefore, the insecticide can be mixed with the total amount of fertilizer used if the farmer decides he should use the mixture. However, the insecticide can be applied alone with equal re-

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sults or can be mixed with any part of the fertilizer used. Farmers, may be able to save money and do a better job by fertilizing strawberries on the basis of a soil test. Often this will mean applying the insecticide and fertilizer separately or having them custom-mixed.

Whether they are used alone or in mixtures with fertilizers, insecticides should be placed at the row for corn. The two materials can be mixed prior to application because some fertilizers should be used at the row on nearly all corn land in Kentucky, and since the insecticide should be applied at planting time. However, corn should be fertilized according to a soil test. This will often mean that the insecticide and fertilizer must be applied separately or custom mixed.

Because the time and method of applying insecticides and fertilizers on tobacco land are not the same, farmers, in general, will find it best to apply the two materials separately.

CORN

INSECTS TO BE CONTROLLED	MATERIALS AND RATES PER ACRE
Corn rootworm	(Use only one material)
Seed corn maggot	Aldrin or
Ants (tending corn root aphid)	Heptachlor
White grubs	Apply either at 2/3 to 1-1/3 pounds actual per acre.
Grape colaspis	
Wireworms	

FORMULATION, METHOD, AND TIME OF APPLICATION

1. Emulsion concentrate - spray in band at the row using a planter-sprayer attachment.
2. Granular - apply directly in the row while planting with a planter attachment.
3. Fertilizer - insecticide mixtures - apply in the row with a planter-fertilizer attachment.

Fertilizer-insecticide mixtures -

1. For best results, fertilize corn on the basis of a soil test, along with past cropping and fertilizer history.
2. The Agronomy Department is not advocating the use of fertilizer-insecticide mixtures on corn, but there is no reason why it cannot be used if the proper ration of fertilizer can be obtained which contains the right amount of insecticide for the rate of fertilizer to be used.
3. Some farmers will find it convenient and economically feasible to apply insecticides alone, while others may find it convenient to apply them in mixtures with fertilizers.
4. The method of application should be determined by the farmer on the basis of cost and convenience to him. Equal insect control from either practice should be expected.

5. The fertilizer application should be 200 pounds of the higher analysis and 400 pounds of the lower analysis fertilizers per acre at the row with enough insecticide to give 2/3 to 1-1/3 pounds actual aldrin or heptachlor per acre. No more than 40 pounds of nitrogen (N) plus potash (K_2O) should be placed at the row.
6. Any additional fertilizer needed should be broadcast and should not include the insecticide.
7. Row treatment with the insecticides is recommended.
8. The Agronomy Department has suggested that fertilizer-insecticide mixtures be confined to the 1-1-1 and 1-4-4 fertilizer ratios.
9. Do not place fertilizer-insecticide mixtures in contact with the seed.

TOBACCO

INSECTS TO BE CONTROLLED	MATERIALS AND RATES PER ACRE
Wireworms	(Use only one material)
	Aldrin - 3 lb actual
	Chlordane - 6 lb actual
	Dieldrin - 1-1/2 lb actual
	Heptachlor - 3 lb actual

FORMULATION, METHOD, AND TIME OF APPLICATION

Emulsion concentrate (spray)
Dust
Granular
Wettable powder (spray)
Applied broadcast over the surface and disked in at least 2 weeks prior to setting plants.

1. The Agronomy Department does not recommend the use of premixed fertilizer-insecticide mixtures because:
   A. Tobacco should be fertilized according to soil test, soil type, past cropping and fertilizer history. This means that fer-

2. If the surface area of the water is known in acres; (No. acres X 2.72 X average depth in ft. ÷ lb arsenic trioxide equivalent per gal) X parts per million needed for treatment = gallons material to use.

Example: (5 acres X 2.72 X 3.5 ft. (deep) ÷ 4) X 5 ppm. = 59.5 gallons needed to give 5 ppm. treatment in pond.

Precautions

Water from ponds treated with sodium arsenite should not be used for any purpose for at least 3 days. Livestock should not be permitted to graze on the shore vegetation until rains have washed off any sodium arsenite that might have drifted on the plants.

Since sodium arsenite is extremely poisonous, directions on the label of the container in which the material is purchased should be followed closely.

Where dense growth of algae occurs throughout the pond, not more than half the pond should be treated with any chemical at one time. A sufficient period of time following the first application should elapse to allow the algae in the treated area to decompose. If all the algae in a heavily infested pond is killed with one treatment, the oxygen supply may be reduced to such an extent that fish will die. In addition, animals should not be permitted to have access to ponds containing large quantities of decomposed algae.

Lexington, Kentucky
April, 1957

10M-4-57

CONTROL OF ALGAE IN KENTUCKY FARM PONDS

By J. W. Herron

Controlling algae or pond "scum" is becoming increasingly important in Kentucky. Algae interfere with propagation and growth of fish, develop unsightly mats on the surface of ponds, clog irrigation systems, prevent fishing, and in some cases are toxic to livestock.

The use of copper sulfate and sodium arsenite are at present recommended for the chemical control of algae in this state. When used as recommended, neither material is considered to be toxic to fish.

COPPER SULFATE

Copper sulfate, commonly known as bluestone, is used at the rate of 8 pounds per million gallons of water.

To determine the number of gallons of water in the pond, the following method may be used. First, determine the surface area. If the

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pond is circular, measure the radius in feet, square that figure and multiply by 3.1416; if the pond is rectangular, multiply the length by the breadth in feet. Multiply the surface area by the average depth of water and finally multiply this figure by 7 1/2.

Copper sulfate may be applied as a spray or by the drag method. For spray applications, dissolve the required amount of material in sufficient water to obtain an even distribution of the solution over the area to be treated. The quantity of water to be used will vary, depending upon the spray equipment available.

The dragging process can be performed by placing the required amount of copper sulfate in a loosely woven sack and dragging it through the pond by a boat, or by a rope handled by a man on each side of the pond. With either method it is essential that the material be evenly distributed through the water. To accomplish this, the sack should be drawn in lanes perhaps 3 or 4 feet wide in a checkerboard pattern throughout the pond.

In Kentucky, 3 to 5 applications with copper sulfate may be necessary for satisfactory control of algae in one season. The first application can be made in the spring shortly after the algae appear.

Precautions

Although copper sulfate is not particularly dangerous to use, it is advisable to follow ordinary precautionary measures when handling this material. Care should be taken that animals do not have access to used containers or quantities of copper sulfate that have been spilled on the ground.

SODIUM ARSENITE

Because of the ease of application, the liquid formulation of sodium arsenite is preferred for pond treatments.

Satisfactory control of algae for an entire season in Kentucky has been obtained with one or two treatments of sodium arsenite applied as a spray in May or June at the rate of 4 to 6 parts per million parts of water.

It is usually not necessary to treat the entire pond with sodium arsenite, but just the area that is heavily infested with algae. For example, if algal growth extends for an average of 20 feet from the shore around the pond, or if it is concentrated in the shallow end of the pond, the quantity of material to be used is calculated according to the number of cubic feet of water in the area to be treated and not the entire pond. In calculating the quantity of material to be used, the arsenic in commercial formulations of sodium arsenite is usually referred to as arsenic trioxide equivalent.

The quantity of sodium arsenite required may be determined by using one of the following formulas.

1. $\frac{\text{No. cu. ft. water to be treated} \times 62.4}{1{,}000{,}000}$ = lb arsenic trioxide equivalent needed to give 1 ppm.

   $\times$ no ppm. needed for treatment = lb arsenic trioxide equivalent needed

   $\div$ lb arsenic trioxide equivalent per gal. = gallons material to use

Example:

$\frac{64{,}080 \text{ cu. ft.} \times 62.4}{1{,}000{,}000}$ = 4 lb arsenic trioxide equivalent to give 1 ppm.

$\times 2\ 1/2$ ppm. = 10 lb arsenic trioxide equivalent needed $\div$ 4 = 2 1/2 gallons material to use.

The most vital contribution you can make toward complete eradication is to arouse interest in the problem among your neighbors. No matter how careful you are with your own herd, you are not safe as long as your neighbors continue to bring brucellosis into the community. No laws, regulations, or program plans can ever be effective unless owners themselves are interested in wiping out the disease. Campaigns on a community or regional basis can and will do the job. Your county agent or state veterinarian will be glad to help.

Several states are now modified certified brucellosis-free. That proves we can wipe out brucellosis.

It's a Cooperative Effort

Many agencies and groups are working together in research, education, in advisory and administrative capacities to wipe out brucellosis: The National Brucellosis Committee; State and County Brucellosis Committees; U. S. Livestock Sanitary Association; the State agricultural experiment stations; the State extension services; State livestock sanitary officials; and the U. S. Department of Agriculture.

Lexington, Kentucky April, 1957
Cooperative Extension Work in Agriculture and Home Economics: College of Agriculture and Home Economics, University of Kentucky, and the United States Department of Agriculture, cooperating. Frank J. Welch, Director. Issued in furtherance of the Acts of May 8 and June 30, 1914.
15M—4-57

Wipe Out

BRUCELLOSIS



Cut — Livestock Losses

Stop — Human Infection

Leaflet 192

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service

(Adapted for Kentucky use from USDA Leaflet 369 of the Animal Disease Eradication Branch of the Agricultural Research Service, USDA.)

You Can't Afford Brucellosis

You can't afford brucellosis in your dairy or beef herd. The financial loss and the risk to the health of your family and customers are too great.

Brucellosis (formerly called Bang's disease or infectious abortion) has driven more dairy and beef cattlemen out of business than any other animal disease. Infected cows produce about 20 percent less milk than healthy cows. Calf crops from infected cows are cut about 15 percent, on the average.

You'll find it harder today than ever before to do business unless your herd is brucellosis-free.

What It Is

Brucellosis is an infectious disease caused by bacteria. It affects mainly cattle, hogs, and goats—and man. Each group of animals is usually infected by its own type of organism: *Brucella abortus* in cattle, *Brucella suis* in hogs, and *Brucella melitensis* in goats. Man is susceptible to all three types of the disease. The goat and swine types are generally the most severe in man, but the cattle type is the most common.

In human beings, brucellosis is also known as undulant fever or Malta fever. Farm people are much more likely to get the disease than city people, because the chances are much greater of their being exposed to it.

Infection in man almost always can be traced to infected animals. There is no evidence that the disease spreads from man to man. Therefore, if brucellosis is to be eliminated in man, it must first be eliminated in animals. It is usually contracted by handling infected animals, aborted calves and placenta, or infected carcasses and meat, and by eating raw or improperly pasteurized milk and milk products. It can also be contracted by inhaling contaminated dust.

No cure has yet been found for brucellosis in livestock. Some progress has been made in treating human brucellosis with antibiotic drugs.

What It Does

Brucellosis causes (1) loss of calves by abortion, (2) temporary or permanent sterility, (3) lower sales value of infected animals, (4) decreased milk and meat production, (5) the breaking up of purebred breeding lines, and (6) greater costs for herd replacements.

It is hard to tell an infected animal from a healthy one in appearance, even in severe cases. Symptoms and effects may vary. Expelling a premature dead fetus is the most common symptom. However, many infected cows and sows do not abort, though they carry the disease to animals that may do so. Abortions result from other conditions and are not absolute proof of brucellosis. If abortions do occur in a herd, brucellosis should be suspected.

In man, brucellosis causes long periods of disability. Victims suffer weakness, headache, painful joints, loss of weight and appetite, alternating chills and fever, profuse sweating, sleeplessness, and a numbness of the arms and legs. The disease usually is not fatal.

Losses to the livestock industry from brucellosis are conservatvely estimated to be more than $58 million a year. No estimate can be made of the loss caused by the disease in man.

Brucellosis Can Be Wiped Out

A national cooperative program to wipe out brucellosis was started in 1934. Then about 10 percent of the cattle in the country were infected. By 1953 infection had been cut to about 2.6 percent.

Testing is the important first step where getting rid of infected animals at once is desired. Two methods can be used—the blood serum agglutination test and the ring test. Each has its value.

The blood test shows if substances called agglutinins are in the blood in the individual animal. If they are present, the animal either is infected or has recently been vaccinated.

The ring test is a newer tool for finding out whether a milking herd is free from brucellosis without testing the individual cows. The milk from all the herd is tested at one time. If any of the cows is infected, that fact will show in the test. The individual reactors can then be located by the blood test. The ring test makes it possible to screen the herds in an area in a short time. An entire herd can be tested for about the cost of giving one animal the blood test.

Vaccination of calves from 4 through 8 months of age with strain 19 is another valuable tool. It produces a resistance to infection that helps to reduce abortions in the herds where exposure may occur. Calfhood vaccination has proved particularly helpful as a first step in controlling the disease in highly infected herds.

Two Plans

Two plans are now recommended in Kentucky as aids in getting rid of brucellosis. Plan A is the more desirable from the standpoint of clearing up a herd quickly.

Plan A—Test the cattle, mark the reactors with a permanent identification, and move them from the premises promptly for slaughter. Calves may or may not be vaccinated.

Plan B—Test the cattle, mark reactors with a permanent identification, and place them under quarantine pending disposal. Vaccinate calves.

What the Livestock Owner Can Do

The safest thing to do is to get in touch with your local, state, or federal veterinarian and have your herd tested. If the disease is found, you and the state or federal veterinarian should decide which of the recommended plans best fits your needs. The important thing is to act promptly. The sooner brucellosis is wiped out, the sooner the financial drain on your operation is removed.

Dredge lamb with flour and brown well in butter. Add the salt, cover with hot water, and simmer until nearly tender—1 to 1½ hours. Add the vegetables (except the tomatoes) to the meat and simmer 30 minutes longer, or until tender. Add tomatoes and continue cooking 10 minutes longer. Mix a little flour with water to make a smooth paste and add enough to the liquid to thicken slightly.

BARBECUED LAMB OR MUTTON

6-lb leg of lamb	1 c water
2 t salt	½ c catsup
Flour	2 T hot sauce
1 onion, sliced	½ t pepper

Wipe leg of lamb with a damp cloth. Rub with salt and dredge with flour. Place in a roasting pan with the onion. Combine remaining ingredients, mix well, and pour over meat. Roast in oven at 350° F., allowing about 30 minutes per pound. Baste with sauce about every 20 minutes.

BARBECUE SAUCE

½ c butter	¼ c chili sauce
1½ c hot water	1 T brown sugar
¼ t salt	2 t mustard
⅛ t black pepper	¼ t hot sauce
¼ t paprika	1 T chopped onion

Mix ingredients and heat to boiling point. Dip meat in sauce before boiling or roasting, or use to baste during roasting.

MINT-PINEAPPLE SAUCE

1 c crushed pineapple	1 T mint sauce
¼ c vinegar	½ t salt

Combine all ingredients. Serve with lamb roast or chops.

SUGGESTIONS ON BUTCHERING TO AVOID OFF-FLAVOR

For a carcass attractive in appearance and best in flavor the butchering must be quickly and carefully done and the carcass must be kept clean. Any dirt or blood that gets on the meat must be washed off immediately, for if it is allowed to dry or set it is hard to remove. Take the pelt off as rapidly as possible, open the carcass and remove the internal organs, and then dash plenty of cold water over the carcass.

Many people have their own ideas about the cause of "mutton taste" sometimes present in lamb. Some say it is caused by the wool touching the meat when the pelt is being taken off; others that it is due to the fell, or thin membrane between the carcass and the pelt; still others say that the source of the difficulty is the lymph gland near the stifle joint. But according to careful tests by the U.S. Department of Agriculture, none of these so-called causes has anything to do with it. The "mutton taste," if present, probably is due to one of four causes: (1) the age of the lamb, for the older the lamb the more likely it is to have such flavor; (2) unsanitary butchering—getting dirt or blood on the meat and not-washing it off thoroughly and immediately; (3) storing the meat in a place too warm for it to keep well; or (4) lambs that are losing flesh seem to have more off-flavors. Another possibility: goat meat, sometimes sold as "lamb," is likely to have a strong flavor.

High quality lamb, carefully butchered, kept clean and cold until ready to be cooked, and then well cooked by one of the recipes given here, will be practically sure to have an excellent flavor.

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LEAFLET 193

LAMB FOR KENTUCKY TABLES

UNIVERSITY OF KENTUCKY
Agricultural Extension Service

Lamb for Kentucky Tables*

Though many persons think of lamb chiefly as a summer meat, because it is available in largest quantity then, a good supply is on the market the entire year. Housewives who buy meat are likely to think of lamb as an expensive luxury. It is true that lamb chops, steaks, and roasts are not inexpensive; but delightful dishes may be prepared from the cheaper cuts of shoulder, neck, breast, and shank.

Group butchering of home-raised lamb affords a means of adding a desirable variety of fresh meat to the diet, especially in summer and fall when it would not be practical to butcher larger animals. Because lambs are small, one may be quickly dressed and consumed by two or three families while the meat is fresh. With the average-size household refrigerators, two or three farm homes can keep the different cuts of lamb or mutton until they are prepared and served on the table.

Lamb, like other lean meats, is a good protein food needed for building the muscle tissues of the body. It also contains iron, phosphorus, copper, vitamin B_1, riboflavin, and niacin.

VEGETABLES AND SALADS with which the flavor of lamb combines especially well:

Vegetables	*Salads*
Buttered peas with mint	Tomato and cucumber
String beans O'Brien	Endive
Onions with pimiento	Grapefruit
Asparagus with Hollandaise sauce	Cabbage-mint
Gingered carrots	Cabbage, dill and horseradish leaves
Cauliflower with cheese sauce	Mixed vegetable salad
Broccoli with cream sauce	Spiced pear filled with ground stuffed olives
Parsley potatoes	Melon balls

Mint jelly or sauce is a traditional favorite with lamb. Also, currant jelly or other tart jelly, spiced conserves, pickles, or horseradish sauce are suitable with roast lamb, mutton, or chops. For mint sauce, dissolve 1 tablespoon powdered sugar in ½ cup vinegar; pour over ¼ cup minced mint leaves and set

* Prepared by Florence Imlay, former extension specialist in foods and nutrition, and Pearl J. Haak, extension specialist in foods and nutrition, and James D. Kemp, associate professor of animal husbandry.

where it will keep warm but not hot. Allow it to infuse for half an hour. If vinegar is very strong, dilute with water.

RECIPES FOR LAMB

ROAST LEG OR SHOULDER OF LAMB

1 leg of lamb (5 or 6 pounds)
1½ t salt
Flour
⅛ t pepper
¼ c French dressing

Wipe the meat with a damp cloth, sprinkle with salt and pepper and rub well with flour. Lay the roast, skin side down, on a rack in an open pan without water, and cook in oven at 300°. Allow 25 to 30 minutes per pound to cook well done. Baste with French dressing if desired.

CUSHION SHOULDER ROAST

1 Cushion shoulder
1 t salt
⅛ t pepper
¼ lb ground lamb
2 T butter
⅔ c fine dry bread crumbs
¼ c water
1 small onion, grated
2 T chopped mint leaves

Wipe lamb with a damp cloth. Remove the bone leaving one side open for inserting stuffing. Season meat inside and out with salt and pepper. Fill with stuffing made from other ingredients. Sew the open side together or fasten with skewers. Place roast with skin side up on a rack in open roasting pan. Roast in a slow oven (325°) until done. Allow 25 to 30 minutes per pound.

BROILED LAMB CHOPS

Broil either by direct heat or in a heavy uncovered skillet. To broil by direct heat, lay the lamb chops in a broiling pan or on a rack and place under an electric grill or the flames of a gas oven. If a gas oven is used, have the chops 2 or 3 inches below a moderate flame. To pan broil, lay the chops in a hot skillet. Sear on both sides until brown. Season broiled chops with butter and salt. Serve hot.

LAMB LOAF

2 lb ground lamb
1 c bread crumbs
2 T minced onion
¼ c chili sauce
1 t chopped parsley
2 eggs
1 c milk
1½ t salt
⅛ t pepper

Combine ground lamb, bread crumbs, and seasoning. Add slightly beaten egg and milk, and mix thoroughly. Place in a loaf pan or ring mold. Bake in a moderate oven (350°) for about 1 hour.

CASSEROLE OF LAMB

3 c cooked diced lamb
2 T grated onion
1 c cooked diced potatoes
½ c diced celery
1 c milk
2 T butter
2 T flour
½ c diced carrots
1 t salt
⅛ t pepper

Combine the lamb, vegetables, and seasoning. Make a white sauce of butter, flour, and milk and add to the lamb mixture. Place in a well-greased casserole dish and cook in a moderate oven (350°) for about 30 minutes.

LAMB SOUFFLE

6 T fat
½ c flour
3 c milk
½ c bread crumbs
3 c ground cooked lamb
2 T chopped parsley
Salt
Pepper
4 eggs

Make thick white sauce with the fat, flour and milk. Add the bread crumbs, meat, parsley, salt and pepper to taste, and the beaten yolks of the eggs. Fold in the egg whites, stiffly beaten. Place the mixture in a greased baking dish or in greased individual baking dishes or custard cups. Set in a pan of warm water and bake in a very moderate oven (325°) for 1½ to 2 hours or until the mixture is firm. Thin gravy or tomato sauce may be served with the souffle.

LAMB LIVER

1 lb sliced lamb liver (5 slices per lb)
1 t salt
⅛ t pepper
2 T bacon fat
Flour

Remove skin from liver if it wasn't skinned before slicing. Dredge in flour. Brown slowly in the fat. Add 1 c water. Cover tightly and simmer until tender on low heat or in a moderate oven.

LAMB STEW

2 lb lamb cubes (shank, breast, neck, or shoulder)
2 T butter
2 t salt
Hot water
Flour
4 medium-sized potatoes, diced
4 carrots, diced
2 onions, sliced
1 c peas
1 c tomatoes

3. Tattooed in the right ear showing Kentucky seal with the quarter and year. Registered animals may use registry number, tattoo and/or color chart.
4. Issued with a vaccination certificate, a copy of which must be on file in the State Veterinarian's office.
5. Vaccinated by a licensed accredited veterinarian.
6. Part of a herd under Plan A or Plan B.

19. What will happen to an animal that was officially vaccinated as a calf, if after reaching 30 months of age it reacts to the test?

It will be branded and tagged, the same as any other reactor, and will be eligible for indemnity if slaughtered within 15 days and if the herd is under Plan A.

20. What advantages does a certified county bring to the herd owners in the county?

1. Protects individual farmers' herds from exposure to brucellosis;
2. Helps farmers meet the demands of their milk markets;
3. Helps eliminate the danger of human brucellosis (undulant fever);
4. Adds to the value of all herds for breeding purposes;
5. Increases the value of cattle offered for sale;
6. Helps farmers maintain disease-free herds;
7. Makes the business of livestock farming more profitable and less hazardous.
8. Facilitates the movement of cattle intrastate and interstate.

21. How does brucellosis usually get into a herd of livestock?

It is usually "bought and paid for." The most common method is by adding an untested, infected animal to a clean herd.

22. How may I find out more about the Area Brucellosis Program?

Contact your practicing veterinarian, local county agent, or State-Federal Area Veterinary Supervisor.

ERADICATE BRUCELLOSIS—
IT WILL SAVE YOU MONEY

Lexington, Kentucky 10M-5-57

KENTUCKY AREA BRUCELLOSIS PROGRAM

Questions and Answers

1. What is an "Area Program"?

It is a cooperative program wherein all cattle (except those listed under question 6) in the county are brucellosis tested.

2. What are the first steps that must be taken to start an area program?

Kentucky procedure requires that a petition must be signed by 75 percent of the cattle owners in a county and that this 75 percent must own 80 percent of the cattle in the county.

3. When is a county declared to be "on area test"?

No county shall be declared on area test until the necessary petitions are signed and are on file with the Livestock Sanitation Division, Ky. Department of Agriculture. The county will then be declared and

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and the
U.S. DEPARTMENT OF AGRICULTURE, Cooperating
FRANK J. WELCH, Director
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the date recorded as a matter of permanent record.

4. What is Plan A?

Plan A - Blood test, Slaughter of Reactors (calfhood vaccination optional): The object, under this plan, is to detect the diseased animals in the herd by test at regular intervals, to segregate and promptly slaughter the reactors, and through cleaning and disinfection of the premises and the practice of good herd management to have the herd subsequently certified as brucellosis-free.

5. What is Plan B?

Plan B - Blood test, Retention of Reactors, and Calfhood Vaccination: Vaccination is limited strictly to calves from 4 through 8 months of age. The object under this plan is to develop a residual herd resistance to brucellosis by cleaning and disinfection of premises, good herd management, and the replacement of reactors with the resistant vaccinated calves.

6. Do I have to test all my cattle?

Yes, except steers (or cattle on a feeding permit and isolated from cattle subject to test), officially vaccinated cattle under 30 months of age, or calves under 6 months of age.

7. Will retesting be done in a county area program?

Yes. Infected herds must be retested at 30 to 60-day intervals.

8. How does a county become a modified certified area?

If, as the result of a blood test of all cattle requiring test within an area, the number of reactors does not exceed 1 percent and the herd infection does not exceed 5 percent of the herds, the area may be declared modified certified brucellosis-free for a period of 3 years.

9. How do you maintain a modified certified brucellosis-free county area?

At the end of the three years the area may be recertified for an additional 3-year period if, as the result of a blood test on 20 percent of the herds plus a retest of all herds in which infection was reported at the time of the previous certifying test, a rate of infection does not exceed 1 percent of the cattle in the area and 5 percent of the herds tested.

10. What does a brucellosis test cost me?

The owner must furnish enough help for handling the animals and must assume all liability for injury to the animals, himself and his helpers. The collection of the blood samples and the test for brucellosis are a service rendered to you by agencies cooperating in this state.

11. What are these cooperating agencies?

The cooperating agencies are the United States Department of Agriculture, Animal Disease Eradication Division, and the Kentucky State Board of Agriculture, Division of Livestock Sanitation. Brucellosis control is a state-federal cooperative program.

12. What is an infected herd?

A herd which contains animals that give a positive reaction to the blood agglutination test.

13. Must reactors be branded and tagged?

Yes.

14. Must reactors be sold for slaughter?

Reactors must be slaughtered within 15 days after tagging and branding if indemnity is to be paid. If the reactors are not sold for slaughter, the Plan A herd becomes a Plan B herd and it may retain reactors.

15. Will indemnity be paid on reacting animals?

Yes, under Plan A. Reactors in herds under Plan B are eligible for indemnity when the herd converts to Plan A testing and meets the requirements and all reactors are offered for slaughter, provided the herd was on Plan B prior to the time the county was declared under area test.

16. Who will receive indemnity?

All owners of infected herds who sign and comply with Plan A for the eradication of brucellosis in cattle.

17. Is calfhood vaccination compulsory in counties undergoing area testing?

Calfhood vaccination is optional under Plan A. Under Plan B, calfhood vaccination is compulsory. All vaccination costs are free to herd owners.

18. How do I have calves officially vaccinated?

A calf, to be officially vaccinated, must be:

1. Within the age of 4 through 8 months.
2. Injected with an approved Strain 19 Brucella Vaccine.

Materials and Rates

Either of two spray mixtures may be used. 1) One employs DDT plus mineral oil and is probably the superior mixture. Use DDT, 25 percent emulsion concentrate, 3 quarts (1 1/2 pounds) plus 5 quarts of white mineral oil (70-80 second Saybolt viscosity) and dilute to 25 gallons with water. Apply at the rate of 25 gallons of the mixture per acre. For knapsack sprayers use 4 fluid ounces of DDT and 6 1/2 ounces of mineral oil in 1 gallon of water and apply at the same rate as above; shake the sprayer frequently. If a sprayer without mechanical agitation is used, there may be considerable damage caused by the mineral oil which tends to separate from the mixture. 2) The other spray treatment employs an increased dosage of DDT. Experimental results with this treatment, while giving satisfactory control, have not been quite so good as with the mineral oil mixture. This spray mixture, however, may be used in sprayers without mechanical agitation. Use 5 quarts of DDT, 25 percent emulsion concentrate, and dilute to 25 gallons with water, and apply at this rate per acre. For knapsack sprayers, use 7 fluid ounces per gallon of water and apply at the same rate.

Method and Equipment

Apply either one of the mixtures described above. High-clearance sprayers should be equipped with adjustable booms and should have at least two fixed nozzles for spraying each side of the row. Spray should be directed at the ear zone. Pressure should be at least 100 pounds per square inch. Mechanical agitation is a necessity when using the DDT and mineral oil combination. Knapsack sprayers should be well agitated, and adequate pressure should be maintained.

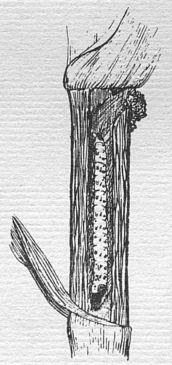
Time of Application

Begin treatment on the first day after silking begins. Apply four sprays at 3-day intervals. This period is usually sufficient to treat all of the emerging silk.

5M-6-57

CONTROLLING CORN BORER AND CORN EARWORM ON FIELD AND SWEET CORN

By J. G. Rodriguez



EUROPEAN CORN BORER

Leaflet 195

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THE EUROPEAN CORN BORER

The corn borer causes losses running into hundreds of thousands of dollars yearly in Kentucky. It has occurred in all counties in the state except in a few eastern ones. Populations vary greatly from year to year, from community to community, and even from field to field. Hence, it is very difficult to predict whether corn is going to need treatment. For that reason it is necessary for the grower to check each field individually, to determine whether it warrants treatment.

The two generations of borers are usually called the June brood and the August brood. Damage to an individual field may be caused by either brood but seldom by both. Early-planted corn may be attacked by the June brood, and late-planted corn by the August brood. The first brood attacks the stalk, while the second brood generally attacks the ears and ear shanks.

Cultural Control

It is best to avoid both early and late planting of field corn if chemical treatment is not going to be a possibility. Suggested planting dates of field corn are: Southwestern Kentucky, April 25 to May 5; Central Kentucky, May 5 to May 15; and Northern Kentucky, May 10 to May 20. Treatment of sweet corn plantings should always be considered, since the borer usually perfers sweet corn over field corn.

The selection of a certified Kentucky hybrid is important. The destruction of overwintering stalk refuse by clean plowing is a good practice and should be done.

Chemical Control

Corn borer can be controlled by treatment with DDT, but application must be made at the right time. Height or maturity

of the corn is an important factor in treatment because the closer the corn is to tasseling, the more favorable are the conditions in the plant for high borer survival. (See the following table for information on determining the need for spraying.)

Insecticidal Treatment Warranted Out

	Field Corn and when	Sweet Corn
Height (is) (leaves pulled up)	35 in. or more	25 in. or more
"Shot-holes" on whorl (are) (per 100 plants)	75 or more, recently made	----------
Egg masses (are) (per 100 plants)	----------	20 or more*
For first brood (June)	yes	yes
For second brood (August)	seldom	yes

*Repeat at 5-day intervals as long as 20 egg masses remain or until 12 days before harvest.

Making Application

For ground application of spray, the boom should clear the corn by a sufficient distance to give a finely divided spray in order to avoid drenching the whorl and causing injury. The drop nozzles on either side of the row should be directed down at an angle so that spray deposits will form at the leaf sheath.

Granules have the advantage of more residue (about 10 times as much) being deposited at the leaf sheath and whorl where borers enter the stalk. Also, much less residue remains on the leaf as compared with spray residue.

Application Rates of DDT Formulations for First Generation Borer Control

	Ground Application Per acre	Airplane Application Per acre
Spray, 25% Emul. Concentrate	3 qt in 10 gal of water	3 qt in 2-3 gal of water
Granules, 5% on clay	15 lb	20 lb

Caution on Feeding Treated Fodder

Treated fodder should not be fed to dairy cattle. When treated for first-generation borer control, it may be fed to beef cattle, hogs and sheep, since there is a federal tolerance of 7 parts per million of DDT in the fat of these animals.

THE CORN EARWORM

Control on Field Corn

Often the corn earworm is very damaging to plants in the whorl stage. This attack often coincides with the first-generation borer attack. An increased amount of DDT is required to control the corn earworm. DDT, 4 quarts of emulsion concentrate per acre, applied as for corn borer control, may be used. Granular DDT, 5 percent, applied at 20 pounds per acre by ground equipment or 25 pounds by air, has also given good control.

Control on Sweet Corn

The corn earworm is the most destructive insect attacking sweet corn. Heavy infestations occur every year, being particularly heavy in fields where corn is planted in succession during the season. Control measures have to be directed at the hatching larvae on the corn silk.

Vigo was first recommended, it was resistant to the races of leaf rust then present. Several of the races now present attack Vigo. Resistant to loose smut and soil-borne mosaic. Susceptible to some races of mildew and to Septoria. Not resistant to hessian fly.

WINTER BARLEY

Dayton - A bearded variety recently recommended for Kentucky. Beards are semi-smooth. Head not so compact as Kenbar but usually has more kernels of grain per head. Superior to Kenbar in yield. In winterhardiness and grain quality similar to Kenbar. Dayton may head a day earlier than Kenbar, but is usually a day or two later in maturing. In tests Dayton was 2 inches taller than Kenbar. Has a loose smut reaction similar to Kenbar. Less resistant to leaf rust but more resistant than Kenbar to scald and net blotch. Not so resistant to mildew as Kenbar.

Kenbar - A winter barley variety released by the Kentucky Station. Semi-smooth, rather short compact heads. Early heading, has a short straw, and is one of our stiffest-strawed varieties. Grain quality is usually good. Has been winterhardy in Kentucky, although not outstandingly so. Resistant to mildew and has considerable resistance to loose smut. Resistant to some of the leaf rust races and usually scald. Susceptible to net blotch. Loose smut will build up in the variety if precautions are not taken.

WINTER OATS

Dubois - A short winterhardy, ivory-kerneled variety. The panicle is short and upright. The most winterhardy and stiffest strawed of the recommended varieties. Has a plump, high-test-weight kernel. Has a high yield record, and probably will

produce less straw or silage than Atlantic or Forkedeer. Heads 3 days later than Atlantic and is 4 inches shorter. Resistant to oat smuts, but is susceptible to crown rust.

Atlantic - A medium-winterhardy early variety with yellow kernels. Approximately the same height as Forkedeer and taller than Dubois. Has a stronger straw than Forkedeer but not so strong as Dubois. More resistant to crown rust than Dubois and Forkedeer. Resistant to the oat smuts.

Forkedeer - A medium-winterhardy variety with dark ivory to yellow kernels. Forkedeer and Atlantic grow more rapidly in the fall and early spring, making more pasture than Dubois. Makes a higher hay or silage yield than Dubois. Susceptible to smut and crown rust.

SPRING OATS

Mo. 0-205 - This has been the highest yielding and highest weight per bushel spring oat. Kernels vary from light to dark gray and for that reason Mo. 0-205 has been discounted on the market as a milling oat. As a feed grain it is as good or better than other spring oat varieties. Heads early and stands well. Relatively resistant to crown rust and resistant to Victoria blight. Resistant to the oat smuts and to some races of stem rust. Similar but superior to Columbia, which has been widely grown in the southern spring oat region.

Andrew - An early-maturing, short-strawed, yellow grain variety. Has a high yield record and a moderately stiff straw. The weight per bushel has been high for spring oats. Has some resistance to stem rust and some tolerance to leaf rust. Resistant to smut and Victoria blight.

5M-6-57

SMALL GRAIN VARIETIES

RECOMMENDED FOR KENTUCKY, 1957

By VERNE C. FINKNER and B. W. FORTENBERY

KNOW YOUR VARIETIES

No one variety is superior in all respects to all other varieties. Different farming systems require contrasting characteristics in varieties. Know your varieties and choose the variety which suits your needs the best. On pages 2 and 3 is a table listing some of the important characteristics of the recommended varieties. Following the table is a word description of the recommended varieties. All the recommended varieties have been tested in Kentucky in comparison with other varieties and are considered as good as or better than other varieties. Except in unusual cases, Kentucky-certified seed of recommended varieties is available and should be used.

WINTER RYE

Balbo - A variety which has performed well over the entire state of Kentucky; its

LEAFLET 196

Cooperative Extension Work in Agriculture and Home Economics
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
UNIVERSITY OF KENTUCKY
and the
U.S. DEPARTMENT OF AGRICULTURE, Cooperating
FRANK J. WELCH, Director
Issued in furtherance of the Acts of May 8 and June 30, 1914.

CHARACTERISTICS OF VARIETIES RECOMMENDED FOR KENTUCKY

	Winter Wheat Varieties				
Character	Todd	Dual	Vermillion	Knox	Vigo
Winterhardiness	very good	very good	very good	good	very good
Earliness	medium	medium	early	very early	late
Straw Strength	very good	very good	good	good	good
Plant Height	medium	medium	short	short	tall
Hessian Fly	resistant	resistant	susceptible	susceptible	susceptible
Loose Smut	resistant	susceptible	susceptible	susceptible	resistant
Leaf Rust	medium	medium	resistant	resistant	medium
Weight per Bu.	medium	medium	high	high	high
Yield	very high	very high	high	high	medium
Grain quality	good	good	very good	very good	very good

	Winter Barley Varieties		Winter Oat Varieties		
Character	Dayton	Kenbar	Dubois	Atlantic	Forkedeer
Winterhardiness	good	good	very good	good	good
Earliness	very early	very early	medium	early	medium
Straw Strength	good	good	good	medium	medium
Plant Height	medium	medium	short	medium	medium
Loose Smut	medium	medium	resistant	resistant	susceptible
Leaf Rust	susceptible	medium	susceptible	medium	susceptible
Weight per Bu.	medium	medium	very high	high	high
Yield	high	high	very high	high	high
Grain Quality	good	good	very good	good	good

abundant upright growth provides excellent fall, winter and early spring grazing. An excellent cover or silage crop. Grain yields approximately equal to other varieties.

WINTER WHEAT

Todd - A beardless, white-chaffed, soft red winter wheat, with semi-compact heads. Winter-hardy was the highest yielding wheat in Kentucky tests. Stiff-strawed and averages 6 to 8 inches taller than Knox. Heads approximately the same as Dual. Todd is intermediate in leaf rust

resistance; susceptible to Septoria. In tests was highly resistant to mildew in the seedling and adult plant stages, and highly resistant to loose smut and soil-borne mosaic. Low in test weight, averaging 2 pounds less than Knox, Vigo, and Vermillion. Resistant to hessian fly.

Dual - A beardless, white-chaffed, soft red winter wheat, with semi-compact heads. Winter-hardy and high yielding in Kentucky tests. Has excellent strength of straw; heads 2 days earlier than Vigo. It is 4 to 6 inches taller than Knox, but its test weight averages about 2 pounds per

bushel less. Dual has good resistance to leaf rust and adult plant resistance to mildew, but was susceptible to mildew in the seedling stage. Resistant to soil-borne mosaic but susceptible to Septoria and loose smut. Resistant to hessian fly.

Vermillion - A beardless, white-chaffed, soft red winter wheat, with compact heads. Very similar to Knox. In tests was slightly more winterhardy and higher yielding than Knox. Somewhat stiffer strawed than Knox and averages about 2 days later in heading and is 2 inches taller. Heads are larger than Knox and more uniform in shape. Usually escapes leaf and stem rust disease damage because of its resistance and early maturity. Resistant to soil borne mosaic. Susceptible to powdery mildew, loose smut and Septoria. Loose smut has not increasd so rapidly in Vermillion as in Knox. Not resistant to hessian fly.

Knox - A short-strawed, beardless, white chaffed, soft red winter wheat, with compact heads. Early maturing; has excellent milling and baking qualities. Averages 10 inches shorter and heads 2 weeks earlier than Vigo. The short straw and early maturity may be helpful in aiding the establishment of grass and legume stands. Has a good yield record; is winterhardy and usually escapes leaf and stem rust because of its resistance and early maturity. Resistant to soil-borne mosaic but not resistant to hessian fly. Susceptible to loose smut and Septoria.

Vigo - A beardless, white-chaffed, soft red winter wheat, with open heads. In 1955 over 80 percent of Kentucky acreage was planted to this variety. Now being replaced in some areas with newer varieties. An excellent quality soft red winter wheat. Not so stiff-strawed as the newer varieties and is the tallest recommended. When

1. Protects individual farmers' herds from exposure to brucellosis;
2. Helps farmers meet the demands of their milk markets.
3. Helps eliminate the danger of human brucellosis (undulant fever);
4. Adds to the value of all herds for breeding purposes;
5. Increases the value of cattle offered for sale;
7. Makes the business of livestock farming more profitable and less hazardous.
8. Facilitates the movement of cattle intrastate and interstate.

19. How does Brucellosis usually get into a herd of livestock?

It is usually "bought and paid for." The most common method is by adding an untested, infected animal to a clean herd.

20. How may I find out more about the Area Brucellosis Program?

Contact your practicing veterinarian, local county agent, or State-Federal Area Veterinary Supervisor.

ERADICATE BRUCELLOSIS -
IT WILL SAVE YOU MONEY

Lexington, Kentucky 50M-8-57
Issued as Leaflet 194, 5-57, 10M-5-57; revised and re-issued as Leaflet 197, 8-57.

KENTUCKY AREA BRUCELLOSIS PROGRAM

Questions and Answers

1. What is an "Area Program"?

It is a cooperative program wherein all cattle in the county are brucellosis tested except steers (or cattle on a feeding permit and isolated from cattle subject to test), officially vaccinated cattle under 30 months of age, or calves under 6 months of age.

2. What are the first steps that must be taken to start an area program?

Kentucky procedure requires that a petition must be signed by 75 percent of the cattle owners in a county and that this 75 percent must own 80 percent of the cattle in the county.

3. When is a county declared to be "on area test"?

No county shall be declared on area test until the necessary petitions are signed

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and are on file with the Livestock Sanitation Division, Kentucky Department of Agriculture. The county will then be declared and the date recorded as a matter of permanent record.

4. Will Plans A and B be employed in the Area Brucellosis Program?

Only Plan A will be employed in the Area Brucellosis Program. No herds will be on Plan B.

5. Do I have to test all my cattle?

Yes, except steers (or cattle on a feeding permit and isolated from cattle subject to test), officially vaccinated cattle under 30 months of age, or calves under 6 months of age.

6. Will retesting be done in a county area program?

Yes. Infected herds must be retested at 30 to 60-day intervals.

7. How does a county become a modified certified area?

If, as the result of a blood test of all cattle requiring test within an area, the number of reactors does not exceed 1 percent and the herd infection does not exceed 5 percent of the herds, the area may be declared modified certified brucellosis-free for a period of 3 years.

8. How do you maintain a modified certified Brucellosis-free area?

At the end of the 3 years the area may be recertified for an additional 3-year period if, as the result of a blood test on

20 percent of the herds plus a retest of all herds in which infection was reported at the time of the previous certifying test, a rate of infection does not exceed 1 percent of the cattle in the area and 5 percent of the herds tested.

9. What does a Brucellosis test cost me?

The owner must furnish enough help for handling the animals and must assume all liability for injury to the animals, himself and his helpers. The collection of the blood samples and the test for brucellosis are a service rendered to you by agencies cooperating in this state.

10. What are these cooperating agencies?

The cooperating agencies are the United States Department of Agriculture, Animal Disease Eradication Division, and the Kentucky State Board of Agriculture, Division of Livestock Sanitation. Brucellosis control is a state-federal cooperative program.

11. What is an infected herd?

A herd which contains animals that give a positive reaction to the blood agglutination test.

12. Must reactors be branded and tagged?

Yes.

13. Must reactors be sold for slaughter?

Reactors must be slaughtered within 15 days after tagging and branding.

14. Will indemnity be paid on reacting animals?

Yes. The Area Program requires that all reactors shall be slaughtered within 15 days after tagging and branding and an indemnity will be paid.

15. Is calfhood vaccination compulsory in counties undergoing area testing?

Calfhood vaccination is optional. All vaccination costs are free to herd owners.

16. How do I have calves officially vaccinated?

A calf, to be officially vaccinated, must be:

1. Within the age of 4 through 8 months.
2. Injected subcutaneously with a 5cc dose of an approved Strain 19 Brucella vaccine.
3. Tattooed in the right ear, showing shield, quarter, and year. For registered animals registry number, tattoo and/or color chart may be used.
4. Issued with a vaccination certificate, a copy of which must be on file in the State Veterinarian's Office.
5. Vaccinated by a licensed accredited veterinarian.

17. What will happen to an animal that was officially vaccinated as a calf, if after reaching 30 months of age it reacts to the test?

It must be branded and tagged, the same as any other reactor and will be eligible for indemnity if slaughtered within 15 days after branding and tagging.

18. What advantages does a certified county bring to the herd owners in the county?

evergreens have been transplanted over two years, they will need occasional waterings whenever seasons are dry.

Evergreens, like other plants, enjoy food, and an application of well rotted manure or tobacco stalks applied in the late fall and left until late March, will supply plant food. If commercial fertilizer is to be used instead of manure or tobacco stalks, apply one pound or more, depending on the size of the plant, by scattering it around the plant in the late winter or early spring. Do not use sulfate of ammonia or nitrate of soda on evergreens.

Cultivate the soil under the spread of the branches of the evergreen every spring. Then, after cultivation, a mulch of decayed straw or grass will help to keep weeds and grass down and retain moisture.

Evergreen leaves, or needles, become dusty, and occasional washing, by turning the hose on them or throwing several buckets of water over the plants, will remove much of this dust. To prevent sun injury, do this in the late afternoon.

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10M--10-57

PLANTING EVERGREENS

BY N.R. ELLIOTT



Leaflet 198

UNIVERSITY OF KENTUCKY
College of Agriculture and Home Economics
Agricultural Extension Service

PLANTING EVERGREENS

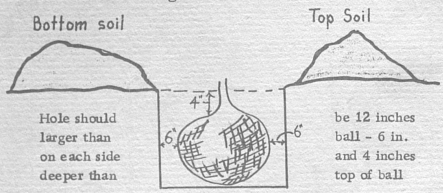
Evergreens should be given special care when they are transplanted. Plants obtained from a nursery will have the roots enclosed in a ball of earth wrapped with burlap. If the plants are obtained from any other source, or even when plants are to be moved from one part of the lawn to another, they should have a ball of earth left on the roots and it can be wrapped with old fertilizer sacks. In either instance, move the plants carefully to prevent cracking the ball of earth. See Fig. 1.



Fig. 1

Evergreen balled and wrapped ready for setting.

The hole for the plant should be dug at least 12 inches larger in diameter than the ball of earth on the roots of the plant, and deep enough to set the top of the ball 4 inches below the level of the ground. See Fig. 2. Measure the ball to get the correct dimensions.



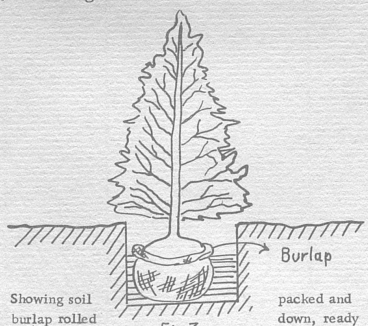
Hole should be 12 inches larger than ball - 6 in. on each side and 4 inches deeper than top of ball

Fig. 2

In digging the hole, place the top soil in one pile and the bottom soil in another. In this way it is possible to use the best top soil to place around the ball, where it will come in contact with it. If all the soil is poor, bring in enough from a cultivated field or the garden, to use in planting the evergreen. The soil is never made any richer by setting a plant in it.

After the hole has been dug, carefully place the wrapped ball containing the roots in it, and leave the burlap tied around the ball. Turn the plant until the best looking side is toward the front. Place 3 or 4 inches of the best soil in the bottom of the hole around the wrapped ball, then, using a 1 x 3 inch plank, tamp this soil until it is tightly packed against the burlap around the ball. Then add 3 or 4 more inches of soil, and tamp, making sure the soil is firm all around the ball. Do this until the hole is two-thirds full.

At this point the burlap should be loosened around the stem of the plant, and rolled down to the soil that has been tamped around the ball. See Fig. 3.



Showing soil burlap rolled for water.

packed and down, ready

Fig. 3

Apply enough water to fill the hole and let it disappear into the soil. Do this at least twice, since this water will moisten the entire ball of earth around the roots, and seal the tamped soil to that inside the burlap.

Finish filling the hole with the bottom soil, leaving a 2-inch depression around the stem of the plant. Do not tamp this soil. The loose soil, lower, around the stem of the plant, forms a basin to hold water and conduct it down to the roots of the plant. See Fig. 4.

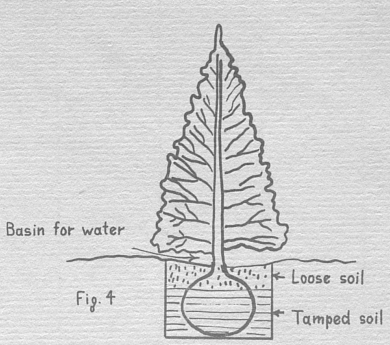


Fig. 4

Showing loose soil and basin to catch water.

When the plant is set in this way, the soil will be about 2 inches higher on the stem than it was before the plant was dug, but the top of the soil will be 2 inches lower than the level of the ground.

There are two seasons of the year to set evergreens in Kentucky - Spring, MARCH, APRIL, and MAY; Fall, AUGUST, SEPTEMBER, and OCTOBER.

Care of Plants After Setting

It is important that newly set evergreens do not suffer for lack of water. Evergreens require much more water than deciduous plants, and one simply cannot depend on rainfall to supply enough water. An evergreen 3 or 4 feet tall should have at least six (6) gallons of water poured slowly around the stem every 10 days during the growing season and once every month during the winter, when the temperature is above freezing. This schedule should be followed throughout the first two growing seasons, regardless of the amount of rainfall. The applications of water during the winter should continue indefinitely, as this lessens the danger of winter injury. After the

1. As soon as coccidiosis appears, confine the chicks to the brooder house.

2. If a deep litter is used, stir the litter and add a little new litter each day. Be sure to remove all wet litter.

3. Keep feed and water containers clean. Infection often is spread in the water, therefore the more times a day the water is changed, the better.

4. If the chicks appear cold, supply more heat.

5. Several drugs used in the prevention and treatment of coccidiosis in Kentucky have met with success providing good management is practiced.

Nitrofurazone, NiCarbazine and Nitrophenide (Megasul), used in the mash, may help to prevent outbreaks of coccidiosis. These drugs are used until an acute outbreak occurs and then one of the intestinal sulfa drugs is used. Another drug used in the prevention of coccidiosis is Sulfaquinoxaline. These four drugs are usually mixed in the mash by certain feed companies according to the manufacturer's directions. Field results in Kentucky have proven these four drugs to be of value in the prevention of coccidiosis.

No treatment will accomplish much unless a strict program of sanitation is followed.

5M-11-57

COCCIDIOSIS in Poultry

By ROBERT F. BEHLOW

Coccidiosis is a very widespread disease of poultry that causes death of many birds, or unthriftiness and lowered egg production in others. It is caused by very small parasites called "coccidia," that cannot be seen by the naked eye. These parasites are passed in the droppings from birds that have coccidiosis. The stage in which the coccidia are passed from the intestine is called "oocyst." This stage is not infective. Before the oocysts will produce the disease in another fowl they must develop for 18 to 48 hours under the favorable conditions of temperature and moisture in the soil or litter. When the cysts become mature and are swallowed by birds in feed or water they produce the infection. The young parasites escape from the cysts and penetrate the cells of the intestinal wall where they grow rapidly, destroying the cells and causing severe inflammation and sometimes hemorrhage. A few days later the bird passes large numbers of oocysts, and the cycle is continued. There are several kinds of coccidia that attack different places along the intestines. Only two kinds cause bloody droppings.

Leaflet 199

(A revision of Leaflet 30)

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SYMPTOMS

In Kentucky, chicks are most likely to have coccidiosis when they are 2 weeks to 4 months old. The disease may, however be found in older birds.

The symptoms, in general, resemble those caused by worms or a nutritional disease. It is therefore almost impossible to diagnose the condition except by autopsy and a microscopic examination of some of the material scraped from the inside of the intestinal wall, to determine the presence or absence of coccidia.

The noticeable symptoms in the acute form of coccidiosis are that the affected chick becomes droopy, with sagging wings, and lags behind the rest of the flock. The beak, shanks, and visible membranes become pale. The droppings may or may not be bloody, depending on the type of coccidiosis the chick has. Usually, many of the chicks will show symptoms at the same time. Because of the disease and the fact that they eat very little, they become very thin. The chicks may die in a few days after the first symptoms are noticed, or they may live and eventually appear free from the disease.

The symptoms of chronic coccidiosis are slow to develop. The birds are usually poorly feathered, pale, and thin. In older birds the combs are blue and the birds are inactive. They may be extremely thin.

PREVENTION

Coccidiosis can be prevented by raising the chicks in clean brooder houses on clean ground away from other poultry. Preventive measures that are effective for coccidiosis will also aid in preventing other diseases and parasites of poultry.

1. Don't depend entirely on medicines or any particular kind of feed to prevent coccidiosis.

2. Clean the brooder houses in the fall or winter before moving them to clean ground. Scrape and sweep the ceiling, walls, and floor until all litter and droppings have been removed. Scrub the house and all equipment with hot lye water (1 can of lye to 5 gallons of water). Wait 1 hour and rinse with hot water. Spray with a 5-percent solution of a cresol compound. The house is now ready to move to clean ground. Clean ground is ground that has not been used for any kind of poultry for at least 3 or 4 years.

3. To avoid carrying infection into the brooder house, keep overshoes to wear only in the brooder house.

4. Construct the feed hoppers and drinking vessels so that the feed and water will not become contaminated with droppings.

5. Clean the brooder house when it needs cleaning. Keep a deep litter on the floor. Remove wet spots of litter as soon as they appear.

6. Until the droppings can be taken to a place remote from the poultry houses and ranges, keep them in containers that will keep out insects and poultry.

7. Coccidiosis may be carried from house to house or from flock to flock by the poultryman, visitors, feed sacks, water pails, poultry crates, animals, birds, insects, and especially flies. Don't encourage visitors to enter your brooder house or poultry lot. Remove from the poultry houses and yards anything that draws flies. Spray to control flies (see Ky. Ext. Circular 477).

TREATMENT

Disinfectants, usually destructive to germs, do not kill coccidia. In fact, moisture of any kind aids the development of this disease. Control, therefore, depends to a great extent on preventive measures.

When vaccinating against fowl pox use either the stab or feather follicle method but use only the feather follicle method when Pigeon Pox Vaccine is applied. The person applying the vaccine should not handle the birds because his hands, contaminated by the virus, might spread the disease.

Vaccinated birds should be maintained under strict isolation as they are a source of infection for unvaccinated birds.

Fowl pox is so widespread in most turkey growing areas that yearly vaccination of all turkey flocks is a good insurance policy. Poults should be vaccinated 8 to 12 weeks of age. Extreme care must be taken when vaccinating very young poults, to prevent vaccine from getting on parts of the body other than the thigh. Turkeys should be vaccinated at least 8 weeks before market time so the vaccination lesion (take) has disappeared completely. The skin of the upper thigh is the site to vaccinate. The wing web is not recommended as a site for applying the vaccine, because of the disastrous results that have followed the use of this site. It is advisable to revaccinate all birds which are to be kept for breeders, 6 to 7 months following the first vaccination.

5M--9-57

Keep FOWL POX Out of Your FLOCK

By Robert H. Behlow

LEAFLET 200

(A revision of Leaflet 32)

Cooperative Extension Work in Agriculture and Home Economics
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KEEP FOWL POX OUT OF YOUR FLOCK

By Robert H. Behlow

This disease is also called chicken pox, avian diphtheria, canker mouth, and contagious epithelioma or sore head. It is caused by a living infectious agent known as fowl pox virus. Until a way is found to kill this virus, poultrymen must seek to prevent its appearance in their flock.

HOW TO RECOGNIZE THE DISEASE

Sores on the unfeathered parts of chickens and turkeys usually are signs of fowl pox. These sores (pox scabs) are little wart-like nodules that develop on the comb, wattle, and skin of the birds. The lesions are observed particularly about the head region, but they may also appear on legs, feet around the cloaca and under the wings. Sometimes pus accumulates in the eyes and in the cavities of the head; and matter, having the appearance of cheese, forms in the mouth and throat. When diphtheria membranes form, bacteria aggravate the disease. The inflamation may extend from the mouth region into the sinuses and pharynx with resulting respiratory disturbances.

When fowl pox appears in a mild form the general health of the birds is not seriously affected and the egg production of the hens is only slightly decreased. But in severe cases the birds become droopy, rapidly lose flesh, and may quit laying eggs. Birds affected with colds have some of the symptoms

of fowl pox. Unless they have the pox scabs or sores, however, such fowls do not have this disease.

HOW THE DISEASE IS SPREAD

Fowl pox is a highly contagious disease. The virus is spread from bird to bird by contact, though mosquitoes, flies, and other insects may be carriers of it. Persons who go from one flock to another may spread the disease by carrying the virus on their hands, clothing, shoes, or on any material contaminated by an infected bird. The time from exposure to the development of visible lesions (scabs) varies from 3 days to 2 weeks.

Fowl pox is most likely to occur in late summer, fall, or winter. The virus is very resistant to drying and disinfectants, and may remain alive in poultry houses and protected places from one season to another.

VACCINATION IS ONLY CONTROL METHOD

When symptoms of fowl pox are present in a flock or when it is known that the flock was infected the previous year, vaccinate every bird. For healthy, young fowls 6 to 12 weeks old, use Fowl Pox Vaccine after the surplus cockerels are sold. For infected flocks and flocks in egg production, use Pigeon Pox Vaccine. This vaccine is milder than Fowl Pox Vaccine; therefore, it causes less severe reaction and is safer to use on laying hens in infected flocks.

Since Pigeon Pox Vaccine does not induce a durable immunity in chickens, older birds should be revaccinated with Fowl Pox Vaccine when they go out of production.

