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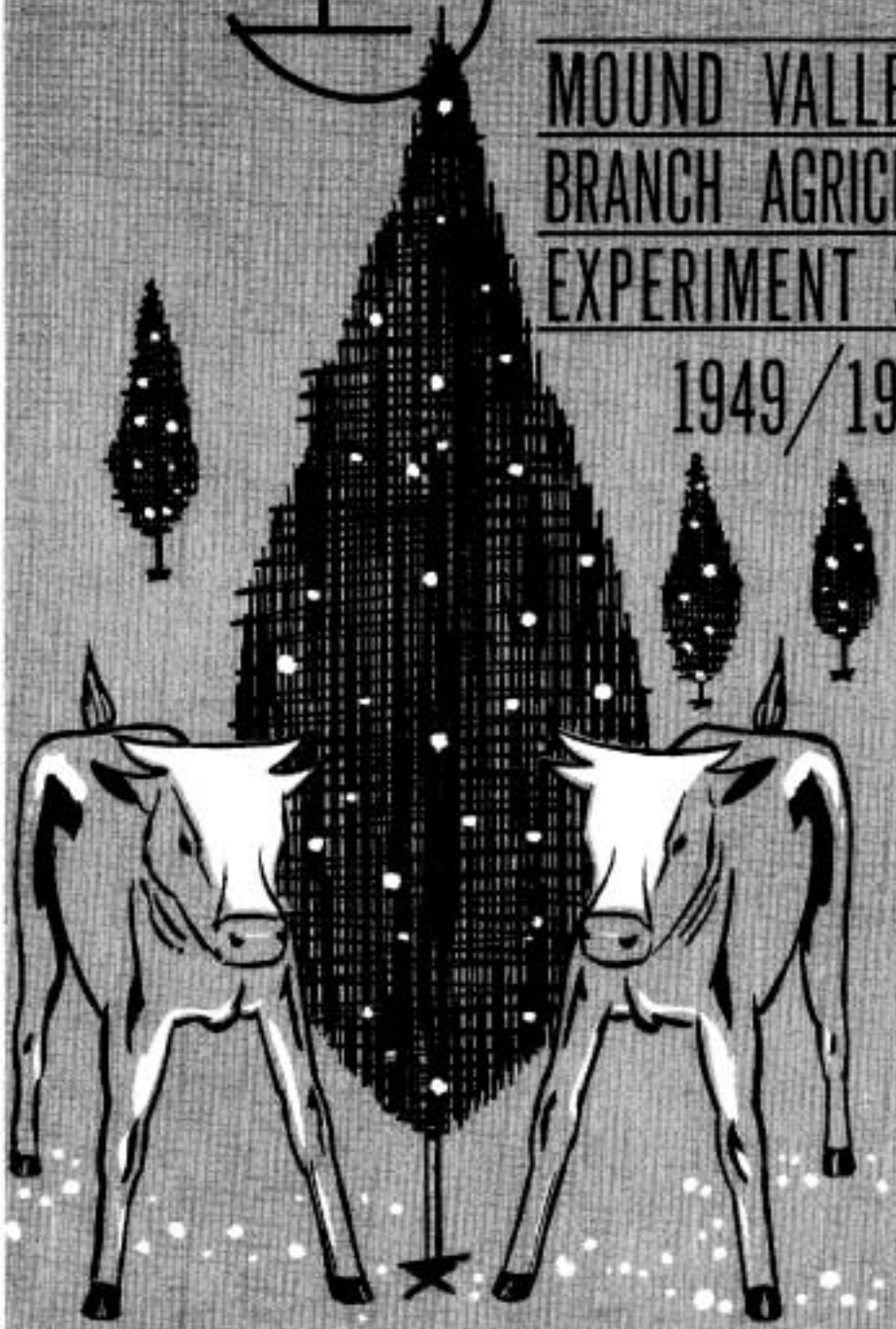
FIRST 15 YEARS OF RESEARCH AT THE MOUND VALLEY (KANSAS) BRANCH AGRICULTURAL EXPERIMENT STATION

1949/1964



AGRICULTURAL EXPERIMENT STATION
KANSAS STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE - MANHATTAN
C. PEAIRS WILSON - DIRECTOR

Acknowledgements

Valuable assistance was furnished in the preparation of this report by the late Floyd E. Davidson, first superintendent of the Station, and his technical staff, and especially by Dr. Grady F. Williams, dairy husbandman, in the preparation of the section on Dairy Investigations.

CONTENTS

First Fifteen Years of Research at the Mound Valley (Kansas) Branch Agricultural Experiment Station[1] 1949-1964

by

Leland E. Call[2]

During World War II, the United States government acquired a tract of land near Mound Valley for an air force auxiliary landing field. In the fall of 1947, this tract, consisting of 242 acres, was declared surplus property by the War Assets Administration. July 23, 1948, ownership of it was transferred to the Kansas State College of Agriculture and Applied Science by quitclaim deed with the provision that the federal government could repossess this land at, any time within a period of 10 years in case of a national emergency, or the state could obtain clear title at any time by the payment of $6,600 less 10 percent for each year that transpired from the time of the transfer of the title to the time of the exercise of the option.

There had been interest for some time by progressive farmers and other leading citizens of southeastern Kansas in the establishment of a branch experiment station in this part of the state. All other branch stations were located in western Kansas, and climatic conditions at Manhattan, where the central station was located, were not representative of conditions in southeastern Kansas. When the College acquired this land, steps were taken immediately by interested residents of southeastern Kansas to secure legislative action to establish an experiment station at Mound Valley to be located on the government-acquired land.

Early in November, 1948, about 30 prominent agricultural leaders and farmers met and organized the Southeast Kansas Agricultural Research Association. Maurice Wycoff, Altamont banker, was elected president; Mark W. Coursey, Parsons, rendering service operator, vice-president; Fred Holmes, Jr., Altamont implement dealer, secretary; and Claude Payne, Altamont farmer, treasurer. The Association sought to help develop new and improved farming methods for southeastern Kansas by establishing experiments on the land owned by the state at Mound Valley and to assist in obtaining needed funds.

This organization, with many other farm and business organizations and a host of individuals interested in agri-

1. Contribution No. 111, Office of Dean of Agriculture, Kansas Agricultural Experiment Station, Kansas State University, Manhattan.

2. Dean of the College of Agriculture Emeritus and Director of the Agricultural Experiment Station Emeritus.

culture in southeastern Kansas, caused bills to be introduced in the Legislature of 1949 authorizing the establishment of the Mound Valley Branch Experiment Station and appropriating funds for its development and operation. The legislative act authorizing the establishment of the Station follows:

"Be it enacted by the Legislature of the State of Kansas:

"Section 1. That for the purpose of advancing and developing the agricultural, horticultural and dairy interests of this state and eastern Kansas, an experimental and demonstration station shall be established near Mound Valley in Labette county, Kansas, on land acquired from the War Assets Administration of the United States government. Such station shall be under the control of the state board of regents, which is hereby authorized to locate and establish same as a branch of the state college of agriculture and applied science.

"Section 2. The state board of regents is hereby authorized to do all things necessary in the way of providing buildings, other improvements and equipment as it may deem necessary to the successful establishment of such station.

"Section 3. The state board of regents shall have control and supervision of said station and shall appoint a competent superintendent, who shall appoint such number of employees as shall be deemed necessary by the board of regents. The state board of regents shall fix the salaries and compensation of such superintendent and employees and establish such rules and regulations as it may from time to time deem necessary to carry out the provisions of this act.

"Section 4. The proceeds arising from the sale of products from said station shall be transmitted to the state treasury and credited by the treasurer of state to a fund for the use and benefit of the branch experimental station in Labette county. Such moneys shall be transmitted at such times and in such manner as the state board of regents shall by rules and regulations prescribe.

"Section 5. This act shall take

Fig. 1.—Station farm buildings. Crop and soil experimental plots in foreground.

effect and be in force from and after its publication in the statute book.

"Approved March 22, 1949."[3]

The act appropriating funds for the establishment of the Station follows:

"Be it enacted by the Legislature of the State of Kansas:

"Section 1. There is hereby appropriated out of any moneys in the state treasury not otherwise appropriated, for the use and purposes specified to the branch experimental and demonstration station near Mound Valley in Labette county, Kansas, the amounts specified below for the fiscal years ending June 30, 1950, and June 30, 1951:

Branch Experimental and Demonstration Station Near Mound Valley in Labette County, Kansas

	1950	1951
Land, buildings, equipment, and livestock	$78,950	$.....
Operating expenses	20,200	20,200
For exercising purchase option	5,940	.....
Totals	$105,090	$20,200

Provided, That any unencumbered and unexpended balances remaining in said funds at the close of the fiscal year ending June 30, 1950, are hereby reappropriated for the same use and purposes for the fiscal year ending June 30, 1951.

"Section 2. That all fees, money, revenue or income from the sale of products, for services or from any other source at the Labette county branch experiment station of Kansas state college of agriculture and applied science shall be remitted to the state treasurer as now, or as may hereafter be, provided by law, and are hereby appropriated for the fiscal years ending June 30, 1950, and June 30, 1951, to said branch station to be used for the purchase of seed and supplies, the employment of labor, and for any other costs of developing or operating said branch station. Any unexpended or unencumbered balance at the close of the fiscal year ending June 30, 1950, is hereby reappropriated for the same use and purposes for the fiscal year ending June 30, 1951.

"Section 3. The auditor of state is hereby authorized to draw his warrants upon the treasurer of state for the sums and purposes specified in this act against the amounts appropriated by this act, upon duly itemized vouchers executed as now, or as may hereafter be, provided by law, filed in his office, and approved by the administrative head of Kansas state college of agriculture and applied science of Manhattan, Kansas, or an agent designated by him, and by the state business manager.

"Section 4. This act shall take effect and be in force from and after its publication in the statute book.

"Approved April 5, 1949."[4]

ORGANIZING THE STATION

The appropriation for the support of the Station became available July 1, 1949. The first step taken was to exercise the option with the War Assets Administration in order to obtain clear title to the air field land. Clear title could be obtained by the payment of $6,600 less 10 percent for each year of time that expired between the time of the transfer and the exercise of the option. Since one year had expired, a clear title was obtained by the payment of $5,940. The legal description of the land acquired from the government follows:

"Beginning at a point 660 feet West of the Northeast Corner of Section Eight (8), Township Thirty-

3. Laws of Kansas, 1949. House Bill No. 221, p. 760.

4. Laws of Kansas, 1949. House Bill No. 336, p. 122.

Three (33) South, Range Eighteen (18) East, thence West three thousand (3000) feet; thence South three thousand five hundred (3500) feet; thence East three thousand (3000) feet; thence North three thousand five hundred (3500) feet to the point of beginning; being the same property acquired by the United States of America under Judgment on Declaration of taking dated December 4, 1942, in Civil Action No. 1292 in the District of the United States for the District of Kansas, Third Division."

This tract is located in Labette County three miles west, southwest of Mound Valley, on the south side of Kansas Highway No. 96, with an elevation of 825 feet above sea level, and contains 242 acres.

A second step was to purchase a farm of 40 acres joining, on the east, from Linnaeus and Mable Oakleaf for $13,560. Improvements on the land consisted of a house, barn, granary, small chicken house, brooder, and wash house. The building site was satisfactory for developing a campus for the Station, but the buildings required extensive remodeling for Station use. The legal description of the Oakleaf land follows:

"East one-half of the East one-half of the Northeast one-fourth of Section Eight (8), Township Thirty-three (33), Range Eighteen (18), Labette County, Kansas."

On July 12, 1950, the formal opening of the Station was held with nearly 2,000 persons from southeastern Kansas attending. The principal dedicatory address was delivered

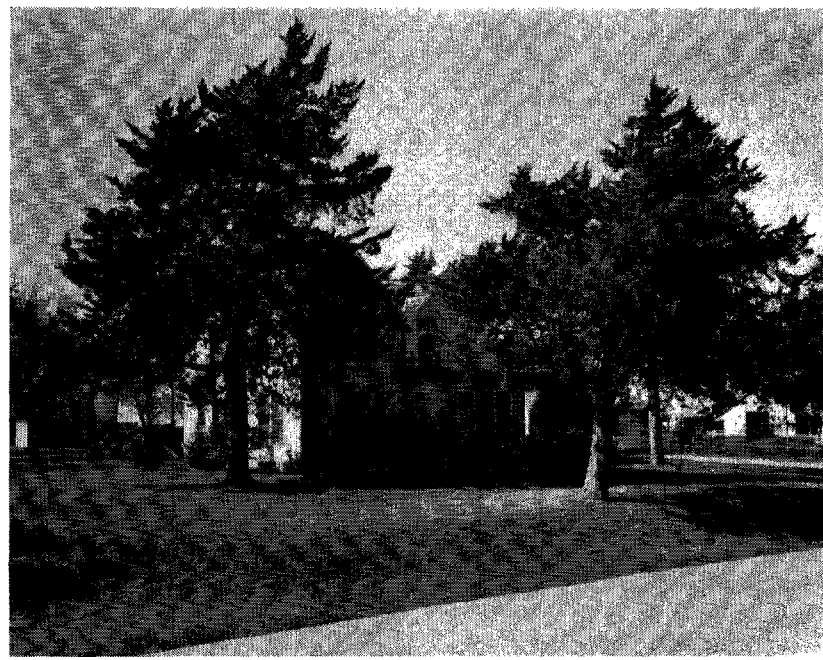


Fig. 2.—Cedar trees on the Oakleaf farm at time of purchase. The trees provided a pleasant setting for the superintendent's residence.

by Governor Frank Carlson. Others participating and speaking briefly were the Director and the Associate Director of the Kansas Agricultural Experiment Station, the head of the Department of Agronomy, and the head of the Department of Dairy Husbandry of Kansas State College.

At the dedication, a flag pole and a United States flag were presented to the Station by the Southeast Kansas Agricultural Research Association.

The soil of the Station farm is classified as the Parsons silt loam, representative of the prevailing soil types of the region. The surface soil, a mealy silt loam, is underlain by a "hardpan" area that prevents easy penetration of water. It is, therefore, usually poorly drained and more subject to drouth during periods of dry weather than more pervious soils. It is usually deficient in lime and phosphorus.

The Station farm is gently rolling, with small areas where there is slope enough that erosion has occurred. On the 242-acre area used as an auxiliary landing field during World War II, large areas had been graded severely to level and smooth the land. On much of these areas the surface soil had been removed, exposing the heavy subsoil and making it exceedingly difficult to grow crops. Heavy liming and application of large quantities of phosphorus and nitrogen fertilizer were required to produce satisfactory yields of farm crops. This grading made it difficult to secure areas sufficiently uniform for experimental plot work.

All of the land on the old landing field was plowed during the summer of 1949. During the fall, areas sufficiently uniform for experimental work were located and bulk production fields laid off and some seeded in the fall to alfalfa, wheat, and winter oats. Others were seeded the following spring to oats, flax, native grasses, corn, sorghum, soybeans, and other spring crops.

The farm land acquired for the Station did not prove adequate for the production of feed needed for the dairy herd. Consequently, starting in 1956, 120 acres of additional land were rented from Mrs. Grace Mayginnes at an annual rental of $1,000. The rent was increased to $1,100 a year in 1959 and to $1,200 in 1964. The leased land joined the Station land on the south and is the balance of the southeast quarter of Section Eight (8).

CLIMATE

Precipitation and temperature records have been taken

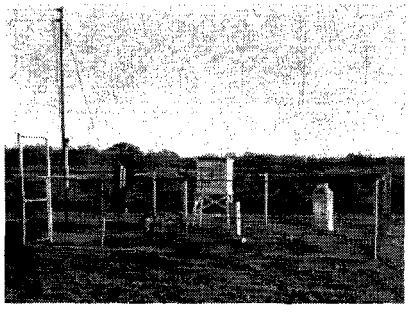


Fig. 3.—The Weather Station. Precipitation and temperature records have been taken since 1951.

at the Station only since November 1, 1951. Long-time records are available, however, at points near the Station. The United States Weather Bureau located at Independence, less than 20 miles west of Mound Valley, has recorded precipitation and temperature since 1887. The annual precipitation at Independence has averaged 37.70 inches, about 25 inches of which fall during the six months of the growing season, April to September inclusive. Precipitation for the six months growing period has averaged 24.99 inches. The driest year on record was 1952 with 18.27 inches, and the wettest, 1908, with a total of 60.29 inches. The heaviest rainfall in a 24-hour period was May 7, 1943, when 5.55 inches of rain fell. The greatest snowfall in any one winter was in 1923-24 with a fall of 32.3 inches, and the least in the winter of 1922-23 when only a trace fell.

The average annual mean temperature has been 58.4° F. The extreme temperatures

Fig. 4.—Floyd E. Davidson, superintendent of the Station, discusses rainfall records with the author, Dean Emeritus L. E. Call.

have varied from 116° F. August 9,1936, to —23° F. February 13, 1905.

Over a period of 86 years at Independence, the latest date of the last killing frost in the spring was May 20, 1894, and the earliest date of the first killing frost in the fall, September 26, 1912. The earliest date of the last killing frost in the spring was March 4, 1878, and the latest, November 26, 1902. The shortest growing season was 141 days from May 20 to October 8, 1894, and the longest, 239 days from April 1 to November 23, 1902. On the average, the frost-free period is about 200 days.

The Mound Valley Station, located as it is in the southeastern part of the state, has the heaviest rainfall of any of the Kansas experiment stations. Its average annual precipitation (Independence) is approximately 37 inches as compared with 32 inches at Manhattan, 23 inches at Hays, 18.5 inches at Colby, 18.6 inches at Garden City, and slightly over 16.5 inches at Tribune. The advantage of the heavier rainfall at Mound Valley is offset in part by periods of excessively heavy rainfall followed by long dry spells, also by an impervious soil that absorbs water slowly. For example, in 1952 only three-tenths of an inch of rain was recorded at the Station between August 23 and November 9. All the winter wheat was seeded in dust, and growth did not begin until after the rains of mid-November. Most of the wheat emerged about Christmas. On the other hand, excessively wet periods are common that result in a delay in the planting of spring crops and of harvesting crops in the summer.

TECHNICAL PERSONNEL

With the establishment of the Station, Floyd E. Davidson was appointed superintendent and began his duties July 1, 1949. Mr. Davidson was a graduate of Kansas State University with his master's degree in soils. He had been in charge of the Southeast Kansas Experiment Fields at Columbus and Thayer from February 1, 1934, to the time of his appointment as superintendent of the Mound Valley Station. He was thoroughly familiar with agricultural conditions in southeastern Kansas. He assumed responsibility

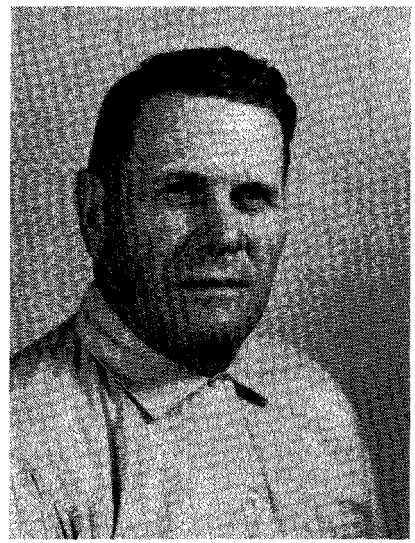


Fig. 5.—Floyd E. Davidson, superintendent, 1949-1963. Mr. Davidson was responsible for administration as well as for research in soils.

not only as superintendent, but also for the direction of research in soil fertility.

Oliver G. Russ succeeded Mr. Davidson as superintendent January 1, 1964. Mr. Russ is a graduate of the University with his master's degree in crops. He served for 12 years as superintendent of the experiment fields at Canton and Newton before his appointment as superintendent at Mound Valley.

Lloyd C. Jones was appointed assistant agronomist, in charge of crop research, February 1,1950. He is a Kansas State graduate with his master's degree in crops, and he had graduate work in farm crops at North Carolina State University.

James E. Knox was appointed assistant dairy husbandman July 1, 1950, in charge of the dairy herd. Mr. Knox is a graduate of Mississippi State College, with graduate work at Kansas State. On September 1, 1959, Dr. Grady F. Williams was appointed dairy husbandman to succeed Mr. Knox. Doctor Williams has completed graduate work with a Ph.D. degree in dairy science at Oklahoma State University.

Three technical positions have been maintained at the Station: superintendent,

Fig. 6.—Oliver G. Russ, present superintendent. Mr. Russ succeeded Mr. Davidson January 1, 1964.

TECHNICAL PERSONNEL AT THE MOUND VALLEY BRANCH STATION

Superintendent	From	To
Floyd E. Davidson	July 1, 1949	December 31, 1963
Oliver G. Russ	January 1, 1964	Present
Agronomist		
Lloyd C. Jones	February 1, 1950	July 1, 1957[1]
Donald D. Thompson	May 1, 1957	May 15, 1958
Joseph D. Ives	September 15, 1958	June 15, 1960
R. Norton Ford	June 16, 1960	June 30, 1963
Dairy Husbandman		
James E. Knox	July 1, 1950	July 31, 1959[2]
Grady F. Williams	September 1, 1959	Present[3]

1. On sabbatical leave February 1, 1957, to July 1, 1957.
2. On sick leave August 15 to November 15, 1953.
3. On half-time basis September 1, 1959, to January 1, 1960.

agronomist, and dairy husbandman. In addition, graduate research assistants have been employed on a temporary basis to handle certain phases of work. For example, Clarence H. Suelter was employed temporarily between August 1, 1951, and October 1, 1953, on two-fifths time basis. He was attached to the Department of Chemistry at the University. He made periodic trips to the Station to supervise blood analyses on the dairy animals. In 1962, a graduate assistant was employed during the summer months to assist with horticultural research.

APPROPRIATIONS

The first appropriation made for the support of the Station authorized funds for the following purposes: land, buildings, equipment, and livestock, $78,950; exercising the purchase option for the purchase of the "landing field" land, $5,940; and $20,200 for operating expenses, 1950 and 1951. Subsequent appropriations have been as follows:

Year	Amount
1952	$25,000
1953	25,000
1954	35,000
1955	35,000
1956	35,724
1957	37,594
1958	43,628
1959	46,703
1960	50,002
1961	52,913
1962	55,751
1963	64,476
1964	71,348

PHYSICAL PLANT

Land.—The Station farm includes (1964) approximately 282 acres, consisting of 242

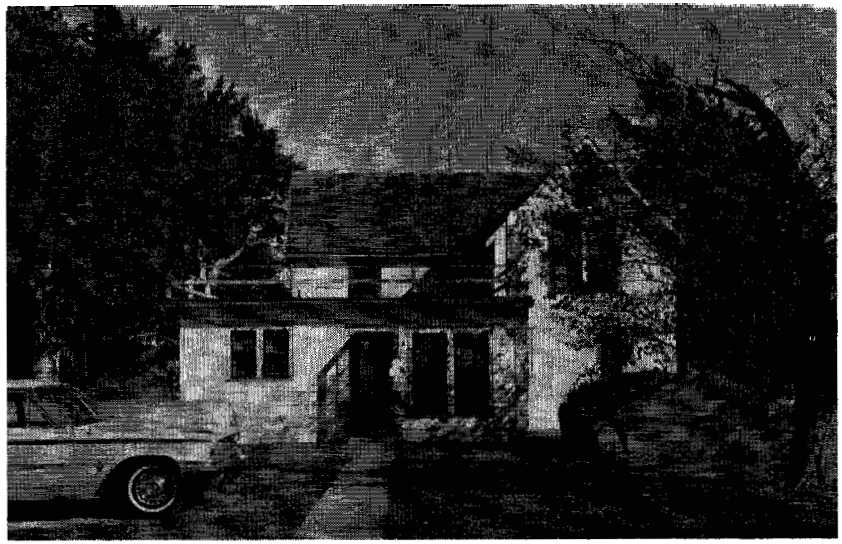


Fig. 7.—The superintendent's residence as remodeled from the original farmhouse. After remodeling, it is still basically a poorly built structure that should be replaced soon by a new, well-constructed farm home for the superintendent.

acres purchased from the federal government and 40 acres purchased from Linnaeus Oakleaf. In addition, 120 acres have been leased from Mrs. Grace Mayginnes since 1956. The Station, therefore, has under its control a total of 402 acres.

Farm Buildings. —The buildings purchased with the farm were all located on the 40 acres purchased from Mr. Oakleaf. They consisted of a two-story, seven-room dwelling, a barn 36 by 36 feet with a hayloft, a granary 28 by 30 feet, a chicken house 12 by 20 feet, a wash house 8 by 10 feet, and a brooder house. The buildings were not well adapted to Station use. They have been remodeled and additional buildings constructed.

The house was remodeled in the fall of 1949 as a residence for the superintendent. A lean-to kitchen and back porch were removed and the building partially remodeled. It is still basically a poorly built structure that should be replaced soon by a modern, well-constructed house for the superintendent. This is at present the most urgent building need at the Station.

An implement shed, 100 by 40 feet, was constructed in 1950 to house farm machinery and to provide space for a shop, seed bins, and additional hay storage. The building was constructed of Dodson blocks tied together with steel rods.

In 1952, two houses, 28 by 36 feet, were built for the families of the Station workmen. The houses were located on the county road south of the superintendent's residence. The frame cottages were identical in dimensions and arrangements but different in interior decoration. They were two-bedroom houses with kitchen, living room, bath, and utility rooms,

Fig. 8.—Cottages occupied by families of the Station workmen. "In 1952, two houses, 28 by 36 feet, were built at a cost of $27,499. They were two-bedroom, completely modern houses."

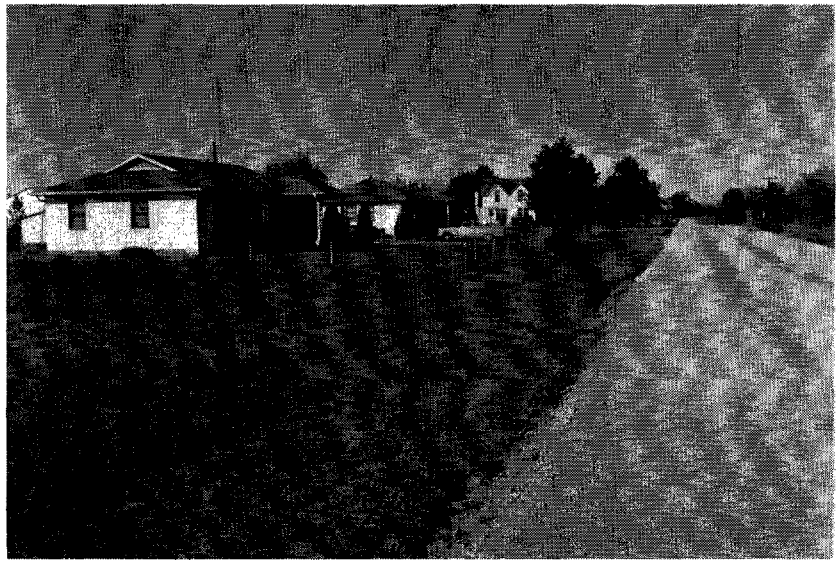


Fig. 9.—The Station residences, with superintendent's home in background, located along the county road on the east side of Station farm.

and were heated with forced-air gas furnaces. They were completely modern and cost $27,499.

In 1962, an addition, 14 by 26 feet, was added to one of the cottages to make it a three - bedroom house. The contract was let to a local builder for $3,750.

The barn, 36 by 36 feet, was almost completely rebuilt and

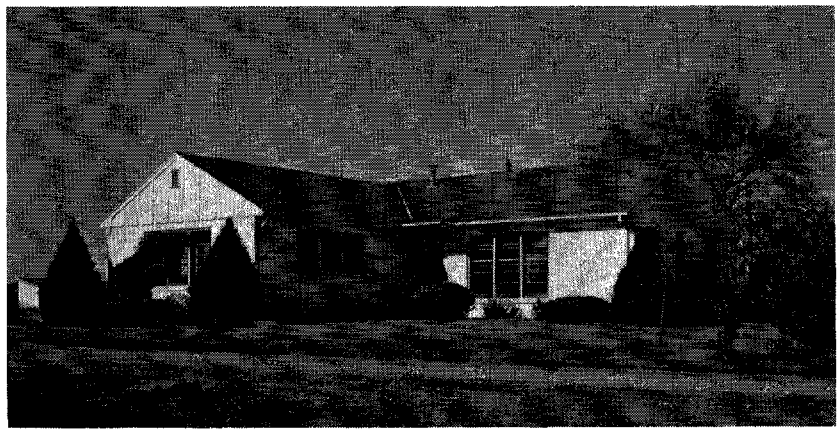


Fig. 10.—The office building. "A new office building was constructed in 1951. It was located southwest of the superintendent's residence. The building was 40 by 21 feet. It cost $14,950. An addition, 18 by 20 feet, was added in 1952 at a cost of $5,000."

enlarged to 66 by 52 feet. Stalls were provided to accommodate 30 cows, individually stalled. The mow floor was strengthened and dustproofed to meet the requirements for production of Grade A milk. A milk room, feed room, box stalls, and a small room for an office were provided in the remodeled structure.

During the first two years, the office facilities at the Station consisted of the small room in the barn and an old 8- by 12-foot frame wash house near the superintendent's residence. A new office building was constructed in 1951 southwest of the superintendent's residence. The building was 40 by 21 feet, of concrete building blocks with concrete floor and composition shingle roof. It contained two small private office rooms, a reception room, a laboratory room, a furnace room, two toilets, and a shower. Floors of the office rooms and the reception room were covered with asphalt tile. The cost of the building was $14,950. In 1952, an addition to the office building, 18 by 20 feet, was added at a cost of $5,000. The addition provided another laboratory room, a storage room for supplies, and a darkroom for photographic work. The office was a much-needed addition to the physical facilities of the Station.

In 1954, a cattle shed, 20 by 30 feet, was constructed on the north side of the barn lot. It was of pole construction covered with galvanized sheet iron, and built with Station labor at a cost of $400 for material.

The Legislature of 1959 appropriated $6,000 for a hay barn to serve as the nucleus for the development of a new location for the dairy unit. The plan is to construct two ell-shaped wings off the north end of the hay barn for loafing sheds, erect four upright silos at the south end, and build a modern milking parlor 100 by 150 feet south and east of the hay barn. These more convenient and modern facilities for the dairy would facilitate investigational work in dairy management and in pasture and forage research.

The hay barn constructed during the spring of 1960, within the limits of the appropriation of $6,000, was a pole-type building 96 by 40 feet with 20 feet to the eaves. The roof and the sides, 10 feet down from the eaves, were covered with galvanized sheet iron. The capacity of the

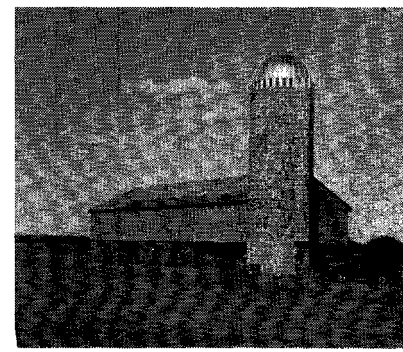


Fig. 11.—A hay barn, 96 by 40 feet, was built during the spring of 1960 at a cost of $6,000. "A cement stave silo, 16 by 50 feet, was placed at the south end adjacent to the hay shed. It constituted one of four silos planned for a new dairy unit."

Fig. 12.—A simple, inexpensive facility for a beef-feeding project constructed in 1962. "It consisted of a 12- by 36-foot pole-type galvanized sheet metal building with a concrete feeding slab, 30 by 30 feet. A partition fence down the middle divided the unit into two equal parts."

building is about 250 tons of baled hay. With the present dairy barn this will store all the hay produced on the Station, in most seasons.

A concrete stave silo, 16 by 50 feet, was donated to the Station in 1963 by the Dodson Manufacturing Company of Wichita. It was placed at the south end of the hay shed. It constitutes one of the four silos planned for the new dairy unit.

In 1962, simple and inexpensive facilities for a beef-feeding project were constructed. They consisted of a 12- by 30-foot pole-type galvanized sheet-metal building, closed on the east, west, and north, with a concrete feeding slab, 30 by 30 feet. A board fence was constructed around the unit with a partition fence dividing the unit into two equal parts. The work was done with Station labor at a cost of $350 for material.

Utilities. — Electricity has always been available for the Station. It is purchased from the Twin Valley Electric Cooperative.

The residences are heated with propane gas. Water is obtained from wells and ponds.

When the Oakleaf farm was purchased in 1950, there was a shallow-dug well, walled with stone and brick, located adjacent to the northeast corner of the dairy lot. It was expected that this well would supply water for the dairy herd. A well was drilled in 1950 to furnish a water supply for the superintendent's residence and the dairy barn. A concrete-block well house, 8 by 8 feet, was built over the well to house the pressure pump and water softener. When, in 1952, two residences were built for Station personnel, a well was drilled to supply water under pressure to these residences. This was only a 40-foot well, since salt water had been struck at a depth of 65 feet in the well drilled in 1950.

These three wells did not provide an adequate supply of water, especially for the dairy herd, following the dry years of 1952 and 1953 when precipitation for the two years was nearly 26 inches below normal. Other supplies of water were necessary. Two ponds to supply water for the dairy herd were constructed in 1954. A small one was constructed in the dairy pasture. A second and larger one, that was to be depended upon as the chief source of supply for the dairy, was built in the northeast corner of the Station a short distance north of the

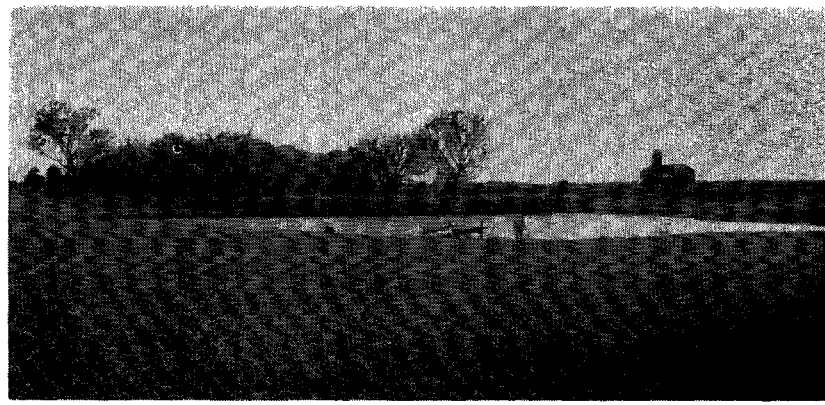


Fig. 13.—The smaller of two ponds constructed in 1954 to supply water for the dairy herd. It was located in the dairy pasture.

farmstead. It was constructed across a drainageway that drained about 200 acres. An earth dam was constructed with a large draw-down structure in the dam. The tunnel was 2 by 3 feet in size and the upright funnel was 3 feet square. The top of the upright funnel was 1 foot below spillway level and the dam was constructed with 4 feet freeboard above spillway. The spillway was 70 feet wide so as to handle heavy runoff in flood time without too great a depth of water. The pond was built to hold about seven acre-feet of water, with a maximum depth of 11 feet, and the depth of the water over much of the pond at least 6 feet. Rains in June, 1954, filled the pond to about one-half full. It was completely filled by October, 1954. A heavy rain in October caused the water to flow over the

Fig. 14.—The larger of two ponds constructed in 1954 as the chief source of supply of water for the Station. It was built in the northeast corner of the Station farm a short distance from the farmstead. It was constructed across a drainageway that drained 200 acres.

spillway to a depth of 10 inches. This caused erosion of the spillway where it broke over the creek bank.

In the spring of 1955, the spillway was repaired and grassed. Local Bermuda grass roots were dug and sprigged on the spillway. The roots were placed about 1 foot apart in rows 18 to 24 inches apart.

Arizona - grown Bermuda seed and Achenbach - grown bromegrass seed were planted over the area and the soil packed with a cultipacker. The area was fertilized. A good stand of grass was obtained; by fall the sod was thick enough to hold the soil when in October, 1955, water from a heavy rain ran over the spillway about 5 to 6 inches deep for two hours. Water from the pond was piped under pressure to the dairy barn. The pond was stocked with bluegill, bass, and channel catfish.

Fig. 15.—The pump house and water-processing plant constructed in 1957. "Through the aid of the Departments of Agricultural Engineering and Bacteriology of the University, a small water treating and processing plant was built. Pond water was used. Alum-injection equipment, settling basin, a sand filter, a 2,000-gallon clear well for purifying water, and a well house that sheltered two pumps and a chlorinator were constructed. The treated pond water has been much more satisfactory than the well water that had been used previously. It was much softer, of better quality, and more adequate."

The wells that had been depended upon for a supply of water for the office, laboratory, and residences proved inadequate. In 1957 a treating plant was constructed to purify the pond water for laboratory and domestic purposes. The Departments of Agricultural Engineering and Bacteriology of the University furnished forms and advice. Pond water that had been pumped previously from the pond to the dairy barn was used. Alum-injection equipment, a settling basin, a sand filter, a 2,000-gallon clear well for processed water, and a pump house that sheltered two pumps and a chlorinator were constructed. The plant was built with Station labor at a cost of about $800 for material. The treated pond water has been much more satisfactory than the well water that had been used previously. It was much softer, of better quality, and more adequate.

OIL LEASE

The Board of Regents, on June 26, 1953, leased 65 acres of the Station land to the Veeder Supply and Development Company, Cherryvale, Kansas, for oil and gas development. The three-year lease covered a portion of the northeast one-fourth of Section 8, Township 33 south, and Range 18 east. The Station

received, as rental, payments of $300 at the time the agreement was signed and $300 each June 26 thereafter until drilling started. A well drilled in 1956 was unproductive and the lease was allowed to lapse. Payments under the lease totaled $1,050.

FARM POWER

Mechanical power only has been used on the Station. Horses have not been kept either for transportation or work. Transportation has been provided by trucks and pickups. Farm power has been provided by tractors. In 1959, lease agreements were negotiated with farm implement companies under which equipment was obtained upon the payment, as annual rental, of 10 percent of the retail purchase price. There is under lease at present (1963) equipment from the John Deere and the New Idea Farm Equipment companies.

DAIRY INVESTIGATIONS

Dairymen of southeastern Kansas believed that crops grown in that area were deficient in some constituents for livestock production and that it would be necessary to correct these deficiencies before satisfactory results could be obtained. To investigate this problem a dairy project was started at the Station in the fall of 1950 including 30 cows, 15 Holsteins and 15 Jerseys, purchased locally. They were divided into three groups of 10 cows each. All were obtained as far as possible in groups of three or in replicates of three. The cows were divided among the three groups as nearly as possible on the basis of record and

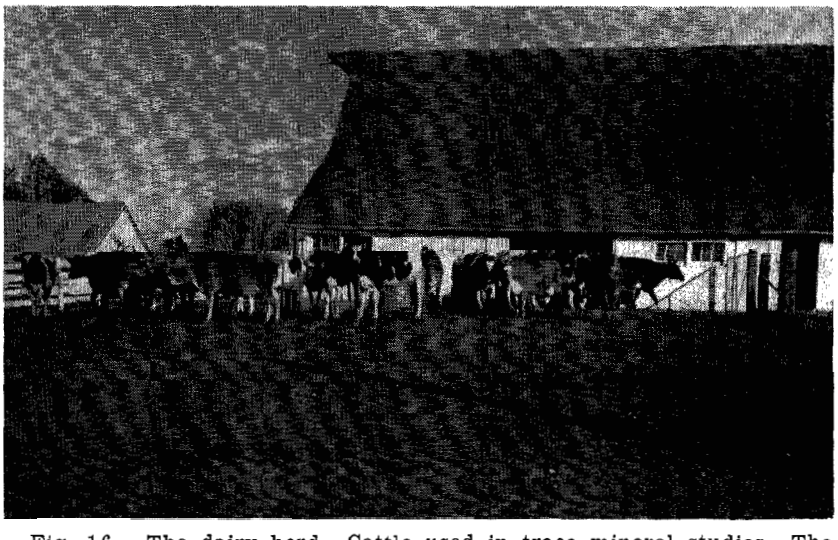


Fig. 16.—The dairy herd. Cattle used in trace mineral studies. The Grade A dairy barn has individual tie-stalls for 30 cows, permitting separate measurement of the forage and grain consumed by each cow.

previous Dairy Herd Improvement Association production records. The cows cost $8,905.

The groups, consisting of five Holsteins and five Jerseys each, were fed as follows: Group I was fed locally-grown feed without mineral supplements except salt; Group II received the same rations as Group I except that steamed bone meal was added to the grain ration at the rate of 1 percent by weight: Group III received the same ration as Group II but was fed feeds grown in other sections of the state, where the soils were much less deficient in phosphorus and lime. The grain ration was made up of equal parts by weight of oats, corn, and soybeans that were mixed and ground in a hammermill. Salt and bone meal were fed uniformly into the mill as the feed was ground. Grain was "weight fed" to each cow according to milk production. Prairie hay was used as forage and each cow was fed all she would eat. Weight of roughage consumed was obtained for each 30-day period.

In addition to individual weight, feed, and production records, general appearance, health, and medical records were kept. Also approximately every six weeks blood samples were taken from each cow and the blood analyzed for serum phosphorus, serum calcium, hemoglobin, cell volume, and red and white cell numbers. The blood from a few cows in each group was analyzed for Vitamin A content. The results of this experiment were published in Kansas Agricultural Experiment Station Bulletin No. 380 (March, 1956), entitled "Southeastern Kansas Feeds for Dairy Cows."

At the end of about two years, when no differences in results were apparent between Group II and Group III, the Group III phase of the experiment was abandoned and the cows transferred to another ration designated as Group IV. The ration for Group IV was the same as Group II except that cobalt was hand fed on the grain ration according to the body weight of the animals.

It soon became apparent that with the animals at hand, it would be necessary to use large numbers of animals to obtain significant differences. Since facilities and funds were limited, it was decided to try to reduce the variation in the research results by the use of identical twins.

The first twins (Jerseys) were purchased December 17, 1952, from P. R. Schwab, Keats, Kansas, for $500. A second set (Guernseys) was purchased from Clarence Raymond for $700 in April, 1953. Eight more pairs of twins were secured in 1953 and subsequent purchases have been as follows:

Year	Pairs	
1954	15	
1955	3	
1956	4	
1957	5	
1958	3	
1959	8	
1960	5	
1961	18	
1962	8	
1963	8	and 1 set of triplets

In all, 87 pairs of twins and one set of triplets have been purchased in 27 localities in Kansas, 13 in Missouri, 4 in Wisconsin, 4 in Minnesota, 2 in Oklahoma, and 1 each in Texas, Nebraska, Iowa, and Arkansas. The breeds represented include Holstein, Jersey, Guernsey, Ayrshire, Brown Swiss, Milking Shorthorn, and crosses. This accumulation of twins makes the Station herd one of the largest, if not the largest, herd of twin dairy cattle in the nation, and the Station herd combined with the University herd at Manhattan provides the largest group of identical twin research cattle in the world. Animals are exchanged between the two Stations, Mound Valley and Manhattan, in order to gain maximum utilization of the twin animals. In addition to the use of paired twins in experimental work, much information is being obtained on methods of identification, inheritance of blood components, flocking instincts, reproduction traits, and growth of identical twins.

Other work undertaken with the dairy herd has consisted of: (1) An experiment started in 1955 to measure the effect of a complete mineral supplement to both prairie and alfalfa hay rations; four-way

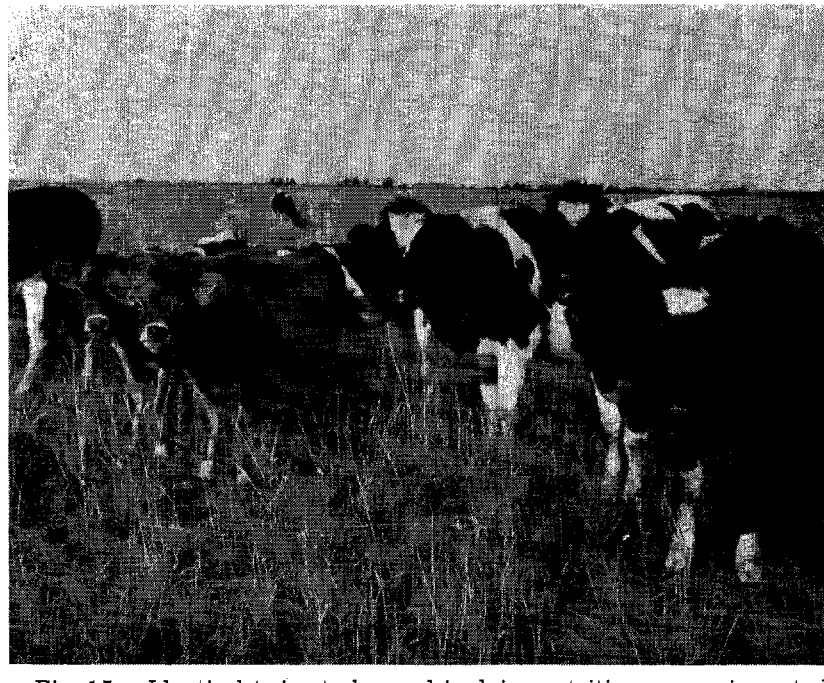


Fig. 17.—Identical twins to be used in dairy nutrition comparison studies. "In all, 87 pairs of twins and one set of triplets have been purchased. This accumulation of twins makes the Station herd one of the largest, if not the largest, herd of twin dairy cattle in the nation."

comparison measured both with supplemented and non-supplemented prairie and alfalfa hay rations, with energy adjusted to equivalent intake basis. No differences in lactation response or blood analysis were found. (2) In 1957 through 1960, spot sampling of certain plants in the area indicated that deficiencies in cobalt and copper exist in southeast Kansas vegetation. Feedstuff analyses showed that soybeans were exceptionally high in cobalt. Since soybeans had been fed in the control rations used in past cobalt experiments, their presence would nullify the results. In 1961, a group of twin animals was started as small calves on a simplified ration calculated to be low in cobalt, consisting of prairie hay, corn, oats, barley, and urea, with grazing permitted until two months before calving. One member of each twin pair received a cobalt supplement. One control animal was unable to rise on the second day after calving. Therapeutic treatment for cobalt deficiency (Vitamin B-12) was effective. It was necessary to add Vitamin A supplement to animals in milk on this ration.

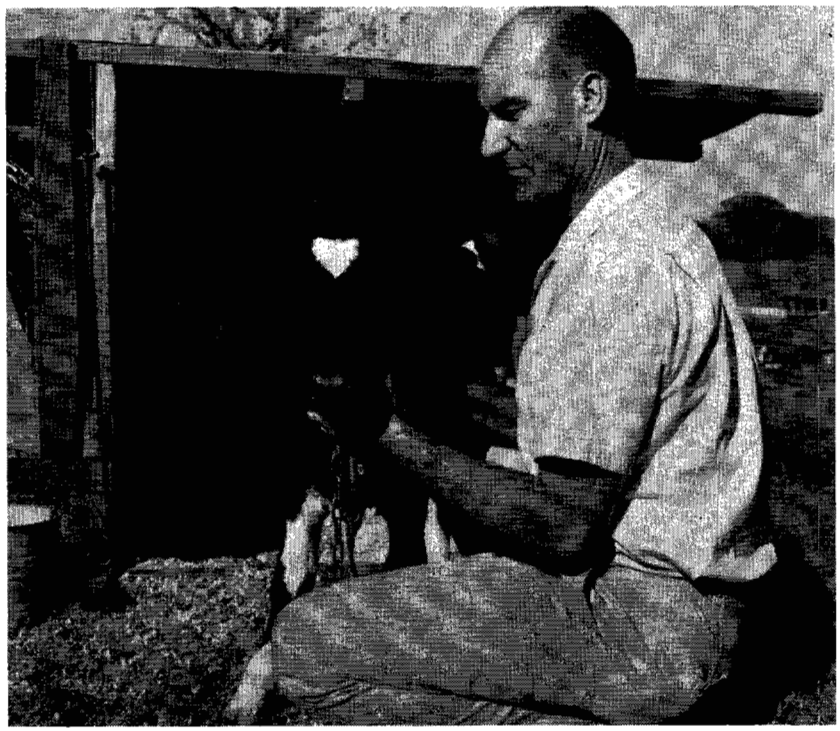


Fig. 18.—Individual portable shelter for raising calves. Calf in portable shed is being compared for growth and disease resistance, with its identical twin raised in a conventional, unheated shed. Shelters are moved as necessary to provide clean, fresh grass. Pictured is Dr. Grady Williams.

Other investigational work with the dairy herd has consisted of investigation of high molybdenum-low copper complexes; incidence of ketosis and other observations pertaining to animals on closely controlled mineral experiments; observations relating to the dairy herd not necessarily associated with the closely controlled mineral experiments relating to growth, reproduction, and general health of the herd; studies relating to the comparative feeding value and palatability of different hays and forages: induction of antibodies to specific diseases of the cow's udder; solid-not-fat measurements on separate morning and evening milkings at 15-day intervals; the use of the California mastitis test on separate morning and evening milkings at 15-day intervals and the correlation of the results of this test with the observation of the dairy workers; the use of individual portable shelters for raising dairy calves; and the loss of nutrients from upright concrete stave silos.

SOIL INVESTIGATIONS

Soil investigational work at the Station has consisted primarily of two projects: (1) A fertilizer rotation experiment: and (2) a study of the comparative value of rock and superphosphate when used with and without lime.

The fertilizer rotation experiment was started in 1950. It consisted of four series of plots, each containing 27 plots, one-twentieth acre in size. Nine fertility treatments were represented, each being replicated three times. The rotation of crops used was (1) Wheat overseeded with sweet clover; (2) sweet clover for green manure followed by corn; (3) oats followed by soybeans for seed planted after harvest, when conditions were favorable; and (4) a series of plots seeded to alfalfa and kept for four years, then broken up and incorporated as one of the series in the above three-year rotation. At the same time, one of the three-year rotation series was seeded to alfalfa. The soil treatments were (1) No treatment. (2) Lime, applied two tons per acre of ground limestone just ahead of the first crop of sweet clover or alfalfa. Additional applications of ground limestone were made as necessary to satisfy the lime requirements as determined by soil tests. (3) Lime and superphosphate; treatment the same as on the lime plots, plus an annual application of 50 pounds per acre of P_2O_5 as triple superphosphate drilled in the row with seed on oats, wheat, and corn and applied as a top dressing on alfalfa. (4) Lime, superphosphate, and potash: treatment the same as for No. 3, plus 25 pounds K_2O per acre as muriate potash applied annually to each of the crops. (5) Lime, superphosphate, potash, and boron; treatment the same as for No. 4, plus 20 pounds of commercial borax per acre applied to all cereal crops plus 30 pounds per acre to alfalfa. (6) Lime superphosphate, pot-

ash, and magnesia; treatment the same as for No. 4, plus 100 pounds of commercial magnesium sulphate per acre applied annually to the cereal crops and 150 pounds an acre annually on alfalfa. (7) Lime, superphosphate, potash, and minor elements; treatment the same as for No. 4, plus an annual application of a mixture of minor elements consisting of the following: borax, 30 pounds; magnesium sulphate, 150 pounds; manganese sulphate, 90 pounds; ferrous sulphate, 90 pounds; copper sulphate, 60 pounds; zinc sulphate, 30 pounds; sodium molybdate, 1 pound, applied annually at the rate of 300 pounds an acre on the cereal crops and 450 pounds an acre on alfalfa. (8) Lime, Superphosphate, potash, and barnyard manure; treatment the same as for No. 4, plus an application of 10 tons of barnyard manure an acre applied on the green manure crop just before it is plowed down ahead of alfalfa. (9) Lime, superphosphate, potash, and nitrate; treatment the same as for No. 4, plus an application of 50 pounds of nitrogen an acre as ammonium nitrate on wheat, oats, corn, and alfalfa.

The experiment has been conducted as planned. Sufficient time has not elapsed to complete one 16-year rotation, but many of the soil treatments have shown striking re-

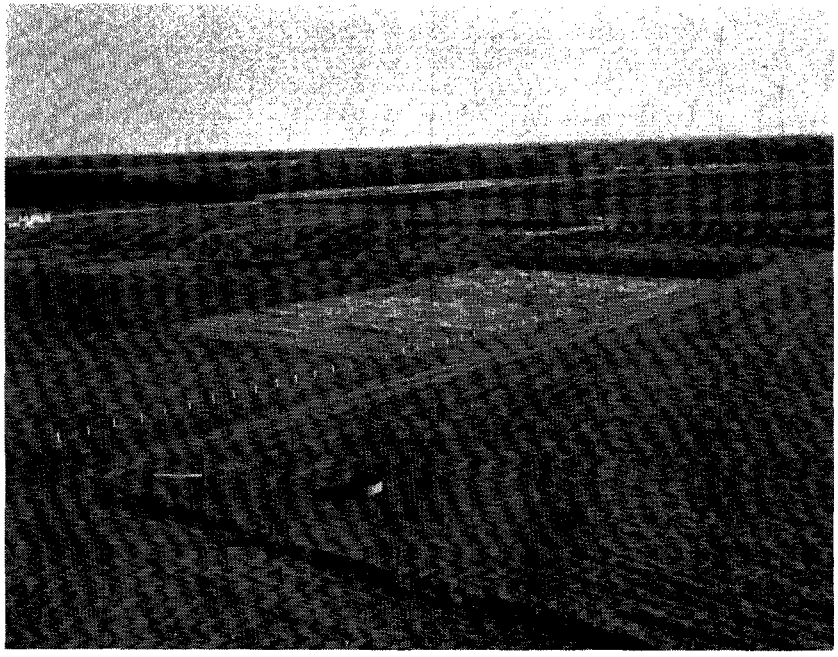


Fig. 19.—The Station farm. Experimental soil and crop plots and pasture for dairy cattle in foreground. Orchard and other tree plantings in background.

sults. All crops have produced poorly where no fertilizer or lime was applied. The largest increase in the yield of all crops over a 12-year period, 1951-1962, came from the application of ground limestone. Alfalfa without lime was a failure, producing on the average less than three-fourths ton of hay to the acre. With lime, the yield was 1.67 tons, while the addition of phosphorus increased the yield to 2.40 tons. The yield was increased further to 2.67 tons by the addition of potassium. Barnyard manure gave further increases up to 3.10 tons, but boron, magnesium, and the mineral mixtures gave only small additional increases. The cereal crops were benefited less than alfalfa from the application of lime, but they were increased by approximately one-third in yield and were benefited further by phosphorus and potassium. A summary of the yields obtained from the different fertilizer treatments on four crops for the 12-year period. 1951-1962, is given below.

Rock Phosphate - Superphosphate Comparison. — A cooperative experiment among a number of the agricultural experiment stations of the cornbelt states was started in an effort to determine the comparative value of rock and superphosphate applied on common crops. The Kansas Station cooperated in the project by starting work in 1951 at the Mound Valley Branch Station comparing the two sources of phosphorus in a three-year rotation with corn, wheat, overseeded in the spring with red clover, or with red clover hay or soybeans, if red clover failed.

Three series of plots were used, each containing 24 pairs of plots. One pair of plots was unlimed and the other pair limed at the rate of two and one-half tons of ground limestone to the acre. Uniform applications of nitrogen and potash fertilizers were made to all plots. There were six different phosphorus fertilizer treatments, each replicated four times and the treatments randomized within each replication: (1) No phosphorus; (2) 10 pounds P_2O_5, 50 pounds (0-20-0) an acre in the row with the seed of wheat and

Treatment	Alfalfa T./A.	Wheat Bu./A.	Oats Bu./A.	Corn[1] Bu./A.
No treatment	0.67	19.0	31.0	19.7
Lime	1.67	25.2	39.6	27.3
Lime and P	2.40	28.4	48.5	29.5
Lime plus P and K	2.64	31.2	50.4	31.1
Lime plus P and K and magnesium	2.69	39.8	49.4	31.2
Lime plus P and K and boron	2.72	30.4	50.4	30.6
Lime plus P and K and manure	3.10	31.6	51.0	33.5
Lime plus P and K and mineral mixture	2.67	28.4	48.4	30.6
Lime plus P and K and nitrate	2.62	35.9	56.5	35.6

1. Corn failed in 1953, 1954, and 1957.

corn at seeding time and applied as a top dressing in the spring of the second year on red clover: (3) 30 pounds P_2O_5, 150 pounds (0-20-0) an acre applied as in No. 2; (4) rock phosphate broadcast at the beginning of the experiment at the rate of 1,200 pounds an acre; (5) a combination of treatments No. 2 and No. 4; (6) a combination of treatments No. 3 and No. 4.

The experiment has been carried out as planned, but exceedingly dry, hot weather during several years caused red clover stands to fail. Soybean hay was substituted for red clover in 1953-1956 and in 1960-1962, inclusive. Corn yields also have been low, and both crops failed in 1954. No soybean hay was harvested in 1955 or 1956. Growing conditions during the 12 years that this project has been conducted have been so unfavorable for crops, especially red clover and corn, that the results secured have been highly inconclusive.

Other investigational work relating to soil fertilizer problems has been conducted as follows: Tests of the comparative value of colloidal phosphate when applied to wheat and oats; determination of the accuracy of laboratory tests as an indication of the correct need for fertilizers by barley; and studies to determine the influence of a legume in the rotation upon the yield and soil characteristics when wheat is supplied adequately with nitrogen in the form of a commercial fertilizer.

FARM CROP INVESTIGATIONS

An important phase of work at the Station has been experiments with farm crops to determine the kinds and varieties best adapted to the climatic and soil conditions of southeastern Kansas. Many of these tests have been in cooperation with the United States Department of Agriculture, some with other agricultural experiment stations of the region, and all have been planned and supervised with the assistance of workers at the Central Station. The tests have been especially valuable in determining quickly the adaptation of any new variety produced in the plant breeding program. Variety tests have been conducted each year with the following crops: Winter wheat and winter barley; oats, winter and spring; sorghums; soybeans; corn; alfalfa; bromegrass; tall fescue; sweet clover; lespedeza; pearl millet; sudangrass; and in most years, flax. More than 100 varieties have been included in these tests.

Nursery work has been conducted at Mound Valley as a phase of the plant breeding work of the Central Station. Again, much of the work has been cooperative with the United States Department of Agriculture and with other stations. Nurseries have been maintained for winter oats and barley hardiness; winter wheat interstate: Northern Great Plains uniform sweet clover; and United States Department of Agriculture regional soybean tests.

Other experimental work with crop plants has included (1) Sorghum phenology tests: The Mound Valley Station was chosen as one of eight places in Kansas to study the influence of temperature on time required from planting to 50 percent bloom of grain sorghums. Six standard varieties of grain sorghum were used. (2) Sudangrass and corn uniform forage clipping tests: Nine varieties or classes of sudangrass and two hybrid corns were used in the test to determine their forage value when fed to dairy heifers and cows. The sudangrass was clipped when the shortest variety reached the height of 18 inches and corn at about 60 days after planting. (3) Brome grass response to fertilizers: Achenbach smooth bromegrass was fertilized with different rates and combinations of nitrogen, phosphorus, and potassium. (4) Response of the Ottawa variety of wheat to fertilizers: This variety was fertilized with 64 different rates and combinations of nitrogen, phosphorus, and potassium. (5) Winter and spring oat comparisons: Yields of different varieties of winter and spring oats were compared when the crops were seeded at different dates in the late winter and early spring. (6) Pasture tests: The carrying capacity of native grass pasture was compared with pastures composed of bromegrass and alfalfa and with annual crops, such as rye and sudangrass.

HORTICULTURAL INVESTIGATIONS

Horticultural work was started in 1954 and consisted of variety tests of green beans, sweet corn, and tomatoes. In 1956, variety tests with watermelon and cantaloupe were started, and in 1958 with potatoes. Experimental work with fertilizers on potatoes and tomatoes was also undertaken, as well as spacing and mulching studies with tomatoes. Water was not available in sufficient quantities most years for adequate irrigation, and in dry years, such as 1954, when drouth persisted from the middle of June to the middle of September, summer vegetables were a failure. When climatic conditions have been favorable, high yields of high-quality vegetables have been obtained from adapted

Fig. 20.—A dwarf plum tree planted in 1956. A comparison of different orchard species and varieties has been made to obtain adaptability to southeast Kansas conditions. The Station has pioneered in the establishment of dwarf fruit trees in the area.

varieties. In recent years, tomato breeding lines from the Department of Horticulture of the University have been evaluated. The highest yielding line in 1963 was a University selection.

Strawberries. — In 1956, work was started with strawberries to determine fertility requirements and variety adaptation. The strawberry plots were located near the farm pond so that they could be supplied with limited irrigation during dry periods. The first season, 10 different varieties were planted and simple fertilizer tests conducted. The work has increased until in 1962 varieties from three different years' settings were harvested, and yields up to more than 250 crates to the acre were obtained from some of the better yielding varieties.

The Orchard and Vineyard. –An orchard and vineyard were started in 1956, located southwest of the Station office building, approximately 400 feet east and west by 215 feet north and south. The orchard area was bordered on the south by a windbreak of five species of pine trees set 10 feet apart in the row, with rows 10 feet apart. The north and south rows were Virginia pines, the second was Ponderosa pines, and the center was shortleaf pines. Each row consisted of 20 trees.

Orchard plantings were made to supply information as to the performance of different kinds and different varieties of fruit trees. First trees set were standard and dwarf peaches, standard and dwarf cherries, dwarf apples, and dwarf plums. Standard trees were set in rows 25 feet apart and 20 feet apart in the row. Dwarf trees were set in rows 20 feet apart and 10 feet apart in the row. Additional peach and cherry trees were set in 1958 and standard apples planted in 1959, as well as additional standard and dwarf apple trees in 1960 and 1961. A light crop of peaches and plums was harvested in 1958 and the first standard cherries and dwarf apples in 1960.

A vineyard was started in 1956 immediately south of the orchard consisting of two rows of plantings in rows 10 feet apart, set 10 feet apart in the row. A three-wire Munson-

Fig. 21.—"A vineyard was started in 1956. Three plants each of Fredonia and Niagara and two plants each of seven different hybrids were planted. Additional plantings were made in 1961."

type trellis was used for training. Three plants each of Fredonia and Niagara and two plants each of seven different hybrids were planted. Triplicate plantings of seven additional grapes were made in 1957, and additional grapevines were planted in 1961. Considerable winterkilling occurred in January, 1959, but light crops of fruit were harvested that year and in the three subsequent years.

Brambles. — An experimental planting of brambles was made in 1958 immediately south of the vineyard. The planting consisted of 10 plants in single rows seven feet apart with plants set four feet apart in the row. Different varieties of red and black raspberries and dewberries were planted. Several of the varieties winterkilled badly during the winter of 1960-61. Generally, the raspberries were injured much worse than other brambles. Notable exceptions were the September and Darrow raspberries. Those varieties which survived the winter made a good growth the following spring, but were severely damaged by rabbits during an extended snow cover in January and February, 1962. As a result, the canes were frozen back to the ground. This damage together with dry weather during 1962 prevented any production. At the end of the season, many of the plants had died.

Christmas Trees. — A Christmas tree project was started in 1958 to determine the best varieties of pine to plant and how best to grow them. Four species of pine were included in the original planting, Virginia pine, White pine, Ponderosa pine, and Scotch pine. The Scotch pine consisted of two varieties, one of these originating from an Indiana seed source and the other from a Wisconsin seed source. The tree plantings were located next to the county road south of the workmen's cottages. They were set in one block consisting of 13 rows, with 40 trees in each row. The spacing was 6 by 6 feet. The trees were cultivated several times during the spring and early summer, but wet weather in July prevented timely cultivation, and weeds and annual grasses became established. The weeds were removed by hand in the fall and the entire area cultivated in November. A count of the live trees made in early December showed the following percentage survival:

Variety	Percentage survival
Virginia	89
Indiana Scotch	74
Wisconsin Scotch	71
White	63
Ponderosa	50

Rabbits and other rodents injured the trees to some extent during the winter of 1958-59. Wisconsin Scotch and White pine were most severely injured. Trees were set in all vacancies in the spring of 1959, and five new blocks were planted in mid-March of the same year, consisting of Virginia, Wisconsin Scotch, Indiana Scotch, Austrian Winter, and Ponderosa pine. The blocks were composed of 13

rows with 39 trees in each row. Clean cultivation was given the area throughout the season and few weeds grew. Although moisture during the season was fairly adequate, mortality was high, especially of the Ponderosa variety, where survival was only about 20 percent. Wisconsin and Indiana pines survived about 70 percent and Virginia pines about 80 percent. The superintendent summarized the work of the project as follows:

"It was apparent after the 1960 season that Virginia pines established easier and made better growth than any other variety. The Scotch pines are close behind the Virginia in these respects and in addition have much better shape and densities for Christmas tree production. Austrian Winter pines established the

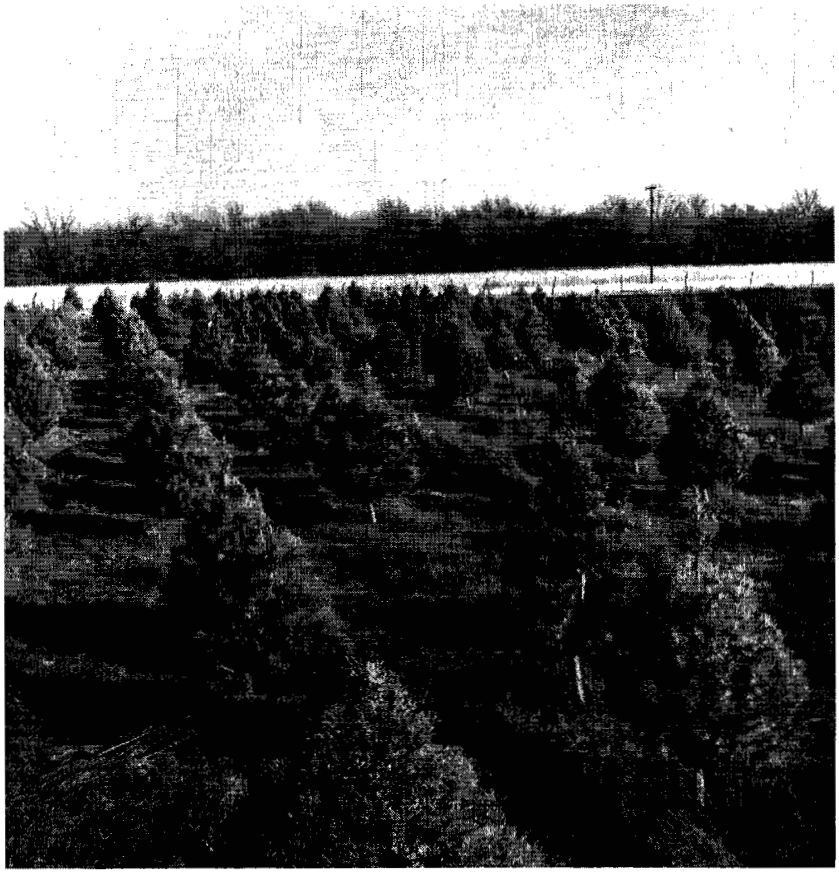


Fig. 22.—"A Christmas tree project was started in 1958. Four species of pines were planted: Virginia pine, White pine, Ponderosa pine, and Scotch pine." Vacant places shown in the picture result from trees that have been harvested.

poorest of those tested and Ponderosa are next in this respect. White pines are intermediate in ease of establishment and are the slowest growing variety. Therefore, it would seem at this time that Scotch pines are the best variety to recommend for Christmas tree production in this area."[5]

The first trees were marketed in 1962.

Nut Tree Plantings. — A group of native pecan seedlings and grafted nursery pecan trees were planted in the spring of 1961 in the southeast corner of the farm. Twenty-two grafted trees were planted of the following varieties: Colby, Posey, Gerardi, Hodge, Peruque, Underwood, Burton, and Giles. Twenty-five native seedlings were planted. The area planted was rolling in topography and was in bromegrass. The trees were set by digging holes in the bromegrass sod. Areas of four to five feet around each tree were cultivated with a roto-tiller to control the grass. In addition to pecans, numerous native seedlings of hican and a few black walnuts were planted.

Annual Garden Flowers.– During 1960 the Station cooperated with the Department of Horticulture and the four other branch stations of the state in evaluating numerous varieties of annual garden

5. Davidson, Floyd E., Annual Report of the Mound Valley Branch Experiment Station, 1960, p. 94.

Fig. 23.—Annual garden flowers. "During 1962, the Station cooperated with the Central Station and the other four branch stations in evaluating numerous varieties of annual garden flowers."

flowers. The study was primarily to determine the adaptability of the newer varieties of petunias, marigolds, salvia, snapdragons, zinnias, phlox, impatiens, coleus, and verbenas. Eighteen varieties of petunias and three varieties each of marigolds, salvia, snapdragons, and zinnias were grown.

Research was initiated in the spring of 1963 to evaluate the adaptability of garden chrysanthemums and recommended cultural practices for southeast Kansas. This was a cooperative study between the Central and the other branch stations,

PUBLIC RELATIONS

A conscious effort has been made to acquaint the people of southeastern Kansas with the work of the Station. Starting in 1950, when 2,000 people visited the Station on opening day, annual field days have been held each year, always in the spring and frequently in the fall. Attendance at these days in the spring has varied from 175 to 350, averaging about 250. Fall field days have been less well attended, averaging about 75. The station also has been host to veterans-on-the-job training classes (in 1951, 20 different schools were represented with 125 persons present); Labette County dairy tours; Coffeyville Chamber of Commerce; Midwest Soil Improvement Association; tree planting demonstrations; and fruit tree pruning demonstrations.

Technical personnel have explained the work of the Station by talks at meetings, on radio programs, in newspaper articles, and in other ways, Numerous talks have been given at service club meetings: Rotary, Kiwanis, and Lions in many of the cities of southeastern Kansas.

In 1956, a program was started with Radio Station KGGF, Coffeyville. Forty-seven programs were produced during the year, 25 by the superintendent, 11 by the dairyman, and 11 by the agronomist. In 1960, 10-minute radio programs were conducted by the Station personnel each Sunday morning over the same radio station. Of these, 30 were conducted by the superintendent, 12 by the dairyman, and 10 by the agronomist. Programs explaining the work of the Station have also been presented over Station KOAM-TV at Pittsburg.

An annual report of the work of the Station has been prepared each year and distributed at the time of the spring field day. Numerous articles giving results of the Station work have been prepared and published in farm and local papers. In 1962, 97 such articles were written, 61 by the superintendent, 31 by the dairyman, and 5 by the agronomist. In these and other ways, the results of the work of the Station have been made known.