

Fencing the cattle-feeding corrals with pipe and cables, arranging gates and pens, and building concrete fence-line bunks began in 1960. Feeding operations were mechanized by addition of a silo unloader, a mixer-auger-conveyor arrangement at the elevator, and a three-compartment feeding trailer. These changes improved the appearance of the cattle-feeding area, reduced costs, and reduced labor needed for winter operations.

**Feeding.** The first feeding experiment was started December 21, 1903, when 51 head of grade Hereford and Short-horn calves 8 to 10 months old were put on feed in seven lots for 182 days. Best gains were obtained from the lot receiving corn and alfalfa, and the poorest from the lot receiving corn and sorghum hay, with corn and oat straw a close second. The same winter, 1903-04, a study was made of the comparison of penicillaria stover with kafir stover as roughage for cattle.

The feeding test authorized by the regents July 31, 1907 (32) with a herd of 40 cattle consisting of 10 head of calves, 10 one-year-olds, 10 two-year-olds, and 10 head of old cows was started on November 14, 1907, and continued until February 7, 1908, at which time all lots were shipped to market. Each group was fed in a separate lot on rations of corn and kafir meal in equal parts with alfalfa and kafir stover. The old cows and the two-year-olds were well finished by this time; the yearlings were in fair condition, but calves were not in shape to bring a good price as baby beef.

These examples of early experiments indicate some of the types of feeding investigations that were to be conducted during the next five decades. They stressed the feeding value of types of grain and forage which could be grown successfully in western Kansas. Emphasis was placed on determining the relative



Fig. 41.—Station cow herd grazing on native pasture. "The main object of developing a high class Hereford cow herd was to provide uniform calves and yearlings for experimental work and as a demonstration of good cow herd management."



Fig. 42.—Experimental cattle in feedlots.

values of different roughages and on increasing the utilization of roughages. Important studies were conducted comparing dry feed and silage, fodder and stover, sweet sorghums and kafir, and grinding and chopping.

Little full feeding was undertaken until 1944, when the combine types of grain sorghum became popular in western Kansas and sorghum grains became available in quantity for feeding. Since 1944 fattening trials have become an important phase of the beef cattle feeding research, and most of the stock have been marketed as finished animals. The most im-

portant studies of this kind have related to different ratios of grain to silage and feed supplements. They have been repeated and refined over the years as management systems and carcass grade specifications have changed. Because of the tremendous production of sorghum grain during the late 1950's, experiments were conducted to determine the feasibility of ensiling sorghum heads, grain, and the forage at different stages of maturity. Concentrates that have been evaluated for fattening cattle include Midland milo, Westland milo, Martin milo, hybrid sorghum grains, corn, barley, wheat, and molasses. Interest-

**PROJECT LEADERS IN LIVESTOCK INVESTIGATIONS**

| Name             | Appointed          | Termination        |
|------------------|--------------------|--------------------|
| J. A. Wilham     | April 13, 1908     | August 31, 1911    |
| A. M. Paterson   | April 15, 1914     | September 15, 1914 |
| A. L. Burkholder | July 16, 1917      | August 31, 1918    |
| H. A. Chittenden | September 3, 1918  | January 31, 1922   |
| L. C. Aicher     | September 20, 1921 | June 30, 1952      |
| Frank B. Kessler | March 6, 1946      | March 11, 1957     |
| John R. Brethour | July 8, 1957       | To date            |

ing experiments have been conducted with the various minerals and antibiotics such as Purdue Supplement A, cobalt, calcium, phosphorus, and vitamin A. The use of stilbesterol and aureomycin in various beef cattle programs also was studied.

**LIVESTOCK PUBLICATIONS**

Results of the beef cattle work have been reported chiefly in Roundup Circulars, the first of which was prepared in 1913 as a mimeographed circular. These publications were numbered consecutively as Roundup Circulars until 1945. Since that time they have been published as Roundup Circulars and circulars or bulletins of the Kansas Agricultural Experiment Station, the first such circular being No. 271 for the year 1946-47. Other circulars published since that time carry the following Experiment Station numbers: 260, 261, 272, 278, 292, 295, 307, 322, 334, 348, 359, 363, 377, and 382.

A number of technical articles have been published in scientific journals.

**DAIRY CATTLE**

The first cow owned by the Station was purchased to supply milk to the station personnel. Authorization was given by the Board of Regents on March 28, 1903, in a resolution as follows: "Moved by Regent Tulloss that Superintendent Haney be authorized to buy one cow at a cost not to exceed \$40. Carried." (34) Only a few milk cows were

kept at the Station prior to the establishment of a dairy farm unit in 1913. The Legislature of 1911 appropriated \$3,000 for the purpose of starting a dairy project. The intention was to operate the dairy farm as a separate and distinct unit in a practical businesslike manner to demonstrate the desirability of more dairying for western Kansas. A tract of 160 acres of upland on the south edge of the Station located on the main highway south of Hays was set aside for the purpose. During 1913 the fields of the dairy unit, were cropped in anticipation of the needs of the dairy herd during the coming winter. Two 100-ton silos were built and partly filled from the crop of 1912. In the summer the construction of a modern dairy barn was begun. It had a concrete floor and feedways, fixtures for stalling the cows, and feed and manure handling facilities. A wing separated by the two silos adjoined the barn and provided accommodations for the teams used in the farm work. Corral yards separated from each other were provided for the cows, calves, bull, and hogs.

About one-third of the \$3,000 appropriation was expended in building the silos and in making other improvements. The Station secured permission from the Board of Regents to use station fees to complete the dairy unit and buy the dairy cattle. Eighteen well bred Holstein cows were purchased in Wisconsin by Prof. O. E. Reed, Head of the



Fig. 43.—South end dairy unit. In 1911 the Legislature appropriated \$3,000 to start a dairy project "as a separate and distinct unit to demonstrate the desirability of dairying for western Kansas."

Department of Dairy Husbandry at the College. They were brought to the Station in September, 1913. The cost of the investment in the dairy unit at the end of 1913 was: dairy barn, \$3,800; two silos, 100 tons each, \$500; hog sheds, corrals, etc., \$91; one-room house (for man), \$46; well, equipment and well-house, \$435; fixtures and equipment, \$278; 18 Holstein cows, \$1,950; total, \$7,100.

The project was in charge of H. E. Dodge, a dairy husbandry graduate of the College. Mr. Dodge resigned September 1914 and was succeeded by R. E. Turner, an experienced dairyman from the College. In 1914 three rooms were added to the small cottage which provided living accommodations for a married man helper for the dairyman.

The dairy farm was operated as a unit until 1922. Competent help was scarce during

and immediately following World War I. Operating the unit separated as it was from the headquarters unit also proved inefficient and unprofitable. It was decided, therefore, in 1922 to convert the dairy unit farm into facilities for wintering the beef herd and to move the dairy to the headquarters unit.

The severe drouth of 1934 resulting in poor pasture conditions and a limited feed supply forced the Station to reduce its livestock population. A large part of the dairy herd was leased to the State School for the Deaf at Olathe and the State Orphanage at Atchison until June 1, 1935. At the termination of the lease agreement the institutions bought the cows. Nine Holstein cows were sold to the State Orphanage at \$80 a head. The cows at the State School for the Deaf at Olathe were sold to the institution for \$70 a head.

Seven calves about six months of age were sold to the two institutions at \$35 a head. Twenty-three 2-year-old heifers were sold locally at private sales at about \$65 each. The remaining 16 head of heifers were sold at public sale at Hutchinson on October 28, 1935. A few heavy springers sold well, but the other bred heifers not so far along sold for \$35 to \$50 a head. Buyers were looking for cows in milk or heavy springers. All of these cattle were purebred, of excellent type. One herd bull was sold to the State School for the Deaf for \$200 and the other to the Fort Hays Kansas State College.

The Station has not maintained a dairy herd since 1985.

### SWINE

The first swine owned by the Station were purchased in 1904. Three breeds of hogs were obtained: Duroc Jersey, Poland China, and Berkshire. Feeding experiments with hogs were started in 1905 and continued through the early years of the Station. Comparisons were made of the gains by hogs following cattle fed different rations and of different types of hogs fed the common feeds of western Kansas.

By January 1913, swine on the Station had been reduced to one breed—Duroc Jersey. The herd numbered 386 head, 32 being bred sows. During the year 517 head were sold for \$6,529.69. The plan of management at this time consisted of breeding 20 to 30 sows, these to bring two lit-

ters a year, bred to farrow in April and in September or October. One good purebred boar was purchased each year. No special hog yards were maintained, the stock being given liberty in cattle pens, on alfalfa range, or in feed lots for fattening. The sows were given such accommodations as the farrowing sheds afforded and were grazed on alfalfa during the summer months.

The Legislature of 1923 appropriated \$1,000 for the construction of a hog house. In 1924 a new hog house was built, with feed lots adjoining, all of which were provided with running water. The equipment provided economical handling of several hundred pigs.

By 1928 the entire herd of swine was purebred Durocs, with some of the best breeding in the state. Many gilts and male hogs were sold to the farmers throughout western Kansas and eastern Colorado. In 1929, 42 sows were farrowed, producing 373 pigs, of which 299 were saved. Intestinal parasites necessitated worming the litters. The cost of worming and keeping the pens sanitary and free from worm infestation became almost prohibitive. Alternating the use of the yards for one year with fallow was started in 1930 in order to attempt to eliminate the worms. The change was successful and less trouble occurred. The exceedingly dry weather of the 1930's reduced grain production and the excessive heat was detri-

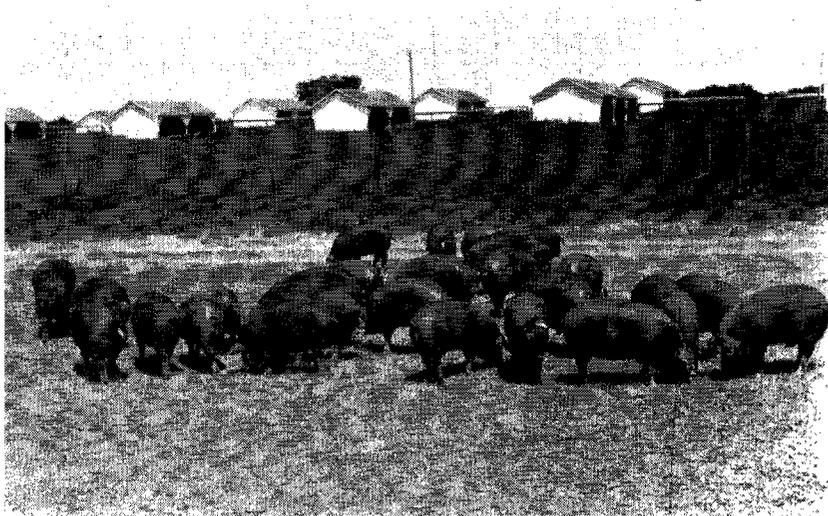


Fig. 44.—Fat hogs ready for market.

mental. A temperature of 106° on June 4, 1933, resulted in the death of two sows. In 1936 the Station decided to dispose of the Duroc Jersey breed and start a herd of Poland Chinas. Since no grain sorghums were produced on the Station that year and feed had to be purchased at a high price, it was decided to keep the hog population at a minimum. In 1937, 18 pigs were saved from the two gilts purchased the year before. They developed into an attractive lot of gilts and fat barrows. As weather for crops improved and feed grain production increased, conditions became more favorable for swine production. In 1940, 103 pigs were farrowed. A purebred Poland China boar was purchased. Between 1940 and 1950 only a sufficient number (10 to 20) sows were kept to produce the pigs needed to utilize waste grain.

Since the project was not contributing to the experimental findings of the Station, it was decided to discontinue the production of swine in 1950. No pigs have been kept on the Station since that time.

### SHEEP

The first and only sheep owned by the Station were purchased from the College in December, 1912. The flock of 57 grade ewes and two purebred Shropshire rams cost \$550. The flock was purchased with two objectives: to demonstrate sheep production in western Kansas, and to determine the possibility of exterminating bindweed with sheep. It was hoped that a flock of 80 to 100 ewes might be kept and a carload of lambs marketed annually. In the fall of 1915 the flock consisted of 90 ewes bred for spring lambing. During the summer of 1915



Fig. 45.—Sheep grazing bindweed. During the summer of 1915 a flock was grazed on a 12-acre field heavily infested with bindweed to determine the effectiveness of sheep in utilizing the weed and the possibility of the weed's extermination in this way.

the flock was grazed on a 12-acre field heavily infested with bindweed to determine the effectiveness of sheep in utilizing the weed and the possibility of exterminating the weed in this way. The field also contained a considerable growth of lamb's quarter, sunflowers, red root, and wild millet. The sheep fed upon these weeds first. After about two weeks the sheep were eating bindweed liberally and continued to graze it until the weed failed to supply forage, at which time it was eaten down to stubble and small stems. The sheep grazed satisfactorily upon bindweed, but did not exterminate it. A growth of bindweed sufficient to supply satisfactory grazing for sheep was also sufficient to maintain a continuing stand of the weed.

By 1916 the flock had in-

creased to 98 ewes, 3 rams, 78 lambs, and 2 wethers valued at \$1,374. By 1917 the inventory value was \$1,635. Labor became hard to obtain during the World War I period. It was difficult also to protect the flock from dogs. It was considered advisable to discontinue the sheep project in 1922. No sheep have been kept on the Station since that time.

#### CEREAL INVESTIGATIONS

The earliest investigational work with crops at the Hays station was with cereals as stated under the section of this report entitled "Early Work at the Station" (p. 32). The work was cooperative with the United States Department of Agriculture almost from the beginning. The report of the Experiment Station of 1902 states that "The

fall wheat and rye seeding comprise 200 acres, a trial of 165 varieties and several methods of seeding. The variety trial is in cooperation with the United States Department of Agriculture. The varieties of wheat tried are those which have been selected as being adapted to this climate. Careful notes are being taken on each variety as to its vigor, manner of growth, yield, etc. A large number of varieties are direct importations while others are hybrids of the best wheats grown in the state. . . . Spring work comprised the planting of 18 varieties of spring wheat, mostly macaroni, 22 of barley, 16 of oats, and one of spelt. The area devoted to this is 140 acres." (35)

The work was financed jointly by the U.S.D.A. and the Station. In 1905 the U.S. Department of Agriculture furnished the seed and \$200. The Station furnished the man in charge and all permanent equipment, fencing, land, labor, and supplies. Subsequently, a larger share of support came from the Department, with the Department paying the salary of the cerealist and the Station furnishing his living quarters, facilities for work, labor, and the major portion of all operating costs.

The cereal investigational work has been cooperative with the U.S.D.A. and with other experiment stations in the Great Plains. Consequently, many of the new and improved varieties developed

during the past 60 years are not the work of a single agency. Co-ordination by the U.S.D.A. has made the work more productive.

**Methods of Work.** From 1903 to 1925 investigations with cereals consisted chiefly of varietal testing of wheat, oats, barley, sorghum, and corn. Improvement was carried out largely by establishing pure lines from foreign introductions. Wheat, the chief crop, prior to 1920 was confined largely to the variety Turkey and to Crimean introductions from Russia. Sorghum selections and pure lines were established from African and Asiatic introductions.

Experiments were conducted in cultural practices such as rates and dates of seeding wheat and sorghum, fertilizer top dressing, chemical seed treatment, and pasturing experiments with winter wheat. The growth response of wheat on cropped and fallowed land was studied.

From 1920 to 1950 improvement through hybridization followed by selection dominated the creation of the new crop varieties which were increased and released through certification. New strains were also created which were not of commercial importance but became useful for their germ plasm.

From 1950 to the present, breeding emphasis has been on the critical and highly specialized study of genetic and cytoplasmic inheritance. This led to the development and use of male sterility in hybridiza-

tion, which in sorghum has been of great economic value to the region.

More recently the Station has made use of backcrossing for the improvement of wheat and sorghums to improve existing good varieties and to eliminate weaknesses. In wheat, emphasis has been placed on quality as well as on yield.

The improvement of crops from pure line selections and hybridization to methods of genetic and cytoplasmic inheritance has progressed steadily at the Station for 60 years. Pure seed has been supplied in quantity to the farmers as a result of this breeding program. Most of the work has been in cooperation with the U.S.D.A. and in close collaboration with the central station at Manhattan.

**Cereals Developed or Fostered.** During the first 30 years the Station served principally to test the value of dif-

ferent varieties of cereals for western Kansas. The adaptability of Turkey and Kharkov wheat was shown. When Kanred wheat was developed at the College, the Station demonstrated its value for the region. Tenmarq and Comanche wheat, both developed at the College, were tested and demonstrated by the Station. Largely through the efforts of A. F. Swanson, cerealist from 1917 to 1951 who rendered signal service, Kiowa and Bison wheats were developed as replacements for Tenmarq and Comanche. Bison in 1961 was grown on 27 percent of the Kansas wheat acreage.

Bison is highly regarded for its strong gluten strength. It has high yield and has spread into Colorado and Nebraska. Apache was developed at the Station and was made ready for certification and distribution, but it lodged badly in a wet year and was never approved. The foundation seed



Fig. 46.—Cutting pink kafir for seed. Pink kafir isolated in 1910 "was highly regarded and had the longest period of distribution of any sorghum variety ever grown at the Station."

was sent to the Clayton Experiment Station in New Mexico and was distributed in New Mexico and in the Texas Panhandle. It came back into southwestern Kansas during the early 1950's, and in 1960 was grown on 1 percent of the wheat area of the state.

Hays Golden corn, acquired by A. F. Swanson on the Fleming Farm in Ness County in 1923, was further purified and was rather widely distributed. It is still being used by corn breeders as germ plasm for drought resistance.

Pink kafir isolated in 1910 by the Station was highly regarded and had the longest period of distribution of any sorghum variety ever grown there. Early Sumac sorgho had wide distribution and is still grown. Dawn kafir, Dwarf yellow milo, and feterita, while not of Hays origin, were grown for seed production.

Wheatland was the first combine sorghum to become established firmly on the Great Plains. It was brought to the Station in 1929 from Woodward, Oklahoma, and was approved for distribution in 1931. It later was replaced by Westland from the Garden City station and by Midland from Hays.

From 1920 to 1950 the Station developed a number of sorghum varieties from plant breeding. Approved for certification but reaching only limited distribution were Kalo, Club Kafir, Norkan, and Cody. The latter was grown for a specialized starch during World War II to meet an

emergency, but was later discontinued. Other minor varieties developed or fostered were Dwarf Freed, Modoc, Greeley, Weskan, Coes, and Gurno. Some of these have been used by plant breeders for new germ plasm. Gurno at one time was grown extensively in South Dakota, while Coes had a distribution in Colorado.

Of the more important varieties, Early Kalo, approved in 1940, came into competition with Westland but later was replaced by Midland which had much better standability. Early Kalo's distribution covered much of western Kansas and reached into Nebraska. All the varieties were replaced in the late 1950's with the new hybrids. By 1961 these predominated the grain sorghum production of the state.

In 1948 the white-seeded Ellis sorgho from the Station was approved for distribution and still is grown extensively in central Kansas. It is highly regarded for its quality, even though the tonnage is relatively low.

Since 1955 the hybrid sorghums KS601, KS602, KS651, and KS701, developed at the Station, have been released. Use of pure-line grain sorghums on the farms has declined rapidly since 1956 so that seed production now is almost zero. This older material has been replaced with hybrids produced by large commercial seed companies having skilled personnel using highly specialized methods and extensive equipment.