

Historical Document
Kansas Agricultural Experiment Station

FIFTEENTH ANNUAL REPORT

OF THE

EXPERIMENT STATION

OF THE

Kansas State Agricultural College.

FOR FISCAL YEAR 1901 -'02,

WITH AN

Index to Bulletins 104 to 110.

MANHATTAN, KANSAS,
1902.



KANSAS STATE AGRICULTURAL COLLEGE.

BOARD OF REGENTS.

- Hon. J. S. McDOWELL (1905),* President, Smith Center, Smith county.
- Hon. F. D. COBURN (1905), Vice-president, Kansas City, Wyandotte county.
- Hon. E. T. FAIRCHILD (1903), Treasurer, Ellsworth, Ellsworth county.
- Hon. WM. HUNTER (1903), Loan Commissioner, Blue Rapids, Marshall county.
- Hon. J. M. SATTERTHWAITE (1903), Douglass, Butler county.
- Hon. S. J. STEWART (1905), Humboldt, Allen county.
- Pres. E. R. NICHOLS (ex officio), Secretary, Manhattan, Riley county,
- Miss LORENA E. CLEMONS, Assistant Secretary, Manhattan, Riley county.

STATION STAFF.

COUNCIL

- E. R. NICHOLS, A. M., Chairma *nex officio*.
- J. T. WILLARD, M. S., Chemist and Director,
- H. M. COTTRELL, M. S., Agriculturist.
- E. A. POPENOE, A. M., Entomologist.
- H. F. ROBERTS, M. S., Botanist.
- D. H. OTIS, M. S., Dairy Husbandman.
- N. S. MAYO, M. S., D. V. S., Veterinarian.
- ALBERT DICKENS, M. S. , Acting Horticulturist,

LORENA E. CLEMONS, B. S., Secretary.

ASSISTANTS

- A. T. KINSLEY, M. S. Assistant in Veterinary Department.
- V. M. SHOESMITH, B. S. Assistant in Feeding and Field-work.
- F. C. WEBER, B. S. Assistant Chemist
- G. O. GREENE, M. S. Assistant Horticulturist.
- E. H. WEBSTER, M. S. Assistants in Dairy Husbandry.
- G. A. DEAN, B. S. Assistans Entomologist.
- LESLIE F. PAULL, A. M. Assistant Botanist.
- ALICE M. MELTON, B. Clerk in Director's office.

FORT HAYS BRANCH STATION.

J. G. HANEY, B. S., Superintendent.

*Term expires.

Historical Document
Kansas Agricultural Experiment Station

KANSAS STATE AGRICULTURAL COLLEGE,
MANHATTAN, KAN., October 21, 1902.

To his Excellency W. E. Stanley, Governor of Kansas:

DEAR SIR—I herewith transmit, as required by act of Congress approved March 2, 1887, the Fifteenth Annual Report of the Experiment Station of the Kansas State Agricultural College, for the year ending June 30, 1902, including the financial statements for that period.

Respectfully,

E. R. NICHOLS,
Secretary Board of Regents.



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EXPERIMENT STATION

OF THE

KANSAS STATE AGRICULTURAL COLLEGE

MANHATTAN.

FIFTEENTH ANNUAL REPORT—FISCAL YEAR 1901-'02.

FINANCIAL STATEMENTS.

Report of the Treasurer.

To the Board of Regents of the Kansas State Agricultural College:

GENTLEMEN — Herewith is submitted my report of receipts and expenditures on account of the Experiment Station for the period between July 1, 1901, and June 30, 1902:

Table with 2 columns: Description and Amount. Rows include Balance on hand July 1, 1901; Received from the treasurer of the United States; Received from cash sales of products; Total; Approved vouchers Nos. 1 to 443, including credits; Balance on hand June 30, 1902.

E. T. FAIRCHILD, Treasurer.

Report of the Secretary.

To the Board of Regents of the Kansas State Agricultural College:

GENTLEMEN — Herewith is submitted the following report of the financial affairs of the Experiment Station of the Kansas State Agricultural College for the year ending June 30, 1902, as prepared under directions from the United States Department of Agriculture. The several items of this account are covered by vouchers approved by the



disbursing officer, certified by the Secretary, and allowed by the President of the Board of Regents:

Experiment Station, Kansas State Agricultural College, in account with the United States appropriation, 1901-'02.

DR.

To receipts from the treasurer of the United States as per appropriation for fiscal year ending June 30, 1902, as per act of Congress approved March 2, 1887 \$15,000 00

CR.

By salaries	\$7,870 03
Labor	3,142 62
Publications	635 89
Postage and stationery	221 79
Freight and express	198 87
Heat, light, water, and power.	87 85
Chemical supplies	112 48
Seeds, plants, and sundry supplies.	305 66
Fertilizers	6 00
Feeding stuffs	794 19
Library	78 53
Tools, implements, and machinery.	110 85
Furniture and fixtures	207 27
Scientific apparatus	218 47
Live stock.	550 26
Traveling expenses	258 59
Contingent expenses	33 70
Building and repairs	166 95
Total	<u>\$15,000 00</u>

We, the undersigned, duly appointed auditors of the corporation, do hereby certify that we have examined the books and accounts of the Experiment Station, Kansas State Agricultural College, for the fiscal year ending June 30, 1902; that we have found the same well kept, and classified as above; and that the receipts for the year from the treasurer of the United States are shown to have been \$15,000, and the corresponding disbursements \$15,000; for all of which proper vouchers are on file, and have been by us examined and found correct, thus leaving no balance.

And we further certify, that the expenditures have been solely for the purposes set forth in the act of Congress approved March 2, 1887

(Signed)

SAMUEL J. STEWART.

[SEAL.]

WM, HUNTER.

E. T. FAIRCHILD.

ATTEST: E. R. NICHOLS, Custodian,



Supplementary Statement.

DR.

To receipts from other sources than the United States for the year ending June 30, 1902:

Balance on hand July 1, 1901	\$800.96
Farm and garden products	<u>1,351.68</u>
Total	<u>\$2,152.64</u>

CR.

Labor	\$6.03
Postage and stationery	12.95
Heat, light, water, and power	9.36
Chemical supplies	2.65
Seeds, plants, and sundry supplies	26.16
Library	15.00
Furniture and fixtures	60.00
Scientific apparatus	62.83
Live stock	8.00
Contingent expenses	204.08
Buildings and repairs	<u>2.40</u>
Total	\$409.46
Balance	<u>1,743.18</u>
Grand total	<u>\$2,152.64</u>

Respectfully submitted,
 LORENA E. CLEMONS.

ITEMS.	General.	Farm.	Botanical.	Chemical.	Dairy.	Entomological.	Horticultural.	Veterinary.	Total.
by salaries.....	\$1,230 00	\$1,255 56	\$988 61	\$1,012 50	\$750 00	\$1,323 36	\$800 00	\$500 00	\$7,870 03
Labor.....	83 63	344 72	605 54	96 38	501 15	98 03	1,227 48	191 72	3,148 65
Publications.....	66 16	201 56	149 84	15 24	72 63	9 31	107 61	18 54	635 89
Postage and stationery.....	118 25	31 18	37 37	1 88	41 60	2 00	1 85	50	234 74
Freight and express.....	26 69	13 66	51 85	29 16	35	12 03	47 41	17 72	198 87
Heat, light, water, and power.....		8 40		27 90	1 00			59 91	97 21
Chemical supplies.....		5 60	22 49	17 06	2 45	30	31 00	36 28	115 13
Seeds, plants, and sundry supplies.....		113 04	52 23	5 75			139 37	21 43	331 82
Fertilizers.....							6 00		6 00
Feeding stuffs.....		395 23			391 21			7 75	794 19
Library.....	2 05		71 83	4 65		15 00			98 53
Tools, implements, and machinery.....	50	50 00	14 25	3 20		40 30		2 60	110 85
Furniture and fixtures.....	85 32	1 10	60 00	40 35		80 00			267 27
Scientific apparatus.....		2 50	150 87	16 50		62 13		49 30	281 30
Live stock.....		194 25			265 00			99 00	558 25
Traveling expenses.....	102 33	49 40	18 50			28 21	38 35	26 80	258 59
Contingent expenses.....	15 00	94 12	112 66	9 00			7 00		237 78
Building and repairs.....	60 25	106 70		1 15				1 25	169 95
Totals.	\$1,790 19	\$2,867 03	\$2,246 04	\$1,231 22	\$2,025 39	\$1,670 67	\$2,501 17	\$1,027 75	\$15,409 46

REPORT OF THE COUNCIL.

To the Board of Regents of the Kansas State Agricultural College.

GENTLEMEN — We present, to accompany the financial statements, the following account of the Station work for the fiscal year ending June 30, 1900, as a part of the annual report of the Station to the governor required by law.

The Staff.

The changes in the Station staff continue to be more numerous than is desirable. Doctor Butler resigned as veterinarian, to take a similar position in the North Carolina station at a higher salary, leaving August 31, 1901. He was succeeded by Dr. N. S. Mayo, who began his duties September 1. Doctor Mayo had been veterinarian of the Connecticut Agricultural College for the last four years, and previous to that time was veterinarian of this Station for seven years. By action of the Board of Regents, a Department of Dairy Husbandry was established July 10, 1901, and Prof. D. H. Otis, who had been assistant in the Station since 1892, was made dairy husbandman. The Department of Entomology and Horticulture was divided July 1, 1901. Professor Popenoe retaining charge of the entomology, and Albert Dickens, assistant in horticulture, was made acting horticulturist, and performed the duties of this office through the year. Professor Cottrell, who had been agriculturist of the Station since 1897, resigned his position and leaves at the close of the fiscal year to assume the superintendency of a large farm, at a considerable increase in salary. V. M. Shoesmith, a graduate of the Michigan Agricultural College, was elected assistant in feeding and field-work, and assumed his duties August 10, 1901. F. C. Weber, a graduate of Ohio State University, began work as assistant chemist September 1, 1901. He became disabled by illness in April, and later resigned to take a position in the bureau of chemistry, United States Department of Agriculture, as soon as his health permits. October 21, 1901, E. H. Webster, who had been chief butter-maker of the Continental Creamery Company, at Topeka, Kan., and who is also a graduate of this institution, became assistant in dairying. March 1, 1902, J. B. Norton resigned his position as assistant entomologist and was succeeded by G. A. Dean, a graduate of this institution and special student in entomology. April 14, 1902, Leslie F. Paull, a graduate of Brown University, began his duties as assistant botanist, the office having been vacant since the resignation of J. M. Westgate, July 31, 1901.

Publications.

The publications for the year include the Fourteenth Annual Report, Bulletins Nos. 104 to 110, and Press Bulletins Nos. 93 to 115. Three other bulletins are ready, but their printing is delayed on account of lack of funds, and several others could be put on the press at short notice. These will probably appear during the summer. A brief summary of the publications follows:

ANNUAL REPORT.

Fourteenth Annual Report, 1900-'01, November, 1901. This contains the financial statements, a report of the Council upon the work of the several departments, outlines of Bulletins Nos. 99 to 104, a list of Press Bulletins Nos. 71 to 92, a list of the previous publications of the Station, and an index to the bulletins for the year. Only 3000 copies were issued, as the publication is not designed for extended distribution. Copies will be sent to those applying for it while a supply remains available. The index is a convenience to those who preserve the bulletins.

BULLETINS.

BULLETIN No. 104. August, 1901, Farm Department. 25,000 copies.

Fall Seeding of Alfalfa (pp. 1-4).— This gives practical directions for the preparation of the soil, and for the seeding of alfalfa in the fall.

BULLETIN No. 105. November, 1901. Veterinary Department. 25,000 copies.

Blackleg in Kansas (pp. 5-28).— This bulletin contains a detailed description of blackleg, a history of investigations concerning means of preventing it, and an account of the investigations at the Station in connection with this disease.

BULLETIN No. 106. January, 1902. Horticultural Department. 25,000 copies.

The Experimental Apple Orchard (pp. 29-56).— The orchard was planted in 1891, as a test of varieties and of whole-root and piece-root grafts. The bulletin gives the results to date.

BULLETIN No. 107. April, 1902. Chemical Department. 27,000 copies.

Analyses of Corn with Reference to its Improvement (pp. 57-98).— The analyses detailed in this bulletin have extended over four years, and indicate marked possibilities in corn improvement.

BULLETIN No. 108. April, 1902. Botanical and Horticultural Department. 27,000 copies.

The Hardy Catalpa (pp. 99-214).— This bulletin contains an account of results observed in catalpa plantations on the College farm, first made in 1872, and a large amount of information concerning the practices of other planters of this tree, and in regard to its utility as post and tie timber.

BULLETIN No. 109. May, 1902. Farm Department. 27,000 copies.
Spontaneous Combustion of Alfalfa (pp. 217-222). — An account of a number of instances of spontaneous combustion of alfalfa which took place near Manhattan last year, suggestions as to its cause and the means of preventing it.

BULLETIN No. 110. May, 1902. Horticultural Department. 27,000 copies.

Grapes (pp. 223-230) — This bulletin brings up to date the observations in the experimental vineyard, including trellis tests, classification, description of varieties, and other topics.

PRESS BULLETINS.

- No. 93. July 2, 1901. Farm Department. 3600 copies.
Baby Beef.
- No. 94. July 9, 1901. Farm Department. 3600 copies.
Three Ways of Feeding Milk to Calves.
- No. 95. July 16, 1901. Farm Department. 3600 copies.
Skim-milk Calves in the Feed Lot.
- No. 96. July 23, 1901. General Department. 4000 copies.
Feeding Wheat.
- No. 97. July 30, 1901. General Department. 3600 copies.
Inquiries Concerning Prairie-dogs and Gophers.
- No. 98. July 31, 1901. Farm Department. 17,000 copies.
What Shall We Feed?
- No. 99. August 1, 1901. Farm Department. 4000 copies.
Fall Seeding of Alfalfa.
- No. 100. August 13, 1901. Dairy Husbandry Dep't. 3600 copies.
Sorghum Pasture for Dairy Cows.
- No. 101. August 20, 1901. Entomological Department. 3600 copies.
The Hessian Fly.
- No. 102. September 17, 1901. Dairy Husbandry Dep't. 3600 copies.
Maintenance Ration for Cattle.
- No. 103. October 22, 1901. Entomological Department. 3600 copies.
Grain Weevils.
- No. 104. December 2, 1901. Veterinary Department. 3700 copies.
Cattle Distemper.
- No. 105. December 9, 1901. Veterinary Department. 3700 copies.
Sore Mouth in Cattle.
- No. 106. December 16, 1901. Dairy Husbandry Dep't. 3600 copies.
Profit in Maintaining the Milk Flow.
- No. 107. December 31, 1901. Veterinary Department. 3800 copies.
Cerebritis or "Staggers" in Horses.
- No. 108. January 7, 1902. General Department. 5000 copies.
Destroying Prairie-dogs.
- No. 109. January 14, 1902. General Department. 5000 copies.
Destroying Pocket-gophers.

- No. 110. January 21, 1902. Chemical Department. 3700 copies.
Corn Improvement.
- No. 111. February 11, 1902. Horticultural Department. 3800 copies.
Onion Notes.
- No. 112. March 11, 1902. Veterinary Department. 3800 copies.
Pneumonia in Cattle.
- No. 113. March 25, 1902. Botanical Department. 3700 copies.
Pasture Weeds, Their Prevention and Eradication.
- No. 114. May 6, 1902. Dairy Husbandry Department. 3700 copies.
Whole Kafir-corn Compared with Ground Kafir-corn for Young Calves.
- No. 115. May 27, 1902. Veterinary Department. 3700 cs.ies,
Contagious Sore Eyes in Cattle.

Work of the Departments.

FARM DEPARTMENT The work has mainly continued along the same lines that have been followed for the past four years—the growth of drought-resisting crops and the feeding of these crops. Cow-peas and rape have been given special attention. Both give great promise of value for all sections of the state. Tests of disking alfalfa have been continued, and a study has been made of the growth of alfalfa under the various conditions of soil and climate found in the state. Combustion of alfalfa was unusually frequent during the summer of 1901, and the conditions which caused it have been studied. An extensive seeding of varieties of grasses from seed sent by the United States Department of Agriculture was destroyed by the unusual drought and heat. The severe drought of June and July, 1901, brought thousands of inquiries in regard to what could be planted after August 1 that would furnish pasture or winter forage. Tests were made on a field scale for this purpose of rape, oats, wheat, corn, soy-beans, and cow-peas. Preliminary tests were made of various combinations of feeds for the production of flavor in eggs and gain in chickens. Six steers of different types were fed, slaughtered, and the carcasses examined, in a preliminary study of the effect of type and feed on the quality of beef.

BOTANICAL DEPARTMENT The main work of the Botanical Department as heretofore has lain in wheat and corn-breeding. Of wheat 408 serial numbers have been grown this year, of which 150 were introduced wheats from southeastern Europe, where climatic conditions closely resemble our own. Experiments this winter demonstrate the feasibility of nursery-plot experiments with our winter wheats, and these will be carried on this coming winter on a considerable scale. The efficiency of breeding from large heavy seed begins to show it-

self in the relative vigor of plants grown from large and small seed. A number of successful crosses have been made between winter wheats and macaroni wheats and spelts, with the object of breeding a more drouth-resistant bread wheat for western Kansas. Of the crossed varieties of corn, twenty-six showing the highest nitrogen content for the three years past have been planted and will be close-pollinated. Enough corn is expected from some of these to plant acreage plats next year. A number of the Illinois pure-bred varieties are being tested. A considerable number of new forage-plants and grasses were added to the experimental plats this year for testing. An investigation of commercial seeds from various sources is well under way, with the object of demonstrating the necessity for improved seed-cleaning processes and the loss in value from the purchase of foul seed. The breeding of oats, rye, barley, soy-beans, cow-peas, Kafir-corn and potatoes has been commenced this year.

CHEMICAL DEPARTMENT. The work in this department has been considerably curtailed by the resignation of Assistant Clothier, whose place was not filled until Mr. Weber arrived, September 1, and by the serious and continuous illness of Mr. Weber from April 14 to the end of the fiscal year. Some valuable observations were made on the drought-resisting capacity of a number of staple and special crops, opportunity for which was afforded by the drought of last summer, which was unprecedented in the history of the Station. Determinations of the moisture in the soil of about thirty fields were made, composite samples being taken to the depth of fifteen inches. Observations on the condition of the crops at that time being recorded, some valuable data were accumulated on drought resistance. A considerable number of miscellaneous analyses were made, but the chief work, as in the previous two years, was the determination of nitrogen in a large number of samples of corn grown by the Botanical Department in efforts at improvement of corn in nitrogen content. These experiments conducted by the two departments are believed to be nearing the fulfillment of high promises.

ENTOMOLOGICAL DEPARTMENT. The work in the Entomological Department has been the further prosecution of the lines of inquiry named in the report of the combined Department of Horticulture and Entomology of last year, with the addition of an investigation into a disease of alfalfa in the western part of the state, supposed to be of insect origin, and a study of the insect fauna of the sandy tracts of the river borders. By the correspondence from various parts of the state, attention has been drawn to several insect pests, that have accordingly received a large share of the investigation of the department. These are especially the several species of cutworm, the Hessian fly, the melon louse, the grain weevils, and the wheat-head army-worm.

HORTICULTURAL DEPARTMENT. The work in methods of orchard, garden and small-fruit plantations has been continued. New plantings of fruit have been made, and a large vineyard and an orchard of forty acres leased, in order that the value and practicability of improved orchard methods may be tested on a commercial basis. The methods of pruning and training the grape have been given considerable attention. Observations on the growth and general value of forest and ornamental trees have been continued and new plantings made. Considerable work is being done in the propagation of trees adapted for Kansas planting. The work of selecting and improving native fruits has been continued, and now, in addition to plums and grapes, embraces the pawpaw, persimmon, wild currant, and gooseberry. The possibilities of our native shrubs for ornamental purposes are being tested and methods of propagation investigated. Investigations concerning the extent to which common fruits require cross-pollination and the affinities of varieties are in progress. Careful records of the success and desirability of the numerous varieties of fruits now coming into bearing are being made.

VETERINARY DEPARTMENT. During the past year experiments have been carried on to determine the cause and method of transmission of an infectious sore mouth of cattle. Experiments have also been made to determine the cause of an infectious disease of cattle commonly known as cattle distemper; a number of outbreaks of poisoning of stock by eating weeds have been investigated, and material collected to determine, if possible, what common weeds are poisonous and the circumstances under which they may prove injurious. Investigations have also been carried on to determine the life-history of the fringed tapeworm of the sheep, and statistics regarding blackleg and its prevention by vaccination have been collected. Experiments are being carried on to determine the number of bacteria in the soil at different depths and under different methods of cultivation.

DAIRY HUSBANDRY DEPARTMENT. This department was established by dividing the Farm Department, in July, 1901. Much of the work along dairy lines had already been planned and started. Since the division the aim has been to carry out the work already inaugurated, adding such other experiments as presented themselves from time to time. The work may be classified as follows:

Experiment with Cows.—The production of high yields with common cows; observing the milk- and butter-producing capacity of grade cows selected by dairymen in several parts of the state, and of ten different pure breeds of the beef, dairy and dual-purpose cattle owned by the Agricultural College; the testing of sorghum, rape and alfalfa pasture for dairy cows; the testing of various kinds of rough-

ness for keeping dry cows and heifers without grain. On account of the dry summer of 1901, wheat and wheat straw were about the only available feed in many sections of the state. A test was made early in the summer to see how much ground wheat would be required in addition to wheat straw to maintain cattle of various ages. A supplementary experiment was carried on to determine how much more ground wheat and cottonseed-meal would be required in addition to the maintenance ration to keep up the milk flow.

Experiment with Calves. — The testing of the comparative value of whole and ground Kafir-corn for young calves, testing Blachford's sugar-and-oil meal and dried blood as supplementary grain feeds for calves; testing of various amounts of grain for young calves; testing the effect of rennet added to milk just before feeding; testing the effect of dried blood and eggs in preventing scours and as a general tonic for young calves; testing the best methods of raising heifer calves for the future usefulness in the dairy.

Experiments in the Creamery. — Testing various makes of power and hand separators, milk heaters and pasteurizers; testing best methods of handling milk and cream during the hot months.

Miscellaneous Experiments. — Testing various fly mixtures for both cows and calves; testing the action of rennet on milk from different cows and on skim-milk heated to various degrees of temperature.

GENERAL DEPARTMENT. The executive work of the Station grows somewhat from year to year. The letters and postal-cards handled in the office of the director during the last year numbered 6600. The number on the mailing list increased 2000, and now amounts to 23,000. These names are added with the greatest care, and their number is a fair index of the appreciation of the Station. The care of so large a list is no small item. As stated in previous reports, the list is kept on cards and also in linotype, the actual mailing of bulletins being done by machine, and using mailing slips taken from the linotype list. The mailing to the regular list is done in the College printing-office under the effective supervision of Supt. J. D. Rickman, to whom we wish to extend our appreciative thanks. There is a continuous demand for back bulletins, and attention to this requires considerable care of the clerk daily. For the last three years the director has maintained an almost unremitting effort to obtain missing numbers to complete sets of station publications. These have met with such success that 216 volumes were sent to the bindery. These, with those that are already bound and others completed since, make a nearly complete set of these valuable series. Unfortunately, because of lack of attention at the right time, there are a number of early items that probably never can be obtained. At present check lists are kept, and all gaps attended to promptly.

The Fort Hays Branch Station.

The Fort Hays military reservation, being no longer needed for military purposes, was turned over to the Department of the Interior October 22, 1889, for disposal under the act of July 5, 1884. In 1889 the honorable secretary of the interior directed the suspension of action on this reservation to await the action of Congress in regard thereto. In February, 1895, Representative Schlyer, of Ellis county, introduced the following resolution in the house of representatives of the Kansas legislature, which was adopted, and concurred in by the senate February 18, 1895:

WHEREAS, The experience of the settlers upon the plains of western Kansas, covering a period of more than twenty years, has demonstrated conclusively that agriculture cannot be pursued with profit under existing natural conditions, and that artificial means and methods must be substituted therefor; and

WHEREAS, The tests and experiments required to determine the fitness of new methods applicable to these higher altitudes and limited rainfall cannot be made at the Agricultural College of the state; and

WHEREAS, The Fort Hays military reservation, at an altitude of 2000 feet above sea-level, contains a valuable body of native timber that should be preserved to posterity, and the land of said reservation is admirably adapted for such experiments in agriculture as are required in the premises; and

WHEREAS, The buildings upon said military reservation, formerly used as residences for officers and their families, barracks for troops, storehouses, etc., are large and commodious, but cannot be moved without destruction of their value, but in their position are of great value, and could be used, with little additional repairs, for the purposes of a branch of the State Normal School; and

WHEREAS, The location of a branch of the State Normal School at this place would be central and convenient for the whole of the north half of the state; and

WHEREAS, The said military reservation has long since been abandoned by the United States government as a military post: now, therefore, be it

Resolved, by the house of representatives of the state of Kansas, the senate concurring therein, That our senators and representatives in Congress are hereby requested to secure the passage of an act of Congress donating the said Fort Hays military reservation to the state of Kansas for the following public purposes: (1) For a western branch of the Kansas Agricultural College; (2) for a western branch of the Kansas State Normal Institute; (3) for a public park.

Resolved, further, That the secretary of state be, and he is hereby, instructed to transmit a copy of these resolutions to the president of the United States senate, the speaker of the house of representatives, and to each senator and representative in Congress from the state of Kansas.

On Saturday, February 23, 1895, a copy of said concurrent resolution was laid before the senate by the vice-president and was referred to the committee on public lands, accompanied by senate bill No. 2799, introduced by Senator Martin, and which reads as follows:

Be it enacted, etc.: That the abandoned Fort Hays military reservation and all the improvements thereon, situated in the state of Kansas, be and the

same is hereby granted to said state, upon the conditions that said state shall establish and maintain perpetually thereon, first, a western branch of the Kansas Agricultural College; second, a western branch of the Kansas State Normal Institute, and that in connection therewith the said reservation shall be used and maintained as a public park; provided, that said state shall, within five years from and after the passage of this act, accept this grant and shall by proper legislative action establish on said reservation western branches of the Kansas Agricultural College and the Kansas State Normal Institute; and whenever the lands shall cease to be used by said state for the purposes herein mentioned the same shall revert to the United States.

This bill passed the senate February 26, and the house March 2, 1895. Congress adjourned March 4 and this bill failed to receive the president's signature.

In view of the passage of senate bill No. 2799 the district land-officers were advised by telegram dated March 22, 1895, that said lands were withdrawn from settlement and entry to give opportunity for further legislation.

A bill similar to No. 2799 was introduced in the fifty-fourth congress and reported favorably to the house of representatives by Mr. Curtis, from the committee on public lands. The report of the committee is in part as follows:

"The Fort Hays military reservation is situated in what is known as the arid belt of the state of Kansas.

"The post was established in the early history of Kansas for the purpose of furnishing a convenient basis of operations against the Indian tribes of the West, and was maintained for many years for that purpose. Excellent buildings were erected thereon for officers' quarters and other army purposes, and are admirably adapted in many respects for the purposes contemplated by this bill. As the Indian tribes were gathered on the reservations in the Indian territory, this military reservation became useless, and several years ago was abandoned as a military station and turned over to the interior department, and from thence until the present time it has been of no service to the government of the United States; upon the contrary, a continued expense and embarrassment.

"In view of the arid condition of the land it would be difficult to sell it for any reasonable amount. A part of the reservation is covered by an unusual growth of timber for that section of the country, and it is important that this timber be preserved for public-park purposes.

"The state of Kansas has already established a State Agricultural College at Manhattan, in Riley county, about 110 miles west of the eastern border of the state. It has also established a State Normal Institute at Emporia, Lyon county, about 125 miles west of the eastern border of the state.

"The entire length of the state is about 407 miles, and the result is that the people in nearly two-thirds of the state are practically deprived of the benefits and advantages of both of these institutions.

"In view of the arid character of this land and its situation in the Western part of the state, about 175 miles west of the present location of the Agricultural College and the State Normal Institute, it would furnish an admirable location for the establishment of branches of these institutions for the benefit of the inhabitants of nearly two-thirds of the state.

"It is and always has been the policy of the government to encourage and develop institutions of learning of this character, and the establishment of a western branch of the State Agricultural College at this point would be particularly beneficial and appropriate for the reasons herein stated, and more fully set forth in the concurrent resolution above named, as it would form a nucleus from which important developments might be expected in determining the agricultural character and value of the arid lands in the western part of Kansas and eastern Colorado; and for all these reasons the committee is of the opinion that the policy contemplated by this bill is a wise and prudent one, and will result beneficially, not only to the state of Kansas, but to the whole country, and we therefore recommend the passage of this bill."

However, the bill did not become a law, although again reported favorably at the second session of this congress. The same or a similar bill was introduced in the fifty-fifth congress. and passed the senate, but did not come up for action in the house. It was again introduced in the fifty-sixth congress, in the senate by Senator Harris, and in the house by Congressman Reeder, and became a law March 28, 1900. As finally passed, it reads as follows:

A BILL granting to the state of Kansas the abandoned Fort Hays military reservation in said state, for the purpose of establishing an experimental station of the Kansas Agricultural College and a western branch of the Kansas State Normal School thereon, and a public park.

Be it enacted, That the abandoned Fort Hays reservation, and all improvements thereon, situated in the state of Kansas, be and the same is hereby granted to said state upon the conditions that said state shall establish and maintain perpetually thereon, (1) an experimental station of the Kansas Agricultural College, and (2) a western branch of the Kansas State Normal School, and that, in connection therewith, the said reservation shall be used and maintained as a public park; provided, that said state shall, within five years from and after the passage of this act, accept this grant, and shall, by proper legislative action, establish on said reservation an experiment station of the Kansas Agricultural College, and a western branch of the Kansas State Normal School; and whenever the lands shall cease to be used by said state for the purposes herein mentioned, the same shall revert to the United States; provided further, that the provisions of this act shall not apply to any tract or tracts within the limits of said reservation to which valid claims have attached by settlement or otherwise under any public-land laws of the United States.

Acting under this law, the following joint resolution was passed by the state legislature at the last session:

Be it resolved by the Legislature of the State of Kansas:

SECTION 1. That the state of Kansas hereby accepts from the United States the abandoned Fort Hays military reservation, as provided in an act of Congress relating thereto, approved March 27, 1900.

SEC. 2. That the provisions of the act of Congress, "An act granting to the state of Kansas the abandoned Fort Hays military reservation, in said state, for the purpose of establishing an experimental station of the Kansas Agricultural College and a western branch of the Kansas State Normal School thereon and a public park," approved March 27, 1900, are hereby accepted by the state of Kansas.

SEC. 3. That upon the approval of this act by the governor, he is requested to transmit a certified copy of the same to the secretary of the interior of the United States.

Approved February 7, 1901.

Copy transmitted to secretary of interior February 7, 1901.

The following act was passed by the legislature in respect to the division of the reservation and making appropriations for the branch station and the branch normal school:

AN ACT relating to the Fort Hays military reservation, locating thereon an experimental station of the State Agricultural College and a western branch of the State Normal School, providing for the preservation of the native timber land for a public park, and making appropriation therefor.

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

SECTION 1. The boards of regents of the State Agricultural College and of the State Normal School, respectively, are hereby authorized to locate and establish an experimental station of the State Agricultural College and a branch or auxiliary of the State Normal School on the Fort Hays military reservation.

SEC. 2. The following-described tracts of land lying within the limits of the reservation aforesaid, to wit: Section 36, township 13 south, range 19 west; section 31, township 13 south, range 18 west; section 1, township 14 south, range 19 west; sections 6 and 8, the east half of section 7, the north half of section 17, and the northeast quarter of section 18, all in township 14 south, range 18 west, are hereby placed under the direction of the regents of the State Normal School. It shall be their duty to lease or rent the said lands to the best advantage, and all moneys derived from rents for such lands shall be collected by the regents aforesaid, who shall deposit the same with the treasurer of the board, to be expended by the said board of regents for the equipment and maintenance of said auxiliary of the State Normal School.

SEC. 3. All the remaining lands of the reservation aforesaid are hereby placed under the direction of the board of regents of the State Agricultural College, except the north half of section 5, township 14 south, range 18 west, which, with the buildings thereon, shall be used jointly as may be determined by the boards of regents of the institution aforesaid.

SEC. 4. The said board of regents of the State Normal School shall employ a principal and such assistant teachers and janitors as the needs of the school may demand; shall prescribe the course of study, not extending over more than two years, conditions of admission, and such other regulations as maybe required for its successful conduct; provided, that such course of study shall embrace only such branches as may prepare pupils for the advanced academic and professional work provided at the State Normal School at Emporia.

SEC. 5. All persons meeting the requirements for admission prescribed by the board of regents shall be admitted to said school; and on declaring their intention to fit themselves to teach in the schools of Kansas shall be exempt from all fees, save a small matriculation fee, which the board of regents may require. Students not intending to teach may be charged a reasonable fee, at the discretion of the board.

SEC. 6. Any person of good moral character over sixteen years of age, having been in actual attendance at least twenty weeks at the above-named school, and having completed the course of study prescribed by the said board of regents, shall be awarded a certificate which shall be a legal certificate to teach in any of the public schools of the state except high schools, and good for one year.

Said certificate shall also admit the holder to the third year's work at the State Normal School at Emporia without examination.

SEC. 7. The president of the State Normal School shall be president of said auxiliary normal school, with such duties and responsibilities as the board of regents may determine.

SEC. 8. The sum of \$7000 is hereby appropriated for the fiscal year ending June 30, 1902, and the sum of \$5000 for the fiscal year ending June 30, 1903, is hereby appropriated, for the current expenses and improvements of said auxiliary normal school, the said amounts to be expended under the direction of the board of regents of the State Normal School.

SEC. 9. The board of regents of the State Agricultural College is hereby authorized to locate and establish on the reservation aforesaid an experimental station of the Agricultural College, and shall adopt such measures as may be necessary to place the same in successful operation and to preserve the land upon which the native timber is now growing as a public park.

SEC. 10. To carry out the provisions of section 9 of this act, the sum of \$3000 is hereby appropriated for the fiscal year ending June 30, 1902, and \$3000 for the fiscal year ending June 30, 1903.

SEC. 11. All sums of money payable out of the appropriations specified in section 8 of this act shall be upon vouchers approved by the board of regents of the State Normal School; and all sums payable out of the appropriations specified in section 10 shall be upon vouchers approved by the board of regents of the State Agricultural College.

SEC. 12. The auditor of state is hereby authorized to draw his warrants on the treasurer of state for the several sums and purposes specified in this act upon verified vouchers approved by the boards of regents of the State Normal School or the State Agricultural College; provided, that no portion of the money appropriated in this act shall be expended by the board of regents until the attorney-general of the state of Kansas shall first notify the governor and the board of regents that the title to the land in said reservation is unimpaired, and the land is available under the terms of the act of Congress ceding said reservation to the state.

SEC. 13. This act shall take effect and be in force from and after its publication in the official state paper.

Approved February 26, 1901.

Published in official state paper March 1, 1901.

At one time the reservation was supposed to be open for settlement, and much of the land was filed upon and occupied. When the state accepted the reservation these claims constituted a flaw in the title. To remove this, the board executed leases to the claimants running from three to five years, in consideration of which all further claim was relinquished.

The plans for managing the branch station are shown in the following resolutions, adopted by the board December 13, 1901:

Resolved, That the president of the board of regents shall appoint a regent, who shall, under the direction of the board, have special charge of all matters pertaining to the Fort Hays reservation in behalf of the Agricultural College, the Experiment Station Council to direct all experiments, subject to the approval of the board.

Resolved, That the crop experiments and such other experiments as can be provided for be begun in the year 1902 on as liberal a scale as circumstances and the funds at our command permit; and that all seeding, cultivation, harvesting, storing, sale and purchase of commodities, or of live stock and its feeding, pertaining to experimental work, and all records in reference thereto, be under the immediate supervision and direction of a competent man, who shall be stationed at Hays so much of the time as may be necessary for best doing the work contemplated.

Resolved, That such repairs be made upon the buildings on the Fort Hays reservation as shall make them available for use, and that a practical farmer be employed, who shall be known as foreman of the farm, and who shall see that all contracts pertaining thereto are fulfilled and all property belonging to the Experiment Station be properly cared for, and shall perform such other duties as shall be assigned to him.

Resolved, That the regent appointed to have charge of the interests of the Experiment Station at Hays shall be paid his per diem and actual and necessary expenses incurred in the performance of such duties, but shall not be allowed mileage.

J. G. Haney, a graduate of the College, for several years assistant in field and feeding experiments and later agricultural agent of the Chihuahua & Pacific Railway Company, was appointed superintendent of the branch station. He entered upon his duties March 29, 1902, as soon as the title to the reservation was reported clear by the attorney-general, and such experiments as could be made on sod were started. Breaking began the last week of March and about 500 acres have been broken. Most of the sod was found to be easily worked up with the disk-harrow, and the following planting was done:

Sorghum sowed thickly, five acres; sorghum and Kafir-corn mixed sowed thickly, five acres; Kafir-corn sowed thickly, eleven acres; barley, twenty-five acres; five varieties of macaroni wheat, fifteen acres; three varieties of sorghum in rows thirty inches apart, six acres; millet, ten acres; Kafir-corn in rows thirty inches apart, seventy acres; corn, thirteen acres; soy-beans in rows thirty inches apart, fifteen acres; cow-peas in rows thirty inches apart, six acres; cow-peas sowed for hay, seven and one-half acres; *Bromus inermis*, four and one-half acres; alfalfa, twenty-two acres; Kansas stock melons and other melons, ten acres; peanuts and garvansas, one-half acre; and a grass garden, containing thirty-one varieties of grass planted in plats, most of which are 14x24 feet. In each grass plat thirty-six hills are planted one foot apart each way, excepting the alfalfa and *Bromus inermis*, where there are 240 hills in each. These are for the purpose of observing individual plants, and possibly the selection of superior individuals, as each hill will be thinned to one plant. About three-fourths of an acre is set to trees and shrubs sent out by the College. An area formerly used by the garrison as a garden has been replowed and an acre planted to potatoes, half of which

is mulched, and a smaller amount has been planted to Jerusalem artichokes, three varieties of cow-peas, three of soy-beans, four of corn, sorghum, Kafir-corn, rape, and pencillaria.

Of the buildings on the reservation which in the division with the State Normal School fell to the Station, but few could be used even when repaired. Some of these have been removed to a more convenient site, and most of the others torn down, and the excellent dimension lumber in them will be used in future buildings. One of these buildings will be repaired and used as a residence for the foreman. The others will be used for a stable, a tool shed, and a temporary seed house. The funds available do not admit of extensive improvements, and it is hoped that the next legislature will increase these to such an extent as properly to develop this branch station.

Under the terms of the Hatch act and the rulings of the Department of Agriculture, none of the funds appropriated by the general government for the Experiment Station can be used to support branch stations. The chief objects of the Fort Hays branch are the testing of plants and methods of culture with special reference to the needs of regions having deficient rainfall. In large part these experiments are expected to be upon a large scale, but performed with careful attention to all details, so as to yield results of scientific accuracy. Experiments in the production and selection of varieties more drought-resistant than the ordinary will at first be on a small scale necessarily. The cooperative experiments of the Station with the Department of Agriculture in the testing and breeding of cereals and in range improvement and forage-plant investigations will be conducted largely at the Fort Hays branch. As means and opportunity permit, feeding experiments will doubtless be conducted there also. As none of the experiment stations of the several states occupy a field similar, climatically, to this, there is no doubt that, if properly conducted, this branch station will yield very valuable results, if provided with adequate funds.

Destroying Gophers and Prairie-dogs.

The increase of prairie-dogs in the western part of the state having become such as to make them very destructive in certain regions, the following bill, offered by Hon. S. E. Cave, of Haskell county, was passed by the legislature at its last session:

AN ACT to provide for the destruction of prairie-dogs and gophers, for making experiments with that in view, and making an appropriation therefor.

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

SECTION 1. The township auditing board of any township in this state, at any regular or special meeting, is hereby authorized to purchase material and to employ one or more suitable persons to destroy prairie-dogs and gophers within the limits of such township; any material so purchased and compensation for

such services to be paid out of the general fund of such township; but no township shall expend for such purpose more than \$100 in any one year, nor shall such compensation to any one person exceed \$1.50 for each day of actual work performed; provided, that no such employment shall be made until a petition signed by a majority of the legal electors of such township shall be presented to such board asking that such action be taken; provided further, that in any township a larger sum than \$100 may be expended in one year if a petition signed by at least two-thirds of the electors of such township be presented to the township auditing board of such township, making such request.

SEC. 2. The board of regents of the Kansas State Agricultural College is hereby authorized and directed to select some competent person to direct and conduct experiments for the purpose of determining the most effective and economical method of destroying prairie-dogs and gophers.

SEC. 3. The person so selected by said board of regents shall have authority to visit the various counties of the state that are infested with prairie-dogs and gophers, and, either by himself or through such persons as may be selected under the provisions of section 1 of this act, make such experiments as he may deem advisable for the purpose of destroying prairie-dogs and gophers. He shall receive such reasonable compensation for his services as may be determined by said board of regents and actual traveling expenses.

SEC. 4. For the purpose of making such experiments, the person so selected by said board of regents shall have authority to purchase any necessary material, prepare the same in a suitable manner, and furnish it to any persons employed by the township auditing board, as hereinbefore provided. And such person so selected by said board of regents is further authorized and directed to procure and furnish to each person so employed by township auditing boards such prepared material as he may by experiment determine to be most effective and economical, in such quantities as he may consider reasonably adapted to the purpose of ridding such township of prairie-dogs and gophers.

SEC. 5. The sum of \$5000, or so much thereof as may be necessary, is hereby appropriated, out of any money in the state treasury not otherwise appropriated, for the purpose of carrying out the provisions of this act.

SEC. 6. The auditor of state is hereby authorized to draw his warrants upon the treasurer of state for the purposes herein set forth upon verified vouchers approved by the board of regents of the Kansas State Agricultural College.

SEC. 7. This act shall take effect and be in force from and after its publication in the official state paper.

Approved February 12, 1901.

Published in official state paper February 22, 1901.

In accordance with section 2, the board of regents employed Prof. D. E. Lantz as a field agent, to take charge of the experiments under the direction of the Station Council. A circular letter of inquiry was distributed as Press Bulletin No. 97. This invited suggestions on the subject, and brought many valuable replies relating to the habits of the animals and methods that had been tried for their repression. Actual experiments began about September 1, 1901. Every reasonable suggestion that had been received was tested. Carbon bisulphide, as an effective gas, and strychnine, as a poison, were the only two agencies for the destruction of prairie-dogs that were found to be

entirely satisfactory as to results. Strychnine was also found to be the most efficient means of destroying pocket-gophers. These conclusions were published in Press Bulletins No. 108 and No. 109, the former being devoted to the prairie-dog and the latter to the pocket-gopher. Later experiments with machines for forcing sulphur fumes into the burrows of prairie-dogs showed that, when defects in the mechanism of the machines are corrected, they will be reasonably effective in destroying the animals.

A formula for a poison, the chief ingredient of which is strychnine, patented by Mr. David W. Staples, of Craft, Okla., was tested December 2, on the ranch of Hon. S. E. Cave, of Haskell county. This was found to be so satisfactory that the Station entered into negotiations with Mr. Staples and purchased the state right to its use. This formula was recommended as No. 2, in Press Bulletin No. 108, and the Station began the preparation and sale of the poison. It was sent upon the receipt of the price to township officers and other citizens of the state, the Station charging only the cost of the materials and container of the poison. This has been \$1.50 per half-gallon can. A can is sufficient to moisten a bushel of wheat or other grain, and will poison from 100 to 150 acres of the animals, if properly distributed. Full directions and the formula accompany each can.

The first of this poison was sent out January 15, and up to June 30 a total of 3250 cans had been sold. The 6500 ounces of strychnine used in the preparation of the poison cost \$3250 at the manufacturer's price; and its purchase by the state saved the farmers on this item alone more than the amount of the appropriation made by the legislature. The demand for the poison, as the people became acquainted with its merits, steadily increased, and the results of its use were, on the whole, highly satisfactory.

Experiments with the same poison in destroying gophers, rats, prairie squirrels and English sparrows have given favorable results. Further tests will be followed by publications on the subject. Experiments on the repression of prairie-dogs by means of contagious diseases are also in progress, and a detailed report on all the work done in this direction will form matter for a bulletin.

Cooperative Experiments.

GRASS AND FORAGE-PLANT INVESTIGATIONS. During the season of 1901, the Experiment Station, in cooperation with the division of agrostology of the United States Department of Agriculture, conducted a series of experiments in Harper county on range improvement. The experiments were located on the farms of Mr. H. B. Waldron, of Anthony, whose estate of over 12,000 acres lies chiefly-

in ranges 7 and 8, and just north of the Oklahoma line. Mr. Waldron is a young man of much enterprise and public spirit, and the location of these experiments upon his farms is due to his generous tender of the use of cultivated and pasture lands desired for the experiment as well as the labor and use of tools incident thereto.

The experiments with grasses fell into two distinct series, the first being on cultivated land, with a few of the grasses and other forage-plants most likely to succeed in a region of limited rainfall, and the second upon native sod which had been injured by excessive pasturing.

In the series of experiments on cultivated land, the following seeds were sown: Tall meadow oat-grass, slender wheat-grass, perennial rye-grass, sainfoin, reed fescue, a mixture of reed fescue, redtop, and orchard-grass, western wheat-grass, "Colorado grass," awnless brome-grass, alfalfa. In addition to these, a plat was planted with roots of Bermuda grass. All of these are true grasses except the alfalfa and the sainfoin, which are legumes. Alfalfa has not been grown much in that region and the importance of leguminous forage is such as to make further experiments with it highly desirable, and several acres were seeded, while an acre or less only was given to most of the other species. Sainfoin is a legume much grown in Europe, but less known in this country. It was put on trial here because of its probable drought-resisting power.

In the experiments in the renovation of worn-out pasture, disking the sod formed the fundamental treatment. This procedure owes its origin to an observation made at this Station by Prof. C. C. George-son, then professor of agriculture here, and described by him in Bulletin No. 48, December, 1894, the observation having been made two years previously. In this experiment the worn-out prairie pasture was thoroughly disked for the purpose of cutting up the sod and was then seeded with cultivated grasses. These came up well, but later the roots of the prairie-grass left in the soil started and by the end of the season had obtained complete mastery, and the following year the prairie pasture seemed to be as good as ever.

Treatment similar to this has since been tried by the United States Department of Agriculture. The object is not to establish tame grasses permanently, but to enable the native grasses which are adapted to the region to recover and resume ascendancy. The temporary growth of the cultivated grass serves to keep down weeds until the native grasses start. In the Harper county experiments, the pasture chosen was one that was near the farm buildings and badly worn out. It was fenced so as to keep stock off, and for comparison a part was left without treatment other than this exclusion of stock. The remainder was disked thoroughly. The natural toughness of the sod

combined with the tramping of stock had rendered it very hard. Some parts were much harder than others. Most of the land was double-disked twice, and then the seed put in it with a disk-drill. This loosened a good deal of the surface to a depth of about two inches. It did not, however, cut off all of the sod, but left it in little tufts surrounded by the loosened earth.

The following seeds were sown on the plats included in this series: Tall meadow oat-grass, awnless brome-grass, rescue grass, oats, millet, alfalfa, and sweet clover. One plat was left without any seed being sown on it after disking. The sowing of alfalfa and sweet clover was with the hope that they might become established and remain a permanent addition to the pasture, thus increasing its value. The trial with oats and millet was with the thought that in so far as the grasses sown serve merely to prevent growth of weeds, it may be possible to accomplish the purpose with these cheap sorts, which are readily available to all farmers, as well as by the use of expensive grasses.

The season was very dry and unfavorable, and the experiments on cultivated land resulted in a total failure, with the exception of the alfalfa, which, at this date, is in very good condition, with the exception of a few places. The field was partly reseeded by Mr. Waldron this spring. There is every indication that alfalfa will do well in that section of the state. With the experiments on pasture land, at this date, the plats give no evidence of the grasses planted on them, and show no result from having been disked. No difference can be detected between treated and untreated portions of the field, either in productiveness or in number of weeds.

The division of agrostology also furnished seeds for experiments on the Station grounds. Owing to the unfavorableness of the season, very little of the seed grew, and, if occasion calls for it, reports will be made by the Botanical and Farm Departments later.

Concluding Statement.

From the preceding pages, it will be apparent that the scope and influence of the Station have materially increased during the past year. It continues to be in good repute in the state and in the country at large. This is shown not only by appreciative press notices of the Station publications, but by similar expressions in scores of letters received. The demand upon the Station force for assistance in farmers' institute work continues to be greater than is consistent with the most efficient prosecution of investigation, and we again urge the need of provision by which the Station force can be increased to such an extent as will allow this important work to be performed without detriment to the more important and special work of an experiment station.

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J. T. WILLARD.	D. H. OTIS.
H. M. COTTRELL.	N. S. MAYO.
E. A. POPENOE.	ALBERT DICKENS.