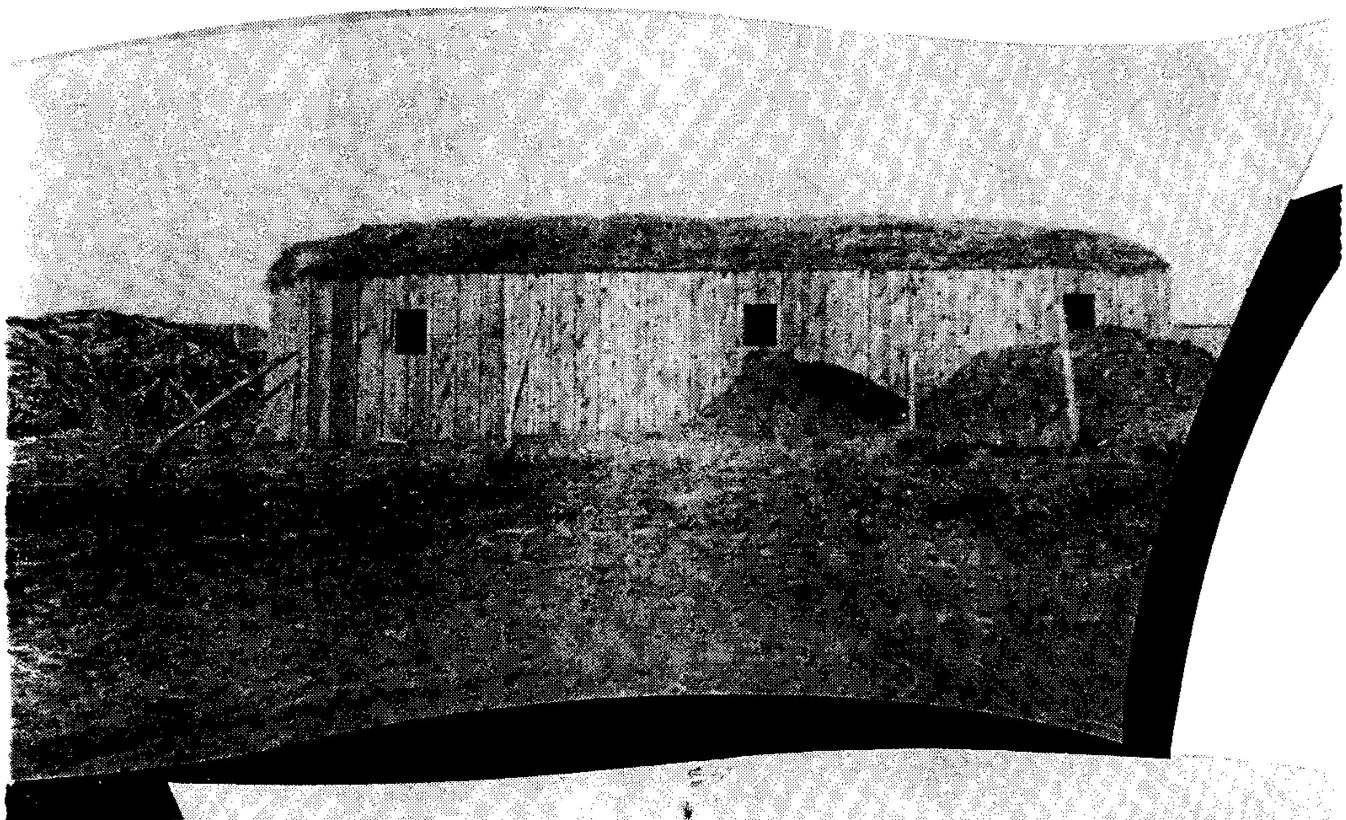
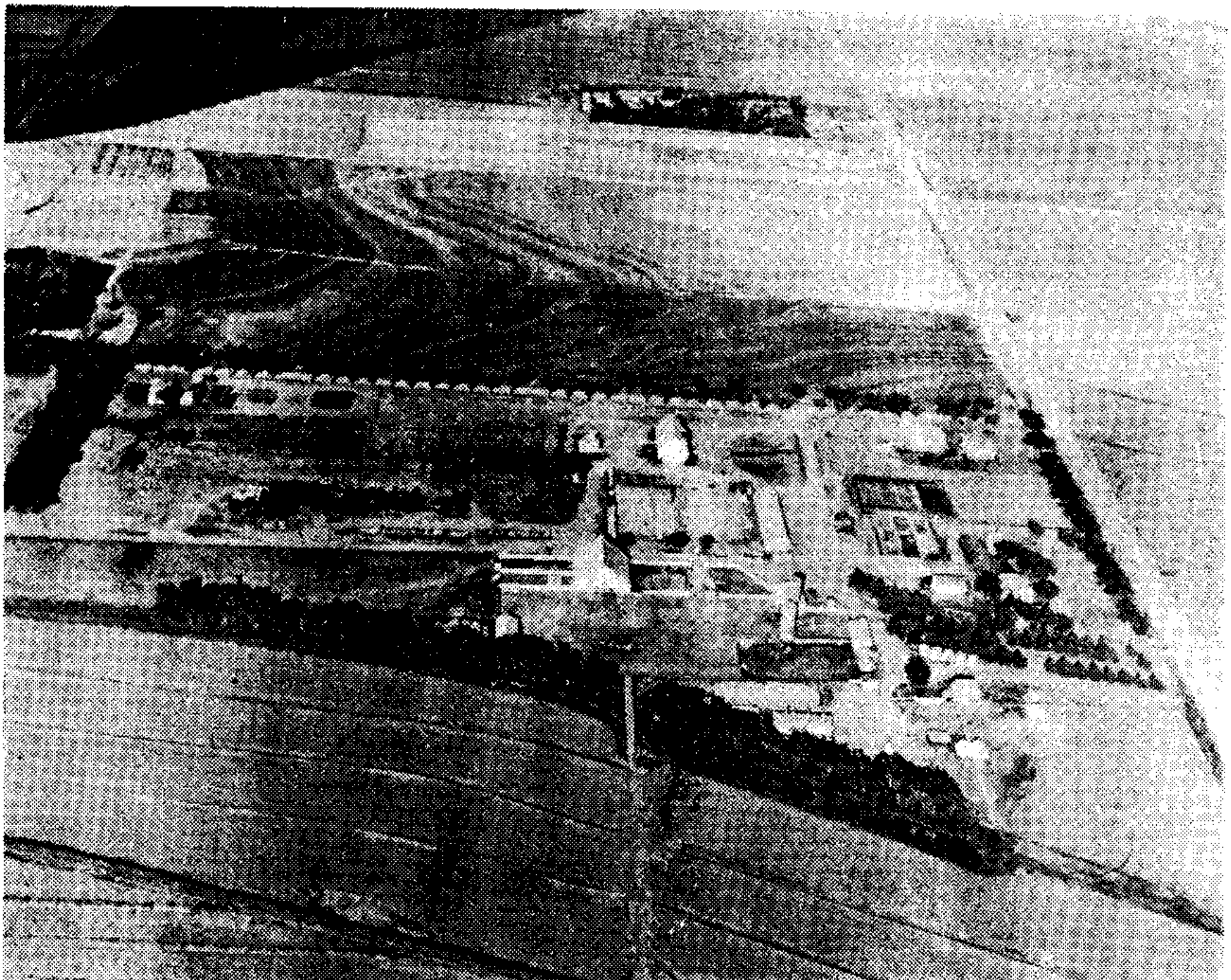
Report 7
June 1957

50 Years of Progress



Garden City Branch
KANSAS AGRICULTRAL
EXPERIMENT STATION



CONTENTS

ABSTRACT

The Garden City Branch Experiment Station has served the people of Kansas in numerous ways during the past 50 years and enjoys the confidence and support of those who know it. This publication presents a historical record of the progress of the station from the standpoint of facilities, accomplishments, and current services. A chronological account of the financial support and a record of technical personnel are included.

PURPOSE

This publication is intended to present a brief but accurate historical report of the establishment of the station, its progress, projects, and personnel. The brief account of accomplishments is intended to create desire for more complete information on various projects and to acknowledge the completion and continuation of valuable research work.

FIFTY YEARS OF PROGRESS[1]
at the
Garden City Branch Station

Andrew B. Erhart[2]

For 50 years the Garden City Experiment Station, a branch of Kansas State College, has served the people of Kansas and has continued to enjoy the confidence which was evidenced by early local support.

"It is facts and not theories that the people want in reference to the subject of irrigation," A. W. Stubbs, editor of the Irrigation Champion, one of the early monthly papers promoting irrigation in western Kansas, wrote in 1895.

This philosophy, as it applies to both dryland and irrigation farming, was responsible for the establishment of the Kansas State College Branch Experiment Station near Garden City, in June, 1907.

A 99-year lease on 320 acres of land about 5 miles northeast from Garden City was presented by the Finney County Commissioners to the State Board of Regents. The lease, actually signed June 21, 1912, covers the period June 14, 1907, to June 14, 2006.

The Garden City Industrial Club raised $6,200 to start irrigation at the experiment station in December, 1911.

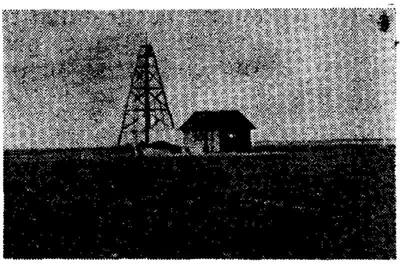


Fig. 1.-First Irrigation Well and Pump-house (1912).

The land leased was the E ½ of section 3, township 24 South, Range 32 West. In July, 1937, 99¼ acres was purchased for $2,000 from George Gano, in the W ½ of section 3. Two years later (April, 1939) an additional 136 acres in the NE ¼ of section 10 was purchased from Pete Meekma for $2,992.

An 80-acre tract (S ½ of SW ¼ 26-23-34), 2 miles north and 1½ miles west of Holcomb, was provided by The Garden City Company, for experimental work starting in 1948.

A 1908 report written by Supt. H. R. Reed states, "The lay of the land comprising the station is variable, ranging from that located in the shallow water area which is adapted especially to crops having deep root-systems, to the upland which

1. Contribution No. 14, Garden City Branch of Kansas Agricultural Experiment Station.

2. Superintendent, Garden City Branch Experiment Station.

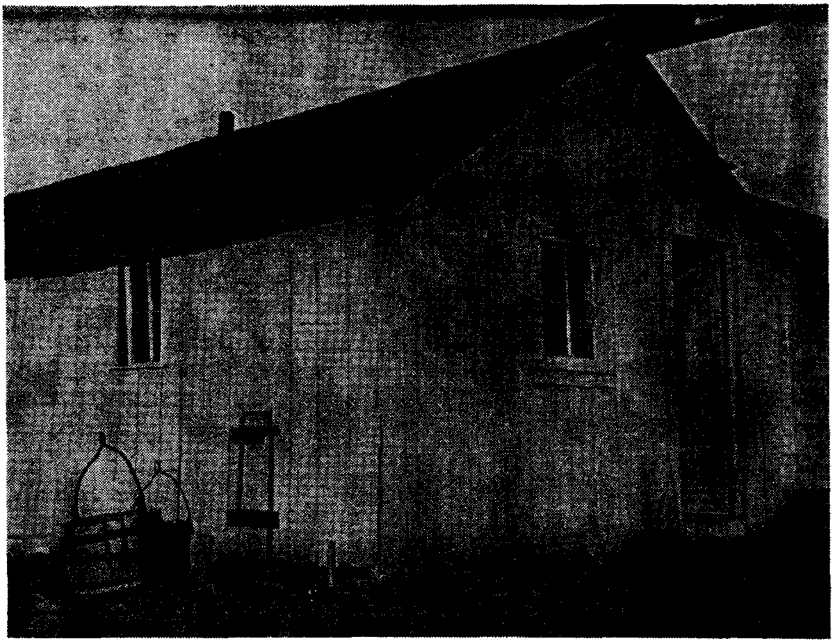


Fig. 2.—This is the first building on the station. It was built in 1908 and consisted of office, harness room, and stable.

is representative of the larger area of the surrounding country."

"The equipment with which the station is provided is limited. One building furnishes shelter for the tools and a lodging place for the man in charge. The implements on hand consist of a plow, disc-harrow, smoothing harrow, grain drill, hand corn-planter, one-horse cultivator, subsoiler, and a light farm wagon. There are two horses. No scales were available with which to determine yields."

"For proper development of the station," he said, "a set of buildings consisting of a house, a barn (including a seed room), an implement shed, and a windmill should be provided, and a binder, a gasoline engine, a small size thresher, a lister, corn planter, and some wagon scales will be needed."

A conservative estimate of equipment investment today would approach $100,000. To replace all land, buildings, livestock, and equipment now being used would require an outlay of more than $1 million at 1957 prices.

It is interesting how well the scientists of those early days understood the problems they faced and which still concern us some 50 years later. An early report of the experiments indicated they were planned to study (1) continuous cropping, using current methods and devising new methods, (2) alternate cropping and summer fallow or other crops, and (3) methods to prevent blowing and conserve moisture. Superintendent Reed's report stated that we need to determine the depth of rooting of the various crops, the extent to which they exhaust soil moisture, and the amount of water they need to produce a given weight of dry matter.

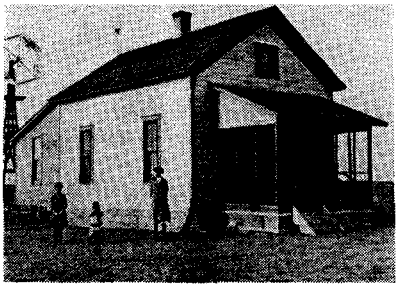


Fig. 3.—First residence on the Experiment Station (1913).

Although many of the questions of those days still remain unanswered, progress has been made. The development of new varieties, better machinery, more complete understanding of moisture, soil and crop relationships, fantastic advances in the use of chemicals for disease and insect control, new fertilizers, hormones and antibiotics, all of which have taken place in one man's lifetime, is almost unbelievable. The Garden City Experiment Station has had a part in that development. The people, who have directed its endeavors, who have done the actual work, or who have supported the activities in any way, can be proud of the results.

Mistakes were made and faulty conclusions drawn at times on the basis of short-time results, e.g., six continuous years of crop failures seemed to justify the statement in the 1914 annual report: "Results of experiments conducted on dryland at this station demonstrate that winter and spring wheat, oats, barley, and corn are unprofitable crops even when raised under the best systems of tillage and in rotation. Thus it has been demonstrated that the various sorghum crops are the only ones that can be made profitable in this district under dry upland conditions."

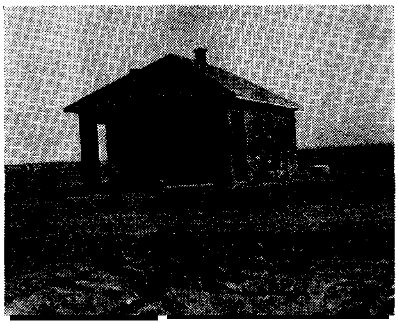


Fig. 4.—Office Building (1913). Used until 1948.

The 1914 report shows wheat yields of 20 bushels per acre but explains, "These yields of wheat are unusual, it being the first year that wheat has been harvested at the station since its establishment."

Fewer than fifty plots were devoted to winter wheat in 1914, including only three different varieties. In recent years as many as 2,000 wheat plots have been studied.

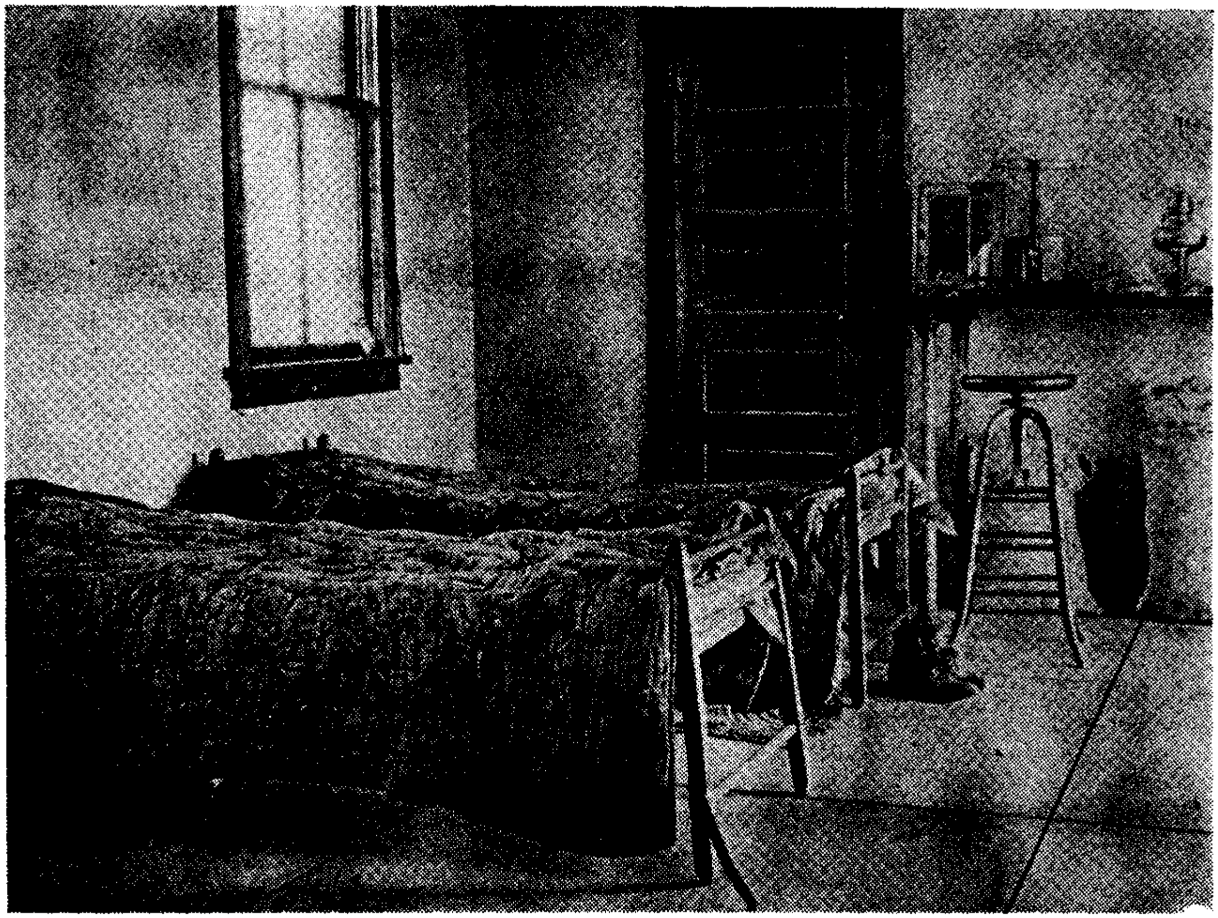


Fig. 5.—Sleeping quarters and laboratory equipment in office building (1916).

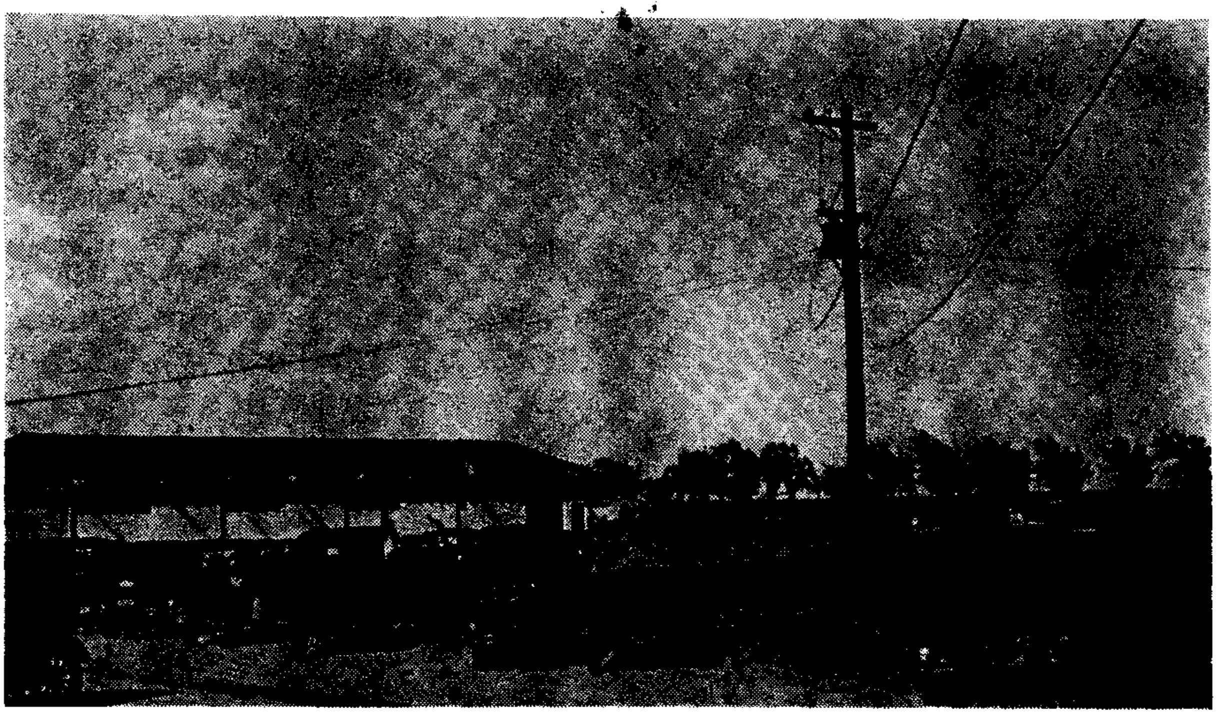


Fig. 6.—Field days have been held at regular intervals each year so farmers could see and hear the results of research. A good crowd attended the 1927 Spring Field Day.

Under irrigation we have more knowledge of the water requirements of crops. We know more of the rooting habits, the critical stages of growth, and soil fertility factors. We've learned some things about the water-holding capacity of soils, their intake rate, irrigation efficiencies and the control of insects and diseases. New varieties have been developed, some of them, such as combine milo, to fit a specific need—in this case a grain sorghum, which could be planted and harvested with the same machinery used for wheat production.

Other varieties with resistance to disease have meant much to the agriculture of Kansas. The so-called "milo disease" was discovered on the Garden City Station and much of the testing to assure resistant varieties is done here.

Fig. 7.—Trees, shrubs and lawns with station water storage tank in background form pleasing view.

Numerous studies with rates and dates of seeding crops have resulted in valuable information. In the early days of the station wheat was generally seeded at 1 bushel per acre. Today's maximum yields on dryland are produced with one half bushel or less. Milo yields, on the average, are best when not more than 2 pounds per acre are planted. Optimum seeding dates, for both wheat and sorghum, are later than those used in the early days.

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The early settlers of western Kansas realized that a home, whether in town or on the farm, should be an attractive place. They knew that trees, grass, shrubs, and gardens helped beautify houses. Since the early days of the station these crops have received attention. Although no elaborate horticultural tests have been conducted, hundreds of species have been grown for observation.

Field days. Although research is the principal function of a branch experiment station, efforts are made to present results to those who can use them. Visitors are welcome at any time

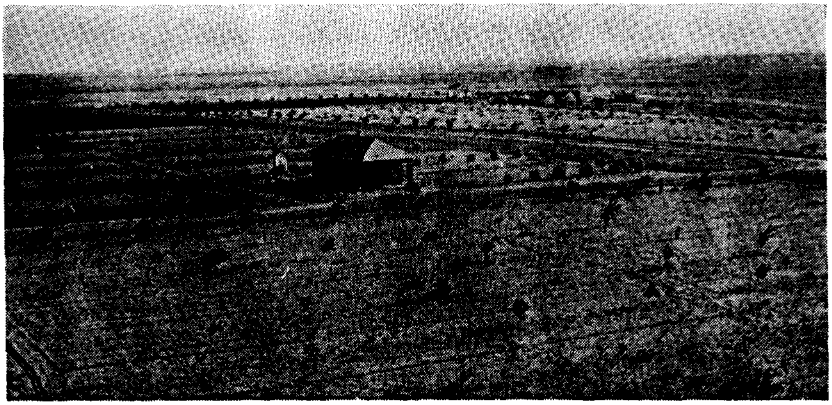


Fig. 8.—Trees and shrubs were planted in 1914. By the following year, when this picture was taken, they were growing nicely.

and records show many hundreds visit the station each year. Field days offer interested persons an opportunity to see the various tests and to hear the research project leaders discuss progress being made.

Visitors often have helped by suggesting certain lines of research. Four field days are currently scheduled, including: Lamb Feeders' Day, Dairy Field Day, Spring Field Day, and Fall Field Day. Groups, such as county agents, soil conservation service men, vocational agriculture classes, 4-H clubs, scouts, and other organizations, frequently make appointments to visit the station.

Other activities. All members of the local staff are available for a limited number of meetings with civic clubs and other organizations interested in agriculture.

Fig. 9.—As the trees grew so did the station, with additional buildings in evidence by 1921.

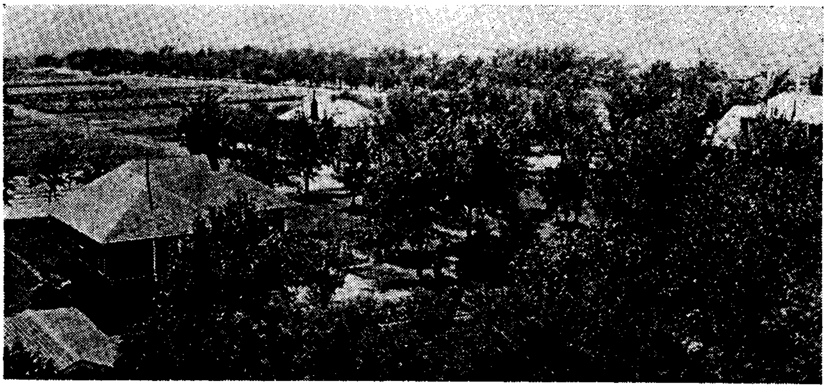


Fig. 10.—By 1927 trees and shrubs afforded beauty, shade, and protection from wind.

Numerous magazine and newspaper reports give results of research and suggestions for its practical application.

A radio report is presented over a local radio station (KIUL) from 7:40 to 7:45 each week-day morning. All staff members contribute to these reports.

Publications. Mimeographed and printed pamphlets are prepared each year, giving data and recommendations on a wide variety of subjects. Articles are prepared for publication in technical and popular magazines.

Fig. 11—Main drive on station as seen in 1918.

Problems. Every experimental planting of crops is subject to hazards of one kind or another. Soil and climatic conditions can be ideal for crop production in years when such things as birds, hail, duststorms, rabbits, grasshoppers, other insects, many kinds of diseases, poor equipment, human error, and even the neighbors' livestock, cause serious damage to plots. Each of these factors has caused lost data at the Garden City Station. They have exerted an undetermined effect on the available data that, in some cases, resulted in erroneous or inaccurate interpretation of results.

Fig. 12.—Main drive in 1936. American elm trees on left have been irrigated. Those on right were unirrigated.

These are problems common to all agricultural research and their complete solution is difficult. The use of the best data available, tempered with good judgment, can bring new ideas and better practices.

To be most effective, applied agricultural research must be carefully planned, executed with painstaking exactness, observed, and recorded in detail, continued for a sufficient length of time, and finally interpreted and reported to the public in a concise and usable manner. This requires dedicated, research-minded personnel, adequate equipment, and continuous financing. Shortages of scientifically trained people and wide variations in appropriations have always reduced the effectiveness of research. Demands for information on many crops, with inadequate facilities to conduct research on them, frequently have compelled project men to spread their efforts so widely that the production of truly reliable data was reduced. Much valuable data remain in annual project reports or even

Fig. 13.—Mimeographed material released during one year, by local staff.

in field notebooks because lack of time, of interest, or of writing ability precluded publication.

Finances. Although agricultural research appears to be a slow, plodding sort of work, the accomplishments of a given period of time may be influenced by the extent and continuity of the investment in research. The records show the following appropriations by the state legislature to the Garden City Branch Station.

1912	$ 5,000	1928	$11,700	1944	$12,000
1913	4,700	1929	11,500	1945	12,000
1914	5,000	1930	12,000	1946	25,500
1915	5,000	1931	12,000	1947	18,000
1916	6,000	1932	12,000	1948	26,500
1917	5,000	1933	12,000	1949	23,000
1918	5,000	1934	7,500	1950	56,000
1919	5,000	1935	7,500	1951	37,500
1920	8,300	1936	7,500	1952	63,600
1921	5,000	1937	12,500	1953	48,600
1922	7,000	1938	16,500	1964	53,000
1923	7,000	1939	14,000	1955	56,000
1924	12,350	1940	13,500	1956	56,992
1925	10,000	1941	11,000	1957	67,913
1926	12,100	1942	13,000		
1927	11,100	1943	13,000		

Specific items are included in some of the appropriations, e.g., in 1920, $3,300 for irrigate pump; 1924, $3,500, foreman's cottage, $850 for threshing machine, and $500 for rabbit-proof fencing; 1925, $2,000 for machine shed; 1927, $1,500 for hay and cattle barn; 1937, $5,000 for purchase of land; 1938, $2,500 for agronomist's house; 1946, $7,500 for new office building; 1948, $8,600 to replace building and equipment destroyed by fire; 1950, $8,000 for repairing houses, $10,500 for improving irrigation system; 1952, $15,000 for water tower and lines.

Receipts from sale of seed and produce of various kinds have been available to support research work, with some restrictions. This money has provided a considerable portion of the operating funds. In recent years it has averaged about $35,000. The availability of receipt money for station improvement and project support has stimulated station workers and administration to apply initiative and good judgment to general station operation and the disposition of project by-products.

Other departments of Kansas State College have financed various projects at the Garden City Station. One currently supported is the entomology project, on insect investigations. A brief account of each important project is a part of this report.

PROJECTS

Responsibility for the various phases of station work is assigned each project worker. Some research requires the close cooperation of two or more staff members. Every project is carefully planned to avoid duplication and is coordinated with the efforts of appropriate departments of Kansas State College.

Relationship with the Agricultural Research Service and other agencies of the United States Department of Agriculture has remained excellent.

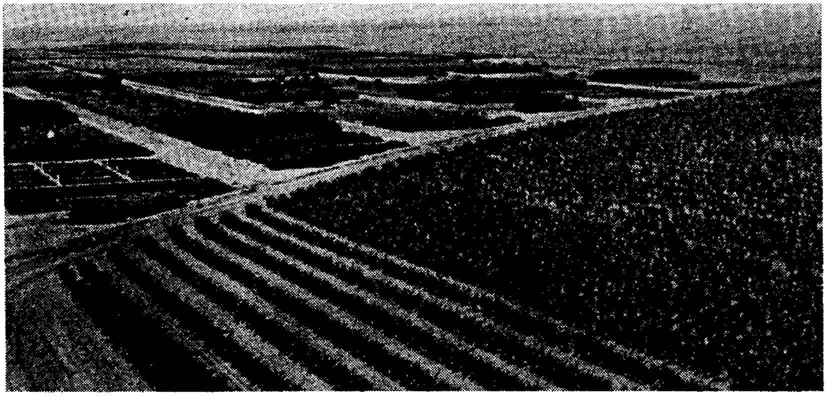


Fig. 14.—A small portion of the early research plots dealing with soils and crops (1930).

Although much of the research work is concentrated on the experiment station land, field trials throughout southwestern Kansas permit the study of problems not present on the station itself. Some of the earliest off-station work was done on the farms of T. A. Spence, Albert Drussell, and Sam Boman, where sorghum and corn variety tests were conducted from 1923 to 1932. Many farmers have given valuable cooperation in making land and equipment available for research purposes.

DRYLAND SOIL MANAGEMENT

In spite of the interest in irrigation during the late 1800's many people believed that the future of southwestern Kansas lay in dryland farming. They wanted information in regard to crop production under very dry conditions. The United States Department of Agriculture cooperated with Kansas State College from the beginning. The Garden City Station was one of 22 such stations, from Canada to the Gulf of Mexico, where dryland experiments were conducted by U.S.D.A. researchers. Throughout the years a sustained effort has been made to conserve the limited supply of soil moisture for crop use.

Supt. M. C. Sewell, in his 1914 annual report, accurately stated that "the amount of water stored by summer tillage is but 15 percent of the rainfall during the tillage period."

Seedbed preparation in the early days of the station involved moldboard plowing 5 to 6 inches deep as a standard practice. Experimental work has proved this is an unnecessary expense that has, in some cases, caused winterkilling of wheat.

Other tests have shown that during an 11-year period improper tillage, which permits serious soil erosion, resulted in a loss of top soil totaling as much as 500 tons per acre. This represents a loss of plant food equal to that required to produce 25 bushels of milo annually for 48 years.

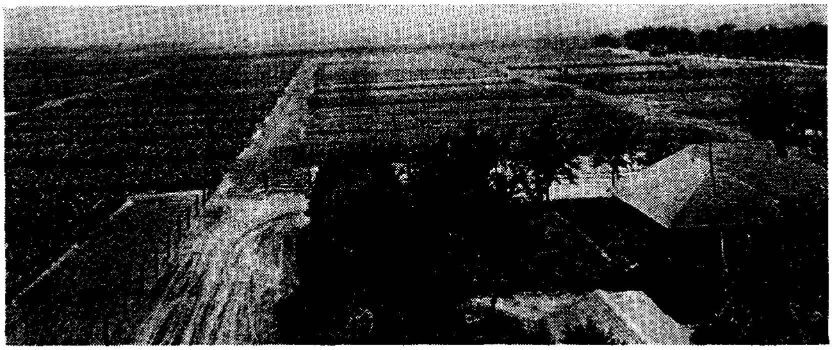


Fig. 15.—A birdseye view of a portion of the old dryland agriculture project as it was in 1927. This was a federal project until 1948, when it was revised and supported entirely from state funds.

In connection with the dryland soil management project climatological records are taken daily showing the precipitation, maximum and minimum temperatures, wind velocities, and humidity. These data, covering the entire Great Plains area, permit correlating weather conditions and crop yields.

Dryland soil management was one of the earliest problems facing the farmer of western Kansas. Moisture is the most important factor limiting crop production. Its conservation and efficient use still challenge the research worker. The value of sub-soil moisture as a basis for predicting crop yields is now common knowledge throughout the Great Plains. The best known methods of seedbed preparation, crop rotation, seeding, and tillage practices leave much to be desired. Progress is being made but the future offers promise of far greater developments.

Some of the more important studies now in progress include: Fertility tests, deep plowing, dryland legumes, chiseling, stubble-mulch tillage, moisture movement within and from the soil, as influenced by temperature and rainfall, and conservation and use of moisture with paper, plastic, or other mulching material.

CROP IMPROVEMENT

This project deals with crop varieties and management factors such as rates and dates of seeding. It was the direct responsibility of the superintendent until July, 1937, when a project leader was hired to devote full time to these studies.

Winter wheat, sorghums, and alfalfa have received major attention, although spring wheat, barley, oats, sweetclover, cotton, flax, jerusalem artichokes, sunflowers, sugar beets, broomcorn, lespedeza, red clover, ephedra, and many kinds of pasture grasses and legumes have been grown on a limited scale.

Fig. 16.—Moisture movement into and out of soil as influenced by surface treatments is a part of current soil management research. Gypsum blocks are buried at various depths in small plots and permit frequent moisture determinations, with no disturbance of the surface (1955).

Wheat. Studies with this crop have contributed valuable data on new varieties (their quality and resistance to insects, diseases, and climatic conditions) and optimum rates and dates of seeding. This crop is tested at this station on both dryland and under irrigation in thousands of plots each year.

Sorghums. Grain, forage, and pasture sorghums have been tested extensively throughout the 50-year history of the Garden City Station. They are among the most dependable crops grown on both dryland and under irrigation. Varieties, tillage methods, seeding dates, rates of planting, effects of rotations, water requirements, fertilizer response, methods of seeding, and many other variables are included in the research work with this crop.

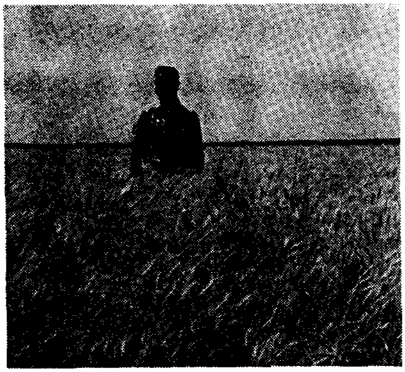


Fig. 17.—This field of irrigated Comanche wheat yielded 54.0 bushels per acre in 1955.

Milo disease (periconia rootrot) was discovered here by Supt. F. A. Wagner in 1926. Since that time the development of resistant varieties has held damage to a minimum. Several varieties, such as Finney and Westland, have been developed here. New varieties, produced by plant breeders throughout the Great Plains, are sent here to determine their resistance to this disease.

The development of combine types of grain sorghums has been a major accomplishment. High yields from such varieties have disproved the early, common belief that short-stalked varieties could never produce like the tall, leafy types.

Alfalfa has been recognized as a valuable crop under irriga-

Fig. 18.—Westland milo is a disease resistant variety developed at the Garden City station. This irrigated field yielded 105 bushels per acre in 1954. Some authorities doubted that low growing combine types could produce satisfactory yields. These varieties were developed specifically to be planted and harvested with wheat farming equipment.

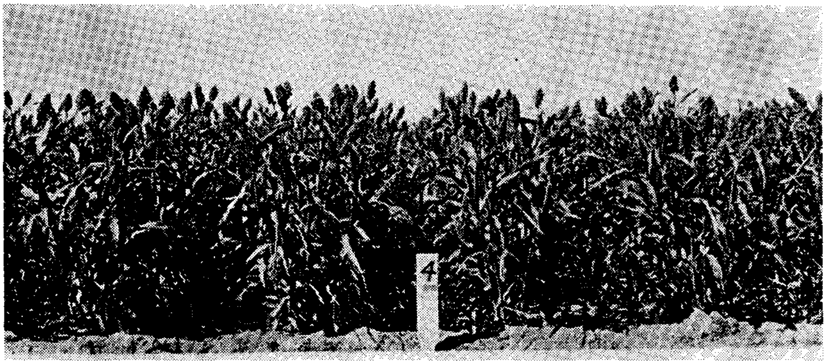


Fig. 19.—Combine types of milo have replaced the tall, crook-neck varieties and are producing high yields of grain. This irrigated field of Dwarf Yellow Milo made 109.7 bushels per acre in 1924. In 1931 this plot, in rotation with alfalfa, yielded 132.5 bushels of grain per acre.

tion in southwestern Kansas. Throughout the years of testing, its water needs and management requirements have been studied and reported. Its value in crop rotations, as a forage crop, and for seed production is well known.

Hay yields up to 9 tons per acre and seed yields above 10 bushels per acre are reported for Garden City station plots.

The Garden City Branch Station was helpful in the development of Buffalo alfalfa, a variety resistant to bacterial wilt.

MOISTURE REDUCTION EXPERIMENT

A rather comprehensive study was conducted from 1914 to 1917, by Dr. Edwin C. Miller, Department of Botany, Kansas Agricultural Experiment Station, to study the fundamental

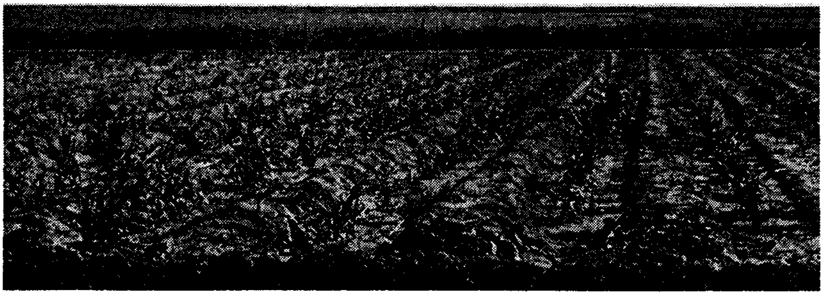


Fig. 20.—A single plant selected by Supt. F. A. Wagner in 1931 resulted in the new variety Westland, a selection from Wheatland developed at this station and released to farmers in 1942.

characteristics which enable sorghum plants to withstand severe climatic conditions.

This study had 4 objectives: (1) To determine the amount of water used by crops at various stages of growth; (2) to study the root systems of each crop at various stages of growth; (3) to determine the extent of transpiration from the leaf surfaces, and (4) to study microscopically the cell structure of sorghum plants.

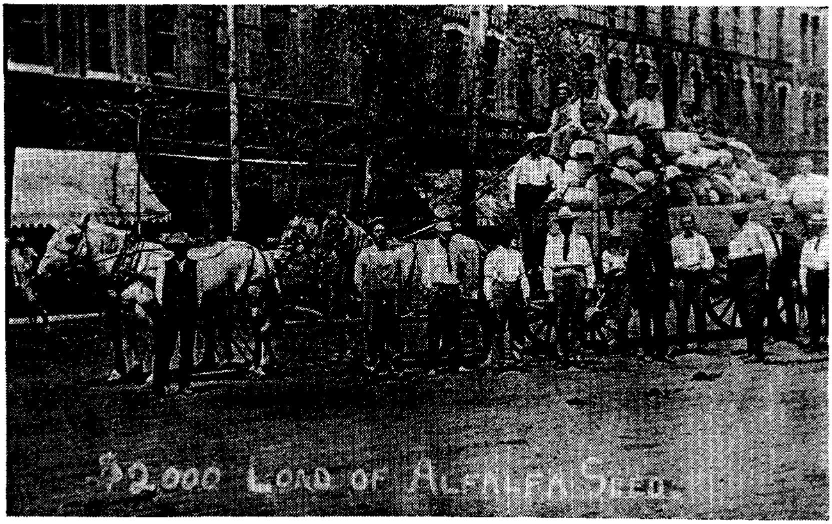


Fig. 2l.—Alfalfa has been one of the most important crops under irrigation in this area. This picture shows a single load of alfalfa seed marketed in 1909, by E. F. Niquette and son, for $2,000. Later in the same year George M. Dallas marketed a $3,000 load of seed, produced on Sunny Land Farm leased from D. R. Menke. Seed was worth $8 to $9 per bushel.

It was found that sorghum roots penetrate 6 feet and produce large numbers of secondary roots. Sorghums produced approximately twice as many and more fibrous secondary roots than did corn plants. This study also provided data on the water requirements of corn and sorghums; daily variation of water and dry matter in the leaves of corn and sorghums; and comparative transpiration of corn and sorghums. The results were published in the Journal of Agricultural Research. V. 6, No. 9, 1916; V. 6, No. 13, 1916; V. 10, No. 1, 1917; V. 13, No. 11, 1918.

HOGS

A purebred herd of Duroc hogs was maintained at this station for many years. A 10-year experiment dealing with alfalfa pasture was concluded in 1929 and is summarized in that year's station report. The herd of hogs was dispersed in 1954 to allow more time for dairy work.

Fig. 22.—High quality breeding stock and use of balanced rations, with alfalfa pasture, maintained a profitable hog herd on the station (1931).

DAIRY

A small herd of grade Ayrshire cattle was transferred from the old Dodge City Experiment Station in April, 1917. This herd failed to develop as planned, as the majority were unproductive, undersized animals, of no value as foundation stock. The entire herd was disposed of in 1922 and good-quality, grade Holsteins replaced them. Holsteins made up the station herd until the fall of 1940 when the herd was sold and replaced with registered Brown Swiss. This breed was rapidly gaining favor in Kansas and had impressed Dean L. E. Call, Director of the Kansas Agricultural Experiment Station. It was decided that the Garden City station should have an outstanding herd of Brown Swiss cattle. Supt. L. M. Sloan, and Prof. F. W. Atkeson, head of the dairy department, Kansas State College, selected 11 individuals from herds in Michigan

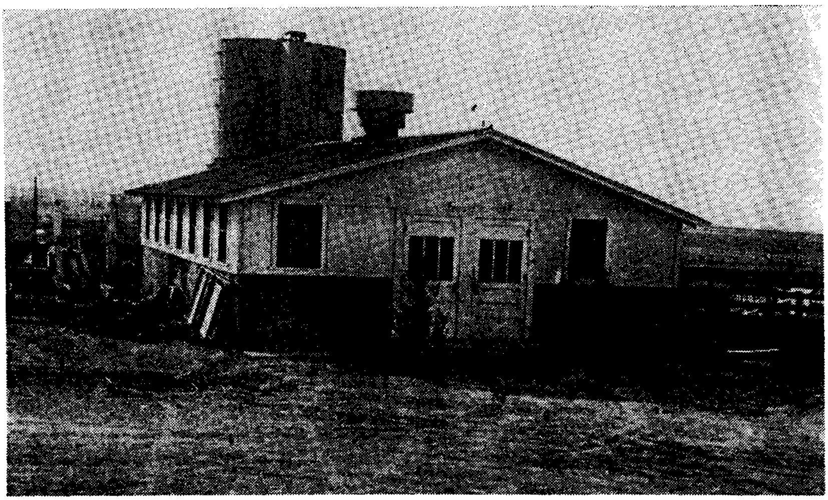


Fig. 23.—This dairy barn, remodeled in 1941, is still in use.

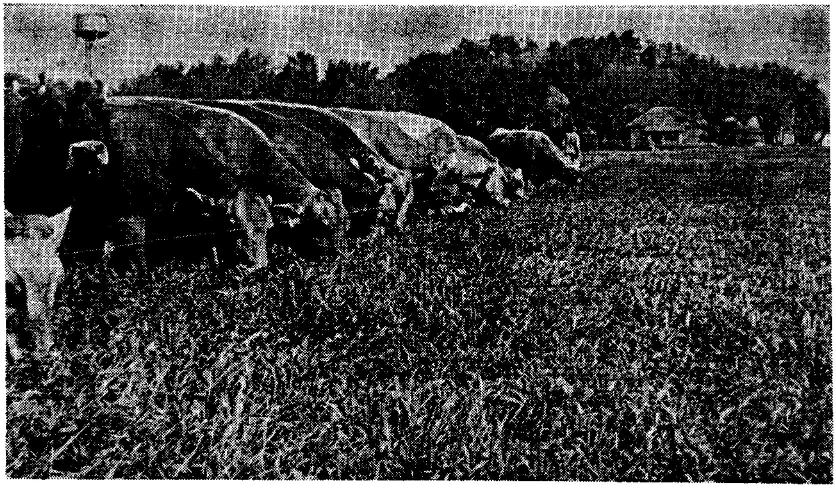


Fig. 24.—A fine herd of Brown Swiss cattle is used to measure productivity of varied irrigated pasture. Here an electric fence restricts grazing to a narrow strip of high quality alfalfa bromegrass pasture. Tests started as early as 1921 have shown the value of alfalfa-brome, sweetclover, and sudan. Less productive crops have been bluegrass, white clover, orchard grass, fescue, red top, wheatgrasses, and tall oat grass.

and Illinois. These animals represented the best blood lines of the breed and were purchased for a total of $2,475. Since that time the herd has been used to demonstrate the place of dairy cattle on irrigated farms, the value of irrigated pastures, the utilization of large quantities of roughage, and to provide

Fig. 25.—Grape vineyard 1925. Varieties were tested from 1923 to 1932.

a limited amount of breeding stock to other dairymen of the state.

The quality of the herd is indicated by the Dairy Herd Improvement Association records, which give a herd average of 10,568 pounds of milk and 442 pounds of butterfat during 1956. The station has been a member of D.H.I.A. since December 1938.

HORTICULTURE

Among the horticultural crops planted for yield tests or observation are: Cantaloupes, grapes, apples, plums, cherries, jujubes, peaches, nectarines, tomatoes, sweet corn, potatoes, strawberries, and numerous bush fruits, lawn grasses, and many varieties of flowers. Also many different shade trees and shrubs have been grown with and without irrigation.

Fig. 26.—The third annual lamb feeders day (February 29, 1936) shows, left to right, R. F. Cox, now head of Animal Husbandry Department, KSC; A. D. Weber, now Dean of Agriculture, KSC; F. A. Wagner, Supt. of Garden City station, 1919 to 1937; L. E. Call, Dean Emeritus KSC; and L. C. Aicher, former Supt. Ft. Hays Branch Experiment Station.

LAMB FEEDING

Lamb-feeding experiments were started in the fall of 1933, when 250 feeder lambs were put on dry-lot feeds. This project has continued every year since with the cooperation of R. F. Cox, T. Donald Bell, and Carl Menzies of the animal husbandry department, Kansas Agricultural Experiment Station.

Tests have dealt with hormones, antibiotics, minerals, vaccines, wheat pasture, sorghum pasture, beet pulp, molasses, wheat silage, sorghum silage, beet-top silage, stover, fodder, protein supplements, corn, milo, alfalfa hay, wheat grain, kafir, sorghum forage varieties, mature and immature grain, ground grain, steam-rolled grain, whole grain, alfalfa straw, dehydrated sorghums, pelleted feeds, soda, self-feeding vs. hand-feeding, light lambs vs. heavy lambs, physical balance of feeds, and combinations of these variables.

Results of these tests have gained international recognition and are of great value to the lamb-feeding industry.

Six hundred lambs now are purchased each year for testing purposes. Weather conditions and facilities here are ideal for these experiments.

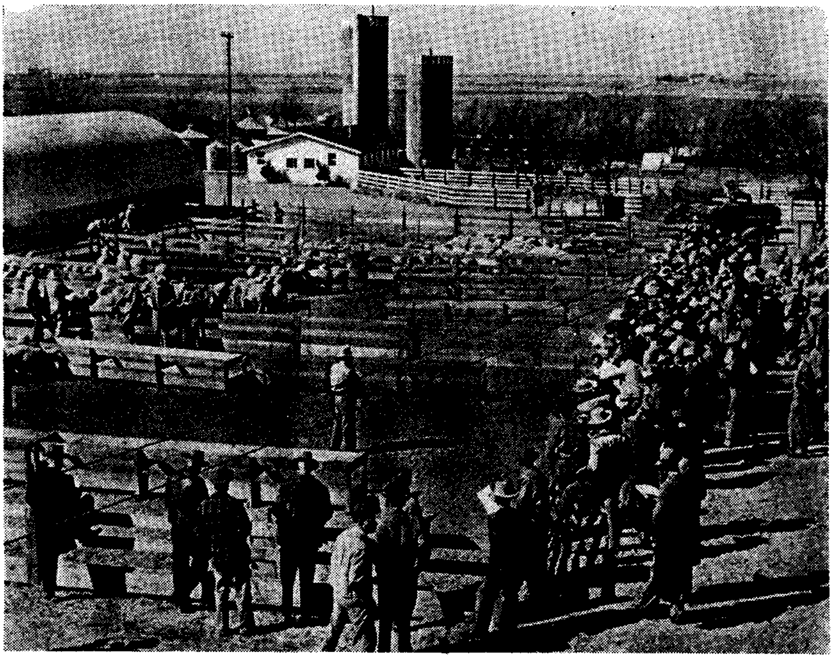


Fig. 27.—Continued interest in lamb feeding experiments is shown by 1950 field day attendance. Dr. R. F. Cox at microphone.

IRRIGATION

Local interest in irrigation has been high since the earliest days of the experiment station. This was shown by the efforts of the Garden City Industrial Club and the county commissioners, in raising $6,200 to be used for drilling a deep well at the station 46 years ago.

This well, as described in the 1915 annual report, was 24 inches in diameter and 180 feet deep, with 90 feet of blank casing and 90 feet wire-wound strainer.

"Water stands at 71 feet and draws down to 130 feet when pumping 725 g.p.m." The pump was a "Van Ness deep-well turbine, shop No. 50, four-stage 24-inch bowls, set 120 feet below the surface, 8-inch suction and 9 5/8-inch discharge." Suction pipe extends 50 feet below the pump. The engine was described as, "Foos No. 29675, 75 rated H.P. single cylinder, 16-inch bore and 24-inch stroke, 175 R.P.M. with 80-inch pulley. Burns 39-degree distillate."

This well and pumping equipment caused considerable trouble and pumped a great deal of sand. The entire installation cost $6,225. A new pump and a 50-H.P. electric motor were added in 1920.

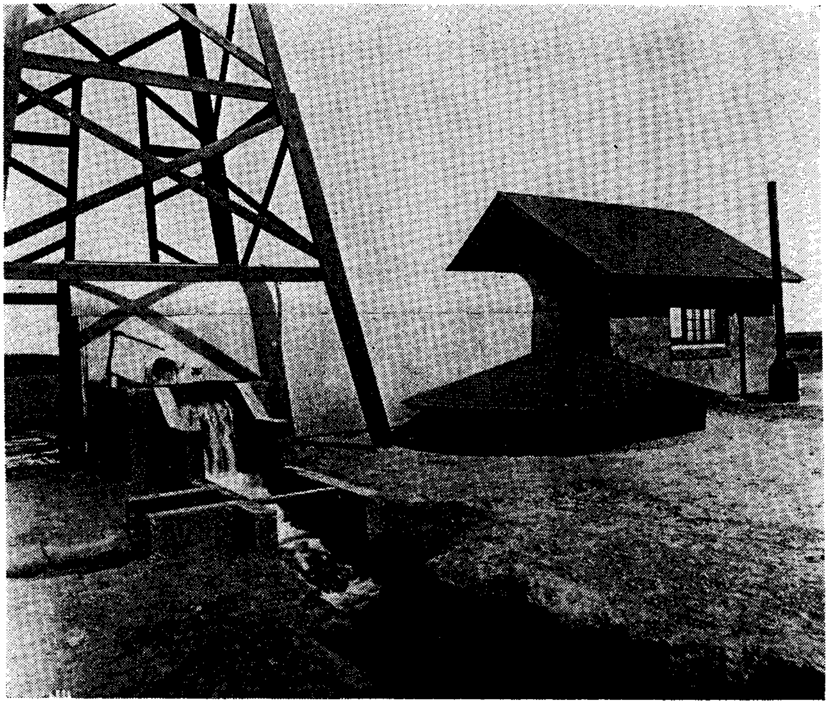


Fig. 28.—First experiment station pumping plant and laboratory building. This well was drilled in December 1911.

It is interesting that the water level in this well, as measured by the State Geological Survey, has shown a gradual upward movement from 1939, when it stood at 71.5 feet, until 1951, when it reached 64 feet. Since that time it has declined to a low of 77.0 feet in January, 1957.

A series of 6 shallow wells were drilled in 1929, nearly ¼ mile west of the original well, in the "bottom land" area of the station. These were 16-inch wells, 75 feet apart. They varied from 43 feet to 51 feet deep. The 6-inch, single-stage, double-suction, ball-bearing centrifugal pump was driven by a 20-H.P. electric motor, and delivered 1000 g.p.m. Total cost was $4,500. A booster pump was installed later at a higher elevation to lift water to the reservoir. The old original deep well was abandoned in 1931, and the booster pump in 1950. Three of the original shallow wells are still used.

Additional improvement was made in 1950, when a deep well

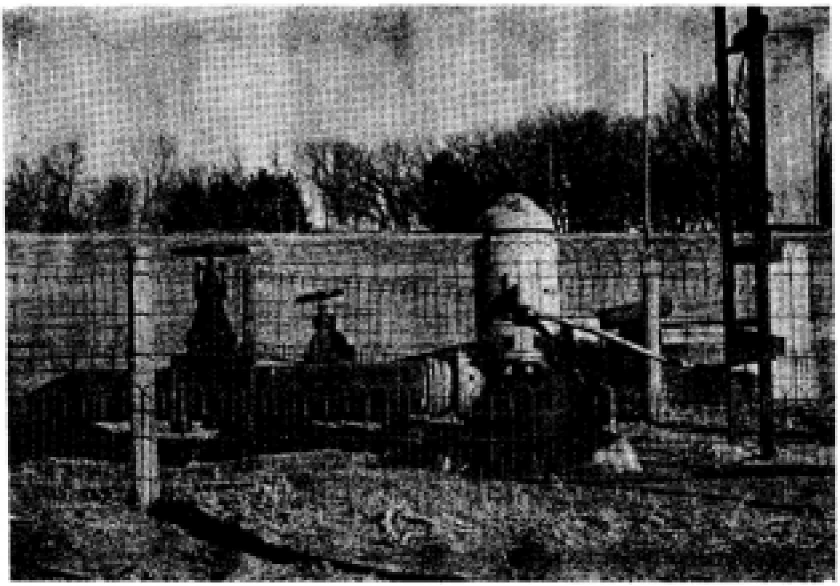


Fig. 29.—This well, completed in 1950, is 245 feet deep and delivers approximately 1500 gallons per minute, through a 10-inch Johnston pump. It is driven by a 40 H.P. electric motor, and discharges into concrete pipeline, open ditch, reservoir, or water tower as desired.

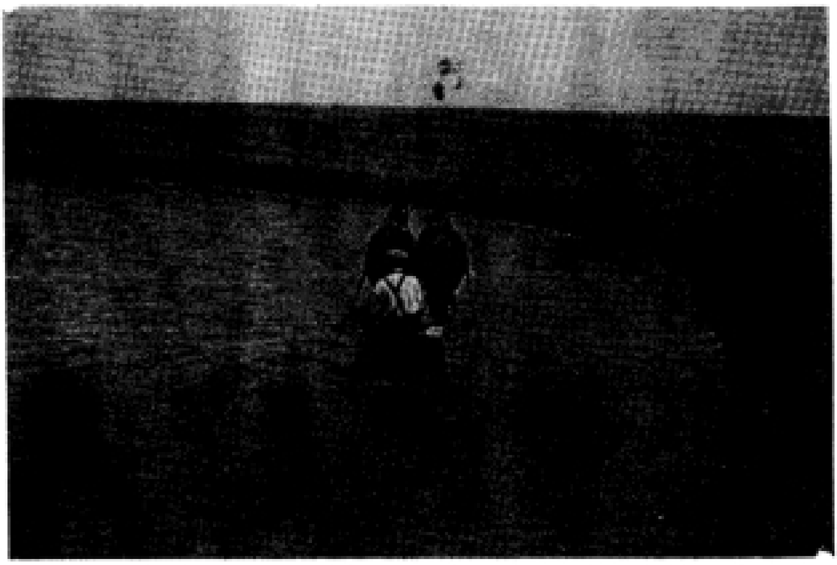


Fig. 30.—Puddling Reservoir—1914. This was necessary to reduce losses by seepage. Even with frequent puddling, 6 to 10-inches of water were lost each day.

was drilled at a point midway between the old deep well and the series of shallow wells. The installation also can be used to maintain automatically the water supply in a 25,000-gallon elevated water tank which supplies livestock and domestic

Fig. 31.—Concrete pipelines were installed for irrigation on the main station in 1954 and 1955. These lines consist of 1,681 feet of 15 inch line and 2,797 feet of 18 inch line. A total of 2,682 feet of 15 inch line was constructed at the irrigation project north and west from Holcomb in the fall of 1956. The value of underground distribution was recognized as early as 1914 when a request was made for such a system.

water requirements. The tank, on a 75-foot tower, was completed in 1952. Water is pumped to the tank through a 6-inch cast-iron pipe and distributed over the station through 4-inch cast-iron mainlines.

Early irrigation studies were designed to determine critical stages of plant growth, cost of deep-well pumping, adaptability of crops to irrigation, economic quantities of water to apply, and loss of water from reservoirs by evaporation and seepage.

A great deal of worthwhile data is available and numerous publications have been released. These may be obtained from the experiment station and various other agencies throughout the state.

Winter irrigation. This is one phase of the irrigation work

Fig. 32.—Wheat has become an important crop under irrigation with yields in excess of 50 bu. per acre rather common. New varieties and improved management methods have made this possible. Proper timing of irrigation helps to produce high grain yields without increasing vegetative growth. Yields of plots represented by these bundles were practically the same.

which illustrates a practical type of information that can mean much to irrigation farmers.

A statement from the Director's Report of 1917-18 says, "One of the most striking and important features of the irrigation work is that in which it was found that profitable yields of several of the field crops grown in southwestern Kansas can be secured if one copious irrigation is supplied to the land in the fall of the year, even if no summer irrigation is practiced."

Circular 72 entitled "Winter Irrigation for Western Kansas," written in 1919 by George S. Knapp, superintendent of the Garden City Branch Station, gives results and points out the value of winter irrigation.

Fig. 33.—Winter irrigating the Meekma tract south of station buildings. This field has averaged 25 bu. per acre of Axtell sorgo seed and 10 tons of silage per acre over a period of three "dry" years with only one irrigation (applied during winter).

Experiments from 1921 to 1930 show the average yield of winter-irrigated milo was 45.0 bushels per acre, compared with 22.8 bushels per acre on unirrigated land. Forage sorghum made 13 tons of silage per acre on winter-irrigated land and 6.7 tons on dryland.

Recent use of this practice on the station and throughout the area substantiates the early results.

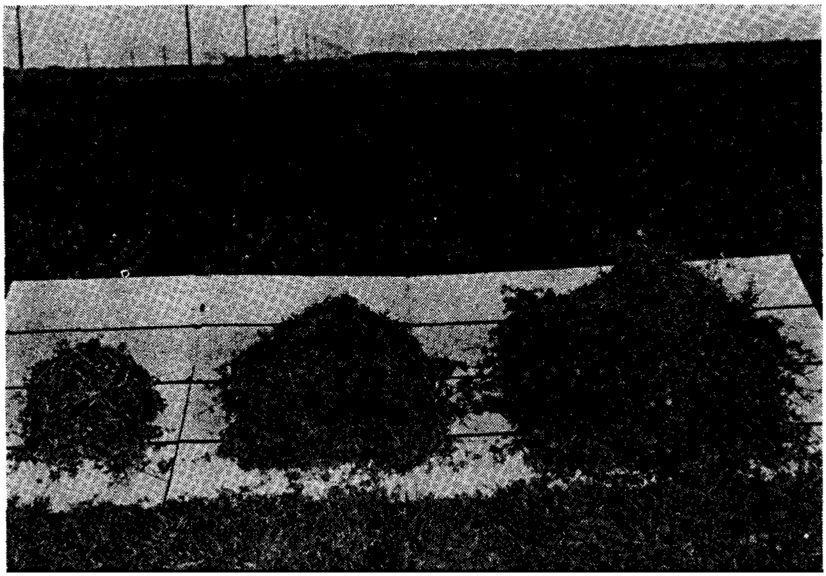


Fig. 34.—Alfalfa continues to be an important crop. Experiments involving varieties, fertilizer, and methods of management have produced valuable data. Increases in yield from phosphatic fertilizer are indicated by this test on the Oldweiler farm near Holcomb in 1954.

A new boost was given irrigation research in 1948, when The Garden City Company made available to the experiment station an 80-acre tract (S ½ SW ¼ 26-23-34) near Holcomb. Funds were available to employ an irrigation agronomist, and the following year the United States Department of Agriculture assigned an irrigation engineer to the station.

This project is concerned with such problems as rotations, irrigation and fertilization of wheat, irrigation and plant populations of milo, leaching of saline-alkali soils, sugar beet varieties, methods and efficiencies of irrigation (including length of run, size of stream, width of border, furrow vs. border irrigation, and effect of level-border irrigation), physical properties of soils and their effect on permeability and intake rate, soil moisture management, and water use (as applied to economic return and critical stages of growth).

SOILS LABORATORY AND FERTILITY STUDIES

Some laboratory analyses were made for many years with limited equipment and under adverse space conditions.

In 1948 funds were appropriated by the state legislature for laboratory equipment in the new office building. Provision also was made to hire an agronomist, trained in laboratory techniques, who could do the laboratory' work and conduct field trials designed to correlate laboratory results with probable field response.

Fig. 35.—Experiment station personnel—1957. Left to right: back row, Edelblute, Armantrout, Grimes, Herron; front row, Lowe, Herring, Erhart, DePew, and Musick.

Analytical service is available to the people of this area at low cost, to determine fertilizer requirements, irrigation water quality, suitability of land for irrigation, protein content of feedstuffs, and other characteristics. More than 10,000 samples have been tested.

An important function of the laboratory is to analyze soil from all research plots on which rotation and fertilizer studies are made. This is done periodically to detect changes as they occur.

Studies include methods of soil analysis, leaching of undesirable salts, effect of fertility on composition of plant products, crop responses to kinds and quantities of commercial fertilizers, effect of fertility on water requirements, and use of chemicals to control chlorosis in milo. Many of these tests are conducted on farms throughout the area.

TURKEYS

A turkey-feeding experiment was started in April, 1947, in cooperation with Prof. L. F. Payne, poultry department, Kansas Agricultural Experiment Station. This project was to make comparisons of various feeds and combinations of feeds, all of which were adequately supplemented with protein, vitamins, and minerals. During the following six years records were kept and results published giving feed consumption, rate of gain, death loss, cost of gain, and market value of graded and dressed birds.

The project was discontinued in 1952 due to lack of local interest and the closing of processing plants at Garden City and Dodge City.

ENTOMOLOGY

A cooperative entomology project with the department of entomology, Kansas Agricultural Experiment Station, during the three-year period, 1939 to 1941, dealt with grasshoppers. The project involved four phases of the problem: (1) ecology, (2) relationship between soil conservation practices (such as strip cropping) and the grasshopper problem, (3) taxonomy and biology, and (4) control measures. One of the interesting facts reported was that grasshoppers do not feed until temperatures reach about 70 degrees. Many farmers, who had previously scattered bait in the early hours of the morning, welcomed this information.

A new project, with the entomology department, Kansas Agricultural Experiment Station and the U.S.D.A. cooperating, was started in the fall of 1951. A representative of each agency was assigned to the local staff. The immediate problem dealt with small grain insects, particularly greenbugs and brown wheat mites. Excellent work was done and a more thorough understanding of the life histories and habits of these insects resulted. The federal entomologist (Charles F. Henderson) was transferred to Stillwater, Oklahoma, in November, 1954, with no replacement. The entomology department has maintained a representative here and entomological work is continuing.

Currently active phases of the work include control measures on wheat insects (brown wheat mites, greenbugs, pale western cutworms, wheat curl mites, false wireworms), sorghum insects (corn leaf aphids, corn earworms), spotted alfalfa aphids, potato leafhoppers, sugar beet leafhoppers, flies, studies of insecticide accumulation in soil and light-trap investigations.

PERSONNEL

No research agency, such as the Garden City Branch Station, can function properly without far-sighted administrative officers, trained project men, and hard-working laborers. Each group has contributed to the work of this station and deserves much credit.

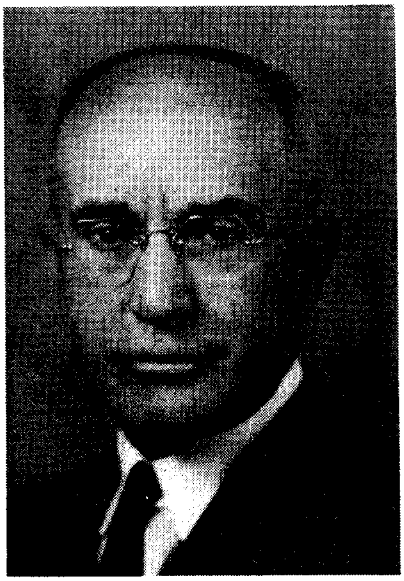
Space will permit listing only administrative and technical personnel. The size of the local staff has varied through the years.

Directors of the Kansas Agricultural Experiment Station since the establishment of the Garden City Branch Station include :

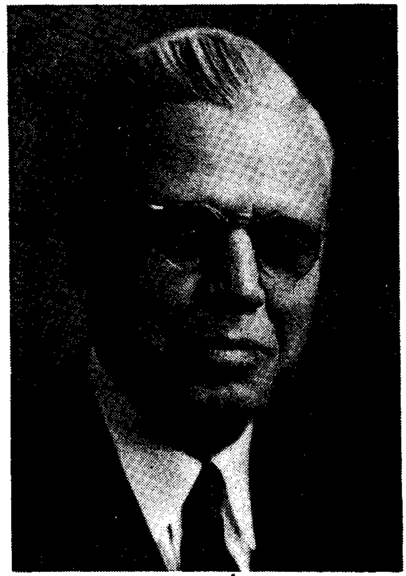
Charles W. Burkett	1906 to 1908
E. H. Webster	1908 to 1913
W. M. Jardine	1913 to 191s
F. D. Farrell	1918 to 1925
L. E. Call	1925 to 1946
R. I. Throckmorton	1946 to 1952
A. D. Weber	1952 to 1956
Glenn H. Beck	1956 to ....

(Continued on inside back cover)

L. E. Call



F. D. Farrell



R. I. Throckmorton


A. D. Weber

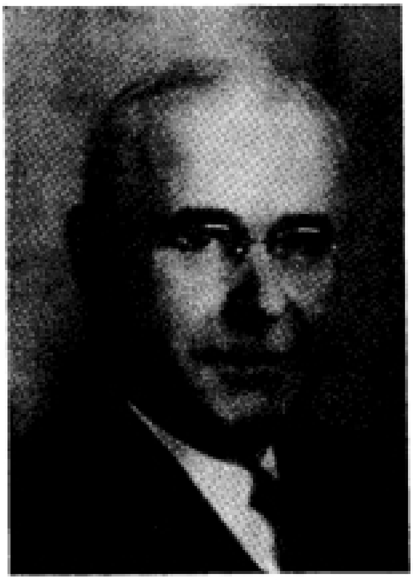

J. E. Payne


Glenn H. Beck


M. C. Sewell

G. S. Knapp

L. M. Sloan



F. A. Wagner

A. B. Erhart

PERSONNEL

(Continued from page 30)

Eight men have served as superintendents of the Garden City Experiment Station during the past 50 years. They are :

J. E. Payne	1907
H. R. Reed	1908 to 1911
E. F. Chilcott	1911 to 1914
M. C. Sewell	1914 to 1916
G. S. Knapp	1916 to 1919
F. A. Wagner	1919 to 1938
L. M. Sloan	1938 to 1948
A. B. Erhart	1948 to ....

Project men for each of the various projects have been:

Dryland Soil Management

Ralph Edwards U.S.D.A.	1911 to 1912
E. F. Chilcott U.S.D.A.	1912 to 1913
J. G. Lill U.S.D.A.	1913 to 1915
C. B. Brown U.S.D.A.	1915 to 1918
F. A. Wagner U.S.D.A.	1918 to 1919
F. E. Keating U.S.D.A.	1919 to 1922
E. H. Coles U.S.D.A.	1922 to 1930
R. L. Von Trebra U.S.D.A.	1930 to 1934
H. J. Clemmer U.S.D.A.	1934 to 1935
Lindsey Brown U.S.D. A.	1935 to 1936
Howard J. Haas U.S.D. A.	1936 to 1942
Hugh G. Myers U.S.D.A.	1942 to 1943
Harold L. Stout U.S.D.A.	1945 to 1948
William L. Rock U.S.D.A.	1948 to 1951
Roy B. Herring	1951 to ....

Crop Improvement

Alvin E. Lowe	1937 to........

Entomology

Roy F. Fritz	1939 to 1942
Elvin W. Tilton	1951 to 1954
C. F. Henderson U.S.D.A.	1951 to 1954
Lester DePew	1954 to........

Irrigation Engineer

J. W. Longstreth U.S.D.A.	-1911 to 1912
Geo. S. Knapp U.S.D.A.	1914 to 1916
Walter R. Meyer U.S.D.A.	1949 to 1955
Jack T. Musick U.S.D.A.	1956 to........

Laboratory and Soil Fertility

Carl W. Carlson	1949 to 1953
L. V. Withee	1953 to 1955
Geo. M. Herron	1956 to........

Irrigation Agronomist

William K. Wieland	1948 to 1950
Ben L. Grover	1950 to 1954
Guy E. Wilkinson	1954 to 1955
Donald W. Grimes	1956 to........

EXTENSION SERVICE

In September, 1955, the Extension Service of Kansas State College assigned two men to western Kansas to promote practices to develop a more stable agriculture in the Great Plains. These men are attached to the Garden City Branch Station and cover 31 counties in western Kansas. Their presence here has been of mutual benefit. Their names and dates of service are :

Area Agriculturist

Dale Edelblute	1955 to........

Area Agricultural Engineer

L. C. Nelson	1955 to 1956
Geo. W. Armantrout	1956 to........