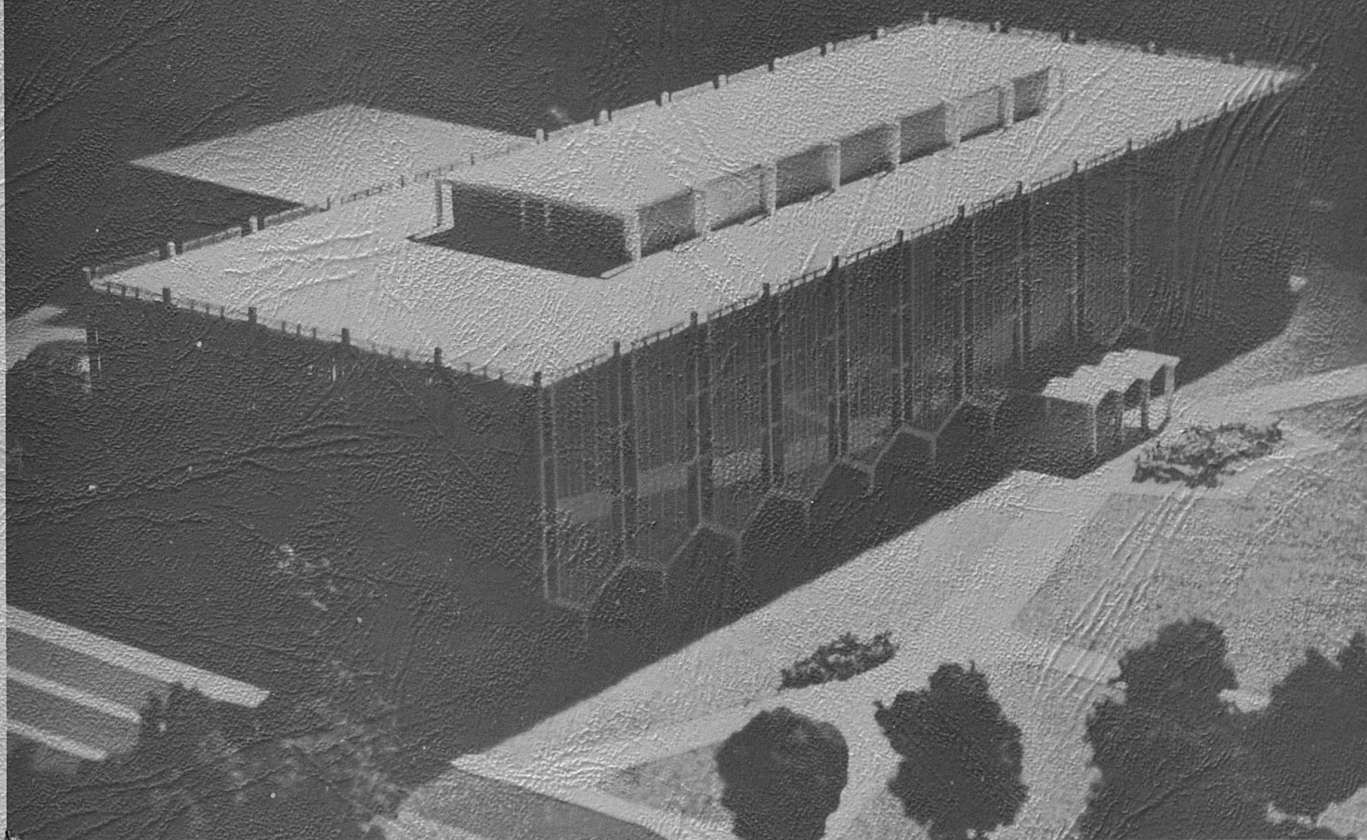


Kentucky **ANIMAL SCIENCE
RESEARCH REPORTS
1962**



Progress Report 116

July 1962

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**UNIVERSITY OF KENTUCKY
KENTUCKY AGRICULTURAL EXPERIMENT STATION**

PROGRAM FOR 1962 ANNUAL LIVESTOCK FIELD DAY

LEXINGTON

July 18, 1962

Morning

Chairman - C. F. Buck

Coldstream Farm - Conducted tours showing beef, sheep and swine research will start at regular intervals beginning at 9 a.m. (EST). Last tour starts at 10 a.m.

Noon

Lunch

Courtesy of Bluegrass Stockyards, Lexington

PRINCETON

July 20, 1962

Morning

Chairman - S. J. Lowry

Livestock Farm West Kentucky Substation - Conducted tours showing beef, sheep and swine research will start at regular intervals beginning at 9 a.m. (CST). Last tour starts at 10 a.m.

Noon

Lunch

Courtesy of Farmers Elevators, Inc. and Field Packing Company, Owensboro

Afternoon

Chairman, W. P. Garrigus

1:15 Address - Progress or Perish

Dr. Ronald H. Nelson
Head, Department of Animal Husbandry
Michigan State University
East Lansing

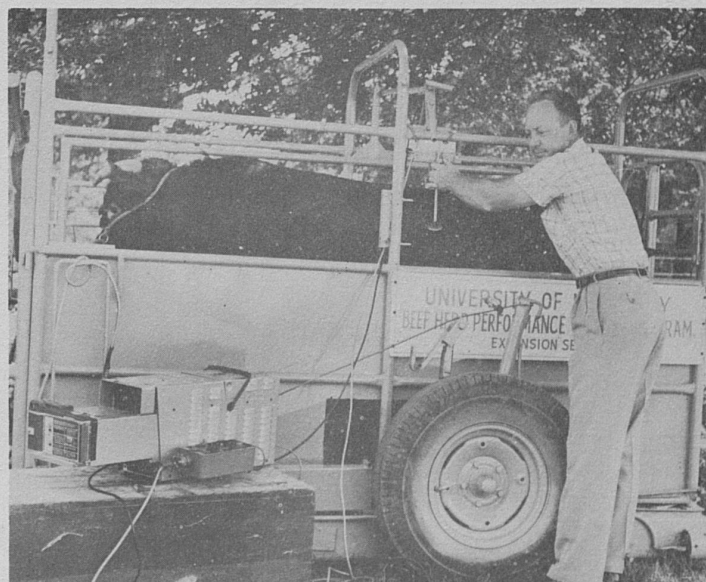
Cover Picture: This is an architect's model of the new laboratory and office building in the proposed Agricultural Research and Science Center at the University of Kentucky. Plans for this building have been completed and construction is to begin in the fall of 1962

BEEF CATTLE SECTION



BEEF CATTLE FACILITIES AT PRINCETON, KY.

These facilities are currently being used for drylot feeding of steers and for beef bull performance testing as a part of the beef cattle improvement program of the University of Kentucky. The barn and 12 feedlots were constructed in 1961 and are adequate for handling 120 animals at a time.



SONOSCOPE IN OPERATION

The sonoscope is being used to measure fat thickness and loin eye area at the twelfth rib. It employs electronic principles in making various body measurements on live animals which are indicative of potential carcass value. Sonoscope measurements are available through the University's Beef Cattle Performance Testing Program.

BEEF CATTLE SECTION

	<u>Page</u>
Effects of Taractan and Tranimal on Beef Steers Being Fattened in Drylot -----	3
Tranimal and Diethylstilbestrol Implants for Fattening Beef Steers -----	5
Effects of Physical Form and Soybean Meal, Corn and Alfalfa Hay on the Utilization of Soybean Hulls by Beef Steers -----	9
Ground, Flaked and Pelleted Corn for Fattening Beef Steers -----	12
Effects of Sire, Breed and Sex on Preweaning and Postweaning Performance of Hereford and Hereford X Red Poll Calves -----	15
Effect for Beef Steers of Fat and Urea on Fattening Rations -----	19
Effect of Stilbestrol Implants During the Preweaning Period on Postweaning Feedlot Performance of Steers and Heifers Receiving Stilbestrol Orally -----	22
Effect of Nitrate Feeding on Serum Carotene and Vitamin A in Steers -----	26
Stability of Gelatinized Vitamin A Mixed with Salt -----	29
Pasture Evaluation with Feed Supplementation for Beef Production -----	31
Cattle Grub and Internal Parasite Control Studies -----	33

BEEF SECTION

EFFECTS OF TARACTAN AND TRANIMAL ON
BEEF STEERS BEING FATTENED IN DRYLOT

N. W. Bradley and B. M. Jones, Jr.
University of Kentucky

Most of the experiments dealing with tranquilizers as feed additives for beef cattle have not revealed consistently beneficial results. Even so, beef cattle researchers should be alert for any new feed additives which may improve performance of beef cattle. There is a variety of tranquilizers and, also, a variety of conditions under which they possibly could prove to be beneficial. This study was to evaluate two new compounds with tranquilizing properties fed to beef steers being fattened in drylot.

Sixty rather fleshy yearling Angus steers were allotted on the basis of body weight to six different lots for use in this experiment. They were fed a fattening ration composed of ground shelled corn, corn silage and soybean meal for 4 weeks before they were allotted and before the different tranquilizer treatments were imposed. Steers in Lot 1, the control group, received only the regular feed ration for fattening on drylot. Steers in lots 2 and 3 were fed 4 and 8 mg Taractan, respectively, per steer daily during the entire 137-day feeding period. Steers in Lot 4 maintained a 10 mg level of Tranimal for the 137-day period, those in Lot 5 received a 25 mg level of the tranquilizer for the first 70 days of the experiment, and those in Lot 6 received a 50 mg level of Tranimal for the first 42 days. The treatments for steers receiving the 25 and 50 mg level of Tranimal were discontinued at the end of 70 and 42 days, respectively, and the steers which had been on these levels of treatment received no tranquilizer during the rest of the feeding period. All the steers in the six lots were implanted with 36 mg of stilbestrol. The results of this experiment are summarized in Table 1.

Neither the 4 mg or the 8 mg level of Taractan had any beneficial effect on feedlot performance. At the end of 42 days, when the 50 mg level of Tranimal was discontinued, there was an increase of 0.21 lb in average daily gain for steers which had been receiving the higher level of tranquilizer. At the end of 70 days, steers which had been receiving the 25 mg level of tranquilizer were gaining at about the same rate as control steers. The 10 mg level of Tranimal which was fed during the entire 137 days resulted in 0.10 lb faster average daily gain than that of control steers. Any advantage for the 50 mg level of tranquilizer which may have existed at the end of 42 days had disappeared by the end of the feeding period.

Results of another experiment in which a 40 mg level of Tranimal was used during the latter part of the feeding period are reported elsewhere in the beef cattle section of this publication.

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	<u>Page</u>
Effects of Taractan and Tranimal on Beef Steers Being Fattened in Drylot -----	3
Tranimal and Diethylstilbestrol Implants for Fattening Beef Steers -----	5
Effects of Physical Form and Soybean Meal, Corn and Alfalfa Hay on the Utilization of Soybean Hulls by Beef Steers -----	9
Ground, Flaked and Pelleted Corn for Fattening Beef Steers -----	12
Effects of Sire, Breed and Sex on Preweaning and Postweaning Performance of Hereford and Hereford X Red Poll Calves -----	15
Effect for Beef Steers of Fat and Urea on Fattening Rations -----	19
Effect of Stilbestrol Implants During the Preweaning Period on Postweaning Feedlot Performance of Steers and Heifers Receiving Stilbestrol Orally -----	22
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Results of another experiment in which a 40 mg level of Tranimal was used during the latter part of the feeding period are reported elsewhere in the beef cattle section of this publication.

Table 1. - Effect of Taractan and Tranimal on Beef Steers Being Fattened in Drylot (137 Days)

	Control	Taractan		Tranimal		
		4 mg	8 mg	10 mg ³	25 mg ²	50 mg ¹
No. of steers	10	10	10	10	10	10
Initial wt	783	783	783	783	783	783
Final wt	1100	1063	1091	1112	1066	1089
Av. daily gain						
42 days	2.66	2.72	2.76	2.32	2.34	2.87
70 days	2.45	2.47	2.46	2.58	2.50	2.54
137 days	2.31	2.05	2.25	2.41	2.07	2.24
Feed/cwt gain (silage on 33% air dry basis)						
137 days	875	991	904	843	982	906
Av daily ration (silage on as fed basis)						
Corn silage	10.6	10.6	10.7	10.7	10.7	10.6
Corn	14.7	14.8	14.8	14.7	14.8	14.8
SBOM ⁴	2	2	2	2	2	2
Carcass grade	C	C	C	C+	C	C

¹ The 50 mg level of Tranimal was discontinued at the end of 42 days.

² The 25 mg level of Tranimal was discontinued at the end of 70 days.

³ The 10 mg level of Tranimal was fed during entire 137-day feeding period.

⁴ SBOM - Soybean oil meal

TRANIMAL AND DIETHYLSTILBESTROL IMPLANTS
FOR FATTENING BEEF STEERS

N. W. Bradley, David McKechnie, Melvin Reitnour
and Nelson Gay
University of Kentucky

A previous feedlot trial in which Tranimal was used indicated that at the end of 42 days a 50 mg level of the tranquilizer produced a beneficial rate of gain response.

The current experiment was conducted to determine the effects of feeding 10 and 20 mg levels of Tranimal during the entire feeding period; a 40 mg level during the latter part of the period.

These tranquilizer treatments were imposed on another trial designed to study variability of feedlot performance among steers of different origins. One hundred and twenty heavy Hereford calves, in rather fleshy condition, were used in this study. Forty of them were purchased at a feeder calf sale in October 1961. These 40 calves came from 18 different farms in the central Kentucky area. Forty other calves, all sired by the same bull, having complete preweaning performance data, and having had very uniform preweaning treatment, were purchased from a farm near Lexington. The remaining 40 steers were also purchased from this farm. These steers had the same preweaning treatment and performance records as the one-half-brother steers, but their dams had been field bred by six or eight different sires. The results of this variability study will be reported at a later date after all data have been completely analyzed.

Each of the three groups of 40 steers were divided into four groups of 10 steers each and assigned to lots and treatments in the following manner:

40 steer calves from feeder calf sale

- Lot 1 - Control
- Lot 2 - 10 mg Tranimal/head daily
- Lot 3 - 20 mg Tranimal/head daily
- Lot 4 - 40 mg Tranimal/head daily (last 104 days)

40 one-half-brother steer calves

- Lot 5 - Control
- Lot 6 - 10 mg Tranimal/head daily
- Lot 7 - 20 mg Tranimal/head daily
- Lot 8 - 40 mg Tranimal/head daily (last 104 days)

40 steer calves sired by 6 or 8 different bulls

- Lot 9 - Control
- Lot 10 - 10 mg Tranimal/head daily
- Lot 11 - 20 mg Tranimal/head daily
- Lot 12 - 40 mg Tranimal/head daily (last 104 days)

One-half of the steers in each of the 12 lots were implanted with 36 mg of diethylstilbestrol.

All steers were fed a ration of corn silage, ground shelled corn and soybean meal for a 188-day period. The ration was supplemented with vitamin A at the rate of 10,000 I. U. per head daily.

The results are summarized, according to tranquilizer treatments, in Table 1. During the first 84 days there were essentially no differences in rate of gain for steers receiving either 10 or 20 mg of tranquilizer and the control steers. Steers in lots 4, 8 and 12, receiving no tranquilizer during the first 84 days gained somewhat slower than steers in lots 1, 5, and 9, that also received no tranquilizer during this period.

During the last 104 days of the feeding period steers receiving 10 and 20 mg of tranquilizer gained 0.13 and 0.16 lb more per steer daily, respectively, than steers receiving no tranquilizer. Steers receiving the 40 mg level of tranquilizer gained 0.23 lb per steer daily faster than control steers. This highly significant increase in rate of gain during the last 104 days might be questioned due to the possibility that these steers were compensating for a somewhat slower rate of gain during the first 84 days. This possibility seems likely in view of the fact that the weight gain advantage for steers on the 40 mg level of tranquilizer was 24 pounds per head during the last 104 days while the weight gain advantage was only 14 pounds during the entire 188 days. Nevertheless, it is felt that the small but consistent increases in rate of gain during the latter part of the feeding period are encouraging enough to warrant further work with this rather new tranquilizing agent.

The effects of stilbestrol implants within tranquilizer treatments are shown in Table 2. During the first 84 days there were no consistent increases or decreases in rate of gain due to the addition of either 10 or 20 mg of the tranquilizer. During the last 104 days in comparisons where steers were not implanted with stilbestrol, average daily rates of gain were increased by 0.20, 0.21 and 0.27 lb per steer for the 10, 20 and 40 mg levels of tranquilizer, respectively. Increases in average daily gain due to adding 10, 20 and 40 mg of tranquilizer to rations for steers which were implanted were 0.07, 0.10 and 0.18 lb per steer, respectively. The consistent responses to Tranimal by steers not implanted with stilbestrol are encouraging. When steers were implanted with stilbestrol, increases in rate of gain of steers receiving the two lower levels of tranquilizer were small, but the increased rate of gain of the steers fed the higher level seems large enough to warrant further work with this new tranquilizing agent.

Table 1. - Effects of Tranimal on Beef Steers Being Fattened in Drylot

	Lots 1, 5 & 9 Control	Lots 2, 6 & 10 10 mg	Lots 3, 7 & 11 20 mg	Lots 4, 8 & 12 40 mg last 104 days
<u>First 84 days</u>				
No. steers	30	30	30	30
Initial wt	599	599	604	599
84-day wt	799	797	806	789
84-day gain	200	198	202	190
84-day ADG	2.38	2.36	2.40	2.26
<u>Last 104 days</u>				
Initial wt	799	797	806	789
84 to 188 day wt	982	994	1006	996
84 to 188 day gain	183	197	200	207
84 to 188 day ADG	1.76	1.89	1.92	1.99
<u>188 days</u>				
188-day gain	383	395	402	397
188-day ADG	2.04	2.10	2.14	2.11
Carcass grade	G+	G+	G+	G+
Feed/cwt gain ¹	863	839	844	837
<u>Rations</u>				
Corn silage ²	9.6	9.6	9.7	9.6
Ground shelled corn	11.4	11.4	11.8	11.4
Soybean meal	2.0	2.0	2.0	2.0

¹ Silage on 44% air-dry basis

² Silage on wet basis

Table 2. - Effects of Tranimal and Diethylstilbestrol on Beef Steers Being Fattened in Drylot

	Lots and Treatments											
	1	5	9	2	6	10	3	7	11	4	8	12
	Control		10 mg		20 mg		40 mg last 104 days					
	No DES	DES	No DES	DES	No DES	DES	No DES	DES	No DES	DES		
First 84 Days												
No. of steers	15	15	15	15	15	15	15	15	15	15	15	15
Initial wt	584	614	610	589	598	610	605	593				
84-day wt	768	830	798	795	781	831	783	796				
84-day gain ¹	184	216	188	206	183	221	178	203				
84-day ADG ¹	2.19	2.57	2.24	2.45	2.18	2.63	2.12	2.42				
Last 104 Days												
84-day wt	768	830	798	795	781	831	783	796				
188-day wt	940	1026	990	998	974	1037	983	1010				
84 to 188 day gain	172	196	192	203	193	206	200	214				
84 to 188 ADG	1.65	1.88	1.85	1.95	1.86	1.98	1.92	2.06				
188 Days												
188-day gain	356	412	380	409	376	427	378	417				
188-day ADG	1.89	2.19	2.02	2.18	2.00	2.27	2.01	2.22				
Carcass grade	10.9	10.9	11.4	10.8	11.5	10.2	11.4	11.0				

¹ ADG - Average daily gain

EFFECTS OF PHYSICAL FORM AND SOYBEAN MEAL, CORN AND ALFALFA HAY
ON THE UTILIZATION OF SOYBEAN HULLS BY BEEF STEERS

N. W. Bradley, W. P. Garrigus, R. R. Garrigus,
J. R. Overfield and S. J. Lowry
University of Kentucky

Owing to an increased demand for higher concentration, lower fiber protein supplements, the production of 50 percent protein soybean meal has increased markedly in recent years. The hull portion of soybeans is not included in the higher protein soybean meal. Therefore, large quantities of soybean hulls have been made available for animals that can utilize feeds containing a relatively high percentage of fiber.

In the fall of 1960, the Animal Science Department at the University of Kentucky began a study to evaluate soybean hulls for stocker steers. The results of this study showed that ground soybean hulls, supplemented with vitamin A, would promote near normal growth gains (1.12 lb/steer daily) when fed to steer calves. Flaking the hulls increased average daily gain by 0.08 pound. Pelleting the hulls increased rate of gain by 0.38 lb per steer daily. It is also significant that steer calves receiving pelleted hulls consumed 244 lb less feed for each 100 lb of gain, although average daily feed intake for the two groups was essentially the same.

These results demonstrated that soybean hulls supplemented with vitamin A is an adequate ration for stocker calves, and that pelleting seems to improve their value considerably.

In the fall of 1961 another study was undertaken to evaluate further soybean hulls as a winter ration for steer calves being fed in drylot. Since very little is known about the feeding value of soybean hulls, when used as the only ration ingredient, small amounts of corn, soybean meal and alfalfa hay were added to the ground hulls. In addition, the pelleting treatments were repeated. The six experimental treatments were as follows:

1. Ground hulls
2. Ground hulls + 1 lb soybean meal/head daily
3. Ground hulls + 1 lb ground corn/head daily
4. Ground hulls + 2 lb alfalfa hay/head daily
5. Pelleted hulls
6. Pelleted hulls reground

Steers on all treatments received 10,000 International Units of vitamin A per head daily.

Sixty Hereford calves, weighing about 500 pounds each, were divided into six groups of 10 steers each for use on the above treatments. These calves were purchased at the Lexington feeder calf sale and were carrying an average amount of flesh. The soybean

hulls were fed on a free choice basis for a 129-day period. The supplemental corn, soybean meal and alfalfa hay were fed daily on top of the soybean hulls. Steers exhibiting various degrees of bloating were observed in all of the lots at various times. Otherwise all steers seemed to be normal and healthy during the 129-day feeding period.

The results of this experiment are summarized in Table 1. Steers on the ground soybean hulls gained at an unexpectedly fast rate of 1.87 pounds per steer daily. This is 0.65 lb per steer daily faster than steers in the 1960 experiment gained. One possible explanation for this is that the faster gaining steers were supplemented with 10,000 I. U. of vitamin A per head daily, while the previous year's steers received only 3,600 I. U. per head daily. Of course, different years, different locations and different steers could also have contributed to this rather large difference in rate of gain. It is evident from the results in Table 1 that the additions of corn, soybean meal or alfalfa hay did not significantly affect rate of gain. However, steers receiving alfalfa hay in addition to the hulls consumed about 100 lb more feed for each 100 lb of gain than steers receiving only ground hulls. The most surprising thing about the results in Table 1 is that steers receiving either pellets or reground pellets gained at a slower rate than steers receiving ground hulls. This is contrary to the results of the 1960 experiment in which steers on pelleted hulls gained significantly faster than steers receiving ground hulls. The results are even more difficult to explain, since steers on pelleted hulls and reground pellets consumed the same amount of feed as those receiving ground hulls.

The chemical analysis of the three kinds of hulls (Table 2) indicates that the feeding value of ground hulls is better than that of ground pellets and also, that ground pellets should be somewhat better than pellets. However, rates of gain of steers receiving the three kinds of hulls did not follow this trend exactly. Although the chemical analysis indicates ground hulls should be better than pelleted hulls, it is felt that this is not the complete explanation for the observed differences in rate of gain.

Daily rates of gain of steers receiving ground soybean hulls, properly supplemented with vitamin A, indicate that the soybean hulls have a much higher feeding value than had been supposed. The daily rates of gain approached those that would be expected from a fattening ration. If these cattle had been treated with diethylstilbestrol it is likely that the average daily gain would have exceeded 2 lb per head daily. It would be interesting to know how long these steers would maintain rates of gain of about 1.9 lb daily and, also, if they would reach choice slaughter grade in a reasonable length of time while receiving a ration of soybean hulls.

Table 1. - Effects of physical form and soybean meal, corn and alfalfa hay on the utilization of soybean hulls by beef steers

	Ground	Ground + 1# SBOM	Ground + 1# Corn	Ground + 2# Alfalfa	Pelleted	Reground Pellets
No. steers	10	10	10	10	10	10
No. days	129	129	129	129	129	129
Av init wt	506	506	505	506	505	505
Av final wt	747	761	752	734	723	701
Av wt gained	241	255	247	228	218	196
Av daily gain	1.87	1.98	1.92	1.77	1.69	1.52
Feed/steer/day	12.2	12.5	12.2	13.2	12.1	12.2
Feed/cwt/gain	654	631	637	750	713	803

Table 2. - Analysis of ground, pelleted and pelleted-reground soybean hulls

	Ground	Pelleted	Ground Pellets
Water, %	7.67	8.57	8.28
Crude protein, %	15.91	12.95	13.44
Ether extract, %	5.16	3.50	3.86
Crude fiber, %	31.2	32.0	31.9
Ash, %	4.82	5.66	5.33
Gross energy, B.T.U./lb	7523.7	7168.6	7329.8

GROUND, FLAKED AND PELLETED CORN FOR FATTENING BEEF STEERS

C. O. Little, N. W. Bradley and B. M. Jones, Jr.
University of Kentucky

Considerable interest in different methods of processing feedstuffs for livestock has developed during the past few years. The potential advantages to the producer include reduced labor in handling feeds and improved animal performance (increased rate of gain, better feed conversion and higher quality carcasses).

This Station compared ground, flaked and pelleted corn fed along with corn silage to fattening steers during the winter of 1959-1960. Steers fed either flaked or pelleted corn gained more with more efficient utilization of feed than those fed ground corn. The utilization of these differently processed corns was further investigated during the past year. The major objective of the experiment reported here was to measure rate of gain, feed conversion and carcass quality of steers receiving ground, flaked or pelleted corn in a fattening ration. Hay was fed in this experiment rather than corn silage as in the previous year.

Thirty yearling Hereford steers were used in this experiment. They were each implanted with 36 mg stilbestrol prior to the start of the experiment. The steers were assigned by weight to the three treatments and placed in individual pens. Each individual pen was equipped with a self feeder, waterer, and salt and mineral box. The corn was self-fed, while soybean oil meal and hay were fed once each day. Salt, bonemeal and limestone were available at all times. The hay was good quality alfalfa, and the soybean oil meal contained 50 percent crude protein and was pelleted. The ground and pelleted corns were purchased from a common source. Flaked corn was not available from this source necessitating its purchase from a different source.

Various experiment stations have reported that differently processed feeds result in altered rumen fermentation products. The volatile fatty acids produced in the rumen during fermentation of feeds have a significant role in the energy metabolism of ruminant animals. For this reason, a secondary objective of this experiment was to compare the molar ratios of volatile fatty acids in rumen contents of steers fed ground, flaked or pelleted corn.

Samples of rumen contents were taken from each steer by a stomach tube on the final day of the experiment. Sampling time was from 5 to 7 hours following the morning feeding of supplement and hay. Volatile fatty acids in the rumen contents were determined quantitatively by gas chromatography.

The results of this experiment are summarized in Table 1. The steers fed pelleted corn showed a larger average daily gain than the steers fed ground or flaked corn. The additional 0.21 lb per day gained by the steers receiving pelleted corn

represents an 8 % increase over the steers fed ground corn. Pelleted corn was more efficiently converted to steer gains than the other two types of corn, only 772 lb of feed being required per 100 lb of gain. The steers fed ground corn required 11 % more feed per 100 lb of gain than the steers fed pelleted corn. Although the steers fed flaked corn gained only slightly more than the steers on ground corn, this gain was produced with 1.3 lb per day less corn; thus the steers receiving flaked corn were 7 % more efficient in converting feed to gain than those on ground corn.

The increased rate of gain and improved feed conversion of steers fed pelleted corn in comparison to ground corn in this experiment are in agreement with the results from this station of the previous year when corn silage was included in the ration. The failure of flaked corn to increase steer gains is not in agreement with past results. In the previously reported experiment, steers fed flaked corn consumed more grain than steers fed ground or pelleted corn. The decreased intake of flaked corn in this experiment may be partially responsible for the lack of increased gains. Greater intake would have probably increased gain. This is suggested by the fact that flaked corn was more efficiently converted to gain than ground corn. It also should be noted that the flaked corn was not from the same source as the other two types of corn. The proximate analyses (Table 2) indicate that the flaked corn was slightly lower in crude protein. Protein intake was above reported requirements for all treatments, thus the influence of this factor in the differently processed corns would seem to be of little significance. The difference in gross energy content of the corns may have been an influencing factor in addition to physical form.

No differences in carcass grades were noted due to feeding the differently processed corns. The carcasses of steers on all treatments had an average grade of high good.

Steers fed pelleted corn had a larger proportion of propionate in rumen contents at the time sampled than steers fed ground or flaked corn. The values reported represent a ratio of molar percent propionate to acetate, thus a higher value indicates a larger proportion of propionate and a smaller proportion of acetate. The lower propionate-acetate ratio in steers fed flaked corn in comparison to ground corn was not expected in view of other reported studies. No differences due to type of corn were noted in butyrate levels. A positive correlation (0.256) between rate of gain and propionate-acetate ratio and a negative correlation (-0.180) between feed per 100 lb gain and this ratio were indicated in this experiment. The significance of the ratios of these volatile fatty acids is being investigated further.

Table 1. - Ground, Flaked and Pelleted Corn For Fattening Beef Steers

	Ground	Flaked	Pelleted
Number of steers	10	10	10
Days on experiment	134	134	134
Av initial wt	740	740	740
Av final wt	1077	1082	1106
Av daily gain	2.52	2.55	2.73
Feed per 100 lb gain	860	800	772
Propionate-acetate ratio	0.712	0.560	0.823
Carcass grade	High Good	High Good	High Good
Av daily ration			
Corn ¹	16.4	15.1	15.9
50% SBOM	1.0	1.0	1.0
Hay	4.0	4.0	4.0

¹ Self-fed

Table 2. - Proximate Analyses of Different Processed Corns

Type Corn	(Percent)					(BTU/lb) Gross Energy
	Dry Matter	Crude Protein	Crude Fat	Crude Fiber	Ash	
Ground ¹	90.0	10.6	2.62	3.23	4.51	7,052
Flaked	91.8	8.2	2.78	2.98	2.54	6,955
Pelleted ¹	87.0	10.2	3.60	3.31	4.69	7,230

¹ From common origin

EFFECTS OF SIRE, BREED AND SEX ON PREWEANING AND POSTWEANING
PERFORMANCE OF HEREFORD AND HEREFORD X RED POLL CALVES

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The first year's results of this study were reported in last year's Kentucky Live-stock Field Day Report. An attempt is being made to determine how the breeding of high- and low-gaining Hereford bulls with Hereford and Red Poll cows affects preweaning performance, postweaning performance and carcass characteristics of the resulting progeny. This report will cover the effects of sire, breed and sex on preweaning and postweaning performance of calves produced in 1961 as well as a two-year summary of the results for calves produced in 1960 and 1961. Complete carcass data for calves produced in 1960 are reported elsewhere in this publication. A two-year summary of the complete carcass data will be reported later.

The high-gaining bull gained 0.72 lb a day faster on a 154-day postweaning performance test, weighed 0.52 lb more per day of age at the end of the 154-day test and made 100 lb gain on 255 lb less feed than the low-gaining bull. At the beginning of the study Hereford and Red Poll cows were divided so that an equal number of each breed was bred to each of the two performance tested Hereford bulls. To equalize the effect of dam during the preweaning phase, cows were allotted to the two breeding groups on the basis of their previous calves' performance. The same two sires were used the second year, but sires and cow groups were switched.

Results of preweaning and postweaning performance of calves produced in 1961 are summarized in Table 1. These results are very similar in almost all respects to those reported last year.

The two-year average results are presented in Table 2. The following differences during the preweaning phase are worthy of noting:

1. Calves sired by the high-gaining bull gained 0.1 lb daily faster than calves sired by the low-gaining bull.
2. Crossbred calves were 6 lb heavier at birth than Hereford calves.
3. Crossbred calves were 111 lb heavier at weaning than Hereford calves.
4. Crossbred calves gained 0.4 lb daily faster than Hereford calves.
5. Male calves were 5 lb heavier at birth than heifer calves.
6. Steer calves were 43 lb heavier at weaning than heifer calves.

The following differences occurring during the postweaning phase are also of interest:

1. The final weight of calves sired by the high-gaining bull was 53 lb heavier than that of calves sired by the low-gaining bull.
2. Calves sired by the high-gaining bull gained 0.21 lb daily faster than calves sired by the low-gaining bull.
3. Red Poll calves maintained 97 lb of the 111-lb weight advantage which they had at weaning.
4. Hereford calves used 126 lb less feed for each 100 lb of gain.
5. The final weight for steers was 101 lb heavier than the final weight of heifers.
6. Steers gained 0.28 lb per head daily faster than heifers.
7. Steers required 76 lb less feed for each 100 lb of gain than heifers.

Table 1. - Effect of Sire, Breed, and Sex on Preweaning and Postweaning Performance of Hereford and Hereford X Red Poll Calves - 1961

	Sire		Breed		Sex	
	Low Gainer	High Gainer	Hereford	Hereford X Red Poll	Heifers	Steers
<u>Preweaning</u>						
No. calves	16	17	17	16	11	22
Sex of calf						
Steer	11	11	12	10	--	22
Heifer	5	6	5	6	11	--
Birth wt lb	70.8	74.6	69.3	76.4	68.3	75.0
Av age days	287	283	286	284	282	286
Weaning wt lb	584	609	544	653	570	610
ADG	1.79	1.89	1.66	2.03	1.79	1.87
Adjusted ADG	1.85	1.95	1.70	2.11	1.93	1.87
Grade	11.4	11.1	11.4	11.0	11.3	11.2
<u>Postweaning - 208 days</u>						
No. calves	16	17	17	16	11	22
Init wt lb	584	609	544	653	570	610
Final wt lb	984	1065	982	1073	958	1060
Total gain	400	456	438	420	388	450
ADG	1.93	2.19	2.10	2.02	1.87	2.16
Feed/cwt gain, lb	1031.	1011.	972.	1073.	1061.	1003.
Slaughter grade ¹	11.6	11.3	11.9	11.0	11.4	11.5
Carcass grade ¹	11.4	10.9	11.3	11.1	11.2	11.2

¹ 10 = Good
 11 = Good +
 12 = Choice -

Table 2. - Effect of Sire, Breed, and Sex on Preweaning and Postweaning Performance of Herefords and Hereford X Red Poll Calves - 1960-61

	Sire		Breed		Sex	
	Low Gainer	High Gainer	Hereford	Hereford X Red Poll	Heifers	Steers
<u>Preweaning</u>						
No. calves	33	34	34	33	30	37
Sex of calf						
Steer	20	17	19	18	--	37
Heifer	13	17	15	15	30	--
Birth wt, lb	71.4	73.3	69.4	75.4	69.4	74.6
Av age, days	281	270	276	275	275	276
Wean wt, lb	565	572	514	625	544	587
ADG, lb	1.75	1.85	1.60	2.00	1.74	1.85
Grade	10.9	10.6	11.0	10.4	10.6	10.9
<u>Postweaning - 208 days</u>						
No. calves	33	34	34	33	30	37
Init wt, lb	565	572	514	625	544	587
Final wt, lb	975	1028	954	1051	946	1047
ADG, lb	1.98	2.19	2.12	2.05	1.94	2.22
Feed/cwt gain, lb	987.	960.	911.	1037.	1003.	947.
Slaughter grade ¹	11.6	11.0	11.6	11.1	11.3	11.4
Carcass grade ¹	11.9	11.3	11.8	11.4	11.6	11.6

¹ 10 = Good
 11 = Good +
 12 = Choice -

EFFECT FOR BEEF STEERS OF FAT AND UREA ON FATTENING RATIIONS

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The effects of fat and urea and combinations of fat and urea in beef cattle rations fed to fattening steers in drylot have been studied at this experiment station during the past three-year period. The first experiment showed that fat could satisfactorily replace 62% of the corn in a fattening ration and that urea could satisfactorily replace all of the soybean meal. However, when both fat and urea were included in the same ration, rate of gain was significantly decreased.

Previous work at this station demonstrated that ration digestibility was decreased by additions of corn oil and that either distillers dried grains with solubles (DDG/S) or rather high levels of supplemental calcium, would alleviate the depressing effect. Therefore, in the second experiment on the effect of fat and urea and a combination of fat and urea high levels of supplemental calcium and lysine were added to beef cattle rations. Results of this experiment showed that a combination of fat and urea again depressed rate of gain and that neither 40 gm of calcium nor 10 gm of lysine per steer daily corrected the depressing effect. Results of the first two experiments have been reported in previous Kentucky Livestock Field Day Reports.

A third experiment was conducted during the summer of 1961 in which the same type rations were used: (1) urea; (2) fat and urea; (3) fat and urea plus enough DDG/S to replace the soybean meal in ration 2; and (4) fat and urea with enough DDG/S to replace the soybean meal and one-half the urea of ration 2. An attempt was made to keep all rations on an equal energy, equal protein basis. Therefore, DDG/S was substituted at the rate of 3 lb of DDG/S for 1 lb of soybean meal and 2 lb of corn. Dicalcium phosphate was also adjusted to compensate for differences in the calculated calcium and phosphorus contents of other ration components. The composition of these rations is shown in Table 1.

During the first two experiments all rations were pelleted. Considerable difficulty was encountered in pelleting these rations, especially the ones containing added fat. Owing to the difficulty of pelleting, none of the rations used during the summer of 1961 were pelleted.

Results of the third experiment have been summarized and are presented in Table 2. After the first 56 days it was apparent that steers being fed ration 4, containing the higher level of DDG/S, were not eating enough feed to promote satisfactory gains. At the end of 84 days these steers were dropped from the experiment. During the first 84 days of the feeding period these steers consumed 10 lb less feed per steer per day than those being fed ration 1, containing urea, and about 4 lb less than steers being fed rations containing fat and urea with either soybean meal or a lower level of DDG/S.

At the end of the 168-day feeding period steers which had been fed rations 2 and 3, containing fat and urea and either soybean meal or DDG/S, had eaten about 5.5 lb less feed per steer daily than steers on ration 1. A comparison of rate of gain for steers on rations 1 and 2 shows that steers receiving a combination of fat and urea gained 0.77 lb per steer daily slower than steers on ration 1 which contained urea but no fat. With such a large difference in feed intake, it is difficult to say how much of the difference in rate of gain should be attributed to a combination of fat and urea and how much is due to the reduced feed intake. In the previous experiment when the rations were pelleted, feed intakes for steers on rations 1 and 2 were identical, and the rate of gain was depressed by combining fat and urea. Assuming that a part of the difference in rate of gain of steers on rations 1 and 2 is due to a combination of fat and urea, then a comparison of average daily gains for steers on rations 2 and 3 indicates that replacing soybean meal with DDG/S did not correct the depressing effect.

It is doubtful that this experiment contributed much toward solving the problem of the depressing effect on rate of gain of a combination of fat and urea. However, it is interesting to compare feed intakes during this experiment, in which rations were not pelleted, to feed intakes during the previous experiment, in which the rations were pelleted. When rations 1 and 2 were pelleted, feed intakes were identical. When they were not pelleted, steers on the ration containing urea consumed 5.6 lb more feed per head daily than steers fed the ration containing both fat and urea. This indicates that pelleting might be of more value to rations containing fat and urea than to some other types of fattening rations.

Table 1. - Rations

Ingredients, lbs	Ration Number			
	1	2	3	4
Ground corn cobs	600	1100	1100	1150
Soybean oil meal	---	100	---	---
Ground yellow corn	1169	549	349	---
Corn distillers dried grains/solubles	---	---	300	614
Molasses	200	120	120	120
Urea	31	31	31	16
Fat	---	100	100	100
Vitamin A and D ¹				
Sulphur (flowers of sulfur)	2	2	2	2
Salt	10	10	10	10
Trace minerals	1	1	1	1
Dicalcium phosphate	7	9	6	4
Total	2020	2022	2019	2017

¹ Vitamin A to furnish 700,000 I.U./ton in each of the four rations.

Table 2. - Performance (168 days in drylot)

	Ration Number			
	1 Urea	2 Fat & Urea	3 Fat and Urea plus X DDG/S	4 Fat and Urea plus 2X DDG/S
<u>84-day results</u>				
No. steers	10	10	10	10
Initial wt	686	686	686	685
84-day wt	953	875	868	778
84-day gain	2674	1894	1829	927
84-day ADG	3.18	2.25	2.18	1.10
84-day feed/cwt gain	754	790	824	1270
84-day av daily feed	24.0	17.8	18.0	14.0
<u>168-day results</u>				
168-day weight	1127	998	982	
168-day gain	4417	3120	2960	
168-day ADG	2.63	1.86	1.76	
168-day feed/cwt gain	931	1018	1061	
168-day av (consumed) daily feed, lbs	24.5	18.9	18.7	
Carcass grade	G+	G-	G-	

EFFECT OF STILBESTROL IMPLANTS DURING THE PREWEANING PERIOD
ON POSTWEANING FEEDLOT PERFORMANCE OF STEERS
AND HEIFERS RECEIVING STILBESTROL ORALLY

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The results of a previous experiment, reported in last year's Kentucky Livestock Field Day Report, indicated that both steer and heifer calves implanted with 12 mg of stilbestrol gained 20 to 30 lb more than calves which had not been implanted. During the postweaning feed lot phase of the study all calves were fed 10 mg of stilbestrol per head daily. Steers which had been implanted before weaning continued to gain faster than those which had not been implanted before weaning. Heifers which had not been implanted before weaning gained faster than heifers which had been implanted. When the results of both phases were combined, implanted steers gained 55 lb more than the unimplanted steers, but implanted heifers gained 13 lb less than heifers which received preweaning implants. Since the number of calves available for this study were limited it was decided to repeat the experiment.

The calves used this year were by the same bulls, out of the same cows and raised on the same farm as those used last year. The calves were about four and one-half months old when they were divided for stilbestrol treatment according to sire, breed and sex. A period of 153 days elapsed from the time the calves were implanted until they were weaned. The calves were moved from the University's Mercer Farm to the Coldstream Farm and put on a fattening ration, containing enough stilbestrol to supply 10 mg per head per day, immediately after weaning.

Results of the preweaning phase, postweaning phase and carcass data are summarized in Table 1. The results this year are considerably different from those last year. During the preweaning phase implanted steers gained 11 lb less than steers which had not been implanted, while implanted heifers gained 24 lb more than those which had not been implanted.

During the feedlot phase previously implanted steers gained 11 lb less than unimplanted steers. Heifers implanted before weaning gained only 5 lb more than the control heifers. Stilbestrol treatment did not significantly affect carcass data for either steers or heifers.

Table 2 gives a summary of the two-year average results. During the preweaning phase, implanted steers gained 10 lb more than unimplanted steers and implanted heifers gained 23 lb more than heifers which were not implanted. Average results for the postweaning feedlot phase show that previously implanted steers gained 6 lb more and implanted heifers 15 lb less than unimplanted steers and

heifers, respectively. With the possible exception of carcasses from implanted heifers grading slightly lower, stilbestrol treatment seemed to have little effect on carcass data.

Rather limited results reported by other stations on the effect of preweaning stilbestrol implants on subsequent feedlot gain have been somewhat variable. The year-to-year variability in the results reported here is certainly too great to draw accurate conclusions or to make recommendations. It is unfortunate that larger numbers of calves were not available for study of the effect of both 12 and 24 mg implants on preweaning and postweaning performance. This problem concerns both feeder calf producers and cattle feeders. It seems obvious that more research is needed in this important phase of beef production.

Table 1. - Stilbestrol Implants for Beef Calves - 1961

	Steers		Heifers	
	No DES	12 mg DES Implant	No DES	12 mg DES Implant
<u>Preweaning</u> (implanted 153 days before weaning)				
No. calves	11	11	6	5
Av age, days	135	132	126	136
Av init wt	348	325	288	315
Av final wt	627	593	547	598
Av gain	279	268	259	283
Increase in gain	--	-11	--	24
ADG	1.82	1.75	1.69	1.85
Type score ¹	10.6	11.3	10.8	10.6
<u>Postweaning</u> (208-day feeding period - 10 mg DES/day)				
Av init wt	627	593	547	598
Av final wt	1082	1037	933	989
Av gain	455	444	386	391
ADG	2.19	2.13	1.86	1.88
Feed/cwt gain	1024	981	1072	1071
Slaughter grade ¹	11.4	11.6	11.6	11.1
<u>Carcass Data</u>				
Carcass grade ¹	11	11	12	10
Marbling score	5.8	5.0	5.8	5.0
Dressing, %	62.8	63.1	62.6	62.7
Ribeye, sq in	10.7	10.9	9.7	9.9
Fat thickness over rib, in	0.9	0.9	1.1	1.0
Ribeye/cwt carcass	1.65	1.75	1.73	1.66

¹ 10 = Good
11 = Good +
12 + Choice -

Table 2. - Stilbestrol Implants for Beef Calves (Two-year Average Results)

	Steers		Heifers	
	No DES	12 mg DES	No DES	12 mg DES
<u>Prewaning</u> (implanted 146 days before weaning)				
No. calves	18	20	13	16
Av age, days	138	130	130	133
Av init wt, lb	334	310	291	306
Av final wt, lb	590	576	530	568
Av gain, lb	256	266	239	262
Increased gain, lb	--	10	--	23
ADG, lb	1.75	1.82	1.64	1.79
Type score ¹	11	10	10	10
<u>Postweaning</u> (208 day feeding period - 10 mg DES daily)				
Av init wt, lb	590	576	530	568
Av final wt, lb	1046	1038	938	961
Av gain, lb	456	462	408	393
ADG, lb	2.19	2.22	1.96	1.89
Feed/cwt gain, lb	944	935	997	1022
Slaughter grade ¹	12	11	12	11
<u>Carcass Data</u>				
Carcass grade ¹	12	12	12	11
Marbling score	5.8	5.7	6.4	6.0
Dressing, %	62.6	63.0	62.5	62.5
Ribeye (sq. in.)	10.6	10.8	9.7	9.9
Fat thickness over 12th rib, (in.)	0.7	0.8	1.0	0.9
Ribeye/cwt carcass (sq in.)	1.69	1.75	1.72	1.73

¹ 10 = Good
 11 = Good +
 12 = Choice -

EFFECT OF NITRATE FEEDING ON SERUM CAROTENE AND VITAMIN A IN STEERS

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Increased incidence of vitamin A deficiency in cattle believed to be receiving adequate rations has led to widespread interest in factors affecting efficiency of carotene utilization. One factor which has received considerable attention is elevated dietary nitrate. Forages grown under stress conditions may accumulate higher than normal levels of nitrate. Considerable evidence indicating that consumption of such forages has an adverse influence on vitamin A status of ruminants has been accumulated. This adverse influence is usually attributed to interference with the conversion of carotene to vitamin A. Previous work at this station has shown that adding 0.4 to 4.0 % potassium nitrate to rat diets elevates serum carotene in this species under certain conditions. The objective of the experiment reported here was to determine whether adding 1% potassium nitrate to a ration containing poor quality roughage would produce a similar effect in steers.

Twenty Hereford steers with an average weight of 550 lb were divided into two lots of ten each. The steers previously had been on an experiment evaluating the forage Sudax. Half of the steers in each lot had been receiving early maturity dehydrated Sudax and the other half had been receiving late maturity pelleted Sudax. In addition to the carotene from the forage, each steer had been fed 10,000 I. U. vitamin A daily for the preceding 62 days.

Previous performance on the Sudax trial was poor. This could have been due to inadequate energy and protein intake, to elevated nitrate intake, or to a combination of these factors. Qualitative checks for nitrate content of the Sudax indicated an above normal level of nitrate. Methemoglobin determinations were made at the conclusion of the Sudax trial, but the results were not available when this trial was started. The results, as obtained later, showed some elevation of methemoglobin level but no differences between Sudax treatments.

Average daily feed intake per steer during the seven week period of this study was as follows: 8.6 lb poor quality mixed hay, 4 lb ground shelled corn and 1.5 lb soybean oil meal. In addition, each steer in Lot 1 received 0.15 lb potassium nitrate per day mixed in the soybean oil meal. This was calculated to provide 1% KNO_3 in the total ration; however, feed refusals early in the trial altered this percentage slightly. Nitrogen intake was equalized by adding an equivalent amount of urea to the control ration (Lot 2). An attempt was made to feed KNO_3 at 2% of the ration, but steers refused the ration containing that level. Steers in both lots 1 and 2 were fed 1 gm of beta-carotene ^{1/} per head daily for the last 4 weeks of the experiment (March 16 to April 13). No vitamin A supplement was fed during this trial. Serum samples were taken at the beginning of the trial and at the end of the third, fifth and seventh week. Initial and final weights were recorded. The schedule of treatments is summarized in Table 1.

^{1/} Carotene furnished by Hoffmann - LaRoche Inc., Nutley, New Jersey.

Results of carotene and vitamin A analyses of serum samples taken at different stages during the trial are presented in Table 2. Considerable variation was observed, and none of the differences between treatments were significant. Differences in initial values for steers fed early maturity and late maturity Sudax approached significance. In this connection, it is of particular interest to note that the serum vitamin A levels for the steers which had received early maturity Sudax could be considered marginal; several steers had levels which would usually be considered deficient. There is also some indication that a carry-over effect from this previous treatment may have influenced the results of this trial, particularly in regard to the influence of nitrate on serum vitamin A levels. Low initial vitamin A levels seemed to be associated with high initial carotene levels, but this association was not apparent later in the experiment. Withdrawal of carotene and vitamin A from the ration during the first 3 weeks of the trial reduced serum carotene considerably and tended to stabilize serum vitamin A at modest levels. Adding carotene to the ration had little effect on serum vitamin A during the subsequent 4 weeks, but produced some increase in serum carotene. No consistent effect of nitrate feeding on serum levels of either carotene or vitamin A was demonstrated. Despite equalized feeding, nitrate seemed to reduce rate of gain, but this effect was inconsistent within subgroups and did not prove significant statistically.

Table 1. - Nitrate and Carotene Feeding Schedule

<u>Period</u>	<u>Lot 1</u>	<u>Lot 2</u>
Feb 23 - March 16 3 weeks	Nitrate ¹ Low carotene	No nitrate Low carotene
March 16 - March 30 2 weeks	Nitrate Carotene ²	No nitrate Carotene
March 30 - April 13 2 weeks	No nitrate Carotene	No nitrate Carotene

¹ Approximatley 1% KNO₃ added to the total ration.

² Carotene fed at the rate of 1 gm per head per day.

Table 2. - The Effect of Nitrate and Carotene Feeding on Serum Vitamin A and Carotene

Previous treatment	Early Maturity Sudax Control	Sudax Nitrate	Late Maturity Sudax Control	Sudax Nitrate	All Control	All Nitrate
Feb. 23, 1962						
Vit A I.U./100ml	38 ± 27 ⁴	20 ± 8	94 ± 31	65 ± 10	66 ± 40	39 ± 26
Carotene mcg %	225 ± 50	207 ± 10	142 ± 40	155 ± 53	183 ± 27	178 ± 48
March 16, 1962 ¹						
Vit A I.U./100ml	42 ± 6	46 ± 4	47 ± 10	35 ± 10	45 ± 8	41 ± 9
Carotene mcg %	86 ± 38	72 ± 12	70 ± 11	78 ± 32	78 ± 8	74 ± 22
March 30, 1962 ²						
Vit A I.U./100 ml	36 ± 7	46 ± 6	36 ± 5	23 ± 4	36 ± 6	34 ± 13
Carotene mcg %	127 ± 37	98 ± 21	109 ± 19	124 ± 47	118 ± 30	111 ± 37
April 13, 1962 ³						
Vit A I.U./100ml	34 ± 5	33 ± 13	37 ± 7	23 ± 6	35 ± 6	28 ± 10
Carotene mcg %	132 ± 41	118 ± 25	111 ± 29	118 ± 34	122 ± 37	108 ± 29
Av daily gain, lb	2.04	1.24	1.40	1.59	1.72	1.40

1 After 3 weeks on low vitamin A ration, with or without nitrate

2 Two weeks after adding 1 gm of carotene per head per day to all rations

3 Two weeks after discontinuing nitrate feeding

4 Standard deviation

STABILITY OF GELATINIZED VITAMIN A MIXED WITH SALT

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Widespread use of vitamin A supplements in beef cattle feeding has renewed interest in the effectiveness of alternate methods of administration. One of the problems in the use of oral methods is loss of vitamin A activity before the supplements are consumed. This problem becomes particularly acute when the vitamin A comes into close contact with minerals. For this reason salt could not be considered as a satisfactory vehicle for vitamin A administration before the advent of gelatinized vitamin A products. Field trials conducted under the arid conditions prevailing in the Southwest have indicated that little potency is lost from gelatinized vitamin A salt mixtures during periods of outdoor exposure up to one month. Two trials were conducted under the more humid conditions in Kentucky last summer.

In each of the two Kentucky 25 lb trials, of a mixture of vitamin A and salt ^{1/} was placed in a covered watertight mineral feeder which was well protected from the weather. Six steers had access to the mixture as their only source of supplemental minerals. One-half-pound samples were removed weekly and analyzed for vitamin A. ^{2/} Trial 1 was started on May 23, 1961, and continued for 8 weeks. The test mixture was a simple combination of a gelatinized vitamin A palmitate and salt. No apparent wetting of the mixture from rainfall was observed, but enough moisture seemed to be picked up from the humid air and perhaps saliva from the steers to induce some caking. As shown in Table 1, approximately 75-80% of the vitamin A potency was retained for 2 weeks, but little potency remained after the fifth week. In Trial 2, which was initiated on August 15, 1961, and continued until September 26, the same procedures were used as in Trial 1, except that the vitamin A-salt mixture contained 0.25% calcium stearate. The mixture remained dry and granular throughout the trial. As shown in table 1, about 20% of the vitamin A potency was lost the first week but there was little additional loss during the next five weeks. Temperature exceeded 90° F on several occasions and several inches of rainfall occurred during each trial. However, there was no apparent relationship between loss of vitamin A potency and either temperature or rainfall.

These results indicate that even slight exposure to moisture results in rapid loss of vitamin A activity from mixtures of salt and gelatinized vitamin A. Much of this loss apparently can be prevented by adding a drying agent such as calcium stearate to the mixture.

^{1/} The salt mixtures were furnished by the Hardy Salt Company, St. Louis, Mo.

^{2/} The vitamin A analyses were conducted by the Agricultural Research and Development Department, Chas. Pfizer and Company, Terre Haute, Ind.

Table 1. Stability of Vitamin A Mixed With Salt

Trial 1 - Salt + gelatinized Vitamin A (5/23/61 - 7/18/61)

Week	Vitamin A (I.U./gram)	% of Potency Retained
0	1000	100
1	740	74
2	790	79
3	620	62
4	630	63
5	100	10
6	13	1.3
7	-	-
8	-	-

Trial 2 - Salt + gelatinized Vitamin A + 0.25% calcium stearate (8/15/61 - 9/26/61)

0	970	100
1	790	81
2	783	81
3	788	81
4	754	78
5	791	82
6	819	84

PASTURE EVALUATION WITH FEED SUPPLEMENTATION FOR BEEF PRODUCTION

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During the pasture season of 1961, this station studied the effects of supplemental feeding of beef steers grazing a mixed grass and legume pasture. Sixty good grade yearling Hereford steers, wintered to gain approximately 1.5 lb per day, were used. They had free access to water, shade and mineral feeders which contained salt, ground limestone and steamed bone meal. The steers were implanted with 24 mg of stilbestrol per steer at the beginning of the experiment.

The experiment consisted of 4 treatments with 15 steers receiving each treatment. The treatments were as follows:

1. Control - pasture only, 20 acres
(April 28 - November 11, 1961).
2. Pasture only, 12 acres. (April 28 - July 1, 1961);
corn full fed on pasture (July 1 - November 11, 1961).
3. Pasture only, 12 acres. (April 28 - July 1, 1961); alfalfa pellets
full fed on pasture (July 1 - October 24, 1961); corn full fed (October
24, - November 11, 1961).
4. Pasture only, 12 acres. (April 28 - July 1, 1961); alfalfa pellets
containing 10% salts of fatty acids full fed (July 1, - September 16,
1961); corn full fed (September 16, - November 11, 1961).

Results of this experiment are summarized by periods in Table 1, and results for the entire trial are summarized in Table 2.

Table 1. Results By Periods

	<u>9/16/61</u>	<u>10/14/61</u>	<u>11/11/61</u>
<u>Treatment 1</u>			
Total gain, lb	3202	4330	4244
Total gain/steer, lb	213	288	282
Av daily gain, lb	1.50	1.69	1.42
<u>Treatment 2</u>			
Total gain, lb	4170	5256	5813
Total gain/steer, lb	278	387	350
Av daily gain, lb	1.95	2.06	1.95
<u>Treatment 3</u>			
Total gain, lb	3840	4562	4525
Total gain/steer, lb	256	304	301
Av daily gain, lb	1.80	1.78	1.52
<u>Treatment 4</u>			
Total gain, lb	4312	4812	5019
Total gain/steer, lb	287	320	334
Av daily gain, lb	2.02	1.80	1.69

Table 2. Results Of This Trial

	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>
Av initial wt, lb	621	621	621	621
Av final wt, lb	904	1009	922	956
Total gain/steer, lb	282	387	301	334
Av daily gain, lb	1.42	1.95	1.52	1.69
Supplemental feed/steer/day, lb	-	13.7	15.5	17.3
Supplemental feed/pound gain, lb	-	7.4	8.7	8.0
Carcass grade	Standard	Good	Standard +	Standard +

CATTLE GRUB AND INTERNAL PARASITE CONTROL STUDIES

Fred W. Knapp¹, J. H. Drudge²
Robert Hall³ and Hugh Mahin³
University of Kentucky

Several different experimental systemic insecticides were tested on a purebred beef herd and the University's test herd during the fall and winter of 1961-62. The two methods used were: (1) pour-on (a process where the insecticide is poured along the midline of the back), and (2) oral (insecticide mixed with feed, fed over a three-day period). All animals were treated by November 19, 1961. Fecal samples were collected from the animals on the internal parasite studies before treatment and one week following treatment. Control of internal parasites was based upon number of internal parasite eggs per gram of fecal material. Cattle grub counts were made on all animals during the early spring months by feeling the grubs in the back of the animals.

Results of these tests are summarized in Tables 1, 2, and 3. The data suggest that these new experimental systemic insecticides will be effective in reducing grub populations and at the same time possibly give some internal parasite reduction. The ease of using these insecticides by a pour-on method or orally decreases the cost of the treatment considerably because the method is quick and no expensive equipment is involved.

Only two compounds used, Ruelene and Co-Ral, are approved for cattle grub control. All other compounds are experimental and will not be available for use until they have had proper clearance with the Pesticides Regulation Division of the United States Department of Agriculture.

¹ Department of Entomology and Botany

² Department of Animal Pathology

³ Department of Animal Science

Table 1. Cattle Grub Control Studies On Cattle Treated With Experimental Systemic Insecticide

Compound	Animals		Date	Treatment Method	Dosage mg/kg	Cattle grubs		
	Type	Number				Av/hd	Animals Infested	% Control
SD3562	Calves	10	10-17-61	Pour-on	30	4.25	3	0
Untreated	Calves	12				4.22	6	-
Neguvon	Heifers	10	10-25-61	Feed	15/day for 3 days	0.8	2	93
Untreated	Heifers	9				10.9	9	-
Famophos	Heifers	12	11-19-61	Feed	35/day for 3 days	0	0	100
Untreated	Heifers	28				13.0	26	-

Table 2. Cattle Grub Control Studies With The Pour-On Method On Beef Herd (Treated 11-1-61)

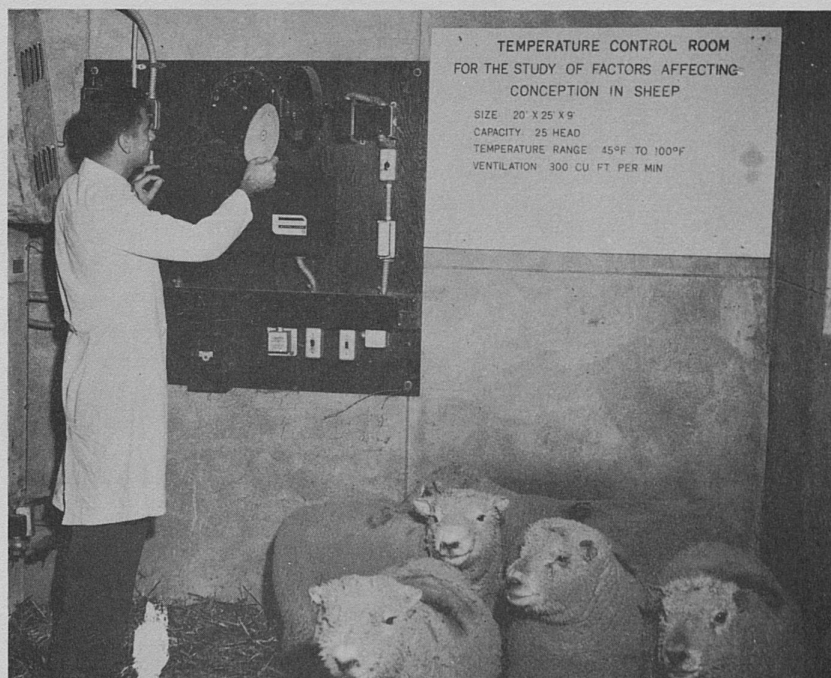
Compound	Animal Numbers	Formulation	Dosage	Av grubs/hd	Animals Infested	% Control
Co-Ral	44	2% water ¹	1 pt/hd	0.7	11	69
Co-Ral	4	2% oil	1/2 pt/hd	0	0	100
SD3562	8	5% water ¹	25 mg/kg	0.25	1	85
Neguvon ²	8	8% mineral oil	1/2 pt/hd	0.25	1	85
Neguvon	6	8% mineral oil	1/4 pt/hd	0.5	1	70
Tiguvon	8	2% mineral oil	1/2 pt/hd	0.25	2	85
Famophos	8	12.5% corn oil	4 oz/hd	0.13	1	92
Ruelene	8	Pour-on mixture ³	1 oz/100 lb	0	0	100
Untreated	18			1.7	5	

¹ Triton x 100 used as an emulsifier (0.75%)² Two cows showed toxic reactions (recovered within 3 days without antidote)³ One part Ruelene 25 EC to 2 parts water

Table 3. Internal Parasite Control Studies On Cattle Treated With Experimental Systemic Insecticide

Compound	Animals		Treatment Date	Method	Dosage mg/kg	Worm eggs/gm of feces			
	Type	Number				Before Range	Before Av	After Range	After Av
SD3562	Calves	10	10-17-61	Pour-on	30	0-170	75	10-190	50
Untreated	Calves	12				0-270	95	60-350	145
									% Change
									-33
									+53
Neguvon	Heifers	10	10-25-61	Feed	15/day for 3 days	40-1340	310	30-1170	450
Untreated	Heifers	9				30-170	85	0-170	50
									+45
									-41

GENETICS SECTION



TEMPERATURE CONTROL ROOM

This room is used in studies of environmental factors affecting conception in sheep. It measures 20' x 25' x 9' and has a capacity of 25 head of sheep. Temperature and humidity can be accurately controlled within a range of 45° to 100°F with a ventilation rate of 300 cubic feet per minute.

GENETICS SECTION

	<u>Page</u>
Selective Breeding for Earlier Lambing in Purebred Southdown Sheep ---	39
Fertility and Embryo Survival in Ewes Following Removal from Heat Stress at or Before Breeding -----	41
Initiation of Breeding Activity and Pregnancy in Anestrous Ewes by Use of Provera and Pregnant Mare Serum -----	42
Effect of Scrotal Wool on Testicular Temperature and Semen Production in Rams -----	43
Breeding Performance in Ewes Following Synchronization of Estrus by Feeding Provera -----	44

GENETICS SECTION

SELECTIVE BREEDING FOR EARLIER LAMBING IN PUREBRED SOUTHDOWN SHEEP

R. H. Dutt, P. G. Woolfolk, R. J. Ericsson and J. S. Evans
University of Kentucky

During the 1960 breeding season the ewe flock was divided in three groups in which early-born yearling rams were used as sires each year. Three weekly semen collections were taken from the rams during July for laboratory study. Semen characteristics for the three sires used for breeding and the breeding performance of the ewe groups are shown in the following tables.

Table 1. Average Semen Production of Southdown Yearling Rams During July

Sire No.	Vol, ml	Semen Characteristics		
		Motile Cells, %	Conc, 10,000/mm ³	Abnormal Cells, %
1	.9	70	263	22.4
30	1.2	50	185	43.8
44	1.1	70	133	15.8

Table 2. Breeding Performance of Ewes

Year	1960			
Sire	1	30	44	Av.
No. ewes	20	20	20	--
Av date first breeding	9/27	9/25	9/8	9/20
Av date lambing	3/8	3/10	2/28	3/6
Ewes lambing, %	95.0	90.0	95.0	93.3
Lambing rate	1.68	1.33	1.53	1.52

Sixteen yearling ewes were added to the breeding flock, but no selection for date of lambing was possible. So far selection for date of lambing has been possible only among the sires.

The percent of ewes lambing and the lambing rate have been satisfactory. The calculated average interval between date of first breeding (date when ewes were first marked by ram) and date of conception was 22 days. Compared with the previous season, the interval was nine days shorter, and the average date of lambing was 19 days earlier. Starting in 1959 the rams were placed in the breeding groups on August 1, and in the preceding years on August 15.

Summarization of the date of first breeding, the interval between first breeding, and conception, and the average lambing date for the five years the project has been active is shown in the following table.

Table 3. Five-year Summary of Breeding Performance

	Year				
	1957	1958	1959	1960	1961
Av date of first breeding	Unknown	9/10	9/21	9/30	9/20
Av date of lambing	3/5	3/7	3/15	3/25	3/6
Av interval between first breeding and conception (days)	---	33	30	31	22

FERTILITY AND EMBRYO SURVIVAL IN EWES FOLLOWING
REMOVAL FROM HEAT STRESS AT OR BEFORE BREEDING

R. H. Dutt
University of Kentucky

Exposing ewes to high environmental temperature at the time of breeding has been found to cause low fertility and increase the percentage of morphologically abnormal ova. In order to obtain information on whether the ova are damaged before ovulation, commercial crossbred ewes were placed in a room at 90°F. temperature, relative humidity 60%, on the twelfth day of the cycle before breeding. One group of ewes was removed from the heat after four days or approximately 1 to 2 days before onset of estrus. A second group remained in a heated room until onset of estrus. This second group was removed from the heat at time of breeding. A control group of ewes was also bred and half of the ewes in the three groups were slaughtered for fertility data. Estimates of embryo loss were calculated from fertility and the lambing data from the remaining ewes in each group.

Fertilization rate was 92.3%, 100% and 91.7%, in the control and the two heated groups, respectively. There was no increase in morphologically abnormal ova from the treated ewes. Eighty percent of the ewes in each of three groups lambled. Estimated embryo loss was 16.7% in the control ewes and 12% for the treated groups. These results indicate that ova from ewes exposed to high temperature before breeding are capable of fertilization and developing into normal embryos, if the heat stress is removed at time of breeding. In studies where ewes have been kept in the heated room after breeding, fertility was reduced and embryo loss was as high as 90%.

INITIATION OF BREEDING ACTIVITY AND PREGNANCY IN ANESTROUS
EWES BY USE OF PROVERA AND PREGNANT MARE SERUM

J. S. Evans and R. H. Dutt
University of Kentucky

Forty anestrus ewes were started on treatment June 6. The ewes were group-fed once a day at the rate of 50 mg of Provera (6-methyl 17-acetoxy-progesterone) mixed in the grain ration. Twenty ewes were fed for 7 days and 20 for 14 days. The second day after ending Provera feeding each ewe was injected subcutaneously with 500 International Units of Pregnant Mare Serum. In the 7-day group 5 ewes (25%) and in the 14-day group 13 ewes (65%) came into estrus within 2 days after the Pregnant Mare Serum injection. These 18 ewes were bred artificially on the day of estrus and all other ewes were bred on the third day after injection.

One-half of the ewes showing estrus in each group and one-half of those not showing estrus were slaughtered. All of the ewes had ovulated except one (average 1.5 per ewe). Thirty-five percent of the ova recovered were fertilized. Fertilized ova were recovered from only one ewe that had not been in estrus. In a group of control ewes, none came into estrus during the trial. Thirty percent of the 7-day ewes and 40 percent of the 14-day ewes, not slaughtered, subsequently lambled. In the 7-day group, 2 ewes that had not been in estrus lambled, but in the 14-day group, only the ewes that had been in estrus lambled. The results of this trial show that a pre-treatment period with a progestational agent of more than 7 days duration is necessary for induction of estrus in a high percentage of anestrus ewes. However, lambing percentages were similar for the 2 groups of ewes.

EFFECT OF SCROTAL WOOL ON TESTICULAR TEMPERATURE AND SEMEN PRODUCTION IN RAMS

R. J. Ericsson and R. H. Dutt
University of Kentucky

Scrotal wool was removed by shaving, and rectal and testicular temperatures were studied in Southdown rams. Control rams and rams with the scrotal wool removed were exposed to 60°F temperature or to 90°F temperature for one week. Average testicular temperature of the control rams at the lower environmental temperature was 94.7°F, while it was 94.4°F for the shaved rams. At the higher environmental temperature, the average testicular temperature was 97.7°F for the control rams and 96.1°F for the sheared rams. The average rectal temperature of rams in the cooler environment was significantly lower than that of those in the heated room.

Exposure to the high temperature resulted in an increase of 1.7°F in testicular temperature of the rams with scrotal wool removed and an increase of 3.0°F for control rams. Increased testicular temperatures have been shown to have a detrimental effect on spermatogenesis and fertility in rams. In a second trial scrotal wool was removed from a group of rams on September 13. During the next five weeks this above-mentioned treatment did not result in any significant change in semen characteristics in shaved rams, when compared with unshaved rams. There was a significant decrease in the percent of abnormal cells during the five-week period in both groups of rams. There was no significant change in semen volume, motility, and sperm-cell concentration.

BREEDING PERFORMANCE IN EWES FOLLOWING SYNCHRONIZATION OF ESTRUS BY FEEDING PROVERA

J. S. Evans and R. H. Dutt
University of Kentucky

An orally-effective progestational compound, Provera, (6-methyl 17-acetoxyprogesterone), was used in attempts to synchronize estrus and time of lambing in ewes. The trial was conducted during the breeding season with 40 commercial ewes. A factorial design was used in which 60 or 90 mg of Provera was fed daily for either 15 or 18 days. None of the ewes came into estrus during treatment. Thirty-eight (95.0%) of the ewes returned to estrus 2 to 5 days (av 3.2 days) after Provera feeding ended. Variance in time of onset of estrus was reduced from 18.3 to 0.6 for pre-treatment and posttreatment estrus, respectively. The average interval from end of feeding to onset of estrus was significantly longer for the 90 mg group (2.7 days vs. 3.6 days, $P < .01$) and for the 18-day group (2.9 days vs 3.6 days, $P < .01$). Ewes showing estrus were artificially bred and 19 were slaughtered.

Ovulation rate was 1.4 and 63% of the ova were fertilized. Sixteen of the remaining 19 ewes (84.2%) lambd to the first posttreatment breeding. All of these ewes lambd within a 7-day period and the lambing rate was 1.4. The treatment was effective in concentrating breeding and time of lambing for most of the ewes. There was no evidence that fertility was adversely affected. Use of orally effective compounds for synchronizing estrus have many advantages over progesterone, which must be injected at frequent intervals in order to be effective.

MEATS SECTION



AIR CONDITIONED AGING ROOM

This room is used in studies of experimental aging of meat products. It measures 10' x 10' x 12' and will hold several hundred hams. It is normally operated at 65°F with a relative humidity of 60 percent.

MEATS SECTION

	<u>Page</u>
The Effects of Partial Pumping on the Characteristics of Aged Hams - - -	47
Quick-aging of Hams - - - - -	50
Shrinkage and Rancidity Development of Dry-cured Hams from Hogs of Different Degrees of Fatness - - - - -	53
A Colorimetric Method for Measuring Rancidity in Fat from Quick-aged Hams - - - - -	55
Relative Cut Out Percentages and Values of Light and Heavier Weight Hogs - - - - -	56
Pork Loin Eye Comparisons - - - - -	60
The Effects of Sex and Type of Rearing on Carcass Characteristics of Southdown Sired Lambs - - - - -	61
Relationship Between Certain Lamb Carcass Weights and Measurements and Carcass Composition - - - - -	65
Effect of Sire, Breed and Sex on Carcass Characteristics of Beef Cattle -	68

THE EFFECTS OF PARTIAL-PUMPING ON THE CHARACTERISTICS OF AGED HAMS

Robert W. Rogers, James D. Kemp and W. Y. Varney
University of Kentucky

Sixty-four hams were divided into 4 equal groups. Eight hams in each group were dry-cured; the companion hams were partial-pumped and enough dry cure was applied to the outside to make the total amount of solids equal to the 10% dry cure. Pumping percentages were 4, 6, 8 and 10 for Groups 1 through 4, respectively. All hams were cured one and one-half days per pound (average weight), at a temperature of 36° to 40°F. After being smoked for 24 hours, at a smokehouse temperature of 100°F, all hams were aged 6 months at 65°F. and approximately 60% relative humidity. All ham were weighed to the nearest 0.01 lb while fresh, after pumping, after curing, after smoking and at monthly intervals for the 6-month aging period. Characteristics of external fat were determined by iodine numbers and free fatty acid content. Hams were observed for color, soundness and smell at the end of the aging period. Two one-half-inch hams slices were used for palatability tests and a third slice, one-fourth-inch thick, was used for salt analysis.

Table 1. - Ham Shrinkage

Group	Pumped				Dry-Cured		
	Pumping Percent	Shrinkage			Shrinkage		
		2 Mo	4 Mo	6 Mo	2 Mo	4 Mo	6 Mo
1	4	16.22	21.56	25.24	19.92	24.44	27.72
2	6	15.33	20.26	23.84	19.73	24.21	27.32
3	8	13.74	19.07	22.73	20.44	24.80	28.04
4	10	11.57	15.76	20.59	20.49	24.88	27.96
Mean		14.21	19.16	23.10	20.14	24.58	27.76

Shrinkage increased throughout the processing and aging period, with the greatest amount occurring during the first month of aging. In all periods during processing and aging, the partial-pumped hams shrank significantly less ($P < 0.01$) than the dry-cured hams.

Iodine numbers and free fatty acid content were not significantly affected by pumping. However, the iodine numbers did show a decrease over the processing and aging period, while there was a significant increase ($P < 0.01$) in the free fatty acid content during the processing and aging period.

Table 2. - Mean Sodium Chloride Percentages

Pumped			Dry-Cured	
Group	Pumping %	NaCl %	Group	NaCl %
1 P	4	6.56	1 D	4.98**
2 P	6	6.97	2 D	5.03**
3 P	8	7.01	3 D	5.30**
4 P	10	6.96	4 D	5.30**
Mean		6.87	Mean	5.15**

** Significant at the 0.01 level.

Table 2 shows that the pumped hams had significantly higher ($P \leq 0.01$) sodium chloride content than the dry-cured hams.

A palatability test measuring flavor, saltiness, tenderness and overall satisfaction was conducted. A hedonic scoring table was used, whereby the highest score (9.00) was "like extremely" and the lowest score (1.00) was "dislike extremely." As shown in Table 3, the palatability panel scored the dry-cured hams significantly higher ($P \leq 0.01$) for flavor, saltiness, and overall satisfaction. Both the partial-pumped and dry-cured hams were ranked about the same in tenderness. There were no significant differences among the pumped groups for any of the palatability ratings.

Table 3. - Mean Panel Palatability Scores

Group	Pumping %	Flavor	Saltiness	Tenderness	Overall Satisfaction
Pumped Hams					
1 P	4	5.77	6.52	7.16	6.12
2 P	6	6.20	6.43	6.93	6.33
3 P	8	6.34	6.40	7.05	6.34
4 P	10	6.61	6.35	7.38	6.65
Mean		6.23	6.43	7.13	6.36
Dry-cured Hams					
1 D		6.81**	6.97	6.97	6.88***
2 D		5.41	6.74	6.91	6.63
3 D		6.42	7.02	7.08	6.57
4 D		6.87**	6.88**	7.31	6.94***
Mean		6.38**	6.90**	7.07	6.75**

** Significant at the 0.01 level when compared with corresponding pumped ham.

*** Approached significance at the 0.05 level when compared with corresponding pumped hams.

These data show that pumping hams for aging reduces shrinkage and does not affect the characteristics of the external fat. However, further work is necessary in order to make partial-pumped hams as desirable as dry-cured hams.

QUICK AGING OF HAMS

George C. Skelley, James D. Kemp, and W. Y. Varney
University of Kentucky

Four trials were conducted involving quick aging of hams with the use of temperature-humidity controlled cabinets. All hams were dry-cured at 10% of their fresh weight and remained in cure for 1.5 days per pound of ham, then were smoked. Hams in Trial 1 were tempered at 65°F for 3 days, then aged at temperatures of 80°, 90°, 100° and 110°F, respectively. Hams in the other 3 trials were tempered at 65°F for 14 days, then aged at temperatures of 75°, 85°, 95° and 105°F, respectively. A total of 128 hams were used in all trials and aging periods ranged from 4 to 20 weeks. Fat samples in the first 2 trials were analyzed for iodine number, free fatty acid content and peroxide value. Shrinkage was determined at weekly or bi-weekly intervals. Hams were removed after the aging period, sliced, observed for color, odor and soundness, cooked for palatability studies and compared with control hams aged for 6 months at 65°F.

Table 1 shows a summary of the shrinkage results. Shrinkage increased rapidly in all groups, but in all trials it was more rapid at the higher temperature.

Table 1. - Shrinkage of Hams Aged at High Temperatures 1

<u>Trial</u>	<u>Period</u>	<u>80°</u>	<u>90°</u>	<u>100°</u>	<u>110°</u>
Trial I	12-weeks	25.14	25.16	25.51	29.75
		<u>75°</u>	<u>85°</u>	<u>95°</u>	<u>105°</u>
Trial II	12-weeks	26.47	26.50	28.24	29.98
Trial III	10-weeks	24.30	25.97	25.71	27.68
Trial IV	12-weeks	23.85	23.06	26.14	26.25

1/ Degrees F

Table 2 gives a summary of the rancidity measurements in Trials 1 and II. Iodine numbers decreased in Trial I, but increased in Trial II. Peroxide numbers were rather high at the end of Trial I, but were very consistent in Trial II, except for high values when fresh. Free fatty acid values increased steadily.

Table 2. - Fat Characteristics of Hams Aged at High Temperatures 1

		Trial I				Trial II			
		80°	90°	100°	110°	75°	85°	95°	105°
Peroxide Value	Fresh	2.00	2.06	1.89	1.96	6.03	6.34	5.64	6.12
	12 weeks	37.76	43.44	28.84	33.05	13.80	14.66	12.57	18.62
Iodine Number	Fresh	64.42	64.79	63.01	63.41	61.81	59.79	61.83	61.76
	12 weeks	61.53	61.90	61.73	61.80	64.17	63.12	64.28	64.61
Free Fatty Acid Content	Fresh	0.13	0.12	0.13	0.13	0.14	0.13	0.12	0.13
	12 weeks	8.90	8.51	10.56	9.18	16.37	16.29	16.87	11.19

1 Degrees F

The hams in the two latter trials were much better quality than those of the first two trials. The spoilage problem in Trial I was remedied by the lengthened aging period and the reduction in aging temperatures. Generally, the hams in the 95°F temperature group were rated the highest. Table 3 gives the palatability scores for all trials. The 95° and 105°F temperature groups were scored highest, particularly in the last two trials. The best combination for quick aging of hams seems to include 2 weeks of tempering at 65°F, then aging at approximately 95°F for about 12 weeks.

Table 3. - Mean Palatability Scores ¹

	Trial I				Trial II				Trial III				Trial IV			
	80°	90°	100°	110°	75°	85°	95°	105°	75°	85°	95°	105°	75°	85°	95°	105°
Flavor	6.28	6.44	6.57	6.54	6.78	6.96	6.76	6.95	7.24	7.36	7.39	7.44	6.53	7.03	7.23	7.50
Saltiness	7.15	7.00	7.10	6.98	6.89	7.07	7.01	7.02	7.47	7.58	7.64	7.69	7.67	7.72	7.90	7.80
Tenderness	7.36	7.64	7.50	7.20	7.88	7.73	7.82	7.74	7.97	8.04	8.11	8.11	8.08	8.20	8.53	8.42
Overall Satisfaction	6.50	6.58	6.77	6.66	7.03	7.08	6.98	7.03	7.36	7.48	7.54	7.59	6.90	7.27	7.50	7.64

¹ 8 - Like very much
7 - Like moderately
6 - Like slightly

² Degrees F

SHRINKAGE AND RANCIDITY DEVELOPMENT OF DRY-CURED HAMS FROM HOGS OF DIFFERENT DEGREES OF FATNESS

Robert W. Rogers, James D. Kemp and W. Y. Varney
University of Kentucky

Eighty hams were purchased from a local packing house and were dry-cured, smoked at a smokehouse temperature of 100°F, and aged for 6 months at 65°F, at a relative humidity of approximately 60%. The hams were divided equally into two groups. Group 1 from hogs having 1.5 in. or less backfat and Group 2 from hogs having 2.0 in. or more backfat. The hams were weighed initially, after curing, after smoking, and at monthly intervals during the aging process. Fat samples were obtained at regular intervals to determine the free fatty acid content and iodine numbers of the external fat.

Comparison of the shrinkage data is presented in table 1.

Table 1. - Ham Shrinkage

Group	Backfat Thickness	Mean Shrinkage Values				
		Cured	Smoked	2 Mo	4 Mo	6 Mo
1	1.5 in. or less	3.51	8.03	19.40	23.79	27.29
2	2.0 in. or more	2.36	7.18	17.58	21.44	24.31
	Mean Difference	1.15**	.85**	1.82**	2.35**	2.98*

* Significant at the 0.05 level

** Significant at the 0.01 level

The shrinkage increased throughout the processing and aging period in both groups with the greatest amount of shrinkage occurring during the first 2 months of the aging period. Complete data on the changes in fat composition are not yet available, however, the data that are available are presented in Tables 2 and 3.

Table 2. - Free Fatty Acid Content

Group	Backfat Thickness	Mean Free Fatty Acid Values		
		Fresh	2 Mo	4 Mo
1	1.5 in. or less	.32	3.11 ¹	5.45
2	2.0 in. or more	.28	3.26 ¹	4.95
	Mean Difference	.04	.15	.50

¹ Data available on only 24 hams of each group.

Table 3. - Iodine Numbers

Group	Backfat Thickness	Mean Iodine Numbers		
		Fresh	2 Mo	4 Mo
1	1.5 in. or less	65.77	65.87 ¹	66.45
2	2.0 in. or more	63.03	64.30 ¹	64.48
	Mean Difference	2.74**	1.57**	1.97**

** Significant at the 0.01 level.

¹ Data available on only 24 hams of each group.

These data indicate that hams from hogs having 2.0 in. or more backfat shrink significantly less and have significantly lower iodine numbers of external fat than hams from hogs having 1.5 in. or less backfat. However, the degree of fatness of the hog does not seem to affect the free fatty acid content of the external fat of the hams.

A COLORIMETRIC METHOD FOR MEASURING RANCIDITY IN FAT FROM QUICK AGED HAMS

George C. Skelley, James D. Kemp and C. Oran Little
University of Kentucky

A trial was conducted to examine the possibility of modifying the ranco value, as reported by Ramsey et al, in the 1960 Livestock Field Day Report measuring rancidity in quick aged ham fat samples. The procedure was changed slightly in order to increase its usefulness with ham fat.

The revised procedure is:

1. Add 300 lambda of rendered ham fat to 5 ml of n-butanol.
2. Add 10 ml of 0.8019 n alcoholic KOH and shake. The alcohol ratio in this solution is 85% isopropanol, 10% methanol and 5% ethylene glycol.
3. Heat in a 70°C water bath for 6 minutes.
4. Remove from the bath, shake, pour into a standardized cuvette and measure optical density at 385 mm in colorimeter.

A blank without the fat added is used as a standard.

Using the above procedure, the following significant correlations were found between ranco value and other tests on 66 ham fat samples:

Aging period	0.76 ± 0.052
Peroxide value	0.62 ± 0.076
Free fatty acid content	0.75 ± 0.054
Iodine number	-0.47 ± 0.096

The original ranco value, composed of pure isopropanol for both solvent and alcoholic KOH, was used for measuring lard oxidation. It gave a correlation of 0.996 ± 0.002 with peroxide value and a correlation of -0.94 with iodine number. These figures suggest that the ranco value is better adapted to measurements of fat oxidation than for total rancidity measurements in ham fat.

RELATIVE CUT OUT PERCENTAGES AND VALUES OF LIGHT AND HEAVIER WEIGHT HOGS

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Carcasses from 2 groups of 30 Hampshire barrows each, of similar breeding and averaging 159 and 215 lb, live weight were evaluated. In percent of total weights of individual cuts, the heavy hogs were higher in boneless ham and ham fat and skin, while the light hogs were higher in boneless-defatted ham, boneless defatted ham cushion and ham bone. The light group was higher in sirloin-end section of loin. There were no significant differences between rib-end and center loin sections, boneless butts and boneless and skinless picnics. The heavier hogs yielded a higher percent of skinless, smoked bacon and were superior in yields of sliced first-grade bacon. The light hogs were higher in percent of lean and primal cuts on live weight and carcass weight bases. The heavier hogs were higher in percent of lard stock on live weight and carcass weight bases. The heavy group showed higher carcass yields, but the light group was worth more per cwt on both the live weight and packer weight bases. The data are presented in Tables 1 through 7.

Table 1. Means and Ranges of Live Weights, Carcass Measurements and Yields

	Adjusted Live Weight, lb		Carcass Yields, %		Carcass Length, in.		Backfat Thickness, in.		Loin Eye Area sq. in.		Loin Eye Area/cwt Carcass, sq.in.	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Light	159	141-174	70.37	65.43-72.61	27.5	25.9-30.1	1.1	0.9-1.4	3.66	2.97-4.67	3.27**	2.78-4.10
Heavy	215	203-239	71.83**	70.62-73.08	29.7	28.5-30.8	1.5	1.1-1.9	4.16	3.01-5.33	2.70	1.95-3.53

**P < .01

Table 2. Means and Ranges of Primal Cut Weights¹

Group	Ham Weight, lb		Loin Weight, lb		Picnic Weight, lb		Boston Butt, Weight, lb		Belly Weight, lb	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Light	24.19	20.74-29.00	19.60	16.43-23.98	11.30	9.98-13.50	7.99	6.98-9.45	16.94	14.18-21.10
Heavy	31.12	27.92-36.43	25.82	22.61-28.81	14.41	12.62-16.43	10.35	9.04-13.06	23.92	20.43-28.60

¹Both sides

Table 3. Lean and Primal Cuts and Lard Stock Percentages

		Group			
Item		Light		Heavy	
		Mean	Range	Mean	Range
Lean cuts	(% Live wt)	39.63**	37.46-43.79	38.03	34.44-40.90
	(% Carcass wt)	56.19**	53.16-60.19	52.94	48.54-56.79
Primal cuts	(% Live wt)	50.26**	46.97-54.62	49.16	46.01-51.88
	(% Carcass wt)	71.43**	68.23-75.22	68.41	64.06-71.29
Lard stock	(% Live wt)	9.75	6.40-12.08	12.75**	10.90-15.80
	(% Carcass wt)	13.84	9.43-17.06	17.75**	15.30-21.86

**P < .01

Table 4. Weights and Percents of Component Parts of Lean Cuts

Cut	Group			
	Light		Heavy	
	Mean	Range	Mean	Range
Right ham wt. (lb skinned)	12.06	10.25-15.00	15.44	13.36-18.25
Boneless ham (lb)	10.67	8.69-13.43	13.77	11.97-16.03
% of total	88.42	84.78-90.06	89.18*	86.97-91.11
Boneless & defatted ham (lb)	9.52	8.06-12.37	11.92	9.80-14.30
% of total	78.89*	72.76-82.47	77.12	70.15-83.03
Boneless & defatted cushion (lb)	5.90	4.68- 7.44	7.22	6.05- 8.64
% of total	48.88*	41.31-56.15	46.78	40.50-52.88
Bone (lb)	1.39	1.16- 1.62	1.67	1.39- 2.21
% of total	11.58**	9.94-15.22	10.82	8.89-13.03
Fat and skin (lb)	1.11	0.60- 1.81	1.85	0.87- 2.96
% of total	9.20	5.85-14.27	12.06**	5.61-19.81
Loin wt. (lb)	19.44	16.10-23.61	25.65	22.36-28.33
Rib-end (lb)	6.27	4.83- 8.16	8.47	7.25- 9.77
% of total	32.38	28.08-38.47	33.06	29.88-38.09
Center section (lb)	6.79	5.42- 9.44	9.13	7.68-10.75
% of total	34.87	29.94-39.98	35.59	31.02-38.96
Sirloin-end (lb)	6.36	5.10- 7.61	8.04	6.84- 9.58
% of total	32.78**	29.86-36.91	31.31	27.52-35.80
Boston butt wt. (lb one)	3.95	3.05- 4.80	5.19	4.56- 6.86
Boneless butt (lb)	3.72	2.80- 4.57	4.88	4.17- 6.48
% of total	94.14	91.80-95.41	94.00	85.63-95.28
Picnic wt. (lb right side)	5.68	4.60- 7.38	7.09	6.05- 8.08
Boneless and skinless picnics (lb)	4.38	3.25- 5.62	5.40	4.48- 6.77
% of total	77.00	70.65-86.07	76.14	70.51-87.35

*P < .05

**P < .01

Table 5. Belly Weights and Bacon Yields

Group	Fresh Belly Wt [†] Skin on (lb)		Out of Smoke Wt [†] Skinless (lb)		Yields	
	Mean	Range	Mean	Range	Mean	Range
Light	16.93	14.18-21.10	14.47	11.35-18.55	85.47	77.32-92.92
Heavy	23.88	18.92-28.60	21.32	15.90-25.35	89.28**	78.43-93.43

[†]Both sides

**P < .01

Table 6. Sliced Bacon Yields

	Light	Group Heavy
Bacon out of smoke, lb	434.12	639.65
Sliced bacon, 1st grade, lb	283.25	455.00
% of total	65.25	71.13
Sliced bacon, 2nd grade, lb	102.25	102.00
% of total	23.55	15.95
Sliced bacon, 3rd grade, lb	27.75	52.50
% of total	6.39	8.21
Scrap, lb	20.50	30.00
% of total	4.72	4.69

Table 7. Live Hog and Carcass Values[†]

	Total value		Value per cwt (Live wt)		Value per cwt Packer wt	
	Mean \$	Range \$	Mean \$	Range \$	Mean \$	Range \$
Light	34.41	30.12-39.29	21.61**	20.43-23.13	30.72**	29.55-33.07
Heavy	44.49	40.87-50.20	20.70	19.74-21.53	28.82	27.55-29.75

[†]Based on average National Provisioner prices for Jan.-June, 1961.

**P < .01

PORK LOIN EYE COMPARISONS

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The cross sectional area of the loin eye (*Longissimus dorsi*) at the tenth, 11th, twelfth and last ribs from 382 pork carcasses, slaughtered at approximately 200 lb, were traced and measured. The animals were mostly of the Hampshire breed, but included a few Yorkshires and Berkshires. The average areas for different years, for gilts and barrows and as totals, at the three loin sections were as follows:

Table 1. Area of Loin Eye (Sq in.)

Year	Number of Hogs	10th rib	12th rib	Last rib
1955				
Gilts	30	3.95	4.31	4.12
Barrows	29	3.54	3.95	3.96
Total	59	3.75	4.14	4.04
1956				
Gilts	33	4.12	4.55	4.41
Barrows	29	3.83	4.14	4.10
Total	62	3.98	4.36	4.26
1957				
Gilts	19	4.16	4.42	4.23
Barrows	31	3.95	4.26	4.07
Total	50	4.03	4.32	4.13
1958				
Gilts	20	4.26	4.48	4.43
Barrows	22	3.92	4.19	4.16
Total	42	4.08	4.33	4.29
1959				
Gilts	24	4.43	4.59	4.37
Barrows	29	4.07	4.15	4.06
Total	53	4.23	4.35	4.20
1960				
Gilts	36	4.19	4.52	4.46
Barrows	31	3.97	4.29	4.23
Total	67	4.09	4.42	4.36
1961				
Gilts	26	4.28	4.51	4.42
Barrows	23	5.64	5.89	5.89
Total	49	4.92	5.16	5.11
All years				
Gilts	188	4.18	4.49	4.35
Barrows	194	4.09	4.37	4.31
Total	382	4.14	4.43	4.33

THE EFFECTS OF SEX AND TYPE OF REARING ON CARCASS CHARACTERISTICS OF SOUTHDOWN Sired LAMBS

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Carcass data were collected from 165 lambs sired by 12 Southdown rams, out of western black-faced ewes. Table 1 gives the number, grade, sex and type of rearing for all ewe, wether, twis and single lambs studied from 1958-61. The 88 twin lambs were further divided into 43 ewe lambs and 45 wether lambs and the 77 single lambs were divided into 40 ewe lambs and 37 wether lambs.

Table 1. Number of Lambs, Grade, Sex and Type of Rearing

Year	Number	Grade Range	Twins	Singles	Ewes	Wethers
1958	43	G+ to P*	10	33	24	19
1959	24	Ch to P*	-	24	11	23
1960	39	Ch to P	19	20	20	19
1961	59	Ch to P+	59	-	28	31
Total	165	G+ to P+	88	77	83	82

*Graded on 1957 standards

The lambs received pasture and were creep-fed when pasture became scarce. When the lambs reached approximately 85 lbs they were trucked to the Meats Laboratory at Lexington where they were slaughtered and evaluated for carcass characteristics. The lambs averaged 183.9 days old, with ages ranging from 119 to 288 days, at the time of slaughter.

The object of this study was to determine differences between sexes and differences between twins and singles, in order to point out variation in rate of growth, age of lambs at slaughter, percent of lean in carcass, percent wholesale cuts and other factors that are of economical importance to the lamb producer.

Table 2 shows that single and wether lambs reached slaughter weight 29.1 and 21.9 days earlier ($P < 0.01$) than did twin and ewe lambs respectively. The difference of 0.05 and 0.04 lbs of carcass weight per day of age ($P < 0.01$) in favor of single and wether lambs would be equal to approximately one tenth and eight hundredth of a pound faster gain per day on a live weight basis. Twin and wether lambs had a higher percentage of carcass lean and a lower percentage of carcass fat, kidney fat and fat over the twelfth rib than did single and ewe lambs. These latter differences are important to today's consumer who is demanding leaner meat. The significant differences in percent wholesale cuts that existed are of little concern, but higher percentages of loin and breast and flank in the fatter carcasses indicate that fat is laid down faster in these areas.

Table 3 shows similar differences for twin ewe lambs versus twin wether lambs and single ewe lambs versus single wether lambs. In addition it should be pointed out that the wether carcasses in both cases had a higher percentage of bone than ewe lambs and also a higher percentage of lean. This indicates a relationship between size of bone and meatiness. This relationship is further borne out by the highly significant positive correlation coefficient of 0.40 obtained between percent lean and bone in the carcass. To substantiate further this finding, the correlation between percent bone in carcass and percent fat was found to be negative 0.65.

Table 2. Summary of Differences Between Sexes and Type of Rearing

Characteristic Studied	88 twin lambs		77 single lambs		83 ewe lambs		82 wether lambs		Differences Between Means
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	
Percent fat in carcass	33.53	3.78	34.80	4.08	35.49	3.79	32.74	3.66	2.75**
Percent lean in carcass	51.50	3.00	50.51	3.32	50.26	3.15	51.82	3.04	-1.56**
Percent bone in carcass	14.08	1.48	13.74	1.30	13.37	1.29	14.48	1.30	-1.11**
Area of eye/45 lb carcass (sq in)	1.99	.208	2.06	.218	1.99	.206	2.06	.218	-.07*
Fat thickness over 12th rib (m m)	6.50	2.25	8.14	2.56	7.60	2.36	6.93	2.66	.67
Age of lamb in days	197.48	34.72	168.38	33.74	194.76	34.56	172.90	36.61	21.86**
Percent kidney fat (inc. kidney wt)	3.41	.996	3.53	.985	3.87	.97	3.06	.84	.81**
Carcass wt/day of age	.220	.040	.268	.060	.228	.052	.267	.057	-.039**
Percent wholesale cuts									
Leg	30.17	1.14	30.28	1.13	30.10	1.82	30.34	1.08	-.24
Loin	10.23	.71	10.16	.82	10.30	.73	10.10	.78	.20**
Rib	8.97	.82	9.08	.85	9.09	.82	8.96	.83	.13
Shoulder	23.18	1.26	23.40	1.14	23.16	1.28	23.41	1.12	-.25
Breast & flank	15.42	.81	15.08	.91	15.28	.87	15.25	.87	.03
Shank	3.29	.37	3.07	.24	3.09	.33	3.28	.32	-.19**
Neck	2.88	.41	2.96	.41	2.82	.36	3.02	.44	-.20**

*Significant at .05 level

**Significant at .01 level

Table 3. Summary of Differences Between Twin Ewe Lambs and Twin Wether Lambs and Between Single Ewe Lambs and Single Wether Lambs

Characteristic Studied	43 twin Ewe lambs		45 twin Wether lambs		Differences Between Means		40 single Ewe lambs		37 single Wether lambs		Differences Between Means	
	Mean	Standard Deviation	Mean	Standard Deviation			Mean	Standard Deviation	Mean	Standard Deviation		
Percent fat in carcass	35.06	3.36	32.07	3.61	2.99**		35.95	4.21	33.55	3.59	2.40**	
Percent lean in carcass	50.68	2.82	52.29	2.99	-1.61*		49.82	3.44	51.26	3.05	-1.44*	
Percent bone in carcass	13.44	1.28	14.69	1.41	-1.25**		13.30	1.31	14.22	1.12	-0.92**	
Area of eye/45 lb carcass (sq in)	1.96	0.207	2.03	0.204	-0.07		2.03	0.200	2.10	0.232	-0.07	
Fat thickness over 12th rib (mm)	6.90	2.33	6.23	2.09	0.67		8.35	2.19	7.92	2.92	0.43	
Age of lamb in days	208.56	30.07	186.38	33.42	22.18**		179.92	33.19	155.89	30.02	24.03**	
Percent kidney fat (inc. kidney wt)	3.82	0.93	3.01	0.83	0.81**		3.92	1.02	3.11	0.75	0.81**	
Carcass wt/day of age	0.208	0.037	0.230	.040	-0.023**		0.249	0.057	0.290	0.057	0.041**	
Percent wholesale cuts												
Leg	30.03	1.26	30.30	1.01	-0.27		30.18	1.10	30.40	1.16	-0.22	
Loin	10.39	0.70	10.08	0.68	.31*		10.19	0.75	10.12	0.89	0.07	
Rib	9.11	0.87	8.84	0.72	.27		9.06	0.77	9.11	0.94	-0.05	
Shoulder	22.93	1.38	23.41	1.09	-.48		23.39	1.12	23.42	1.17	-0.03	
Breast & flank	15.44	0.84	15.40	0.79	.04		15.10	0.88	15.07	0.95	-0.03	
Shank	3.19	0.38	3.39	0.34	-.20*		2.99	0.21	3.16	0.25	-0.17**	
Neck	2.81	0.38	2.96	0.43	-.15		2.84	0.36	3.10	0.44	-0.26**	

*Significant at .05 level

**Significant at .01 level

RELATIONSHIPS BETWEEN CERTAIN LAMB CARCASS WEIGHTS AND MEASUREMENTS AND CARCASS COMPOSITION

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Lamb carcass evaluation is essential if meat-type lambs are to be selected. Physical separation of cuts is perhaps the most accurate method of evaluation, but it is laborious and time consuming. This study was made to evaluate methods of estimating carcass composition from certain weights and measurements.

Carcass cut-out, specific gravity of carcass and right rack, and physical composition of the right side and each cut were determined on 165 Southdown-cross-bred lambs. Table 1 gives some relationship between composition of cuts and composition of carcasses.

Table 1. - Relationships Between Physical Composition of Cuts and Carcasses

Relationship Studied	"r" **	Estimating equation, 1, 2, 3	Standard error of estimate, %
Fat of carcass with fat of:			
Leg	0.88	$Y = 5.45 + 1.10X$	1.89
Loin	0.82	$Y = 11.61 + .61X$	2.28
Rib	0.89	$Y = 7.54 + .68X$	1.82
Shoulder	0.81	$Y = 10.80 + .77X$	2.34
Breast and Flank	0.77	$Y = 6.96 + .58X$	2.54
Shank	0.22	$Y = 29.22 + .22X$	3.89
Neck	0.63	$Y = 22.14 + .42X$	3.10
1 $Y = \% \text{ fat in carcass, } X = \% \text{ fat in cut.}$			
Lean of carcass with lean of:			
Leg	0.86	$Y = -5.94 + .92X$	1.63
Loin	0.82	$Y = 21.41 + .56X$	1.83
Rib	0.82	$Y = 21.82 + .65X$	1.83
Shoulder	0.87	$Y = 4.36 + .82X$	1.58
Breast and Flank	0.81	$Y = 26.07 + .58X$	1.88
Shank	0.31	$Y = 37.86 + .25X$	3.05
Neck	0.53	$Y = 34.30 + .33X$	2.72
2 $Y = \% \text{ lean in carcass, } X = \% \text{ lean in cut.}$			
Bone of carcass with bone of:			
Leg	0.81	$Y = 1.98 + 1.00X$	0.83
Loin	0.61	$Y = 10.15 + .39X$	1.12
Rib	0.84	$Y = 5.80 + .55X$	0.77
Shoulder	0.82	$Y = 4.16 + .78X$	0.81
Breast and Flank	0.72	$Y = 7.87 + .70X$	0.98
Shank	0.35	$Y = 8.35 + .22X$	1.32
Neck	0.52	$Y = 9.67 + .22X$	1.21
3 $Y = \% \text{ of bone in carcass, } X = \% \text{ bone in cut.}$			

** All correlations significant at 0.01 level.

The rib showed the best estimation of all three components, having the highest correlations and lowest standard errors for fat and bone. The leg and shoulder were quite similar in their predictive values for lean. These cuts are larger and require much more labor in separation; therefore, the rib would be much more practical for general use. Other cuts except shank and neck showed high correlations.

Specific gravity is related to fatness or leanness. Since fat is lighter than lean, it is reasonable to assume that a fatter carcass would have a lower specific gravity than a leaner carcass. Table 2 shows these relationships. Although there is highly

Table 2. - Relationships Between Percent Fat and Lean in the Carcass and Selected Measurements

Relationship Studied	"r" **	Estimating Equation, 1, 2	Standard error of estimate, %
Percent fat in carcass with:			
Specific gravity of rib	-.64	$Y = -209.95 + 236.78X$	3.06
Specific gravity of carcass	-.49	$Y = -201.54 + 228.43X$	3.48
Area of eye/45 lb carcass	-.43	$Y = 18.03 + 7.94X$	3.60
Fat thickness over rib	.63	$Y = 26.94 + 0.99X$	3.10
Percent kidney and pelvic fat	.55	$Y = 26.49 + 2.20X$	3.33
Percent leg	-.48	$Y = 16.58 + 1.68X$	3.50
Percent lean in carcass	-.94	$Y = 25.36 + 1.17X$	1.36
1 Y = % fat in carcass, X = Item compared			
Percent lean in carcass with:			
Specific gravity of rib	.62	$Y = -185.41 + 229.39X$	3.13
Specific gravity of carcass	.47	$Y = -128.60 + 174.13X$	2.83
Area of eye/45 lb carcass	.47	$Y = 36.91 + 6.97X$	2.83
Fat thickness over rib	-.53	$Y = 46.19 + .67X$	2.71
Percent kidney and pelvic fat	-.48	$Y = 45.69 + 1.54X$	2.81
Percent leg	.51	$Y = 7.77 + 1.43X$	2.75
Percent fat in carcass	-.94	$Y = 25.28 + .75X$	1.09
2 Y = % lean in carcass, X = Item compared			

** All significant at 0.01 level.

significant relationship, the variation is too great for the estimating equation to have much predictive value. The same is true for simple correlations of fat and lean with the rib eye area, with fat thickness over twelfth rib, present kidney fat and percent leg. These correlations and equations are also shown in Table 2. When area of loin eye, percent kidney fat and fat thickness over the eye are combined, the correlation coefficient is increased to 0.71, with an estimating equation of: percent lean in carcass = $26.62 + 13.27 (\text{loin eye area}/45 \text{ lb carcass}) - 0.19 (\text{fat over eye m m}) - 0.36 (\% \text{ kidney and kidney fat})$. If percent of leg is added, the correlation coefficient is increased to 0.75 with an estimating equation of: percent lean in carcass = $33.27 + 3.90 (\text{area of loin eye}/45 \text{ lb}) - 0.46 (\text{fat thickness over eye, m m}) - 0.80 (\text{percent kidney and kidney fat}) + 0.53 (\text{percent leg})$.

From these data, it seems that physical separation of the rib is the most accurate method of predicting fat, lean and bone. If no physical separation is to be done, the last equation using area of eye, percent kidney fat, fat thickness over rib and percent leg is a fairly good predictor of leanness.

The Hereford cattle significantly exceeded the Hereford X Red Polls in carcass conformation, rib eye area per cwt of carcass, tenderness (shear force), and percent separable lean other than rib eye in the ninth, tenth, and eleventh rib section.

The progeny of the high gaining bull significantly exceeded those of the low gaining bull in rib eye area per cwt of carcass, tenderness (shear force), percent rib eye in the ninth, tenth, and eleventh rib section and percent total separable lean in the ninth, tenth, and eleventh rib sections. The progeny of the low gaining bull were significantly higher in fat thickness over the rib eye and percent separable fat in the ninth, tenth, and eleventh rib section.

The heifers significantly exceeded the steers in marbling score and percent separable fat in the ninth, tenth, and eleventh rib section. There were no significant differences among any of the other factors listed.

EFFECT OF SIRE, BREED AND SEX ON CARCASS CHARACTERISTICS OF BEEF CATTLE

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Carcass data from 34 steers and heifers from Hereford and Red Poll cows and a high gaining and a low gaining bull are given below. These data were given in part in the Beef Cattle section of last year's report. Complete data were not available at that time.

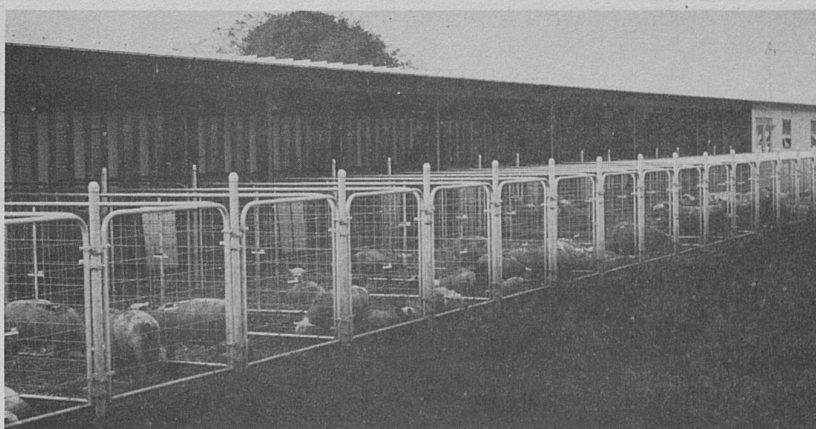
	Sire		Breed		Sex	
	Low Gaining	High Gaining	Hereford	Hereford x Red Poll	Heifers	Steers
No. of calves	17	17	17	17	19	15
Live weight	930	943	885	988	896	987
Carcass grade	12.3	11.7	12.3	11.7	11.9	12.1
Carcass conformation score	12.3	11.8	12.7	11.4	11.6	12.7
Carcass yield (%)	61.5	61.1	60.5	61.0	61.3	61.3
Fat thickness over rib eye in.	0.9	0.7	0.8	0.8	0.8	0.8
Rib eye area (sq. in.)	9.5	10.8	9.9	10.3	9.7	10.7
Rib eye area /cwt	1.7	1.9	1.9	1.7	1.8	1.8
Marbling score	6.7	6.5	6.9	6.2	7.0	6.1
Hide yield (%)	7.6	8.3	8.6	7.3	7.7	8.2
Physical separation of 9th, 10th, 11th ribs						
Fat (%)	43.94	39.77	40.90	42.80	43.50	39.80
Rib eye (%)	15.49	17.63	16.40	16.70	16.20	17.10
Total lean (%)	42.30	46.70	45.70	43.30	43.40	45.90
Bone (%)	13.26	13.27	13.20	13.30	12.80	13.80
Rib eye moisture (%)	70.1	70.7	70.3	70.4	70.0	70.8
Rib eye ether extract (%)	5.2	4.7	5.0	4.9	5.2	4.7
Flavor score	7.72	7.95	7.83	7.83	7.84	7.82
Tenderness score	7.83	7.95	7.89	7.65	7.74	7.81
Juiciness score	7.50	7.70	7.59	7.55	7.61	7.53

SHEEP SECTION



PUREBRED SHEEP BARN, COLDSTREAM FARM

This barn will be used to house the University's purebred Southdown and Hampshire flocks. Construction was completed in the spring of 1962. There are 10 pens which measure 12' x 20', a lambing pen area which can be closed off, a feed storage area, an office, and student living quarters.



SHEEP EVALUATION STATION, COLDSTREAM FARM

This building is used to house farmer-owned ram and wether lambs on performance test in which rate of gain, feed conversion and carcass characteristics are determined. There are 24 pens, each of which measure 5 1/2' x 24'; a feed storage area, and a student room.

SHEEP SECTION

	<u>Page</u>
Creep Rations for Lambs -----	71
Creep Feeding Suckling Lambs on Pasture at Eden Shale Farm -----	74
Ewe Performance and Creep Feeding Trials -----	76
Protein-Mineral Blocks and Four Drenching Treatments for Western Ewe Lambs Wintering on Permanent Pasture -----	78
Value of Routine Administration of Furazolidone to Young Suckling Lambs -----	80
Alfalfa-Bromegrass Silage and Two Levels of Grain for Wintering Ewes -----	81
Kentucky Sheep Evaluation Trial, 1961-62 -----	83

SHEEP SECTION
CREEP RATIONS FOR LAMBS

J. M. Gay, P. G. Woolfolk and C. M. Reese
University of Kentucky

The second year of a lamb creep feeding project was completed in 1961. Five lots of 19 or 20 pregnant blackface-cross western ewes each were assigned to this trial as follows: Lot 1 - control, no creep; Lot 2 - simple creep mixture, 89% cracked yellow corn, 10% soybean meal and 1.0% Aureomycin Crumbles; Lot 3 - shelled corn used in the simple creep mixture; Lot 4 - pelleted corn used in the simple creep mixture; Lot 5 - complex creep mixture, 56.5% cracked yellow corn, 30% soybean meal, 5% sugar, 1.5% bonemeal, 1.0% phenothiazine salt, and 1.0% Aureomycin Crumbles.

Ewes in all lots were fed a ration of alfalfa hay, alfalfa silage and corn during the drylot period, from December 7 to March 28. The pasture phase of the trial was from March 28 to June 16. On May 19 the lambs remaining on trial were weaned and kept on their respective rations. The lots were rotated on pasture in an effort to remove variability due to forage. After the trial was terminated all unsold lambs were finally run together on pasture and fed the simple cracked corn creep mixture until they reached market weight.

Results are summarized in Tables 1 and 2. As shown in the first year's work, creep feeding definitely increased rate of gain. Creep fed lambs reached market from 24 to 29 days earlier than control lambs, including data from control lambs that had to be finished on feed at the end of the season. No marked differences in gains were noted among the rations. The pelleted corn ration was not consumed as well as the other rations but was the least costly per 100 pounds of gain. Cost of the complex ration was high and gains were no better than on the simpler mixtures. Work on this project is being continued this year. A complete pelleted ration is being used in the present trial.

Table 1. Summary of Lamb Weights

	Control No Creep	Simple Creep			Complex Creep
		Cracked Corn	Shelled Corn	Pelleted Corn	
Number of ewes	19	19	19	20	19
Number of ewes lambing	16	17	16	19	18
Number lambs raised	23	22	21	23	23
<u>Av birth weights, lb</u>					
Singles	9.9	10.3	9.8	9.8	9.5
Twins	9.3	8.4	8.1	8.4	8.5
<u>Av 28-day weights, lb</u>					
Singles	23.2	29.5	26.4	25.3	27.2
Twins	21.4	19.8	19.3	27.3	20.0
<u>Av 56-day weights, lb</u>					
Singles	37.8	51.8	43.9	41.5	45.1
Twins	35.3	35.9	33.8	39.1	34.7
<u>Av 100-day weights, lb</u>					
Singles	58.8	78.7	69.3	65.3	72.5
Twins	60.1	60.3	58.5	64.0	59.9
Av market weight, lb ¹	84.8	89.6	88.7	87.6	90.8
ADG, birth to market, lb	0.42	0.54	0.52	0.51	0.51
Av market age, days	179	150	155	154	155

¹Remaining data in table include those figures recorded after lambs were run together.

Table 2. Summary of Feed Intake, Feed Conversion and Gains to June 16

	Control No Creep	Simple Creep			Complex Creep
		Cracked Corn	Shelled Corn	Pelleted Corn	
Av daily creep-feed intake per lamb, lb	---	0.76	0.62	0.55	0.78
<u>Av daily gain, lb</u>					
Singles	0.45	0.58	0.54	0.52	0.56
Twins	0.46	0.50	0.48	0.51	0.55
Creep-feed per 100 lb gain, lb	---	144	128.2	106.4	141.3
Creep feed cost per 100 lb gain ¹	---	\$3.82	\$3.28	\$3.04	\$5.65

¹The cracked corn ration cost \$2.65/cwt; the shelled corn ration \$2.56; the pelleted corn ration \$2.86; the complex ration \$4.04.

CREEP FEEDING SUCKLING LAMBS ON PASTURE
AT EDEN SHALE FARM

P. G. Woolfolk, M. A. Slaughter and O. D. Hawkins
University of Kentucky

One hundred thirty-nine suckling spring lambs were allotted according to sire group and whether single or twin to either of two rations as follows: Lot 1 - control, no creep on pasture; Lot 2 - creep fed on pasture on a ration consisting of 78.5% cracked yellow corn, 20% soybean meal and 1.5% Aureomycin Crumbles. Prior to allotment all lambs had been running together and were creep fed the same ration in the test. Thus, the experimnt was designed to determine whether or not creep feeding should be continued on pasture. Lambs were allotted on May 3. On July 5 all the unsold lambs were weaned and continued on their respective rations. On September 25, 25 unsold lambs from the pasture and 5 from the fed group were turned together and they finished weight gaining on the test ration. Prior to this, while the two groups were separate they were rotated on pasture; management was the same.

Results are summarized in Table 1. Four lambs in the creep fed lot and one in the control lot died. This did not appear to be due to treatment, however. Creep fed lambs gained 36% faster and were marketed 35 days earlier on the average than control lambs. Based on 1961 market prices with only feed costs deducted, returns were higher for control lambs. This average does not take into consideration additional pasture and labor costs required by control lambs because of their longer finishing period. This cost was not determined, but probably would amount to more than the \$1.08 spread in returns between the two groups of lambs. Also, under last year's market conditions, the lambs that were sold in June brought less than those sold in early July. Normally, the greater number of creep fed lambs that were sold early would have sold for relatively higher prices than they did last year.

This experiment is being repeated this year. Lambs were allotted to the same treatments on April 18.

Table 1. Summary of Results, May 3, 1961 to Marketing

	Lot 1 Control, No Creep on Pasture	Lot 2 Creep Fed on Pasture
Number of lambs on test	68	71
Number of lambs marketed	67	67
Av number days on test	119	84
Av initial weight, lb	55.0	58.3
Av market weight, lb	88.5	90.0
Av gain per lamb	33.5	31.7
Av daily gain, lb	0.28	0.38
Av marketing date	Aug. 30	July 26
Av daily feed per lamb, lb ¹	0.31	1.25
Av total feed per lamb, lb ¹	36.7	105.1
Av market price per cwt	\$ 18.15	\$ 18.92
Av market value, per lamb	\$ 16.06	\$ 17.03
Av feed cost per lamb ²	\$ 0.95	\$ 3.00
Returns per lamb over feed	\$ 15.11	\$ 14.03

¹All feed after allotment up to market, including that used to finish control lambs remaining after September 25

²Cost of ration, \$2.85 per cwt

ewe performance and creep feeding trials

West Kentucky Substation

P. G. Woolfolk, J. R. Overfield and S. J. Lowry
University of Kentucky

Two groups of 16 and 13 Colorado blackface ewes each and a group of 31 blackface Montana ewes were used in trials at Princeton during 1960-61. Group 1 Colorado ewes had originally been wintered in 1956-57 as ewe lambs at a high level of nutrition (3.6 lb alfalfa hay) and Group 2 ewes at a low level (2.4 lb alfalfa hay). The Montana ewes were yearlings and two-year olds added to the flock in 1959 and 1960. All three groups of ewes were bred to purebred Hampshire rams.

Lambs were allotted according to type of dam and whether twin or single to either of two creep rations as follows: (1) 90% cracked corn, 10% soybean meal with 50 gm of aureomycin per ton of creep ration; (2) 67.5% cracked corn, 25% soybean meal, 5% alfalfa meal, 1.5% bonemeal, 0.8% salt, 0.2% trace minerals and 50 gm of aureomycin per ton of creep ration. On July 14, the 17 unsold lambs were weaned and put on feed in drylot. Alfalfa hay and creep ration (1) was used for these lambs.

Ewe data are summarized in Table 1. Lamb production in all groups was low due to a poor lambing percentage. The slightly lower values for the Montana group were probably due to the large number of yearlings rather than to the source of the ewes.

Results of the creep feeding trial are summarized in Table 2. No differences were evident between the two rations other than the more economical gains on the more complex ration. This ration was consumed in somewhat less total quantity and produced equal gains. These two rations are now being tested for the third year. Final results on both phases of this work will be available at the end of this year's work.

Table 1. - Comparison of Ewe Performance

	Blackface Colorado Ewes		Montana Ewes
	High Level	Low Level	
Number of ewes, fall 1960	16	13	31
Initial number ewe lambs, 1956	28	28	--
Average lambing date	Feb. 18	Mar. 3	Feb. 28
Lambs sold per ewe	0.88	0.85	0.77
Average 56-day lamb weights, lb			
Singles	47.6	44.3	44.8
Twins	32.7	41.1	37.1
Average age marketed, days	180	165	164
Average market weight, lb	90.4	90.4	89.8
Average Market price per cwt	\$17.97	\$18.00	\$17.55
Average market value per lamb	\$16.24	\$16.28	\$15.76
Average dressing percentage	54.3	54.0	51.9
Average carcass grade	High Choice	High Choice	Choice
Average ewe weights, July 1961, lb	153.2	156.6	151.4

Table 2. - Summary of Creep Feeding Results

	Creep No. 1	Creep No. 2
	Corn Soybean Meal	Corn, Soybean, Meal Alfalfa Meal, Minerals
Number of lambs marketed	22	27
Average 56-day lamb weights, lb		
Singles	42.8	48.5
Twins	37.4	36.1
Average age marketed, days	167	170
Average market weight, lb	90.4	89.8
Average market price per cwt	\$17.73	\$17.81
Average market value per lamb	\$16.03	\$15.99
Creep feed cost per lamb	\$ 2.56	\$ 2.10
Creep feed cost per 100 lb gain	\$ 3.80	\$ 3.04
Average dressing percentage	52.3	53.1
Average carcass grade	High Choice	High Choice

PROTEIN-MINERAL BLOCKS AND FOUR DRENCHING TREATMENTS
FOR WESTERN EWE LAMBS WINTERING ON PERMANENT PASTURE¹

C. G. Marsh and P. G. Woolfolk
University of Kentucky

A group of 574 Wyoming and 273 Montana ewe lambs was allotted to a wintering trial to determine the value of feeding protein-mineral blocks on pasture and to compare four drenching treatments. The lambs were run in two groups as follows: (1) controls, pasture and free access to plain white salt; (2) pasture plus free access to protein-mineral blocks which contained 37% protein and a complete mineral mixture. Within each of the above-mentioned groups the following drenching treatments were administered at the beginning of the experiment: (1) two phenothiazine drenches; (2) phenothiazine followed by a Cunic drench; (3) two Cunic drenches; (4) a Cunic drench followed by a phenothiazine drench. In each case, the second drench was administered three weeks following the first. The two groups of lambs were rotated on pasture, at intervals of approximately one month. During bad weather an equal amount of rough mixed hay was fed to each group on pasture. The wintering period was from October 28, 1961 to April 10, 1962.

Average daily consumption of the protein-mineral blocks was 0.12 lb. per ewe. Total consumption was 19.62 lb per ewe for the wintering period. Average total gain and average fleece weights are shown in Tables 1 and 2. Based on the averages of all groups the supplement resulted in only 1.87 lb of lamb and 0.15 lb of wool. Based on both gains and fleece weights, Montana lambs appeared to respond to the supplement slightly more than Wyoming lambs. No consistent difference due to drenching treatment was evident. In general, all of the differences were small and probably of no economic importance.

Following the wintering portion of this trial, all lambs were run together on spring pasture and will be weighed at the end of this pasture period. Final results will be available after this weighing.

¹ Acknowledgement is made to Producers Livestock Marketing Association, Louisville, and Swift and Co., Chicago, Ill. for support of this project.

Table 1. - Average Total Gain, Wintering Period, October 28 to April 10, lb

	Controls, Pasture Only		Pasture plus Supplement		Average
	Montana	Wyoming	Montana	Wyoming	
Phenothiazine- Phenothiazine	2.52	3.52	5.94	3.62	3.90
Phenothiazine- Cunic	2.97	3.04	6.18	4.55	4.18
Cunic-Cunic	2.80	2.51	5.21	3.55	3.52
Cunic-Phenothiazine	2.84	3.59	4.62	5.04	4.02
Average	2.78	3.16	5.49	4.19	

Table 2. - Average Fleece Weights, lb

	Controls, Pasture Only		Pasture plus Supplement		Average
	Montana	Wyoming	Montana	Wyoming	
Phenothiazine- Phenothiazine	6.96	6.27	7.36	6.22	6.70
Phenothiazine- Cunic	6.70	6.33	7.05	6.37	6.61
Cunic-Cunic	7.13	6.38	7.26	6.36	6.78
Cunic-Phenothiazine	6.91	6.27	6.98	6.55	6.68
Average	6.92	6.31	7.16	6.38	

VALUE OF ROUTINE ADMINISTRATION OF FURAZOLIDONE TO YOUNG SUCKLING LAMBS ^{1/}

P. G. Woolfolk, L. H. Boyd and E. G. Holbert
University of Kentucky

One hundred sixty-four lambs from the purebred flock at Lexington and the commercial flock at the Eden Shale Farm completed a trial in which the treatments were as follows: (1) untreated controls; (2) treated with a 2 cc dose of nf-180 suspension (Furazolidone) twice daily for three days, beginning at 3 days of age. Both groups of lambs in each flock ran together with their dams. Feeding and management was as optimum as possible on each farm. Birth, 28-day, and 56-day weights were recorded. Observations on incidence of scouring and general physical condition of the lambs were noted. Fifty-six day weights were not taken on a few late lambs that went to pasture on other treatments which might have biased results.

Results are summarized in Table 1. No difference in gain occurred between treated and untreated lambs at either of the weighing periods. It should be noted that no incidence of scouring was evident in any of the groups. Furazolidone has been reported to be of value in treating infectious enteritis in lambs under more adverse conditions than those under which this experiment was conducted.

Table 1. - Total Gain, Lbs

	Untreated		Treated nf-180 suspension	
	Number of Lambs	Gain	Number of Lambs	Gain
<u>Gain to 28 days</u>				
Crossbred singles	12	16.7	11	18.5
Crossbred twins	48	12.7	41	11.9
Southdown singles	9	12.6	8	11.4
Southdown twins	2	7.9	2	7.2
Hampshire singles	5	20.2	7	20.0
Hamshire twins	6	13.8	6	12.7
Hampshire twins raised single	4	15.1	3	16.2
<u>Gain to 56 days</u>				
Crossbred singles	9	35.4	7	37.1
Crossbred twins	34	26.3	33	25.7
Southdown singles	9	25.5	8	25.6
Southdown twins	2	17.9	2	15.7
Hampshire singles	5	40.5	7	39.7
Hamshire twins	6	33.6	6	31.0
Hampshire twins raised single	4	38.7	3	40.2

^{1/} Acknowledgement is made to Hess and Clark, Inc., Ashland, Ohio, for support of this project

ALFALFA-BROMEGRASS SILAGES AND TWO LEVELS OF GRAIN FOR WINTERING EWES

P. G. Woolfolk and C. M. Reese
University of Kentucky

Seventy-eight blackface-cross commercial ewes were fed in drylot from December 7 to March 18 in a comparison of alfalfa-bromegrass silage preserved with 250 lb of corn per ton and wilted alfalfa-bromegrass silage fed with two levels of grain. One group of ewes served as a control on a standard alfalfa hay-corn ration. Ewes in the silage lots were fed alfalfa hay at the rate of 1.00 lb per ewe daily and silage at maximum consumption. A high level of corn was fed to one group on the wilted silage in an effort to determine the value of extra energy in this type ration. All lots had free access to bonemeal, ground limestone, salt and water. All lambs were creep fed a mixture of 89.0% cracked yellow corn, 10% soybean meal and 1.0% Aureomycin Crumbles. After the wintering period, all lots were run together, first on small grain pasture and later on permanent pasture.

Results are summarized in Table 1. Ewes were quite heavy with lamb when put on trial and consequently all lots showed ewe weight losses. The corn preserved silage more nearly maintained ewe weights, this is in agreement with last year's trial. Adding additional grain to the ration of ewes on wilted silage was of no benefit, particularly when it is considered that this lot raised the smallest number of lambs. Fleece weights were lowest on the control ration in line with greater liveweight losses in this group. Lamb weights were quite comparable for the four groups. If one considers all data from this trial and previous results either method of silage preservation used in this trial appears to be satisfactory.

Table 1. - Summary of Results

	Control Alfalfa Hay	Corn Preserved Alfalfa-Brome Silage	Wilted Alfalfa-Brome Silage	
			Normal grain	High grain
Number of ewes	19	20	20	19
<u>Av ration, lb</u>				
Silage	--	8.78	9.36	9.29
Alfalfa	4.37	1.00	1.00	1.00
Corn	.78	.78	.78	1.18
<u>Av ewe weights, lb</u>				
Initial, Dec. 7	153.5	155.6	154.0	155.0
Final, Mar 18	131.7	151.5	136.4	145.2
Weight change	- 21.8	- 4.1	- 17.6	- 9.8
Fleece weights	6.9	7.9	7.4	7.4
Number ewes lambing	18	19	19	19
Number lambs raised	26	27	30	24
<u>Birth weight of lambs, lb</u>				
Singles	10.2	11.2	11.8	9.5
Twins	8.4	8.4	7.7	7.9
<u>28-day weight of lambs, lb</u>				
Singles	25.0	27.4	26.0	24.2
Twins	18.9	20.6	19.4	20.3
<u>56-day weight of lambs, lb</u>				
Singles	43.8	46.2	45.3	43.5
Twins	32.2	35.4	32.8	35.0
<u>100-day weight of lambs, lb</u>				
Singles	66.7	69.8	68.0	64.4
Twins	52.7	58.6	54.9	59.9

KENTUCKY SHEEP EVALUATION TRIAL, 1961-1962

P. G. Woolfolk and C. M. Reese
University of Kentucky

Seventy-three purebred lambs completed the first public sheep evaluation trial in 1961-1962. The test started on September 28, 1961. All wether lambs on test were fed until they reached slaughter weights ranging from 88 to 104 lb. Ram lambs were weighed January 8, 1962, taken off the test and returned to the owners. All groups were self-fed the same complete pelleted ration and had access to water at all times. Each group of lambs on the test represented the progeny of one sire.

Growth, feed conversion, and carcass data are given in the tables that follow. Average daily gain on the test of ram lambs ranged from 0.28 to 0.84 lb. Wether lambs ranged from a 0.21 to 0.62 lb average daily gain on test. Weight per day of age at the end of the test ranged from 0.28 to 0.61 lb for ram lambs and from 0.25 to 0.40 lb for wether lambs. Feed per lb gain ranged from 6.90 to 10.89 lb.

Wethers 2, 21, and 43 were the only lambs that met lamb carcass specifications adopted by the Reciprocal Meats Conference in 1961 as follows:

Carcass Wt, lb	Loin eye per 100-lb carcass, sq in.	Fat over eye, in.
40-45	4.50	0.35
46-50	4.40	0.35
51-55	4.30	0.40
56-60	4.20	0.40

In general, the other lambs were too fat and wasty. Several of the lambs failed to have loin eyes large enough to meet specifications.

Kentucky Sheep Evaluation Trial, 1961-62

Growth Data ¹

Lamb Number	Days on Test	Initial Weight lb	Final Weight lb	Average Daily Gain lb	Feed per lb Gain for group lb	Age at End of test days	Weight per Day of Age lb
<u>Pen 1 - University of Kentucky, Southdowns</u>							
Ram 33	102	67	115	0.47	7.15	314	0.37
<u>Pen 2 - Hill Crest Farms, Henry Quisenberry, Southdowns</u>							
Wether 1	34	75	96	0.62		---	----
Wether 2	34	86	104	0.53		---	----
Ram 3	102	89	130	0.40		---	----
Ram 4	102	88	121	0.32	7.96	---	----
<u>Pen 3 - A. H. Stephenson, Southdowns</u>							
Wether 427	82	68	94	0.32		311	0.30
Wether 443	151	59	91	0.21		370	0.25
Ram 504	102	58	88	0.29		290	0.30
Ram 490	102	61	90	0.28	10.64	299	0.30
<u>Pen 4 - A. H. Stephenson, Southdowns</u>							
Wether 448	53	73	99	0.49		271	0.37
Wether 438	68	70	93	0.34		288	0.32
Ram 437	102	77	110	0.32		322	0.34
Ram 447	102	75	121	0.45	9.91	320	0.38
<u>Pen 5 - Roy C. Gray, Hampshires</u>							
Ram 14	102	122	179	0.56		---	----
Ram 21	102	100	149	0.48	9.58	---	----
<u>Pen 6 - Roy C. Gray, Hampshires</u>							
Ewe 23	102	92	127	0.34		---	----
Ewe 27	102	68	123	0.54	8.13	---	----

¹ Blank spaces indicate data not available.

Lamb Number	Days on Test	Initial Weight lb	Final Weight lb	Average Daily Gain lb	Feed per lb Gain for Group days	Age at End of Test lb	Weight per Day of Age lb
<u>Pen 7 - Roy Hardesty, Southdowns</u>							
Ram 591	102	95	132	0.36		330	0.40
Ram 595	102	80	109	0.28		328	0.33
Ram 531	102	99	138	0.38		338	0.41
Ram 552	102	87	122	0.34	10.34	334	0.37
<u>Pen 8 - Robert Hall, Suffolks</u>							
Ram 6	102	154	199	0.44		326	0.61
Ram 9	102	137	183	0.45		321	0.57
Ram 19	102	130	182	0.51		316	0.58
Ram 32	102	124	186	0.61	10.59	313	0.59
<u>Pen 9 - University of Kentucky, Hampshire</u>							
Wether 21	34	77	98	0.62		255	0.38
Wether 43	53	70	103	0.62		257	0.40
Ram 34	102	109	172	0.62		319	0.54
Ram 6	102	106	177	0.70	8.43	332	0.53
<u>Pen 10 - University of Kentucky, Hampshires</u>							
Ram 45	102	98	178	0.78		304	0.59
Ram 39	102	118	187	0.68		318	0.59
Ram 44	102	99	184	0.83	7.46	306	0.60
<u>Pen 11 - University of Kentucky, Hampshire</u>							
Ram 22	102	69	139	0.69		322	0.43
Ram 35	102	76	162	0.84		319	0.51
Ram 47	102	70	130	0.59		302	0.43
Ram 4	102	79	157	0.76	6.90	332	0.47
<u>Pen 12 - University of Kentucky, Southdowns</u>							
Wether 25	68	68	93	0.37		284	0.33
Wether 57	173	44	88	0.25		355	0.25
Ram 13	102	78	114	0.35	10.89	321	0.36

Lamb Number	Days on Test	Initial Weight lb	Final Weight lb	Average Daily Gain lb	Feed per lb Gain for Group lb	Age at End of Test days	Weight per/Day of Age lb
<u>Pen 13 - University of Kentucky, Southdowns</u>							
Ram 3	102	82	115	0.32		327	0.35
Ram 37	102	67	99	0.31	10.00	313	0.32
<u>Pen 14 - University of Kentucky (Mercer Co. Flock), Southdowns</u>							
Ram 1	102	78	110	0.31		349	0.32
Ram 6	102	74	109	0.34		337	0.32
Ram 12	102	73	108	0.34		329	0.33
Ram 24	102	73	106	0.32	10.88	315	0.34
<u>Pen 15 - University of Kentucky (Mercer Co. Flock), Southdowns</u>							
Ram 25	102	68	120	0.51		315	0.38
Ram 8	102	64	107	0.42		332	0.32
Ram 39	102	63	105	0.41	8.82	311	0.34
<u>Pen 16 - University of Kentucky (Mercer Co. Flock), Southdowns</u>							
Ram 61	102	57	106	0.48		302	0.35
Ram 41	44	87	87	0.42	7.77	311	0.28
<u>Pen 17 - University of Kentucky (Mercer Co. Flock), Southdowns</u>							
Ram 46	102	76	129	0.52		309	0.42
Ram 89	102	67	105	0.37		268	0.39
Ram 56	102	69	107	0.37		304	0.35
Ram 72	102	60	105	0.44	9.99	293	0.36
<u>Pen 18 - University of Kentucky (Mercer Co. Flock), Southdowns</u>							
Ram 69	102	47	90	0.42		296	0.30
Ram 82	102	43	89	0.45	8.14	280	0.32
<u>Pen 19 - University of Kentucky (Mercer Co. Flock), Southdowns</u>							
Ram 10	102	75	124	0.48		330	0.38
Ram 67	102	78	121	0.42		298	0.41
Ram 31	102	71	117	0.45		314	0.37
Ram 11	102	67	110	0.42	8.79	330	0.33

Lamb Number	Days on Test	Initial Weight lb	Final Weight lb	Average Daily Gain lb	Feed per lb Gain for Group lb	Age at End of Test days	Weight per/Day of Age lb
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Pen 20 - University of Kentucky (Mercer Co. Flock), Southdowns

Ram 23	102	66	111	0.44		315	0.35
Ram 28	102	68	116	0.47		315	0.37
Ram 16	102	49	99	0.49	7.96	327	0.30

Pen 21 - Henry Besuden, Southdowns

Wether 556	173	29	94	0.38		320	0.29
Ram 488	100	72	114	0.42		322	0.35
Ram 495	100	86	120	0.34		322	0.37
Ram 477	100	93	142	0.49	8.91	322	0.44

Pen 22 - Ben Shearer, Southdowns

Ram 285	97	77	117	0.41		289	0.40
Ram 223	97	74	107	0.34		332	0.32
Ram 293	97	67	114	0.48		313	0.36
Ram 254	97	79	119	0.41	9.56	325	0.37

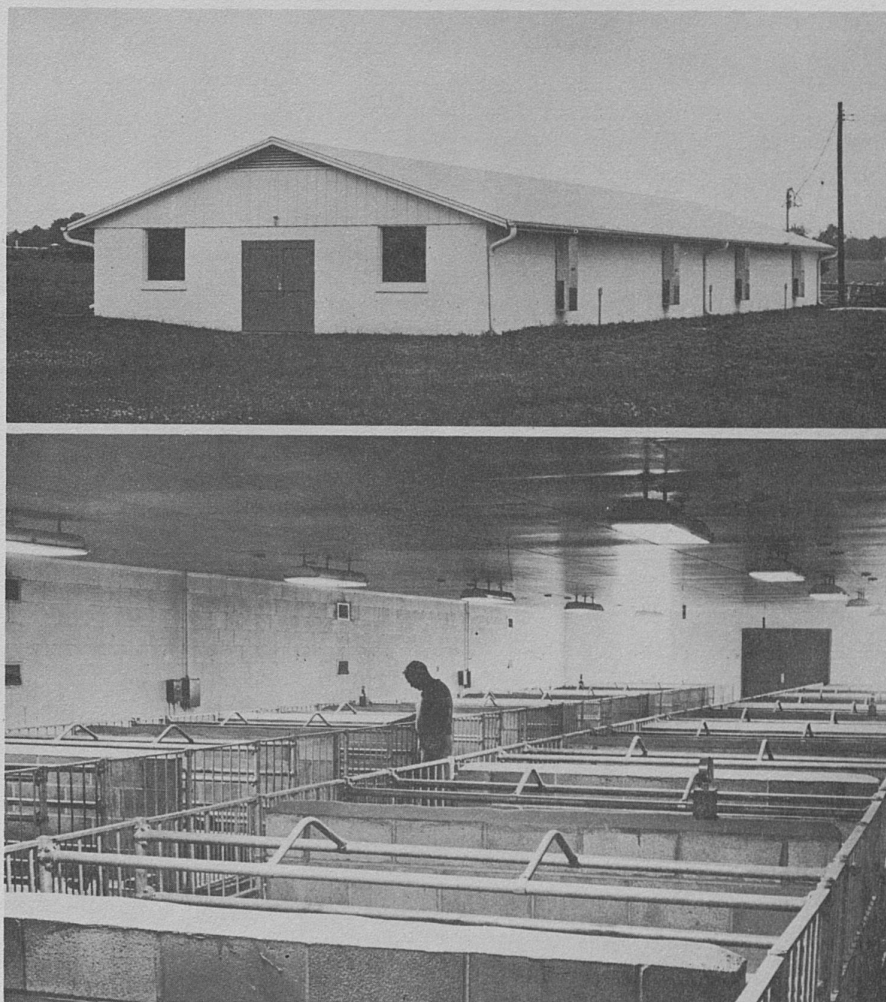
Pen 23 - Hicks Bros. and Yearly, Dorsets

Ram 223	96	77	126	0.51		304	0.41
Ram 233	96	77	112	0.36	8.64	304	0.37

Carcass Data

Lamb Number	Cold Carcass Weight lb	Dressing Percentage	Carcass Weight per Day of Age lb	Conformation	Area of Loin Eye sq in	Area of Eye per 100 lb Carcass sq in	Fat Over Eye in	Yield of Leg, Loin and Rack %	Kidney and Pelvic Fat %
<u>Pen 2 - Hill Crest Farms, Henry Quisenberry, Southdowns</u>									
Wether 1	50.5	54.3	--	Top prime	2.49	4.93	0.39	49.03	2.71
Wether 2	55.5	54.4	--	Top prime	2.45	4.41	0.36	47.37	4.50
<u>Pen 3 - A. H. Stephenson, Southdowns</u>									
Wether 427	51.1	55.5	.164	Top prime	2.28	4.47	0.59	49.28	5.60
Wether 443	48.9	54.3	.132	Top prime	2.00	4.09	0.56	49.35	4.60
<u>Pen 4 - A. H. Stephenson, Southdowns</u>									
Wether 448	56.0	56.6	.207	Top prime	1.90	3.39	0.60	46.12	5.61
Wether 438	51.6	56.1	.179	Top prime	2.64	5.11	0.45	47.57	5.38
<u>Pen 9 - University of Kentucky, Hampshires</u>									
Wether 21	49.5	53.8	.194	Low Prime	2.33	4.71	0.18	49.21	2.26
Wether 43	54.0	52.4	.210	High choice	2.81	5.20	0.20	46.64	3.28
<u>Pen 12 - University of Kentucky, Southdowns</u>									
Wether 25	49.1	53.4	.173	Top prime	2.02	4.11	0.41	49.64	5.33
Wether 57	52.6	59.8	.148	Top prime	2.27	4.31	0.95	48.16	4.96
<u>Pen 21 - Henry Besuden, Southdowns</u>									
Wether 556	51.5	54.2	.161	Top prime	1.94	3.77	0.70	47.59	3.09

SWINE SECTION



NEW SWINE FARROWING FACILITIES, COLDSTREAM FARM

These facilities are used in the swine research program at the University. The farrowing house (top) is of concrete block construction, and constant temperature and humidity are maintained. The inside view (bottom) shows the concrete and steel farrowing pens which will handle a total of 24 sows at a time.

SWINE SECTION

	<u>Page</u>
Effects of Nitrofurantoin on Gestating Brood Sows -----	91
A Comparison of Alfalfa and Corn Silage for Bred Sows -----	93
Effects of Injectable Antibiotics Upon Bred Gilts -----	96
Feed Additives for Early Weaned Pigs -----	97
Feed Additives for Growing Pigs on Wire -----	98
Feed Additives for Growing Pigs on Concrete -----	99
Further Studies with Nitrofurans and Other Swine Feed Additives -----	101
A Comparison of a Nitrofurantoin and Aureomycin for Growing Pigs -----	103
Acknowledgments -----	104

SWINE SECTION

EFFECTS OF A NITROFURAN ON GESTATING BROOD SOWS

C. E. Barnhart, C. H. Chaney and T. W. Cathey
University of Kentucky

Experiment I

Ten mature Hampshire brood sows of proved performance were randomly assigned to 2 ration treatments at breeding and were maintained on these treatments through gestation and the first 3 weeks of lactation. The treatments were: (1) basal gestation and lactation ration; (2) basal ration plus 136 gm of HCO441/ton (HCO441 is a nitro-furan).

All sows were maintained in a dirt drylot. Adequate housing and shade was provided. Automatic waterers were provided both groups of sows. All sows were hand-fed 6 pounds of the gestation ration daily. Sows were fed ad libitum after farrowing. Good accepted farrowing and suckling management was practiced.

Results of experiment I are found in Table 1.

Although there were no differences in the average number of pigs farrowed, the sows fed HCO441 had more and heavier pigs at 3 weeks. Probably not enough sows were tested in this experiment to draw any safe conclusions. However, it was evident that feeding HCO441 at this level resulted in no toxic or harmful effects.

Experiment II

Forty-two mature and proved Hampshire sows were randomly assigned to four ration treatments 4 weeks before breeding. Sows were fed and managed in the same manner as described for Experiment I. The treatments were: (1) basal ration for entire period; (2) basal plus 136 gm/ton HCO441 for 4 weeks before breeding; (3) basal plus 136 gm/ton HCO441 for 4 weeks before farrowing; (4) basal plus 136 gm/ton HCO441 from 4 weeks before breeding and continuously to farrowing. All sows were fed the basal lactation ration throughout lactation. Results are presented in Table 2.

There was a poor liveability of pigs among all groups, which may be explained by poor quality alfalfa meal or inadequate B vitamin supplementation for sows confined to drylot. Nevertheless, the feeding of HCO441 seemed to improve litter size at birth and at 56 days. The most desirable period for feeding seemed to be for the 4 weeks period prior to farrowing. These data seemed to be in agreement with the results of Experiment 1.

Table 1. - Results of Experiment 1

Basal Ration					
Sow	No. Pigs Farr	No. Pigs Farr Alive	Av Birth Wt, lb	No. Pigs 3 Weeks	Av Weight 3 Weeks lb
314	8	7	3.3	6	12.1
182	8	8	3.3	7	9.5
302	9	9	3.2	9	10.0
190	14	10	3.0	7	11.8
102	12	12	3.1	11	10.1
Average	10.2	9.2	3.2	8.0	10.7

Basal Ration + 136 gm HCO441

382	12	12	2.9	10	9.7
100	10	10	3.4	10	9.9
1170	11	8	3.3	8	12.5
380	11	11	2.9	9	10.3
361	5	5	3.7	5	14.9
Average	9.8	9.2	3.2	8.4	11.5

Table 2. - Results of Experiment II

Ration Treatment	No. Sows Bred	No. Sows Farrowed	Av No. Services per Sow	Av No. Pigs Farrowed	Av No. Live Pigs Farrowed	Av Birth Wt Pigs lb	Av No. Pigs 56 Days	Av Wt Pigs 56 Days, lb
Basal	11	8	1.45	9.38	7.38	3.00	4.88	25.49
Basal + 136 gm HCO441 for 4 wks before breeding	11	5	1.64	8.00	7.40	3.22	5.00	29.44
Basal + 136 gm HCO441 for 4 wks before farrowing	10	9	1.30	10.11	9.11	3.09	6.11	28.22
Basal + 136 gm HCO441 for entire period	10	9	1.90	11.1	8.8	2.70	5.9	28.78

A COMPARISON OF ALFALFA AND CORN SILAGE
FOR BRED SOWS

R. K. Broadbent, C. E. Barnhart, C. W. Nichols, C. H. Chaney
and T. Carlin
University of Kentucky

Thirty-two purebred Hampshire sows of similar breeding were randomly allotted to four different rations (4 lots) of eight sows each. The sows were placed in adjoining concrete floored covered pens during the gestation period. The rations were as follows:

Lot 1 - 6 lb of concentrate ration was fed per sow daily throughout the entire gestation period.

Lot 2 - 3 lb of concentrate ration was fed per sow daily plus all the corn silage the sows would consume. After the first weight period (2 weeks), the concentrate was increased from 3 lb per sow daily to 4 lb per sow daily plus all the corn silage the sows would consume. This was necessary because the sows had lost weight during the first two weeks.

Lot 3 - 3 lb of concentrate ration was fed per sow daily plus all the alfalfa silage the sows would consume. At the end of the second weight period (4 weeks), because of inadequate gains, the concentrate was increased from 3 to 5 lbs per sow daily, plus all the alfalfa silage the sow would consume.

Lot 4 - 4 lb of gestation ration was fed per sow daily plus all the alfalfa silage the sows would consume. At the end of the second weight period (4 weeks), because of inadequate gains, the concentrate was increased from 4 to 5 lb per sow daily plus all the alfalfa silage the sows would consume.

After variance of silage feeding the first week of the experiment, all pens of sows were consuming about 12.5 lb of silage per sow daily or about 100 lb of silage per pen daily. When this amount of silage was increased, the sows wasted part of the silage. It was observed that the sows sorted out the corn silage and did not eat the coarser parts of this silage.

All the sows in the experiment had been hand bred previous to the start of the experiment. Six sows were removed from the experiment because they were not bred. Of these six sows, two were from lot 1, three from lot 2, and one from lot 3.

All sows were hand-fed the rations twice daily in long wooden troughs. Automatic waterers were used to water all lots of sows.

Results of this trial are presented in Tables 1 and 2.

There was no overall significant difference found between the lots of pigs because there was so much difference within the lots. However, some significant differences were found between sows within the lots.

A significant statistical difference ($P < 0.05$) was observed between the total number of pigs farrowed in Lots 1 and 3. In computing birth weights, Lot 3 pigs were significantly heavier ($P < 0.01$) than those in Lot 1 when each sow was compared separately with Lot 1. The three week weights showed that sows within lots differed significantly ($P < 0.01$), but no significant difference was found between lots.

Although not significant, the following facts were observed. Sows in Lots 2 and 4 farrowed more pigs per litter than Lot 1; however, the individual pig weights in Lot 1 were heavier at birth (2.98 - 2.73). At three weeks of age the pigs from Lots 3 and 4 were heavier by individual weights and also by litter weights as compared to Lots 1 and 2. Sows from Lots 3 and 4 also had more live pigs at three weeks of age than Lots 1 and 2.

Table 1. - Summary of Litter Averages At Birth

Lot	Total Pigs Farrowed	Live Pigs Farrowed	Dead Pigs Farrowed	Litter Weight	Average Weight per Pig
1	9.83	8.71	1.12	27.95	2.98
2	11.00	9.80	1.20	31.70	2.90
3	12.86	10.28	2.57	34.85	2.73
4	10.75	9.12	1.63	29.45	2.78

Table 2. - Summary of Litter Averages At 3 Weeks of Age

Lot	Number of Live Pigs	Litter Weight	Average Weight per Pig
1	6.50	67.01	10.85
2	6.23	69.87	10.85
3	8.28	90.37	10.91
4	8.12	86.85	10.90

EFFECTS OF INJECTABLE ANTIBIOTICS UPON BRED GILTS

C. E. Barnhart, C. H. Chaney, C. W. Nichols and
T. Carlin

University of Kentucky

Thirty gilts were randomly assigned to two treatment groups at breeding. One group served as untreated controls. A second group was injected with 5 cc of antibiotic (penicillin streptomycin) and 5 cc of terramycin injectable solution on the first day of breeding and again one and two days later. All gilts were given two services. All gilts were run together on good alfalfa pasture and were hand-fed recommended levels of a complete gestation ration. Water was provided with an automatic waterer.

Results of this trial are presented in Table 1.

Table 1. - Results of Experiment

	Controls	Antibiotic Injection
No. sows	14	16
Av pigs farr	8.14	8.31
Av dead pigs farr	0.64	1.62
Av farr wt per pig, lb	2.70	2.49
Av pig weaned	6.78	5.38
% live pigs weaned, 8 wks	90.48	80.37

On the basis of this trial the injection of antibiotics at breeding did not improve reproductive efficiency, but instead seemed to result in poorer liveability of pigs.

FEED ADDITIVES FOR EARLY WEANED PIGS

D. R. Ramage, C. E. Barnhart, C. H. Chaney
and T. W. Cathey
University of Kentucky

Sixty-four three-week-old pigs were randomly allotted to 8 ration treatments. The pigs were housed in 8' x 8' pens in a totally enclosed nursery building. Pens and equipment had been thoroughly steam cleaned and disinfected prior to starting the experiment. The pigs averaged 12.5 lb at the start of the trial and were fed to a final lot average of 40 lb. All pigs were self-fed the rations and had access to water at all times.

The ration treatments were: (1) basal; (2) basal plus 25 gm HC067/ton; (3) basal plus 50 gm HC067/ton; (4) basal plus 100 gm HC067/ton; (5) basal plus 50 gm aureomycin/ton; (6) basal plus 50 gm HC067 plus 20 gm aureomycin/ton; (7) basal plus 50 gm virginiamycin/ton; and (8) basal plus 50 gm HC067 plus 50 gm virginiamycin/ton. Results of this early weaning experiment are presented in Table 1.

Table 1. - Summary of Experiment

Ration Treatment	Av initial wt, lb	Av final wt, lb	Av daily gain, lb	Av daily feed consumed lb	Av feed per 100 lb gain lb
Basal	13.43	40.00	0.64	1.25	197.00
Basal + 25 gm HC067	12.60	42.13	0.56	1.14	205.40
Basal + 50 gm HC067	12.50	40.25	0.53	1.19	223.00
Basal + 100 gm HC067	12.50	40.00	0.51	1.05	211.30
Basal + 50 gm aureomycin	12.83	41.17	0.55	1.35	245.60
Basal + 50 gm HC067 + 20 gm aureomycin	12.63	40.13	0.57	1.25	217.30
Basal + 50 gm virginiamycin	12.50	40.13	0.61	1.35	219.90
Basal + 50 gm HC 067 + 50 gm virginiamycin	12.75	41.50	0.62	1.44	231.80

All pigs responded well. None of the additives gave any response in growth rate or improvement in feed efficiency. No scouring was observed among any of the pigs.

EFFECTS OF INJECTABLE ANTIBIOTICS UPON BRED GILTS

C. E. Barnhart, C. H. Chaney, C. W. Nichols and

T. Carlin

University of Kentucky

Thirty gilts were randomly assigned to two treatment groups at breeding. One group served as untreated controls. A second group was injected with 5 cc of antibiotic (penicillin streptomycin) and 5 cc of terramycin injectable solution on the first day of breeding and again one and two days later. All gilts were given two services. All gilts were run together on good alfalfa pasture and were hand-fed recommended levels of a complete gestation ration. Water was provided with an automatic waterer.

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% live pigs weaned, 8 wks	90.48	80.37

On the basis of this trial the injection of antibiotics at breeding did not improve reproductive efficiency, but instead seemed to result in poorer liveability of pigs.

FEED ADDITIVES FOR EARLY WEANED PIGS

D. R. Ramage, C. E. Barnhart, C. H. Chaney
and T. W. Cathey
University of Kentucky

Sixty-four three-week-old pigs were randomly allotted to 8 ration treatments. The pigs were housed in 8' x 8' pens in a totally enclosed nursery building. Pens and equipment had been thoroughly steam cleaned and disinfected prior to starting the experiment. The pigs averaged 12.5 lb at the start of the trial and were fed to a final lot average of 40 lb. All pigs were self-fed the rations and had access to water at all times.

The ration treatments were: (1) basal; (2) basal plus 25 gm HC067/ton; (3) basal plus 50 gm HC067/ton; (4) basal plus 100 gm HC067/ton; (5) basal plus 50 gm aureomycin/ton; (6) basal plus 50 gm HC067 plus 20 gm aureomycin/ton; (7) basal plus 50 gm virginiamycin/ton; and (8) basal plus 50 gm HC067 plus 50 gm virginiamycin/ton. Results of this early weaning experiment are presented in Table 1.

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Basal + 50 gm HC067	12.50	40.25	0.53	1.19	223.00
Basal + 100 gm HC067	12.50	40.00	0.51	1.05	211.30
Basal + 50 gm aureomycin	12.83	41.17	0.55	1.35	245.60
Basal + 50 gm HC067 + 20 gm aureomycin	12.63	40.13	0.57	1.25	217.30
Basal + 50 gm virginiamycin	12.50	40.13	0.61	1.35	219.90
Basal + 50 gm HC 067 + 50 gm virginiamycin	12.75	41.50	0.62	1.44	231.80

All pigs responded well. None of the additives gave any response in growth rate or improvement in feed efficiency. No scouring was observed among any of the pigs.

FEED ADDITIVES FOR GROWING PIGS

H. W. Miller, C. E. Barnhart
and C. H. Chaney
University of Kentucky

Thirty-six purebred Hampshire weanling pigs, weighing an average of 23 lb, were randomly allotted to 6 ration treatments. Each pig was provided a wire-floored crate that was equipped with a self-feeder and an automatic waterer. These animals were housed in an insulated metal building which provided adequate protection from the weather. The building and all crates, feeders, and waterers were thoroughly cleaned and steamed before using. The crates, waterers, and the floor were cleaned daily by washing them down with a hose.

The ration treatments were: (1) basal including 20 gm per ton of terramycin; (2) basal + 5 gm of indole acetic acid per ton; (3) basal plus 10 gm indole acetic acid per ton; (4) basal plus 20 gm indole acetic acid per ton; (5) basal including 5% dried corn distillers solubles; and (6) basal including 3% condensed fish solubles.

Results of this experiment are presented in Table 1.

Table 1. - Results of Experiment

Treatment	Av Initial Wt, lb	Av Final Wt, lb	Av Daily Gain, lb	Feed per 100 lb Gain, lb	Av Daily Feed Consumed, lb
Basal	23.3	95.3	1.14	266	3.04
Basal + 5 gm indole acetic acid	23.2	97.6	1.20	259	3.11
Basal + 10 gm indole acetic acid	23.2	95.8	1.21	258	3.14
Basal + 20 gm indole acetic acid	23.5	96.6	1.16	249	2.90
Basal + 5% dried corn distillers solubles	23.0	96.3	1.23	257	3.17
Basal + 3% condensed fish solubles	23.0	96.3	1.19	266	3.18

All of the treatments equalled or improved both the growth rate and feed efficiency over the controls. Increasing the levels of indole acetic acid used did not cause an accompanying increase in rate of gain; however, the pigs fed the high level of indole-acetic acid were the most efficient feed converters. The addition of 5% dried corn distillers solubles promoted the fastest rate of gain.

FEED ADDITIVES FOR GROWING PIGS

H. W. Miller, C. E. Barnhart, C. H. Chaney
C. W. Nichols and T. Carlin
University of Kentucky

Eighty purebred Hampshire weanling pigs, weighing an average of 29 lb, were randomly allotted to 10 ration treatments with 2 replicate lots of 4 pigs for each ration treatment. All pigs were confined on concrete.

The ration treatments and additives used per ton of feed were as follows: (1) basal; (2) basal plus 20 gm aureomycin per ton; (3) basal plus 20 gm aureomycin plus 1000 gm sodium acrolate per ton; (4) basal plus 20 gm prostrep per ton; (5) basal plus 20 gm zinc bacitracin per ton; (6) basal plus 20 gm tylosin per ton; (7) basal plus 20 gm virginiamycin per ton; (8) basal plus 20 gm terramycin per ton; (9) basal plus 20 gm terramycin plus 5 gm oleandomycin per ton; and (10) basal plus two lb copper sulfate per ton.

All pigs were weighed bi-weekly and feed consumption weights were made each weigh day. This trial was terminated when the pigs in each lot reached an average weight of 125 pounds. This trial is summarized in Table 1.

The addition of sodium acrolate to aureomycin improved the rate of gain and feed efficiency slightly over straight aureomycin. The addition of cleandomycin to terramycin improved the daily gain and feed efficiency 8.1 and 8.9%, respectively, over the standard terramycin treatment. All ration treatments were effective in improving the rate of gain over the basal ration and statistical analysis showed a significantly faster rate of gain for pigs fed pre-strep, zinc bacitracin, terramycin plus oleandomycin and copper sulfate, when each ration treatment was compared individually with the basal ration.

Table 1. - Results of Experiment

Treatment	Av Initial Wt, lb	Av Final Wt, lb	Av Daily Gain, lb	Feed per 100 lb Gain, lb	Av Daily Feed Consumed, lb
Basal	28.8	124.6	1.26	308	3.89
Basal + 20 gm aureo- mycin	29.2	125.2	1.41	306	4.32
Basal + 20 gm aureo- mycin + 1000 gm sod- ium acetate	29.2	125.4	1.42	296	4.20
Basal + 20 gm pro-strep	29.6	126.8	1.50**	293	4.41
Basal + 20 gm zinc bacitra- cin	29.5	121.0	1.49*	292	4.35
Basal + 20 gm tylosin	29.0	125.8	1.44	292	4.23
Basal + 20 gm virginia- mycin	28.8	126.2	1.42	292	4.15
Basal + 20 gm terramycin	29.1	126.0	1.34	314	4.23
Basal + 20 gm terramycin + 5 gm olean- domycin	28.8	124.8	1.45*	286	4.16
Basal + 2 lb cop- persulfate	29.1	126.2	1.47*	296	4.36

* Significant at the 5% level from the basal lot

** Significant at the 1% level from the basal lot

FURTHER STUDIES WITH NITROFURANS
AND OTHER SWINE FEED ADDITIVES

D. R. Ramage, C. E. Barnhart, C. H. Chaney
and T. W. Cathey
University of Kentucky

One hundred Hampshire weanling pigs, averaging 34 lb, were randomly allotted by sex and weight to 2 replicate lots of 5 pigs each to 10 ration treatments. The pigs were confined to concrete. The pigs were fed to a lot average of 125 lbs.

The ration treatments fed were: (1) basal; (2) basal plus 20 gm aureomycin/ton; (3) basal plus 90 gm arsanilic acid/ton; (4) basal plus 20 gm virginiamycin/ton; (5) basal plus 20 gm HC067/ton; (6) basal plus 20 gm aureomycin plus 20 gm HC067/ton; (7) basal plus 20 gm arsanilic acid plus 20 gm HC067/ton; (8) basal plus 20 gm virginiamycin plus 20 gm HC067/ton; (9) basal plus 20 gm furazolidone/ton; and (10) basal plus 20 gm furazolidone plus 20 gm HC067/ton. Results of this experiment are presented in Table 1.

All of the treatment groups made faster gains than the control group, except the arsanilic acid group. Likewise, all of the treatment groups except the aureomycin and HC067 combination made their gains more efficiently than the control group. The virginiamycin group made the fastest and most efficient gains; very little difference was noted among the other treatment groups.

Table 1. - Results of Experiment

Ration Treatment	Av Initial Wt, lb	Av Final Wt, lb	Av Daily Gain, lb	Av Daily Feed Consumed lb	Av Feed per 100 lb Gain, lb
Basal	34.10	125.80	1.31	4.53	347.40
Basal + 20 gm aureomycin	33.90	126.50	1.38	4.52	328.40
Basal + 90 gm arsanilic acid	34.10	124.70	1.29	4.22	326.90
Basal + 20 gm virginiamycin	33.90	131.60	1.53	4.71	309.20
Basal + 20 gm HC067	34.50	124.60	1.35	4.55	336.00
Basal + 20 gm aureomycin + 20 gm HC-067	34.20	125.60	1.35	4.69	348.00
Basal + 20 gm arsanilic acid + 20 gm HC067	34.00	128.10	1.40	4.56	327.30
Basal + 20 gm virginiamycin + 20 gm HC067	33.80	126.00	1.44	4.62	321.10
Basal + 20 gm furazolidone	33.50	125.80	1.38	4.35	325.00
Basal + 20 gm furazolidone + 20 gm HC067	38.90	128.00	1.40	4.80	342.00

A COMPARISON OF A NITROFURAN AND AUREOMYCIN FOR GROWING PIGS

D. R. Ramage, C. E. Barnhart, C. H. Chaney
and T. W. Cathey
University of Kentucky

Fifty Hampshire weanling pigs, averaging 34 lb, were randomly allotted by sex and weight to 2 replicate lots of 5 pigs each to 5 ration treatments. The pigs were self-fed the following rations: (1) basal; (2) basal plus 20 gm aureomycin/ton; (3) basal plus 20 gm HC067/ton; (4) basal plus 40 gm HC067/ton; and (5) basal plus 80 gm HC067/ton. HC067 is a nitrofurantoin.

A 4' x 8' section of housing area connected to an outside area (4' x 12') was provided each lot of 5 pigs. The entire floor area was concrete. Each lot was equipped with a self-feeder and an automatic waterer. All buildings and equipment were thoroughly steam cleaned before the animals were placed on experiment. Each pen was cleaned twice weekly.

These pigs were fed to an average final weight of 125 lb. Results of this experiment are given in Table 1.

Table 1. - Summary of Experiment

Ration Treatments	Av Initial Wt, lb	Av Final Wt, lb	Av Daily Gain, lb	Av Daily Feed Consumed lb	Av Feed per 100 lb Gain, lb
Basal	34.50	124.50	1.24	4.16	336.20
Basal + 20 gm aureomycin	34.40	128.40	1.31	4.25	323.40
Basal + 20 gm HC067	34.60	126.40	1.24	4.17	339.30
Basal + 40 gm HC067	34.80	127.80	1.27	4.01	317.00
Basal + 80 gm HC067	34.40	125.70	1.26	4.03	319.60

Fifty Hampshire pigs were fed 5 ration treatments, basal, basal plus 20 gm aureomycin per ton and basal plus 20, 40 and 80 gm HC067 per ton. Pigs were fed from an average initial weight of 34 lb to an average final weight of 125 lb. The average daily gain and feed conversion was essentially the same for all treatment groups. The 40 and 80 gm per ton levels of HC067 produced the most efficient gains.

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