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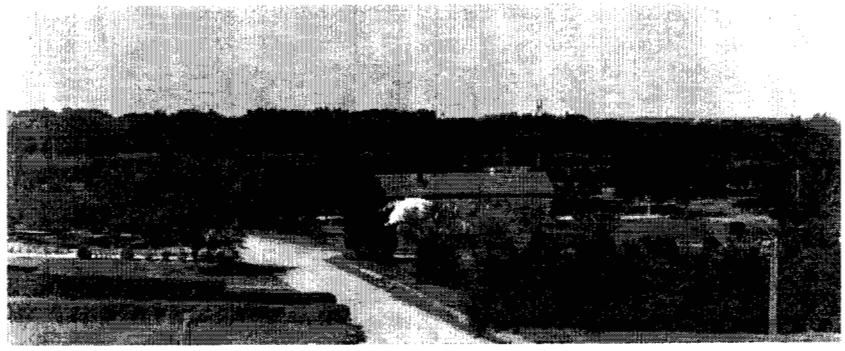

Fig. 32.—General view of the forest nursery in 1933. In January, 1912, the Regents had directed that nursery stock be grown at the Station and made available to the residents of the state at cost.

Early Shelterbelt. In 1907 60 acres a half mile south of the Station campus were set aside as a demonstration of the value of windbreaks under western Kansas conditions for the protection of orchard plantings. About 30 acres in the center of the tract were planted to some 1,000 fruit trees. A windbreak 10 rods wide occupying about 30 acres was planted around the orchard. At the start about 17,000 forest trees were planted, consisting of catalpa, honey locust, and Osage orange. A severe drouth in 1907 made it necessary to replant most of the trees, both fruit and forest. In the spring of 1909 2,200 more trees were planted, but a destructive hail that summer killed 97 percent of the fruit trees and severely damaged the forest trees in the surrounding shelterbelt. The orchard was not replaced. Replantings were made in the shelterbelt, but after the hail the area did not receive the care required to maintain trees in good growing condition. Superintendent Helder in his report for 1914 stated, "The forest plantation on upland . . . 10 rods wide, surrounding a field of 30 acres of upland prairie land had no pruning and very little cultivation because of insufficient help during the rush season of harvest and threshing." (23)

The shelterbelt gradually deteriorated and was disposed of completely in 1925 by pulling up the old stumps and cleaning the field. At that time most of the trees were dead and served only to catch blowing Russian thistle and trash carried into the area by the high winds of western Kansas.

Nursery Established. June 1, 1910, a state forester was appointed. He was stationed at Kansas State Agricultural College but worked with the Hays Station. It was his recommendation that a forest nursery be established. An assistant state forester, Christian Jensen, was appointed and placed in charge of the forestry work. A nursery was

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established to produce forest, shade, and ornamental trees, and shrubs and vines of species and varieties found adaptable and desirable.

In January, 1912, the Regents directed that nursery stock be grown at the Station and made available to Kansas residents at cost. J. W. Preston, a graduate of the College, was appointed nursery foreman March 15, 1912.

The propagation and commercial distribution of nursery stock were continued without much emphasis on experimental work until 1923. In April, 1927, E. W. Johnson, a graduate in horticulture and forestry at Colorado Agricultural College, was appointed forester. He immediately began testing new trees and shrubs for adaptation to western Kansas conditions. The Chinese elm was proving a rapid-growing, hardy tree, apparently well adapted to western Kansas. A scarcity of seed existed, so a grove of Chinese elm was planted in 1925 and enlarged in 1930, for propagation purposes. A new greenhouse completed in 1925 provided facilities to propagate Chinese elms with root cuttings. Several thousand root cuttings were made and planted in the greenhouse in December, 1925. These cuttings grew well, with 85 percent surviving.

Distribution of forest tree seedlings in cooperation with the U.S. Forest Service, as authorized by the Clarke-McNary Act, was started in 1928. Under this act the Forest Service was authorized to provide funds equal to those expended by the state to distribute forest tree seedlings at low cost to farmers; 10,000 seedlings were distributed in 1928. Maximum distribution was 868,000 in 1948. From 1941 to 1951, 5,154,642 trees were distributed. Orders were received from nearly every county in the state, especially those in western and central Kansas. Seedlings were purchased also by Colorado farmers for shelterbelt plantings. The program was discontinued in 1952.

Chinese Elm.[8] Mention has been made of the Chinese elm tree first planted at the Station in 1913. This tree was one of two obtained from China and was the first Chinese elm planted in Kansas. The tree grew rapidly and gained great popularity. Thousands of trees propagated from this mother tree were planted throughout the state upon the recommendation of the Station. The March 26, 1931, blizzard, most severe to hit western Kansas in 68 years, killed thousands of Chinese elms and severely injured more by rupturing their cambium layers. Two-thirds of the trees in the planting of 1925 were killed. Many trees not killed outright recovered satisfactorily, demonstrating remarkable power of recuperation.

The next severe damage to Chinese elm from cold occurred with the "Armistice Day Freeze" in 1940. The tem-

8. The "Chinese elm" discussed in this manuscript is **Ulmus pumila.** It is usually referred to in horticultural publications as Siberian elm.

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Fig. 33.—A 15-year-old Chinese elm tree, planted as a seedling in 1913. This tree was one of two obtained from China and was the first Chinese elm planted in Kansas. Thousands of trees propagated from this mother tree were planted throughout the state.

perature at Hays dropped to 0° and to —1° F. November 13 and 14, respectively. No cold weather to harden off vegetation had occurred prior to the freeze. The freeze destroyed all tender types of vegetation. Chinese elm particularly suffered severely. Practically all Station Chinese elm over 16 inches in diameter were killed, and most of the other young trees were damaged. The old tree that was planted in 1913 was killed, except for one branch on the north side. It was felled the next fall. At 3 feet above the ground the tree had an aver age diameter of 24 1/2 inches inside the bark, with the greatest diameter being 26 inches. The circumference at this height was almost 7 feet. The tree was 52 feet tall. The loss of Chinese elm from the

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freezes of 1931 and 1940 lessened the enthusiasm of western Kansas people for this species. Prior to this time many had planted Chinese elm to the exclusion of all other kinds. The freezes may have been useful in demonstrating that the Chinese elm was not the only kind of tree to plant in western Kansas.

Chinese elm and cherry trees were the only deciduous trees on the Station that suffered severely from the freeze, although several other species in the nursery were affected. Most of the Chinese arborvitae were killed. No pines were killed outright. The red cedar and Pfitzer juniper were damaged. Among seedlings in the nursery, black locust and Osage orange were a total loss, as were most of the catalpa. Hackberry, Russian olive, American elm, black walnut, and honey locust were damaged little. Most of those species were sufficiently dormant before the cold weather struck.

Since the state forest nursery closed in 1952, the Station has devoted little attention to tree propagation or distribution. Commercial nurseries, the Extension Service, and the Soil Conservation Service now perform those services.

ORCHARDS AND GARDENS

An orchard and vineyard of 300 fruit trees and 500 vines was planted in 1903 and made a "splendid start." This orchard was planted on the north side of what is now the Station campus and nursery. It contained different varieties of apple, plum, and peach trees. In 1910 it was reported that there were a number of bearing trees in the orchard but that "The high winds of

PROJECT LEADERS IN FOREST INVESTIGATIONS

Name	Appointed	Termination
J. L. Pelham	July 1, 1905	March 15, 1906
R. Green	May 1, 1906	November 30, 1906
J. L. Pelham	April 1, 1907	February 28, 1908
C. F. Jackson	March 1, 1908	April 30, 1910
Christian Jensen	May 1, 1910	July 31, 1911
Charles Scott	Spring, 1912	
J. W. Preston	February 15, 1912	April 30, 1916
I. T. Bode	May 15, 1916	May 24, 1918
W. A. King	January 1, 1919	April 15, 1919
C. R. Jaccard	April 15, 1919	February 28, 1920
Tom Williams	March 21, 1920	July 15, 1920
Henry Nye	July 12, 1920	February 28, 1921
D. E. Wilson	March 1, 1921	November 30, 1926
Jake Schoenfeldt	December 1, 1926	March 1, 1927
E. W. Johnson	April 1, 1927	June 1, 1934
E. P. Eshbaugh	July 1, 1934	May 15, 1940
J. C. Crupper, Jr.	July 5, 1940	July 31, 1942
J. G. Harrison	August 16, 1942	Retired on leave January 1, 1962

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western Kansas and the late spring frosts are the greatest detriment to rapid growth of fruit culture. The old orchard shows the effect of these high winds in the number of deformed trees growing in exposed locations." (24)

As the trees in the orchard died, they were replaced principally with cherry trees. A large number of apple trees were removed in the winter of 1927-28 and replaced with Early Richmond and Montmorency cherries. This orchard suffered in the Armistice Day freeze. Before that it had produced full crops. It continued to be maintained, principally as a cherry orchard.

Grape Variety Test. A variety test of 21 varieties of grapes was planted the spring of 1927. By 1931 only six of the varieties gave promise of being able to withstand western Kansas conditions. Of these, only three varieties have borne fruit in quantity. Commonest difficulty with grapes in western Kansas is winterkilling.

The Cherry Orchard. An experimental cherry orchard was planted in 1930 on terraced land that was too rough to be used for field crops. Earth terraces were constructed on the contour and the trees planted with 20-foot spacings in the row and the rows spaced 22 to 28 feet apart. In all, 1,040 trees were planted, consisting of 12 varieties of cherries and 10 varieties of plums; 400 of these trees were Early Richmond and 300, Montmorency cherry. The trees were hand watered

Fig. 34.—Water in cherry orchard terraces (1934) following heavy rain. The orchard was planted in 1930 and trees reached maximum production in 1938 and 1940. The orchard was killed by the "Armistice Day freeze" in 1940.

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the first year but received no irrigation later. The orchard was top-dressed the first year with barnyard manure to supply nutrients and to retard erosion. Regardless of the dry conditions of the 1930's the trees produced well. By the summer of 1940 when measurements were made of the growth of the trees, the largest had reached a height of 12 feet and a diameter of 8 1/2 inches. The orchard was killed by the 1940 Armistice Day freeze and was not replanted.

Experimental Fruit Plantings. When commercial cherry and plum trees were planted on the contour (1930), experimental plantings of cherry, plum, and apricot were made in the nursery. They made good, upright growth in contrast to exposed trees in the terraced orchard on the upland that had a decided north "lean." Most of the varieties produced fruit in 1932. Fruit plantings are still being made as an important phase of experimental work at the Station.

Gardens. Garden crops were first grown at the Station in 1903 when 9 acres were planted in part to potatoes, cabbage, tomatoes, beans, and corn for irrigation studies in cooperation with the U.S.D.A. This experimental work was of short duration.

In 1928 five varieties of seedling potatoes descended from the South American yellow-fleshed potato were received from the Presque Isle Potato Station of the Bureau of Plant Industry, U.S.D.A. Results were disappointing and the experiment was discontinued in 1930.

Paper Mulches for Vegetables. An experiment to determine the value of paper mulches for vegetables was conducted for two years —1929 and 1930. Most promising results were obtained with beans, peas, carrots, and cantaloupe, with yields ranging from 114 percent to 190 percent of those from the plots without paper mulch. Negative results were obtained with lettuce, radishes, and one variety of watermelons. The paper mulch proved unsatisfactory under the windy conditions in western Kansas.

Tomatoes. Tomatoes in western Kansas produced vines but little fruit. The Horticultural Field Station of the U.S.D.A. at Cheyenne, Wyoming, had started to study this problem with the Hays Station cooperating. In 1937 seed of a number of varieties was secured from Cheyenne, and purchases were made of others. The results, while not conclusive, showed that some of the old standard varieties were not dependable. The variety Bison, despite numerous faults, gave an excellent yield and was recommended for western Kansas.

WORK ANIMALS

All tillage work on the Station farm the first year of its operation (1902) was done by hired and contract labor. The regents on March 4 passed the following resolution relating to the first tillage work:

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Fig. 35.—Reeves steam plowing outfit, purchased under a legislative appropriation made in 1907.

"Moved by Regent Nichols to break at once at Hays about 340 acres at best terms available." (25)

The first authorization by the regents for the purchase of work animals was August 8, 1902, as stated in the following resolution offered by Regent Fairchild: "Whereas, the available funds for use at the Hays Branch Station for the current year are not more than $1,000, and believing that the importance of the work at Hays justifies the most liberal treatment, be it resolved that $350 or so much thereof as may be necessary be appropriated for the purpose of purchasing a team of young horses and harness for use at the Hays Experiment Station." (26)

The Legislatures of 1903 and 1905 appropriated for horses, mules, and equipment. The report of the Director of the Experiment Station for 1907 contains the following: "The Branch Experiment Station now has 15 horses and 12 mules. . . . This number is inadequate to properly carry on the farm work at the time such work should be done, so that at harvest and plowing time, additional teams have been rented." (27)

Mechanical power equipment was being tried in an experimental way for tillage. Steam plowing outfits were being manufactured. The Legislature of 1907 appropriated $3,500 to purchase a steam plowing outfit for the Hays Station. A minute of the Board July 31, 1907, was: "Moved by Regent Nichols that the act of the committee in purchasing steam plow outfit and Otto[9] engine be approved. Carried." (28)

That this purchase was entered into with some skepticism is indicated by another minute of the Board passed

9. The Otto engine referred to in this minute was a stationary gas engine. The engine secured with a plowing outfit was a 33-hp. Reeves steam engine.

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at the same meeting: "Resolved that Mr. Colliver, in the absence of Mr. McClelland, be instructed to offer $1.50 per acre for plowing to the extent of 200 acres in case the steam plow does satisfactory work; and in case the plow fails to work satisfactorily, he will then hire done whatever portion of the remainder of the summer plowing may be necessary in his judgment to bring about the best results." (29)

That the steam plow outfit did not give satisfactory results is indicated by a minute of the Regents passed June 28, 1909: "Moved by Regent Capper that Director Webster be requested to investigate gas and tractor engines, also possibility of trading the old steam engine plowing outfit." (30)

This effort to dispose of the steam plowing outfit was unsuccessful, and Superintendent Helder, in his annual report for 1913, reported: "It is proposed that effort be made to dispose of the steam plowing outfit, either by direct sale or trade, and acquiring a tractor for farm use, perhaps as large as 35 hp. Or, procure a 20 hp. tractor and engine plow of not to exceed 5 gang size, so that demonstrations of the practicability of such equipment for farm needs may be made." (31)

The steam engine was not disposed of but remained on the Station as a source of power for threshing and other stationary engine jobs.

The Station depended chiefly on horses and mules as power for field work. A number of mares were purchased and an effort made to produce horse and mule colts as a source of supply of young work stock. During 1913 and 1914 one of the stallions from the Department of Animal Husbandry at the College was loaned to the Station. In 1914

Fig. 36.—Five 6-horse (and mule) teams pulling gang plows in 1914, when the Station depended chiefly on horses and mules as a source of power for field work.

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a well bred, two-year-old jack was purchased by the Station for $800. The effort to produce colts was not overly successful and reliance was placed chiefly on the purchase of young work stock. In 1915, 34 young mules ranging up to two years old and 2 two-year-old colts were purchased for $3,321.50. The Station inventory at the close of 1915 showed 1 stallion, 1 jack, 11 geldings, 6 colts, 15 mares, 7 fillies, 26 mules, and 35 mule colts —for a total of 102, and the most work stock ever owned by the Station. Interest increased in tractors for power. In 1915 the J. I. Case Implement Company provided the Station a Case 40 tractor. A few years later a Rumley Oil Pull tractor was purchased. These tractors supplemented team work and reduced somewhat the animal power requirements.

In 1921, 96 head of horses and mules were in use on the Station farm, and as many as 66 head of work animals were put into the field at one time for tillage operations. The use of work animals presented many problems; keeping up equipment was a great expense, and runaways, many of which were permitted by incompetent teamsters, were common. Substituting tractors for horsepower began in earnest in 1924. An Allis-Chalmers, a Farmall, and two Caterpillar tractors were purchased within the next 10 years. A Caterpillar Diesel No. 35 tractor was secured on the college loan plan in 1934, and a Caterpillar Diesel 40 tractor purchased in 1936. The Station became completely mechanized in 1947. The last use made of work horses at the Station was in the winter of 1944 when a team was used in feeding cattle. Fourteen horses were still on the Station in 1947. Twelve of these were large black Percheron horses weighing about a ton each. They were beautiful teams but were sold for $45 a head to a packing house. The only horses remaining on the place were two saddle horses. Riding horses have always been and are still kept at the Station to handle cattle.

BEEF CATTLE

Management. The most extensive work with livestock at the Station has been with beef cattle. Management and feeding work started the second year of the operation of the Station and has continued without interruption to the present time. The first herd, acquired in 1903, consisted of 144 head of common cattle, mostly breeding stock. They were bred to good Shorthorn and Hereford bulls to demonstrate what could be done by using good sires to improve the quality of this kind of cattle.

The Legislature of 1907 appropriated $5,000 for livestock experimental work. In anticipation of starting new work the regents authorized the sale of all cattle on the Station. A minute pertaining to the matter reads: “Moved by Regent Griffith that ten (10) cows

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Breed	Bulls	Cows	Yearlings	Calves	Total
Shorthorn	1	25	22	25	73
Aberdeen-Angus	1	25	21	22	72
Hereford	1	25	17	25	65
Galloway	1	25	23	25	74
Total	4	100	83	97	284

and their calves, ten (10) two-year-olds, and ten (10) yearlings be fattened and that the remainder of the herd be sold when in condition. Carried." (32)

An experiment started in the year 1907-08 compared the four common breeds of beef cattle — Shorthorn, Angus, Hereford, and Galloway. A new herd of each breed was obtained consisting of 25 head of high-grade yearlings. Each herd was headed by a pure-bred sire of the very best breeding. The animals were purchased with the aid of Professor Kinzer[10] of the College at different times during the fall, winter, and spring. All animals were TB free. They were reported to be splendid individuals, fairly representative of their respective breeds.

The plan was to raise three crops of calves, and at the end of four years fatten and sell the entire number: cows, three-year-olds, two-year-olds, and calves. Results would be compared by feeding out the different ages, including maintenance and selling value. Each herd was to be pastured and fed separately but given similar conditions and the same kind and quality of feed. In 1910 the herds consisted of the individuals shown above.

The experiment was never well understood by the superintendent of the Station. In 1913 Superintendent Helder reported regarding this work: "So far as the Hays Station office was informed, no definite plan was organized and put into execution concerning the lines of investigation to be studied. The consequences of it resulted in conflict of orders and method of maintenance for the greater period of four years. Hence, no valuable data is accumulated regarding features of beef cattle production, such as must have been the intent when the project was first undertaken." (33)

In 1915 the cow herd on the Station farm, including calves dropped that year, numbered 51 Galloways, 69 Angus, 31 Shorthorn, and 285 Hereford. One hundred of the Herefords that bore the XI brand were purchased as yearling heifers in 1914 from the Adams Ranch at Maple Hill. In the fall of 1915 an outbreak of blackleg resulted in a loss of 26 head, and considerable trouble had arisen from abortion.

Developing the Hereford Herd. In October 1915 the Station purchased 100 Hereford calves at $43 a head from Poole Bros. of Manhattan. These heifers were to be used

10. Professor Kinzer was head of the Department of Animal Husbandry at the College.

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Fig. 37.—The Station feed yards in 1904. In 1903 the first herd, 144 head of common cattle, was acquired.

in a breeding experiment where one half were to be bred to calve at two years old and the other half at three years old. Paragon Rupert and Beau Parsifal, two well bred bulls, were purchased in the spring of 1919. In the fall of 1919, 30 Hereford heifer calves and 9 yearling bulls were purchased from Alex Philip at Hays. These heifers were also used in the breeding experiment. It was found that the two-year-old heifers had a hard time calving. Much assistance was required of the herdsman, and despite the assistance many calves and a few heifers died at calving time.

In the spring of 1922 abortion among the young cows again became a problem. Nineteen abortions were recorded at the close of the calving period that year. Changes were made in the methods of handling and feeding the cow herd during the fall and winter of 1923. Abortions were reduced to 11 for that year. In the fall of 1924, 75 off-type cows, including those that had lost their calves, or had not produced a calf, and all bulls, were shipped to market. This cut the cow herd to 98 head composed almost entirely of cows of Poole Bros. and Adams XI breeding. These were old cows remaining from the purchases made in 1914 and 1915. The Hereford heifers purchased in 1919 were the last to be introduced into the herd. Since that time all females used in the Station herd have been bred and raised on the Station.

In the fall of 1924 four bulls were purchased at the dispersal sale of the W. E. Dickey purebred Hereford herd at Kansas City, Missouri. Two of these bulls rendered outstanding service. They were deep-bodied, thick-fleshed, and heavy-quartered individuals with great scale. They passed on these qualities to their offspring.

In 1929 three purebred Hereford bulls were purchased

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Fig. 38.—Yearlings sired by Matthews bulls. In 1931 four yearling bulls of Regulator breeding were purchased from E. L. Matthews of Kinsley. The service of these bulls proved "most outstanding."

from Robert H. Hazlett of El Dorado. Among these bulls was a son of Hazford Rupert 25th. He proved an outstanding sire. In the fall of 1931 four yearling bulls of Regulator breeding were purchased from the E. L. Mathews herd at Kinsley. The service of these bulls proved most outstanding. The bulls were all from the same sire. They passed on excellent qualities and uniformity to their calves. Many of the heifer calves were used as herd replacements. Another good sire of similar breeding was purchased of Mathews in 1934. Other bulls have been purchased as follows: in the fall of 1935 Carlos Domino III bull from the Wyoming Hereford Ranch at Cheyenne, Wyoming; in 1936 an Advance Mischief bull from John M. Lewis and Sons of Lamed; in 1937 a Regality Bred bull from the College; in 1940 a Domino Mixer bull from the Rothschild dispersal sale at Norton. Bulls purchased between 1940 and 1950 included Battle Mischief, Delson Rupert, Rollo Mischief 8th, Real Pioneer 23rd, Perfect Tredway, Prince Tredway, and J. O. Royal Lad.

Bulls obtained in the period 1951 to 1955 inclusive had similar breeding and included Dandy Tredway 4th, Duke R. Domino 2nd; P. Royal Duke 92nd; P. Royal Duke 33rd; J. O. Duke Pride 71st; and two Princeps Mixer bulls the 44th and 46th, respectively.

In 1955 a series of breeding investigations was begun that involved the relationship of the feedlot performance of a sire to that of his progeny.

Since the heritability of feedlot gain is relatively high, this project was initiated to study the feasibility of feeding a fattening ration to a group of bulls for 180 days after weaning, in order to determine their ability to gain when on full feed and to investigate further the importance

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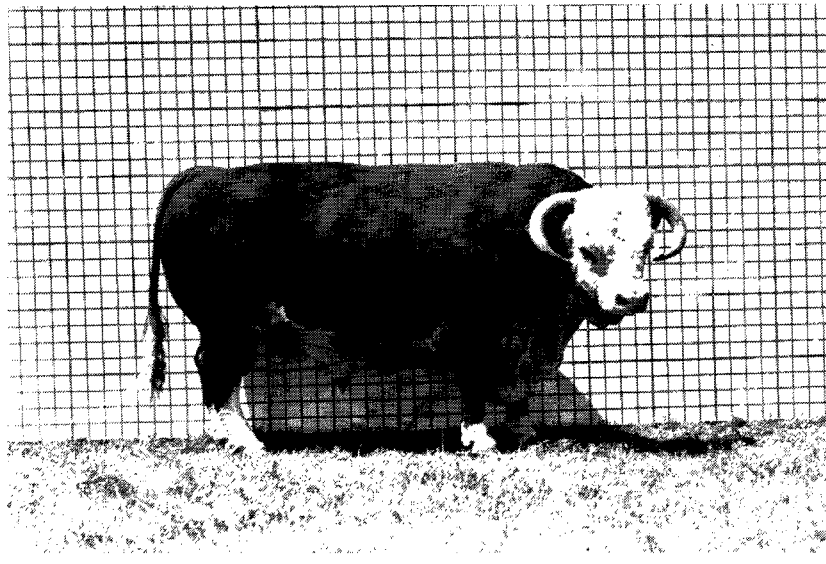

Fig. 39.—Perfect Tredway, "typical of the bulls that headed the Station herd, passing on excellent qualities and uniformity to their calves."

of considering this factor when selecting a herd sire.

Nine bull calves all sired by the same bull and from closely related dams were selected during the period 1955 to 1962, from the herds of the following purebred Hereford breeders: William F. Winzer, Reece; L. W. Henry, Leoti: Thad Douthit, St. Francis; and the Sun Ranch, Salina. Additional sires for use on the remainder of the cow herd not used in the progeny-testing investigations were obtained from the Forest J. Scrivner herd at Haigler, Nebraska.

In 1933 a policy was inaugurated of marking each calf with tattoo numbers. In one ear the tattoos recorded ownership and the number of the mother; in the other ear the tattoos recorded the year of birth and the calf number. In this way it was possible to determine the kind and quality of calves each bull was siring.

During the 1930's great difficulty was experienced in maintaining the herd. Following the exceedingly hot, dry season of 1934, poor pastures and depleted finances made it necessary to dispose of breeding cattle in 1935. All the yearlings were sold and the old cows culled, reducing the herd to 89 cows and 81 calves. The herd then was shipped to Manhattan and grazed on the Alvin Springer pastures north of town. In 1937 following the exceedingly dry year of 1936 the cow herd, including 2-year-old replacement heifers, totaling 123 head and 94 calves, was shipped to Niles for summer grazing. Forty-four yearling steers were grazed that sum-

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mer on rented pasture 15 miles north of Hays, and a few yearling heifers were given the run of the entire pasture area of the Station. There were 185 females in the herd upon return from pasture in 1937. All were given the Bangs test and found negative, resulting in the Station's being awarded a Bangs-free certificate.

Feed shortage and insufficient funds made it necessary in December 1937 to sell 50 cows, heavy with calf. Because of continued dry weather it again became necessary in 1939 to rent pasture for the cows and calves. Good pasture was located in Mitchell County. Thirty-seven cows were sorted out and sold before the herd was moved to pasture, in order to provide funds for Station operation. The continued drouth situation and shortage of funds in 1940 again made it necessary to sell breeding cattle. Thirty-three 10- and 11-year-old cows and 12 two-year-old heifers were sold. The rest of the herd consisting of 76 cows and calves and 23 yearling heifers were moved by truck in June to pasture near White City. The average weight of calves off grass that fall was 520 pounds, showing the value of good grass and of selecting good cows and herd sires proved by the herd sire testing program.

The Hereford cow herd was developed at the Station to provide uniform stock for experimental work and a demonstration of good cow herd management.

The cattle inventory reached an all-time high of 774 head in the fall of 1961. All were used as experimental animals. There were 150 head in the cow herd, and 275 steer calves were purchased that fall. Half of the steer calves were wintered in the lots and used in the summer feeding programs. The others were held over for use for annual grazing trials followed by fattening tests the second winter. Calves from the cow herd were on creep-feeding tests.

Fig. 40.—Station yearling heifers on grass near White City, where the herd of 76 cows with calves and 23 yearling heifers were moved to pasture when the drouth persisted in 1940.