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Kelley History Copy 1 of 2

AGRICULTURAL ENGINEERING IN KENTUCKY, 1919-1957
by Professor James B. Kelley

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(Professor Kelley died December 23, 1960 leaving this unfinished. Assembled by Earl R. Young, July, 1964)

Chapter I

History of The Development of The Agricultural Engineering University of Kentucky, 1908-1919



The Agricultural Hall - The Kentucky State Legislature in 1907 session appropriated $35,000 for this building and also passed a law to establish the College of Agriculture at the University of Kentucky.

A Brief History of the University of Kentucky Extension Work
Years 1910 - 1919 *

First extension department was organized in Kentucky in 1910 and T. R. Bryant, Assistant Professor was put in charge. At the same time the Extension Committee of the Board of Trustees recommended that a new department be created to be known as the Extension Department.

The following year, Miss Arlyn Chinn, who had been placed in charge of the Department of Home Economics began to give assistance in holding movable schools on butter making, poultry raising and gardening.

The first farmers' short course was held in the University Gym in 1911. In 1912, the General Assembly made the first permanent appropriation for the Experiment Station.

In March 1912, the first train of 9 cars making 4 stops daily was operated in Kentucky. It was operated 29 days. Helpers on train were Mrs. Joseph E. Wing of Ohio and Mr. E. C. Martindale and Miss Neale S. Knowles of Iowa State College. Mr. H. B. Hendrick, poultry; J. H. Carmody for horticulture reported as extension workers on September 1, 1912.

First County Agents See T R Bryant p 8

Frank Montgomery - Madison and Rockcastle, September 1, 1912
Charles A. Mahan - Henderson, October 1, 1912
Nat T. Frame - Jefferson, February 1913
Dr. Scovell died August 15, 1912
Dr. Joseph K. Kastle appointed research chemist in 1910 and Director of Experiment Station in October 1913. Mrs Helen Wolcott appointed State Agent.

August 1916, Dr. Kastle was relieved of his duties as Director of Experiment Station, and died September 24, 1916.

January 10, 1917, Professor Goerge Roberts was made Acting Head of College and Experiment Station, presented a memorial signed by members of the staff of the Agricultural College for consideration of Board of Trustees

of the University on which the relationship of the officers of administration were set forth under the organization of the University and under the provisions of various laws having to do with such matters and with respect to the memorandum of the understanding signed July 1914 by the President of the University, Dr. Barker and Section of Agriculture. This was approved by the Board of Trustees, January 1917.

A resolution of Board of Trustees passed in 1916 provided for an investigation. Robert G. Gordon was on this committe of investigation.

Dr. Frank L. McVey was made President of the University, fall 1917.
Dean Thomas P. Cooper assumed duties January 1918

The last agricultural train operated by Extension Division was July 15-24, 1914.

The first boys' Club Camp, a two-day affair, was held in Ballard County the summer of 1916.

Fred Mutchler, Superintendent of Extension 1914 to 1919.

Dean Cooper, in July 1919, was made director of all phases. Professor Roberts assisted ~~and~~ Dean, T. R. Bryant, Assistant Director of Extension and Mrs. Helen Woolcott, State Leader of Home Demonstration Agents, October 1, 1913. Resigned September 18, 1919.

Miss Gertrude M. Cheyne - September 18, 1919. Resigned August 31, 1920.

Miss Margaret ~~Whitmore~~ Whittemore, August 31, 1920 to November 1920

Miss ~~A~~ Myrtle Weldon was appointed June 1, 1924.

The Agricultural Adjustment Act of Congress and its first in acreage adjustment of wheat crops sown in the fall of 1933. The Extension Service over the entire U. S. was requested to put the provisions of this act into effect.

* Ref. - Reported in a History of the Kentucky Extension Work In Kentucky by: Professor Bryant

Chapter II

A History of the Development of Agricultural Engineering at the University of Kentucky, 1908-1919 (Aug.) 1907-1957 ?

The catalog of the University for 1907 showed that a two-year course in Agriculture was offered the fall of 1907 with Professor George Roberts as Acting Head of Soils and Crops and Professor ~~H. H.~~ J. J. Hooper in Charge of Animal Husbandry courses.

That same year the State Legislature appropriated $35.000 to build a 45'x100' 3-Story brick building for an Agricultural Building on the University of Kentucky campus

I Period 1908 to August 15, 1919

In 1909 Professor George Roberts became head of the Agronomy Department.

That the founders of the agriculture 4-year curriculum in 1908 were cognizant of the need of applying engineering practices in agriculture, is indicated by the fact that the following courses were offered in 1907 under the supervision of Professor Roberts of the Agronomy department.

A two-credit-hour course, Land Surveying in the Sophomore Year;
A three-hour lecture and recitation period in Farm Equipment;
A one-hour period in Farm Equipment Laboratory Work.

In the Senior Year:

A two-hour credit course in Rural Architecture, included a discussion of arrangement, location, construction and equipment of farm buildings, particularly of stock barns, silos and other structures concerned in the feeding and management of livestock.

In 1909 (Page 45 of Catalog) the title of Land Surveying course was changed to Rural Engineering and the Farm Equipment and Rural Architecture courses were combined into a four-hour credit course, "Farm Equipment and Management". It included lectures and practical exercises on the selection and equipment of the farm, arrangement of farm buildings, and the study of

the source of power of farm engines, farm machinery, water supply, etc. Text Book, Farm Machinery, by Davidson and Chase.

On Page 105 of The Brief History of Development of the Agronomy Department, Professor Roberts stated, "I took over the teaching of the courses of soils and field crops and also the course in farm equipment which dealt with farm machinery and the course in surveying. I taught these courses until January 1, 1911 when Professor E. J. Kinney was added to the staff and took over all the work in fild (field) crops".

Although Professor Roberts did not so state, I understand that Professor Kinney also took over the teaching of some of the farm engineering courses.

James A. Farra was added to the agronomy staff as instructor in 1912 to take charge of the work of farm engineering and served in this capacity until July 1917 when he resigned, after taking a leave of absence during 1916.

August 1, 1918, Dean Thomas P. Cooper appointed Mr. Mark Haverhill (Havenhill) Professor of Farm Engineering but he resigned in July 1919 to accept a position of Educational Director to train salesmen and dealers for the Cleveland Tractor Company.

II Period, August 15, 1919 to September 1, 1957 (1956?)

James Byron Kelley was employed August 15, 1919 as Professor in Agricultural Engineering to be head of the Farm Engineering Section of the Agronomy Department in charge of the teaching and extension and research phases.

On Page 1 of Professor Roberts' records and on Page 211 of the 1919 College Catalog are the following statements:

"The work in Agricultural Engineering was placed in the Department of Agronomy only for administrative purposes". Quotation from Professor Roberts' History of the Development of Work of the Agronomy Department.

"The writer during his administration of the department gave freedom to the Agricultural Engineering Division in determining the development of its work."

The Agricultural Engineering Department offers instruction to agricultural students in subjects involving the application of engineering knowledge to the solution of farm problems.

Starting in September 1919, the Agricultural Engineering Section offered for agricultural students six courses as follows:

1. Farm Machinery, 3-hours credit, 1st Semester
2. Rural Sanitary Equipment, 2-hour credit, 1st Semester
3. Farm Construction, 2-hour credit, 1st Semester
4. Farm Motors, 3-hours credit, 2nd Semester
5. Land measurement and Drainage, 2-hour credit, 2nd Semester
6. Shop (Farm), 3 hours credit, 2nd Semester

In addition to the above courses, James B. Kelley taught a special short course, spring 1921, for 30 veterans of the First World War to train them to become tractor mechanics. As a matter of record, the expenses of these men were paid from unused funds which had been donated for Y. M. C. A. Activities for the soldiers during the war.

On July 10, 1931, Mr. Howard Matson was added to staff as part-time instructor and part-time extension specialist. Mr. Matson remained on the staff until October 1934, at which time, on account of lack of funds due to the depression, he was loaned to Kentucky Forrestry Department at Frankfort to assist in organizing and directing the engineering work done by the C. C. C. Camps in Kentucky. By the time funds were available again at the college for returning Mr. Matson to the Agricultural Engineering Staff, he had so thoroughly demonstrated his fine traits of leadership and his knowledge of the fundamentals of Engineering, that the Federal Conservation officials at Washington D. C. outbid the college, employed and assigned him to Soil Conservation work in Texas, where within three years he was made a district

engineer to supervise the work in three southern states.

Jesse B. Brooks joined the staff, February 1, 1935 as instructor and part-time extension specialist, but was transferred to the position of full-time extension specialist in Agricultural Engineering on July 1, 1946, and continued in that position until March 1948 when he resigned to enter professional sales engineering work in Kentucky.

He rejoined the Agricultural Engineering Staff on March 1, 1949 as Assistant Professor. September 18, 1950, he successfully passed the examination to permit him to qualify as a Professional Agricultural Engineer in Kentucky. He was on leave of absence during the months of July and August 1954 and 1955 to complete his work for obtaining a Masters Degree, which was conferred on him by the University of Alabama, Auburn, Alabama, August 7, 1955.

As an extension specialist, he did outstanding work on farm buildings, water supply and sewage disposal.

As a teacher, he has been highly appreciated by his students and associates. He has developed into an excellent draftsman, an authority on water supply, sewage and farm buildings. At present, in addition to his teaching, he is acting as the Agriculyural Engineering Consultant and designer of buildings, water supply, etc., for the Experiment Station Farms at Lexington, and in Mercer and Owen counties.

Earl R. Young joined the staff as instructor in August 1936; was advanced to Assistant Professor in July 1944, and Associate Professor in 1957. He has been an excellent teacher, an outstanding organizer of his owrk, an inspiring teacher and a loyal co-operator with all phases of work carried on by members of the staff.

He especially taught the woodworking and metal working shop courses, and the farm tractor and power machinery courses.

Although, not employed to do extension work, he has prepared several

excellent circulars - (see list on pages _____).

Mr. Young acted as Chairman of the course scheduling committee, was in charge of keeping the Agricultural Engineering inventory records of machinery and equipment and was in charge of the department in the absence of Professor Kelley.

Chapter III

BUILDINGS AND EQUIPMENT

From August 1919 to September 1, 1931, the Agricultural Engineers occupied part of one office in the Experiment Station Building. College classes were held in the Agriculture Building and the Stock Pavilion. Laboratory work was conducted outdoors and in a small unheated frame structure, and the space of 3 box stalls in the old mule barn located on Experiment Station Farm, and a steel structure 40'x80' which was erected at a cost of $4,000.00 in the summer of 1920. This steel building was heated with one coal stove.

In 1930, the State Legislature appropriated $75,000.00 for an Agricultural Engineering Building which was completed in 1931 and dedicated October 28, 1931.

The preliminary plans of the building were drawn by J. B. Kelley, and the architectural firms of L. J. Frankel and John J. Curtis were commissioned to complete the plans and specifications. The other firms receiving contracts for various phases were: Building proper, W. T. Congleton and Company; Electric Wiring, Moore-Young Electric Company of Lexington, Ky.; Steam Heating, John H. Scott, Frankfort, Kentucky

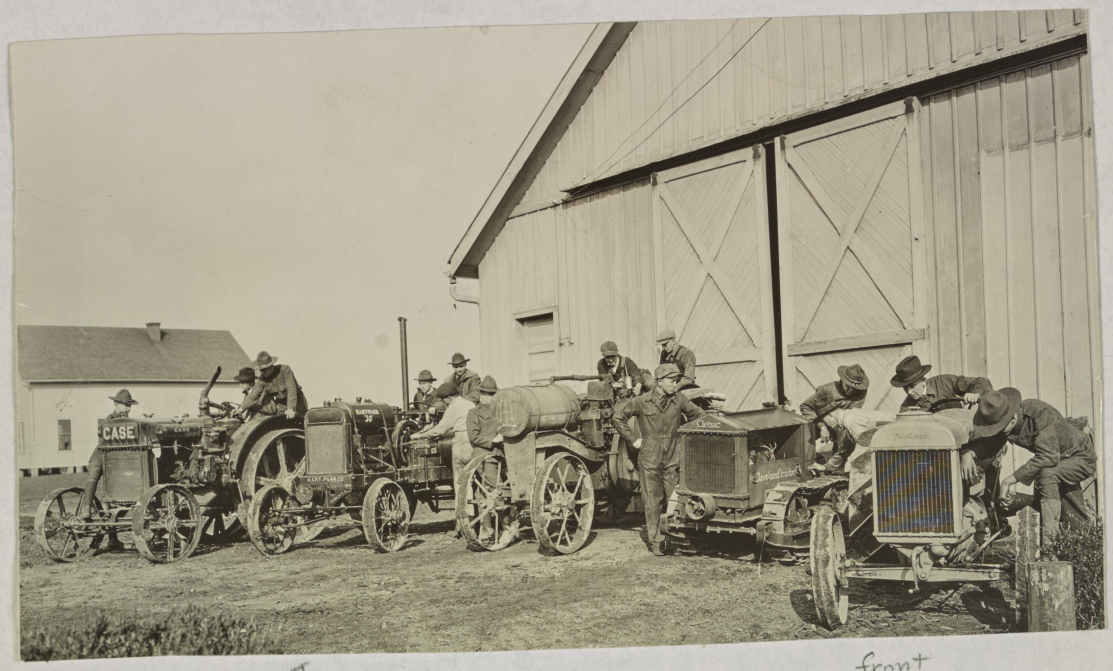


Agricultural Engineering Buildings

An old frame 24'x24' 2-story header-house mounted on posts and located at about 50' from the northwest corner of the Live-stock Pavilion was from 1918 to 1926 used for a laboratory for a farm woodshop and stationary gas engines laboratory. (Picture not Available).



Three Box Stalls, the center driveways of this old mule barn and roadways around the barn were used for teaching laboratory classes from 1924 to 1931. The Truscon steel 40'x80' prefabricated building on the left of the picture, costing $4,000. was built in summer of 1926 and a 20'x40' frame lean-to shed was built at the rear of it by the students in 1928. The steel building was heated by a coal stove. This structure was used from 1926 to 1931 for laboratory space for wood and metal work, gas engine and tractor, also sanitation courses.



World War I Veterans Class working on tractors in ~~from~~ front of mule barn which was the only structure available in 1920 for Agricultural Engineering Laboratory work.



Agricultural students working on tractors inside of a 40'x80' Truscon steel building built in 1921 for laboratory work.

Agricultural Engineering Buildings, continued

The agricultural engineers shared a class room in the second floor of the Agriculture Building from 1919 to 1931 and offices in rooms of the Experiment Station Building from 1926 to 1931, also the engineers shared a class room in the Judging Pavillion.



New Agricultural Engineering Building dedicated October 28, 1931. This building was remodeled during the year of 1952 by covering the center court with two full monitor roofs, additional wiring, providing heat for the area, one office, altering hallways and shop areas, Etc., at a cost of $75,000.

New Agricultural Engineering Building

Mr. Kelley started drawing plans of an Agricultural engineering building as early as 1920 and by 1929 had some floor plans and suggestions on elevations to submit to Dean Cooper when he requested such plans to use in selling to the Legislature Budget Committee the urgent need of appropriating $75,000 for such a building.

I wish as a matter of record also to give credit to Mr. W. E. Difford, Secretary of the Kentucky Lumber Dealers Association and several members of the association for going before the Budget Committee to present facts why they would be justified to recommend in the budget funds to build an agricultural engineering building at the University in which to train students, conduct research and extension projects and other phases of agricultural engineering work.

9A

Dedication

of the

Agricultural Engineering Building

University of Kentucky

Lexington, Kentucky

October 28, 1931

Program

Dedication

Agricultural Engineering Building

President Frank L. McVey Presiding

Invocation: Reverend A. H. Pitzer

Address:

DEVELOPMENT OF AGRICULTURAL ENGINEERING

Professor J. B. Davidson,
Iowa State College, Ames, Iowa

Address:

CONTRIBUTIONS OF AGRICULTURAL ENGINEERING TO RURAL LIFE

S. H. McCrory, Chief of the Bureau of
Agricultural Engineering
United States Department of Agriculture,
Washington, D. C.

DEDICATION OF BUILDING

President Frank L. McVey

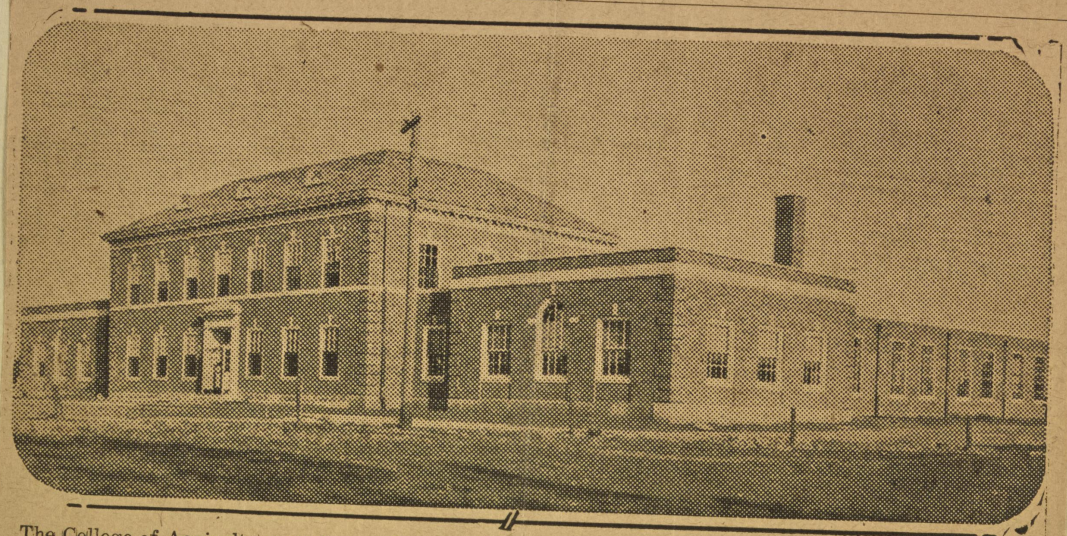
Benediction: Reverend A. H. Pitzer

October 28, 1931 Three o'Clock Agricultural Engineering Building

10-15-31

THE CYNTHIANA DEMOCRAT, CYNTHIANA, KENTUCKY

NEW FARM ENGINEERING BUILDING AT THE UNIVERSITY OF KENTUCKY



The College of Agriculture at the University of Kentucky is now equipped to teach farm boys how to operate the most modern types of machinery. Its new agricultural engineering building will be dedicated October 28. The speakers will be Prof. S. H. McCrory, head of the bureau of agricultural engineering in the United States Department of Agriculture, and Dr. J. B. Davidson, head of the farm engineering work at Iowa State College. The building contains farm shops, motors, tractors, and all kinds of the latest types of farm implements, tools and appliances.

Room 202	Private Office
Room 207	Private Office
Room 205	Extension Workers Office
Room 206	Work Room
Room 208	Blue Printing Room
Room 209	Storage for Office

BASEMENT

Room No. 1	Concrete Laboratory
Room No. 2	Storage
Room No. 3	Hydraulic and Drainage Laboratory
Room No. 4	Switch and Meter Room

THE CYNTHIANA DEMOCRAT, CYNTHIANA, KENTUCKY

CROMWELL'S COMMENTS
By John M. Cromwell

THE PASSING CROWD

DEMOCRAT, OR INDEPENDENT?

cause I figures dat by dat time dis heah Hoover administration will be over and might be I could get a job and make an honest livin', was the explanation."

ve some particular pet
en into the constitution.
's greatest wrangle and
or more, during which
vention members would
ay, there would emerge
good, probably, as the

10

INSPECTION TRIP THROUGH THE AGRICULTURAL ENGINEERING BUILDING

FIRST FLOOR

Room 111	Tractor and Power Machinery Laboratory
Room 109	Farm Machinery Laboratory
Room 108	Storage Room
Room 107	Farm Shop
Room 106	Farm Mechanics Class Room
Room 101	Entomology Laboratory
Room 105	Tool Room
Room 104	Student Wash Room
Room 103	Faculty Wash Room
Room 110	Farm Motors Laboratory
Room 102	Sanitation and Home Equipment Laboratory

SECOND FLOOR

Room 201	Class Room and Laboratory for Farm Buildings and Drainage Courses
Room 203	General Office
Room 202	Private Office
Room 207	Private Office
Room 205	Extension Workers Office
Room 206	Work Room
Room 208	Blue Printing Room
Room 209	Storage for Office

BASEMENT

Room No. 1	Concrete Laboratory
Room No. 2	Storage
Room No. 3	Hydraulic and Drainage Laboratory
Room No. 4	Switch and Meter Room

The Development of Agricultural Engineering

(This address was presented by Dr. J. B. Brownlee Davidson, Head of the Department of Agricultural Engineering, Iowa State College, Ames Iowa in dedicating the Agricultural Engineering Building on the Experiment Station Farm, University of Kentucky Campus, October 28, 1931)

For a department of instruction, in a great educational institution, to be recognized by the erection of a splendid building for its use, such as we are gathered this afternoon in a formal exercise to dedicate, is a significant event. An appreciation of the importance of the branch of education so recognized and faith in the men supervising it in the institution, are affirmed.

It seems quite appropriate in connection with the dedication of a new agricultural Engineering Building to trace the development of Agricultural Engineering to outline its contribution to human progress and consider briefly at least, the future possibilities for its development. I consider it a high honor to be invited to do this.

It would seem desirable in beginning a discussion of the subject to outline as clearly as possible the field of agricultural engineering. Being one of the newer branches of education, and representing to a certain extent a reorganization of older branches, there may be some opportunity for a lack of a common understanding of the scope and character of agricultural engineering. It is obvious that agricultural engineering embraces the relationship of agriculture and engineering. Furthermore, it must be recognized that any significent factor in agriculture is endowed with a degree of importance. For agriculture, the industry committed with the production of food and raw materials used for food, shelter and clothing, supplies a basic need of mankind. Agriculture along with education and homemaking are the three primary industries to which all others are secondary and subservient.

Turning to engineering, an accepted and conventional definition for engineering is "the art of organizing and directing men and utilizing the forces and materials of nature for the benefit of mankind", In other words, the engineer is a specialist in labor - "the organization and direction of men," in power - "the forces of nature", and materials - "the materials" of construction and manufacture. Regardless of the branch of the profession to which an engineer may belong, the motive and objective of his work is to utilize labor, power, and materials to produce efficently the goods and services to supply human needs, to make life more confortable, surroundings more pleasant, environment more liveable, facilitate travel, transportation and communication, and to provide opportunity for recreation, culture and advancement.

The engineer contributes to these objectives in three ways: First, by doing a thing so well that it does not need to be done over again for some time - for instance, water may be carried from a well to the house in a pail and the requirements for water may be such that the trip to the well and return may be repeated several times in a day. By stretching a pipe - an elongated container from the well to the house introducting a pump to move the water in the pipe, the container does not need to be moved or replaced. The selection of the right kind and quantity of materials makes the installation permanent.

The second way in which the engineer works is to reduce the waste and to make effor more effective. The cleaning of grain, removing weed seed, reduces waste of effort in growing a crop. The building of a hard surface road reduces the waste due to rolling resistance to a wheeled vehicle. Artificial silk has an appeal because it obviates the necessity of looking after silk worms and the spinning of artificial silk costs less in effort than to unwind raw silk from cocoons.

The third principle field of activity of the engineer is to multiply the output of human effort by the application of power. The process began when early man subdued an animal, perhaps an ox, and tied it to his crude plow and the development in the use of power continued to the present use of fuels and the power of waterfalls. The application of power to conserve labor and increase output is something to cogitate about. Man as a motor is hopelessly outclassed. A strong man can develop about one-eighth of a horse power, an insignificant amount when output is desired. A man may travel with his own energy about 2 1/2 miles per hour. With power in an automobile on a good road is practicable to travel 60 miles per hour and 220 miles per hour miles has been attained. The principal cause for the difference in speed is power.

The output of the worker the world over is directly related to the amount of power utilized per worker. In China most of the workers work without any assistance in the way of a motor. The production under such conditions may be considered unity. In France with the power used per worker it is estimated that the output is increased 8 1/4 times; in Great Britain 18 times and in the United States 30 times. To use an illustration frequently used, every American worker has the equivalent of thirty slaves at his command.

A committee of the former Association of American Agricultural Colleges and Experiment Stations, as far back as 1900, defined the subject of rural engineering as "the science and art of laying out farms, designing and constructing farm buildings and works, (including water supplies, irrigation, drainage, sewage systems and roads) and the construction and use of farm machinery".

The American Society of Agricultural Engineers has seen fit to define its field simply as - "the art and science of engineering related to agriculture." This definition indicates that agricultural engineering instead of representing a splitting off or segregation of a group of specialists from the parent groups as was the case of civil engineering from military engineering and later mechanical engineering from civil, and still later electrical engineering from mechanical, was a bringing together all the phases of engineering involved in and related to, agriculture. In this respect agricultural engineering is like mining engineering or ceramic engineering.

As now organized in most education institutions, agricultural engineering is subdivided into four main subjects, viz.:

Land development, including drainage, irrigation, and land clearing.

Farm Structures.

Farm Utilities, the water, sanitary, lighting, heating and ventilating systems, used in farm buildings and farmsteads.

Power and Machinery.

In tracing the development of agricultural engineering, some attention must be given to each individual branch because their development has taken place under different circumstances.

As a member of a Rotary Club, I have listened to many talks by members on their classification, that is their business or profession, as the case may be. It seems the customary thing is to begin at the beginning and many professions take considerable pride in their traditional background. I have the honor to claim that the agricultural engineer is the oldest of all professions. Tradition relates that before the age of man, when his predecessor the monkey depended upon the natural products of the forests for food, there was one year a shortage of cocoanuts, due to drought or some similar cause. Under normal times the trees dropped sufficient cocoanuts to furnish a

bountiful supply of food, but this particular year not only were the nuts consumed which were dropped but those in easy reach were exhausted and starvation threatened the tribe. One monkey more ingenious than the others conceived of knocking off the nuts which were otu of reach with a club thus saving the tribe from starvation. I contend that here we observe the first agricultural engineer and that he had invented a "harvester".

The improvement, development and reclamation of land by drainage and irrigation are old arts and can be traced back into remote antiquity. Herodotus, the Greek historian, tells of the practice of drainage and irrigation by the Egyptians in the Valley of the Nile as early as 400 B. C. Many Roman writers refer to these arts. The reclamation of large areas by the Dutch are of historical importance. Drainage in the United States had its beginning in 1835 when John Johnston at Geneva, New York, laid his first drain.

Irrigation was practiced in the United States before the coming of the white man. The beginning of modern irrigation should perhaps be credited to the Mormon pioneers in Utah.

Land clearing is distinctly an American practice. Perhaps in no other country has there ever at one time been such a large area of stump lands left from harvested forests as in America.

At the present time in the United States (1920) Census of the 365 million acres of improved land in crops, 53 million or 14.5 percent have been made available by drainage, 19 million or 5 percent by irrigation, and 5 million or 1.4 percent by land clearing.

Ayres and Scoates estimate that the total improved land in farms, 503 million acres, may be increased should economic conditions justify, by 155 million acres or 31 percent.

Farm structures have grown from the simple buildings of the pioneers to one of the largest classes of structures in the country.

It is asserted on fairly good authority that under normal economic conditions 40 percent of the building construction of the country is on the farms. The 1930 Census gives the value of farm buildings for the United States as 11 1/2 billions or 14.7 percent of the fixed capital of the farms.

No material development has contributed so much to rural life as farm utilities. Comfortable homes, heated and ventilated, water supply systems, proper disposal of wastes, lighting and power systems for the home are the earmarks of a high standard of living. From simple devices we have advanced almost wholly during the last century to the point where it is estimated that in our most advanced sections the majority of the farm homes are equipped with modern utilities.

It is in the application of power to agriculture to modify labor, making it less arduous and more a matter of the mind and less of brawn, andt to increase the output of the worker, that we find the most fascinating development of American agriculture. The development of this phase of the application of engineering to agriculture has been so recent and so rapid, that its story is actually thrilling. From the early beginnings of agriculture down through thousands of years and including the early experience of our own fathers, hand methods of production prevailed in agriculture. In the comparatively short time of three-quarters of a century the output of the farm worker has been multiplied many times and the character of farm labor entirely changed. There is an urgent temptation to to to cite statistics and figures to illustrate just what has taken place but instead I think it will be more interesting to describe a feature of a pageant enacted at the annual meeting of the American Society of Agricultural Engineers last June (1931). In this pageant the development of harvesting machines was illus trated to an audience assembled on a grandstand adjoining a rye field. All

of the tools and machines used in harvesting were actually demonstrated from the hand sickle of the ancients to the modern combined machine of today. Many men who had used hand tools in their younger days were enlisted to demonstrate the use of these hand tools and the binding of the grain. It is the last episode of the pageant that I wish now to describe because it was so impressive as to almost startle the spectators. First came a laborer with a cradle, carrying a sack containing a small quantity of grain representing the product of one hour of labor with hand tools in the harvesting and threshing of grain. Immediately following this laborer was a truck carrying in sacks piled high the product of one hours effort of one man under average conditions (about 30 bushels) with a modern combined harvester-thresher in harvesting and threshing. This was significant but the third part of the episode was even more impressive for marching in group were 72 laborers, 12 cradlers, 12 binders and 48 flailers which would be required with their tools to equal the work of one man with the machine. Even engineers who are expected to fullly appreciate the great changes which take place were greatly impressed with the demonstration.

Thus, I have tried to briefly trace for you the development of engineering as applied to agriculture. Unquestionably, this development has been the most significant development in American agriculture. Other countries excell in yields per acre and equal us in quality of product, but no country surpasses the American farmer in proudction per worker. We hear much about the influence of the machine on agriculture. The machine has as its first function the application of power to certain operations. The Utilization of power is engineering, so what is really meant is not the influence of the machine but of engineering, for a machine cannot be produced without engineering and its use involves engineering. With more primary power in use in agriculture than all of the manufacturing industries, who will question the

importance of this branch of agricultural engineering.

It is not within the scope of my subject to treat of the benefits of engineering, but giving due credit to the most valuable contribution of other sciences to agriculture, it must be conceded that engineering in agriculture has been in no small degree responsible for making the benefits of civilization available to the great masses of our people.

We are dedicating today a building to the use of education and I would not treat my subject adequately unless some mention be made of the development of agricultural engineering education. A study of the earliest curricula in agriculture, such as was offered by the Pennsylvania State College in 1862, reveals that certain engineering subjects were included such as surveying, mechanical drawing, and engineering. In 1900 the Association of American Agricultural Colleges and Experiment Stations had a committee which in a report urged extending instruction in this field and prepared a syllabus of agricultural engineering instruction. In 1903 the report of the committee on rural engineering of the Association emphasized the opportunities for education and research in the different branches of engineering and recommended "the creation of separate departments of rural engineering in the colleges". The report of the Office of Experiment Stations for 1903 described the course of instruction in agricultural engineering at the agricultural colleges in Illinois, minnesota, North Dakota and New York. Prof. F. H. King gave courses in engineering for many years at the University of Wisconsin in the Department of Agricultural Physics. At the Iowa State College and at the University of Nebraska, departments of farm mechanics were established in 1904 and buildings erected for the work of the departments. Instruction at other institutions was rapidly added.

In 1905 the committee on rural engineering of the Association advised that more adequate attention be given to instruction for agricultural students and that departments of rural engineering be established with persons having engineering training in charge.

In 1906 the records of the Association indicated that at least 32 colleges were giving some instruction in agricultural engineering but in general the work was not well organized.

In 1909 the committee called attention to the necessity of not only improving the courses for agricultural students but that courses of study for students wishing to specialize in agricultural engineering be organized. Such a four-year course leading to a degree of bachelor of science in agricultural engineering was organized at Iowa State College in 1910.

The American Society of Agricultural Engineers was organized in 1907 and in 25 years has grown to a membership of over 700 members. It has the distinction of having a larger percentage of its members attend its annual meeting than any of the national engineering societies. At the last annual meeting the registration was 335, June 1931.

In recent years there has been a rapid extension of research in agricultural engineering. Perhaps there is no branch of experiment station work where there is so much coordination of effort as in the various branches of agricultural engineering research.

During recent years, under the guidance of a national committee a remarkable advance has been made in use of electricity in agriculture.

Turning our attention to the present situation in agricultural engineering education, the report of the recent survey of Land-Grant Colleges and Universities that agricultural engineering was taught as such in 44 state institutions and that 37 of these offered an average of 10 courses. Twenty institutions offer curricula leading to degrees in agricultural engineering.

Perhaps as significant in the growth of agricultural engineering from a small beginning twenty-five years ago to the present, has been the change in the character of the instruction. Formerly instruction was of the most practical kind emphasizing manipulative skill to a large extent. Such instruction in connection with mechanical equipment has been quite correctly labeled "grease it and fix it" instruction. Now the instruction is given an economic and managerial background and fitted into the problems of agricultural production. The relation with other agricultural sciences has been better established. For instance, in the growing of a crop, it is recognized that the soil specialist should furnish the principles of soil management, the crop specialist guidance in the selection of seeds and indicate the essential requirement of the plants cultivated, and the botanist outline the basis of weed control. Bit it is the job of the agricultural engineer to carry out the cropping program efficiently and economically by the use of labor, power, and equipment. The importance of engineering is recognized from the fact that labor and power costs make up under conditions of normal crop production, from 40 to 60 percent of the total cost of production and most of the balance is not within control of the individual farmer.

Since agricultural engineering has such a direct bearing upon the income of the individual farmer and since agricultural engineerin g makes such an important contribution to the comfort, convenience, pleasure and general well-being of those engaged in rural pursuits, it would seem to be assured of an important place in education. With better instruction, expanding literature, effictive research, the training of more agricultural engineers in this field of education should make an ever increasing contribution to the advancement of American Agriculture.

It would appear to me that any educational observer, after carefully studying the progress and possibilities of agricultural engineering, would commend the trustees, the president, the dean and others for providing this spendid building to further

instruction and research in this field.

I wish to congratulate Professor Kelley and his associates for the great opportunity that is theirs in having such a splendid building in which to carry on their work.

CONTRIBUTION OF AGRICULTURAL ENGINEERING TO RURAL LIFE

By

S. H. McCrory, Chief, Bureau of Agricultural Engineering,
United States Department of Agriculture

(Delivered at the dedication of the Agricultural Engineering Building, University of Kentucky, Lexington, October 28, 1931)

The rural population of the United States, according to the 1930 census, is 53,820,000 or 43.8 per cent of the total for the nation. This rural population comprises 30,157,000 people living on farms and 23,663,000 others living in towns and villages having populations of less than 2,500.

The particular characteristic of rural life, as compared with urban residence, is the relative isolation of the families, either on separate farms or in small groups, and the consequent independence and freedom of action of the members. The individuality and self-reliance engendered by rural living has been one of the great elements of our national strength. These are qualities that must be preserved.

In spite of the pressure of existing economic problems in agriculture, rural life in the United States is today on a higher plane than it ever has been before. The farmer's work is less arduous, and by his own efforts he is able to work more land. At the same time, he labors but a smaller part of the day and yet harvests bigger crops. The

wife has been relieved of much of the drudgery that formerly pertained to farm life. Happily, no present day writer can truthfully describe the wife's place on the farm in words I now quote, as published in 1539:1/

> "It is a wive's occupation to wynowe all manner of cornes, to make malte, to washe and wrynge, to make heye, shere corne, and, in time of nede, to helpe her husbande to fyll the muckewayne or dounge carte, drive the ploughe, to loade heye, corne, and suche other. And to go or ride to the market, to sel butter, chese, mylke, egges, chekyns, capons, hennes, pygges, gese, and all manner of cornes."

Both the farmer and his family now have more leisure and more facilities for recreation and for intellectual development.

What has agricultural engineering contributed to this advancement?

Agricultural engineering is not a department of fundamental science, like electrical or mechanical engineering, for instance; it is an application of available resources in power, materials, and technology to a particular field - agriculture and rural conditions. This is a broad field but fortunately characterized generally by small, independent operating units. I say fortunately, for it is to this quality of individuality that can be ascribed the rugged independence

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1/ Loudon's Encyclopaedia of Agriculture, Vol. 1, p. 41.

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of thought and action that has been an outstanding feature of American rural life. Says an early writer, 2/ in reference to the self-sufficient farmer of that day:

> "From his feet to his head the farmer stood in vestment produced on his own farm. The leather of his shoes came from the hides of his own cattle. The linen and woolen that he wore were products that he raised. The farmer's wife or daughter braided and sewed the straw hat on his head. His fur cap was made from the skin of a fox he shot. The feathers of wild fowl in the bed whereon he rested his weary frame by night, were the results acquired in his shooting. The pillow-cases, sheets and blankets, the comfortables, quilts and counterpanes, the towels and table cloth, were home made. His harness and lines he cut from hides grown on his farm. Everything about his ox yoke except staple and ring he made. His whip, his ox gad, his flail, axe, hoe, and fork-handle, were his own work. How little he bought, and how much he contrived to supply his wants by home manufacture would astonish this generation."

Fortunately, the farmer of today does not have to depend upon his marksmanship for his hat, nor does he cut his own harness. But it is interesting to note these evidences of self reliance in our

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2/ History of Agriculture in Northern United States, 1620-1860, p. 126.

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ancestors, and there is satisfaction in the thought that these qualities still generally inhere in our present day farm dwellers.

Just what the future of the agricultural engineer is we do not now know. By that I mean that we do not now know how his field ultimately will develop. We are all familiar with the practicing engineers of the fundamental branches - the consulting mechanical engineer, the engineering-contracting firm, and so on. But we do not often see the shingle of the agricultural engineer displayed beside his office door. Just now we chiefly find him connected with State and Federal agricultural institutions and with the larger manufacturers of agricultural equipment. What is he doing? He is engaged either in developing new engineering facts that will aid agriculture, or in passing these facts along to the farmer. The first of these activities we call research, and the second extension. The time has not yet come when farm owners as a class will pay for engineering advice respecting their every-day operations, as will the mine owner for instance, or the mill owner. But I believe we shall see the time when the progressive farmer - and there will be no room for any other kind - will consider money spent for engineering advice to be well invested. Our agricultural institutions must always be responsible for training young men for this important field of work, as well as for a large part of the research directed toward developing new engineering facts applicable to agriculture. And for the present, at least, these institutions must assume practically the

entire burden of instructing the farmer in respect to the engineering aspects of his operations.

Farming has generally been viewed, not so much as a business as a mode of living. Nevertheless, the quality of this living -- the fullness of rural life -- depends much, as in urban life, upon the profits of the business in which the members are engaged, for many of the advantages of modern life, rural or urban, depend upon services that cost money.

Engineering is not an end in itself but is a means to an end. Consequently agricultural engineering must ever be associated closely with the other branches of agricultural research and operation, such as agronomy, entomology, plant industry, animal industry, fertilization, and perhaps most closely with farm management and agricultural economics. The agricultural engineering worker must be the very nature of his field bear in mind the necessity for cooperation.

The Land

The basis of all agriculture is the land itself. It has been said that the farmer's land is his bank. Under normal agricultural conditions he can invest money, thought, and energy in his land and reasonably hope to draw interest in his investment. This interest will include a money return, of which it is only necessary to say here that with it he can provide for his family the things that money will buy. But his returns will include more

than money. There is something about the ownership of a well ordered farm that appeals to the human animal. Else why do we see so many wealthy city men retire to the farm. These men are in a position to enjoy all that the city offers, yet we see them desert their urban palaces to acquire land on which they proceed to lavish their money and attention. During their years of sojourn in the city, devoted to the accumulation of wealth, they carry a yearning to retire to the country. They will tell you this, and when the time comes that they feel justified in gratifying their yearning they will proceed to do so. The truth is, I think, that in the possession of a home on a sizeable tract of land man comes nearest to fulfilling the role for which nature intended him. Now the farmer is no different than the city man in this respect, but he differs from the city man in that from the land itself he must earn his right to live on it.

Money, thought, and energy - these comprise the farmers capital that he puts in the bank, his land. Which of these is the most important? Thought, undoubtedly, for we can conceive of at least moderate success where capital and energy are limited, but we can see nothing but failure in misdirected energy and wasted funds. Now the agricultural engineer can not help the farmer in respect to the money or energy items of his capital, but fortunately he can be of assistance to him in directing the use of these resources. Through the medium of the extension engineer there are made available to the farmer the

accumulated engineering experience of others, and the conclusions and results of scientific research by men who are devoting their whole time to it.

The engineering operations that concern the condition of the land as a basis for tillage are ordinarily recognized as land-clearing, drainage, and irrigation. Rather recently, the subject of soil-erosion prevention has come into the foreground, and with good reason, because we are not witnessing the slow but sure destruction of this very basis of our agriculture. Erosion is the removal of soil by rainwater flowing on the land surface. The obvious remedy is to control the surface water so that it shall not erode the soil - that is, to provide proper drainage.

Just what are these engineers doing who are concerning themselves with the condition of the land? Their goal is that on every farm the land, so far as its physical condition is concerned, shall be in such shape as to yield the maximum of profit to its owner, and that this condition shall be permanent. Underdrains, where practicable, to maintain the proper balance of soil moisture and to replace the land-wasting and unsightly ditch; permanent terraces scientifically located and constructed to hold the soil on the field and conserve the rainwater; stumps and stones taken off the tilled land, and field boundaries readjusted to best serve the owner's schedule of operation. These are some of the things the agricultural engineer hopes to aid the landowner in accomplishing.

In passing, I wish to dwell briefly on a specific accomplishment of the engineer in the matter of improving swamp and overflowed land. It is worth while to point out that a rough compilation shows that some 60 million acres of such land in the eastern half of our country have in the last fifty years been reclaimed from a state unfit for agriculture, either through disastrous flooding by streams or through the prevalence of malaria and today they afford homes for millions of people. A worth-while contribution, as I think you will agree.

Irrigation is not a subject of primary interest to farmers here in the East, although it is often a paying investment as a means of insuring an adequate supply of moisture at critical periods in the growth of valuable crops. In parts of the West, however, the artificial application of water plays a major part. It is essential, one may say, not only to a high plane of rural life but to the practice of agriculture at all. The vital problem of Western irrigation is now, and will continue to be, the conservation of the limited water supply which means not only the capturing of every source of water but also the avoidance of waste to the last degree. It is particularly in this last feature that agricultural engineering plays an important part. The accurate measurement of water to the farmer to insure that he gets what he pays for; the best means of handling the water on his fields; the determination of the exact quantity of water he should apply to various crops to avoid waste. These are some of the ways the engineer is helping to make it possible for a considerable percentage of our

population to establish and maintain homes in a section where nature, while supplying a climate and a soil of unsurpassed possibilities, has by withholding water denied us the primary means of taking full advantage of these resources.

We still hear people speak of "worn-out" land. As a rule these lands are not worn out but washed out. In the old days the system was to abandon these lands and seek new soil. That day has passed, not perhaps so much because the American has completely outgrown his native restlessness, but rather because the day of virgin land is gone. The American farmer has come to the time when he must keep the land he has and make the best of it. And that is exactly what the agricultural engineer is helping the farmer to do - to make the best of it. Who will say that this change - this passing from the restless era of hand-to-mouth management of land and its accompanying transitory residence, to permanence with all this implies in respect to citizenship and social aspects - who will say that this change can have other than a beneficial effect on rural life.

Mechanical Equipment

Undoubtedly the most spectacular contributions of agricultural engineering to rural life have been in the application of machinery to farming, and in the substitution of mechanical power for animal power and human labor. Just where to draw the line between mechanical technicians and engineers, I do not know, nor do I feel that it is important that such line be drawn.

Some of the agricultural machines most effective in saving human labor have been invented, at least in their original form, by men who were not technically trained in engineering. But how many of these machines are now found in their original form. The late Thomas A. Edison, we are told, in 1880 considered his carbon-filament incandescent light to be the ultimate in the way of artificial lighting!

Mechanical power on farms, in the form of windmills and steam engines, had appeared in small numbers a full half-century ago, and two decades later stationary gas engines furnished a measurable part of the primary horsepower available on farms. At that time, the beginning of the present century, mechanical power comprised probably a scant one-fourth of the total, not including passenger automobiles. In 1924, the latest year for which figures are available, work animals comprised about 42 per cent, and tractors alone 22 per cent of the total available horsepower on farms. Probably at the present time work animals constitute about one-third of the total, and tractors about the same.

The general purpose or row-crop tractor probably has had the greatest effect in lightening the labor and reducing the cost of agricultural production. It is strictly a product of agricultural engineering, designed on the basis of analyzed requirements for farming operations, particularly as regards weight, maneuverability, and adjustability to crop row spacing. It provides a power unit for use by one man greater than he can control in any other form available for crop cultivation and other field operations.

With mechanical power, the saving in time required for the various farming operations reduces the amount of hired labor and that must be employed, or permits increasing the acreage that can be tilled. It permits advantage to be taken of favorable soil and weather conditions for tillage, planging, and harvesting, whereby crop yields are often increased and crop losses are yet more often reduced or avoided. Mechanical power halts not for extreme of heat or cold; it requires less stable room than horses and mules; it needs not the continuous care, when idle, that work animals must have. The feed storage space otherwise required for work stock and the fields for growing the feed, on the motorized farm can be devoted to income-producing purposes. Thus has agricultural engineering made possible expansion of the farmer's business, without increasing his investment, by releasing land and buildings for profit-yielding operations.

I need not here recount the multitude of applications of mechanical power on the farm. Two extensively used applications, however, are the auto truck and the passenger automobile. Though not designed particularly for agricultural use, they nevertheless contribute immeasurably to economy of time in the farming business, and to the enjoyment and improvement of leisure in rural life.

Electrical power, as it is rapidly becoming more generally available, is contributing to rural life by relieving farm life, particularly in the home, of much of its drudgery. As yet, high-line service is available to but a small part of our six million

farms, but through the cooperation of State agricultural colleges, federal agencies, the power interests, and manufacturers of electrical machinery and equipment, and particularly through the efforts of Committee on the Relation of Electricity to Agriculture, the number of farms served is increasing very rapidly and gratifying progress is being made in the solution of many of the difficult problems that heretofore have operated to deprive the rural dweller of this useful agent. We can not yet say that electricity is practicable for tillage and harvesting operations, but in lighting the farmstead and the village homes, and in performing the lighter tasks of the home, the farm shop, the dairy, and the granary, it is an extraordinarily useful and convenient form of power.

Structures

Now, a few words on farm structures. It is estimated that the buildings on farms in this country today represent an investment of about 12 billions of dollars. In 1931 these buildings range in age perhaps from 100 years downward. Most of them were built with no very definite idea as to what part buildings play in the economics of agriculture. We now know that the relation of farm buildings to farm profits is a very real one, although we perhaps are not able to reduce this relation to a definite figure. We can be pretty sure of one thing, though. Reasoning through analogy, that is, by considering what is being done in respect to features of other industries that represent such a huge investment, we can safely conclude, I think, that a capital of 12 billions of dollars expended

in so haphazard a way as has characterized farm building expenditures, affords a real opportunity for constructive scrutiny.

The average farmer's working life is directly devoted to securing and maintaining a home for his family. In his work he uses land, stock, implements and buildings. These, in the final analysis, are but the means to an end - the home. That being the case it is difficult to account for what we now often see in the way of farm homes. I am not advocating expensive and luxurious farm houses for I well know that this is out of the question. But I am sure that many millions have been spent on farm houses that did not yield an adequate return, simply because they were not planned wisely. It is too late, now, completely to remedy this unfortunate situation, but a great deal can be done in the way of comparatively inexpensive remodelling to mitigate the obvious results of poor planning, as well as to provide for the rural family some of the conveniences that have been developed in recent years but which so far have been available only to the city or town dweller. Here is a rich field for the agricultural engineer. I can think of no single contribution he can make to rural life which is more worth while than the helping of the rural housewife to attain these things.

As for the other buildings on the farm - the barns, the hog and poultry houses, and the storage buildings - these are tools which the farmer uses in his program of operation and they should be considered strictly as such. By this, I mean that each type of structure has

its definite purpose - as much so as the hoe or the plow - and each should be designed and built to meet its specific requirements. As a rule it is more difficult to arrive at these requirements than, having determined them to design and build to meet them. In most cases the agricultural engineer must collaborate with the specialists in other fields of agriculture. A single example will suffice. Suppose we are to plan a dairy barn to recommend to dairymen in Kentucky. It has been found that the physiological reactions of a dairy cow have a direct bearing on the quality and quantity of her milk. Temperature and humidity, among other factors, to be maintained in the barn are therefore matters to be considered. What is the temperature and the degree of humidity that will give the best results? These are matters for careful experimentation and analysis. They involve not only the work of the agricultural engineer to produce the air conditions required, but also that of the dairy specialist to determine the absolute effects of these conditions. The same applies to the interior arrangements, the space requirements, etc. Not until all of these factors have been determined and evaluated, is the agricultural engineer in a position to design the barn.

The point I wish to emphasize is that, excepting only the farm dwelling, each of the farm buildings is directly related to the farm profits and each of them must specifically be planned and built to yield the largest profit in respect to the use that is made of it.

The American Society of Agricultural Engineers has gone to some pains to formulate a very brief statement that should embody the aims and objectives of agricultural engineering education. It is this:

> "The objective of agricultural engineering education is to develop leadership by encouraging higher efficiency, greater productive capacity, and better operating practices among those engaged in the production of raw materials for food, shelter, and clothing, through the application and use of engineering principles in the industry of agriculture.
>
> The aim of this objective is directed toward creating a desire for and the capacity to enjoy higher standards of living, better working conditions, adequate educational facilities and equitable social progress for those engaged in the agricultural industry."

I have tried to outline very briefly some of the ways in which the agricultural engineers are pursuing these aims and objectives through the application of four fundamental branches of engineering - civil, mechanical, electrical, and hydraulic - to the everyday operations on the farm. The field is very wide. We have as yet made no more than a start. I am sure, however, that the agricultural engineer has already made himself felt as a factor for agricultural progress, which progress in the end can be correctly expressed only in terms of a higher plane of rural living.

In the dedication of this fine building, Kentucky in this hour joins the growing list of States whose citizens recognize in agricultural engineering a force for progress. It is to me a peculiar privilege to be here and in these inspiring surroundings to speak a work of felicitation. It is a source of satisfaction to experience this visible evidence of the growth of an idea, which though young in years already gives such promise of attaining a lusty youth. I am sure that the investment this structure represents will prove to be one of the best Kentucky has made. It can hardly be otherwise, for it is dedicated to two of your most noble resources - the youth and the agriculture of your State.

New Agricultural Engineering Building

The following article written by M. M. J. Crutcher (deceased), Superintendent of the University of Kentucky buildings and grounds and published in the September 1931 issue, Vol IV of the Kentucky Alumnus, ably described the lack of adequate space for offices, class rooms and laboratories.

The University of Kentucky concluded its present building program by opening for the fall term a new $75,000 Agricultural Engineering Building for the College of Agriculture. The 1930 General Assembly appropriated this sum of money to further the interest of agricultural instruction at the University. A large amount of careful planning, hard work and pains-taking effort, has transmuted the $75,000 into a beautiful Georgian building, spacious, adequate, and equipped in every way to meet the new demands placed upon the shoulders of those who must blaze the trail to the new frontiers of Agriculture.

In many ways it is not unlike the facinating story of from "A log cabin to the White House". Professor J. B. Kelley has for years carried on with this important work in a big way in a very small tin building, two or three sheds, and the great out of doors. He has withstood the rigors of wintry blasts and freezes along with the withering heat and drouths of summer. It must be agreed that moving into a building such as this, after the hard experiences of the past, presents no difficulties or misgivings to those who must submit to the ordeal.

I. K. Frankel and John J. Curtis of the Architectural firm of Frankel & Curtis, Lexington, Kentucky, were commissioned by the Board of Trustees to draw up plans and specifications for the building. On October 3, bids were received and contracts signed with a number of firms covering the work involved. A list of the various contractors and contract prices is included here as a matter of general information. 1. Building proper - W. T. Congleton & Company, Lexington, Kentucky, $53,457.00. 2. Plumbing - Ben F. Hurst Company, Richmond, Kentucky, $4,250.00. 3. Steam Heating - John H. Scott, Frankfort, Kentucky, $4,046.00. 4. Electrical Wiring, Moore-Young Electric Company, Lexington, Kentucky, $2,250.00.

This was done for the benefit of those who may want to know how

much the building cost, and to place the name of the contractor in print, so that he may have his just share of credit for doing a good job, in case the time ever comes for contractors to receive such recognition. In most cases the contractor's name is buried in oblivion unless he goes broke on the job or the building falls down before his generation lays down their hammers and tongs.

As to the location on the campus, the Agricultural Engineering Building occupies a prominent position at the end of a new agricultural quadrangle now in process of development, just off of Rose Street, on the Experiment Station Farm. Plans have been made to build a consideragle group of agricultural buildings within this area as the years go by and the money is made available by the Legislature, friends, Alumni or otherwise. As evidence of this plan, one may now see at the west end of the Quadrangle, the new Dairy Products and Manufacturing building, built year before last and dedicated in May 1930. The new livestock Judging Pavilion stands midway between them as a part of the group. So that three new and modern buildings have been erected on this area since 1926. There are four or five old frame buildings on the outskirts of this group as well as the Serum Laboratory and the Vetinary Department building housing the work of Dr. Dimock, which has gained worldwide prominence in less than three years. If the present conservative rate of expansion can be maintained over a like period of years the Old Grad who returns to his Alma Mater in 1938 will find a new and beautiful Agricultural campus for his inspection.

The building itself conforms in style, construction and architecture, with the type now being built on the campus. It is fireproof throughout, conveniently planned and pleasing to the eye. In many ways it is a fine example of the Modern University of Kentucky and shows plainly the results of experience

in matters of building, selection of materials, composition, mass and proportion. It illustrates improvement in matters pertaining to better looking buildings and shows that artistry and utility can after all, be happily joined together as a contribution to a new age in which education, in the true sense or the word, is playing a very important role.

As to plan, the building is shaped like the letter "U" having three wings or sections, inclosing a large outdoor machinery court or park. The building is 198 feet across the front and is 98 feet deep. The middle wing is two stories and the basement high, while the side wings are one story in height.

The basement space in the middle wing will be used for laboratory work in hydraulics, drainage, sanitation, concrete, and storage of lumber, supplies and equipment. The first floor area includes two class rooms, one laboratory, tool room, wash and locker room and a commodious hallway. The second floor is divided into four offices for the staff, a large combination drawing and class room and two convenient rooms for the work of producing blueprints.

The side wings are divided into large spaces for laboratory work in gas engines, farm motors and pumps, farm machinery demonstration floors, seed drying rooms, blacksmithing, woodworking, sheet metal works and lumber storage. The machinery park between these wingssconsists of a macadamized space 70x90 feet, and will be used for open air machinery demonstrations.

It goes without saying that Agricultural Engineering will be enabled to carry on in these new quarters with renewed vigor and greater efficiency.

1950-51 REMODELING AGRICULTURAL ENGINEERING BUILDING

The need for additional space for conducting the various phases of the Agricultural Engineering work increased to such extent that in 1950 Dean Thomas P. Cooper requested $70,000 for that purpose.

In 1951, the following remodeling or additions were made in the Agricultural Engineering Building. The open court was roofed to provide a floor space of 57' x 72' to be used for a farm machinery laboratory and a shop for doing research work and farm machinery maintenance work. The former wood shop laboratory room 107 was remodeled into a larger classroom, a hallway and an office for making blueprints for the extension farm building plan service.

Room 108 originally used for the farm machinery laboratory for students was remodeled for a metal and woodworking laboratory, stock storage room and two equipment storage closets. New electrical wiring was installed for lights and power.

The preliminary remodeling plans were prepared cooperatively by Earl R. Young, Jesse B. Brooks and J. B. Kelley.

The architectural firm of Frankel and Curtis completed the plans and specifications and supervised the construction work in 1951. That year Dean and Director Thomas P. Cooper was placed on the Change of Work Status and Dr. Welch was appointed to take his place.

Chapter IV

II Extension Work, Agricultural Engineering 1919-1957

The extension project in agricultural engineering was approved in 1919 shortly after James B. Kelley was employed. Active fild (field) work began in March 1920 when Earl G. Welch joined the staff as the first specialist in agricultural engineering, to work on land drainage.

However, some of the extension workers of other departments who were interested in the improvement of housing conditions for rural people, livestock and farm products, had done some extension work relating to farm buildings.

In 1920, the members of the section studied the needs of the state to plan a program of work and, in the first few years, considerable time was spent in acquainting the staff of the college, the extension workers, farm leaders with varius phases of agricultural engineering and their relationships to all phases of the science of agriculture, and in establishing their importance in the agricultural program of the state.

A questionnaire answered by the county agents in 1925 indicated the great need for teaching subject matter in engineering to the agents. The percent of county agents who thought they were qualified either by college training or experience to answer general questions concerning ~~economic~~ agricultural engineering subjects were as follows: Drainage 34 percent, Soil Erosion 46 percent, Farm Buildings 34 percent, Water Supply 14 percent, Sewage Disposal 17 percent, Farm Machinery and Farm Motors 26 percent.

Sub-projects and various phases of sub-projects were determined through an analysis of needs for assistance as expressed by county and home agents, farmers through these agents, direct correspondence and by close cooperation with the specialists of other departments of the college.

Sub-Projects Adopted

The subjects approved, the years in which sub-projects were included in the extension program, untimate goals, and a general statement of results accomplished are as follows:

TRACTOR SCHOOLS: 1920-1921

The first tractor school held in Kentucky for farmers and dealers was held at Louisville, Kentucky the winter of 1920 under the leadership of Earl G. Welch.

Ultimate Goal - To decrease the cost and increase the efficiency of tractors on Kentucky farms by educating owners and operators in the care and operation of farm tractors.

General Statment. A series of 50 meetings at twelve district schools held in cooperation with tractor manufacturers and their dealers resulted in individual schools being conducted annually by dealers and manufacturers. The average attendance at the 50 meetings was 80 farmers and operators.

FARM DRAINAGE 1921.

Ultimate Goal. To bring about the condition where all land classified as agricultural land is well drained and the necessary drainage structures are properly installed and manintained.

General Statement. The practice of under-draining wet land in Eastern Kentucky Counties is growing rapidly. Clogged stream channels in many western Kentucky counties make under-drainage inadvisable in many instances because of unsatisfactory outlets. This is a condition which apparently is to be remedied in the area as a whole, in spite of the incentive given to the dredging and maintenance of dredge ditches in organized drainage projects by Federal agencies cooperating with county drainage commissions. Some workable plans ~~is~~ are needed for clearing stream channels to provide outlets

for tile and to improve surface drainage.

In 1925 (August) Mr. Welch in cooperation with county agents, in 1928 conducted educational meetings to assist farmers to organize a cooperative drainage project on Elk Creek, Hopkins County. Twenty-two land-owners provided a fund of $5,400 with which to dredge 3.5 miles of channel. The land-owners cleared a right-of-way 50 feet wide where the ditch ran through the project. This project was completed in the fall of 1928.

Extension engineers also designed and assisted in carrying out a cooperative drainage project in a deserted channel of Elkhorn Creek, Franklin County, which was completed in 1930. Seven young farmers took the contract to excavate the open ditch with mules using slip scrapers. Within about two weeks the contractor found out that he was losing money. In order to save money on his food bill for his men, he fed them turtle soup as they were plentiful. As he was an honest man and agreed to finish the contract at a loss Mr. Welch told him he would try to interest one of the manufactures of dynamite to furnish the blasting materials and conduct a demonstration on the area by blasting out ditch with dynamite. At that date no dynamite had been used before in Kentucky for that purpose. With such cooperation the drainage project was completed to the satisfaction of every one concerned. Dynamite was used to clean out and straighten the open ditch that ran through four farms, and to construct a mile of open ditch on a fifth farm. This land, once well-drained and very fertile had become waste marshy land because of silting of the channel.

Starting in 1929, much drainage work was done in the mountainous counties of Kentucky where a large percentage of the most fertile level land was wet. A survey of Knox County showed that the average farm of that county had o nly 14 acres of land not too steep to be plowed with a 2-horse plow and four of the 14 were too wet for any other purpose but pasture.

The State of Kentucky had 573,299 acres of improved land that needed drainage, and 1,365,000 acres of undrained swamps and overflow lands in January 1926, according to a letter which Professor Bryant sent to all the manufacturers of tile in Kentucky, at the suggestion of the agricultural engineers, requesting them to write us offering their criticisms and suggestions for the future development of the work and to let us know, "what your company is doing to assist the farmers with their drainage problems".

Erosion Control



Good pasture covers are effective in controlling erosion, but on steep slopes much sheet erosion and gullying take place from the time of seeding until there is enough vegetation to protect the soil.

Examples of Erosion Control Demonstrations



Farmers Attending a terracing demonstration on J. W. Fulkerson Farm in Muhlenburg County.

Examples of Erosion Control Demonstrations



Plowing a terrace line on W. B. Stinson Farm, Elkton, Ky.



A badly eroded gulley.

Soil Conservation and Improvement Program For Kentucky

Approved or Adopted by Agronomy Department
Friday, November 24, 1944

I. Use Land According to Its Capability

1. Limit cultivated crops to the least erosive land.
2. Use other suitable land for meadows or pastures.
3. Grow trees on land not suited to cultivated crops, meadows or pastures.

II Maintain and Increase Fertility

1. Lime acid soils and supply limiting minerals nutrients.
2. Keep up the nitrogen supply with grass-legume sods, supplemented when profitable with fertilizer nitrogen.
3. Conserve and use manure and crop residues.
4. Grow cover crops.

III Conserve moisture and Control Run-Off.

1. Plow, Plant and cultivate on the contour.
2. Use terraces and diversions where needed.
3. Protect waterways and other critical areas with sod.

IV Establish and Maintain Good Pastures

1. Use adapted grass-legume mixtures.
2. Provide supplemental pasture.
3. Control weeds and give attention to other management practices.

V Drain Wet Lands that are Potentially Productive and on Which Drainage is Feasible.

for

1. Provide adequate surface a tile drainage.
2. Protect low land by diverting water from sloping land above.

VI Provide an Adequate Livestock Water Supply.

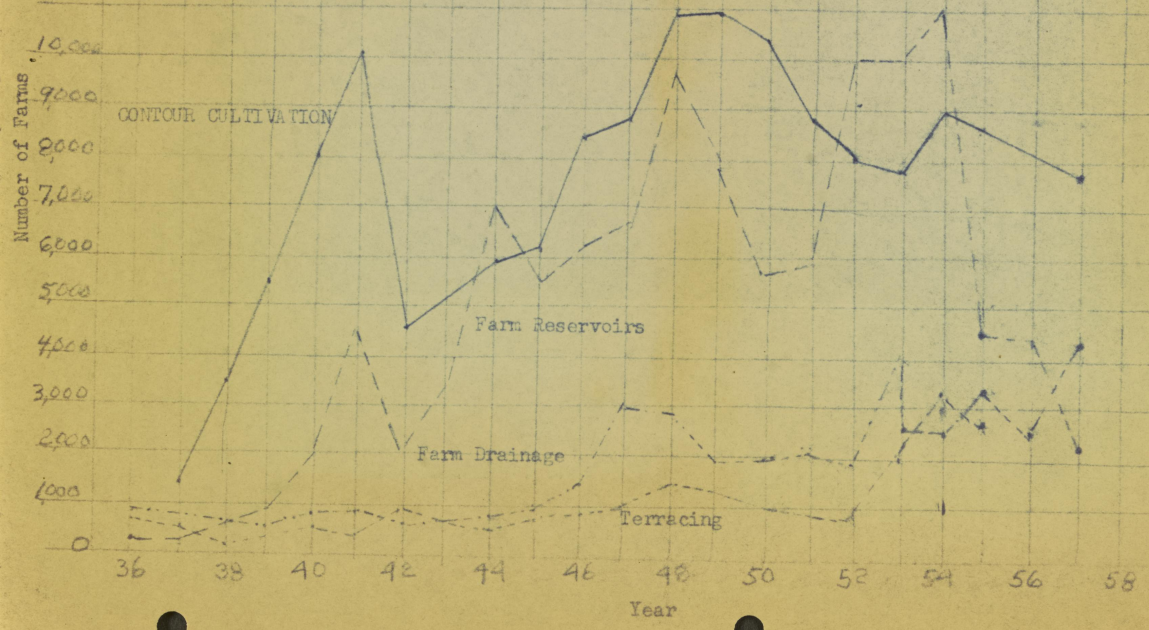
1. Construct farm reservoirs, and develop springs or other sources of water.

VII Use Good Farm Woodland Management

1. Prevent fires.
2. Avoid grazing.
3. Practice selective cutting. of timber.

AGRICULTURAL ENGINEERING EXTENSION WORK
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
University of Kentucky

Progress in adoption of Water Management Practices
Contour cultivation, terracing, drainage - Farms Assisted
Farm Reservoirs - Number constructed



The following information which J. B. Kelley presented at the Agricultural Section of the Kentucky Education Association (KEA) Meeting at Louisville, Kentucky kn 1927 & 1928 shows the seriousness of the Sanitation conditions in rural Kentucky at that time.

The need for adopting better sanitary measures in the rural communities of Kentucky is indicated by the following tables prepared by the Public Service Laboratories of the University of Kentucky. During 1926, 2905 samples of water were testedfrom various parts of the State. Of these, 2585 samples were from schools and home water supplies. The tests show that a high percent of the samples from wells, springs and cisterns were contaminated. In one county, out of 199 samples of water sent in from schools, 71 samples were bad.

1926 Water Supply Samples
Tested by Public Service Laboratories, Lexington, Ky.

School	Bad	Good	Total	Percent Bad
Wells	175	132	307	57
Springs	38	9	47	80.9
Cisterns	104	181	285	36.5
Miscellaneous	8	5	13	61.5
Domestic				
Wells	703	317	1020	68.8
Springs	153	44	197	77.7
Cisterns	215	284	499	43.1
Misc.	70	47	117	59.8
Totals for Schools and Domestic				
Wells	878	449	1327	66.1
Springs	191	53	244	78.3
Cisterns	319	465	784	40.7
Misc.	78	52	130	60.0
City				
Treated	43	245	288	14.9
Untreated	15	17	32	47.0

Mr. Welch, observing the hard life under which the mountainous people were barely ekeing out an existance on the hillsides, decided that straightening the stream channels and tile draining the rich bottom land would help improve living conditions in the area. That his decision was correct is shown by the following examples:

Drainage was started in Knox County in 1929. In 1931 Annual Report (2-yr. period), Extension Circular No. 259, Page 35 is found these records. Since then, 1929, 98 farmers have improved the drainage conditions of 3,579 acres. This year, 11 farmers tile drained 112 acres and 54 farmers improved drainage conditions on 2,592 acres by clearing 18 miles of creek banks of brush and trees and removing dams from the creek beds. Five of the drained fields treated with lime and phosphate fertilizer produced 61 bushels of corn per acre. Three demonstrations covering 18 acres of land reclaimed by enlarging creek beds, gave an average of 57 bushels of corn per acre. Nine demonstrations on 65 acres of drained land produced an average of 3 tons of soybeans per acre. The graph on page 50 shows the number of farms on which the agricultural Engineers gave assistance on land drainage problems from 1936-1957.

Soil Erosion

Observations taken by the agricultural engineers in 1921 convinced them that probably the greatest cause of loss of fertility from soils in Kentucky was soil erosion, because practically the whole area of the state is more or less rolling and much of it is decidedly so.

In January 1921, J. B. Kelley and Earl G. Welch outlined and started writing a circular on the subject. After preparing the first draft of the manuscript containing soil and crops and mainly engineering control practices, the engineers asked Professor George Roberts if he would read the manuscript, help revise it and become a co-author of it.

This Extension Circular No. 129 on "Soil Erosion" printed May 1922, was the first one published in Kentucky on the subject, although the practice of bench and ridge terraces had been conducted for several years in some of the southern states.

The first demonstration on terracing in Kentucky was conducted by Mr. Earl G. Welch and the County Agent, Mr. R. M. Greene, on the farm of John R. Downing, Route #4, Maysville, Kentucky, on November 24, 1924.

Probably the first farmer in Kentucky to personally lay out and construct a terracing system on his own farm was Mr. Herman Dutschke near Hardinsburg, Kentucky. Note that the U. S. Soil Conservation Service was established by Congress by approving the Soil Conservation Act of 1935. You can see from the dates above that our agronomists and agricultural engineers had already been activating this program in Kentucky for approximately 11 years.

The progress made from 1936 to 1957 is indicated on chart _____, Page 50.

For a number of years the agricultural engineers had a difficult time in convincing the soils and crops specialists that as they contacted farmers, they could help activate the erosion control program by advocating engineering practies in addition to the use of blue grass.

The proof that blue grass alone would not prevent soil erosion is shown in the attached picture taken of a farm reservoir, located in Fayette County, that had been in sod for about 20 years. Note that the sheet erosion had filled the pond to a depth of about 6 feet. (Page 18, Circular No. 470).

This picture and others taken from a 21.1 acre field, located on Experiment Station Farm, Lexington, Kentucky, which showed the gullying effect of winter rains or a field from which corn had been grown the previous summer, was shown by Mr. Welch in connection with an illustrated talk on erosion Practices at an Agronomy Department Staff Meeting the spring of 1942,

As a result, this meeting the engineers were authorized to establish terracing demonstrations for class work in the corn field, November 1943, and a

(51)

committee was appointed by Professor Roberts to prepare a Soil Conservation Improvement Program For Kentucky, for the cooperation of all the members of the Agronomy Staff, which was approved November 29, 1944. See a copy on Page 49 6.



Wet land on the farm of George Johnson in Muhlenburg County cleared of timber and brush ready to be tile drained, during 1925. Drainage system designed by Earl G. Welch.





The same field produced pounds of tobacco and 70 bushels of corn per acre in 1926.

A Drainage Demonstration



Excavating a drainage ditch for tile with Owensboro V-Shaped Ditcher, horse-drawn.



The tile in place and partially covered.

A Drainage Demonstration



The filled trench

Land Drainage



Undrained 8-acre field on Kelley Nickell's Farm, Morgan County



A cash expenditure of $125 for tile drainage on an 8-acre field owned by Kelley Nickell in Morgan County increased the yield of corn 40 bushels per acre.

Land Drainage



Mulenburg County
Drainage
George Johnson Farm
1925



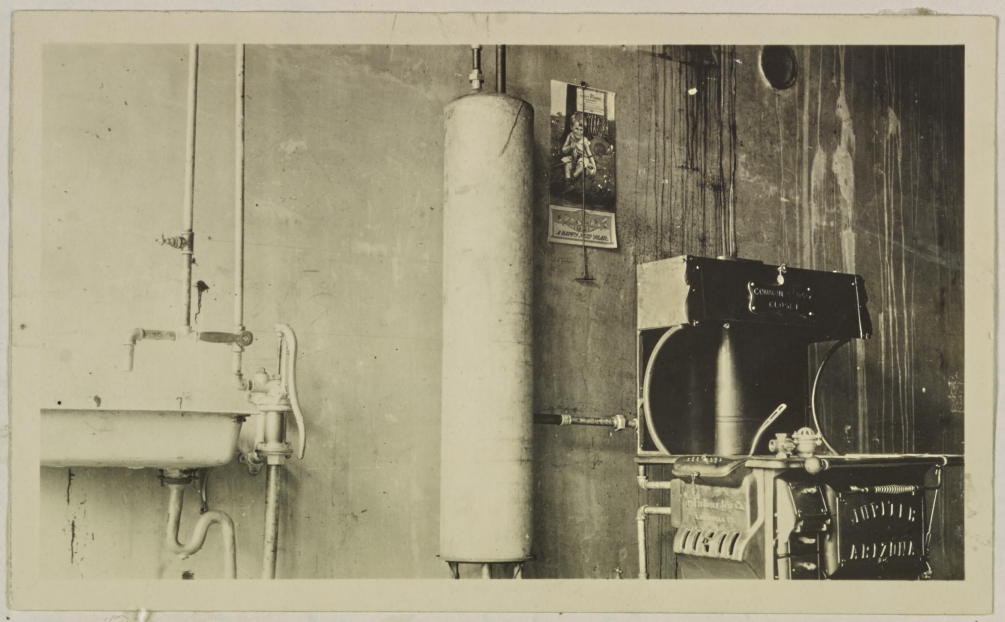
Dynamiting Ditch, Franklin County, 1928

Sanitation (Sewage and Water Supply) 1921 to date

Ultimate Goal: That all farms have adequate sources of pure water and that sewage be disposed of in a safe manner.

General Statement: The work on water supply and sewage disposal systems consisted chiefly in leader-training meetings conducted with the cooperation of the home management specialist for leaders of homemaker's club. Emphasis up to the time of the advent of the Rural Electrification Program, was placed on simple systems requiring a minimum of cash outlay. With electric service, came a demand for automatic electric pumping units with a corresponding increase in installations made each year. The chief handicap to the installation of water systems of any type had been the lack of adequate sources of water, because of limestone formations over much of the state makes it difficult to obtain satisfactory wells at reasonable cost either for household or for farm operations.

Sanitation: As a basis for an effective sanitation program, preliminary surveys were made in nine counties. The surveys showed the need of a more general adoption of practices for protecting sources of drinking water from sewerage contamination. Also it showed the lack of adequate water systems for homes. The value of such a survey is illustrated by the work of one of the home demonstration agents in Boyd County. Surveys revealed the need in many homes for pitcher pumps, sinks and simple drainage systems. The home demonstration agent applied herself to the task of this particular home improvement and was soon able to report that 20 homes had put pitcher pumps in the kitchen and simple drainage or sewage disposal systems according to recommendations. Also 18 new kitchen sinks and 30 drainboards were placed in kitchens.



An example of demonstrations conducted by agricultural engineers showing how to provide both cold and hot water in a home by installing a hand-operated force pump connected to the cistern, and have storage tank in the attic, a range boiler, a 3-way valve, a water front or back in kitchen stove. Many of these were installed during 1919 to 1935 to relieve the housewife from the drudgry of carrying water into the house and sewage out.

Also many pitcher pumps were installed at the kitchen sink when money was not available for the heating system.

Farm Reservoirs:

One of the most essential contributions the Agricultural Engineering Extension Specialists have contributed to the agricultural welfare in Kentucky is the educational work that has been done in teaching contractors and farmers how to construct better farm reservoirs. This work was initiated in 1927 by Earl G. Welch, but increased interest was aroused in the subject in August 1928 when an Ext. Circular No. 470, "Earth Dams for Farm Reservoirs" was published. Since 1941, approximately _____ farm reservoirs have been constructed in Kentucky.

The construction of farm reservoirs promoted in several counties seemed to be the best solution of the livestock water situation, and is still an important source of water for livestock and household uses when equippped with proper water treatment equipment. (see Ext. Circular No. 566, "Treating Pond Water For Farm and Home Use". The graph on Page ____ shows the number of farmers assisted in building ponds each year from 1936 to 1958, as reported in the Annual Reports of the county agents.

Farm Reservoirs

Pictures of a few of the reservoirs for which Mr. Welch assisted the county agents in selecting, staking dam sites, spillways and supervised the construction of the same.





IRRIGATION

In 1948, Mr. John Fisher of Fayette County and Earl G. Welch, Extension Specialist, planned an irrigation system for the production of tobacco, which was the first system used on tobacco in Kentucky. In 1949, sixty-nine farmers in 18 counties irrigated a total of 483 acres and the number increased to 1350 systems used on 16,000 acres of tobacco irrigated in 102 counties in 1954. Supplemental irrigation practices have proven to be practical in Kentucky on crops of high income value planted on fertile soils and for establishing fall seedings of cover crops, grasses and legumes. Due to the drought periods that occur almost annually in Kentucky, the practice of supplemental irrigation will no doubt increase.

Farm Mechanization

The Agricultural Engineers through correspondence, personal interviews, field demonstrations and training of leaders for 4-H Club Tractor Maintenance schools, have given considerable assistance in the very rapid development that has taken place in the mechanization of farms in Kentucky since 1940. What the growth has been is shown by the following data:

Number of Selected Machines Used in Kentucky

Farms In	1940	1956
Tractors	11,927	88,667
Grain Combines	1,700	9,221
Pick-up Balers	700	11,334
Corn Pickers	200	10,597
Field Forage Harvesters		1,937
Milking Machines	700	9,092

By use of mechanized farm equipment, Kentucky farmers have greatly increased yields per acre, reduced production costs and made farm work easier.

Irrigation In Kentucky

Previous to the year 1951 some Kentucky farmers had long desired a method of overcoming the ill effects of drouth periods, even those of comparatively short duration which occurred almost every year. Only a few truck farmers had previously installed permanent overhead sprinkler systems on level land of high productivity with satisfactory results, even though the cost per acre of the installations was very high.

In 1951 the agricultural engineers decided to investigate the practicability of the use of centrifugal irrigating pumps, light weight portable pipe with automatic couplers and rotary sprinklers making it possible to irrigate the rolling land in Kentucky economically.

Immediately our extension engineer, Earl Welch working in cooperation with the county agents and commercial dealers and farmers established irrigation demonstrations to study the problems involved.

Table I and Table II below show the results of the Farm Tobacco Tests.

			Irrigated			Non-Irrigated		
Yr.	No. crops	Counties	Av.lb/a.	Av.price	Av. $/A.	Av. lb./A.	Av. price	Av.$/A.
1951	12	8	2081	$61.20	$1273.47	1493	$55.00	$820.35
1952	15	10	1970	54.00	1063.69	1296	49.38	640.00
1953	42	19	1959	55.92	1095.09	1398	51.82	747.31
1951) 1952) 1953)	69	25	2003	57.04	1144.06	13.96	52.07	735.89

Table II

No. Crops	Time of First Irrigation	Average Selling Price
18	Before August 1	$58.20/100 lbs.
22	After August 1	53.44/100 lbs.

As a result of these observations, Mr. Welch wrote a very excellent handbook on designing irrigation systems, crops and method of irrigating them, and investement cost and results, Circular No. 528, "Irrigation In Kentucky" which was published February 1955.

This is another example of the value to Kentucky farmers of the extension work pioneered by the agricultural engineers.

Irrigation in Kentucky



Portable pipe lines with quick couplers are laid on top of the ground.



Sprinklers are usually placed 40 to 60 feet apart and the lines are moved 60 or 80 feet.

Irrigation in Kentucky



A typical field of tobacco that has been irrigated. Note the sprinkler in the right center of the picture. Tobacco fields are generally irrigated two or three times with 1 to 1 1/2 inches of water each time. During the three years, 1951 to 1953, irrigation increased the income of tobacco for 69 crops in 25 counties an average of $408.17 an acre.

Irrigation

Pumping installations for irrigation experiments on pasture fields on Republic Steel Farm, Paris, Kentucky. Water pumped from a low dam on Stoner Creek



Pump Located at dam site



Pump located at top of creek bank at bottom of slope of pasture area.

Agricultural Engineering Phases



Gas engine driven portable centrifugal pump located on _____ Creek used for irrigating pasture plots on the Republic Steel Farm near Paris, Kentucky

Lime Burning: (1923 to 1930

Ultimate Goal: To establish the practice, in cooperation with field agents in soils, of preparing limestone for agricultural use, by burning as an additional source of lime in those communities where limestone and cheap fuel make it possible to decrease the outlay for lime to a minimum.

General Statement: The development of plans for building lime kilns and limestacks, in blueprint and circular form, and method demonstrations conducted by extension agricultural engineers and county agents, have established a source of lime for farmers in many counties where any cash outlay for lime is an important item. The use of burned lime obtained from Kilns or stacks in some counties stimulated the use of burned lime by the farmers where there was not limestone available as a by-product and where high freight rates and long hauls over bad roads make shipping and hauling of pulverized limestone too expensive. In 1924, Circular No. 174 was prepared, "Making Limestone More Available For Farmers", by George Roberts. In it was a section on plans for lime kilns and plans for lime sheds, by Earl G. Welch and J. B. Kelley. Nearly 100,000 tons of burned lime were used in the period 1925 to 1942, pricipally in counties remote from commercial railroads and quarries. Plans for lime kilns were furnished by the College. The use of portable lime grinders were used widely in some counties, especially in Bourbon County. Railroads became interested. In 1928 twenty-six carloads were delivered in Graves County and twenty-four in Webster County.

Lime Burning To Be Used For Fertilizer
Year 1930



A lime kiln ready to be fired, built by,
John McKee near Danville, Kentucky



One-half-ton lime kiln ready to be fired
with natural gas in Taylor County, Kentucky



Lime kiln fired with logs

Lime Burning (continued)



Burned lime crushed by hand using hammers and axes.
Taylor County in Kentucky



Pit of burned hand-crushed lime

Lime Sheds:

Another help furthering the use of limestone was the cooperative lime sheds placed at railway stations. In 1931 plans for building forty-six such sheds were furnished by the Agricultural Engineering Section, University of Kentucky. in 1924, another activity that was helpful in promoting the use of limestone was the loaning of two limestone crushers to farmers by the State Department of Agriculture. The number increased to 7 crushers and tractors. This work was discontinued in 1938 because of the lack of funds. The equipment was then placed in counties in charge of the county agents where limestone was not easily available to farmers. The amount ground in a year reached as high as 30,000 tons.

Since 1930, active field work on buring limestone was discontinued by the agricultural engineering extension agents, but plans for building and burning lime kilns and stacks were available to farmers and others.

Lime Pulverizing: 1934 to 1936

Ultimate Goal: To obtain and distribute information on the cost of labor and the mechanical operations of pulverizing limestone, and additional items including moving, repairs, depreciation, interest and profit.

General Statement: In 1935 and 1936 customs operators of lime pulverizing equipment kept on blanks, provided, cost records which were summarized and used as the basis of recommendations for charges to be made for customs work. Increased efficiency of pulverizing operations based on these recommendations has resulted in lower charges with satisfactory profits for the operators.

The following was quoted from Professor George Roberts' "History of the Agronomy Department", Page 125, on the using of lime materials: "I CAN NOT find any estimate of the annual use of lime in Kentucky for agricultural

purposes prior to 1925 except for the year 1918, given by the National Lime Association which was 12,959 tons." Beginning in 1925, S. C. Jones started to collect annually from county agents, reports of the amount of liming materials used by farmers. That year 101,452 tons were used and the records recorded from 1925 to 1942 a total of 9,977,000 tons .

Lime Sheds



A lime shed constructed at a railway siding according to plans prepared by the agricultural engineers.



J. L. McKitrick assisted in establishing this lime quarry and processing equipment in _____ County.

Loading and Spreading of Marl - 1928-1930

By E. G. Welch and S. C. Jones.

Ultimate Goal. The general adoption of mechanical equipment for loading and spreading marl and thus stimulate its use as a cheap source of liming materials.

General Statement. The observations of S. C. Jones, Soils Field Specialist on a visit to Nelson County in 1923, observed the benefits of the growth of sweet clover and alfalfa on areas below marl banks. In 1926, he found deposits of marl that contained as much as 98 percent calcium carbonate. He estimated that about 2 1/2 million acres of land could be limed with marl within a hauling distance of 2 1/2 miles from some of the deposits.

In order to interest the farmers to use the marl even on the farms where it was located, it was necessary to substitute for hand shovels, less laborious methods of handling it.

The work done on this sub-project by Mr. Welch and Jones consisted of preparation of plans and blueprints and a circular on marl loading equipment and the use of it.

Through the cooperation of commercial concerns spreading attachments were developed for spreading marl over a wide area as it came from the machines. Twenty-three demonstrations were conducted in 1928. In 1928, County Agents reported a 60 percent increase in the use of marl. One commercial concern sold 995 manure spreaders with marl spreading attachments in 1928. Mr. Welch and Mr. Jones prepared Circular No. 223, "Loading and Spreading Marl" in 1929. Following the year 1930, the field agents in soils actively promoted the use of marl loading and spreading equipment without the assistance of the Agricultural Engineering Section.

Farm Building Plan Service: 1921

Ultimate Goal: That all farm buildings and equipment be constructed or remodeled according to plans and specifications adopted to Kentucky conditions in order that farm families, poultry, livestock and farm produce

may be adequately and efficiently housed.

General Statement: The number of farms constructing buildings from plans designed for Kentucky conditions and distributed by the Agricultural Engineering Section has increased from 570 in 1922 to 5037 in 1956. The cooperation of field agents in tobacco, poultry, livestock and home economics, contributed much to this work.

This service was starged in Kentucky in 1919 when no source in the state was in position to furnish building plans to meet the needs of the farmers. The plans and other building information furnished rural people from 1919 to 1957 unquestionably in no small way have been responsible for better homes for rural people and more adequate labor saving and healthier housing conditions for livestock and poultry. Such plans and information have made possible the growth that has taken plane in dairying and broiler industry in Kentucky.

Agricultural Engineering Extension Phases



Earl G. Welch demonstrating how to save labor by loading marl into a manure spreader using an incline plane and a slip scraper.

Agricultural Engineering Extension Phases of 4-H Clubs

In 1928 the Agricultural Engineers decided that one of the best ways to spread the agricultural engineering practices to the farmers was by working with the 4-H Club boys.

Therefore, Mr. Welch in cooperation with the 4-H Club Department and county agents conducted that year a 4-H Club Terracing Contest. Each 4-H Club boy was taught to use a leveling instrument, stake out a field for terracing and take part in a county terracing contest to select a winning team of two boys to send to 4-H Club Junior Week emcampment at Lexington, Kentucky

Thirteen teams in 1928 came to Junior Week where each boy was given an examination on the adjustments of the instruments and terracing practices, and also to stake out a terrace line.

The winning team of the state contest was given a level and rod and won a trip to the International Livestock Exhibition in Chicago.

The group picture on Page 81 was taken of the county agents and their winning teams that entered the State Contest in 1928.

The interest in this type of educational contest spread rapidly and as a result, the agricultural engineers continue to promote the terracing contest and have added others as follows:

4-H Club Contest on Farm Reservoirs
4-H Club Contest on Land Drainage
4-H Club Contest on Contour Cultivation
4-H Electrical Projects
4-H Woodworking Projects
4-H Tractor Maintenance
4-H Tractor Driving Contests
4-H Metal Roofing Projects.

Agricultural Engineering Extension Phases of 4-H Clubs



The first terracing teams trained by Mr. E. G. Welch and the county agents in the year 1928.

(~~21~~)

4-H Tractor Maintenance Schools, 1944-1949

The first 4-H Club Tractor Maintenance School in Kentucky was held in the Agricultural Engineering Building, University of Kentucky in January 1944, and two of these schools have been held each year since 1944; one at Lexington and one at either Princeton, Kentucky or Hopkinsville, Kentucky.

The school is a cooperative project envolving National and state officials or leaders of 4-H Clubs, oil companies, tractor companies, agricultural engineers, county agents, volunteer farm leaders, local tractor dealers and 4-H Club members.

The purpose of the schools is to train the volunteer leaders, who attend from the counties, how to organize and conduct similar schools in their home county, for training 4-H Club members to operate and maintain their own or their father's tractors. This project has been very popular and has helped reduce tractor operating costs on thousands of farms in Kentucky.

Rural Electrification. 1934

Ultimate Goal. To improve the standard of living on all Kentucky farms where practical, through educational programs designed to assist rural people to obtain electrical service and use electric power efficiently.

General Statement. As leaders of the Rural Electrification Program, agricultural engineers, with the cooperation of home economics extension agents, county agents, and local leaders, have conducted and assisted utility companies with their programs of rural electrification to the extent that practically every county in Kentucky is benefiting by some type of rural electrification progress. Little was accomplished in Kentucky by Government Agencies or utility companies until the extension division stimulated action by conducting development educational meetings, and by preparing and furnishing rural people with publications on electrical wiring and uses of electrical equipment. (see list of electrical publications, Page _____ and _____.

History and Development of Rural Electrification in United States of America and in Kentucky.

A. History of C. R. E. A. - Nation Committee on the Relation of Electricity to Agriculture started active work August 1, 1923, with Dr. E. A. White as Chairman and he continued in that position until September 1940, when the committe disbanded.

Its function was to give purpose and direction to a national movement looking toward the solution of the problem of getting electric lights and power service to the farms in the United States. The original committee was composed of representatives from the following organizations:

Rural Electrification. 1934, continued

American Farm Bureau Federation	U. S. Dept. of Agriculture
National Electric Association	U. S. Dept. of Agriculture
Power Farming Association	U. S. Dept. of Agriculture
American Society of Agricultural Engineers	

Realizing that the rural electrification problem varies with the types of agriculture found in different parts of the U. S., the committee directed its efforts to the formation of state organizations for the primary purpose of instituting and executing investigations which would unearth the possibilities for the use of electricity on the farm. By January 3, 1928, 15 states were organized for research work. The State Committees requested the Agricultural Colleges and Agricultural Experiment Stations to direct the investigational work.

B. The Tennessee Valley Authority.

The Tennessee Valley Authority was created by an Act of Congress on May 18, 1933.

The work of the Tennessee Valley Authority includes the generation and sale of power, the building of dams, power plants, and transmission lines, the development of fertilizers, and under the immediate direction of the President, a program of social and economic planning with the aim of promoting the social and economic welfare of the region and of the nation. This more general program includes soil erosion, forestry, the balancing of agriculture and industry, the better and fuller use of mineral resources, and such problems as the vocational adjustment of unemployed men and women to new or more productive fields of work.

C. History of R. E. A.

The Rural Electrification Administration was established by Executive Order No. 7037, dated May 11, 1935. Funds were made available by Congress for rural electrification under Emergency Relief Appropriation Act. 1935.

1934

ACKNOWLEDGMENT

On April 6, 1934 we received a wire from Mr. Geo. W. Kable, Rural Electrical Engineer, Bureau of Agricultural Engineering, Washington, D. C., authorizing us to employ three engineers for making a rural electrification survey in Kentucky, as a continuation of the Rural Housing Survey. By Wednesday April 11, the wark was started. Mr. John B. Trice of Hopkinsville, Kentucky was employed as surveying engineer for Fayette County and to assist in compiling the data for the State. Mr. L. C. Huffman, Elizabethtown, Kentucky was employed as surveying engineer for Hardin County, and Mr. W. T. Miller as surveying engineer for Shelby County. We were ntotified later that the work must be completed by April 28. This only allowed us 17 days for doing the work. In that time, however, we were ble to complete the surveying in three counties and gather other information of value on the present situation which will give us a foundation for continuing this work at some later date.

I wish to acknowledge the very cordial cooperation which we received from the various utilities companies doing business in the State. The majority of them very kindly furnished us with maps showing the location of their transmission and distribution lines, data regarding their power stations; information regarding line construction and many of them copies of their rural service contracts. This information, along with the data obtained on the rural housing and rural electrification surveys, are included in this report.

From the maps furnished by the various companies and information available on the State Geological Survey maps, a State map was prepared showing the locations of all the transmission and distribution lines in the State, ownership lines, location and sized of powerstations, and voltages of the various transmission lines.

I wish also to acknowledge the assistance given us by Miss Myrtle Weldon, State Leader of Home Demonstration Specialists, who was the Chrisman of the Committee on Rural Housing Survey for the State of Kentucky; Bruce Lorch, State Supervisor of the Rural Housing Survey, and her assistants. I wish also to acknowledge the assistance of M. Paul Thurman, Lexington, Kentucky, who assisted in preparing the State Map. The members of the Farm Economics Department and Dr. Ralph Woods, of the Education Department, kindly furnished us with the economic data showing the agricultural situation here in Kentucky. These data should prove very helpful in formulating a future pokicy forthe development of rural electrification in Kentucky.

James B. Kelley
Professor Agricultural Engineering
University of Kentucky
Collaborator of the Bureau of
Home Economics
U. S. D. A., Washington, D. C.

Rural Electrification, continued

The first rural electric co-op member to be connected in Kentucky was Mr. Frank Street, located on the Henderson-Union Rural Electric Co-operative at Henderson, Kentucky - this was in 1937. Today, Kentucky has 26 Co-ops with lines in 112 counties, serving about 230,000 installations, or about a million people. Ref. Rural Kentuckyian, May 1960 issue, Page 15.

When the organizers investigated the requirements for setting up a cooperation, they learned that the only bill in Kentucky statues for setting up rural cooperatives was the Bingham Act used for organizing the Burley Tobacco Association in 1920, and that the provisions specified in it would not exactly be suitable for establishing rural electric cooperatives.

The firm of Pentecost and Dorsey was instrumental in drawing up and preparing the Rural Electric Cooperative Act, which was adopted at a special session of the State General Assembly in 1934, at which time A. B. (Happy) Chandler was governor. This was the act under which all of the present state-wide Rural Electric Cooperatives were organized. There were several "firsts" that this legal talent participated in, among which was the "first rural electric cooperative to be organized in the state", "first to effect a consolidation of rural electric cooperatives," and the first to energize its lines." Ref. Rural Kentuckian, May 1960 Issue, Page 35.

Under the leadership of Ben N. Niles, of the president and other members of the Henderson County Farm Bureau, Ben Kolgore, Executive Secretary of Farm Bureau and the cooparation of Governor Chandler, K. R. Krug, Chairman and members of the Kentucky State Bower Commission, a suitable bill was prepared known as House Bill No. 126 and was made a law February 27, 1934. This bill was such an excellent one that a large number of other states used it as a model in preparing similar bills for the same purpose.

Rural Electrification, continued

By May 24, 1937, twenty-eight counties had submitted requests from R. E. A. for allotments of funds. Twleve additional counties were making preliminary surveys and two projects, Henderson and Salt River (consisting of Nelson, Bullitt, Washington and Spencer Counties) were starting the construction work. (see letter to Mr. Ben Kilgore, by Mr. Earl G. Welch, May 24, 1937, J. B. Kelley file).

In January 1936, Kelley and Welch outlined the plan and policies for the engineers and county agents to follow in carrying on the educational program on the development of the Rural Electrification Program in Kentucky by the Director of Extension, Thomas Poe Cooper, in 1936.

Nature of Programs Conducted by Agricultural Engineering Specialists On Rural Electrification Project:

1. Held educational meetings to outline assistance available from REA; the method recommended by that agenty for developing cooperatives under state laws; and the development of county and community organizations for making membership surveys.

2. Educational meetings on wiring to meet code requirements and REA specifications.

3. Subject matter training meetings for county agents and home demonstration agents.

4. Special rural electrification exhibits at State Fair and Farmers' Week at Lexington.

Tennessee Valley Authority

A cooperative agreement between the College of Agriculture and the Tennessee Valley Authority, effective since 1935, resulted in increased opportunities for this section with the employment of a supervisor and 6 assistants in the seven counties of the Tennessee River Area in Kentucky. These agents spent all their time in soil improvement work including that of an engineering nature. The Supervisor is a member of the Agriculture Engineering Section. The cooperative relationship between TVA and the College has been very satisfactory and has resulted in outstanding improvement work in crops, soils and agricultural engineering.

Rural Electrification, 1934, continued

The Rural Electrification Act of 1936 (approved May 10, 1936) definitely established the Rural Electrification Administration and the President appointed Morris Llewelly Cook as Administrator.

Rural Electrification, continued

Information obtained through the state-wide survey on rural electrification inaugurated on December 27, 1934 and completed in April 1935 by the State Planning Board for the Federal Emergency Relief Administration indicates that in practically every county in the state the rural people are interested in getting electricity and that in many of the counties in the state the conditions are such as to make transmission lines that may be erected, self-supporting. The following data was taken from the reports of the K. E. R. A. Survey.

a. Survey of Existing Rural Customers

1.	Total miles of rural lines reported	3,018
2.	Total nunber of customers reported	15,813
3.	Average number of customers per mile	8.31
4.	Average light bill per monty	2.98
5.	Total income per year for current	507,484.00
6.	Total kwh consumption per customer per year	403
7.	Total kwh consumption per year for all	6,127,394

b. Survey of Proposed Lines

1.	Total miles of proposed lines	10,594.4
2.	Total number of prospective customers	70,548
3.	Average number of customers per mile	6.6
4.	The total miles of proposed new lines varied from 9.9 miles in Martin County to 246 miles in Hopkins County.	
5.	The average number of customers per mile on the present lines varied from 3.49 to 19.4.	
6.	The estimated average per kwh comsumption per year per customer on the proposed new lines varied from 120 to 600.	

The First R. E. A. Cooperative in Kentucky

The first R. E. A. Cooperative organized in Kentucky was in Henderson. The record found in our extension annual report of 1936 specified that Earl G. Welch assisted in the development of this organization for farmers for a line 163 miles in length.

Extension Publications Prepared by Members of the Agricultural Engineering Staff - From 1921 through Sept. 1957

No. of Circular	Date	Date (Revision)	Title	Author or Authors
53 (AES)	1942		"How to Make A Castor Bean Thresher	J. B. Kelley
71 "	1952		"Space Requirements for Kentucky Farm Homes"	J. B. Kelley J. N. Krueger
107	1921	May 1928 Mar. 1931 Apr. 1936 Aug. 1940 (No. 351) Feb. 1945 (No. 403) Nov. 1957	"H ousing Farm Poultry" "Shed-Roof Poultry House"	J. B. Kelley J. Holmes Martin J. B. Kelley Wm. Insko, Jr.
111	1921	Apr. 1924 May 1928 Jan. 1935 1943 (Cir. No. 397) Jul. 1944 June 1948 June 1957 (Misc. No. 94)	"List of Farm Bldg. Plans"	
124	1922		"Junior Shop Exercises" (Woodworking Merit Course)	J. B. Kelley Earl G. Welch
125	1922	Aug. 1923 Feb. 1936	"Pitcher Pump Instal lation"	J. B. Kelley Earl G. Welch
128	1921	Jan. 1930	"Building Plans for The Dairy Farm" Revised by:	J. B. Kelley J. J. Hopper Earl G. Welch J. B. Kelley
129	1922	 Mar. 1928 Jul. 1937 (No. 304)	"Soil Erosion" "Soil Erosion & Its Control"	Prof. Geo. Roberts Earl G. Welch J. B. Kelley
131	1931	Apr. 1947 (431)	"Septic Tanks for Sewage Disposal"	J. B. Kelley Earl. G. Welch
139	1922		"A Simple Hot and Cold Water System"	J. B. Kelley Earl G. Welch
156	1923		"Team Demonstration Outline"	E. E. Fish J. B. Kelley

157	1923	Jan. 1927 & 1930 Jan. 1933 & 1935 Jan. 1936 & 1938 Feb. 1940 & 1942 June 1943 & 1949	"Brooding Chicks Artificially"	J. B. Kelley J. E. Humphrey
174	1924		"Making Limestone More Available For Farmers"	Prof. G.Roberts Earl G. Welch J. B. Kelley
198	1926		"Sunlight Movable Hog Houses For Kentucky"	Prof. E. J. Wilford James B. Kelley
223	1929		"Loading & Spreading Marl"	Earl G. Welch S. C. Jones
246	1931		"The Hydraulic Ram"	Howard Matson
247	1936	(revised)	"Burning Limestone for Agricultural Use"	Earl. G. Welch
266	1933	Jul. 1937	"Home Storage Structues & Equipment Revision by:	Howard Matson J. B. Kelley
279(Rev. 299)		?	"Ventilation of Tobacco Barns"	Russell Hunt J. B. Brooks
291	1937		"Simple Problems in Land Measurement"	E. G. Welch
305	1937		"The Cost of Rural Electric Service"	J. B. Kelley Earl G. Welch
311	1938		"Electric Service for the Homestead"	J. B. Kelley E. G. Welch (Miss) Ida Hagman
315	1938		"How to Estimate the Cost of Wiring, Equip. and Electrical Service For Farmstead"	J. B. Kelley Earl G. Welch
317	1938	June 1949(470)	"Earth Dams for Farm Reservoirs"	Welch-McKitrick
319	1938		"Electrically Operated Water Systems For Farms"	Jesse B. Brooks
325	1939		"4-H Woodwork Project"	J. Brooks-Young, E.
375	1942		"Mowing Machines, Repair and Adjustment"	J. B. Kelley
398	1944	May 1945 Mar. 1946	"Storing Food in Freezer Lockers" Revised by:	J. B. Kelley Pearl Haak J. B. Kelley Mrs. Haak A. J. Olney & E. J. Wilford

404	1945		"Opportunities in Ky. Agriculture". Work in cooperation with other members of the College in preparing this publication	J. B. Kelley
423	?		"Woodworking Project"	Jesse Brooks Earl Young
431	1947	Sept. 1956	"Septic Tanks for Dwellings"	E. G. Welch J. B. Kelley
434	1947		"How to Select and Use Concrete Blocks in Farm Building"	E. S. Holmes
444	1943		"Distribution of Temperatures and Relative Humidity Within A Burley Tobacco Barn"	L. S. O'Bannon
452	1948	May 1953	"Electric Water Systems for Farms"	J. B. Brooks E. G. Welch
470	(Formerly 317)	June 1949	"Earth Dams for Farm Reservoirs"	J. McKitrick
492	1952		"Materials & Construction Specifications for Kentucky Farm Homes"	J. Krueger J. B. Kelley
496	1952		"Heating Practices and Equipment for Curing Burley Tobacco"	J. Krueger
501	1947		"Principles of Burley Tobacco Barn Operation"	L. O'Bannon
528	1955		"Irrigation In Kentucky"	E. G. Welch
553	1957		"Bulk Tank Milk Storage"	J. B. Brooks J. D. Foster E. C. Scheidenhelm
580	1938		"Planning for the Use of Electricity in the Home"	Miss Ida Hagman

4-H Woodwork Projects:

4-H 1150, 1st yer. 1956		"Farm and Home Electrical Projects" - Holmes - Fish
4-H 1152, 3rd Yr. 195s	Jan 1954 " 1955 " 1956	" " " " - Holmes - Fish

LIST OF MIMEOGRAPHS BY THE AGRICULTURAL ENGINEERING STAFF, 1921-1948

No.	Title	Authors
A-- 7	Home Butchering Equipment	
A - 9	Lamp and Lantern Brooder (now replaced by leaflet)	
A - 10	4-H Terracing Contest	
A - 17	Lamb Feed Troughs	
A - 19	Plan of Work, Electrically Brooding Demonstration	
A - 20	Results of Electrical Brooding 1940, and Brooding Record Sheet	
A - 22	Fish Screen	
A - 23	Lime Spreader From Rear Axle of Ford Car - J. B. Kelley	
A - 27	Water Stand for Poultry - J. B. Kelley	
A - 30	List of Farm Building Plans	
A - 32	Directions for Making a Fly Trap - J. B. Kelley	
A - 35	Trench Silos (now Misc. #6) - Earl G. Welch, Jesse B. Brooks	
A - 37	Electric Light for Stripping Rooms - Earl G. Welch	
A - 42	Sheep Feeding Equipment	
A - 43	Suggestions on Electric Brooding	
A - 45	A Cotton Fluffing Machine - J. B. Kelley	
A - 47	Freezer Locker Plants - Revised 1944	
A - 51	Better Farm Gates	
A - 52	Self-Feeders for Hogs	
A - 54	Results of Electric Brooding Demonstration 1940 & 1941 - E. G. Welch	
A - 55	Plans for Inter-County Electric Lighting Fixtures for Stripping Tobacco	
A - 56	Poultry Feeding Equipment	
A - 57	A House for Hogs - J. B. Kelley	
A - 61	The Use of Water Channels as A Means of Controlling Erosion in the Hills-of-The-Bluegrass Area in Kentucky - E. B. Welch	
A - 64	Machinery for Planting Hemp for the Production of seed, 1943.	

Mimeographs, continued

A - 75	Hemp Seed Data for Planting - J. B. Kelley
A - 76	Wheat Storage Structures and Problems - Jesse B. Brooks
A - 78	Equipment for Dehydrating Fruits and Vegetables - J. B. Kelley
A - 82	Instructions for Adjusting Combines and Threshers for Cleaning Hamp Seed - J. B. Kelley, J. L. McKitrick
A - 84	Portable Hay and Grain Racks for Cattle
A - 85	Plan of Work, Repair, Adjustment and Utilization of Farm Machinery
A - 86	Homemade Electric Water Warmers for Poultry
A - 87	Order Machinery in order to win (replaced by leaflet)
A - 90	4-H War-Time Agricultural Engineering Project - Memers Can Save
?	Weight of Limestone in Concical Piles
A - 92	Bale Tie Straightner - J. B. Kelley, J. L. McKitrick
A - 94	List of Mimeographs Available
A - 97	A Machine for Beating Out Hemp Seed, March 1943 - Jesse B. Brooks
A - 100	Dipping Vat For Sheep (stationary) - Jesse B. Brooks
A - 101	Harvesting Red Clover Seed - E. N. Fergus, J. B. Kelley
A - 104	Miner Feeder for Sheep
A - 109	Homemade Levels
A - 111	Homemade Phosphate and Lime Spreader, -Brooks, January 1944.
A - 116	Fertilizer Attachment for a Walking Plow. Kelley, 1944
A - 118	Homemade Electric Lamp Brooder
A - 127	Hog Waterers. Brooks, 1944
A - 130	Temporary Silos
A - 136	Minimum Requirements in Dairy Barns. Brooks, 1944
A - 137	Two-Row Corn (knife) Cutter for Tractor - J. B. Kelley
A - 140	Bill of Materials Required for Homemeade Level and Target - E. G. Welch
A- 143	Tobacco Housing Hoist

Mimeographs, continued

A - 149 Self-Dumping Manure Cart -

A - 150 Tobacco Wall Press - Jesse B. Brooks

A - 159 Laundry Cart - 1945, Miss Ida Hagman

A - 160 Lap Table - 1945 " " Hagman

A - 161 Shoe Shining Cabinet

A - 162 Wood Box - Ida Hagman, J. B. Kelley

A- 163 Sewing Cabinet - Miss Hagman, J. B. Kelley

A - 164 Utility Table - Miss Hagman, J. B. Kelley

A - 165 Ironing Board - Miss Ida Hagman

A - 169 Serving Table or Pull Board Table - Miss Ida Hagman

A - 171 Homemade Dish Cabinet - August 1946

A - 174 Tobacco Housing Hoist (metal) -

A -175 Tobacco Plant Bed Burner - E. S. Holmes

A - 183 Suggested Homemade Weed Control Spray Rig for Applying 2 4 D Treatment - Tractors. J. F. Freeman, L. M. Josephson

A - 187 Suggested Homemade Weed Control Spray Rig,(Same Except, Hand Operated - John L. McKitrick, J. F. Freeman

A - 190

A - 190 Methods of Handling and Storing Ear Corn - J. B. Kelley

A - 196 Automatic Poultry Waterers - E. S. Holmes, C. E. Harris.

MIMEOGRAPHS - Farm Shop - Earl R. Young

A - 24	Stool and Stepladder
A - 25	Miter Box
A - 26	Nail and Hardware Cabinet
A - 28	Fruit Jar Rack
A - 29	Bracket Shelf
A - 33	Homemade Lathe
A - 39	List of Shop Plans
A - 58	List of Essential Tools (shop)

Leaflets:

No.	Title
A - 4	Contour Cultivation - E. G. Welch
- 6	Check List For Farm Machinery Repairs, 1943
- 17	How to Make A Lantern Brooder With Sun Porch - Jesse B. Brooks
- 22	Hints on Remodeling Poultry Houses - Jesse B. Brooks
- 23	How To Harvest Hemp Seed , July 1942
- 24	Farm Reservoirs, Suggestions on Planning and Construction - E. G. Welch
- 35	How To Dehydrate Food (Electric Dehydrator) 1943 - J. B. Kelley
- 44	Homemade Brick Brooder Stove, April 1943 - Kelley
- 51	Storage Structures For Vegetables, - Kelley
- 52	Basement and Cellar Storage For Fruit And Vegetables, 1943
- 73	Pulling Tobacco Plants - 1944 - Earl R. Young
- 75	Machine Setting o Burley Tobacco, 1944 - Earl R. Young
- 76	Cutting and Spearing Tobacco, 1944 - " " "
- 79	Cutting and Housing Tobacco, " - " " "
- 84	Stripping Burley Tobacco, " - " " "
- 86	Taking Down, Bulking, Stripping & Pressing Burley Tobacco, Oct. 1944 - " " "

Leaflets, Illustrated -

No.	Date	Title	Authors
75	Apr. 1944	Machine Setting of Burley Tobacco	(Geo) (E) (Ed) -Byers, Young, Nesius
76	June "	Cutting, Spearing Burley Tobacco	-Byers, Young
79	July "	Cutting & Housing Burley Tobacco	-Nesius, Young, Byers
90	April 1945	How to Save Time in Pulling Tobacco Plants	-Byers, Young
?	1945	One-Man Plant-Bed Board	-Young, Byers
W. S. #6	"	Hand-Setting Tobacco With Less Work	-Nesius, Byers, Young
W. S. #7	"	Tobacco Stick Sharpener	-Young
W. S. #10	"	Tobacco Lowering Hook,	-Young, Byers
W. S. #11	"	Tobacco Knife, Pistol Grip Splitting Knife	-Young, Byers
W. S. #12	"	Tobacco Suckering Knife, (hooked)	-Byers, Young
W. S. #13	"	Easier Way To Do Farm Work, Tobacco Setting Machine	-Byers, Young
W. S. #14	"	Tomahawk Tobacco Knofe, or (hack type)	-Young, Byers
W. S. #15	"	Shoulder Strap, Carry Plant Basket	-Young, Byers
W.S. #17	"	Stick Rack and Stalk Rack	-Young, Byers
W. S. #18	"	Stick Holder for Bulking Tobacco	-Byers, P. Pinney

MIMEOGRAPHS

	Author or Authors
Farm Buildings, Structural Details	
Saving Labor in Hog Feeding, showing plan of feeder	
Tobacco Scaffold	James B. Kelley
Ventilator for Tobacco Barns	" " "
Insulation of Milk Cooling Tank	" " "
Simple Problems in Land Measurement	Earl G. Welch
Plan of Work - Utilization of Electricity, Agricultural Engineering Phase, Rural Electrification	Welch - Kelley
Home Economics 580 - Planning for the Use of Electricity in the Home	Miss Ida Hagman J. B. Kelley
Rural Electrification Data, May 28, 1937	
Conference on Rural Electrification at Lexington, Kentucky, Nov. 1937	J. B. Kelley Earl G. Welch
A Registery of Farm Machinery for Sale, Rent, or Customs Work	
Questionnaire to Agents on Customs Work for 1942	Earl G. Welch
Kentucky Farm Buildings Extension Project for Rural Carpenters	Staff
Summary of Agricultural Engineering Sub-Projects for 1938	"
Capacities of Silos	
Killinger Marl and Lime Spreader (Homemade)	
Water Supply Systems - Sources and Adequacy of Supply	Earl G. Welch
Farm Reservoirs, When Built by Customs Operators with Tractor Power, How to Decrease Cost	" " "
Water - Farm Reservoir, Purity, Adequacey of Supply, Etc.	" " "
4-H Handicraft Exercises in Electricity	Jesse B. Brooks
Recommended War-Time Practices for 1944 in Agr'l Engr.	Staff
Hemp Threshing Data Sheets	

Chapter ~~VI-A~~ IV-A

Facts Concerning the Establishing of
The Agricultural Engineering Curriculum
University of Kentucky

As Mr. Earl Welch and Mr. Kelley became better acquainted with the Agricultural conditions from 1920 to 1930 in Kentucky, they were convinced that there was a great need for establishing an agricultural engineering curriculum at the University for training young men on the applications of engineering in agriculture.

Dean Thomas Poe Cooper acted very favorably to this proposal, but Dean Paul Anderson of the College of Engineering and Dean Graham, who took his place later, did not give us much encouragement. However, we were convinced through the results of our extension activities of the benefits the State would acquire by providing trained young men for County Agents, Home Demonstration Agents, teachers and professional engineers.

Finally in 1950, the Presidents and Deans, Members of the Land Grant College Association were convinced at their annual meeting that additional colleges should offer Agricultural Engineering Professional courses.

When Dean Cooper and Dean Dan Terrill returned from that meeting, Dean Cooper directed the Kentucky Agricultural Engineers to prepare a proposed course of study and set up policies of procedure for offering a curriculum jointly with the College of Agriculture and College of Engineering.

In September the Agricultural Engineers prepared a proposed curriculum and the statements of policies for consideration. Then Dean Cooper asked Dean Dan Terrill if he would consider the proposal. He agreed and appointed a committee from his staff to work with J. B. Kelley, Earl R. Young and Jesse B. Brooks to complete the final drafts to present to the faculties for approval. The heads of various departments of the College of Engineering were placed on the committee.

The Minutes of the agricultural faculty of October 2, 1950 records the following:

"Professor J. B. Kelley presented a curriculum leading to the Degree of Bachelor of Science in Agricultural Engineering to be given jointly with the College of Engineering".

The agricultural faculty voted to postpone action to a later date because a few members of the faculty felt the college funds at that time would not permit the establishment of a separate department without handicapping some of the phases of work of other departments.

Later both faculties of the College of Agriculture and Engineering approved the recommendations to be sent to the President for his consideration. Dr. H. H. Donovan complimented the committee for the fine work in preparing the curriculum and policies of cooperation, but to our great disappointment stated that for the present he would have to table the request.

When Dean Thomas P. Cooper retired July 1, 1951 and Dr. Frank J. Welch took his place, the members of the agricultural engineering staff at once asked for permission to have an interview with him to discuss the status of the agricultural engineering work. At the close of that meeting he kindly informed us that he was very much interested in obtaining additional funds for expanding extension work, for research and to establish a separate agricultural engineering department and a professional curriculum to train engineers.

On September 1, 1956, Dr. Drayton T. Kinard became Head of the department to direct and supervise the agricultural program in teaching, research and extension. He received his B. S. Degree in Agricultural

Engineering from Clemson College in 1933, a M. S. in Agricultural Engineering from Virginia Polytechnic Intitute in 1941 and later a PH. D. from Michigan State University.

Under Dr. Kinard's able leadership the 1950 proposed curriculum and statements of policies were soon revised and submitted to both faculties, and were approved in October 1956. The University faculty approved them and Dr. H. H. Donovan and the Board of Trustees authorized the establishment of the new curriculum and Department of Agricultural Engineering at the December 1956 monthly meeting of the University Board of Trustees.

That the agricultural engineers were truly dedicated to their professional work, saw the opportunities for such service to the rural people in Kentucky was badly needed, saw there was a need to establish a professional degree at the University, was demonstrated by the long years of service, 25 to 41 years, spent at the college, working long hours for small salaries and limited funds for the development of the various phases of the work.

That the above statements proved to be truth have been established by the facts given in this historical report.

6 copies

STATEMENT OF POLICY GOVERNING THE ESTABLISHMENT AND ADMINISTRATION OF A CURRICULUM LEADING TO THE DEGREE, BACHELOR OF SCIENCE IN AGRICULTURAL ENGINEERING, AND THE RELATIONSHIP OF THIS CURRICULUM TO THE OTHER PHASES OF AGRICULTURAL ENGINEERING.

1. A Department of Agricultural Engineering shall be organized in the College of Agriculture and Home Economics of the University of Kentucky. The functions of this department shall be:

a. To offer courses and a curriculum leading to the professional degree, bachelor of science in agricultural engineering.

b. To offer professional courses in agricultural engineering which may be elected by students in other phases of engineering.

c. To offer service courses in farm engineering for students in agriculture and for other students.

d. To offer graduate work leading to the degree, Master of Science in Agricultural Engineering.

e. To conduct Agricultural Engineering research in the Agricultural Experiment Station.

f. To carry on extension work in agricultural engineering.

2. The professional curriculum in agricultural engineering shall be offered and administered jointly by the College of Agriculture and Home Economics and the College of Engineering. It shall be listed in the University catalog under both colleges. Such curricula as may be established leading to the degree Bachelor of Science in Agriculture shall be offered and administered by the College of Agriculture and Home Economics.

3. Freshmen in the professional agricultural engineering curriculum shall register in the College of Engineering. Sophomores, juniors and seniors shall have dual registration in the College of Agriculture and Home Economics and the College of Engineering.

4. The degree, Bachelor of Science in Agricultural Engineering, shall be awarded jointly by the two colleges, with the signatures of both deans on the diplomas.

5. The budget for the three branches of agricultural engineering, (teaching, research and extension), shall be administered by the Dean and Director of the College of Agriculture and Home Economics, the Agricultural Experiment Station and the Division of Agricultural Extension.

6. The selection and recommendation for appointment of the Head of the Department of Agricultural Engineering shall be made by the Dean and Director of the College of Agriculture and Home Economics. The Dean of the College of Engineering shall concur in the recommendation.

7. The selection and recommendation for appointment of members of the staff of the Department of Agricultural Engineering shall be made by the Head of the Department. Approval shall be as follows:

a. Those appointed to teach professional courses shall be approved by the Dean of the College of Agriculture and Home Economics and the Dean of the College of Engineering.

b. Those appointed to teach service courses shall be approved by the Dean of the College of Agriculture and Home Economics.

c. Those appointed as research workers shall be approved by the Director of the Agricultural Experiment Station.

d. Those appointed as field agents in extension shall be approved by the Director of Agricultural Extension.

8. The Head of the Department of Agricultural Engineering and the staff teaching courses in the professional curriculum shall have the status of members of the faculties of the College of Agriculture and Home Economics and the College of Engineering in matters pertaining to the professional curriculum in agricultural engineering.

Chapter V

List of Heads of Agronomy Staff and Staff Members of Agricultural Engineers 1909 to 1958

Name	Date Appointed	Remarks, Etc.
Professor George Roberts	1909-1912	Taught a course in farm surveying and farm mechanics. Head of Department of agronomy until July 1, 1943.
Farra, J. A.	1912-1917 (Resigned)	Instructor, Farm Mechanics and Surveying.
Havenhill, Mark	Aug. 1918-Aug. 1919	Professor, Farm Engineering
Kelley, James B.	Aug. 15, 1919-	Change of work, September 1, 1959. Professor, Agricultural Engineering. Head, Farm Engineering Section of Agronomy, Aug. 15, 1919 to June 1, 1957.
Welch, Earl G.	Mar. 1, 1920- Nov. 4, 1956 (deceased)	Extension Specialist.
Matson, Howard	July 10, 1930-Oct. 11, 1934	Part-time teaching and an Extension Specialist.
Brooks, Jesse B.	Feb. 1, 1935	Teaching and part-time extension. July 1, 1936 transferred to extension full time. Resigned March 1, 1948 to do professional sales work. Rejoined staff as Assistant Professor, March 1, 1949, half-time teaching and half-time extension to 1953. Professional Engineer of Kentucky, Sept. 18, 1950. Sabbatical Leave June 16 to July 31, 1954 and June 6 to July 31, 1955. Received M. S. in Agricultural Engineering, Auburn, August 7, 1955.
McKitrick, John L.	Aug. 17, 1935	T V A Ag. Engineer. Sabbatical Leave, February 1, to November 1, 1950. U. S. 4-Point Program August 28, 1952 to 1954. Resigned August 28, 1954.
O'Bannon, Lester S.	July 1, 1936	B. S. in M. E., University of Kentucky M. S. _____. Research Engineer. Joined Agronomy Section of Engineers as Research Engineer on Tobacco Project. Resigned _____.

List of Agronomy Heads, Staff & Engineers, continued.

Young, Earl R.	Sept. 1. 1936	B. S. in Agriculture, University of Minnesota. Instructor, Sept. 1936. Assistant Professor of Agricultural Engineering, University of Kentucky. Sabbatical Leave 1937-1938, M. S. in Agricultural Engineering, University of Minnesota, 1938. Associate Professor, Agricultural Engineering, Sept. 1950.
Kinney, E. J., Professor	July 1, 1943	Head, Department of Agronomy July 1, 1943 to December 31, 1949.
Denton, C. E.	Oct. 1, 1938	B. S. in Architecture, 1938, University of Illinois. October 1, 1938-March 1, 1939, Farm Building Draftsman.
Skinner, R. E.	1951	B. S. in Agricultural Engineering, University of Georgia 1947. 1951, Research Engineer
Meeks, M. E. Dr.	1950	Head, Department of Agronomy, January 1, 1950 to August 31, 1952.
Price, H. B. Dr.	1952	Acting Head, Department of Agronomy, July 1, 1952 to January 4, 1954.
Webster, G. T. Dr.	1954	Head, Department of Agronomy, June 1, 1954.
Krueger, J. N.	1951	B. S. in Agricultural Engineering, University of Minnesota. 1951, Research Engineer. Resigned, December 1953.
Pattyn, M. J.	1948 or 1949-1951	Extension Engineer, Specialist.
Holmes, E. S.	June 1946-May 1957	Extension Specialist in Agricultural Engineering
Mills, Kermit C.		B. S. in Agricultural Engineering, 1953. B. S. in Agriculture, Berea College. County Agent, May 1946 to September 1950. September 1950-1953, Leave of Absence. (Air Force June 1942 to May 1946).
Baxter, D. O.	Nov. 1, 1951-Aug. 1, 1954	Extension Engineer
Kinard, Drayton T.	September 1, 1956-Sept. 1, 1958 (Resigned)	Head, Dept. of Agricultural Engineering
Parker, Blaine F.	July 16, 1957	Research and Teaching to Head of Department of Agricultural Engineering
Jenkins, Geo. H. Jr.	April 15, 1956	Leave for Army Service. Extension Specialist in Agricultural Engineering. Return from Military Leave May 23, 1960

List of Agronomy Heads, Staff and Engineers, continued

Kline, C. K.	Dec. 1, 1957 Sept. 1, 1959	Extension Specialist in Agricultural Engineering
Turner, George M.	Feburary 1, 1958	Ext. Specialist in Agricultural Engineering
Aldrich, R. A. Dr.,	July 1, 1958-Jan. 31, 1959.	Teaching and Farm Buildings.
Smith, S. Warren	November 1, 1958	Research.
Smith, Edward M.	August 1, 1957	Teaching and Research

Mr. Kermit Mills was appointed Extension Specialist in Agricultural Engineering, August 27, 1953.

He received a B. S. Degree in Agriculture from Berea College, Berea, Kentucky in 1939; served as county agent in Kentucky from 1939 to 1942; served in U. S. Air Force from 1942 to 1946, returning to his former position as county agent. He was on leave from 1950 to August 17, 1953 attending the Iowa State College, Ames, Iowa, where he received a B. S. Degree in Agricultural Engineering.

The last seven years, Mr. Mills, as an Agricultural Engineering Specialist, has done outstanding work on the following projects:

Soil and Water Management, Farm Buildings and also work on all other phases.

Chapter VI

4-H Club Camps

Bingham 4-H Camp - 1940:

Through the efforts of J. W. Whitehouse and Professor Thompson R. Bryant, Associate Director of Extension work, in 1940, arrangements were made to acquire a large hotel resort including 10 acres of land, located in Washington County. Historically, it was built shortly after the close of the Civil War about 1875, and is known as the Tatham Springs Hotel, because of the sulphur springs located on the rear of the grounds.

The two-story frame "E" shaped structure measures 164 feet across the front and is 98 feet deep. Two of outside wings are 40 feet wide and 60 feet long, and the third or center wing, 20'x60' on first floor and 16'x60' on the second floor. Surrounding the outside walls of the house on both floors are shed-roofed porches 10 feet wide.

After this property was obtained by the College of Agriculture, this camp was named the Bingham 4-H Club Camp in memory of the father of Barry Bingham, who donated money to purchase it.

At the request of Mr. Whitehouse, Mr. Kelley visited the site in the fall of 1940, after practically all the arrangements had been completed for the purchase of the property, and made a thorough inspection of the building, grounds and sources of water, and later helped check the deed and boundary lines or "calls".

The "old-timers" in the area told us that the two shallow wells and the springs had always provided an adequate supply of water for the guests that stayed in this ho el. When Mr. Kelley crawled under the entire building, he learned that about 3/4 of the wood piers, supporting the hotel, were badly infested with termites, and that practically all the floor joists

4-H Club Camps



Barry Bingham 4-H Club Camp Building. Originally built for a summer health resort about 1875. Acquired and repaired by the Extension Department, College of Agriculture in 1940, as a 4-H Club Summer Camp, housing 250 boys and girls including 4-H Club Leaders.

and floor of the dining room and kitchen were practically destroyed.

Starting in January 1941, Mr. Kelley did the following in connection with remodeling this building and land area to provide a camp for 225 4-H Club Boys and Girls:

1. Drew plans of the entire old structure to scale of 1/8"= 1 ft.
2. Checked the flow of water available from the old springs and two dug wells and found them inadequate.
3. Had the two old outside bath houses and decaying water storage tank removed.
4. Made arrangements for the RECC to build a transmission line and install a transformer at the rear of the kitchen and wire the building for lights and power.
5. Designed, and prepared plans and specifications and was supervisor of installing a septic tank and disposal field; two bath houses, one for girls and one for boys; repaired porch floors, plastered rooms and repaired metal roof, painting same; rebuilding dining room, kitchen and pantry floors, and installed a commercial "Walk-in Refrigerator". As the extension department had very little money to pay for the materials and labor to do all this work, the College, through Mr. Whitehouse, applied to the Federal Security Agent of the National Youth Administration For Kentucky for funds and permission to use unemployed young men of Washington County to do most of the work at 20 cents an hour.

The college employed a local carpenter at 40 cents an hour to supervise the 20 young men, and J. B. Kelley went to the camp at least once each week from March 1 until August 1, to direct and to check the work.

Mr. Kelley also soon decided it would be necessary to use the water from the river to provide an adequate supply, so he planned and supervised the installation of a centrifugal jet pump, 30 gallons per minute, pneumatic pressure tank, of a capacity of 1,000 gallons, three filter tanks and chlorinating equipment and a structure to house them.

In a 30'x75' concrete swimming pool was installed at the camp. The money for it was donated by and Mr. E. N. Farris and his engineers were in charge of preparing the plans, specifications and construction work. They also added a large settling basin and water treatment plant, but on account of lack of funds, were unable to provide filteration tanks of sufficient capacity to refilter the water in the swimming pool often enough to meet the State Health requirements.

Therefore, in May 1957, Mr. Boyd Wheeler and J. B. Kelley prepared plans and specirications and supervised the concrete work and letting of a contract to install 3 steel filter tanks, 60' in diameter, to filter the pool water and water from the river at the rate of 30 gallons per minute.

4-H Club Camps

Dawson Springs 4-H Club Camp, 1950:

In the summer of 1950, Mr. Whitehouse invited J. B. Kelley to go with him to Dawson Spring, Kentucky to determine what could be done to equip that Federal Park for 4-H Camp work for Western Kentucky, if the College could acquire it from the United Stated Department of Interior National Park Service, Cooperating with Kentucky Board of Public Property. During the war, this place had been established for a recreation place for soldiers on week-end leaves from camps in Kentucky. A acre lake stocked with fish, two bath houses with latrines, two s eptic tank disposal fields, a large rustic open air shelter with a large rock fireplace were provided for the visitors.

Water was provided from a deep drilled well, which w as delivered to the various outlets from a pneumatic pressure tank.

There was a lovely rustic house on the place for the use of the family of the superintendent of the grounds. This area acres, with its facilities was turned over to the College on .

During 1950, the agricultural engineers in cooperation with Mr. Whitehouse and his staff of men and women, prepared plans for the following:

1. Laid out playground areas
2. Map of layout of buildings for various pruposes.
3. Plans and specifications for constructiong a 48'x72' building for kitchen, dining hall, Etc. This was revised by engineers of the State Building Commission at Frankfort.
4. For building 16 cottages, 20'x26'-8", eight for girls and 8 for boys.
5. Revamp the toilet and bath houses and disposal fields.
6. Obtained and moved from the Federal Army Camp at Camp Campbell to Dawson Springs Camp, 6 frame cottages which had been used for families of officers.

4-H Club Camps

Feltner 4-H Club Camp, 1957:

At the request of Mr. J. W. Whitehouse, State 4-H Club Leader, J. B. Kelley attended several planning conferences at Lexington, regarding establishing a 4-H Club Camp near London, Kentucky. Also made one trip to London to help the local committee to pick out the camp area and site for the buildings.

Chapter VII

Farm and Home Equipment Shows

In an attempt to arouse greater interest and attendance at the Annual Farm and Home Convention the agricultural engineers sponsored a Farm and Home Equipment Show in January 1925.

The first one was held in the University Armory. As the armory was too far from the Judging Pavilion where the main programs were held, the attendance at the show was small. Therefore, the idea was dropped.

Start

The agricultural engineers again received permission to prepare another show for the 26th Annual Farm and Home Convention, held January 25 through January 29, 1938. The 1938 ~~This~~ show was called an Electrical Festival. Starting at the transformers, the series of exhibits were set up showing the electrical service equipment, an electric lighted dining room, an electrically equipped bedroom, kitchen, laundry room, electric equipment for poultry, for feed processing, for a dairy and farm shop. ~~(See attached a printed program of the festival containing a list of Lexingtonians and out-of-town exhibitors who cooperated with the college and members of the staff in making possible such a complete Farm and Home Electrical Festival.~~

These exhibits proved to be timely and very helpful to farmers as the festival was held in the early period of the rapid spread of the Rural Electric Cooperative Development in Kentucky. As a result of this show the farm men and women, the college staff, officials of manufacturers of all kinds of farm and home labor-saving equipment, water and sanitation equipment, encouraged the agricultural engineers to plan a similar exhibit each year. (END) These special features ~~are~~ were continued from 1938 to 1957 in the Agricultural Engineering Building under the management of James B. Kelley.

Farm and Home Equipment Shows

The care that was taken selecting the timely subject matter of value to rural people and the care taken in erecting the displays to arouse the attention of the visitors are shown by the following pictures of the exhibits that were displayed in the Agricultural Engineering laboratories each year from 1930 to 1957.



Concrete walls and floors

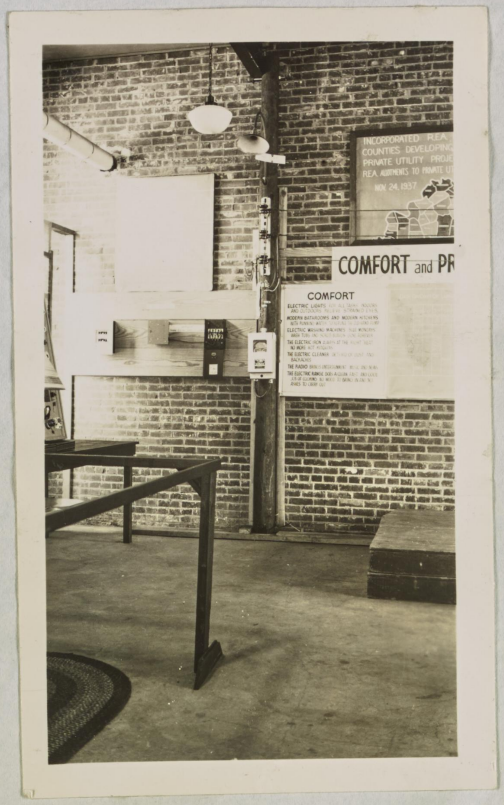
Farm and Home Equipment Show

Exhibits Displayed at the Electric Festival

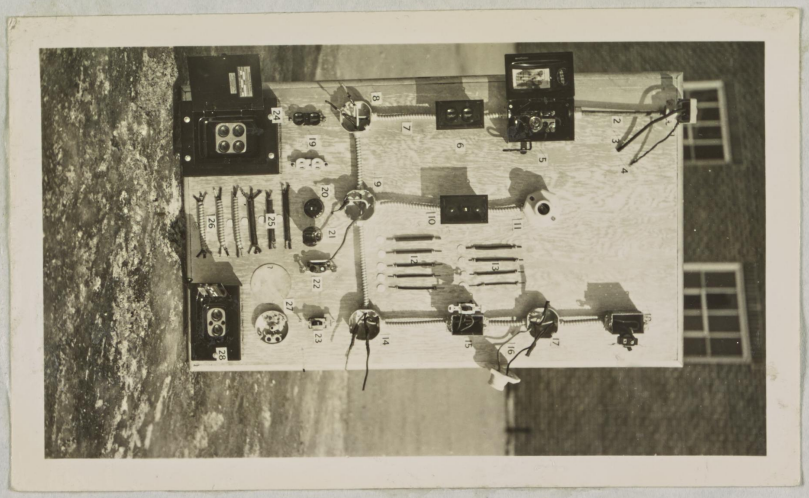
January 25, 27, 28, 1938



Transformer on Yard Pole



Electric Meter and Service Panel



Samples of Wiring Fixtures

Farm and Home Equipment Show

Exhibits Displayed at Electric Festival

January 25, 27, 28, 1938



Parts of 3 Exhibits (a) Laundry Room (b) Bedroom (c) Household Equipment

Farm and Home Equipment Show

Exhibits Displayed at Electric Festival

January 25, 27, 28, 1938



Electrified Living Room



Electrical Kitchen

Farm and Home Equipment Shows



Building Materials



Care and Use of Galvanized Roofing

Farm and Home Equipment Shows



Materials Sold by Lumber Dealers

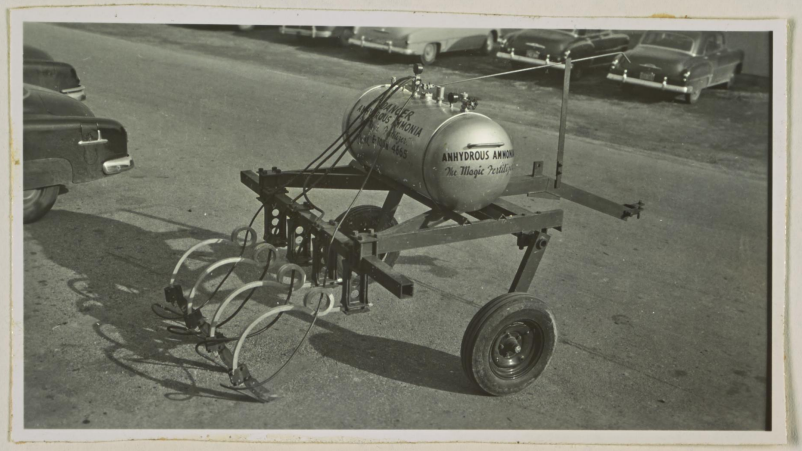


Materials Sold by Lumber Dealers

Farm Home Equipment Show



Irrigation Equipment Exhibit



Part of a Liquid Ammonia Exhibit

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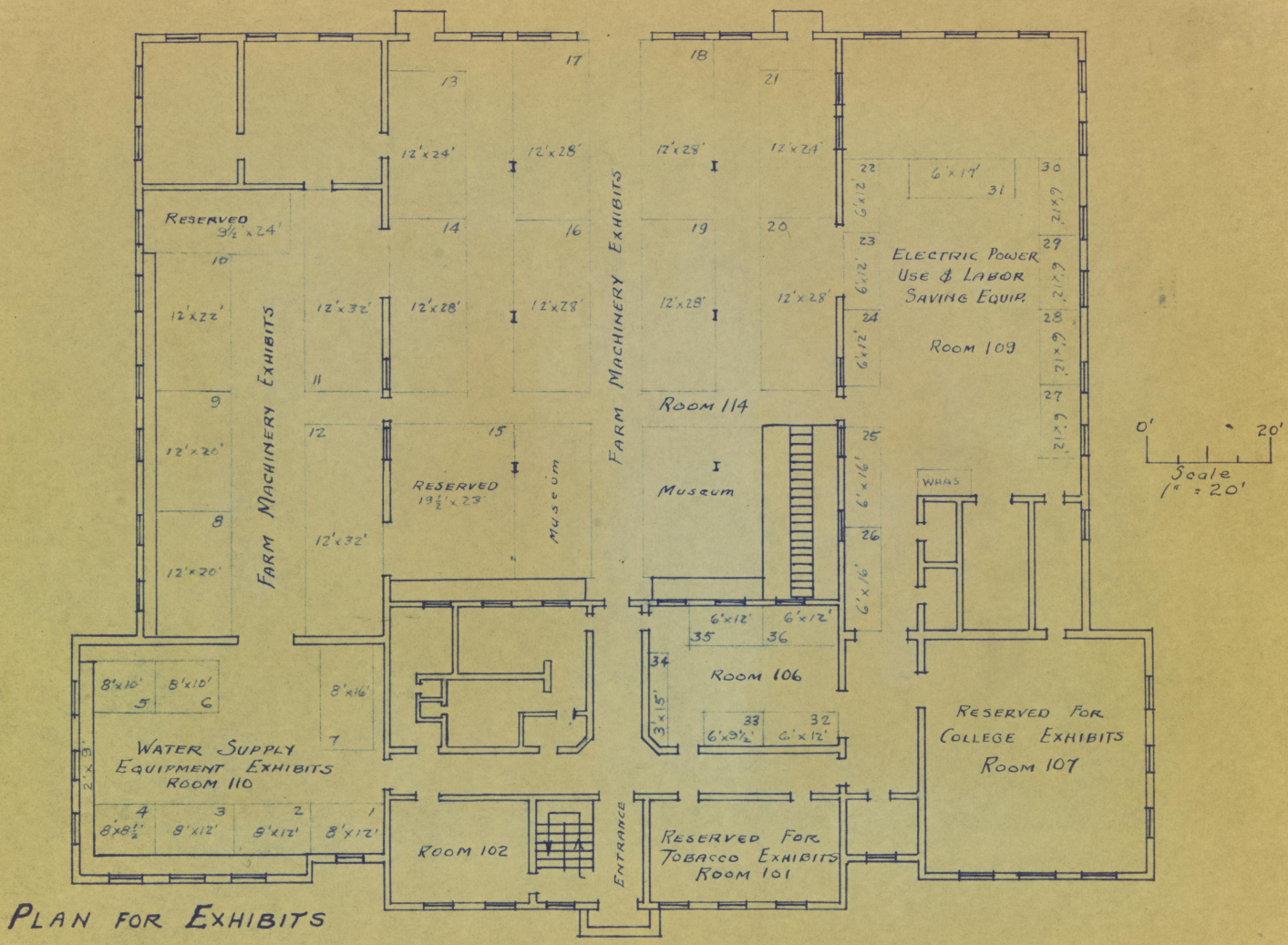


PLAN FOR EXHIBITS

FIRST FLOOR OF THE AGRICULTURAL ENGINEERING BUILDING

STATE FAIR EXHIBITS

The adoption by several Kentucky cities of a milk ordinance to regulate the sanitary production and sale of milk and milk products raised many problems in connection with the remodeling of buildings and equipping of dairy barns and milk houses. The agricultural engineers received requests in 1931 to design and furnish plans to meet the requirements.

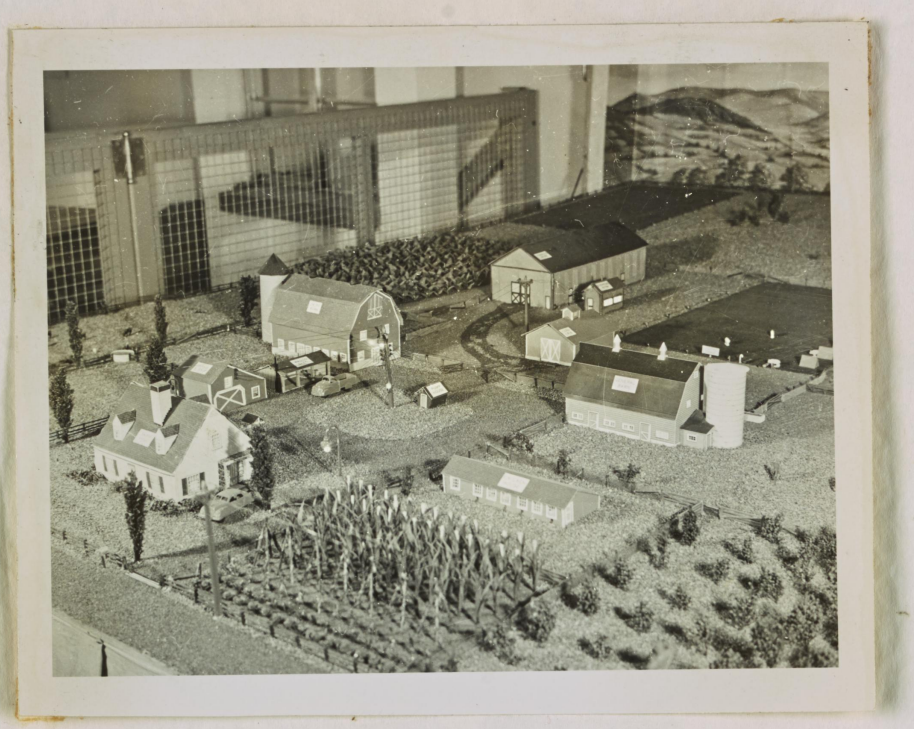
To help advertise to the dairymen that such plans were available from the college, the officials of the Lumber Dealers Association of Kentucky offered to build a full-size 2-room milk house according to plans prepared by the agricultural engineers to be used as a display at the State Fair. (see picture of this exhibit on Page).

In December 1931, a model of the milk house was built to a scale of 1"= 1 ft., and was exhibited at the State Banker's Association Meeting the week of June 22, 1932 to advertize the Farm Building Plan Service of the Extension Service.



Kentucky State Fair Exhibits

A few examples of State Fair Exhibits prepared and exhibited at the Kentucky State Fair from 1921 to 1956 by the agricultural engineers on all ph
phases of extension work promoted by the department.



Farmstead Building Exhibit

chap VIII

Chapter VIII

Farm Machinery Exhibits and Demonstrations on Experiment Station Farm - Agronomy Field Days

(start)

In 1927 the Agricultural Engineering Section of Agronomy Department decided that Kentucky farmers could, with profit, make greater useof better machinery. Since labor represented 60 percent of the total cost of producting crops, farm machinery demonstrations were arranged to be held in connection with the Experiment Station Agronomy Field Days.

The first program of this nature was held on August 4, and 5, 1927 on the Experiment Station Farm, Lexington, Kentucky.

The meeting that year featured the use of better larger and more up-to-date machinery not commonly being used in Kentucky, such as one and two bottom sulky horse-drawn plows, two to six-mule team hitches, haymaking machinery such as modern side-delivery rakes, hay-loaders and harpoon for hay-unloaders for storing loose hay in stacks or lofts of barns. A grain combine was also demonstrated. It was the second one ever used in the state of Kentucky.

Tractor operated limestone crushers ran throughout the day piling up big heaps of ground limestone for use as fertilizer. Approximately 1200 farmers attended the two days program, representing 55 counties and five other states, including Tennessee, Indiana, Illinois, Missouri and Virginia. Both from the standpoint of attendance and interest displayed, the meeting was considered to be a great success.

A number of other such machinery exhibits and demonstrations were held in the 30's and in 1950, 1951 and 1952. These field meetings were made possible by the generous cooperation of as many as 40 local dealers and representatives of the State Branch houses of the various farm implement and farm mechanization equipment. Each year the latest models and new kinds of farm equipment were shown to about 2,000 visitors. (end)

Annual Experiment Station Field Days

Up to 1927 a large number of our Kentucky farmers were knows as "One and two-horse farmers". Many of them at that time drove teams using one line in place of two lines when using left-hand bottom cast iron mould-board walking plows.

The shortage of man power during the war naturally aroused interest in the use of tractors for power and other labor saving machinery to reduce the cost of labor which at that time represented 60 percent of total cost of producing crops.

The agricultural engineers, therefore, decided to feature the latest improvements on farm machinery at the Fourth Annual Soils and Crops Meeting, at the Agricultural Experiment Station Farm on August 3 and 4. This was the first program of this nature held in Kentucky

Special attention was given to demonstrations on hay making machinery, both horse-drawn and tractor-drawn mowers, rakes, loaders, stackers, three, four and six-horse hitches used on plows; lime crushers, lime spreaders and a combine harvester. A Lexington Herald News clipping dated August 5, 1927 stated"approximately 1200 farmers attended the two-day meeting representing 55 counties in Kentucky, and 5 other states including Tennessee, Indiana, Illinois, Missouri and Virginia. Both from the standpoint of attendance and interest displayed, the meeting was considered by those in charge to have been of the most successful ever held at the Experiment Station. Professor J. B. Kelley was in charge of the program". See an original copy of the Program and news clippings.

The 12' J. I. Case Combine, the 2 - 16" bottom plow, the tractor-operated mowers, side delivery rakes, the hay loaders, were furnished to the College direct from the respective factories because the were not as yet being handled in Kentucky by local dealers.

Proposed Program
For
Two Days Agronomy Meeting Featuring Farm Field Machinery
On
Experiment Station Farm, Lexington, Kentucky
August 4 - 5, 1927

August 4.	9 A.M. - 11:30 A.M.	Tour of Agronomy Experiment Field Plats Inspection of Machinery Exhibits.
	12 M. - 1:30 P.M.	Lunch period. (Lunch will be provided at Judging Pavilion.)
	1:30 P.M. 1:45 P.M.	Address of Welcome - Dean Thomas P, Cooper.
	1:45 P.M. 2:30 P.M.	Some Lessons Learned from Experiment Station Work in Agronomy. Prof. Geo, Roberts.
	2:30 P.M.	Field Demonstrations. 1. Power take-off Tractor Mowers 2. Lime Crushers. 3. Lime Spreaders.
August 5.		Guides will be available for making tours of the Agronomy Experiment Plats for visitors who are not present on August 4.
	9:00 A.M.10:30 A.M.	Horse Hitch Demonstrations. By representatives of Horse Breeders Association of America.
	10:30 A.M.11:15 A.M.	Field Demonstrations of Raking Machinery.
	11:15 A.M.12 M.	Inspection of machinery exhibits - Combine Harvester - Row Harvesters.
	12 M. - 1:30 P.M.	Lunch period.
	1:30 P.M.-1:45 P.M.	The farm machinery situation in Kentucky By a local man.
	1:45 P.M.-2:30 P.M.	Better equipment as a factor in reducing the cost of production. By -
	2:30 P.M.-4 P.M.	Field Demonstration: Hay Loaders Hay Stackers.

This combine harvester and another in Western Kentucky were the first two combine harvesters ever used in the State of Kentucky. By the _____ _____, there were 1790 combines in use on Kentucky farms.

The farmers, county agents and the farm machinery companies and dealers who co-operated with us in conducting the demonstrations in August 1927 were so highly pleased with the success of the demonstrations that they requested other programs of this nature to be held at the Annual Experiment Station Field Days _____.

A number of other such machinery exhibits and demonstrations were held in the 30's and in 1950, 1951 and 1952. These field meetings were made possible by the generous co-operation of as many as 40 local dealers and representatives of the State Branch houses of the various farm implement and farm mechanization equipment. Each year the latest models and new kinds of farm equipment were shown to about 2,000 visitors.

See attached, a printed program of the Festival containing a list of Lexington and out-of-town exhibitors who co-operated with the College and members of the staff in making possible such a complete farm and home electrical festival.

These exhibits proved to be timely as it was held in the early period of the rapid spread of the Rural Electrical Corporation development in Kentucky. As a result of this show the farmers, men and women, the college staff, officials of manufacturers of all kinds of farm and home labor saving equipment, water and sanitation equipment encouraged the agricultural engineers to plan similar exhibits each year. These special features were continued from 1938 to 1957 in the Agricultural Engineering Building under the management of Mr. J. B. Kelley.

Experiment Station Farm
Lexington, Kentucky



Cutting wheat with a 12' combine on the Experiment Station Farm, Lexington, Kentucky. This shows the first combine used in Kentucky. It was operated by J. B. Kelley, the McCormack Brothers of Winchester, Kentucky, and Mr. Reeves, the J. I. Case dealer, Lexington, Kentucky

Experiment Station Field Days



A demonstration loading alfalfa hay with tractor drawn cylinder-type loader.



Demonstrations showing how to hitch mules to a two-16" bottom plow to increase the acreage plowed per day by one man.

Experiment Station Field Days



A demonstration of a horse mower hitched to a tractor.

Experiment Station Field Days



Demonstrating a two-row corn planter equipped with fertilizer attachments.



Excavating and loading marl with a slip scooper into a manure spreader for hauling and spreading it in a field as fertilizer.

Experiment Station Field Days



Demonstrating A Portable Rock Crusher



Demonstrating three different makes of portable rock crushers

Experiment Station Field Days



Lime Pulverizer



A picture showing part of the crowd attending the field day and a new type spreader equipped for spreading manure, lime or marl.



A machine for spreading manure, marl or lime.



A hopper-type machine for spreading lime and commercial fertilizer.



An old practice of using a drag made of planks for breaking clods and leveling land in preparation for a field of tobacco.



An early attempt to reduce labor requirements.

Pictures of Types of Horse-Drawn Farm Implements In Use In Kentucky During the 1920's



A colored man driving a team of mules using only one line, plowing with a 12" cast-iron left hand bottom plow. This method was quite common during the 20's



A 2-Horse spike tooth drag for preparing a seed bed.



Threshing Soy Beans, using a horse-drawn portable one-cylinder gas engine.





Note the six-shovel one-row horse-drawn riding cultivator. It was the first one ever used on the Experiment Station Farm, Lexington, Kentucky. The purchase of it was recommended by J. B. Kelley.



This was probably the first demonstration conducted in Kentucky showing how to hitch 5 mules to a two 16" steel bottom sulky ~~going~~ gang plow.



An early type of tobacco plant setter operated by three men.

Chapter X

RESEARCH PHASES

1923 - Introduction to Tobacco Housing and Curing Studies -

That the agricultural engineers soon recognized the great economic importance of the need of improving the tobacco curing practices in Kentucky, is shown by the fact that J. B. Kelley, after a careful examination of the available literature, prepared a paper on the subject, "Research Problems in The Design of Tobacco Barns", which he presented at the Annual Winter Meeting of the American Society of Agricultural Engineers in December 1923, at Chicago, Illinois. A copy of this paper was published in the A. S. A. E. Journal, April 1924 (see copy attached).

In 1925, a request was made to the State Legislature for funds for the Agricultural Experiment Station to start tobacco curing studies, but it was not approved.

TOBACCO HOUSING AND CURING STUDIES

In 1934, Professor George Roberts appointed a committee consisting of Professor E. J. Kinney, Dr. D. W. Valleau and J. B. Kelley to prepare plans for conducting tobacco curing studies and prepare preliminary plans for a tobacco curing laboratory. The building was erected on Washington Avenue in 1936.

In 1936, Lestor O'Bannon, Professor of heating and ventilation engineering at the University of Kentucky, was employed to design and install 9 curing chambers and the heating and ventilating equipment to control the temperatures in the curing chambers to provide a range of 50° F. to 150° F., and humidity range from 25 to 95 percent to automatically control them for + or - 2° F., of the settings desired. These ranges were decided upon by the committee because no one had previously determined the correct temperatures and humidities required to cure Burley Tobacco.

Two sizes of insulated curing chambers were installed. One size for holding 36 sticks and one for 72 sticks of tobacco.

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RESEARCH PHASES, continued

You can see by reading the publication that Professor O'Bannon made an outstanding contribution to the tobacco farmers of Kentucky. He resigned in 1947 and we were unable to find a qualified Agricultural Engineer to take his place for four years.

In 1951, Mr. Jack Krueger was employed to do research work on the Bankhead-Jones Project, BJ9-3, "Studies in Planning and Remodeling To Improve Low Cost Farm Housing" and BJ9, 58, "Study of Fuels and Equipment for Curing Burley Tobacco".

The need for continuing the tobacco curing studies is shown by the following facts:

Burley tobacco is Kentucky's chief cash crop. In 1952 it comprised 69 percent of the Burley tobacco grown in the United States.

The frequently occurring adverse weather conditions for air curing tobacco during the curing season and the resulting losses of millions of dollars to Kentucky farmers by poor housing and curing conditions, practices used emphasized the need of further studies of this nature.

At this time, no data had been collected to give accurately the benefits resulting from these studies.

In 1949, it was estimated that Kentucky farmers lost from 15 to 20 million dollars by poor housing and curing methods. Tobacco grading records of sales from 1936 to 1950, show too much in low grades. Almost 70 percent was 4th quality or lower, nearly 25 percent 3rd quality and less than 5 percent was FIRST or SECOND QUALITY.

Mr. Krueger during the 1951 tobacco curing season, made some studies on various kinds of fuels and heating equipment located in the experimental tobacco barn on the Experiment Station Farm, Lexington, and on a number of farms in Fayette County.

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RESEARCH PHASES, continued

In order to provide uniform growing conditions and permit the studies to be continued throughout the year, glass greenhouses were provided equipped with underground irrigation and heating equipment, and electric lights.

In 1936, Dr. R. N. Jeffrey, a plant chemist was employed by the Agronomy Department and put in charge of the curing studies made in the curing cabinets. The result of reasearch done in the curing chambers were reported by Dr. Jeffrey in Bulletin 407 published in 1940 and Bulletin 496, "The Relations of Curing Conditions to Quality Burley Tobacco", December 1946.

The next step in curing studies was to find out the conditions which prevail inside tobacco barns as they were at present constructed and operated.

To obtain this information, temperature and relative humidity surveys were made during the 1941 and 1942 curing season in a barn located on the Agricultural Experiment Station Farm, Lexington, Kentucky, by Professor O'Bannon. As many of our outstanding tobacco growers at the time were very desirous of obtaining information about a practicability of using artificial heating, Mr. O'Bannon made some stud es on the use of coke and gas. The findings attainted by these studies were reported by O'Bannon in Bulletin No. 444, "Distribution of Temperature and Humidity Within A Burley Tobacco Barn", published May 1943.

To summarize observations taken during 5 curing seasons and to provide farmers curing instructions, Bulletin No. 501, "Principles of Burley Tobacco Barn Operation" was prepared by L. S. O'Bannon and published in May 1947.

In 1946, he also designed a tobacco curing structure to be provided with air conditioning equipment which would enable a farmer to cure a good quality of tobacco automatically, regardless of the outside weather conditions, but we were unable to get anyone to furnish money for building one.

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RESEARCH PHASES, continued

The facts he obtained from these studies were published in Experiment Station Circular No. 496, "Heating Practices and Equipment for Curing Burley Tobacco". August 1952.

During the year 1952, he (Krueger) designed and equipped the curing barn with an atuomatically controlled ventilation doors and gas heaters making it possible to maintain an excellent curing atmosphers within the barn even though the outside conditions vary to a considerable extent from the ideal, during the curing season.

During 1953, curing season a crop of tobacco was successfully cured in the barn equipped with the automation equipment.

Unfortunately, we had to drop these studies as Mr. Krueger resigned in December 1953, and it was not possible to find an engineer qualified to do research, that would accept the position for the salary and funds available for continuing the studies.

II Farm Housing Studies -

Project Bankhead-Jones BJ 9-3 "Studies in Planning and Remodeling to Improve Low Cost Houses".

Mr. R. E. Skinner was employed to work full-time on this project from January 1947 to January 26, 1951, when he resigned.

Mr. J. W. Krueger worked part-time on this project from April 2, 1951 to December 7, 1953.

The Nature of the Studies Was: To obtain facts regarding the typical housing conditions of families of low incomes, living on small farms of rolling or broken topography of low productivity, many of which lacked opportunities for full-time employment. 2. To design plans and prepare specifications for remodeling old houses and for building new ones that will provide these families satisfactory housing conditions at a reasonable cost. The importance of these studies is shown by facts obtained by the survey made by Mr. Skinner of 120 owner operator families

Research Phases Continued

in Laurel and Morgan Counties in 1948. Upon completion of the survey it was found that the floor plans of the present houses consisted of five general types. An examination of these plans revealed the lack of the following desirable requirements for providing good housing conditions:

1. Lack of privacy in sleeping and living areas
2. Lack of plumbing and sanitary facilities
3. Inconvenient arrangement of rooms and too much wasted space
4. Inadequate storage facilities
5. Improper location of doors and windows
6. Lack of adequate heating facilities

An idea of the economic conditions of the families at the time they were interviewed can be obtained from the following statements:

The average farm visited in Laurel County contained approximately 65 acres of which 45 acres were tillable. In Morgan County, the average farm contained 85 acres of which 28 acres were tillable. Practically all the farms had a small tobacco base (average 1.5 acres) which was the principle source of cash income. Other income was derived from sale of hogs, calves, vegetables, poultry and dairy products. The annual net farm income averaged about $500. About half the farms reported market size timber growing on the farm, although, this is seldom an important source of income.

A large number of farm owners supplemented their incomes by part-time work away from farms.

Abstract Major Results and Conclusions

Based on the housing data obtained in 1948 and a study of functional housing requirements a basic house plan (Ky. 11.71-13) was developed in 1949 to meet the housing needs of low income farm families in Eastern Kentucky as well as low income families in other parts of the state.

RESEARCH PHASES, CONTINUED

The plan provides for the basic necessities of a family of 2 to 5 persons and may be expanded with slight alterations from a 4 to a 6-room house with or without a basement, as circumstances permit. The basic unit consists of a living room, combined kitchen and dining area, two bedrooms, a complete bath, a bath room, ample storage space and heating equipment.

In addition, suggestive floor plans were prepared by Mr. Skinner showing how to remodel the five typical house plans found in the region.

The cost of building the basic four room house of frame construction with basement and bath-room in 1951 ranged from $5000 to $5600.

Part of the time allotted to this project during 1951 was spent by Jack N. Krueger and J. B. Kelley in collecting information and preparing two greatly needed manuscripts, "Space Requirements for Kentucky Farm Homes" and "Material and Construction Specifications for Kentucky Farm Homes".

In 1952 some building cost data was collected, but due to Mr. Krueger's unexpected resignation on December 7, 1953, and because we were not able to employ an engineer for the found that were available, the studies on this phase were discontinued in December 1953.

However, considerable help has been given Kentucky rural people with their building problems through correspondence, office consultations, farm visits and by furnishing them blueprinted house plans through our Extension Plan Service.

USEFULLNESS OF FINDS : (Present or Potential - to other scientists - farmer acceptance- exonomic value to agriculture - other)

It is difficult to estimate the economic value that information prepared as a result of this project has contributed to the economic value of Kentucky Agriculture. An idea of the usefullness of such information can be judged from the facts that the county agents in their annual reports specified that in the last five years (1950-1955) that 7873 new farm dwellings were built and 28,993 dwellings remodeled on Kentucky farms.

RESEARCH PHASES, continued

STUDY FOR THE SIMPLIFICATION OF PRESENT FARM LABOR AND EQUIPMENT PRACTICES IN THE PRODUCTION OF FARM PRODUCTS IN KENTUCKY

In April 1943 - Due to the war emergency and resulting scarcity of labor and machinery, the U. S. General Education Board asked the college to start a "Study For the Simplification of The Present Farm Labor and Equipment Practices in the Products in Kentucky". Under the leadership of W. D. Nichols and James B. Kelley, such a project was prepared, April 1943 and field studies started by Dr. E. J. Nesius, Dr. George Byers of Agriculrural Economics Department and Professor Earl Young, as active leaders.

Because of the importance of tobacco as a source of cash income on Kentucky farms and because so much labor is required in its production, it was decided that work simplification studies should be concentrated mainly on that crop.

Previous farm management studies showed wide range of production accomplishment per worker under substantially similar conditions. Very little study has been done in Kentucky to show in detail the causes of such differences in effectiveness and performance. Records gathered in research projects in farm management in Kentucky show that some farmers used 15 man hours per acre in the operation of gathering corn as contrasted with 8 hours per acre used by other farmers; in stripping tobacco some operators accomplished 110 pounds per man per day as compared with 50 pounds accomplished by others; these differences in both the corn and tobacco being due principally to differences in the labor and equipment techniques used.

The data obtained by these studies were published in Experiment Station Bulletin, Farm Ex. W. S. 6 and 7 leaflets prepared by the leaders during 1944. (see publication list on Page 20)

These three men should be highly commended for the excellent work they did in taking moving pictures of the time and motion studies of the various operations involved and in the preparation of the publications which were later used in training German War prisoners who were brought into Kentucky to harvest, store and prepare the tobacco for the market.

Chapter XI

Experiment Station Farm, Lexington, Kentucky

List of buildings designed, specifications written and construction work supervised by J. B. Kelley.

Poultry Farm: - May and June 1927

1 - Laying House and Frame Service Building 20'x102'.

22 - 12'x12' Shed Roof Experimental Frame Laying Houses.

10 - 10'x12' Frame Brooder Houses.

1 - 20'x85' Shed roof Frame, hot water heated, Brooder House. Designed by the Shannadoa Company.

1 - Brick Veneer 4-room Cottage for the superintendent of poultry, consisting of 2-bedrooms, bathroom, living room, combination dining room and kitchen, 2 closets and partial basement.

1 - Large Turkey Shelter.

1 - Septic Tank Disposal System. Laid out water mains and supervised installation of same on the poultry farm.

In December 1929, Dean Thomas P. Cooper gave me two sets of blueprints of dairy products buildings which he had borrowed from Ohio State University and from Purdue University, requesting me to prepare some suggestive floor plans for him to use to show the members of the State Legislature when he presented a request for funds for a dairy products building for the college here at Lexington.

I prepared plans of the first and second floor arrangements to a scale of 1/2" to 1'. The legislature granted his request for the funds. I was pleased to learn later that the architects who finished the plans and specifications made very few changes in the original arrangements of the floor plans of the "T" shaped building.

In 1930, I prepared the plans, specifications and supervised the contractors who built the Fancy Beef Cattle, "L-Shaped" barn; main barn 36'x108', wing 24'x100'. Main barn has 7 double box stalls, 3 single box stalls, 6 double tie stalls for nurse cows, office, washroom for cattle, washroom for herdsmen, feed room,

grain elevator and dump, 2 silos, dairy room, loft for storage of hay and grain. The wing has 9 double and 1 single tie stalls for young steers, feeding pens, dairy stable for milking 4 cows at a time, and loft space for storage of hay, bedding and grain. Shows arrangement of the outdoor pens and water tank for livestock. Frame walls and roof covered with asbestos cement siding and shingles. The plans included a metal septic tank disposal syster for herdsmen washroom and milk house, and 1 - 18'x49' gable-roof house for 4 bulls. Roof and yard drains.

In 1930, prepared the plans, specifications and supervised the contractor who built the cement block community farrowing house, 25'x58'-8".

The funds, $67,000., $17,000., and $4,500, were authorized by the legislature the same year. Also the year, 1930, the funds were approved by the legislature to build the Agricultural Engineering Building, the new Beef Cattle Barn, and the Piggery.

Piggery - 1928-1931

Designed and supervised the construction of about 16 or 5 types of portable 8'x8' frame hog houses, using various wall and roof coverings, 1"x10' boxing corrugated 20 oz. coated galvanized steel (aluminum .019) 1/2" Plywood.

Summer 1931 - Community Farrowing house 25'x58'-8" consisting of 8 - 8'x8' farrowing pens, feed storage room scale room, herdsmen office and 8 concrete floor sun porches. The structure consists of a concrete foundation, floor made of 5"x8"x8" hollow tile blocks laid flat side down, then covered with 4" of concrete. Side walls constructed of 8"x8"x16" cement blocks. The gable roof consists of scissor trusses sheathing solid and covered with asbestos cement shingles. Ceiling insulated under trusses with 1/2" celotex insulation.

About 1930, prepared plans and specifications and supervised construction of a fertilizer storage house, a gable roof structure 24'x32' for Agronomy Department on Experiment Station Farm, Lexington.

The same year, 1930, prepared plans and specifications and supervised ~~the~~

the construction of a fertilizer storage house, a gable roof structure 24'x32' for Agronomy Department on Experiment Station Farm, Lexington.

In 1935, remodeled old heifer barn, converting the gable roof to a gambrel roof to increase the hay storage capacity. Provided a feed storage room and livestock electrically heated water bowls.

In 1941, supervised the erection of a small glass greenhouse for grass studies by Dr. Fergus on Experiment Station Farm.

In 1942, prepared plans, specifications and supervised the contractors who built a "T" shaped sheep barn, two-story gambrel roof 36'x60' and two one-story wings 25'x48'.

Dairy Center, 1948.

J. B. Kelley in cooperation with Dr. Dwight Seath of Dairy Department, prepared the preliminary plans and specifications of the Dairy Center which were finished by Franklin and Curtis, architects.

The same year, supervised the purchase and installation of the chain link fence across front and south side of dairy pasture along Nicholasville Pike.

In 1951, prepared plans, specifications and supervised construction of Safety, Two-Pen Bull House and Breeding Stall at Dairy Center.

In 1955, located roadways and water mains for installing a sprinkler irrigation system for legume breeding plots.

In 1955, prepared plans, specifications and supervised construction of a 28'x57'-4" cement block, gable roof, experimental heifer barn for Dairy Center.

In 1958, designed sprinkler irrigation system for the dairy pasture forage studies.

Roadways: Supervision of maintenance Experiment Station Farm, Lexington.

From January 1930 to the spring of 1955, J. B. Kelley had the responsibility of supervising all the painting maintenance work done on the farm buildings, roadways, water and sewage and disposal systems on the Experiment Station Farms Lexington. To do the work, he had working under him one mechanic for tractor

farm machinery and other metal work; two full-time carpenters, and in the summer time, two to four extra men for painting and repairing buildings and gates, small structures, etc., for livestock - three brick and 4 frame residences and a header house and two greenhouses. He let the contracts and supervised all the construction of all the roadways and water lines for the buildings and fields, from 1930 to 1955.

Tile Drainage Systems Installed on the Kentucky Experiment Station Farm, Lexington, Ky., 1926 to 1952:

J. B. Kelley was responsible for making all the surveys, designing, mapping and supervising the installation of 32,068 or 6 miles of tile and the bulkheads installed on the farm 1926-1951 as follows:

Year	Sizes and Feet of Clay Tile Installed					
	12"	10"	8"	6"	5"	4"
1926-27-29	856	1941 824	24 419 200	750 6458 600 1225	588	1330 2266 850 1150
1939				633	420	7405
1947				400		400
1951				600		2937

Note: Records are located in the steel vault in business office in Experiment Station Building.

Kentucky Experiment Station Farm
Lexington, Kentucky



Dairy Center, 1948 - Experiment Station Farm
Lexington, Kentucky



June, 1947
Poultry House, Experiment Station Farm
Lexington, Kentucky

Experiment Station Farm, Lexington, Kentucky



Three-Pen Bull Barn at Beef Cattle Barn (1932).



Laying House and Storage Unit (1927)

Kentucky Experiment Station Farm
Lexington, Kentucky



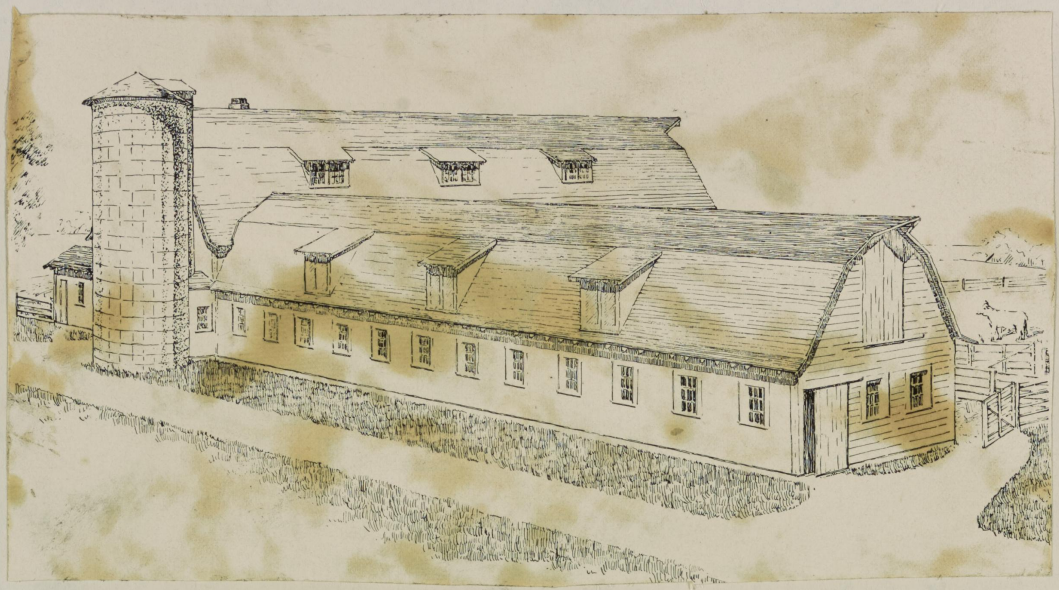
A picture of Harold J. Barber who was the devoted shepherd of the flock from 1922 to 1960, showing one of many of the grand champions ewes that he raised. The picture also shows a view of the sheep barn which was designed by J. B. Kelley and Mr. Barber and erected on the Experiment Station Farm in 1933. The barn loft of this barn was equipped with the first electrically operated hay drier installed in Kentucky for curing alfalfa hay. This outfit enabled Mr. Barber to provide the properly conditioned green hay that he had always desired for his flock.

Experiment Station Farm
Lexington, Kentucky



Poultry Cottage built in 1927

Experiment Station Farm
Lexington, Kentucky

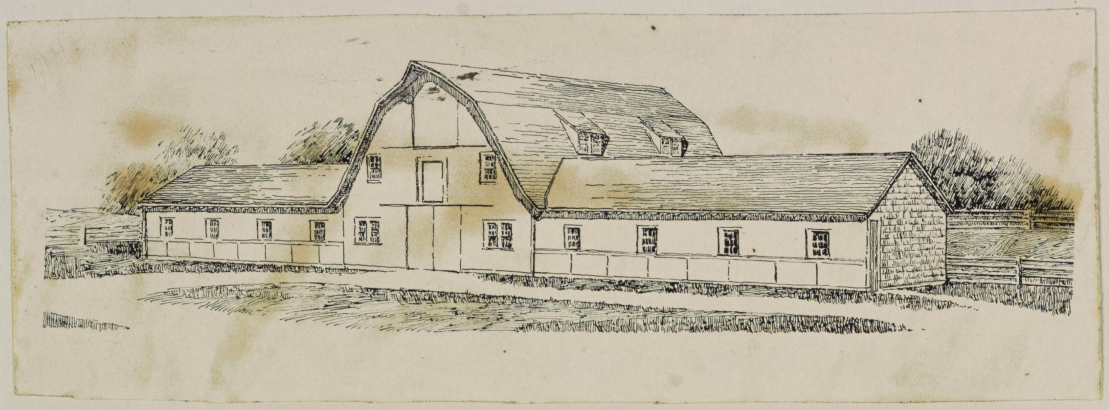


Fancy Beef Cattle Barn built in 1931



Community Hog House built in 1931

Experiment Station Farm
Lexington, Kentucky



"T" shaped sheep barn built in 1942

Western Kentucky Sub-Station Farm
Princeton, Kentucky

In 1924, after the farm families in Western Kentucky bought and deeded to Kentucky Experiment Station the Luttrell and O'Hara tracts, consisting of _____ acres of land, about 1 1/2 miles East of Princeton, for establishing the Western Kentucky Sub-Station Farm, Mr. S. J. Lowery was appointed as the superintendent.

At the request of Mr. Lowry, I went to Princeton with him to inspect the farm for the purpose of deciding what had to be done in clearing the land of shrubbery, unusable old buildings, for providing roadways, for drainage systems; for providing an adequate water supply system; preparing plans for new buildings needed.

NOTE OF INTEREST: To help raise money for purchasing the farm and to increase interest and publicity among the people in Western Kentucky, an old mule which had been given to Dean Cooper for the farm, was raffled off by the school children of Caldwell County by selling lead pencils.

We found sources of water to be three shallow wells, two cisterns, and two contaminated springs. One of our state senators, who lived in Caldwell County informed us that we could obtain all the water that we would need by drilling wells on the farms. He also told us that he had inherited the power from his father and grandfather to enable him to locate sites for wells by the oldtime art of "witching", using a forked part of limb (peach tree limb) and that he would be glad to perform that task for us. Under the circumstances, although my faith was not as strong as the senator's, we deemed it expedient to accept his cordial offer.

We drilled one well and struck a 5-gallon per minute flow at a depth of 40 feet, but upon testing it we found that it contained B-Coli. For household use the water supply had to be obtained from cisterns. Later a water main was installed from the farm to the Princeton Water Supply System. A

Western Kentucky Sub-Station Farm, continued

septic tank disposal system was also installed.

In 1924, Mr. Kelley prepared plans and specifications for remodeling the O'Hara brick veneered house for a residence for Mr. Lowry and his family, including some office rooms. The same year plans were made and the structures were erected of the following.

A combination, gambrel roof frame barn, 36' x 72', for 6 box stalls for mules, a harness room, a corncrib, a hay loft with a 24' x 72' machinery shed attached.

A 16 stanchion, 34' x 72' gambrel roof dairy barn, 4 cow pens, feed room and a milk room.

A 16' x 25' bath house for 4-H Club site on the Luttrell Tract.

In 1925, he prepared plans and specification for a 4-room, 26' x 28' tenant house for colored help, consisting of 1-bedroom, room for future bath room, living room, a bedroom or dining room, combination kitchen and dining room.

In 1925 Mr. Kelley rechecked the traverse boundry lines with the deeds on the O'Hara Tract and found some errors that had been made in the survey by the county surveyor. He surveyed and made contour map of 2½' vertical intervals of the farm.

In 1926, Mr. Lowry and J. B. Kelley made arrangements to install a 3" galv. water main extending it from the end of the 4" cast-iron water main of the City of Princeton, 5265 feet to a fire hydrant placed at the rear of the superintendent's house on the Luttrell farm, in order to provide the water needs of the farm.

In 1927 a one-car load beef cattle, gambrel roof feeding barn, 36' x48' and a reinforced concrete above ground water storage tank, on the O'Hara trct was built.

In 1927, Mr. Welch selected and staked out a site for an earthen dam for a farm reservoir for livestock, but the dam was not constructed because it was decided to build a water tank to catch water from the beef cattle and general

Western Kentucky Sub-Station Farm, continued

barn.

In 1930 (Sept.). plans and specifications were prepared and a contract was let for a brick veneered service building, 14' x 36', pavilion 40'x 74', basement, steam heating system, 2 public toilets, refrigeration for fruit storage in basement and septic tank disposal system.

In 1933, plans and specifications were prepared for a 20' x 48'-8" fire curing tobacco barn on the Luttrell Tract.

Prepared plans and specifications for poultry laying house and brooder houses.

In 1937, a 24' x 36' gable roof heifer barn. A 2-story storage house for fruit, 24' x 36' but funds were not furnished to build it.

In 1940, selected and made arrangements to install a set of Fairbanks Wagon Scales.

In 1946, a skylight tobacco stripping room, 14' x 20'.

In 1947 and 1948, a combination shop, machinery and fertilizer storage building, 26'x100'.

In 1949, 2 - 12' wide span concrete road bridges across a stream on the Luttrell Tract.

In 1950, staked out located water mains onsisting of 2525' of 2 1/2" pipe extending from fire hydrant back of the superintendent's home to the booster pumps installed in a concrete pit and then extended 2" main 1593' long to the buildings located on the O'Hara Tract and for spraying the orchard, Etc.

In 1954, an addition of 16' x 36' and necessary heating equipment for enlarging the service building were erected.

Revised plans and specifications for building a header-house and greehhouse which consisted of a glass gable roof, concrete block foundation and a 29'

Western Kentucky Sub-Station Farm, continued

wide by 69.4 7/8" long structure and a frame header house heated with hot water for doing "dark tobacco" research work on the Luttrell Tract at the Sub-Station, Princeton, Kentucky.

In 1954 and 1955, furnished plans and specifications for building 2 - 1 1/2-story frame cottages, roofed and sided with asbestos cement materials, for the Assistant Superintendent, Mr. Lowry Caldwell, and one for the foreman In Charge of Animal Husbandry phases.

In 1955, for remodeling the dairy barn, adding 10 stanchions, cow stalls and manure gutter-cleaner equipment. Also added 32' x 34' gable roof addition provided with 3 maternity pens, 9 separate 3' x 6' calf pens, feed room and storage for baled straw, and a loft.

Helped to make plans for converting a frame ~~ary~~ army officers' cottage into a crop drier structure, equipping it with an electric-power operated drier, fand and 4 drying chambers.

In 1956, remodeled the cottage for the poultryman's family.

As a matter of record, I wish to state that through all these years, 1924 to the present time, that the Superintendent, Mr. S. J. Lowry demonstrated that he was an outstanding man of high integrity, of unquestionable Christian principles with untiring devotion to his work, and a man who has proven his ability as a leader and an inspiration to the men who have worked under him; on the soils and crops phases and the agricultural engineering phases which have been applied in developing the work at this Sub-Station. He should be given credit also as the resident superintendent of construction of all the buildings and other engineering structures erected on the farm.

SIGNED _____

James B. Kelley

Western Kentucky Sub-Experiment Station Farm
Princeton, Kentucky



Four-room frame cottage, 26' x 28' with bath, for dairy herdsman.
Built in 1925.



Old tenant houses located on the O'Hara Tract which were torn down , 1925 - 1930.

Western Kentucky Sub-Experiment Station Farm
Princeton, Kentucky

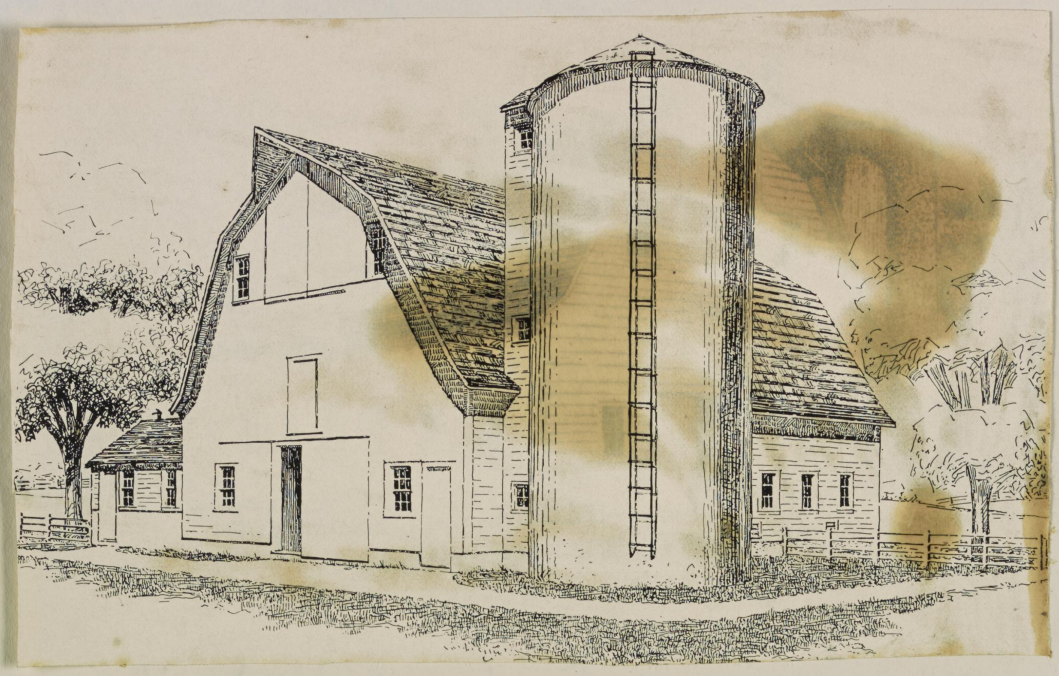


Service Building Housing Offices and Assembly Hall or Pavilion
Princeton 1930

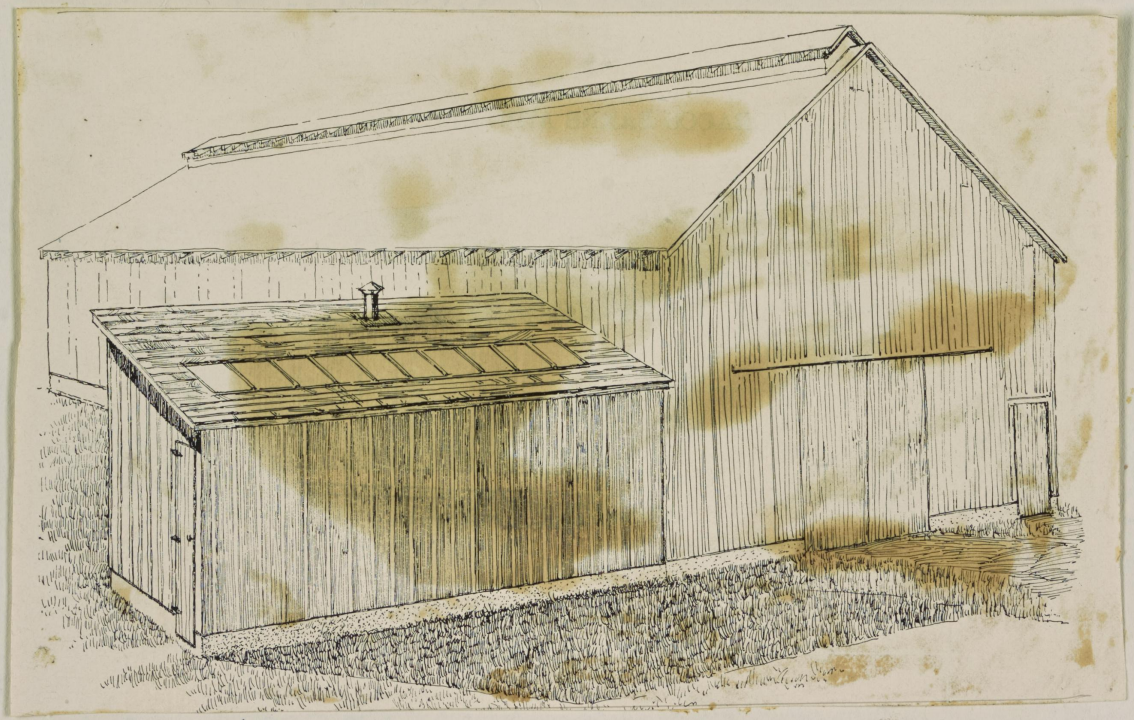


Remodeled this 2-story brick veneered 8-room and bath O'Hara Residence to use for the home of superintendent and for temporary offices.
1924

Western Kentucky Experiment Sub-Station Farm
Princeton, Kentucky

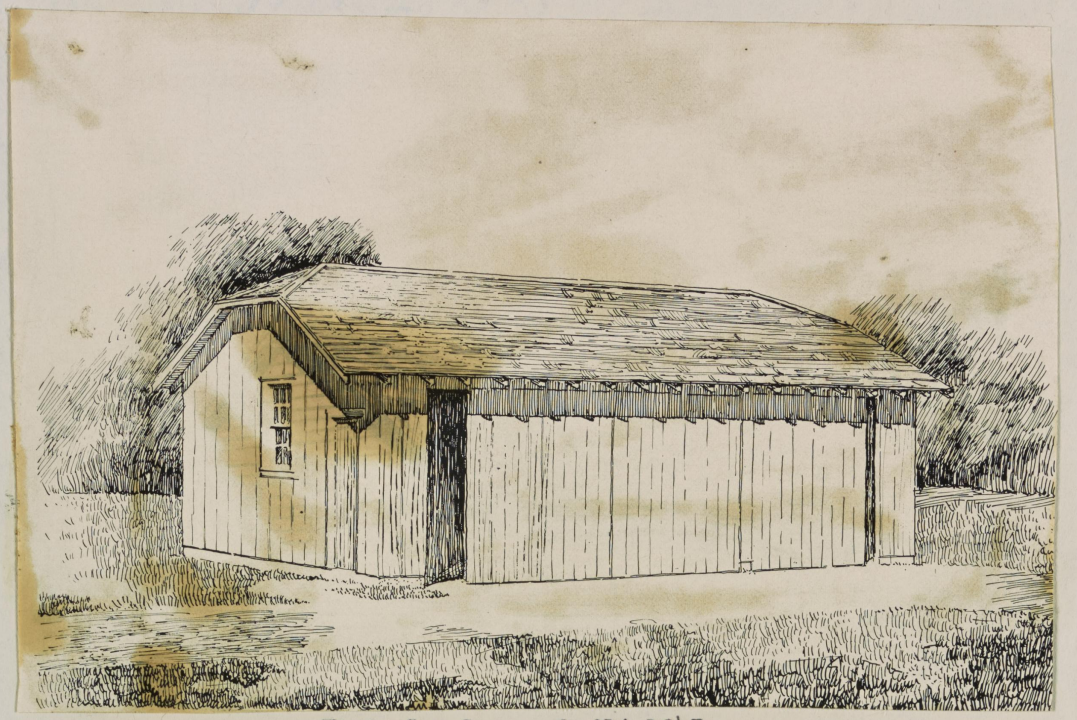


Dairy Barn, Milk House and Silo, built 1924



40' x 72' Burley Tobacco Barn and Stripping Room
Built 1933

Western Kentucky Experiment Sub-Station Farm
Princeton, Kentucky



Three-Car Garage built 1947

Western Kentucky Sub-Experiment Station Farm
Princeton, Kentucky



The following pictures give an idea of the amount of hard hand-grubbing work that was done by Mr. S. J. Lowry and his men in clearing the land in preparation for crops.



Condition of roadway from front to rear of O'Hara Tract in 1924

Western Kentucky Sub-Experiment Station Farm
Princeton, Kentucky



Before clearing fence line along county road between the sandstone and limestone tracts of land



After Clearing fence line along county road between the sandstone and limestone tracts of land, 1925

Western Kentucky Sub-Experiment Station Farm
Princeton, Kentucky



Old out buildings located on the O'Hara Tracts when the farm was donated to the Experiment Station 1924



Typical picture of a large area of the sandstone farm land which was covered with wild blackberries in 1924

Work Done by Agricultural Engineers on
(The Robinson Tract) Sub-Experiment Station Farm
Quicksand, Kentucky
1924 - 1957

October 1924, J. B. Kelley prepared plans for combination dairy and mule barn which was built later that year.

In June 1924, Mr. Welch and J. B. Kelley, at the request of Dean Thomas Poe Cooper, went to Quicksand to investigate the water supply situation. A report of their findings was made, June 19, 1924 as follows:

Located on the property was an abandoned wooden water tank on a tower formerly used for the saw mill and which had been filled by pumping water from the river. The pumping equipment had been r emoved when the sawmill was torn down.

Three drilled wells from about 50 to 125 feet deep; one dug well 18 feet deep. All these wells contained highly mineralized water and needed to be cleaned and tested.

A new hand pump was later installed in the 70-foot well in front of the Club House, the last of June, and a Delco pneumatic pressure system in a well 125 feet deep was placed in the Club House basement.

In July 1924, J. B. Kelley made a survey and prepared drawings for installing a 1 1/2-inch galvanized water main from the Delco System to Mr. Jones' house, a distance of _____ feet, above the Club House, providing fittings for connecting the main to the other cottages owned by the Experiment Station.

In 1934, Mr. Welch designed a 500 to 1,000 gallon storage tank, to be mounted on top of the hill back of the general barn, which he proposed to fill with water pumped from the river. Because of lack of funds the idea was dropped.

In 1942, at the request of Dean Cooper and Mr. Jones, J. B. Kelley made surveys and designed a water filtering and chlorinating system and partial specifications for providing safe water supply for pumping it from the river. Again funds were not made available.

April 8, 1943, Mr. Kelley was requested to prepare an estimate and specifications for letting a contract to drill a 6-inch well 500 to 700 feet deep in an attempt to provide water for the Quicksand Experiment Station. After a contractor was found and the specifications were finished it was learned that on account of the war the necessary steel casings could not be obtained at a fair price, so the proposal was again dropped.

In June 1957, the families and business enterprises located on a pike running parallel to the river from Jackson to Quicksand, and the families living in Quicksand, agreed to help finance the construction of a water main from a point from where the Jackson Water Company city main crosses the river east of the city, if the Experiment Station would make the necessary survey plans and specifications and estimates of cost.

The proposed line was 12,200 feet long and difference in elevation at each end of the main, 100 feet.

Mr. Kelley made a trip to Quicksand to investigate the advisability of this proposal. He prepared a map showing the location for the water main, calculated the daily water requirements, sized the pump, motor and water main and storage tank, made estimate of the cost of installing the system.

Later that summer, Professor David K. Blythe, Civil Engineering Department had a crew of his students taking college work, at the Civil Engineering Summer Camp, make the profile leveling survey, staking out the line and prepared a complete report for letting a contract. Still no funds have been made available to complete this installation.

About 1926, Mr. Wlech surveyed and designed and supervised a drainage system for about a 10-acre bench area below the general barn.

In the year 1927 (/), Mr. Welch and Mr. Kelley terraced the orchard site on the steep hill behind the general barn, realizing it was too steep.

It, however, was the only site available for an orchard at Quicksand and the Horticulture Department deemed it very desirable to have a demonstration orchard on the farm. It continued to be used for 18 years.

To spray the 400 fruit trees, a centralized spray installationwas was constructed about 1930.

Mr. Welch and Kelley over a period of years visited ~~the~~ Home Place at Ary to help Miss Lucy Hale locate, plan a drainage system, water system, several barns and poultry houses needed at this Experiment Station Farm.

Information Regarding Water Supply, Quicksand, Kentucky

(Notes taken by J. B. Kelley and Earl G. Welch, June 19, 1924)

(1) Found a drilled well in hillside just above the old barn across the river. Well was cased with 6" steel casing. Gauged well and at depth of 12 feet struck the top of a pump suction pipe which was left in well when pump was removed.

(2) Found a dug well located south of barn. It is walled up with stones. Depth 18 feet. Contained 7 ft. of H_2O.

(3) Found a drilled well on left hand side of old track between barn and bridge. The well is 65 feet deep and contained 55 feet of water.

(4) The drilled well in front of club house was found to be 70 feet deep and water was within 29 feet from top.

(5) Found an old well in basement of club house at left of door which had been ruined by being filled with coal.

(6) The well back of the Haddix cottage was put in by Mr. Webber, formerly employed as Secretary of Company Store and he claims that it is 125 feet deep. (It is a good well).

(7) At a distance of 1065 feet from bridge on the north side of river upstream is a cove on the mountain side which could be used for a natural water reservoir by building a dam approximately 20 feet high and 50 feet long at the top. The elevation at top of dam would be 177.20 feet. This elevation would force water to any building owned by the University; elevation at club house porch floor, first floor, being 100 feet, and at Mr. Jones' house, 111.9 feet; Hutchinson house, 106.36 feet; Brown's, 100.27 feet; Haddix, 99.32 feet; Barker, 101.11 feet.

(8) Notes on installation of water system, by J. B. Kelley.

a. A Delco 1/2 h. p. deep well pump No. 108 was installed at well No. 4 in front of club house. Used 2 foot frost length, 60 ft. of 2 1/2" Galv. suction pipe. The lower end of suction pipe is approximately 62 feet from top of pump platform. Used 3/8" galv. pipe for pump rods. This outfit was installed by Mr. J. Williams and Mr. W. Maxwell, of the Delco Light Company, Lexington, Ky.

b. A 120 gallon pneumatic tank was installed in the basement of club house.

c. A new 1-1/2" galv. main was run from the pressure tank to Mr. Jones' house. The main runs parallel to club house 1.1 ft. from northwall, 19 feet from N. E. corner of house it branches off 45°. In this line 19 feet from turn almost in line with well was placed a hydrant connection. At a point in line with south side of store building the main is 31.5 feet from S. W. corner of store (not porch). At a point in line with front of L & E Depot the main is 113 feet from corner of depot. The line is offset 19 feet before going under the three R. R. tracks. Unions were placed in line on each side of tracks and the pipe was placed inside of a 3-inch pipe under main R. R. Track.

Six feet from the south track, at intersection of crossing and plank road was found a 24 R. R. storm sewer. The pipe was bent to pass under the sewer

The main then passes through the Hutchinson yard within 8.5 feet of front N. E. corner of house, and within 12.8 feet of S. E. Corner of main part of house. A 1 - 1/2" union was placed in line at a

point 6.5 feet from south line of porch in order to connect further into the old pipe line running between the houses 3 feet back of the union.

The main passes through the gardengate and turns, going direct to Mr. Jones' house along ou side edge of sidewalk. It is connected to a 1-inch pipe going into the center of the bathroom 20 feet from S. E. corner of house. There is a union in the line underneath sidewalk.

Robinson Sub-Station Farm
Quicksand, Kentucky



Picture of the terraced orchard site at Quicksand, 1927

Bryant Farm, Lexington, Kentucky
1955

Shortly after the T. R. Bryant farm near Versailles was leased by the Experiment Station, Mr. Kelley was asked to investigate the water situation on the farm. He learned that there were two shallow wells on the farm. The one 200 feet from the house and about 50 feet deep scarcely supplied enough water for a family of three.

A second well about 2,000 feet from house proved to be a dry hole. Two small shallow ponds were used for livestock. After further investigations, having contacted the State Geologists, it was decided to make one attempt to obtain water by drilling a well on the back end of the farm. A hole was drilled 50 feet deep without striking water.

In April 1955, J. B. Kelley and Professor Bryant, after contacting the proper officials of Versailles and of the Methodist Orphans Home, obtained permission to obtain water for the Experiment Station Farm. Legal papers were prepared and duly signed for installing a 2" Galvanized main from the meter box on the Orphan Home property and across that farm 3,000 feet to Experiment Station Farm. Mr. Kelley did all the necessary engineering work for completing the records for letting a contract for installing the main, and extending the line to various fields for water for livestock and irrigation purposes.

*** Moral - Never buy a farm without first making a thorough investigation of the possibilities of obtaining an adequate supply of pure water. (I make this statement after 40 years of observations in Kentucky.

J. B. Kelley).

Work Done By Agricultural Engineers
EDEN SHALE Sub-Station Farm

J. B. Kelley and Earl Welch were asked by Dean Welch, January 1955 to be the engineer members of the committee to select a farming area from Harrison, Pendleton, Owen, Grant or Boone Counties, now to be known as the Eden Shale Sub-Station Farm.

The area finally selected was acres in Owen County. In September 1955, J. B. Kelley and Mr. W. L. Mahan made plans for repairing the superintendent's house as follows: the roof, refinishing the interior walls and ceilings, installing a bathroom, remodeling the kitchen, plumbing and water system installation, warm air furnace and laying out a septic tank disposal system for the superintendent's frame, two-story 32'x32' house.

The superintendent's residence, renovated of ten rooms and a partial basement. It was heated by fireplaces and one coal stove.

Mr. Welch and J. B. Brooks in 1956 selected two sites for earthern dams to provide water for the production of livestock. The engineers of the Soil Conservation Service prepared the plans for the earthen dams and supervised their construction. The larger dam was 160 feet long and 20 feet high. Mr. Wlech and Mr. Brooks staked the location of water mains and sized the pipes to meet water required for all the houses and barns.

January 1957 and 1958, Mr. Brooks designed a filteration plant for providing safe water needed for the farmstead, and supervised the construction of the various structures and installation of water pumping and treatment equipment. He also acted as a supervising architect in connection with the erection of the loose-pen dairy barns, concrete milking parlor and milk house.

Chapter XII

Cooperation With Federal Agencies

Federal agencies with which the Division of Agricultural Engineering has cooperated and the nature of the work done is as follows:

Bureau of Agricultural Engineering

1. Supervised engineering phase of Rural Housing Survey. Supervised compilation of State Reports.

2. Assisted Bureau, through county agents, in establishing of CCC Drainage Camps, in selecting projects, and in educational work for supervisors and technicians in camps located in Kentucky, Southern Indiana and Southern Illinois.

3. Provided building plans to the Bureau for inclusion in a group of plans offered to all states by the Bureau in an interchange of plan service.

4. Cooperated with the Bureau in a rural electrification surveys in three counties in Kentucky as an extension of the Rural Housing Survey.

Soil Conservation Service

1. Assisted with the program of the Soil Conservation Service since its beginning when Flood Control CCC Camps were established under the supervision of the State Forestry Service. Howard Matson, Agricultural Engineering Section, was given a Leave of Absence to assist in setting up the camps and to act in a supervisory capacity. At the suggestion of extension engineers and Mr. Matson, an educational program covering agronomic as well as engineering work was emphasized in these first camps in 1943. → go to #2

2. Acted in advisory capacity to Federal and State Technicians in matters pertaining to engineering techniques as it applies to terracing, gully control structures, and terrace outlets. → go to Fm Security

3. Attended and participated in meetings, tours and field inspection trips of technicians.

4. Attended and participated in State and Regional Conferences for developing programs and recommendations concerning technical matters.

Farm Security Administration

1. Acted in advisory capacity to State and county supervisors in matters pertaining to lime pulverizing, drainage, erosion control and farm buildings where such assistance was desired for purposes of furthering their work.

War Activities

Never before in our history had the American farmer faced a bigger job than the one confronting him in 1941, 1942, 1943 and 1944.

The food production goals as set up by the War Food Administration was the highest on record. "This program called for the use of every productive acre, every serviceable motorized machine and implement, and every available person on the American farms." It called for Greater and still Greater food production with the help of Less farm labor."

The Food Administration called on the extension staff of the colleges to activate programs in the various states.

As the proper maintenance, wider and more efficient use of labor-saving farm equipment was of first importance, the Agricultural Engineering Section was requested, through Professor T. R. Bryant, to plan such a program. What was done is explained in the following subject matter. Note: See attached Sheets.

start → War Activities

In December 1941, the extension engineers prepared a Plan of Work for Repair and Adjustments of Farm and Household Machinery and Equipment, which Assistant Director, Mr. T. R. Bryant sent out to the County and the Home Demonstration Agents as per letter of December 19, 1941. (See copy of letter and Plan of Work).

In November 1942m the engineers were asked to plan a program for holding a farm machinery conference as per letter of November 30, 1942, by J. B. Kelley. Attached is a copy of the program which was held at the Agricultural Engineering Building on December 14, 1942, and a registery of attendance.

War Activities, (continued)

HEMP

In November 1942, the USDA War Board, November 5, 1942, sent a War Board Memorandum to the college deans and extension directors of Illinois, Indiana, Kentucky, Iowa, Minnesota and Wisconsin on the subject, "1943 Fiber Program" for thefollowing reasons:

1. "Reports of Manila hemp fiber (abaca) from the Philippines and other eastern areas normally have supplied the hard fiber needs of this country for the army, navy, merchant marine and civilian uses. Now that imports are cut off and out requirements are increased so much, it is necessary to develop a supply of substitute fiber. American Hemp is the best known substitute which can be produced on a practicable basis.".

Kentucky was asked to increase its 5,000 acres grown in 1942 to 48,000 acres in 1943. In January 1943, Kentucky was asked to raise hemp for seed and for the other five states for the production of fiber. Farmers Home Journal, in the November 1943 issue, announced "Hemp, Once King of Kentucky Cash Crops, Reigns Again".

In 1943, program called for construction of 71 new hemp fiber mills to be financed by the Defense Plant Corporation.

The Agricultural engineers helped Mr. S. J. McCory, Chief of USDA Agricultural Engineering Bureau, Washington, D. C. to select a site for a in Kentucky, which was built on the Winchester Pike between Lexington and Winchester, Kentucky.

In January 1942 the agricultural engineers made some studies on how to plant hemp seed by using two row corn planters, using the check wire method, the automatic hill drop method and hand-operated hill drop method. As a result, on April 11, 1942, a Mimeograph A-64, Agricultural Engineering Section,

"Machinery for Planting Hemp for the Production of Seed" by James B. Kelley, was printed July 1942; A-23, "How to Harvest Hemp Seed", by James B. Kelley. That same year, Jesse Brooks designed a successful simple machine for beating out and cleaning the seed, about 75 per cent. Plans and instructions for constructing this homemade machine and for operating it were published in mimeograph, by Agricultural Engineering Section, author, Jesse B. Brooks, March 16, 1942.

Some of the old hemp growers in Kentucky told us that they did not believe that hemp could be properly threshed with the old-type threshing machines. Therefore, Mr. J. L. McKitrick was assigned to determine if it could be done, using a T. V. A. small thresher and a combine.

By September 16, 1942, the engineers were able to furnish directions for using the T. V. A. thresher and grain combines for cleaning the seed threshed by hand or by the thresher designed by Jesse B. Brooks. We ran across an old thresherman who rigged up an old J. I. Case machine for successfully threshing the seed from bundles of hemp. He moved the machines from shock to shock of hemp in the field. Seed head end of the bundles was thrust into the cylinder and stocks were thrown to the ground and trash and seed passed through cleaning equipment and clean seed was sacked.

The engineers also worked with several of the implement companies in developing hemp harvesting machines for fiber production. (See pictures.)

A Mr. Cook, a University of Kentucky M. E. Graduate, reared near Danville, Kentucky, designed and demonstrated a portable machine for breaking and baling the retted stocks for fiber.

In April 1943, the Farm Economics Department and Section of Agricultural Engineering were authorized by Dean Cooper to cooperate with the U. S. General Education Board on the Work Simplication Cooperative Program taking as an assignment the Production of Burley Tobacco in Kentucky. Mr. George

B. Byers assumed the responsibility for plant bed and setting phases. Mr. Earl R. Young, the cutting and housing phases, and Mr. E. Nesius, the stripping and preparation of the tobacco for marketing. Preliminary observations were made in tobacco fields in Fayette County the first year to determine the methods of procedure in taking time and motion studies of the various operations involved in making, planting tobacco beds, weeding and pulling of plants; the machine setting, cutting and housing practices involved in removing the cured tobacco from barns; stripping and preparing for market.

A summing up of the results found in these studies showed that an increase of from 25 to 75 percent in the accomplistment of workers could be achieved by adopting the principles developed in these studies. These three men did outstanding work on this project in gather the facts, and in the preparation of extension leaflets for use of the farmers. See Page_____ and in taking of films, which were later used to increase the efficiency of the workers and to quickly train German prisoners of war, who on account of the shortage of labor were brought into Kentucky during the tobacco crop harvesting season.

Frozen Food Lockers:

As a war food measure the frozen food preservation locker service in Kentucky was initiated in 1940, starting with the establishment of three locker plants which increased to 11 in 1941 and to over 120 commercial locker plants by January 1, 1956, making such a service available in almost every county in the state. This development has greatly improved the health of both rural and urban people.

Frozen Food Storage. 1944

The sale of frozen foods and establishing of locker plants in 1940 through 1942, created a great increasing demand for information regarding the preparation, freezing and storing of meats, fruits and vegetables.

At the request of Dean Thomas P. Cooper, J. B. Kelley made a study of literature that was available and prepared a manuscript on the subject, August 1943, in an attempt to answer some of the requests that were coming into the College for such information. Fortified with this information, Mr. Kelley appealed to Miss Pearl Haak, our Extension Specialist in Foods, to cooperate in preparing a more comprehensive circular, No. 398, "Storing Food in Freezer Lockers." This was published in 1944.

The demand for this kind of information has been so great that the circular has been revised and brought up to date practically eacy year from 1944 to 1956. During this period of years a minimum of 2 thousand to 25 thousand copies per year were sent out as requested. Staff members of the Agricultural College have been co-authers of this publication - Pearl Haak, Florence Inlay, J. B. Kelley, Professor Wilford, Jamed D. Kemp, W. M. Insko and A. J. Olney.

Frozen Locker Short Course for Locker Managers

A frozen food short course for locker managers was held at the University of Kentucky, Lexington, Kentucky on April 24 & 25, 1944, sponsored by the staff members of the College of Agriculture.

Problems in the operation of frozen food lockers were discussed by the speakers - about 200 men and women attended the meeting. Registered were managers of locker plants in 36 Kentucky counties, representatives of locker manufacturers of locker equipment, members of the Kentucky State Board of Health, county and home demonstration extension agents and members of the University faculty, Loran Baker of Tennessee Valley Authority, Ken F.Warner of the U. S. Department of Agriculture, Wasington, D. C., Dr. H. H. Plagge, Iowa State College, Ames, Iowa, Harry Florry, Vice President of the National Frozen Food Locker Association, Eaton, Ohio, Dr. Jennie McIntosh, Consumers' Institute of General Electric Company, Bridgeport, Connecticut, and Mr. Claude W. Kniffen, Westinghouse Company.

War Activities



A picture of the labor-saving tobacco housing equipment section of a farm and home labor-saving exhibit which was planned and built through the cooperation of all sections of the College of Agriculture and was first shown in the Agricultural Engineering Laboratories, then loaded into one large van truck and was displayed in county seat towns in various parts of the State during 1946 and 1947.

From this exhibit the rural people that visited it, picked up many labor-saving ideas that helped them to solve some of their labor shortage problems.

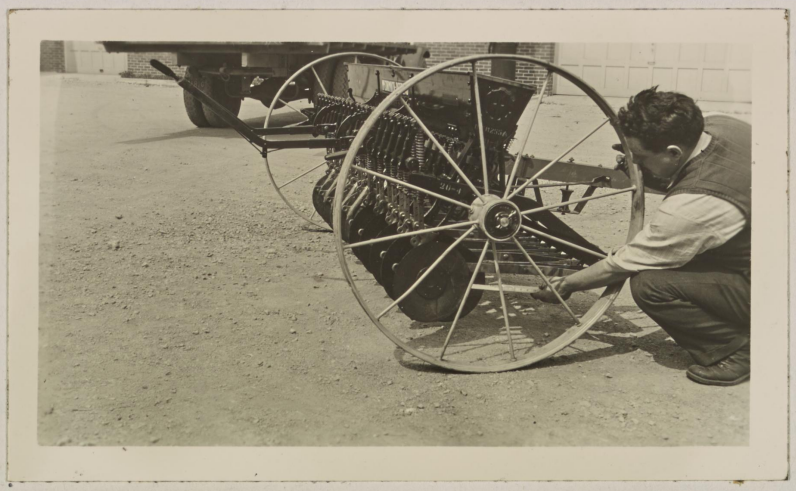
Mr. Arley M. Money, Mr. E. C. Alexander and Mr. E. W. Kessler helped build the exhibit and were in charge of the town through the State.

War Activities



The agricultural engineers cooperated with a number of manufacturers in taking observations on the use of new types of hemp harvesters on a farm in Bourbon County.

War Activities



Grain Drill



The agricultural engineers helped design equipment for a grain drill and a two-row corn planter to save labor in planting hemp seed.

Chapter XIII

Overall Picture of The Housing and Economic Conditions in Kentucky Farm Families 1940

The following information was taken from the published proceedings of a conference sponsored by the Committee for Kentucky in association with University of Kentucky National Committee on Housing, Inc., Lexington, Kentucky, May 25 and 26, 1945, shows the housing situation in Kentucky in 1940.

" Mrs. Samuel I. Rosenman Chairman of the National Committee on Housing, Inc., presented an overall picture of the housing and economic condition of the nation's farm families, which delineated the basic problems to be solved in planning a program for better housing."

Dr. Howard Beers, Professor of Rural Sociology, University of Kentucky, presented a brief survey of housing conditions in 1940, with the comment that they are possibly worse at the present time.

With 51 percent of the houses valued at less than $500.00, the picture was clearly one of widespread poor housing, reflectiong low income and bringing in its wake disease, illiteracy, crime, psycho psychoneurosis and dependency in contrast with the healthy bodies and well adjusted personalities found among people with good housing. He touched upon the problems of the tenant farmer who, moving from place to place almost every year, deprives his children of the stability necessary to the formation of a denpendable personality.

"Poor farm housing," Dr. Beers Stated, "is due to several factors. Chief among them is low income which forces the farmer to give priority to expenditures for barn and equipment by which he can increase his income; the habits and folkways of farm families which would have to be changed through guidance and instructions before modern ideas of health, sanitation and privacy prevail, and the dispersed patterns of farm homes."

Dean Cooper -"There are some 280,000 farm families in Kentucky. Their homes vary from the most poverty stricken to the finiest and most confortable that money can supply."

James B. Kelley - "Housing data taken from the 1940 U. S. Census reports shows that in the entire State we have 293,774 farm dwellings. In region number one we have 81,667 dwellings; in region number two, 63,512; in number three, 55,879; and number four, 9,082. Number five has 15,379 farm dwellings; number six, 33,927; number seven, 14,553, and number eight, 19,775. Of these 293,774 dwellings there are 109,366 that are in need of repairs, each region having its share. In the entire State, 37.2 percent of these dwellings need major repairs. For the various regions the percentages of houses needing repairs varied as follows: 40.8 in the first district, 38.9 in the second, 29.4 in the third, 16.8 in the fourth, 38.2 in the fifth, 40 percent in the sixth, 33.7 in the seventh, and 45.6 percent in the eighth."

"Miss Weldon mentioned the need of running water in the dwellings. The data shows that 4.2 percent of the entire number of farm dwellings in the State have running water in the house, with regions number one and two having the lowest percentage, 2.5 and 2.4 respectively. Only 3.6 percent of the dwellings in Kentucky having running water within 50 feet of the house, and 69.8 percent have other water supply within 50 feet of the house. There are 17.8 percent that have no water supply within 50 feet of the house. Three and one-tenth percent have no toilets in the house, 82.5 percent have outside toilets, and 14.4 percent have no outside toilets at all. In number one region the homes without any toilets amount to 17.3 percent of the total; number two, 21.7 percent; number three, 5.4 percent; number four, 1.6 percent; number five,

13.9 percent and number six, seven and eight, 16.3 percent, 7.9 percent, 11.7 percent respectively.

"A survey of farm housing in Kentucky in 1940 showed that of the 37.2 percent of dwellings badly in need of rapairs, 23.9 percent were considerably overcrowded. The average number of rooms per house was five, with a range from two to six. The occupants of the dwellings averaged 4.3, with a range of 4.2 to 6.1 persons. The number of bedrooms per house averaged 2.4 with a range of 1.8 to 2.9. Sixty-nine and two-tenth percent of the dwellings have closets; only 7.6 percent have bathrooms, with a range from 1.2 to 30.9 percent in the different counties; 14.9 percent have basements, with a range of 3.3 to 40 percent.

"Owners occupied 57 to 60 percent of the dwellings; non-owners, 42.9 percent; non-whites occupied four percent.

"A survey made in 1934 also showed there were 25.3 percent uppainted frame dwellings; painted 61.7 percent; stucco, 0.3 percent; log dwellings, 8.2 percent; brick, 4 percent; stone 0.4 percent and concrete dwellings, 0.1 percent. The age of these houses was: 13.1 percent under ten years old; 27.5 percent were from 10 to 24 years old; 33.3 percent from 25 to 49 years old average, and 25.1 percent of the houses were over 50 years old.

"Now I will offer some suggestions on how to repair or remedy this situation. As I travel about the state I find that we have different types of houses in different regions. In some regions the standards are low, houses being without running water with leaky roofs and walls, and no toilet facilities whatsoever. But right here in Lexington, as in every other city, we have houses that have no running water or toilet facilities, and we also have houses that have nothing but earth floors. If we are going to improve the housing conditions under which these people live, we will have to provide means for people to work to increase their income so that they can

afford repairs and improvements.

"The lack of an edequate income is the limiting factor for these people. Many of them would have made the repairs long ago were it not for the lack of income. We can stand here and talk for weeks about what we want to do, what we ought to do, and what they want to do or should do; but we can't do anything about it without providing incomes for these people. It is true that many of them have some savings that they will spend after the war when materials are available, but they must be educated as to what they should purchase, what type of repairs they should make, and in the case of new dwellings, what type of dwelling will best suit their family. We are doing everything we can to help our rural people in Kentucky. Many farmers will have to do off-farm work in order to obtain money for repairs and improvements.

"Rural people must have the desire to improve their housing conditions before we can help them. Some of them make a good income on the farm and some make money at off-farm work; some of them save it and some of them spend it as fast as they make it. Some could have better living conditions, but they spend their money unwisely and live in low-class houses, with no thought or desire for improvement. We are going to have to find some way to build up this desire for better homes".

FARM HOUSING DATA (From 1[illegible]0 U. S. Census)

Regions

	State	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8
Total Farm Products Sold, Traded or Used per Farm	681	316	573	1,331	921	1,006	575	854	708
Number of Dwellings	293,774	81,667	63,512	55,879	9,082	15,379	33,927	14,553	19,775
Dwellings Needing Repairs	109,366	33,327	24,715	16,408	1,526	5,880	13,577	4,907	9,026
Percent of Dwellings Reporting Needing Repairs	37.2	40.8	38.9	29.4	16.8	38.2	40	33.7	45.6
Running H_2O in Dwellings - Percent	4.2	2.5	2.4	7.3	22.9	4	2.7	3.2	3.7
Running H_2O within 50'	3.6	3.6	5	4.1	2.0	4.6	2.4	1.5	1.5
Other Supply within 50'	69.8	74.1	58.0	71.8	58.5	67.8	69.2	78.8	85.0
No Water Supply " "	17.8	18.2	27.9	11.2	3.9	19.2	21.9	10.9	5.7
Toilet in House	3.1	1.3	1.5	6.2	19.4	2.9	1.8	2.3	2.5
Outside Toilet	82.5	81.4	76.8	88.4	79.0	83.2	81.9	89.8	85.8
No Outside Toilet	14.4	17.3	21.7	5.4	1.6	13.9	16.3	7.9	11.7

Number of Sets of Blueprints of Buildings and Equipment Plans Furnished Farmers Annually From 1919 Through 1957

Year		Sets
1919		16
1920		142
1921		1135
1922		1120
1923		535
1924		740
1925		548
1926		600
1927		600
1928		600
1929		668
1930		554
1931		569
1932		726
1933		408
1934		353
1935		756
1936		1125
1937		756
1938		1389
1939		1332
1940		1576
1941		1915
1942		1802
1943		1955
1944		1505
1945		
1946		2469
1947		3126
1948		4333
1949		
1950		3221
1951		4059
1952	~~3879~~	5061
1953		1805
1954		2988
1955	~~3237~~	5202
1956		5037
1957		3564

SUMMARY OF COUNTY AGENTS' STATISTICAL REPORTS

The following summary, of work accomplished on the major sub-projects as taken from the totals for the state in the years 1920 to 1943 indicates the increase in effectiveness of the work rather than the total mount of work accomplished in any one year.

Number of Farms Reporting Improved Practices

Year	Sub-Projects: Farm Buildings	Drainage	Erosion Control	Water Supply	Sewage Disposal	Rural Electrification
1922) 1923)	Data Not Available					
1924	668	71	60	43	43	
1925	855	88	100	43	27	
1926	861	89	107	50	40	
1927	1148	56	133	80	54	
1928	895	100	206	29	32	
1929	1171	332	293	37	39	
1930	925	251	304	72	56	
1931	1001	341	188	81	43	
1932	1604	126	157	83	42	
1933	2215	250	220	29	36	12
1934	719	160	377	47	75	8
1935	1544	452	505	112	83	91
1936	2766	743	894	171	57	1476
1937	3280	559	4181	211	123	1977
1938	4888	434	5448	610	214	6985
1939	6360	529	8174	1030	364	9711
1940	6681	679	11575	1013	379	8159
1941	7203	796	14193	626	357	8529
1942	7005	437	11763	130	72	640

Estimated Number of Implements on Kentucky Farms by Types for Selected Years

Implements	1920	1930	1940	1942	1945	1950	1951	1952	1955	1956
Farm Tractors (all types)	2,000	7,300	11,900		24,400	59,200	68,200	74,800	94,670	
Horses & Mules	675,000	505,000	469,000	461,000	425,000	359,000	339,000	311,000		
Motor Trucks	1500	7,200	19,100		27,200	55,000		60,000	68,013	
Combines			1,700		2,422	7,053	8,500	10,000		
Corn Pickers			200		570	4,980	6,300	7,400	10,597	
Balers (pick-up)			700		1,200	5,979	7,350		11,334	
Balers (stationary)				10,300			5,200			
Forage Harvesters						600	800	1,000	1937	

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