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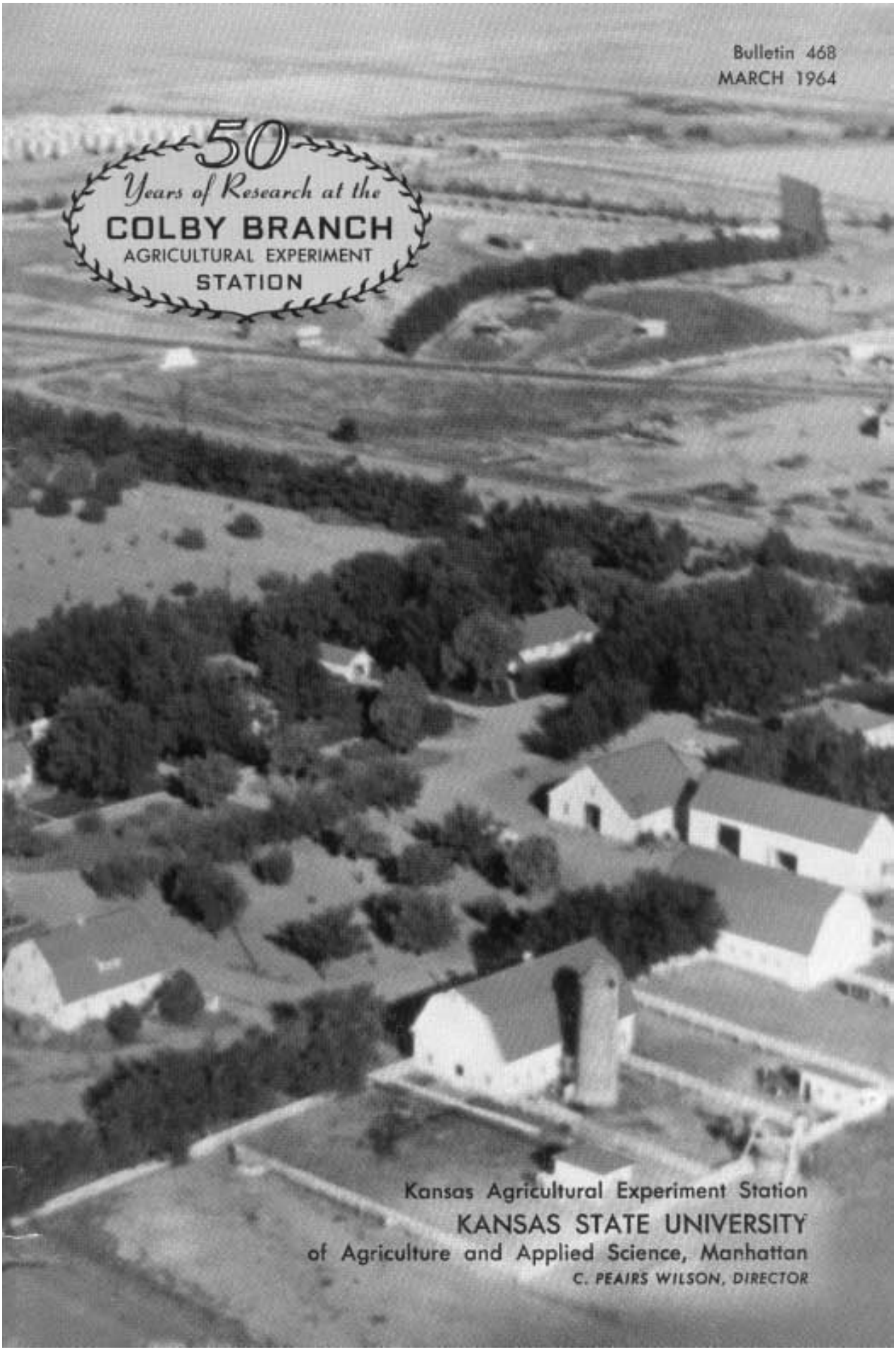
50 Years of Research at the COLBY BRANCH AGRICULTURAL EXPERIMENT STATION



Kansas Agricultural Experiment Station
KANSAS STATE UNIVERSITY
of Agriculture and Applied Science, Manhattan
C. PEAIRS WILSON, DIRECTOR

Acknowledgments

Invaluable assistance was furnished in the preparation of this report by Evans E. Banbury, the present superintendent, and by his technical staff. The information presented in the section on Dryland Agriculture Investigations is from the publication of the United States Department of Agriculture, Circular No. 979: Dryland Crop Rotation and Tillage Experiments at the Colby (Kansas) Branch Experiment Station.

CONTENTS

Fifty Years of Research at the Colby (Kansas) Branch Experiment Station[1] 1914-1963

by

Leland E. Call*

The Legislature of Kansas March 6, 1913, authorized the establishment of a branch station near Colby in northwestern Kansas and appropriated funds for its support. The enabling act 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 irrigation interests of this state and western Kansas, an experimental and demonstration station shall be established near Colby, in Thomas County, Kansas, under the control of the State Board of Administration who are hereby authorized to locate and establish such station as a branch of the State Agricultural College.

Section 2. The State Board of Administration is hereby authorized to direct all improvements in the way of buildings, fences, etc., and to take such other steps as they may deem necessary to the successful establishment of such station.

Section 3. It shall be the duty of the Board of County Commissioners in Thomas County to purchase the necessary land, not less than 160 acres, and to deed the same to the State of Kansas for the purpose of establishing thereon such Experiment Station.

Section 4. The State Board of Administration shall have control and supervision of the said station, and shall appoint a competent superintendent, and such other employees as to them may appear necessary. They shall fix the salaries and compensations of employees and establish such rules as they may from time to time deem necessary.

Section 5. The proceeds arising from the sale of products from said station shall be applied to the liquidation of the running expenses, and all monies so accruing shall be accredited as coming from the state and be applied as a part, or as a whole payment of any amount which may be appropriated from the funds of the state for the maintenance of said station.

Section 6. To enable the State Board of Administration to carry out the provisions of this act, they are hereby authorized to expend such amounts as they may deem necessary from any monies hereafter appropriated to carry out the spirit and intent of this bill.

Section 7. To carry out the provisions of the act the following sums, or so much thereof as may be necessary, are hereby appropriated out of any money now in the State Treasury not otherwise appropriated:

Superintendent's cottage, barns, fences, and other permanent improvements	$4,000
For pump and other equipment for irrigation	6,000
Farm implements, livestock, and other equipment	2,000
Maintenance for 1913 and 1914	2,000
Maintenance for 1914 and 1915	2,000

Section 8. It is understood and agreed that hereafter the Board of County Commissioners of Thomas County, Kansas, will appropriate an amount equal to any amounts that

1. Contribution No. 110, Office of the Dean, Agricultural Research, Teaching, and Extension, and director, Agricultural Experiment Station, Manhattan.

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

may be appropriated by the State of Kansas to provide for maintenance and support of the experimental and demonstration station herein created.

Section 9. The auditor of the State of Kansas is hereby authorized to draw warrants on the treasurer of the state for the purpose and amount specified in this act, or so much thereof as may be necessary to liquidate all such claims as may be presented to him, to be paid out of any money in the state treasury not otherwise appropriated.

Section 10. This act shall take effect and be in force from and after its publication in the official state paper.

Approved March 3, 1913.

Published in official state paper March 6, 1913."

LOCATING THE STATION

Authority to choose an exact location for the Station was delegated by the State Board of Administration to the Agricultural Experiment Station of the College. In the late fall of 1913, the Director of the Experiment Station accompanied by the General Superintendent of the Stations, the Agronomist of the College, and a representative of the United States Department of Agriculture made a careful survey and chose a farm considered suitable for the Station. The farm selected was a tract of land approximately one half section (320 acres) with a 10-acre fruit orchard and improvements consisting of a small cottage, a barn, two granaries, and several small outbuildings.

The farm, owned jointly by Ike William Crumly and William Sang Ferguson, was one of the better improved farms of the community and was not for sale. It was so satisfactory from the standpoint of location and adaptability for Station work that the committee appointed to choose a location insisted upon the purchase of the particular tract. It was due only to Mr. Ferguson's keen interest in community welfare and his desire to have the Station located at Colby

3. Laws of Kansas, 1913, Senate Bill No. 34, p. 514.

Fig. l.--The buildings on the Station farm as they appeared at the time of purchase, 1914. "The improvements consisted of a small cottage, a barn, two granaries, and several small buildings. The state allowed the County Commissioners of Thomas County $2,000 toward the purchase price for the buildings."

that the owners reluctantly consented to sell.

The farm was located approximately 100 deg. west longitude and 39 deg. 15' north latitude, with an elevation approximately 3,150 feet above sea level. The farm is adjacent to the southwest corner of the City of Colby. It was purchased by the County Commissioners of Thomas County for $10,000 for land and buildings and was deeded to the State of Kansas for as long as it was used for experimental purposes. The State allowed the County Commissioners $2,000 toward the purchase price for the buildings, making the cost of the farm to the Commissioners $8,000.

Four of the farm's 320 acres had been taken at the northeast corner for a high school. The farm extended one mile east and west along U.S. Highway 24 and one half mile

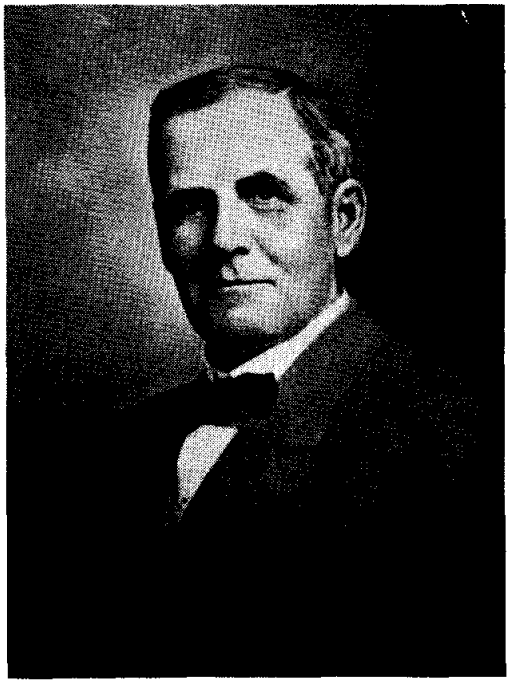


Fig. 2.-William Sang Ferguson, co-owner of the farm from whom the Station farm was purchased. "It was due chiefly to Mr. Ferguson's keen interest in community welfare and his desire to have the Station located at Colby that the owners reluctantly consented to sell."

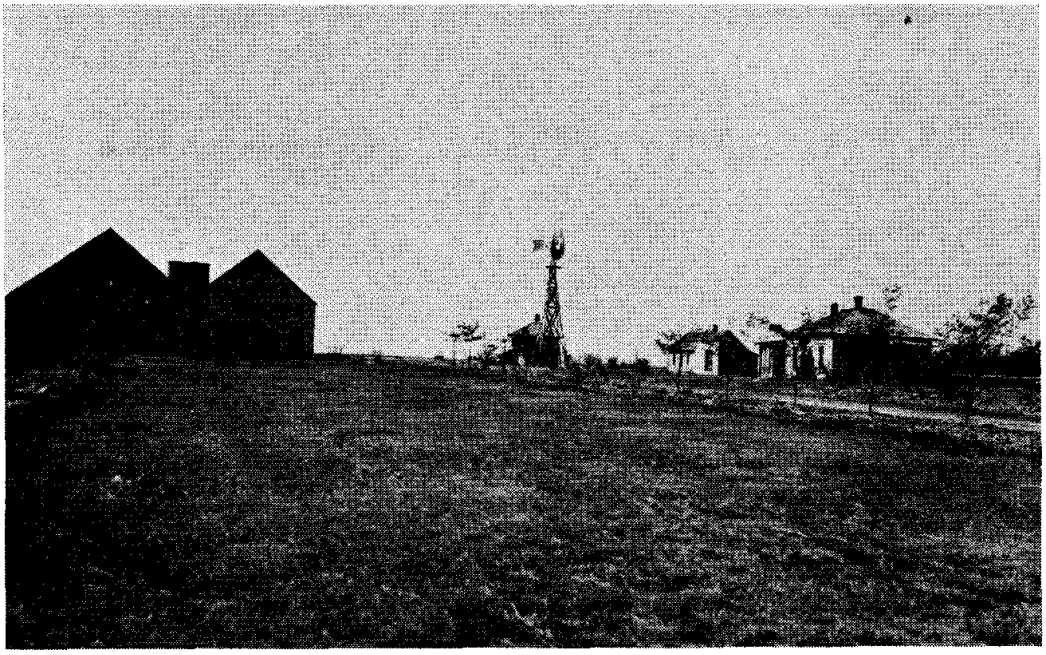


Fig. 3.-The Station farmstead, 1917, three years after it was acquired by the state.

north and south. When purchased, approximately one half of the land was under cultivation and the other half in buffalograss and grama grass. The cultivated land was level to gently rolling, ideally adapted to experimental plot work. Ground water in supply adequate for pump irrigation was available at approximately 112 feet deep.

The soil is of the Chestnut group, now classified as Keith silt-loam, formerly as Colby. It is representative of the prevailing soil of the region. The soil is friable and easily worked when in proper moisture condition. It blows readily when the surface is dry and finely pulverized without vegetative cover. The soil is fertile, so crop production is limited by moisture rather than by fertility.

CLIMATE

Climatological records, including precipitation, temperature, wind velocity, and evaporation, have been kept at the Colby Station since its establishment in 1914. Annual precipitation has averaged 18.50 inches, more than three fourths of which (14.22 inches average) fell during the six months' growing season, April through September. Much of the precipitation falls in hard rains, resulting in runoff and soil erosion. The driest year on record was 1934, when 8.60 inches were recorded; and the wettest, 1915, with a total of 31.81 inches. The largest monthly precipitation recorded was 10.80 inches during July, 1941. No moisture was recorded in January, 1931, for the lowest monthly precipitation. The average annual snowfall over 50 years has been 28 inches, with the most, 64.6 inches, recorded in 1958. The average annual mean temperature has been 51 deg. F. Temperature has varied from 113 deg. F. July 25, 1940 to -25 deg. F. February 8, 1933. In all the years since 1914, except

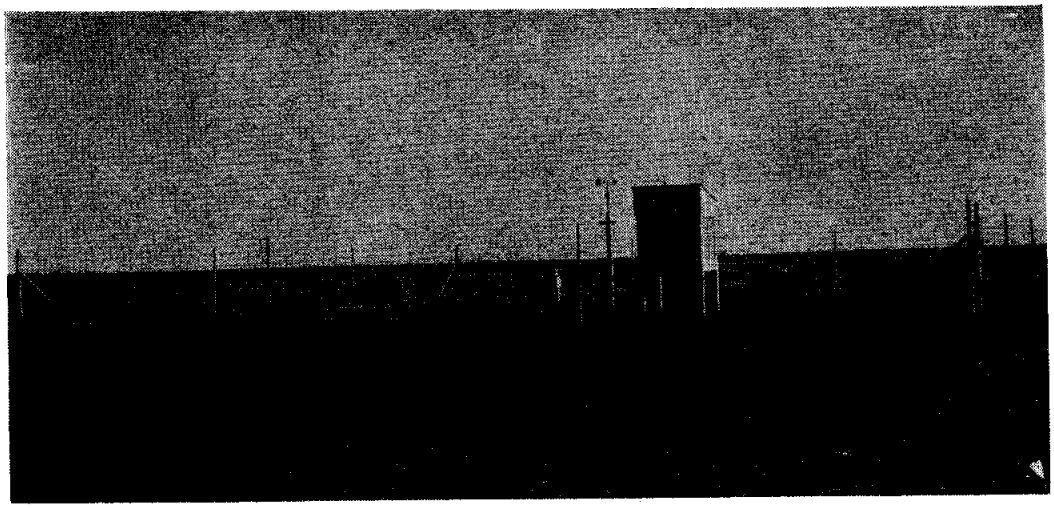


Fig.4.--- The weather station. "Climatological records have been kept at the Colby Station since 1914. Precipitation, temperature, wind velocity, and evaporation have been recorded for 50 years, 1914-1963."

1915 and 1923, 100 deg. F., or more, maximum temperatures were recorded during each summer. In all years since 1914, subzero temperatures were recorded each winter. In winter, sudden drops in temperature occur that are often injurious to vegetation. January 17-18, 1950, the temperature dropped over night from 70" F. to 0" F.

The average date of the last killing frost in the spring has been May 1, and the first killing frost in the fall, October 11, which makes an average frost-free growing season of 163 days. The earliest date on record of the last killing frost in the spring was April 10, 1942; the latest date, May 28, 1947. The earliest date of the first killing frost in the fall was September 20, 1934; the latest, November 2, 1937. The shortest frost-free period since the establishment of the Station was 135 days in 1916 and 1946; the longest, 193 days in 1957.

High winds are one of the farming hazards of the Colby area. They occur more commonly in March, April, and May but also during severe storms in winter when they are a livestock hazard. The soil in the Colby territory is considered only moderately susceptible to erosion by wind. However, when the surface soil, that is unprotected by vegetation, becomes dry and pulverized, it blows readily. Under these conditions high winds frequently drift the soil into stubble fields, roadside ditches, fence rows, shelterbelts, and other places where the soil is deposited as the wind is slackened by such obstructions.

Fig. 5.-After a March blizzard. "The average annual snowfall over 50 years has been 28 inches, with the largest annual snowfall recorded in 1958 of 64.6 inches."

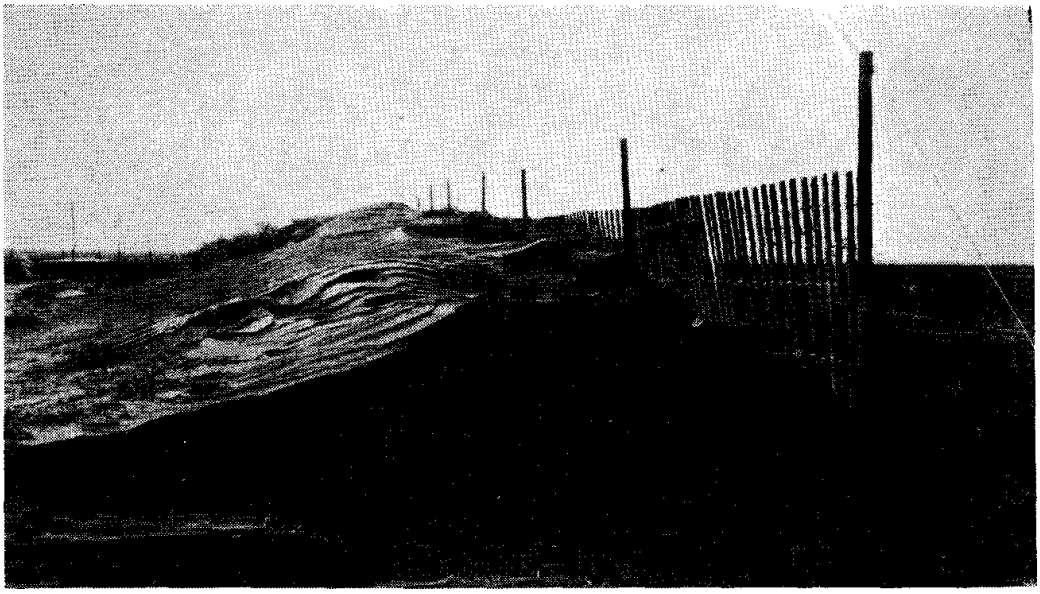


Fig. 6.--Blown soil caught behind a snow fence. "At the time the Station was established in 1914, several thousand acres in the vicinity of Colby had been blowing for two years. . . . One of the objectives in establishing the Station at Colby was to determine what might be done to control soil blowing."

When the Station was established in 1914, several thousand acres in the vicinity of Colby had been blowing for two years. Vegetation on large areas had been denuded, groves of trees had been submerged by drifting soil, and farm families had been compelled to move from the blowing areas. One of the objectives in establishing the Station at Colby was to determine what might be done to control soil blowing. In addition to experimental work started at the Station to determine how best to control the problem, an agreement was entered into with the County Commis-

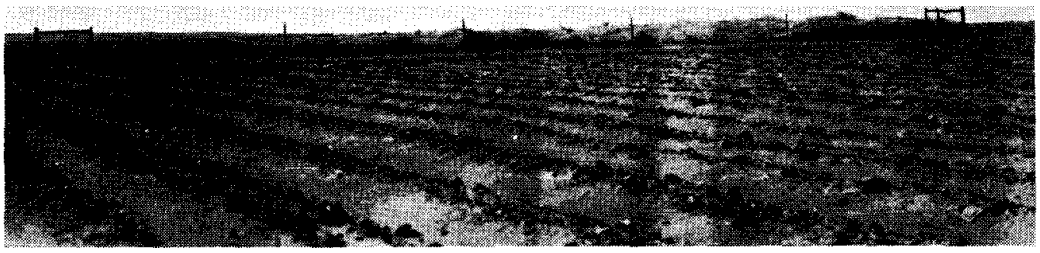


Fig. 7.--Listing helped to control soil blowing.

sioners for the Station to take control of several farms in the "blow areas." It was agreed that the Station would handle these farms in such a manner as to prevent blowing during the season of 1914. One farm of 160 acres was listed in alternate rows and planted to native corn. The growing season was favorable and no cultivation after planting was given to the crop. By advance agreement, the crop was to become the property of the County Commissioners. At the end of the season, 1,400 bushels of corn were sold from the area at auction for $200.

A second farm of 160 acres was listed and planted to different varieties of grain and forage sorghum. All varieties produced a good crop. A third area near the Station farm was blowing badly and was a hazard to the Station. It was listed to prevent blowing and sorghum planted on portions of the field. Blowing was controlled and a good crop of feed produced.

In most years, soil blowing can be prevented by working the land to leave it rough and cloddy or with crop residues on the surface. There are periods, however, when a number of dry years in succession leave too little vegetative cover or crop residue to protect the soil. Also during such periods, the soil may become so finely pulverized and loose from working it when dry that it is exceedingly difficult to hold the soil from blowing until rainfall becomes abundant and frequent enough to start and establish vegetation. While much progress has been made in developing methods of soil management that will control soil blowing, constant vigilance is required to prevent it.

TECHNICAL PERSONNEL

The Colby Station has been fortunate in having competent

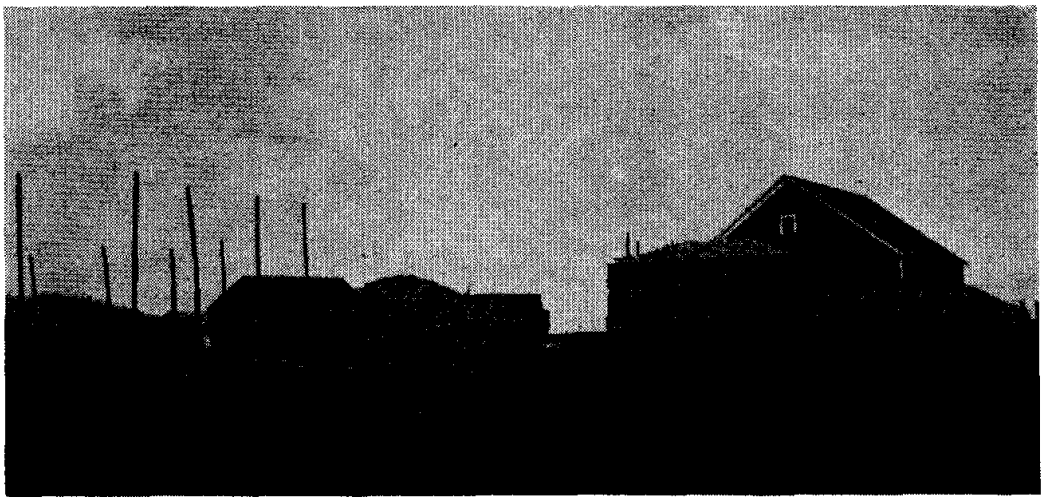


Fig. 8---Corn grown by the Station in 1914 for the County Commissioners of Thomas County to aid in the control of soil blowing. "At the end of the season, 1,400 bushels of corn were sold from the area at auction for $200."

employees that have served for comparatively long periods. The first superintendent of the Station, Stanley P. Clark, was appointed March 1, 1914, and served for four years. He was succeeded by John J. Bayles who served approximately three years, and he by Ben F. Barnes who served from 1921 to 1929. April 1, 1929, Embert H. Coles was appointed superintendent and served for 25 years, until his death in 1955. Mr. Coles was a graduate of the College of Agriculture and had served seven years as dryland agriculturist at the Garden City Branch Experiment Station before his appointment as superintendent of the Colby Station. Mr. Coles was well qualified by training, personality, and experience for the position. In the quarter century that he served, he developed the Station that became recognized as an authority on agricultural practices for northwestern Kansas. His 15-minute daily broadcasts on current agricultural events and practices over Radio Station KXXX at Colby became one of the most popular programs of the Colby broadcasting station. His untimely and sudden death June 30, 1955, was a serious loss to the experiment station, the broadcasting station, and to all of northwestern Kansas. Mr. Coles was succeeded by Evans E. Banbury November 16, 1955. Mr. Banbury, a graduate of the College with county agent experience, is well qualified for the position. He has proven to be a worthy successor to Mr. Coles. During the interval between Mr. Coles' death and Mr. Banbury's appointment, Ted L. Walter was acting superintendent of the Station.

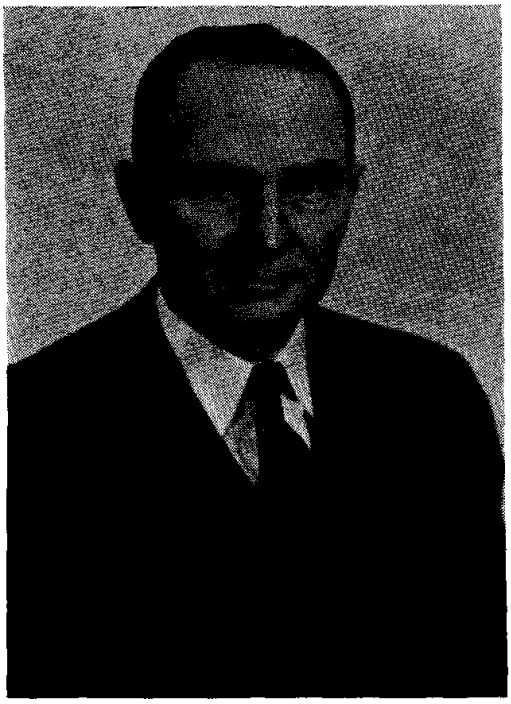


Fig. 9.—Embert H. Coles, superintendent, 1929-1955. "In the quarter century that he served, he developed the Station that became recognized as an authority on agricultural practices for northwestern Kansas."

Another technical worker with long and valuable service was Joe B. Kuska, a graduate of the College of Agriculture, University of Nebraska, and an employee of the United States Department of Agriculture. He joined the staff as scientific assistant in charge of the dryland agricultural investigational work when the Station was organized in 1914, and served until July 1, 1951, except for seven years, 1919-1926, when he farmed in northwestern Kansas.

Fig. 10.--Evans E. Banbury, superintendent since 1955. "A worthy successor to Embert Coles."

TECHNICAL PERSONNEL AT THE COLBY BRANCH STATION

Superintendent	From	TO
S. P. Clark	March 1, 1914	March 15, 1918
John J. Bayles	April 22, 1918	December 31, 1920
Ben F. Barnes	January 1, 1921	April 1, 1929
Embert H. Coles	April 1, 1929	June 30, 1955
Ted L. Walter (Acting)	July 1, 1955	November 15, 1955
Evans E. Banbury	November 16, 1955	Present
Dryland Agriculture		
J. B. Kuska	March 1, 1914	May 31, 1919
A. Osenburg	June 1, 1919	December 31, 1919
J. J. Bayles	January 1, 1920	December 31, 1920
B. F. Barnes	January 1, 1921	April 1, 1929
J. B. Kuska	July 1, 1929	June 30, 1951
Scientific Assistant		
W. H. Von Trebra	June 17, 1924	July 31, 1926
J. B. Kuska	August 1, 1926	July 1, 1929
Cerealist		
D. E. Crumbaker	January 1, 1947	November 15, 1950
Ted L. Walter	June 1, 1951	June 30, 1960
John R. Lawless	July 1, 1960	Present
Soil Scientist		
H. C. Engdahl	October 1, 1951	June 30, 1955
W. W. Harris	September 15, 1955	Present

APPROPRIATIONS

The legislative act that authorized a branch experiment station near Colby carried an appropriation of $15,000 for the biennium 1913-15 to be used as follows:

Superintendent's cottage, barns, fences, and other permanent improvements	$4,000
Pump and other equipment for irrigation	5,000
Farm implements, livestock and other equipment	2,000
Maintenance for 1913 and 1914	2,000
Maintenance for 1914 and 1915	2,000

Amounts of subsequent appropriations follow:

1916	$ 4,000	1924	7,200
1917	3,000	1925	3,700
1918	2,500	1926	4,500
1919	2,500	1927	5,000
1920	2,500	1928	4,000
1921	2,500	1929	4,750
1922	2,500	1930	9,500
1923	2,500	1931	9,000
		1932	11,500
		1933	11,000
		1934	5,750
		1935	5,750
		1936	6,250
		1937	6,250
		1938	8,000
		1939	8,500
		1940	8,000
		1941	7,750
		1942	11,000
		1943	11,000
		1944	7,000
		1945	7,000
		1946	8,000
		1947	8,500
		1948	12,500
		1949	12,500
		1950	16,500
		1951	16,500
		1952	25,000
		1953	25,000
		1954	28,000

1955	30,000
1956	30,660
1957	38,368
1958	48,767
1959	50,981
1960	54,850
1961	56,704
1962	64,897
1963	92,927

PHYSICAL PLANT

Land. — The 316 acres deeded to the Station by the county commissioners of Thomas County were reduced in 1927 when the legislature authorized the use of 40 acres of the Station land by the Thomas County Fair Association for a fair grounds. House Bill No. 507 was the authorizing act and reads as follows:

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

Section 1. The board of regents of the state of Kansas are hereby directed to permit the Thomas County Fair Association to use 40 acres of the state demonstration farm at Colby, Kansas, for the erection of bulidings and improvements and for holding of fairs thereon. If after such conveyance, the said association fails for any two consecutive years to hold a fair upon such land, the use of such land shall revert to the state of Kansas.

Section 2. This act shall take effect and be in force from and after its publication in the statute book."[4]

The area set aside for the fair grounds was the northeast corner of the farm, south of the high school. It was part of the quarter section used by the Station for pasture purposes. It resulted in the Station being required to rent and eventually to buy additional land for pasture. The land that the Thomas County Fair Association was permitted to use still is being used as a fair grounds.

The area of land available to the Station did not provide the amount of pasture needed for the dairy herd. A quarter section of pasture adjoining the Station on the southeast became available. It was owned by I. W. Crumly of Colby. This land was rented in 1918 for $100. Due to the rapid rise in the price of land, the owner in 1919 asked $200 per season if rented from year to year, or $160 per season if leased for a period of three years. By informal agreement between the station superintendent and the owner, the pasture was leased for the three years, 1919, 1920, and

4. Laws of Kansas, 1927. House Bill No. 507, p. 494.

Fig. Il.---Station farmstead in winter about 1930.

1921, at an annual rental of $160. In case the Station did not use the land for all three years, $200 a year was to be paid for those years when it was used. This pasture was rented until 1941, then it and another 160 acres were purchased for $8,000.

In 1935, a 65-acre tract of land was leased from I. W. Crumly. This tract joined the northwest quarter of the Station land and was easily accessible. It also joined on the west a quarter section of land previously rented from Mr. Crumly for pasture. The principal reason for renting this 65 acres of land was to provide an additional area for annual crops such as sudangrass and rye for summer grazing for the dairy herd. The native pasture, including the pasture rented from Mr. Crumly, was overstocked and growing up to weeds.

In 1938, the cultivated land leased from Mr. Crumly was increased from 65 to 160 acres. This gave the Station control of an entire section of land less the area occupied by the high schcool and the fair grounds.

The Legislature of 1941 appropriated the $8,000 to purchase the half section of land rented from Mr. Crumly. Purchase of this land gave the Station a well-balanced unit of approximately a section of land, one half cultivated and the other half in pasture.

The Legislature of 1963 authorized a transfer by quitclaim deed of approximately 38.75 acres of the Station land, located on the east side of the Station south of the fair grounds, to the Colby Development, Inc., of Colby, Kansas, in exchange for one quarter section (160 acres) of land conveyed by warranty deed to the Station. The 160 acres conveyed to the Station joined Station land on the west. It is excellent quality cultivated land and provides additional land for experimental work. Colby Development, Inc., plans to use the land acquired from the Station for industrial and residential development.

The legislative act of 1963 authorizing this exchange of land (House Bill No. 69) follows :

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

Section 1. The state board of regents is hereby authorized and directed to convey by quitclaim deed to Colby Development, Inc., of Colby, Kansas, for the purpose of industrial and residential development, a tract of land located in the east half (E-1/2) of section one (1), township eight (8) south, range thirty-four (34), west of the 6th P.M., in Thomas county, Kansas, more particularly described as follows, to wit: Beginning at the southeast corner of the said half section, thence north along the section line to a point 805 feet north of the northeast corner of the southeast quarter of section 1, township 8, range 34, thence west at right angles 500 feet, thence south 1648.5 feet, thence west at right angles 230 feet, thence south 300 feet, thence east 230 feet, thence south to a point on the section line which is 500 feet west of the southeast corner of said half section, thence east 500 feet to the point of beginning, and containing 38.75 acres, more or less, exclusive of existing right-of-way: Provided, That no such conveyance shall be made by said board until Colby Development, Inc., has conveyed by warranty deed to the state of Kan-

sas the southeast quarter (SE-l/4) of section two (2), township eight (8) south. range thirty-four (34), west of the 6th P.M., Thomas county, Kansas, and until the title to and conveyance of the same shall have been approved by the attorney general. Upon the conveyance of said land to the state of Kansas, said deed shall be delivered to the state board of regents who shall cause the same to be recorded in the office of the register of deeds of Thomas county, Kansas, and thereafter shall file the same in the office of the secretary of state. Upon the acquisition of said property, the same shall be under the jurisdiction and control of the state board of regents to be used as a part of the agricultural experiment station now located in Thomas county, Kansas.

Section 2. This act shall take effect and be in force from and after its publication in the official state paper."[5]

The Station farm now (1964) contains approximately 717.25 acres consisting of 320 acres in the original purchase, 320 acres purchased from Mr. Crumly, and 160 acres deeded by the Colby Development, Inc., less four acres occupied by the Thomas County Hospital, formerly high school land, 40 acres of fair ground land, and 38.75 acres of Colby Development, Inc., land.

Early Farm Buildings.--The buildings on the farm at the time of purchase consisted of a small six-room cottage; a barn 32 by 40 feet with loft; a shed 16 by 40 feet attached to the barn; two granaries, one 40 by 40 feet, and the other 16 by 40 feet; a pit silo 10 by 20 feet; one windmill and several other small buildings. The buildings were in a fair state of repair but were not well adapted to Station use.

During the first year improvements were made in the buildings to adapt them better to Station use. The smaller of the two granary buildings (16 by 40 feet) was moved and re-

5. Laws of Kansas 1963. House Bill No. 69, p. 1054.

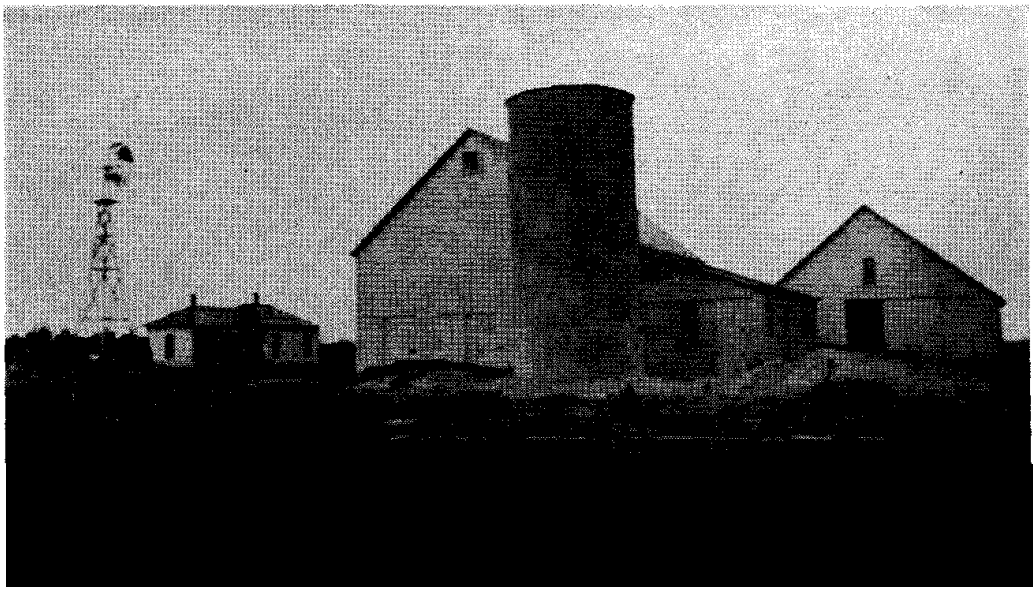


Fig. 12.—The original farm buildings. The 85-ton cement plastered silo was built after the farm was purchased.

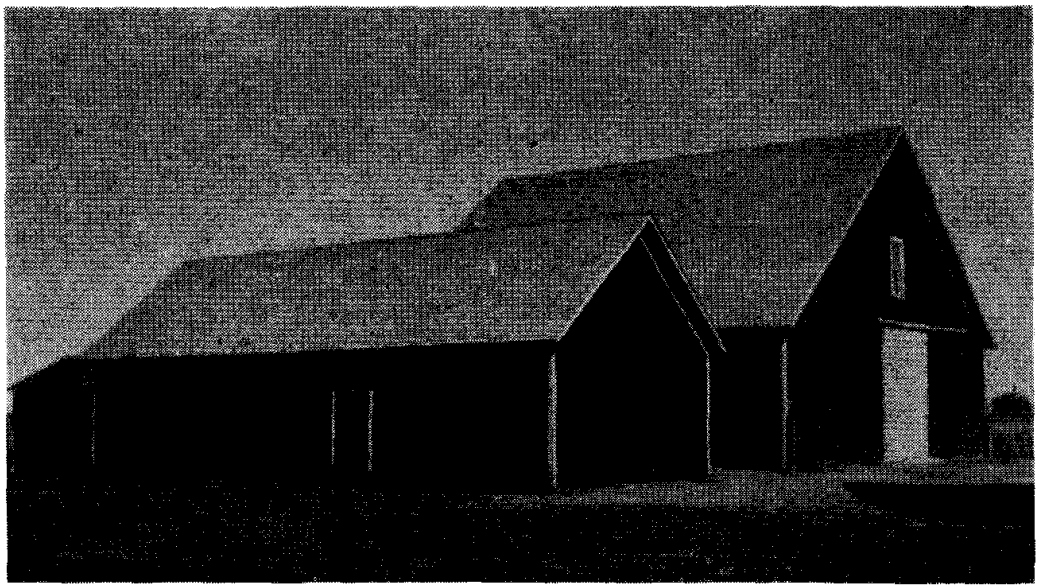


Fig. 13.-The two granaries on the farm at time of purchase. "The smaller was moved to a more convenient and desirable location and remodeled into an office building."

modeled into an office, laboratory and exhibit building. All buildings on the farm were painted a uniform gray.

Silos.--- No changes of importance were made in the pit silo. However, during the first summer a metal-lathcement-plastered silo of 85-ton capacity was built at a cost for material and labor of $405. It adjoined the dairy barn on the east.

In 1917, a second pit silo

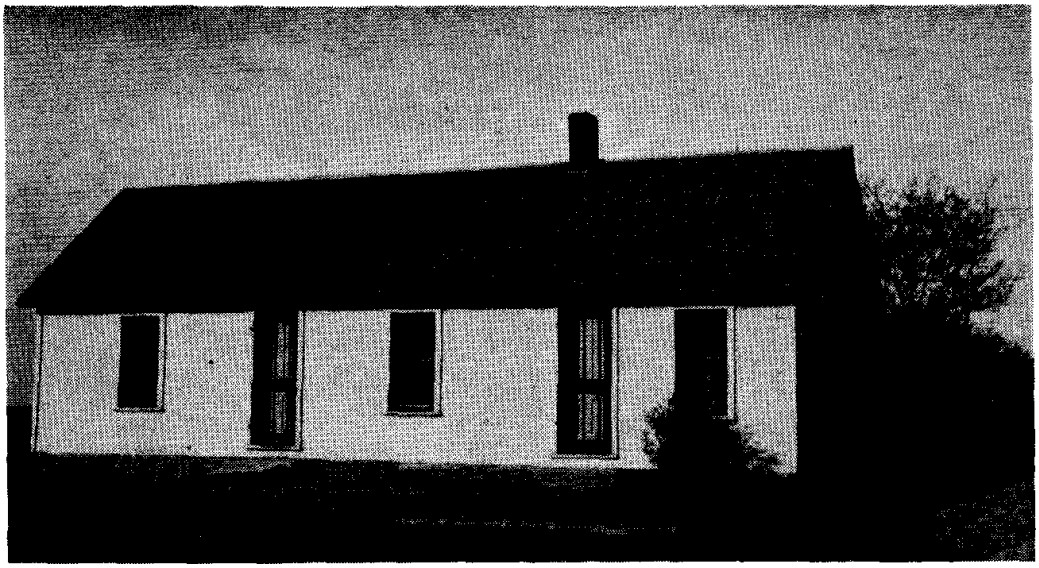


Fig.14-- "The first office building constructed from the smaller of the two granaries purchased with the farm. The building, 16 by 40 feet, was placed on a concrete foundation and divided into three sections–an office, a laboratory, and an exhibit room."

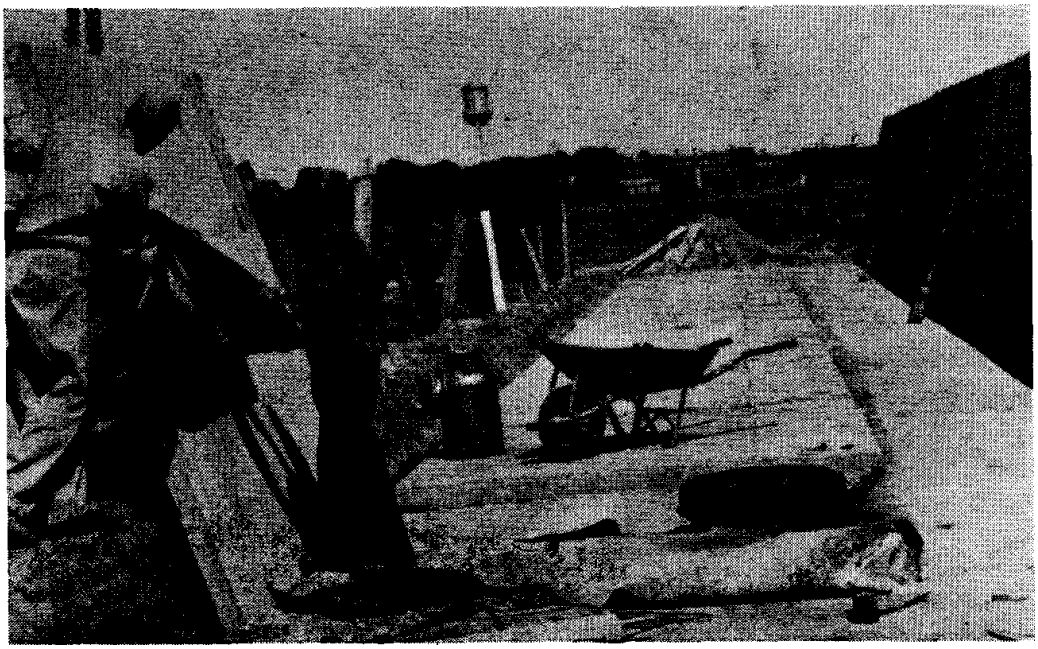


Fig. 15.---Putting side walls, formed in segments of reinforced concrete, in place for the experimental above-ground trench silo.

with a capacity of 95 tons was constructed at a total cost of $167, $69 for material and $98 for labor. By exchanging labor with a neighbor, the actual cash outlay amounted to only $84.

An above - ground cement stave silo connected with a new dairy barn was constructed in 1932 at a cost of $500.

In 1953, an experimental above-ground, 196-ton trench silo was constructed. It is 100 feet long, 12 feet wide at the bottom, 16 feet wide at the top, and has 8-foot walls. The floor is reinforced concrete six inches thick. The side walls were formed in segments of reinforced concrete 8 by 10 feet and 3⅜ inches thick. It cost $1,345, $937 for material and $408 for labor.

Superintendent's Residences.---The first major building constructed was a residence for the superintendent, with a legislative appropriation of $3,500 in 1924. A two-bedroom cottage with living room, dining room, bath, kitchen, and full basement was completed in March, 1925. Its total cost, including digging and cementing the basement, a hot-air furnace, a septic disposal system, walks and grading, was $4,662. After the new residence was built, the old cottage was used as a residence for the farm foreman.

In 1932, the superintendent's cottage was remodeled for $1,083, paid from Station fees. The remodeling consisted of extending the living room and the north bedroom six to eight feet to the north which replaced the front porch and provided protection from the north winds. A vestibule entrance was added on the east side of the house to re-

Fig. 16.—The superintendent's cottage after it was remodeled in 1932.

place the entrance on the north that was closed. A fireplace was built on the north end of the living room and hardwood floors were laid throughout the building.

The Legislature of 1950 made $6,000 available from the building fund to remodel the superintendent's house. A 14- by 22-foot addition was made in 1951 to the south end of the house. The addition was divided into a utility room, shower bath, and dining area. The partition between the old dining room and the living room was removed and the entrance to the bathroom improved. Most of the walls and all the ceilings were replastered and a completely new wiring system was installed.

In addition to the superintendent's house, four other residences have been provided for Station personnel. One house was converted from one of the original buildings purchased with the farm. A second was a cottage of the superintendent that became available in 1924 when a new residence for the superintendent was built. Both of these houses were rebuilt and modernized in 1924. A third, formerly the old office building, was converted into a residence in 1948 when the new office building was built. Another house was constructed in 1953, on contract, for $13,960.

The Dairy Barn.--The first dairy barn at the Station consisted of a shed 16 by 20 feet. attached to the east side of the horse barn. This shed was converted into a cow stable with cemented floors and gutters. The building was reinforced and strengthened throughout. Feed bins were provided in the loft to facilitate feeding and caring for the stock. The barn provided space for 12 cows. This shed served as a dairy barn until a new barn and complete dairy

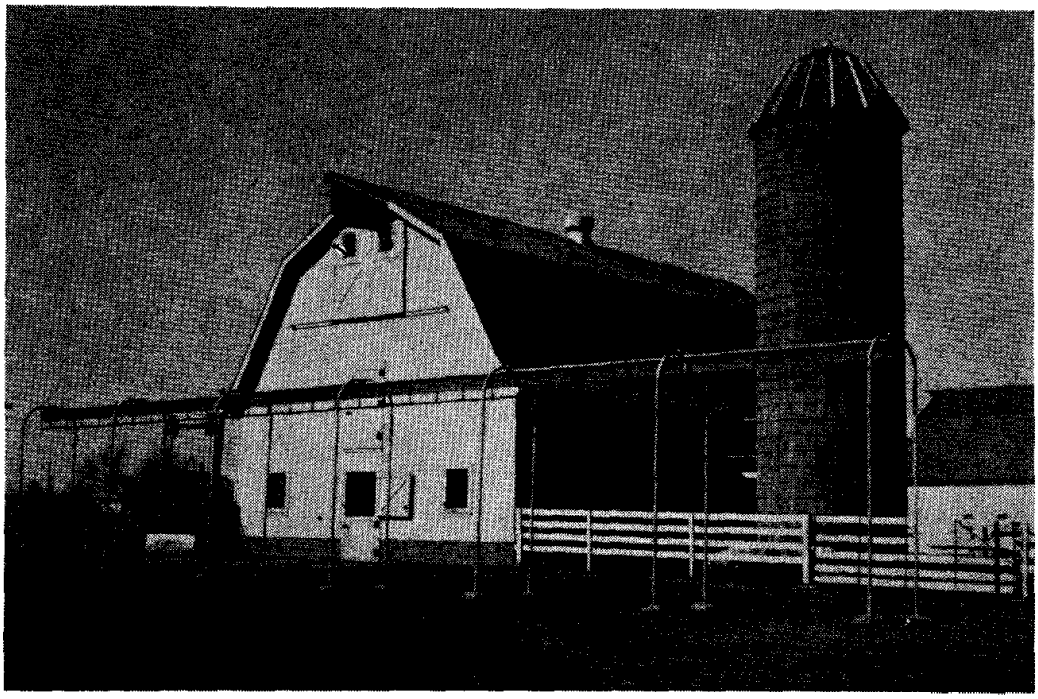


Fig. 17.-The dairy barn. "A new dairy barn and complete dairy unit were constructed in 1932, the Legislature of 1931 having made an appropriation of $6,000 for the purpose."

unit were constructed in 1932, with a 1931 legislative appropriation of $6,000. The unit consisted of a dairy barn, 34 by 60 feet; a milk house, 14 by 20 feet; a feed room, 12 by 12 feet; and a 12- by 36-foot concrete stave silo. The milk house was divided into three rooms : milk room, a boiler room, and a store room. The contract price for the barn, feed room, and milk house was $4,357; silo, $500; and extras on the barn, $147, making the total cost without equipment, $5,004. The barn was fitted throughout with Louden steel equipment. The 16 stalls and stanchions, 12 drinking fountains, manger divisions, paneling for four pens, calf stanchions, hay carrier and silo cart were purchased and installed for $624. Additional litter carrier equipment was purchased for $174. The cost of the sewage disposal plant and the extension of the water system to the dairy unit was $236, for a total cost of the unit of $6,039.

Office Building.--The first office building was described earlier.

Another office building, 36 by 20 feet, was built in 1921, and served until a new building was constructed in 1948. The new office building is 29 by 36 feet, 6 inches with a full basement, located across the main drive from the superintendent's residence. The basement walls are reinforced concrete. The main floor consists of four office rooms, two toilet rooms, and four closets. It was built for $12,920. The old office building was converted

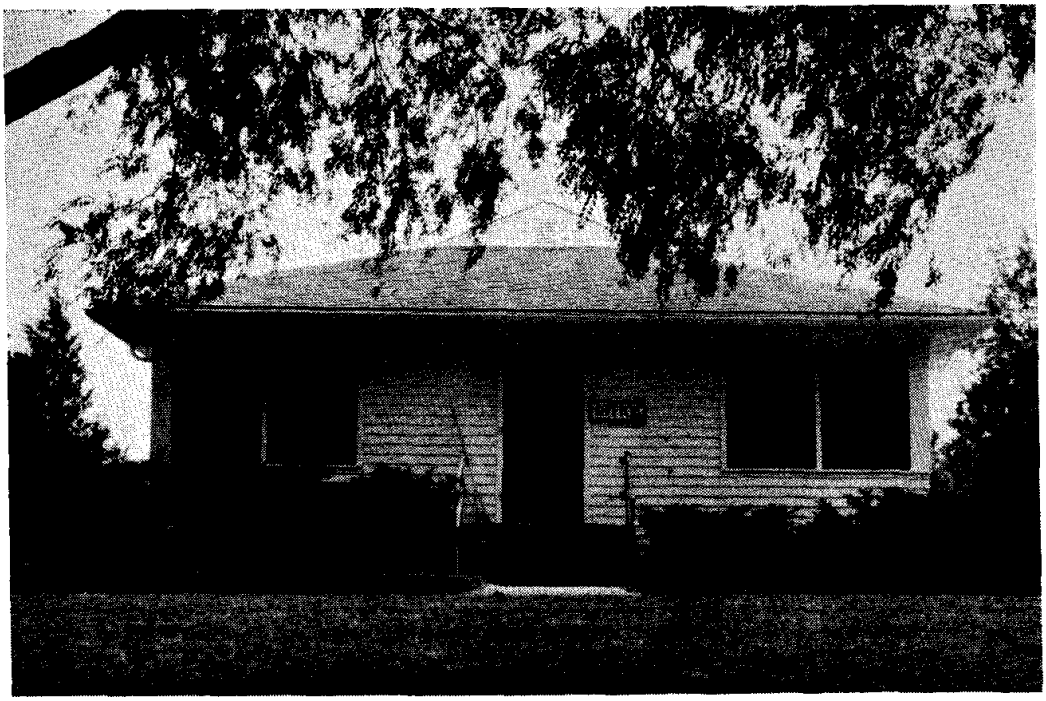


Fig. 18.—The new office building constructed in 1948 at a cost of $12,920. "It is located across the main drive from the superintendent's residence."

into a residence for Station employees.

Other Station Buildings.-- Other buildings include a hog house, 32 by 12 feet, built in 1919 at a cost of approximately $250; a stock barn, 36 by 40 feet, built in 1919 at a cost of $2,000; an implement shed large enough to house most of the implements of the farm, constructed in 1927; an open-front cattle shed, 20 by 40 feet, constructed in 1930 at a cost of $377; a seedhouse constructed in 1938-39 at a cost of $2,326; a hayshed costing $2,348 built in 1950 from Station fees and a special appropriation of $1,000; in 1953 a soils laboratory was constructed in the basement of the office building costing, with equipment, $2,308; a steel frame galvanized building for forage drying purposes, with a forced air furnace, built in 1959, cost approximately $800; a manure spreader shed, 16 by 12 feet, built in 1933, was remodeled in 1961 into a pole-type livestock building, 30 by 34 feet, at a cost of $550 for material; two pole-type livestock sheds, one 22 by 32 feet and the other 34 by 36 feet, built at a cost of $1,150 for material; one shed was for beef cattle and the other for sheep; a pole-type livestock shed, 72 by 32 feet, built in 1963 at a cost of $1,300 for material only, for lamb feeding tests; and two 1,000-bushel steel grain bins erected in 1959 and 1961 at costs of $475 and $488, respectively.

Utilities. —Electricity supplied from the City of Colby has been available at the Sta-

tion since its establishment. Electrical energy has always been available when needed, both for lighting and power.

A special appropriation of $1,000 became available July 1, 1925, to install a water system. After a study of various systems that might be used, it was decided to obtain water from the City of Colby. This was done by laying a two-inch line approximately 1,460 feet from the city pumping plant to the Station hydrant. From this hydrant, six lines were laid to points on the Station where water was needed. The cost of labor and material for the water lines was $734. With the installation of water, provision was made for the disposal of sewage: (1) By installing a septic disposal system for the superintendent's cottage; (2) a smaller cesspool for the employees' cottages; and (3) a larger cesspool for the milkhouse.

In 1941, the Kansas-Nebraska Natural Gas Company laid gas lines to the foundations of the cottages, the office, and the milkhouse without cost to the Station.

IRRIGATION

The legislative act establishing the Colby Station authorized experimental work with pump irrigation and appropriated $5,000 for the purpose. Ground water was found to be available in ample quantities at 112 to 160 feet deep. Equipment to pump from that depth had not been well developed and tested. It was thought advisable, therefore, to undertake irrigation on a small scale and to irrigate limited areas for feed crops, such as alfalfa and silage, rather than to irrigate large areas for grain crops, so an

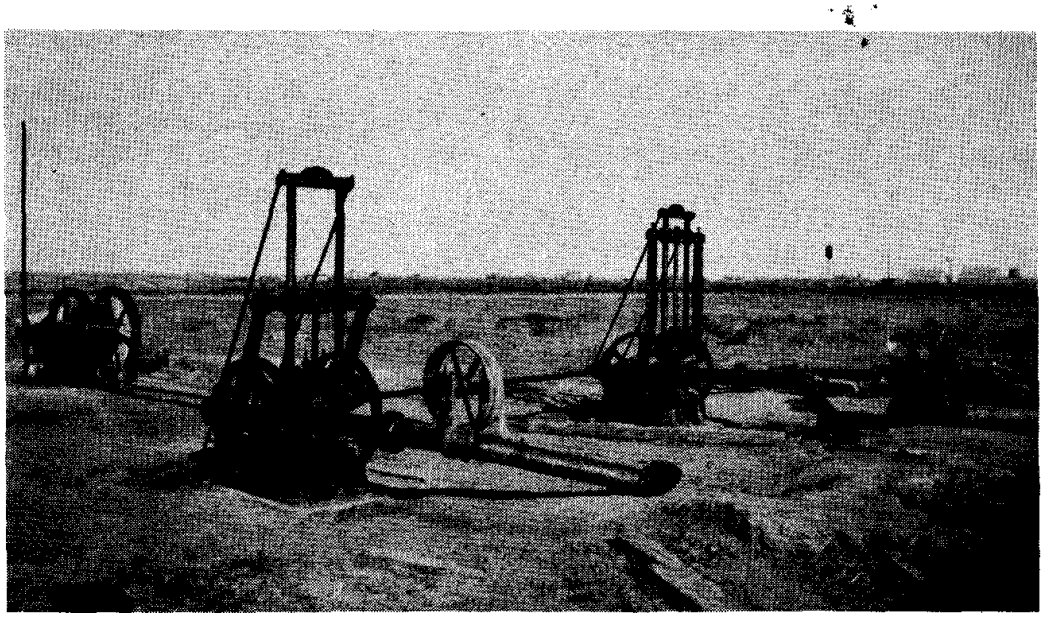


Fig. 19.---Engine and pump head of the first irrigation plant constructed in 1914. "Two wells were dug, one to 155 feet and the other 160 feet deep. The wells were located 12 feet apart and connected with a line shaft."

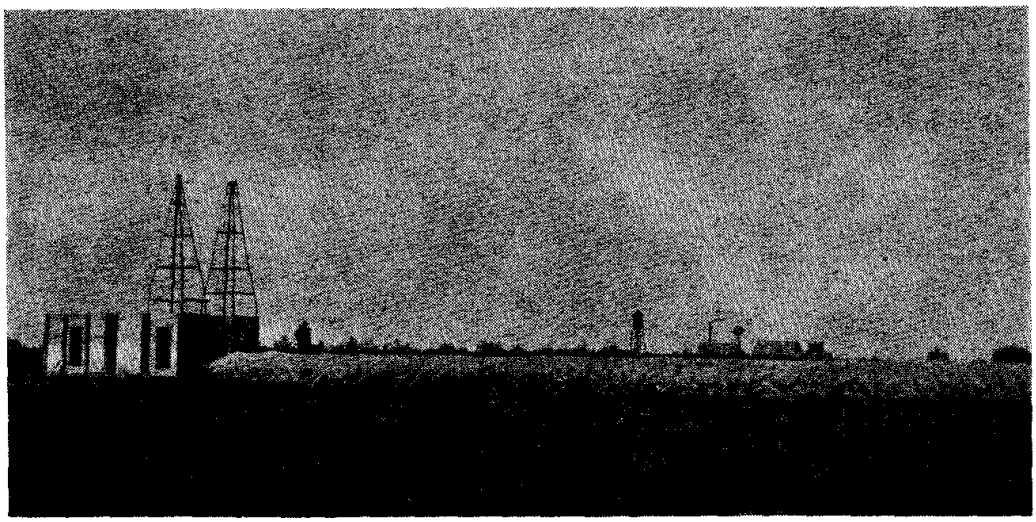


Fig. 20.---Irrigation plant and reservoir. The Legislature authorized experimental work with pump irrigation and appropriated $5,000 for the purpose. "In 1916, a metal-lath plaster house was built over the pump and engine, and an acre-foot reservoir was built to store water for irrigation purposes."

irrigation plant of the simplest possible type was developed. Two wells were dug in 1914, one 155 feet and the other 160 feet deep. The wells were 10-inch holes for the first 130 feet and 9-inch holes for the remainder. The pumps were ordinary deep - well tubular type with brass-lined cylinders, located 12 feet apart and connected with a line shaft. The line shaft was driven with an eight-horsepower, horizontal-type Fairbanks-Morse engine. The wells with the pumping equipment cost $2,-627. The capacity of the wells was tested up to 200 gallons per minute. In 1915, a metal-lath plaster house was built over the pump and engine, and an acre-foot reservoir was built to store water for irrigation purposes. These improvements cost $558.63.

In 1916, 16 one-tenth-acre plots were used for experiments comparing the yield of irrigated and nonirrigated crops. Irrigation increased the yield of potatoes from 16 to 65 bushels an acre; Red Amber sorghum silage, from 5 to 17 tons; and corn silage, from 3 to 8 tons an acre.

The most extensive work with irrigation was conducted in 1917 when the pump was kept running continuously an average of 16 hours a day from April 6 to August 7. Alfalfa, potatoes, pinto beans, and a portion of the fruit orchard were irrigated. Two destructive hailstorms, one June 4 and the second August 7, greatly reduced the yield of all crops and seriously injured the orchard. Mechanical difficulties that required extensive repairs developed in the pump in 1918. Labor became difficult to obtain and expensive due to World War I. The appropriation available for the support of the Station was not sufficient to maintain the

pumping plant and continue the irrigation experiments. While some water was pumped to irrigate alfalfa in 1919 and 1920, the pumping plant was not maintained. The equipment was removed, the reservoir filled, and no further irrigation was undertaken until 1957.

A marked expansion in irrigation development occurred in western Kansas following the drouth of the early 1950's. This expansion created a demand for research information to determine the most profitable production practices for irrigated crops under the climatic and soil conditions existing in the area served by the Station. The drouth also caused a loss of valuable data and plant materials from crop-breeding research. Equipment for deep-well pump irrigation had been improved greatly and was far more dependable than when the first irrigation was undertaken in 1914. Natural gas fuel was also available at less cost than the diesel fuel used at the earlier date. The cost for fuel and oil in 1962 was 96 cents an acre-foot for the water pumped compared with $5.62 an acre-foot in 1919. It was decided, therefore, in 1957 to attempt irrigation for a second time. Work was started in June. The purpose for undertaking the work was threefold: (1) To study crop production practices by irrigation under conditions existing in the area; (2) to assure the uninterruption by drouth of valuable long-time agronomic and plant-breeding studies; and (3) to assure a supply of feed in dry years for livestock experimental studies.

To determine the best location for the irrigation well, a test hole was drilled at the high point (highest elevation) near the west side of the northwest quarter of section 1. The test indicated that a well at this location should yield 1,500 to 1,800 gallons per minute under continuous pumping. Since 1,000 gallons per minute were considered adequate for the foreseeable future needs of the Station, the well drilled at this location was equipped and powered to produce this yield. The total cost for completing the well and pumping installation was $8,444. This included expenses for drilling, casing, gravel packing, pump, power unit and the necessary natural gas line from near the headquarters to the well site. The reverse rotary hydraulic drilling method was employed to drill the 36-inch-diameter hole. This size hole was drilled to shale, which was encountered 278 feet below the soil surface. An abbreviated geologic log of the parent materials encountered follows:

Depth in feet	Parent materials
0 to 146	clay, sandstone, limestone
146 to 251	water-bearing sand and gravel
251 to 263	sandy clay
263 to 278	water-bearing sand and gravel

Eighteen - inch - diameter, 10-gauge steel casing was installed in the well in the following increments, beginning at the soil surface: 146 feet, plain casing; 105 feet, perforated casing; 12 feet, plain casing; and 15 feet, perforated casing. This installation would permit withdrawing water from all the available aquifer.

An 8-inch Berkley turbine pump was installed. The pump contained a 4-stage bowl assembly, suspended on 240 feet of 8-inch column pipe, equipped with a 10-foot tail pipe section and screen, and a 70-horsepower right-angle gear drive. A 70-horsepower (continuous duty) internal combustion natural gas (factory equipped) engine was installed to power the pump. Natural gas fuel was supplied through 2,740 feet of 2-inch plastic and 200 feet of steel pipe leading from the headquarters to the well site. Natural gas is purchased at 22 cents per 1,000 cubic feet (1963). Average fuel costs for 1957 to 1963 were 98 cents per acre-foot of water pumped. This was only one fifth of the fuel cost in 1914. The unit was equipped with a flow meter to measure the amount of irrigation water pumped. This meter records the cumulative total of the water pumped (acre-inches) as well as provides an instantaneous record of the rate of pumping. Original well yield tests indicated that the well would produce 970 gallons per minute at l-700 revolutions per minute of the pump and engine. The draw-down at this pumping rate was 28 feet-pumping lift of 152 feet. During 1958 and 1959, 1,590 feet of 10-inch gated pipe and a steel fireproof well house were purchased. These items and the flow meter cost $3,476.

Eight level basins were constructed for the major irrigation testing work. Each basin is 130 feet wide (a 30-foot roadway included) and 640 feet long. Leveling construction was completed on four of these in 1957 at a cost of $462 and the remaining four were completed in 1958 at a cost of $374. Water is conveyed and applied to these basins through the gated pipe. The flow meter is used to determine when the desired quan-

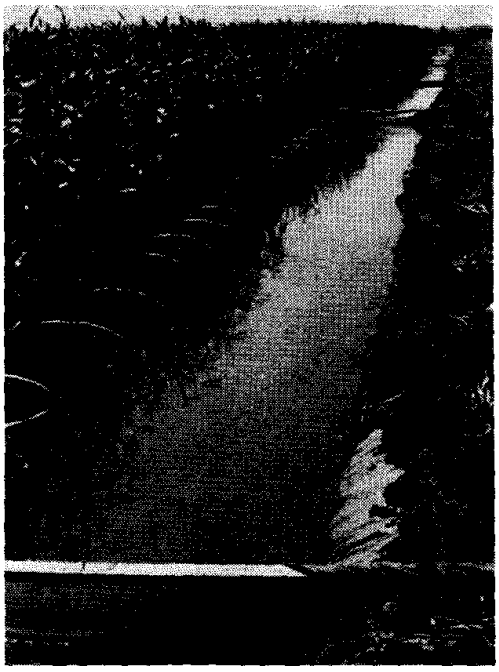


Fig. 21.-Head ditch on irrigation project. "Fields are irrigated with gated pipe where possible. Other fields were irrigated by the open-ditch-siphon-tube method."

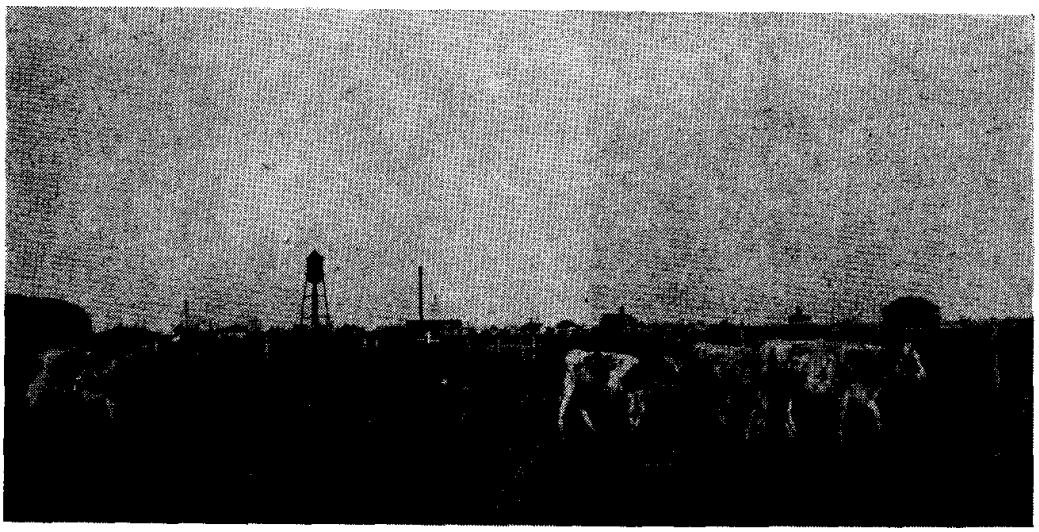


Fig. 22.-The dairy herd in 1916. "The herd was started in 1915 with the purchase of six cows and a purebred Ayrshire bull. Four of the cows were grade Ayrshire and two grade Shorthorn."

tity of water has been applied to each basin.

By 1962 an additional 90 acres in general field crops were brought under irrigation. These fields are irrigated with the gated pipe where possible, and by the open-ditch-siphon-tube method elsewhere. A part of the 90 acres is used in full irrigation for maximum yields primarily of grain sorghum and forage sorghum silage for livestock feeds; the rest, to produce cereal crop and sudangrass pasture using only a preirrigation. As much as 120 bushels an acre of grain sorghums and 26 tons an acre of sorghum silage has been harvested in one year from the general irrigated fields.

THE DAIRY

Historically, dairying was the major livestock project of the Station. The dairy herd was started in 1915 with six cows that cost $510 and a purebred Ayrshire bull for $100. Four of the cows were grade Ayrshires and two grade Shorthorns, about average cows compared with farm dairy grade cows then. The herd was established for two purposes: (1) To utilize roughage and grain produced on the Station farm, and (2) to demonstrate the desirability of dairying on western Kansas farms. The dairy project was intended to be demonstrational rather than experimental except to study good management, such as using purebred sires to upgrade dairy herds. The cows were delivered October 2, 1915.

In 1918, two additional grade cows were purchased. One, a Shorthorn, proved to be a poor milker and was sold for beef.

Purebred cows were purchased and added to the herd as follows: (1) In 1918, two cows, Star of Juneau, No. 46355, and Princess Wagram,

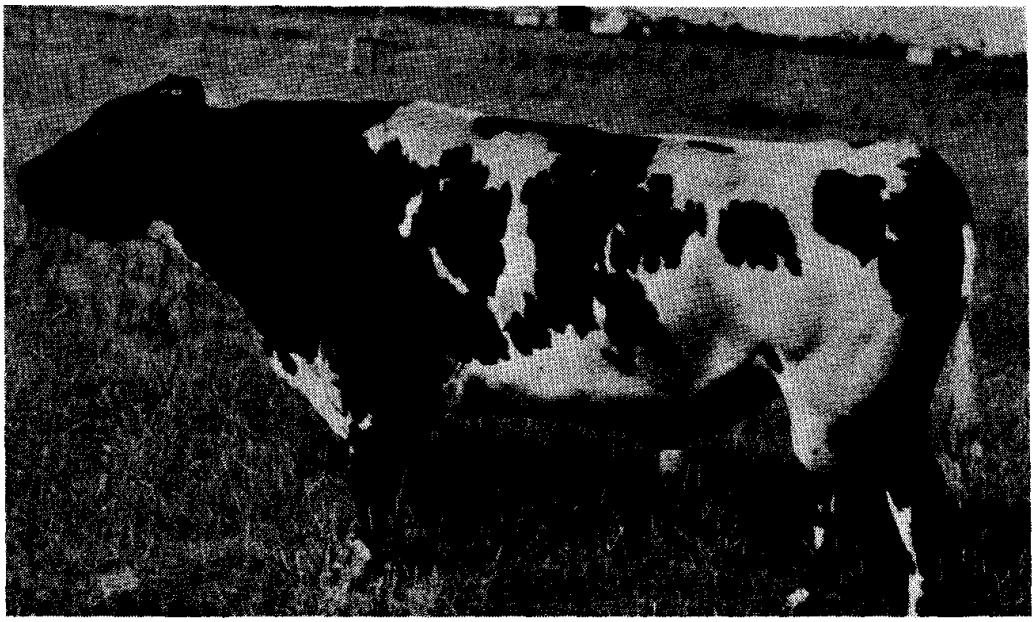


Fig. 23.—The first herd sire, Marquis 2nd's Sir Fearnot. "He came from the College and was used on the herd until 1923."

purchased by Prof. J. B. Fitch[6] for $225 each; (2) in 1925, two purebred Ayrshire heifers, Linndale Laurie, No. 91608, and Linndale Alpha Johanah, No. 91612, purchased at the Jim Linn dispersal sale at Manhattan; and (3) in 1931, two purebred Ayrshire cows, Aronsyde Heather Queen and Fair Fields Lily Pan, purchased at the Fair Fields farm sale of David Page at Topeka.

These six cows and heifers constituted all the purebred females of the foundation herd. All others were from those foundation animals. The first two purebreds purchased in 1918 proved to be poor producers and did not increase the production of the herd. They were sold in 1926. Only one heifer calf from the two cows proved good enough to be added to the herd. The other purebred foundation cows were good producers and improved the production and quality of the herd.

The bull purchased for $100 when the herd was established in 1915 was Marquis 2nd's Sir Fearnot, No. 17751. He came from the College and was used on the herd until 1923. Other bulls in the approximate order of their service were:

Bell Melrose's Sir Croft, No. 25441;
Bell Melrose's Crusader, No. 30442;
Fair Fields Arab, No. 38464;
Cacapon Leto 24th, No. 34766;
Cacapon Caesar, No. 46979;
Cleone's Royal Hutch, No. 50139;
Kanstacol Peer Optimus, No. 66691;
Woodhull Rare Sun, No. 58446;
Good Acres Craigman, No. 72904;
Woodhull Mister Jim, No. 66044;
Colby's L. Caesar, No. 79119;
K.S.I.R. Lassie's Jim, No. 65329:
Strathbar Lucky Star, No. 82590;
Woodull Professor Tim, No. 83225; and
Colby's Lawrence, No. 114680.

The herd has been bred artificially with semen from the Kansas Artificial Breeding

6. Professor Fitch was head of the Department of Dairy Husbandry at the College.

Service Unit since 1955, using semen from these bulls:

Good Acres Craigman, No. 72904 ;
Reymann Canary Major, No. 91718;
Meredith High Merit, No. 104944;
Woodhull Rare Artist, No. 94934;
Woodhull Arrogant Prince, No. 99207;
Medford Rare Bingo, No. 88074;
Ayr-Line Rare Mister, No. 94201;
Medford Timid Mickey, No. 97587;
Windrow Preferred Ike, No. 117905;
Vista Grande El Matador, No. 113734; and
Ayr-Line Modish Guy, No. 106285.

Herd Numbers and Production.-The herd in 1916 consisted of the six original cows that averaged 5,336 pounds of milk each that year. By 1930, the herd had been increased to 12 cows, eight heifers, and six heifer calves with one herd bull, Fair Fields Arab. Eight of the cows in 1930 averaged 7,320 pounds of milk each. Superintendent Coles, in his report for 1930, stated that "the fact that the eight grade cows milked in 1930 produced an average of 7,320 pounds of milk, compared with the average of 5,336 pounds produced by the six original cows in 1916, indicates that some progress has been made in the way of increasing the production of the herd by the use of purebred sires and the use of the milk scale and the Babcock tester."[7]

Vigorous selection was practiced with the grade cows, only the best being retained in the herd, while less vigorous culling was practiced with the purebreds. As a result, of the eight cows milked in 1931, four grade and four purebred, the grade cows averaged ll,-209 pounds of milk and 441 pounds of butterfat; the purebreds, 7,732 pounds of milk and 283 pounds of butterfat. Superintendent Coles observed: '"This comparison shows rather conclusively the

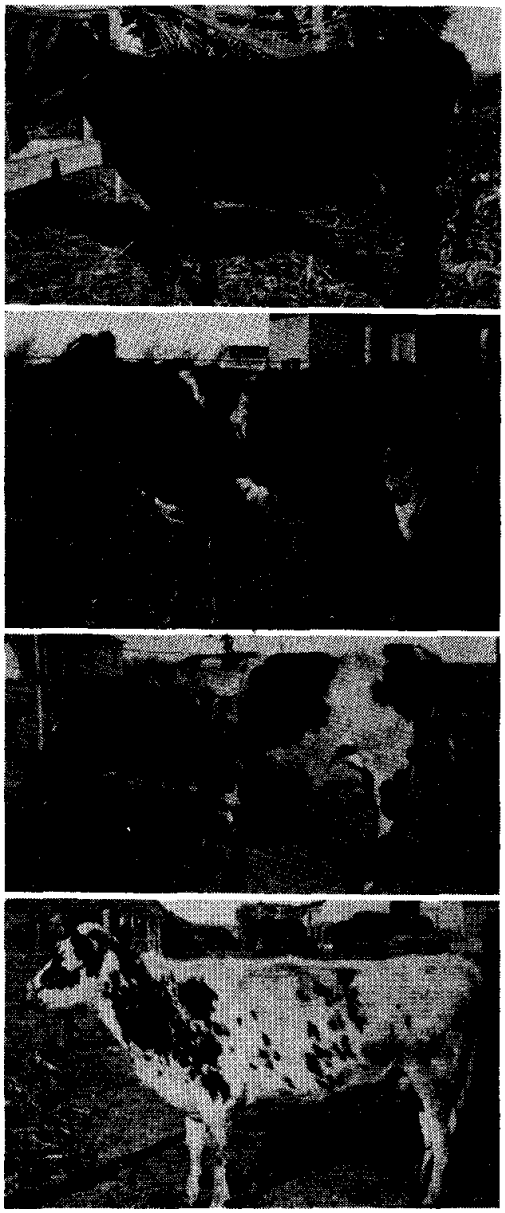


Fig.24.--Four of the foundation cows of the dairy project. "They were about average cows compared with the farm dairy grade cows of the period."

7.Coles, E. H., Colby Branch Experiment Station Annual Report, 1930, . .

Fig. 25.---· The dairy herd in 1930. "It was composed of 12 cows, eight heifers, six calves, and the herd bull, Fair Fields Arab."

effect of selection. The lower-producing grade cows have been eliminated from the herd while all purebreds have been kept."[8]

By 1945, the herd consisted of 11 grades and eight purebreds with an opportunity to cull purebreds. The average production of the 11 grades was 8,543 pounds of milk and 33.2 pounds of butterfat: of the eight purebreds, 9,939 pounds of milk and 393 pounds of butterfat. By 1954, the size of the herd had been increased to 28 cows, 21 heifers, eight heifer calves, and two bulls. The production of the grade cows for the year averaged 8,958 pounds of milk and 363 pounds of butterfat, and of the pure-

8. Coles, E. H., Colby Branch Experiment Station Annual Report, 1931, p.68.

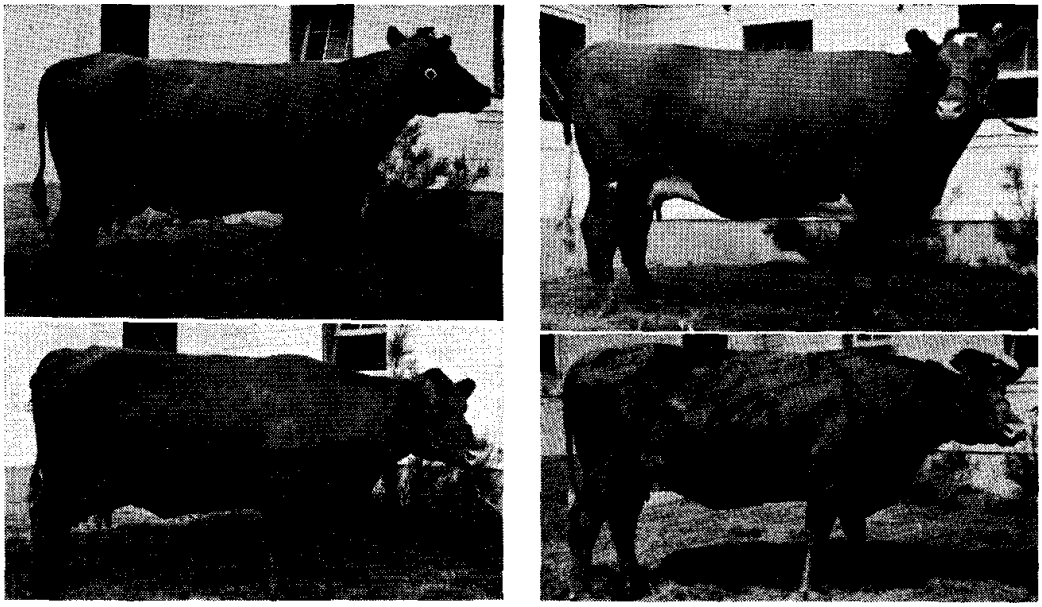


Fig. 26.-Four of the six cows purchased in 1941, to study milk production and feeding ability of the progeny of common farm cows bred to purebred Ayrshire bulls.

breds 10,156 pounds of milk and 399 pounds of butterfat. The dairy project was closed in 1960. By August, 1960, 29 cows, 20 heifers and five heifer calves had been sold, several to the Department of Dairy Science, College of Agriculture, Manhattan.

Breeding Project.--A breeding project was started in 1941 to study milk and butterfat production of progeny of common farm cows bred to purebred Ayrshire bulls. At the same time, feeding ability for beef production was studied, using the male calves produced in the project. Six red cows were purchased, four from J. T. Mold of Little River and one each from Robert Hunter and T. J. Conners of Geneseo. Four of the cows had been bred to Shorthorn bulls; the other two were bred on the Station to the Ayrshire bull, Cacapon Caesar. This study was continued until the close of the dairy project in 1960.

In 1948, the average production of four of the common farm foundation cows in nine lactations was 4,980 pounds of milk and 194 pounds of butterfat. Five of the daughters from Ayrshire bulls in 13 lactations produced an average

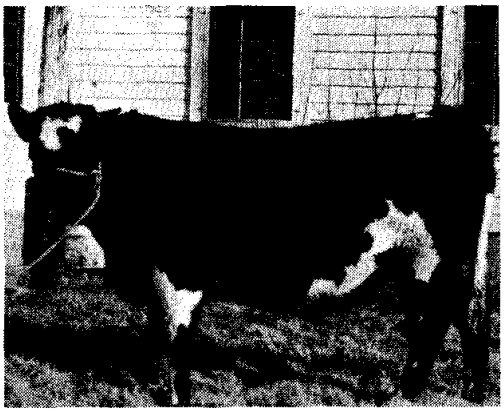


Fig. 27.-A steer from the red cow-Ayrshire cross breeding project. "Bull calves from cows with varying degrees of Ayrshire breeding were castrated and fed for baby beef."

of 8,344 pounds of milk and 319 pounds of butterfat. This was an increase for the daughters of 3,363 pounds of milk and 124 pounds of fat. Production data through five generations (See below).

Bull calves from cows with varying degrees of Ayrshire breeding were castrated and fed for baby beef. They ranged in breeding as calves from red cows sired by Shorthorn bulls through first, second, and third generation crosses to purebred Ayrshires. The following table gives the number of calves of different breeding that were fed, the number of days fed, the average weight at birth, the final weight, the

Red Cow-Ayrshire Cross Breeding Project
Average Production, All of Foundation and Progeny Cows

Generation	Days in milk	Number lactations	Lbs. milk produced	Test	Av. lbs. butterfat
Foundation cows	228	11	5007	3.9	197
1st generation	283	14	8342	3.9	325
2d generation	281	25	8961	4.0	359
3d generation	262	16	7422	4.0	299
4th generation	276	7	8076	4.1	335
5th generation	305	1	7829	4.2	328

Red Cow-Ayrshire Cross-Breeding Project
Baby Beef Feeding Trials

Number calves and different breeding	Number days fed	Av. weight at birth, lbs.	Final weight, lbs.	Total lbs. gained	Av. daily gain, lbs.
2 Grade Shorthorn	390	83	855	772	1.97
4 First Cross	444	79	849	769	1.74
3 Second Cross	530	85	839	854	1.66
1 Third Cross	554	81	900	819	1.48
1 Ayrshire	441	79	825	746	1.70

total pounds gained, and average daily gain in pounds.

Cow No. 29—The cow in the Station herd that gained the most renown, No. 29, was a world's record grade cow that produced over 150,000 pounds of milk in her lifetime on twice-a-day milking under average farm conditions. She was shown in 1935 on the show circuit by the Ayrshire Breeders Association of Brandon, Vermont, at the Topeka Kansas Free Fair, the Kansas State Fair at Hutchinson, the National Dairy Congress at Waterloo, Iowa, and the National Dairy Show at St. Louis, Missouri. At all of these shows, she was the center of the Ayrshire exhibit and was attractively exhibited in a scenic booth. Literature telling of her accomplishments, her production, and her breeding record was distributed to at least 150,000 persons.

No. 29 was a descendant of one of the foundation grade cows purchased in 1915. Her dam had been tested for seven consecutive years and had averaged 6,617 pounds of milk. Her sire was a registered Ayrshire bull, Marquis 2nd's Sir Fearnot. Since No. 29 averaged 11,915 pounds of milk a year for nine years, she had an increase over her dam of 5,289 pounds of milk a year. In 1934, the year before she made the fair circuit, she produced 14,044 pounds of milk and 520 pounds of butterfat. Her lifetime production record follows :

Born January 23, 1922

Freshened	Lbs. milk	Percent fat	Lbs. butterfat
February 20, 1925	8,552	4.22	360.89
June 3, 1926	9,479	3.74	352.01
June 16, 1927	11,740	3.52	425.39
August 5, 1928	10,059	3.87	380.00
October 14, 1929	13,514	3.97	540.47
December 29, 1930	13,246	3.78	495.81
January 6, 1932	13.243	3.84	506.84
February 5, 1933	13,360	3.85	513.48
January 25, 1934	15,537	3.80	583.09
July 29, 1935	14,247	3.98	557.99
May 16, 1937	13,332	3.94	519.28
September 20, 1938	14.080	3.98	552.92
Total	150,389	3.88	5,788.17

Fig. 28.—Cow No. 29. "A world's record grade cow that produced over 150,000 pounds of milk during her lifetime on twice-a-day milking under average farm conditions."

The last full year that No. 29 was milked was 1939. She was milked in 1940 only long enough to bring her total lifetime production to 150,000 pounds. She had failed to breed and in early September, 1940, she was shipped to the College for treatment. She was returned to the Station, and in August, 1941, was destroyed at 19 years of age because of failure to breed, her advanced age, and an injured hip.

Milk.--The milk produced on the Station, for the most part, was sold to Colby residents. In 1919, it was retailed at 9 cents a quart; in 1928, at 12 cents a quart, or four quarts daily for 11 cents a quart. Some milk was sold in quantity to other retailers at 9 cents a quart at the farm. Only during summer months, July to November inclusive, was total production of the farm sold on the dairy route. During other months, the surplus was separated, the cream sold, and the skim milk fed to pigs. During the depression of the 1930's, the price of milk delivered was 8 cents a quart.

A demand developed in Colby for soft curd milk for infant feeding. Samples of milk for each cow in the herd were sent to the College for testing. Two tests were made, one in the spring and the second in the fall. The tests agreed well. They showed curd tension varying from 34 grams to 119 grams, the milk from four of the 13 cows tested only 45 grams or less curd tension. Soft curd milk was recommended by Colby doctors for babies with sensitive digestive systems. The soft curd milk was retailed at 19 cents a quart when general herd milk sold at 8 cents a quart.

The price of milk delivered was 10 cents a quart in 1934, 11 cents in 1935, and 10 cents from 1936 to 1942. By the winter of 1943, the price had increased to 13 cents and thereafter raised gradually to 22 cents in 1959 when the dairy herd was disbanded. The largest receipts from milk and cream in one year were $15,837 in 1956.

WORK STOCK

Horses and mules were the only source of power for field work until 1930. The Station inventory for 1918 shows a pair of black mares for breeding and for work, three work mules, a driving horse, three fillies, and two geldings. All the young stock had been foaled on the Station by the two black mares.

By 1921, the work stock included 15 head, with a second

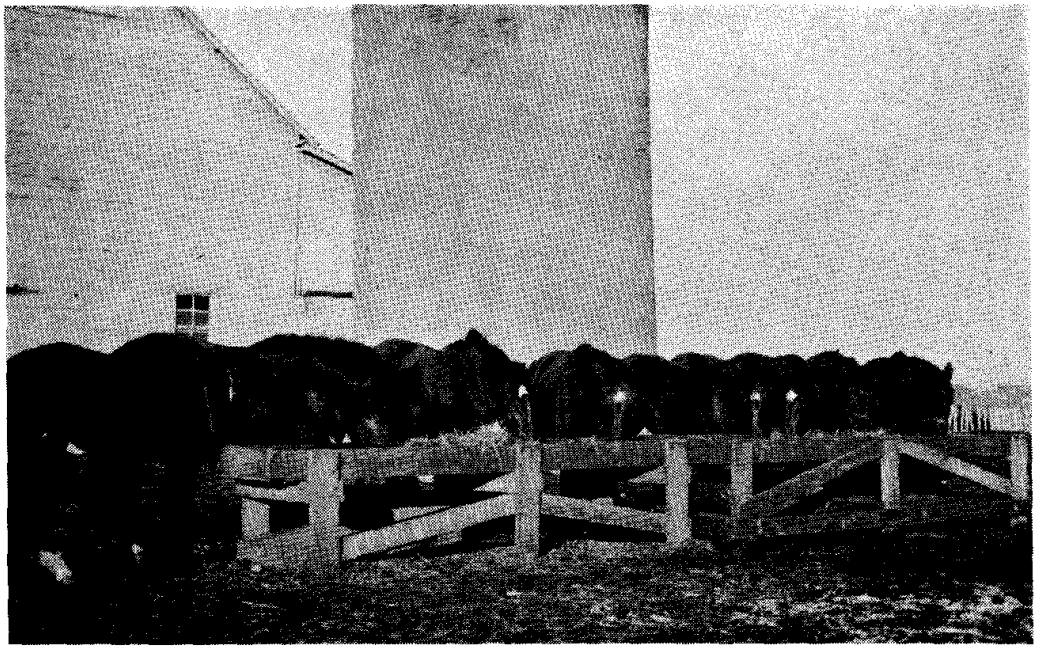


Fig. 29.---The work stock, 1919. "The Station owned a pair of black mares that were used for breeding and for work, three work mules, a driving horse, three fillies, and two geldings. All the young stock had been foaled on the Station by the two black mares."

driving horse for the milk route.

A change from animal to mechanical power began in 1930. A Caterpillar 15 tractor was lent to the Station by the Caterpillar Tractor Company that year but was operated only a few days for lack of tractor - drawn equipment. Both the tractor and tractor-drawn equipment were purchased in 1931. In 1941, a Farmall H tractor on rubber

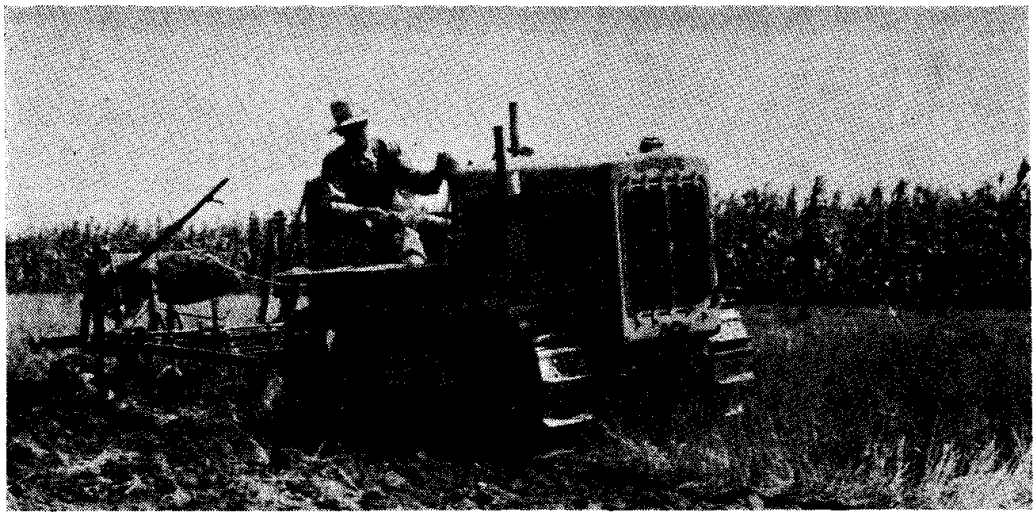


Fig. 30.-"A change from animal to mechanical power began in 1930. The first tractor was used that year. A Caterpillar 15 tractor was lent to the Station by the Caterpillar Tractor Company."

was purchased, and a new Diesel 2 Caterpillar tractor with power take-off, in 1944. In 1947, the old Farmall H tractor was traded for a Farmall M, paying a difference of $767.50. In 1950, a seven-foot, self-propelled Massey-Harris "Clipper" was purchased. In 1953, arrangements were made with the John Deere Company to lease a Model M tractor with tractor-drawn equipment for 10 percent of the cost of the implement.

The Station now leases equipment from five machinery companies as follows:

John Deere Company: BD 1 Model 2010 row crop utility gas tractor, No. 2312 loader, and No. 1881 Model N manure spreader.

International Harvester Company: No. 150, 14 by 10 press drill, Farmall 560 gas tractor; No. 461, 4-R cultivator, No. 314, 3-bottom plow, and 3-point adaptor.

Eversman Manufacturing Company: Model No. 329D land leveler and Model D6 ditcher.

Noble Cultivators Limited: DK4 hoe drill, Basin MN2 blade cultivator, and CI-M24 coulter.

Massey-Ferguson, Inc. : Model 3 0 0 combine.

Leases for tractors are now (1963) being renewed for a second year. At the end of the second year of operation, the implement companies have replaced them with new modern equipment. Some equipment has been purchased after being used on lease a second year. Usually when equipment has been purchased, the Station has been given credit for the rental payments.

Other equipment purchased has been a Shaw garden tractor with attachments: a General Motors Company three-fourths-ton milk delivery truck purchased in 1949; a three-fourths-ton pickup purchased in 1954; a Model F 254 Ford pickup; two three-fourths-ton Chevrolet pickups purchased in 1957 and 1963; two Merry tiller tractors purchased in 1957 and 1962; a Vogel nursery thresher purchased in 1952; Gehl ensilage cutter purchased in 1963; and numerous pieces of other cultivating and harvesting equipment purchased since 1940.

Much of the older equipment, such as a Diesel 2 Caterpillar purchased in 1944, the Farmall M tractor purchased in 1947, and the Massey-Harris "Clipper" combine purchased in 1950, is still in use.

As mechanical equipment was secured, animal power was gradually replaced with mechanical power. Three horses were sold in 1931. Another team of horses was sold in 1936. Others have been disposed of gradually until about 1940 when the Station became practically mechanized.

SWINE

When the dairy was started in 1915, a supply of skimmed milk became available. Five shoats were purchased in 1917 to utilize the milk. An inexpensive hog house, large enough to accommodate four brood sows and their litters, was built in 1919. The building was 12 by 32 feet and cost about $250 for material and about the same for labor.

Swine were kept only to utilize the skimmed milk produced by the dairy. Consequently, the number of sows bred was limited to from two

Fig. 31.—"An inexpensive hog house, large enough to accommodate four brood sows and their litters, was built in 1919."

to four a year. Two litters were usually produced each year, one in the spring and the other in the fall. Purebred registered Duroc-Jersey boars were purchased, and from two to four of the better sows were retained each year for breeding. A few young sows were sold to 4-H Club boys and girls. Those not sold for breeding purposes were fed and marketed as fat hogs.

In May, 1929, nine registered Duroc-Jerseys were purchased from the Fort Hays Branch Experiment Station.

The superintendent of the Station, in 1930, reported as follows regarding the swine project : "It is felt that a small herd can be maintained at the Station at a profit. They have proved an efficient means of converting waste feed, such as skimmed milk, screenings, et cetera, into a salable product. It is planned to keep not more than four brood sows. The hogs have attracted considerable attention by visitors. By keeping the papers up on them, several can be sold for breeding purposes."[9]

Only Duroc-Jersey swine were kept until 1957 when two Tamworth gilts were purchased from Dr. Frank Flipse, D.V.M., Colby, Kansas. One Tamworth gilt farrowed in the spring of 1958. In 1959, one Duroc sow and four Tamworth sows farrowed in both the spring and fall. A Yorkshire boar was purchased in October, 1960. In April, 1962, a Hampshire boar was purchased. Boars of various breeds were purchased for crossbreeding purposes, and the swine project enlarged and increased in importance. As of July 1, 1962, the number of swine on the Station consisted of one boar, six sows, and 40 shoats. Receipts from the sale

9. Coles, E. H., Colby Branch Experiment Station Annual Report, 1930, p. 69.

of hogs during the years have varied from $120 in 1921 to $3,394.68 in 1962.

SHEEP

When the dairy project was discontinued in 1959, a sheep project was started with 151 southwest fine wool yearling ewes secured May 4 from Del Rio, Texas. Six Hampshire rams were purchased at the Kansas Purebred Sheep Breeders Association sale at Hutchinson, Kansas. The objective of this project was to determine the value of different management practices, types of pastures, feeds, feed additives and combinations in maintaining a commercial ewe flock, and fattening suckling lambs for spring market.

Objectives of four studies initiated in 1959 were: (1) To determine the effect of different rations during the flushing period on the rate and earliness of lambing; (2) to determine lamb birth weights and lambing problems as affected by prelambing rations; (3) to compare lamb gains when nursing ewes are maintained on rye pasture and drylot feed; and (4) to determine the advisability of vaccinating suckling lambs against enterotoxemia followed later with a bacterin.

Major attention since 1959 has been on the effect of feed during flushing on the rate and earliness of lambing.

The superintendent of the Station in 1962, reporting on results, wrote as follows: "As one looks over the results obtained for the past three years, they have not for the most part been consistent. . . . Buffalograss without grain supplement has been consistently good for all three years in percent lamb crop produced. On the other hand, buffalograss supplemented with one half pound of grain per ewe per day was considerably lower, which does not seem logical. However, it was observed that ewes receiving the grain supplement on buffalograss did not graze as much and remained near the feed bunks a great deal of the time. . . .

"Indications are that when good adequate pasture is avail-

Fig. 32.---Sheep grazing sudangrass. "When the dairy project was discontinued in 1959, a sheep project was started."

able, feeding extra grain does not appear to be an advantage in flushing; on the other hand, if pasture is not adequate, some grain supplement will be necessary to secure sufficient flushing gains. In general, results have indicated an association between weight gained during the flushing period and early lambing but it has been less evident as ewes increased in age. The information to date further points out that a number of feed combinations will produce similar results, and each individual operator should make maximum use of those feeds available on his farm and those that may be the most economical balanced feeding ration under his conditions.

"In checking the lambing data against the period in flushing, using 148 days as a gestation period, it was found that between 25 and 40 days of flushing, 49 percent of the ewes conceived in 1959; 54 percent conceived in 1960; and 63 percent conceived during that period in 1961. On the average for the three years, 17 percent conceived later than 40 days after flushing started. It then appears that 40 days might be reasonably close as for the number of days that ewes should be flushed."[10]

THE ORCHARD

The 10-acre fruit orchard on the north end of the farm west of the farm buildings when the Station was purchased was surrounded by a windbreak of a row each of Redcedar, Honey Locust, and Russian Mulberry trees. The windbreak occupied about three of the 10 acres. In the orchard were 11 rows of apple trees, five rows of sour cherries, two rows of peaches, two rows of plums, one row of pears, and a few apricot trees. The orchard was in poor condition due to dry weather, sun-

10. Banbury, Evans E., Colby Branch Experiment Station Annual Report, 1962, pp.

Fig. 33.---The Station orchard in 1918. "The Station orchard was surrounded by a windbreak of a row each of Redcedar, Honey Locust, and Russian Mulberry trees. The windbreak occupied about three acres, leaving about seven acres in fruit trees."

scald, and insect damage. Considerable replanting was necessary. During the first year (1914), the only fruit produced was cherries. They were excellent quality: 328 quarts sold for $28.70 besides furnishing fruit for table use.

The orchard was badly damaged by hail the summer of 1917. The hail stripped bark from the smaller limbs and killed many branches back two or three feet from the tips. The dead branches were heavily pruned; the following summer (1918) was unfavorable because of high winds and light rainfall, and many of the trees died. The superintendent, commenting upon the condition of the orchard at that time, wrote: "No orchard under these conditions can be made a success commercially, but, since the object in keeping up the orchard is not to make money but to demonstrate that trees of the right kind can be made to grow here if given proper care, the work on the orchard will continue and will be extended to include some small fruits and group planting of trees."[11]

So few fruit trees remained in good condition that all were gradually replaced with young ones. By 1930, the old trees had been removed on the east half of the orchard and replanted to cherries and plums. Several varieties of Hansen hybrid plums--Sapa, Opata, Waneta, and Hanska–were planted. Early Richmond and Montmorency were the principal cherry varieties planted; although a few Black Tartar-

11. Bayles, John J., Colby Branch Experiment Station Annual Report, 1918, p. 19.

Fig. 34.-Cherry trees damaged by hail. "The orchard was badly damaged by a hailstorm that occurred in the summer of 1917. The hail stripped the bark from the smaller limbs and killed many of the branches two to three feet from the tips."

ian, English Morello, and Compass were added.

Climatic conditions were so severe during the early part of the 1930's that all trees had difficulty in surviving. During the early winter of 1935, all of the apple, pear, peach, and cherry trees on the west side of the orchard were grubbed out–by people in Colby who were willing to do the work for the fuel. These trees were either dead or in poor condition. The area cleared was summer fallowed during 1935 in anticipation of starting a cooperative experimental orchard with the Cheyenne, Wyoming, Horticultural Field Station of the United States Department of Agriculture, when moisture conditions became favorable. The area was summer fallowed through 1935, 1936, and 1937. A top dressing of barnyard manure was made in 1936 to supply organic matter to replace that which had been depleted by continuous cultivation. Conditions did not become favorable for planting until 1938. At that time, a memorandum of understanding between the Colby and the Cheyenne Stations was signed and the new orchard planted May 9 and 10, 1938. The plantings consisted of duplicate plantings of three rows and 17 varieties of apples ; two rows and seven varieties of pears; two rows and five varieties of apricots: and three rows and eight varieties of plums. All trees were spaced 40 feet apart in the row, with 30, 35, and 40 feet between the rows. Additional plantings of one variety of apples, 11 varieties of pears, 10 varieties of apricots, and 12 varieties of plums were made in 1939; and 11 varieties of apples, two of pears, seven of apricots, and 12 of cherries were made in 1940.

The Armistice Day freeze November, 1940, severely damaged the orchard. It killed nearly all the old cherry trees and damaged older trees of other fruit more than the younger trees. Replacements of dead trees were made, and in 1942 practically the entire orchard space had been planted. However, by 1948, mortality among trees necessitated replanting 11 apple, nine cherry, six peach, two apricot, and two plum trees. Replacement plantings were made again in the spring of 1956 and 1958. Plantings in 1956 consisted of 10 apples of four varieties; nine peaches of three varieties; nine plums of three varieties; and 15 cherries of four varieties. It has been necessary to make only a few replacements since 1958.

Some of the hazards encountered in fruit production and the probability of producing successful crops of fruit in northwestern Kansas may be judged by the production record at the Station since cooperative work was started with the Cheyenne Station in 1938. Yearly records as reported by the superintendent of the Colby Station have been as follows:

1939.-- Tree plantings in 1938 made a fair growth in spite of a severe season and

some damage by grasshoppers and rabbits.

1940.--Trees in the old cherry orchard produced a fair crop of fruit. Some of the plum trees planted in 1938 were heavily laden with fruit, most of which was picked before ripening to keep the branches from breaking.

1941.--Most young trees in the orchard withstood the Armistice Day storm and came through the winter in good condition. Nearly all the young trees made an excellent growth during the summer. Some of the young plums produced fruit that was nearly all eaten by birds.

1942.--The season was a favorable one for growth of young trees. Some young apricot trees blossomed, but practically no fruit set. Some of the trees leafed out and then died, principally the result of the freeze the fall of 1940. Most of the young plum trees set some fruit.

1943.--Practically no fruit was produced on any of the trees. Blossoms of several apparently were killed by late frost.

1944.--All trees made an excellent growth but fruit produced was sparse except for plums. The Opata trees planted in 1938 produced 1 1/2 bushels of fruit. The Sapa tree planted in 1939 produced three pecks.

1945.--No fruit was harvested. Warm weather in March hastened blossoms, which later cold weather killed.

1946.--Most fruit trees in the orchard are now large enough to bear. Most varieties of cherries blossomed heavily and a good crop of fruit set, but most of the fruit fell off the trees before ripening. A good crop of Hansen plums was produced. A few scattered apples were found on some of the larger trees.

1947.--Most of the trees blossomed heavily but a late freeze killed many of the apple and apricot blossoms. An early apple, Anoka, was the heaviest producer. Some pear varieties had a heavy set of fruit, but much of it fell before it matured. Cherries were the most nearly satisfactory. All varieties of cherries produced in abundance. Hansen plums produced well.

1948.--Many of the fruit trees blossomed heavily but a late frost killed practically all. Even cherries produced no fruit.

1949.--A hail storm June 27 destroyed what had promised to be a good fruit crop, so practically no fruit was produced.

1950.--Little fruit was produced this season. Most of the older trees blossomed heavily in the spring, but the 22° F. temperature April 30 killed most of the blossoms.

1951.--Above - normal precipitation in May, June, and July favored growth and production of fruit. The largest apple crop ever harvested was produced. Average apple yields per tree were: Haralson, 11.5 bushels; Cortland, 5 bushels; Yellow Transparent, 4.25 bushels; Jonathan, 1.75 bushels; and McIntosh, 15

bushels. Three bushels of small pears were produced on the Sudduth trees and 2 bushels on the Mendel. Cherry and plum crops were poor. Cherries were injured by leaf spot and many Hansen hybrid plum trees have died.

1952.--Practically no fruit was produced because of a combination of frost damage at blossoming time and drouth. High temperatures of early June "cooked" the fruit (cherry and plum) on the trees.

1953.--A killing frost May 13 (26 deg. F.) destroyed most fruit blossoms; even sour cherries and plums that usually do best failed.

1954.--No fruit was produced. Some fruit set on apple and pear trees, but high June and July temperatures dried it on the trees.

1955.-All fruit trees blossomed heavily. Two peach trees produced fruit--for the first time since the cooperative project was started in 1938. Cherries did well and plums produced some fruit. Pears and apples set a fair amount of fruit and some matured despite a late summer drouth. Pears appeared to withstand the drouth better than apples.

1956.--Many of the trees set fruit well, but it fell off early for lack of moisture and wind. The most nearly satisfactory early apples were Yellow Transparent and Anoka; late varieties, Haralson, Cortland, and Secor. Dolga and Florence crabs have been rather consistent yielders.

1957.--This was one of the most favorable years for fruit production. All fruit escaped frost, as the last killing frost occurred April 14. The top yielding apple varieties were Haralson, Cortland, and Anoka. The highest yielding pear trees were Parker, Sudduth, and Mendel. Apricots failed, and the highest yielding peach variety was Mayflower. Cherries and Hansen hybrid plums are short-lived trees. Very few remain in the orchard. They have been the most consistent producers in past years.

1958.--The last killing frost was April 28, and all fruit except apricots escaped damage. Quality of the fruit harvested was severely damaged by a hailstorm July 3.

1959.--With the last killing frost April 22, apples, pears,

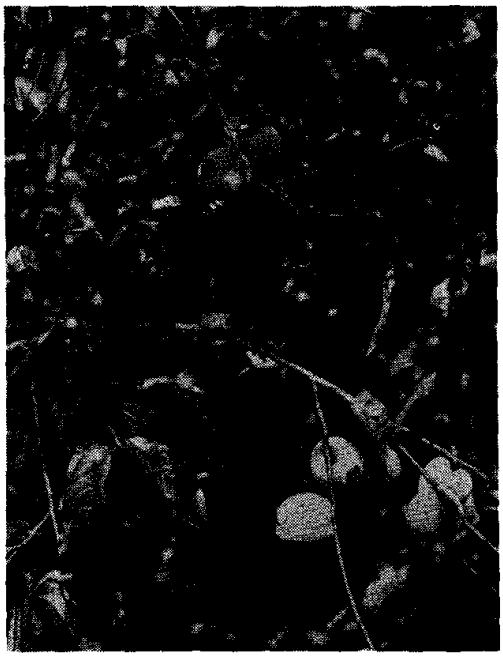


Fig. 35---"Two peach trees produced in 1955. This was the first time that peaches had been produced since the cooperative project was started in 1938."

cherries, and plums escaped serious frost damage three successive years. Peach buds were killed by low temperatures during the winter and most apricot blossoms were killed by the April 22 freeze.

1960.--All apricot blossoms and a high percentage of the cherries and plums were killed by the April 30 freeze of 28 deg. F. Most apples and pears escaped and yields were good. The highest yielding apple (Ames) produced 935 pounds of fruit, and the highest yielding pear (Sudduth), 788 pounds of fruit.

1961.--The quality and yield of fruit produced this year were generally poor, due chiefly to a severe hailstorm May 31. Highest yielding apple varieties were Dolga, Haralson, Anoka, Patten, and Yellow Transparent; highest yielding pear, Parker.

1962.--Fruit yields were good for most apple, pear, plum, and cherry varieties. Most of the peach buds were killed by low temperatures in February and apricot blossoms were killed in early April when temperatures fell to 15° F. Highest yields of fruit for the season were from Ames, Yellow Transparent, and Cortland varieties of apples; and the Ming, Parker, and Sudduth varieties of pears. Highest yielding varieties for six years, 1957 to 1962, have been:

Varieties	Average annual pounds per tree
Common Apple	
Haralson	540
Ames	401
Cortland	245
Yellow Transparent	238
Crabapple	
Florence	273
Dolga	264
McIntosh (sweet)	197
Pear	
Sudduth	390
Parker	379
Mendel	215
Ming	187

Fig. 36.---Well-developed apricot trees in 1960. "All apricot blossoms and a high percentage of the cherries and plums were killed by the April 30 freeze of 28°F."

The experience at the Colby Station with tree fruit extending over nearly a half century has not been such as to encourage fruit production either from the commercial standpoint or for home use. Low winter temperatures and late spring freezes preclude the possibility of successful apricot and peach production, at least with present varieties. Frequent hailstorms and long periods of drouth during the growing season preclude the possibility of producing other tree fruits successfully much of the time. The most dependable tree fruits have been sour cherry and the Hansen hybrid plums. These trees are short-lived, seldom remaining productive more than 10 years. While a few sour cherries and plum trees might be planted in home gardens of northwestern Kansas, it would appear wiser to direct the care and attention that must be given to make such plantings successful to the growing of shade trees, ornamentals, and other plantings for beautification.

GRAPES

Two vines of each of 20 varieties of grapes were planted at the Station in April, 1927, with planting stock from the Woodward, Oklahoma, Field Station of the United States Department of Agriculture. This planting was one of several being made by the Woodward Station to determine the adaptability of grapes to the climatic conditions of the Great Plains. Of the 40 plants set, 10 failed to grow and were reset in 1928. Four others that lived through 1927 failed to grow in 1928 and were replanted in 1929. During the 1929-30 winter, all grapevines were killed to the ground. Most varieties recovered and made satisfactory growth but produced no fruit.

Fig. 37.—The vineyard. "Two vines each of 20 varieties of grapes were planted in 1927. The planting stock was furnished by the Woodward, Oklahoma, Field Station of the United States Department of Agriculture."

In fact, no fruit was produced during the first seven years. In 1935, a fairly heavy crop of grapes set on the vines, but a drouth in July dried them up so that no edible fruit was harvested. An unsuccessful attempt was made to avoid winterkilling by allowing the vines to grow on the ground instead of training them on trellises. While the grape arbor was maintained until the 1940's, no satisfactory crop was produced. It appears that no variety has been developed yet that is sufficiently hardy to withstand northwestern Kansas winters.

STRAWBERRIES

Strawberries have been the most dependable fruit grown at the Station when water has been available for irrigation. They were grown first in the home garden of the superintendent in 1931 when 100 plants of mixed varieties and 100 plants of Champion strawberries were planted. Under irrigation, they made satisfactory growth. Experimental plantings were started in the 1940's and the strain of North Platte No. 8-9-12 was added in the fall of 1949. A dozen potted plants were set September 29, too late to bear in 1950. In 1951, varieties under test consisted of Cheyenne Nos. 1, 2, and 3; North Platte No. 8-9-12, and Gem. Two new varieties were started, Sioux supplied by the North Platte, Nebraska, Experiment Station, and Red Rich, purchased from a commercial company. The Ogallala variety was started in 1953. By 1958, the varieties under test consisted of 10 June bearing types and five everbearing types. Average yields for the two years, 1959 and 1960, in quarts an acre of the better varieties follow:

Varieties	Average quarts an acre
June Bearing	
Pocahontas	4,645
Ardmore	3,804
Paymaster	3,606
Surecrop	3,020
Everbearing	
Ogallala	6,052
Superfection	2,552

Other varieties that had done well in other years among the June bearing were Plentiful and Dixieland, and among the everbearing, Gem and Arapahoe. The superintendent of the Station wrote about the strawberry work as follows: "The practical strawberry for the average home garden should be of the everbearing type. . . . Strawberries are perhaps the most practical and the surest fruit we can recommend in this area. Cherries are the next surest fruit producers." [12]

WINDBREAKS AND ORNAMENTALS

When the farm was purchased for the Colby Station, a seven-year-old windbreak was part of the l0-acre fruit orchard. This planting consisted of three rows of trees: one of Russian Mulberry on the outside, one of Honey Locust in the center, and Red-

12. Coles, E. H., Colby Branch Experiment Station Annual Report, 1960, p.19.

Fig. 38.---A Western Yellow Pine windbreak. "In 1932, two rows of pine trees were set just south of the south cedar windbreak."

cedar on the inside. The trees were small then and had been damaged by soil blowing and wind. As trees in the windbreak died, replacements were made. In the original plantings, a row of fruit trees was planted 20 feet from the row of cedars in the windbreak. This proved to be too close. In later plantings, 40 feet were allowed. In 1932, two rows of pine trees were set just south of the south cedar

Fig. 39.---Snow drifted behind the orchard windbreak. "A severe snowstorm caused snow to drift behind the windbreak so that many of the fruit trees on the two north side rows of the orchard were completely covered. The snow broke many of the limbs and completely destroyed some of the trees."

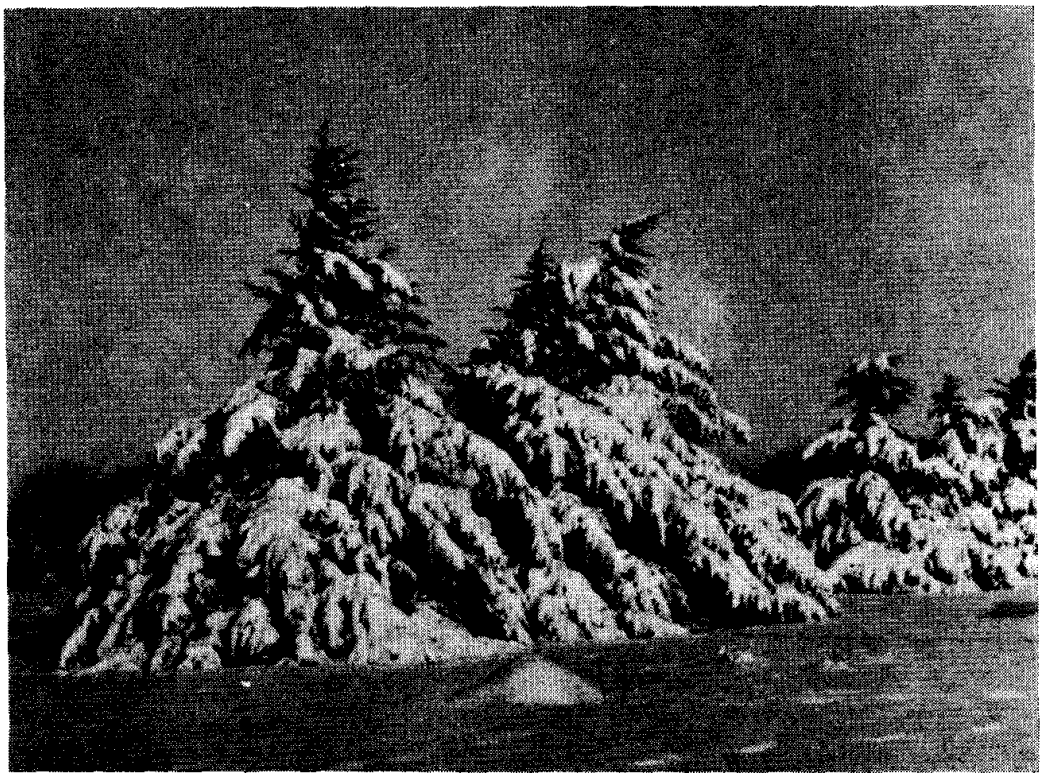


Fig. 40.---Redcedars with orchard in background. "Redcedar grows slowly. It is hardy and long-lived and will withstand severe wind and hailstorms."

windbreak. The north row was Western Yellow and the south row Austrian pine. A row of Western Yellow pine was also set west of the west cedar windbreak. In 1940, 30 small Western Yellow pine trees were used to fill in the vacancies in the south and west windbreaks: and in 1941, 65 Western Yellow pines were used as a second row of pines on the west side of the orchard. Also, 100 Scopulorum cedar trees were set along the north side of the north windbreak. A severe snowstorm and blizzard November 17, 1948, caused snow to drift behind the windbreak so that many of the fruit trees on the two north side rows of the orchard were completely covered. The snow broke many of the limbs and completely destroyed some of the trees. Few trees in the remainder of the orchard showed damage. It appears from this experience that fruit trees should not be planted closer than 80 to 100 feet south of an orchard windbreak in northwestern Kansas.

The orchard windbreak has been maintained in good condition by replacing dead and damaged trees.

Trees and shrubs for ornamental plantings were started in the early years of the Station, with first plantings in 1919 of 100 Redcedars and 50 Chinese Elms. Redcedars grow slowly but are hardy, long-lived and withstand se-

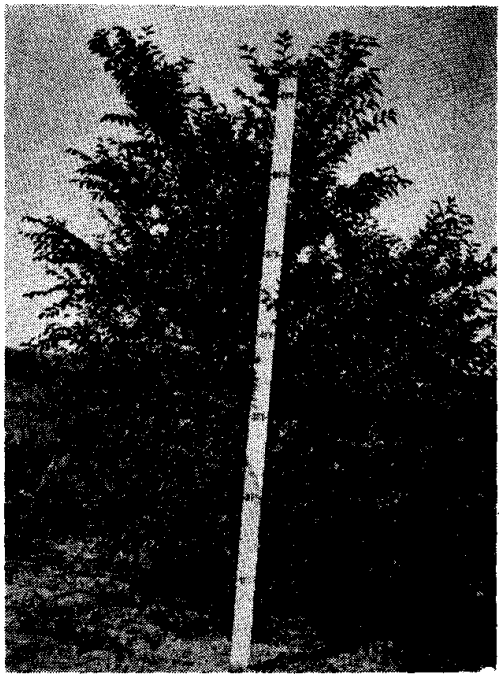


Fig. 41.---A Chinese Elm three years old. "The Chinese Elm, which had been introduced recently, appeared at the time to be one of the best trees for western Kansas."

vere wind and hailstorms. The Chinese Elm only recently introduced at the time, appeared to be one of the best trees for western Kansas.

The first extensive planting, following a well-developed landscape plan, was made during and immediately preceding 1927. These plantings surrounded the superintendent's cottage, went north and east and around the farm residences. On the west, they joined the windbreak plantings surrounding the orchard. Many kinds of both trees and shrubs were used, which afforded an opportunity to determine those adapted to the region and created a most attractive setting for the Station buildings.

In 1931, a windbreak of three rows of pine trees was planted north of the machine shed. Western Yellow pines were planted on the outside rows, Austrian pines in the center. The Western Yellow pines grew well, but a high percentage of the Austrian pines died and were replaced in 1932.

The Cheyenne Horticultural Field Station in 1936 supplied five specimens each of 29 different kinds of shrubs. These were planted in nursery rows where they could be irrigated. Many species were unable to withstand the climate. Of those that survived, several were transplanted around the residences and other farm buildings. Among those surviving were Dwarf Caragana, Chokecherry, False Goldenrod, Amorpha, False Indigo, Mountain Maple, and Boz Birch. A two-acre nursery of shrubbery plantings. was started in 1949 to provide stock for general landscaping: 149 plants of 16 different species were planted. Among them were Polish privet that had proven to be a good hedge plant.

A project in cooperation with the regional Plant Introduction Station, United States Department of Agriculture, Ames, Iowa, known as NC-7 was started in 1954. Under this project, trees and shrubs for study on a regional basis were supplied. Twenty-one varieties were planted the first year. Five plants of three varieties that died were replaced the next year. By 1960, the number of trees and shrubs under observational testing in

the cooperative study had increased to 127 species.

Some of the shrubs found to be satisfactory over a period of years are: Peking Cotoneaster, Tartarian Honeysuckle, French and Common Lilacs, Caragana Pygmy, Mentor Barberry, Vanhoutte Spirea, and Eunonymous Patens. Others that have survived well are Buckwheat Bush, Wild Olive, Skunk Bush, and Rocky Mountain Maple. Among the evergreen shrubs that have done well are Andora Juniper, Pfitzer Juniper, and Mugho Pine. Satisfactory hedge plants have been Polish and Amur River (north) privets. For shade trees, Hackberry has been one of the best, although it grows slowly. Others that have done well are American Elm, Moline Elm, Chinese Elm, Russian Olive, and Honey Locust (thornless).

FLOWERS

While flowers have been grown to beautify the Station grounds, and zinnias found to be hardy and well adapted, the only flower under close observational study has been the chrysanthemum. In 1941, the Cheyenne, Wyoming, Horticultural Station, United States Department of Agriculture, supplied roots of five plants each of 63 varieties of chrysanthemums. They were planted May 7 on an area immediately north of the lawn of the superintendent's cottage. The rows were 42 inches apart with plants spaced 24 inches apart in the row. Of 328 roots planted, 251 produced plants that grew to maturity. The earlier varieties started blooming the last week in September, and from that time until the freeze of early November they were a succession of attractive flowers. The project has attracted many visitors from a large area–even into Nebraska and Colorado.

Starting in 1950, floral work has been in cooperation with the North Platte, Nebraska, Branch Experiment Station with many new varieties supplied by that Station. Chrysanthemum plantings have

Fig. 42.---Flowers in a formal garden at the rear of the superintendent's cottage.

been made annually since 1941; 600 plants were grown in 1947, and 59 different varieties in 1962. During the 22 years that chrysanthemums have been grown, good to excellent flowers were produced 11 years; fair flowers, seven years; and poor flowers, only four years. Poor flowers have been caused by hail, by plants blooming too early and being damaged by heat, by early severe freezes, and by winterkilling. The 22 years' experience shows chrysanthemums to be one of the better types of flowers for northwestern Kansas.

LAWNS

Lawns of bluegrass and buffalograss have been maintained around the farm residences since the early years of the Station. Bluegrass has been grown successfully when irrigation water was available. In 1932, buffalograss sod was cut in the pasture and planted around the teamster's and dairyman's dwellings. The grass grew well and made a satisfactory lawn. Since then buffalograss has been depended on for lawns where water was not available for irrigation.

The first experimental work with lawn grasses was undertaken the spring of 1956. Six warm-season and nine cool-season grasses were planted, followed by a seventh warm-season grass in 1957 and three additional warm - season grasses in 1958. Each variety was maintained in plots six feet wide and 40 feet long with one foot between varieties. All plots were irrigated. Various commercial fertilizers were applied experimentally, with iron sulphate and sulphur used to control chlorosis.

After seven full seasons,

Fig. 43.---A bluegrass lawn at the Station. "Bluegrass has been grown successfully when water for irrigation was available."

Kentucky and Merion bluegrass continued to be the most desirable cool-season grasses. The stands, after seven years, of Kentucky Fescue 31, New Zealand Fescue, Fairway and Crested Wheatgrass, Turkish Crested Wheatgrass, Perennial Ryegrass, and Highland Bentgrass plots are 50 percent or more bluegrass. Among the warm-season varieties, U-3 and Uganda Bermuda grasses maintained nearly pure stands from 1956 to 1961. However, U-3 winterkilled approximately 40 percent during the 1961-62 winter, and Uganda 80 to 85 percent. Both recovered fairly well during the 1962 growing season. Emerald Zoysia, planted in 1958, was abandoned due to its slow spreading habit. Meyer Z-52 Zoysia appears to be one of the better warm - season grasses when chlorosis, to which it has been susceptible, is not a serious problem.

During 1959, the entire lawn grass plot area was set up to observe various fertilizer treatments. After four full seasons of fertilizer comparisons, 10 pounds of ammonium sulphate and 10 pounds of iron sulphate per 1,000 square feet, in early April and again in early September, each season has been equal or superior to other treatments.

DRYLAND AGRICULTURE INVESTIGATIONS

The Division of Dryland Agriculture of the United States Department of Agriculture early in this century established in the Great Plains area a number of experiment stations to study crop adaptation, the effect of different cultural methods, cropping systems, and other practices

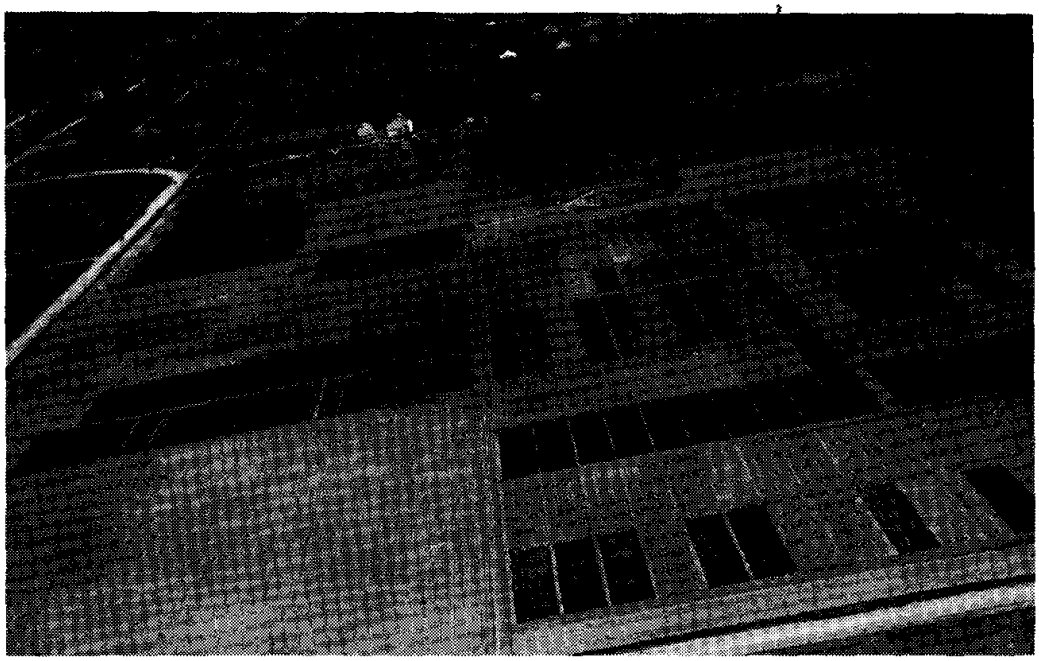


Fig. 44.—Aerial view of the dryland agriculture plots. The Station farmstead and the town of Colby are in the left background.

adaptable to conditions in the area. These stations were of great value in determining crops that could be grown successfully and the methods best suited to producing them. Two of these cooperative stations had been started in Kansas before the Station at Colby was established, one at the Fort Hays Branch Experiment Station and the other at the Garden City Branch Experiment Station. When the Colby Station was established in 1914, arrangements were made to establish immediately a third such station there.

Mr. J. B. Kuska, a graduate of the College of Agriculture, University of Nebraska, who had been raised on a farm in the Great Plains, was employed by the United States Department of Agriculture in charge of the project. The Office of Dryland Agriculture paid the salary of the project leader and the Station provided the land, equipment, and most of the labor. Mr. Kuska joined the staff of the Station at its start in 1914 and served, except for a few years, as project leader until the termination of the support of the project by the United States Department of Agriculture in 1951. His firsthand knowledge of farming practices in the Great Plains, his good judgment, energy, and enthusiasm were in large measure responsible for the success of the work.

The superintendent of the Colby Station when Mr. Kuska retired in 1951 wrote: "Joe Kuska was a loyal and painstaking research worker. His accomplishments form an excellent monument of a worthwhile job well done."[13]

The experimental work in dryland agriculture consisted of study of cropping systems, tillage practices, and cultural methods for dryland farming. The first experimental plots were laid out for the 1914 year on land, according to the best information available, that had been broken out of buffalograss sod, first by plowing about 1885. The land was permitted to go back to sod in the early '90's and was broken again in 1905. It had been

13. Coles, E., H., Colby Branch Experiment Station Annual Report, 1951, p. 7.

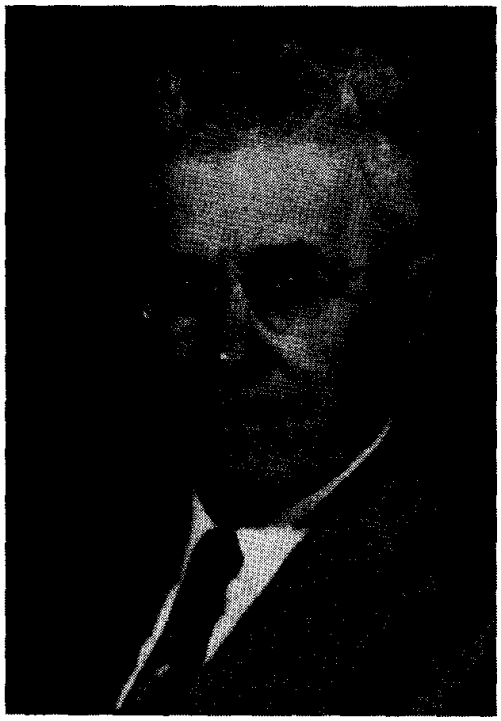


Fig. 45.—Joe B. Kuska, dryland agriculturist, 1914-1951. Mr. Kuska joined the staff of the Station at its start in 1914 and served except for a few years until 1951. "His accomplishments form an excellent monument of a worthwhile job well done."

damaged to some extent by soil blowing.

One hundred sixty plots were laid out in 1914. Other plots were added later until 294 plots were devoted to the work when the project closed in 1951. The plots were two by eight rods or one tenth acre. They were separated by four-foot alleys and at the ends by 20-foot roadways. The alleys were cultivated and kept free of vegetative growth. Standard recommended varieties of each crop were grown. The same variety was planted on all plots of a given crop in any one year. Improved varieties were substituted whenever seed became available.

Cropping Systems

The work embraced cropping systems with winter wheat, spring wheat, milo, barley, oats, corn, and some minor crops. Summer fallow was introduced into some of the cropping systems. Crops were grown both continuously and in alternate fallow cropping systems.

Winter Wheat.--Since winter wheat was the most important crop of the region, more than half the plots were devoted to it. The rotations started in 1914 had 30 plots of winter wheat on fallow, mostly in rotation; two continuously cropped winter wheat plots using different tillage methods; one plot after corn in 80-inch rows; and one plot on green-manured land. In 1920, 1932, and 1939, other plots were added. The work in 1932 was added to provide further information: (1) On the effect of different implements and times of commencing tillage on yields of winter wheat grown each year; (2) more comprehensive tests of methods of fallow; and (3)

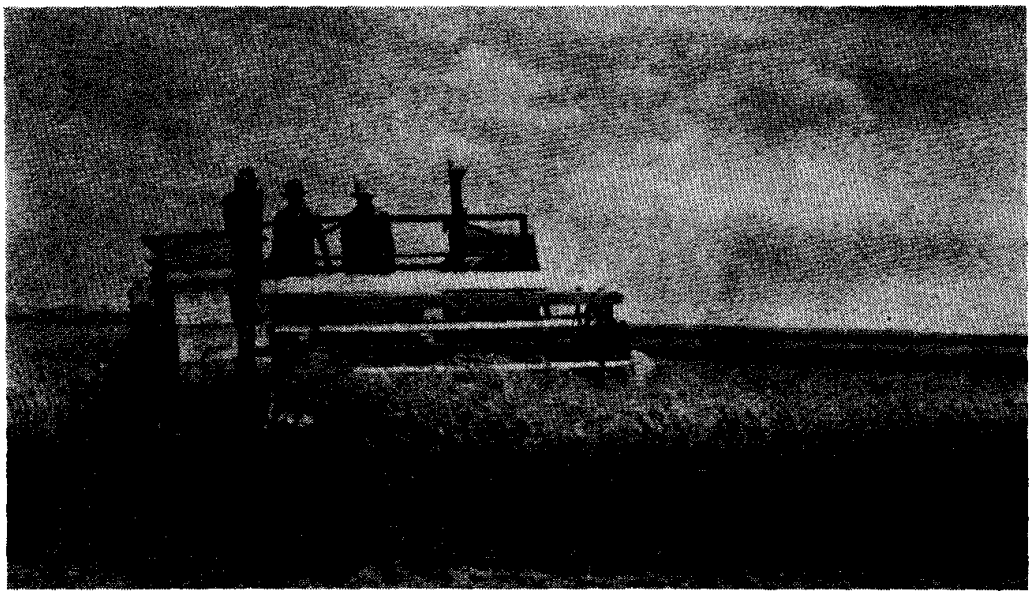


Fig. 46.-Combining winter wheat plots. “Since winter wheat was the most important crop of the region, more than half of the plots were devoted to it.”

plots where wheat was seeded in standing cornstalks.

The following are some of the conclusions drawn from the work with winter wheat: (1) The yields of winter wheat on fallow averaged practically double the yields of the best methods on cropland; (2) where winter wheat followed a small grain, there was no significant difference as to treatment; only the plot "stubbled-in" without cultivation gave significantly lower yields: (3) late shallow-plowed continuous wheat yielded more than early fall-plowed continuous wheat; (4) yields of wheat after corn and milo in 40-inch rows were apparently equal to yields after small grain; (5) yields of wheat following corn grown in 80-inch rows were approximately four bushels an acre higher than after corn in 40-inch rows; (6) wheat on bean land produced higher yields than on comparable corn land; and (7) the yield of wheat on land where a green-manure crop of winter rye had been plowed under was higher than on land where any method of annual cropping had been practiced but lower than on fallow.

Spring **Wheat.**—Spring wheat was grown continuously on fall and spring plowing, in rotations, on fall and spring plowing after oats and corn, on disked corn ground, and on fallow. All yields were low compared with those of other crops. Spring wheat is the only crop that did not give a creditable yield on fallow. The crop is not adapted to Kansas conditions.

Oats. — Oats have been grown in rotations and on land continuously cropped.

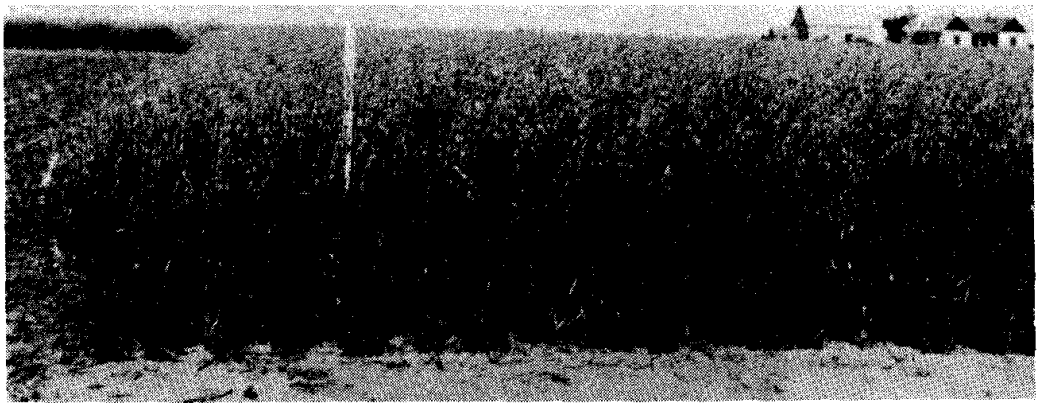


Fig. 7.---Oats on fallow. "Oats do not respond so well to fallow as winter wheat or barley, but complete failures were no more frequent."

Acre yields as an average of 36 years were:

	Bushels
After continuously cropped oats	16.5
After other small grains	15.3
After corn on spring plowing	13.3
After corn on disked corn ground	15.4
After fallow	25.4

Oats do not respond so well to fallow as winter wheat or barley, but complete oat failures were no more frequent than with other commonly grown crops.

Barley.--Barley was grown on eight plots: three in continuous or alternate cropping and five following other crops in rotation. Barley produced more pounds of grain to the acre than oats in all tillage and cropping sequences. It responded strongly to fallow. The margin of difference was much greater on fallowed land than on other methods. It was found that barley leaves the soil slightly less favorable to following crops than does other spring-sown grain.

Corn.–Corn has been grown on 23 plots: continuously cropped; plowed and listed; after small grains; after milo; and after fallow as well as in 40-inch and 80-inch rows. Corn planted on listed ground gave a higher yield, was less subject to complete failure than corn on surface-planted ground; it made a slower early growth and suffered less damage from hot winds and high temperature at tasseling time. Disking or shallow working to kill weeds before planting increased the average yield slightly, provided a better soil condition for listing at planting, and reduced the effort necessary to control weeds. Corn planted in 40-inch rows yielded approximately 50 percent more than corn grown in 80-inch rows. It appeared to suffer less from hot winds, grasshoppers, and hail. Corn in 80-inch rows did not use all available moisture between rows. This resulted in higher yields of milo and wheat after corn from 80-inch than after corn from 40-inch rows. Corn after barley yielded slightly less than after other small grain and much lower than after milo. Corn produced too little after fallow to make fallowing for corn a desirable practice, and it did not decrease the chance of crop failure.

Milo.--Milo was own continuously, after fallow, after green manure, in 80-inch rows, and in rotations. It did not become an important crop until in the 1930's with the introduction of early-maturing, combine types. Before combine milo was introduced, corn had yielded more than milo. The relative yield of milo was greatly increased by the combine type; the quality of the grain was improved; and the cost of harvesting. reduced. Lister planting without previous cultivation produced yields about equal to those of plowing and surface planting. Early disking in absence of lister planting increased yield. Milo did well on fallow. Fallowing more than doubled the

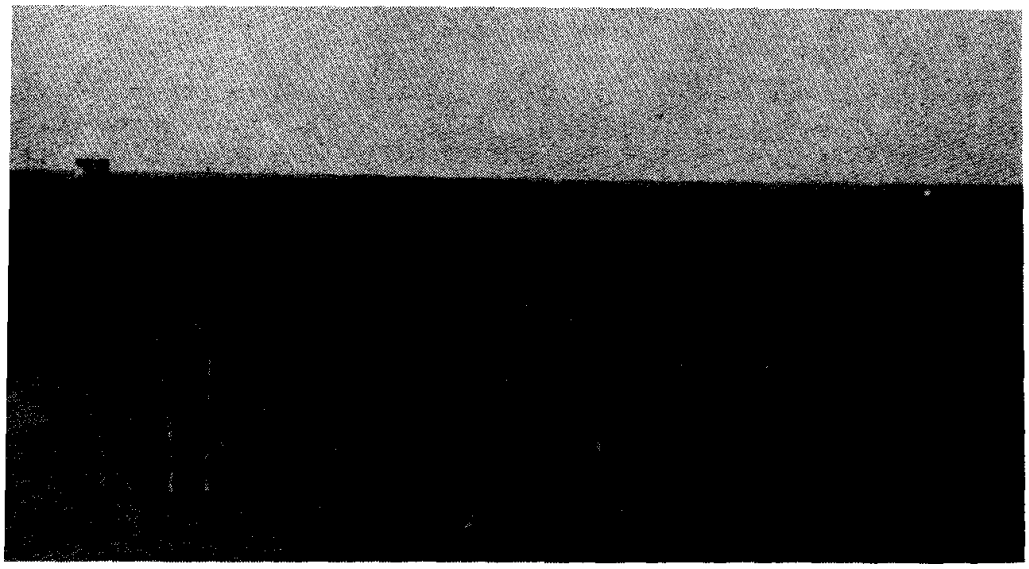


Fig. 48.—Milo was grown continuously and in rotation. "It was not an important crop in the early years of the project, but became important in the 1930's with the introduction of early-maturing combine types."

field but did not afford complete protection against failure since milo on fallowed land failed as frequently as on surface-planted cropped land.

Early Sumac Sorghum.-Early Sumac sorghum was grown 17 years (1932-1948) in a series of method-of-seedbed-preparation plots, and in 1940 a series of rotations were started to compare Sumac on cropped land with that on fallow. For 10 years (1941-1950), average fallowed plot yields exceeded average cropped-land plot yields more than one third. Also seed was produced on fallowed land each year except one (1949). Fallowed sorgo land was as productive as fallowed winter wheat land.

Other Less Important Crops.--Other less important crops grown were kafir, feterita, Coes sorghum, and dry beans. Three plots of early-type dwarf kafir were also grown. Two were on continuously cropped land and one on land alternately cropped and fallowed. Kafir was less productive than milo with all methods. Kafir failed to produce grain in eight of the 36 years on fallow and in 14 of the 36 years on cropped land.

Feterita was grown on four plots from 1917 to 1945. It matured earlier than Dwarf Yellow Milo, but early-maturing combine types of sorghum replaced feterita. Coes, an early-maturing variety of sorghum, grown to some extent in the Great Plains, was substituted for feterita on the plots beginning in 1945. It was less satisfactory than milo. Beans (pinto) in the earlier years, and Great Northern, later, were grown from 1920 to 1950 in a single two-year rotation with winter wheat. The average yield for 31 years (1920-1950) was three bushels an acre. The crop

Fig. 49.—Feterita was grown from 1917 to 1945. It matured earlier than Dwarf Yellow Milo, but early-maturing combine types of sorghum replaced feterita.

failed completely in 13 of the 31 years.

Tillage Experiments

Tillage experiments have been conducted relating to frequency of plowing, implements and practices, and methods of summer fallow for winter wheat. A series of rotations were started in the fall of 1931 to determine the extent to which plowing for winter wheat could be omitted without seriously reducing yield. Wheat was grown on land plowed every year, every second year, every third year, every fourth year, and every fifth year. Years when the land was not plowed, the tillage given depended on the amount of weeds or volunteer wheat growth after harvest. When the stubble was clean and the ground not too hard, wheat was drilled without previous tillage. In other years, the stubble was one-wayed or undercut with surface sweeps. In 19 years (1932-1950), plots not fallowed were stubbled-in eight years, one-wayed seven years, and worked with sweeps four years. Land plowed every year produced the lowest yield. Plowing every year after harvest appeared to leave the land too loose for best results. Land plowed after a year of "stubbling-in," or shallow cultivation, produced the highest average yield. Too frequent plowing apparently is neither necessary nor advisable.

In another experiment different tillage tools were used to prepare stubble for the next crop of wheat. Tools used

were the lister, disk plow, moldboard plow, and one-way. One-waying and moldboard plowing were used at two depths-shallow (three to five inches) and deep (over seven inches). The early tillage work was carried out as soon as practicable after harvest, usually in July. Tillage practices on other plots were started in August and September. Two sets of plots were used. In one set of six plots, the different tillage operations were carried out each year on the same plots. In the second set of 20 plots, the same six tillage operations and four additional ones were alternated with uniform preparation. Tillage in the uniform year was the same as that given the unplowed plots in the frequency of plowing experiments discussed above. Average yield for the six early methods ranged from 10.5 bushels on listing to 12.9 bushels on deep one-waying. The only early method producing continuously lower yields than the others was listing. For the 19-year period, the yields averaged 12.2 bushels for July plowing, 10.7 bushels for August 15 plowing, and 8.1 bushels for September 15 plowing. There was no appreciable difference for depth of plowing. No tillage tool or method used proved vastly superior to other tillage tools or methods.

Methods of fallow for winter wheat were studied in two sets of experiments, one started in 1915 and the other in 1931. The first experiment

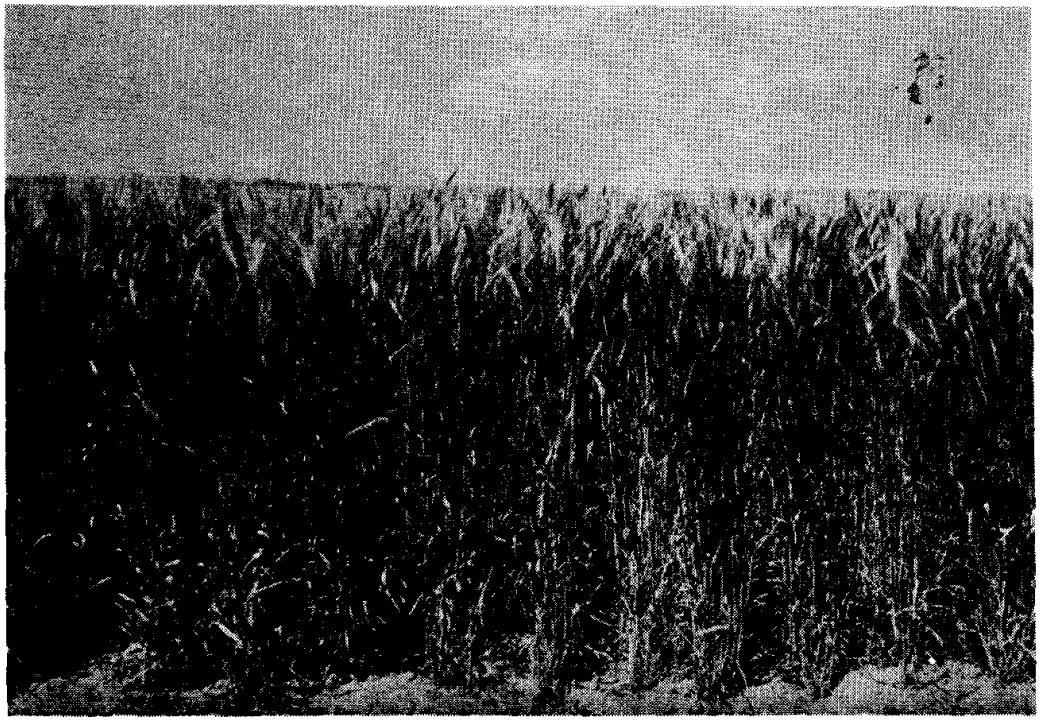


Fig. 50.-Winter wheat on fallow. "Methods of fallow for winter wheat were studied in two sets of experiments. One started in 1915 and the other in 1931."

was planned to determine when cultivation for fallow should start; the second to test implements for fallowing, with plowing and listing used for comparisons. The first experiment was conducted on land alternately fallowed and cropped. The second was on land under a three-year rotation of fallow, wheat, wheat. In all treatments, weeds were controlled from the first tillage operation until seeding. Five different times of starting tillage operations were used: (1) Plowed soon after harvest, replowed in June; (2) plowed late in the fall, left rough over winter; (3) left in stubble over winter, plowed about May 15 ; (4) left in stubble over winter, plowed about June 15; and (5) listed late in fall, ridges leveled about May 15. May plowing was found to be the most efficient method tested. The fallow period was reduced to four months and the number of surface cultivations on the average to fewer than three. Plowing in June reduced the fallow period to three months and the number of cultivations to two, but the decrease in labor was more than offset by reduced yields. The first method represented the longest and most intensive fallowing period. It usually required an average of more than four surface cultivations in addition to two plowings. Seeding was usually after September 15, making the fallow period about 14 months long. The average yield from that method was lower than for late fall or May preparation. Fall-listed land produced a higher yield than fall-plowed land and resisted soil blowing somewhat better.

In the experiments started in 1931 to compare other tillage tools in fallowing for winter wheat with the plow and lister, wheat stubble on the land to be fallowed was left undisturbed in the fall. Instead of alternating wheat with fallow, two crops were grown after fallow, making a three-year rotation of fallow, wheat, wheat. The methods used were : (1) Fallowing with a duckfoot or sweeps only; (2) fallowing with a one-way only; (3) fallowing and listing about May 15 with and without previous spring tillage; (4) fallowing about June 15 with and without previous spring tillage; and (5) double listing. The average number of surface workings required over the 19 years in this experiment was four to five for the duckfoot or sweeps, four for the one-way, three for the May plowing and listing, and two for the June plowing. There was little difference in the effect of the several types of implements on the yields. Comparable one-wayed, listed, and plowed plots produced average yields within a fraction of a bushel of each other.

The second crop of wheat after fallow in this experiment was produced with minimum seedbed preparation. Wheat was drilled in the stubble eight years; stubble was one-wayed seven years; and was undercut with subsurface sweeps four years. Plot yields did not differ significantly

and, for most plots, were approximately 45 percent of the average on fallow.

Moisture Studies

Soil moisture studies have been a part of the dryland agriculture experiments during the entire period. Starting in 1914, soil samples were taken on each plot to eight feet deep to determine texture and water-holding capacity. Moisture determinations to varying depths were made each year on a number of

Fig. 51.---Taking soil samples for moisture determinations. "Soil moisture studies have been a part of the dryland agriculture experiments during the entire period, starting in 1914."

plots to determine the soil moisture content and its use by crops. Some of the problems studied have been: moisture storage under different methods of fallow; moisture storage by more than one year of fallow; moisture storage with a basin lister; conservation of winter moisture; available moisture in soil at seeding time and its effect on yield and penetration of rain. In the study of rain penetration, samples taken in three-inch sections on sod following an extremely dry season showed that showers of about 0.25 inch wet the soil from 1.5 to 3 inches deep. Showers of between 0.25 and 0.50 inch wet the soil two to six inches deep and averaged about three inches. Rainfall of one inch wet down to about six inches; those of about 1.25 inches, from six to nine inches; those of about 1.5 inches, from six to 12 inches; and those of two inches from 12 to 15 inches. A five-inch rainfall wet wheat stubble land two feet down.

Showers of less than 0.25 inch usually did not increase the moisture content of the soil. The same quantity of rain did not always wet the soil to the same depth. Other factors that influenced the quantity of water stored were the character of the rain, the physical and moisture condition of the soil, and weather conditions following the rain.

A half century of investigational work in dryland agriculture conducted at three experiment stations in Kansas (Hays, Garden City, and Colby) and other stations located throughout the Great Plains indicates that the dryland farmer, to be successful, should follow a flexible system. This applies to his cropping systems, tillage methods, and cultural practices. He should choose those that fit his weather and soil conditions, taking into consideration the preceding crops, surface residue, weed population, soil moisture, and soil tilth.

Other Soil Work

With the close of the cooperative work with the United States Department of Agriculture in dryland agriculture investigations and the retirement of Mr. Kuska, the soils work at the Station was reorganized and new work undertaken. A soils laboratory was started and equipped, and over 1,000 nitrate determinations a year have been made. A tillage test in the management of wheat straw residue was started in 1952. Fertilizer tests on wheat were begun and deep chiseling experiments introduced on fallowed land. In 1956, off-Station fertilizer tests were started with irrigated sorghum and wheat, but were moved back to the Station in 1958 after an efficient irrigation system was developed. Other studies undertaken have consisted of moisture use by winter wheat and by weeds, wheat emergence with limited soil moisture, post-harvest dormancy of wheat, and residue reduction by different tillage implements.

Publications

Two publications have been issued covering the dryland investigational work, both by the United States Department of Agriculture: Circular 184, Methods of Crop Production at the Colby (Kansas) Branch Experiment Station, 1915-1929, by J. B. Kuska, issued in 1931; and Circular 979, Dryland Crop Rotations and Tillage Experiments at the Colby (Kansas) Branch Experiment Station, by J. B. Kuska and O. R. Matthews, issued in 1956.

CEREAL CROP INVESTIGATIONS

A major objective of the Colby Station when it was established was to determine the kind and varieties of crop plants best adapted to northwestern Kansas as well as how best to grow them. The first annual report of the Station (1914) set forth those objectives in the following words: "The Station expects to put into actual practice on the experimental farm the best known methods of handling soils and crops under existing conditions. In addition, variety tests of any crops known to be adapted to this part of the state as well as variety tests of any crop which gives even a remote possibility of proving profitable for this section will be given a fair and thorough test."[14]

The pursuit of these objectives was begun in 1914 by the establishment of corn and sorghum variety tests. Emphasis was also placed on cereal crop tests, both varietal and cultural. Close cooperation was maintained from the beginning with researchers with other experiment stations in Kansas and the United States Department of Agriculture in Kansas and other states.

Varietal tests on all major cereal crops have been conducted almost from the beginning. The 1914 tests included

14. Thompson, G. E. and Clark S. P., Colby Branch Experiment Station Annual Report, 1914, p. 4.

Fig. 52.—Winter wheat variety test. "Varietal tests of all major cereal crops have been conducted almost from the beginning."

11 sorghum and 10 corn varieties. Wheat varietal tests were begun in 1915 on both winter and spring types. Spring oat tests were added in 1916. Spring barley tests were begun in 1917 and winter barley in 1943. Spring wheat tests were discontinued in 1943 because of the poor performance of spring wheat in this area and the lack of farmer interest. Now fallow and irrigated varietal tests are being conducted on winter wheat, winter barley, and grain sorghum. Spring oat and spring barley tests were included only on fallow. Corn is presently tested under irrigation. It is of interest that the winter wheat variety, Turkey, was included in the tests as early as 1915. This variety is still included in tests as a long-time check.

Tests to determine the effects of various cultural practices on yield and other agronomic characteristics of cereal crops have been conducted throughout the period. In 1915, tests on the use of wheat planted in 22-inch furrows and wheat planted in stubble without any previous preparation were described in the annual report. In 1916, a test comparing the yield of corn from a pure variety and a mixture of varieties was conducted. Many farmers in the area were mixing corn varieties, as it was felt that better yields could be obtained by doing so.

Other cultural tests that have been conducted and the dates when such tests were first mentioned in the annual reports are as follows: Winter wheat date-of-planting test (1917); rate of planting (1915); drill types and effect on yield, winterkilling and soil blowing in winter wheat (1917); type-of-drill test on wheat, corn, and kafir (1918); rate and direction of seeding wheat with both furrow and press drills on two dates (1918); date and rate tests on grain sorghum (1923); drill type for sorghum surface planter, furrow drill, and press drill (1923); date of planting corn (1931); type of drill for barley (1931); spring barley rate and date test (1956); irrigated wheat rate test (1957); spring barley seed source (1959); winter barley date-of-planting test (1961); irrigated grain sorghum date-of-planting test (1961); and irrigated corn date-of-planting test (1962).

In addition to the regular variety tests, several additional tests and nurseries have been grown in most years to differentiate varietal response to environmental conditions. Many of these tests have been in cooperation with the United States Department of Agriculture and grown at several locations throughout the area, while others are state-wide in cooperation with personnel at other state stations. Much information on yield potential, disease and insect resistance, and other characteristics of varieties and/or new lines and selections of the various crops has been obtained from these nurseries.

Some of the nurseries which have been grown and the date when first mentioned are as

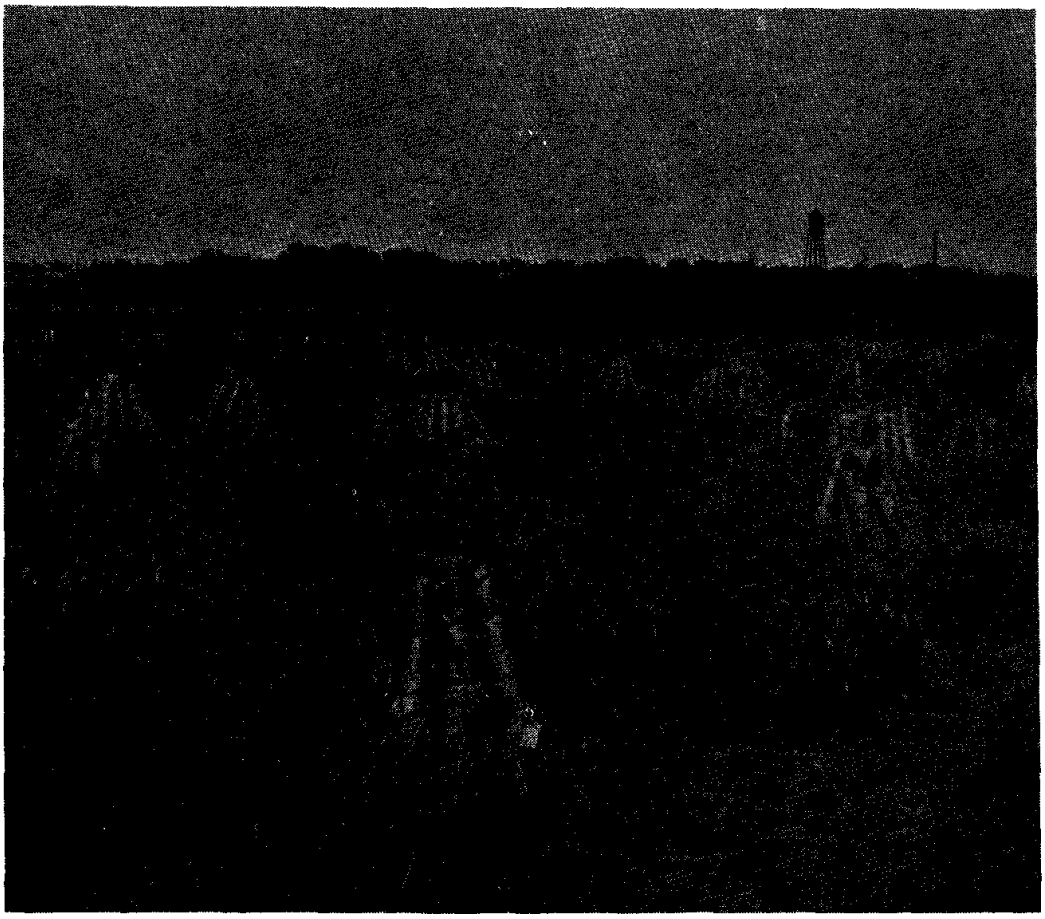


Fig. 53.---The winter wheat nursery.

follows: Wheat winterhardiness nursery (1923) ; barley nursery (1923) ; spring wheat rust nursery (1924) ; oat rust nursery (1925); sorghum smut nursery (1925) ; barley introductions nursery (1925) ; Hessian fly nursery (1925); winter wheat rust nursery (1926) ; Kansas intrastate wheat nursery (1930) ; uniform winter wheat yield nursery (1933) ; uniform winter barley yield nursery (1948) ; uniform winter barley hardiness nursery (1948) ; regional wheat streak mosaic nursery (1950) ; wheat drouth nursery (1952); regional grain sorghum yield nursery (1955); regional uniform sorghum hybrid observation nursery (1955); and the Colorado - Kansas - Nebraska interstate sorghum nursery (1955).

In addition to the testing programs, considerable breeding and selection work has been performed. The environmental conditions in northwestern Kansas such as rainfall, temperature, humidity, elevation, and growing season are enough different that varieties well adapted in other parts of Kansas are often unadapted in this area. Breeding programs have been directed toward the development of improved varieties adapted to northwestern Kansas.

Some breeding work has

Fig. 54.—The uniform winter barley hardiness nursery in the spring of 1957. Many of the selections failed to survive the winter.

been conducted on all major cereal crops at some time during the 50-year period. Work was begun in 1916 in an attempt to isolate early-maturing strains of milo and kafir. Dwarf Yellow Milo was used in much of the early selection work. Corn selection work was begun in 1921 and wheat and spring barley soon after. Breeding work in recent years has been confined to grain sorghum, winter and spring barley. The present sorghum-breeding program is directed toward developing high-yielding, strong-stalked, early-maturing hybrids better adapted to this area than hybrids presently available. Winter barley work has been limited primarily to selection from bulk populations. Much improvement is needed in the winter barley varieties now available. Added winterhardiness, good straw strength, smut resistance, and good yield potential all need to be improved.

The greatest accomplishment of the breeding programs at the Station to date has been the development of Colby milo. The original material from which Colby milo was selected was a Dwarf Yellow milo and an Early White milo cross obtained from the Woodward, Oklahoma, Experiment Station in 1931. Of the original 51 strains, all but five were eliminated by 1937. The best appearing of the five strains was released as Colby milo. The combination of earliness, good-yielding ability, and the short height of Colby milo made it a popular variety in northwestern Kansas in the late 1930's and early 1940's.

Maintaining a source of pure seed of many of the cereal crops has been an important service of the Colby Station. The importance of such a service was realized early in the history of the Station. The 1915 annual report states: "In order that the Station may be the center of pure seed distri-

bution for northwestern Kansas, pure strains of the best known varieties of wheat, sorghum, and corn should be furnished for planting. For the preparation of seed for sale, a cleaning and grading mill should be purchased." [15]

An attempt to purify several varieties through mass field selection was described in 1918. These included feterita, Red Amber sorghum, and Bloody Butcher corn. Many crop varieties have been grown for certification. Included are Kanred, Comanche, and Bison wheat; Norkan and Colby milo; Beecher and Otis spring barley; and Dicktoo and Meimi winter barley. A source of repurified Comanche wheat seed has recently been made available through an extensive roguing of a small plot which was then increased.

PROTEIN LABORATORY

In 1929, an effort was made by the State Grain Inspection and Weighing Department to make available to farmers, facilities to determine the protein content of wheat. It was thought that such knowledge would help farmers secure a premium for high-protein wheat.

Laboratories to which farmers might send their wheat for testing were established at different points in the state. One was at the Colby Station. The equipment was installed in June, 1929, and a competent chemist employed by the Department. Because of the low premiums paid for high-protein wheat in 1929, the number of samples sent for analysis was too few to justify the expense of maintaining the laboratory. It operated only one season.

FORAGE CROP INVESTIGATIONS

Forage work was begun soon after the Station was established in 1914. Forage yields were obtained for all corn and sorghum varieties tested in 1914. Sudangrass tests comparing yields from cultivated and close-drilled rows were conducted in 1914. Also alfalfa and sweet clover plantings were made but stands were not good.

Forage sorghum variety tests have been conducted in most years since the Station was established. In the early years all sorghums, grain and forage, were included in one test and both forage and grain yields were obtained. With the development of combine-type grain sorghums, it became desirable to test the two types separately. Red Amber was a variety widely grown in the area during the early period. Early Sumac became popular after its release in 1922 and is still grown in the area to some extent. While many other varieties have been grown, most forage sorghums now grown are hybrids. Many commercial forage sorghum hybrids have been included in the Kansas Forage Performance Tests at Colby in recent years.

Some selection work on forage sorghum was initiated as early as 1918, but intensive

15. Clark, S. P., Colby Branch Experiment Station Annual Report, 1915, p. 27.

Fig. 55.—"Some selection work in forage sorghums was initiated as early as 1918, but intensive breeding programs have not been conducted."

breeding programs have not been conducted at the Station. Tests were initiated between 1918 and 1923 to compare dates, rates, and methods of seeding. Since the establishment of the present irrigation system, fertilizer and variety tests have been conducted under irrigation.

Considerable work on sudangrass has been done since 1914 when tests comparing cultivated row and drill plantings were started. The work also includes variety testing, method-, date-, and rate-of-seeding, and pasture tests.

Dryland corn variety tests were conducted from 1914 through 1955. In most years, both stover and grain yields were obtained. Nursery work and cultural practices with corn were also included at various times during this period. Commercial as well as experiment station hybrids and varieties have been included. Irrigated yield tests have been conducted since 1958, with both silage and grain yields being obtained. Population, date-of-planting, and fertilizer tests have also been included under irrigation. The Kansas Forage Performance Tests, in which the Colby Station has cooperated, have included corn hybrids in recent years.

Other forage work, conducted at some time since the establishment of the Station, includes alfalfa variety tests, sweetclover nurseries, and

warm- and cool-season grass plantings.

INVESTIGATIONS WITH OTHER CROPS

An objective of the experiment station at Colby was to test "any crops which have even a remote possibility of proving profitable." Several crops, other than those normally grown in the area, have been tested. A planting of pinto beans was made as early as 1917. Cotton and soybean nurseries were started in 1924. Popcorn and Great Northern and pinto beans were included in 1931; flax was added in 1932. Safflower tests were conducted in the 1950-52 and 1962-63 periods. The recent safflower tests include irrigated plantings. Irrigated tests on castor beans, soybeans, sugar beets, pinto and Great Northern beans have also been initiated. Observational plantings of guar and sesbania were made at the Station in 1956.

SUPPLEMENTAL PASTURE AND HAY INVESTIGATIONS

Sudangrass was recognized early in the history of the Station as a promising crop for northwestern Kansas. In his 1914 annual report the superintendent wrote: "This crop seems to be a promising one for Thomas County and the Station will plant a considerable acreage in 1915 for hay production as well as a small acreage for seed."[16]

The most extensive sudangrass work related to the choice of varieties, carrying capacity; influence on milk production, and as a summer pasture to supplement or replace native buffalograss.

It was found that cattle on good sudangrass pasture maintained or increased milk production, while cattle on

16. Clark, S. P., Colby Branch Experiment Station Annual Report, 1914.

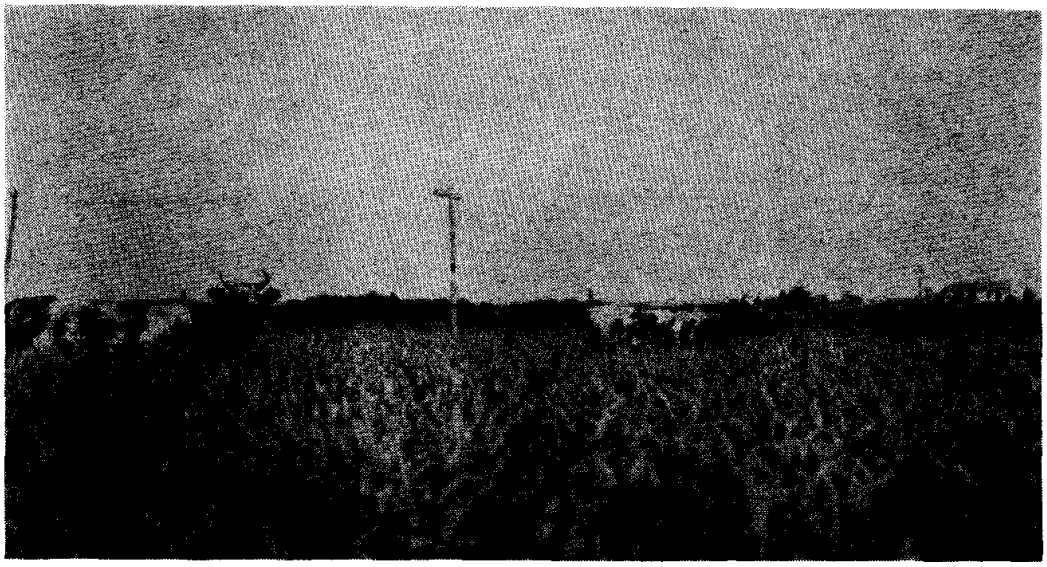


Fig. 56.-Dairy cows on a sudangrass pasture. "Sudangrass was recognized early in the history of the Station as a promising crop for northwestern Kansas."

native pasture lost production during the same period. The number of mature cow-grazing days an acre varied from 0 to 115 days under continuous cropping, with the conclusion drawn that this crop should carry in a normal year one mature animal to the acre for 90 days. During dry years, sudangrass failed to produce pasture. This prompted, beginning in 1932, the testing of sudangrass for pasture under an alternate crop-fallow system. In 1937, the superintendent reported that more than three times as much pasture was secured from the fallowed area as from the continuously cropped area. Records showed that as many as 170 mature cow-grazing days an acre were secured on sudangrass pasture during one grazing season.

After this practice was proved, summer-fallowed sudangrass pasture was used extensively in the late 1930's and early 1940's to supplement na-

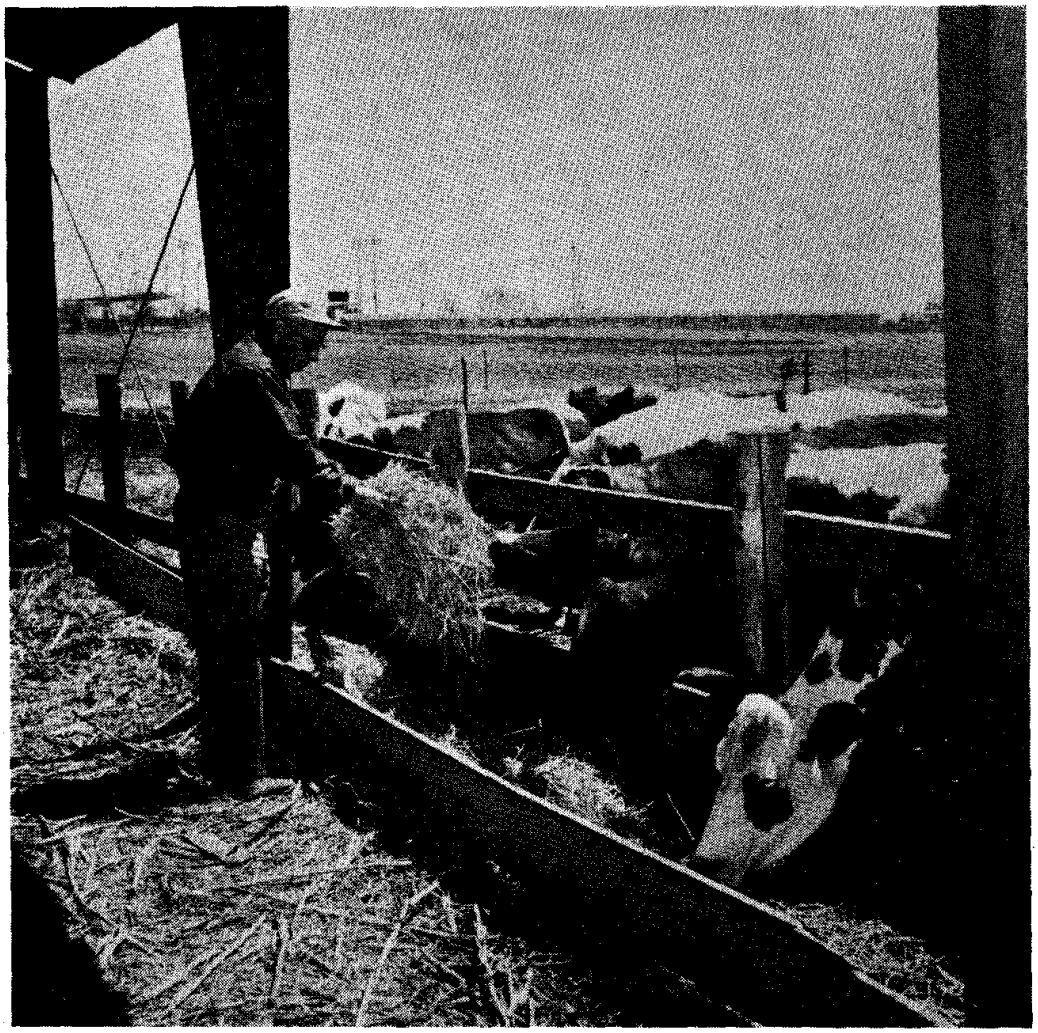


Fig. 57.---Superintendent Coles feeding wheat hay to dairy cattle. "Starting in 1942, wheat as a hay crop was investigated. Yields of three to four tons of air-dry hay an acre were secured."

tive grass pasture, thus allowing buffalograss pasture to recover from the severe drouth of the 1930's.

Listing became the favored planting method for sudangrass in the middle 1940's. Weeds were more easily controlled in the wide-spaced rows, less pasture wastage occurred, more roughage was produced, and plants in the listed rows recovered more rapidly after being grazed than plants in close-drilled rows.

Beginning in 1958, records on grazing capacity from preirrigated winter rye, winter barley, and spring barley were obtained. Six to seven hundred mature ewe-grazing days an acre or 450 to 500 ewe-with-lamb-grazing days an acre were obtained from Balbo rye as a pasture. Otis spring barley provided more than 425 mature sheep-grazing days an acre in addition to producing over 15 bushels of grain an acre. Meimi winter barley planted in early April averaged (two years) 535 grazing days an acre for mature ewes from the middle of May to late June.

Starting in 1942, wheat as a hay crop was investigated. Yields of three to four tons of air-dry hay an acre were secured. The amount of hay produced increased progressively with stage of maturity from the time that first heads appeared to the soft-dough stage. On the other hand, the protein content of the hay declined as the stage of maturity advanced. The results indicated that wheat could be used satisfactorily for hay when cut at the right stage of growth and properly cured. Use of this information has been made by farmers to enable them to salvage a wheat crop when conditions were unfavorable for grain production.

In 1953, Kochia (fireweed) was cut for hay in the early-bud stage. It produced 1.3 tons of cured roughage to the acre; while a second cutting, harvested when the crop was in bloom, produced 1.51 tons to the acre, or 2.81 tons total.

MAKING THE RESULTS KNOWN

The Station has used several methods of bringing results of its research to the attention of the general public: written reports and publications, radio broadcasts, inviting the public to visit the Station, and by the technical staff attending public gatherings to explain results of work of the Station.

Over 80 formal publications have been issued. These publications were in the form of popular bulletins and circulars as well as technical bulletins of the Agricultural Experiment Station and technical journal articles in such publications as the Journal of the American Society of Agronomy, Soil Science, and Crop Science. A publication entitled "Research Results" has been issued annually since 1959. It is distributed at the annual field days. In 1962, the Research Results publication distributed at the 1963 field days contained information on climatological data; results of experimental work

with winter wheat, winter barley, spring oats, grain and forage sorghums, corn, and specialty crops, both under dryland and irrigation; tillage tests; moisture use; and horticultural studies. The specialty crops reported upon were soybeans, castor beans, safflower, and dry beans. The horticultural studies related to orchard and ornamental trees, chrysanthemum and annual flowers, strawberries, tomatoes, sweet corn, potatoes, and lawn grasses.

In addition to distribution to individuals, Research Results have been made available to newspapers, farm journals, agricultural extension workers, and vocational agriculture teachers. In this way, information regarding the work of the Station has been made available to many who have been unable to visit the Station. Many popular news articles have been prepared by the technical staff and distributed to the press.

A second method that has been most effective in acquainting people with the work of the Station has been broadcasts over Colby Radio Station KXXX by the Station superintendents. Daily broadcasts were started in 1948. Varying amounts of time, ranging up to as much as 15 minutes a day, were made available for these broadcasts.

Fig. 58.---Superintendent Coles broadcasting over Colby Radio Station KXXX. "Daily broadcasts were started in 1948. They were exceedingly popular with the farm folk of western Kansas."

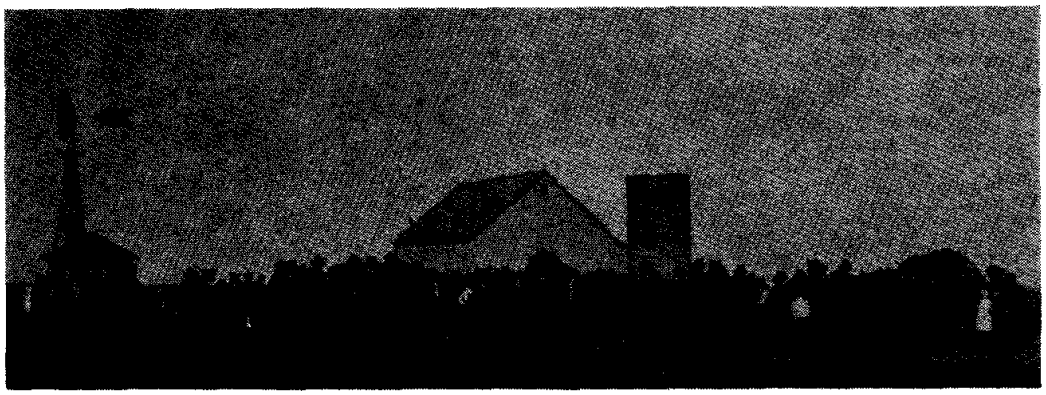


Fig. 59.---Field day visitors at the Station. "The first group of visitors to the Station was in 1915 when more than 100 farmers attending the Colby Farmers Institute visited the Station."

They were exceedingly popular with the farm folk of western Kansas in the territory covered by Station KXXX. The program had many daily listeners and did much to popularize the Station. Broadcasting on a daily basis was discontinued in 1955 with the untimely death of Superintendent E. H. Coles. It has been continued on a less frequent basis since that time.

The third method of acquainting the public with the work of the Station has been by public events at the Station where the results of the Station work were presented through demonstrations, exhibits, and oral reports. These have included field days, judging contests, and visits by farmers, both individually and in groups.

The first group to visit the Station was in 1915 when more than 100 farmers attending the Colby Farmers Institute visited the Station. A high school class also visited the Station in 1915. Livestock judging contests became annual events both for the Farmers Institute and high school classes at Colby and nearby towns. Later the Station conducted judging schools for vocational agriculture high school students and for 4-H Club boys and girls. These became annual events. In 1938, a judging school held in cooperation with the Foster Farms was attended by 200 vocational agriculture high school students and 35 4-H Club members. Students participating in these events had an opportunity to see the work of the Station and become familiar with the results.

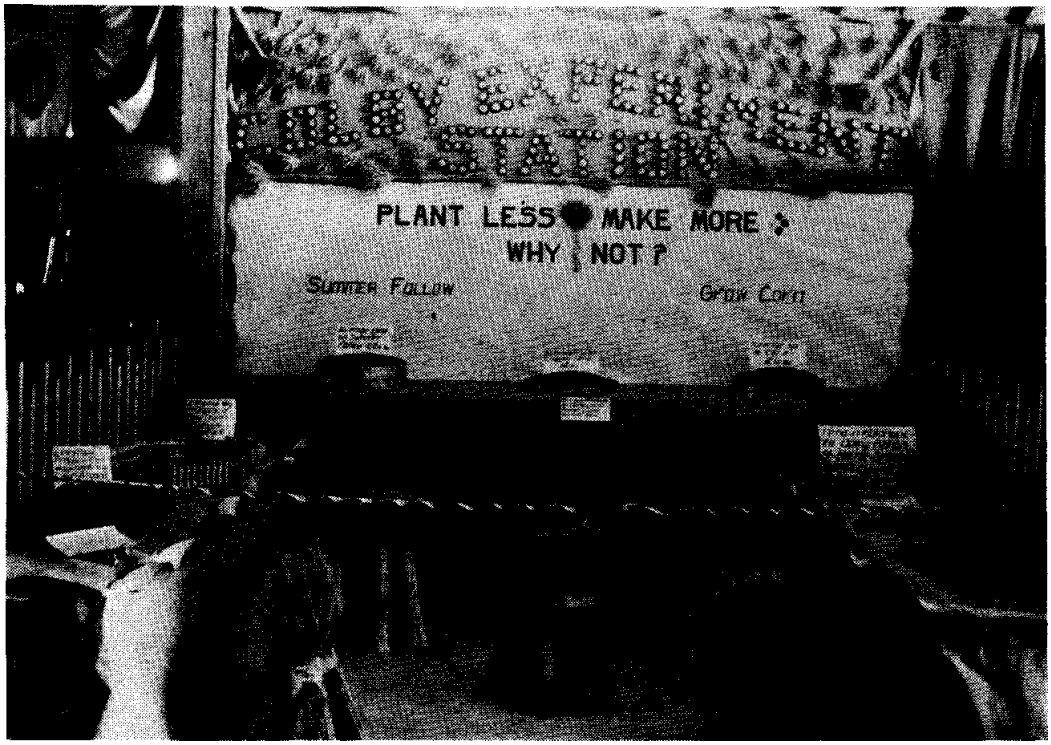


Fig. 60.---The Station exhibit at the Thomas County Free Fair, 1931.

The first annual field day was June 19, 1929. More than 200 visitors registered: 79 from Thomas, 32 from Logan, 23 from Rawlins, nine from Decatur, six from Sherman, four from Cheyenne, four from Lane, and two from Norton counties. Field days have been held annually in both the spring and fall. Emphasis has been placed on small grain experimental work at the spring field days and on sorghum and other row crop work in the fall. Invitations to farmers to visit the Station on field days and other occasions have been extended through the press, over the radio, and in other ways. Attendance over the years has varied from a few to several hundred.

Ayrshire field days were held occasionally, in cooperation with the Kansas Ayrshire Club, while the dairy herd was maintained.

Special field days have been held from time to time. One was a silo construction field day in 1953 when wall segments of an above-ground silo were tilted into position. More than 500 attended. In 1954, a group of 180 women visited the Station to study shrubbery, trees, flowers, and other ornamental plantings.

Following inauguration of the sheep project in 1960, annual sheep field days were started the spring of 1961.

The technical staff of the Station has presented the work of the Station to the public by nearly all communications media.

As the work has become known, the results have been accepted and the knowledge applied to a gratifying extent by the farmers of the region.

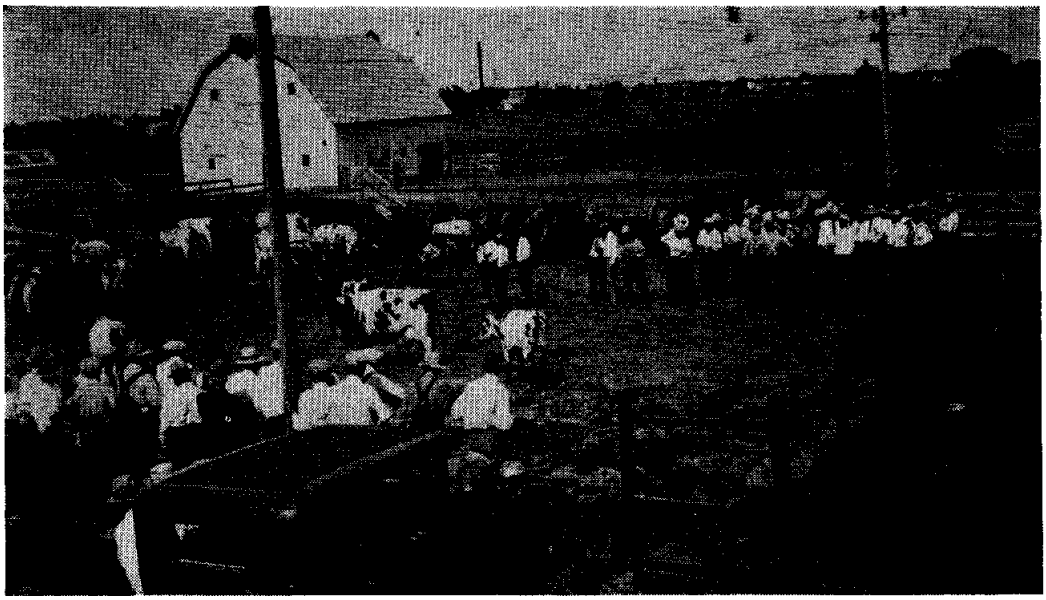


Fig. 61.—"Ayrshire field days were held occasionally while the dairy herd was maintained. This afforded an opportunity for breeders of Ayrshire cattle to study firsthand the animals in the Station breeding project."