

**Historical Document**  
Kansas Agricultural Experiment Station

SIXTEENTH ANNUAL REPORT

OF THE

**EXPERIMENT STATION**

OF THE

Kansas State Agricultural College.

---

FOR FISCAL YEAR 1902-'03,

INCLUDING

Bulletins 111 to 118, and Index.

---

MANHATTAN, KANSAS.  
1903.

**Historical Document**  
Kansas Agricultural Experiment Station

KANSAS STATE AGRICULTURAL COLLEGE,  
MANHATTAN, KAN., November 3, 1903.

*To his Excellency W. J. Bailey, Governor of Kansas:*

DEAR SIR—I herewith transmit, as required by act of Congress approved March 2, 1887, the Sixteenth Annual Report of the Experiment Station of the Kansas State Agricultural College, for the year ending June 30, 1903, including the financial statements for that period.

Respectfully,                      E. R. NICHOLS,  
*Secretary Board of Regents.*



**KANSAS STATE AGRICULTURAL COLLEGE.**

**BOARD OF REGENTS.**

- Hon. J. S. McDOWELL (1905),\* President, Smith Center, Smith county,
- Hon. C. E. FRIEND (1905), Vice-president, Soldier, Jackson county.
- Hon. R. J. BROCK (1905), Loan Commissioner, Manhattan, Riley county.
- Hon. E. T. FAIRCHILD (1907), Treasurer, Ellsworth, Ellsworth county.
- Hon. J. W. BERRY (1907), Jewell, Jewell county.
- Hon. J. O. TULLOSS (1907), Sedan, Chautauqua 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.,<br>Chairman <i>ex officio</i> . | D. H. OTIS, M. S.,<br>Animal Husbandman.      |
| J. T. WILLARD, M. S.,<br>Chemist and Director.        | N. S. MAYO, M. S., D. V. S.,<br>Veterinarian. |
| E. A. POPENOE, A. M.,<br>Entomologist.                | ALBERT DICKENS, M. S.,<br>Horticulturist.     |
| H. F. ROBERTS, M. S.,<br>Botanist.                    | A. M. TEN EYCK, B. AGR.,<br>Agriculturist.    |
| LORENA E. CLEMONS, B. S.,<br>Secretary.               |   |

**ASSISTANTS.**

- |                             |                                      |
|-----------------------------|--------------------------------------|
| V. M. SHOESMITH, B. S. .... | Assistant in Feeding and Field-work. |
| G. O. GREENE, M. S. ....    | Assistant Horticulturist.            |
| G. A. DEAN, B. S. ....      | Assistant Entomologist.              |
| LESLIE F. PAULL, A. M. .... | Assistant Botanist.                  |
| C. L. BARNES, D. V. M. .... | Assitant in Veterinary Department.   |
| ROSCOE H. SHAW, B. S. ....  | Assistant Chemist.                   |
| ALICE M. MELTON, B. S. .... | Clerk in Director's office.          |

**FORT HAYS BRANCH STATION.**

- |  |                                  |
|--|----------------------------------|
| J. G. HANEY, B. S.,<br>Superintendent. | O. H. ELLING, B. S.,<br>Foreman. |
|--|----------------------------------|

\*Term expires.



**TABLE OF CONTENTS.**

---

Letter of Transmittal . . . . .	ii
List of Regents and Station Officers. . . . .	iii
Financial Statements:	
Report of the Treasurer . . . . .	v
Report of the Secretary . . . . .	vi
Supplementary Statement of the Secretary . . . . .	vii
Expenditures by Departments. . . . .	viii
Report of the Council:	
The Staff. . . . .	ix
Publications . . . . .	ix-xi
The Work of the Departments. . . . .	xii
Fort Hays Branch Station . . . . .	xv
Destroying Gophers and Prairie-dogs. . . . .	xvii
Cooperative Experiments . . . . .	xx
Concluding Statement . . . . .	xxi
Publications of the Station, to date . . . . .	xxii
Index to Bulletins 111 to 118 and Annual Report for 1902-'03 . . . . .	213



EXPERIMENT STATION

OF THE

KANSAS STATE AGRICULTURAL COLLEGE,  
MANHATTAN.

SIXTEENTH ANNUAL REPORT—FISCAL YEAR 1902-'03.

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, 1902, and June 30, 1903:

Table with 2 columns: Description and Amount. Rows include Balance on hand July 1, 1902; Received from the treasurer of the United States; Received from cash sales of products; Total; Approved vouchers Nos. 1 to 341, including credits; Balance on hand June 30, 1903.

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, 1903, 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, 1902-03.*

D R.	
To receipts from the treasurer of the United States as per appropriation for fiscal year ending June 30, 1903, as per act of Congress approved March 2, 1887 .....	\$15,000 00
C R.	
By salaries .....	\$8,190 58
Labor .....	3,388 54
Publications .....	430 50
Postage and stationery .....	113 80
Freight and express .....	283 01
Heat, light, water, and power .....	9 10
Chemical supplies .....	28 82
Seeds, plants, and sundry supplies .....	463 16
Feeding stuffs .....	262 94
Library .....	79 75
Tools, implements, and machinery .....	49 53
Furniture and fixtures .....	243 40
Scientific apparatus .....	640 68
Live stock .....	82 60
Traveling expenses .....	200 67
Contingent expenses .....	25 75
Building and repairs .....	507 17
Total .....	\$15,000 00

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, 1903; 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)	C. E. FRIEND.
[SEAL.]		R. J. BROCK.
		E. T. FAIRCHILD.

ATTEST: E. R. NICHOLS, *Custodian.*

Supplementary Statement.

D R.

To receipts from other sources than the United States for the year ending June 30, 1903:

Balance on hand July 1, 1902 .....	\$1,743 18
Farm and garden products .....	5,511 61
Total .....	<u>\$7,254 79</u>

C R.

Labor .....	\$431 70
Publications .....	106 75
Postage and stationery .....	8 80
Freight and express .....	16 29
Chemical supplies .....	24 87
Seeds, plants, and sundry supplies .....	17 71
Feeding stuffs .....	2,455 20
Library .....	2 00
Scientific apparatus .....	71 71
Live stock .....	2,687 59
Traveling expenses .....	42 04
Contingent expenses .....	225 29
Total .....	<u>\$6,089 95</u>
Balance .....	1,164 84
Grand total .....	<u>\$7,254 79</u>

Respectfully submitted.

LORENA E. CLEMONS.

**Expenditures by Departments, 1902-'03.**

Items.	General.	Farm.	Animal husbandry.	Botanical.	Chemical.	Dairy.	Entomological.	Horticultural.	Veterinary.	Total.
By salaries.....	\$1,317 00	\$929 17	\$618 75	\$1,255 33	\$1,186 53	\$157 50	\$1,155 00	\$1,075 00	\$433 30	\$8,190 58
Labor.....	103 46	705 10	814 75	676 59	49 56	131 12	2 25	1,106 68	229 73	3,820 24
Publications.....	85 42	87 58	176 87	54 10	84 38	5 95		11 80	31 15	537 25
Postage and stationery.....	54 30	9 00	42 76	10 44	5 57			58		122 60
Freight and express.....	63 77	99 32	1 50	31 13	20 67	1 90	3 80	63 84	13 32	299 30
Heat, light, water, and power.....		7 65							1 45	9 10
Chemical supplies.....				13 41	39 40		38		50	53 69
Seeds, plants, and sundry supplies.....	23 45	122 75	7 85	52 34	2 85	3 00	8 10	242 14	13 36	480 87
Feeding stuffs.....		73 17	2,597 24			42 83			4 90	2,718 14
Library.....	2 00			74 90	4 85					81 75
Tools, implements, and machinery.....		44 95		1 83	2 75					49 53
Furniture and fixtures.....		42 83		16 01	184 56					243 40
Scientific apparatus.....		247 78		20 71	275 41		57 41		101 08	712 39
Live stock.....			2,758 19						12 00	2,770 19
Traveling expenses.....	88 68		1 00	103 15			6 40	10 00	33 48	242 71
Contingent expenses.....	50 00			8 35	9 00			183 44	25	251 04
Building and repairs.....	44 02	332 70		1 00	129 45					507 17
Totals.....	\$1,837 10	\$2,703 03	\$7,018 91	\$2,322 31	\$1,994 93	\$372 80	\$1,273 31	\$2,693 43	\$374 52	\$21,039 95



---

**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, 1903, as a part of the annual report of the Station to the governor required by law.

*The Staff.*

There have been but few changes in the Station staff during the year. The vacancy existing in the office of agriculturist was filled by the appointment of A. M. Ten Eyck, of the North Dakota college and station, who entered upon his duties December 1, 1902. September 26, D. H. Otis was made animal husbandman, instead of dairy husbandman, and E. H. Webster, assistant in dairying, was made dairyman. A. T. Kinsley, assistant in the Veterinary Department, resigned his position September 1, in order to take advanced study, and was succeeded by C. L. Barnes, of the Washington college and station. The vacancy in the assistantship in chemistry was filled by the appointment of Roscoe H. Shaw, of the Bureau of Soils, and formerly of the New Hampshire and the Wisconsin stations. He assumed his duties October 6. April 1, Professor Webster resigned his position to accept one as expert in the dairy division of the Bureau of Animal Industry, United States Department of Agriculture. At the Fort Hays Branch Station, O. H. Elling, a graduate of the College, was appointed foreman.

*Publications.*

The publications for the year include the Fifteenth Annual Report, Bulletins Nos. 111 to 118, and Press Bulletins Nos. 116 to 124. A brief summary of the publications follows:

*Annual Report.*

FIFTEENTH ANNUAL REPORT, 1901-'02, October 1902.— This contains the financial statements and report of the Council upon the work of the several departments, a complete account of the Fort Hays Branch Station, an outline statement of experiments in destroying gophers and prairie-dogs, a notice of cooperative experiments with the United States Department of Agriculture in grass and forage-plant investigations, outlines of Bulletins Nos. 104 to 110, a list of Press Bulletins Nos. 93 to 115, a list of the previous publications of

the Station, and an index to the annual report and bulletins for the year. Three thousand copies were issued, chiefly for the use of public officials and libraries. Copies of the annual report are sent to others applying for them, while a supply remains available, the index being of special value to those who preserve the bulletins.

**Bulletins.**

BULLETIN No. 111. May 1902; issued July 1902. Farm Department. 27,000 copies.

*Quality in Beef (pp. 1-24).*— This bulletin details the results obtained in feeding a grade Short-horn, a grade Angus, a Jersey, a Holstein, and two strut steers, with a description of the differences in the quality of the beef produced numerous illustrations of the live animals, and of various cuts of the meat.

BULLETIN No. 112. June 1902; issued September 1902. Farm Department. 27,000 copies.

*Fattening Steers without Hogs to Follow (pp. 25-36).*— An account of feeding experiments with eighty head of steers fed upon corn and alfalfa in various states of preparation. With four cuts.

BULLETIN No. 113. June 1902; issued September 1902. Farm Department. 27,000 copies.

*Baby Beef (pp. 39-50).*— A discussion of the production of baby beef, with details of an experiment in feeding 130 head of calves. They were divided into six lots, to test the value of alfalfa hay, prairie hay, corn, Kafir-corn and soybeans in the production of baby beef. The feeds named were used in several combinations.

BULLETIN No. 114. June 1902; issued September 1902. Farm Department. 30,000 copies.

*Growing Alfalfa in Kansas (pp. 51-86).*— This bulletin gives a complete statement of the author's mature judgment in respect to the best methods of seeding alfalfa and handling the crop for hay or seed. It also contains much other information concerning the proper treatment of alfalfa fields. It is accompanied by ten cuts.

BULLETIN No. 115. December 1902. Chemical Department. 30,000 copies.

*The Exact Calculation of Balanced Rations (pp. 97-146).*— This bulletin describes an original method by which the quantities of any given feeds that must be taken to produce a ration of a definite composition may be exactly calculated, if the composition of the feeds permits it. It also contains tables showing the composition of some important feeds, with certain other data, a table of feeding standards, and a table of over 2100 ready-calculated balanced mixtures, including fourteen different nutritive ratios and the most important feeds and fodders.

BULLETIN No. 116. January 1903. General Department. 27,000 copies.

*Destroying Prairie-dogs and Pocket-gophers (pp 147-166).*— This bul-

letin gives statistics concerning the distribution of prairie-dogs and pocket-gophers in this state, and describes in detail methods for their destruction. It contains seven illustrations.

BULLETIN No. 117. May 1903. Veterinary Department. 28,000 copies.

*Bacteria of the Soil (pp. 167-184).*— After some general statements concerning the nature of bacteria and methods used in their investigation, this bulletin gives the results obtained in an investigation concerning the number of bacteria in a large number of soils, and a list of the species isolated. It contains three cuts.

BULLETIN No. 118. May 1903. Animal Husbandry Department. 28,000 copies.

*Flesh and Fat in Beef (pp. 185-212).*— This bulletin describes an experiment in some sense a continuation of that described in Bulletin No. 111. The animals fed were a pure-bred Hereford steer, a cross-bred Shorthorn-Hereford steer, a poor, thin cow (canner), and a matured grade Hereford bull. The bulletin describes the beef produced and gives the result of a cooking test. There are seventeen cuts.

***Press Bulletins.***

No. 116. August 19, 1902. Veterinary Department. 3700 copies.

*Glanders and Farcy.*

No. 117. September 18, 1902. Veterinary Department. 3700 copies.

*Ergotism.*

No. 118. Veterinary Department. January 13, 1903. 4000 copies.

*Scab or Itch in Cattle.*

No. 119. February 3, 1903. General Department. 4200 copies.

*Poison for Prairie-dogs and Pocket-gophers.*

No. 120. February 24, 1903. Agricultural Department. 3800 copies.

*Better-bred Grain and Corn for Kansas.*

No. 121, March 3, 1903. Veterinary Department. 4200 copies.

*Fistulous Withers and Poll-evil.*

No. 122. April 28, 1903. Animal Husbandry Department. 3800 copies.

*Pasture for Hogs.*

No. 123. May 26, 1903. Dairy Department. 3700 copies.

*A Test of Hand Separators.*

No. 124. June 2, 1903. Agricultural Department. 3700 copies.

*Late Crops.*

***The Work of the Departments.***

FARM DEPARTMENT. The Farm Department has largely increased the experiments with farm crops. This work consists mainly in the testing of varieties of all common grains and grasses, corn and forage crops in a field way, rotation and cultivation experiments with wheat and corn, and pasture experiments with grasses and annuals in conjunction with the Animal Husbandry Department. The unusually wet spring and the floods which delayed planting and destroyed crops made necessary the undertaking of experiments in the planting of late crops.

There were planted for trial in the season of 1903 the following: Eighty varieties of grain, field peas, vetch, flax, millet, and buckwheat; seventy-eight varieties of corn; twenty-five varieties of sorghum and Kafir-corn; thirty varieties of late-planted corn; six varieties of late-planted sorghum and Kafir-corn; twenty-three varieties of cow-peas, and twenty varieties of soy-beans, in one-tenth-acre plats. In addition to the trials on the small plats, thirty varieties of grasses, mixed grasses and legumes were sown in one-fourth-acre plats; eight mixtures of pasture grasses, five acres each; nine varieties and mixtures of annual crops, one and eight-tenths acres each; eight varieties of ensilage crops, one and one-half acres each; eight varieties and mixtures of late forage crops, one and one-fourth acres each; twenty-two plats of breeding corn, one-fourth acre to fifteen acres in area. There were fifty one-fourth-acre plats used for rotation and cultivation experiments with wheat and corn, eight one-fourth-acre plats in an experiment in disking and manuring alfalfa, six plats in a fertilizer trial, etc., making in all about 450 plats which were planted separately, and the crop will be harvested, thrashed, weighed and stored separately, and the results of each experiment carefully recorded. Some 240 acres are devoted to crop experiments this season, including the 70 acres used in pasture experiments in conjunction with the Animal Husbandry Department.

In connection with the cropping some study of the moisture content of the soil is being made. Several hundred soil samples have been taken. One of the objects of the study is to learn what amount of water it takes to produce each crop under ordinary field conditions. Work is also being done in washing out the roots of various plants to compare the root systems of different crops and the root development under different methods of culture.

ANIMAL HUSBANDRY DEPARTMENT. During the past year experiments have been in progress in the production of high yields of milk

and butter-fat with common cows and different pure breeds of beef, dairy and dual-purpose cattle; the testing of sorghum and also of rye as pasture for dairy cows; the feeding of corn ensilage to dairy cows; the feeding of buttermilk in comparison with skim-milk to calves; a test of a variety of grains for calves; feeding steers of different ages; testing the value of corn ensilage in beef-production; comparing the value of alfalfa hay with Kafir-corn stover for steers; a slaughter test of steers, showing the distribution of fat and lean in animals of various ages and conditions; comparing the value of alfalfa and rape for hogs as against no pasture; a cooperative test with the Agricultural Department to determine the best varieties of grasses for permanent pasture, the best annuals for fall and spring pasture, and the best crop or mixture of crops for ensilage.

DAIRY DEPARTMENT. This department has conducted experiments in testing different makes of hand separators, and has inaugurated some cooperative work with creameries in scoring the flavor, body, color, salt and style of package in creamery butter. In this the Chemical Department has cooperated by the determining of fat, water, curd and salt in the different samples of butter, and the Veterinary Department by making a bacteriological examination.

BOTANICAL DEPARTMENT. Plant-breeding has been extended during the past year to include soy-beans, with the object of improving their value as a grain crop; prolificness, earliness and non-shattering qualities being the factors to which attention is chiefly being directed. To this end 2000 plants were selected in the field and the bearing capacity of each determined. The seed of the most of these was planted this spring as stock for mother plants. Several hundred varieties of wheat, rye, oats, barley and emmer were imported, and tried during the past season. Some of these offer great promise for breeding purposes. The Kansas hybrid wheats are being further tested. Extensive nursery plats of some of the better wheats have been maintained to develop mother plants for increase plats. Corn-breeding for increased protein content has continued the hopeful results of preceding years. The Botanical Department is especially engaged in investigating the behavior of hybrids in the successive generations after the cross. Numerous wheat-rye hybrids obtained this spring and wheat-emmer hybrids from last season's work will be useful toward this end.

Aside from the work of plant-breeding, general tests of new plants are being made. Some twenty vetches have been tried, of which some develop promising qualities. Two perennial vetches are being grown on a larger scale for observation. Experiments on the propagation of buffalo-grass have been commenced in cooperation with the office of the agrostologist of the United States Department of Agriculture.

CHEMICAL DEPARTMENT. The work of the Chemical Department has consisted chiefly in the analysis of a considerable number of sugar-beets grown by the farmers of the state, a continuation of the analyses of corn with reference to the production of varieties of higher protein content, and analyses of soils, in cooperation with the Bureau of Chemistry, in a study of the relative feeding capacity of several crops on different soils. Numerous minor analyses have been made. The work has been practically limited to six months, as the Station laboratory in the new building has been available less than that length of time. The department now has commodious and well-adapted quarters, in which it is hoped much more work will be done in the future than has been possible in the past.

ENTOMOLOGICAL DEPARTMENT. The chief lines of study have been in continuance of those indicated in the report of last year, with such variations as have been rendered necessary by seasonal or local insect abundance. The Hessian fly has continued to call for attention, several tree-inhabiting scale-insects from widely different parts of the state have been given study, the large field ant of the western section of the state has been made the subject of special investigation, additional data have been collected on plum insects, and extended notes, with abundant specimens, have been gathered on the insects of the sandy river regions. Among the insects most important in the office correspondence have been the Hessian fly, the various cutworms, the canker-worm, the destructive field and garden grasshoppers, and several plant-lice of horticultural importance.

HORTICULTURAL DEPARTMENT. The continuance of the work planned in former years, and noted in previous reports, has occupied a great part of the time of this department. Careful notes as to growth and vigor and complete descriptions of fruit borne have been an important part of the work done in orchards and vineyard. Tests of cultural methods and of various cover crops are being continued. The work with forest-trees has been continued, and consists chiefly in propagation and planting, observation as to vigor and hardiness, and measurement of growth. The work with vegetables has consisted mainly of tests of methods of culture and the effects of fertilizers. Some work in testing newly-introduced vegetables has been conducted in cooperation with the United States Department of Agriculture. The efforts toward the improvement of native fruits are being continued. Some promising varieties have been added and propagation is being carried on. The comparative cost and efficiency of liquid and dust spray is being investigated.

VETERINARY DEPARTMENT. Investigation of blackleg in cattle,

the preparation of vaccine and collection of statistics regarding the prevention of blackleg by vaccination have been continued, as has the investigation of poisoning of live stock from eating poisonous plants. An outbreak of ano-vulvitus in cattle has been investigated to determine the cause, method of transmission and most effective treatment. Scab or itch in cattle and methods of prevention and treatment, particularly upon a large scale, have also been investigated. The effects of various substances upon the preservation of eggs have been studied.

GENERAL DEPARTMENT. The executive work of the Station has been transacted as during the preceding three years, the chairman presiding at Council meetings and certifying to vouchers, the Secretary keeping the minutes of the Council meetings and the financial records, and the Director being in charge of the printing and distribution of publications and the general business and correspondence of the Station. While no special efforts have been made to extend the circulation of the bulletins, the mailing list has steadily increased, and now numbers 25,172. The issue of press bulletins has continued, though the number for the year is smaller than usual. The mailing of publications to addresses on the printed lists continues to be done in the printing department of the College, and, under the efficient oversight of Supt. J. D. Rickman, this is accomplished at a minimum of expense and with the maximum of accuracy. The care and labor required to keep the printed list corrected can be appreciated only by those who have attempted similar tasks.

*Fort Hays Branch Experiment Station.*

The work of the past year consisted in harvesting the crops sown during the spring of 1901, and planting the crop that is now growing. The trials of forage crops were generally favorable. The sorghum and Kafir-corn made a good growth on sod, and were excellent feed. Minnesota No. 13 corn, though planted late, matured, and made a fair crop. Pencillaria, or pearl millet, did not compare favorably with Kafir-corn or sorghum. Rape made very little growth. Turnips, sown in July, were a very good crop. Kansas stock melons, planted on sod, made a wonderful yield, and are certainly a crop worth planting. Hogs, cattle and chickens eat them with a relish.

The grass garden, of twenty-five wild grasses, did excellently. Two were especially promising. Planted on newly broken land, *Panicum bulbosum*, alkali saccaton, made a heavy growth, and withstood dry, hot weather to a remarkable degree. The hay is excellent in quality, with a great abundance of long, soft blades. The yield of the plat was over 2¼ tons per acre—4540 pounds. The other, *Leptochloa*



*dubia*, Texas crowfoot, made about the same yield, but not so good a quality of hay, and proved to be an annual, while *Panicum bulbosum* seems to be perennial. The *Agropyrum spicatum*, Colorado bluestem, *Elymus canadensis*, wild rye, and others, are very promising.

The macaroni wheat and barley, considering that they were planted on fresh sod and a month later than they should have been, did very well.

The fall wheat and rye seeding comprised 200 acres, a trial of 165 varieties, and several methods of seeding. The variety trial is in cooperation with the United States Department of Agriculture. The varieties of wheat tried are those which have been selected as being adapted to this climate. Careful notes are being taken on each variety as to its vigor, manner of growth, yield, etc. A large number of the varieties are direct importations, while others are hybrids of the best wheats grown in the state. Only new land being available, few culture trials could be made. A trial was made of plowing the ground as compared with disking or planting in stubble; early and late breaking; disking *versus* not disking sod, and corn stubble *versus* bean stubble.

Spring work comprised the planting of eighteen varieties of spring wheat, mostly macaroni, twenty-two of barley, sixteen of oats, and one of speltz. The area devoted to this is 140 acres. A rotation to determine the effect of various crops was begun. The determination of soil moisture is also being made in connection with the rotation. Wheat for three years in succession follows fallow, Kafir-corn, oats, legumes, and barley.

Eighty acres were broken and planted to sorghum and Kafir-corn for feed. Seventy-five acres were planted to crops for irrigation and cultivation tests. Nine acres were planted to potatoes, cabbages, tomatoes, beans, corn, sorghum and Kafir-corn for irrigation experiments in cooperation with the United States Department of Agriculture. The water will be pumped by a twelve-horse-power traction engine and a four-inch centrifugal pump.

An orchard and vineyard of 300 fruit-trees and 500 vines has made a splendid start. One thousand forest-trees and 4000 cedars and pines were planted.

The alfalfa sown on sod in May 1901, is excellent. The fall seeding of 1901 is also good. About twenty acres were sown this spring, but the stand is not good, on account of the heavy rains soon after planting, which covered the young plants. In a spring and fall trial of seeding *Bromus inermis*, spring seeding proved to be the better. Ten acres were sown and a good stand obtained this spring. Four-



teen more varieties of wild grasses were sown, and a trial of resetting buffalo sod made.

***Destroying Prairie-dogs and Gophers.***

During the past year the Station has continued the experiments in the destruction of prairie-dogs, using a number of appliances, and including the trial of infectious diseases upon the animals. Nothing, however, was found either as successful or as cheap as the patented poison which we began distributing at cost in January 1902. The trials of infectious diseases were complete failures.

The patented poison was used with a surprising degree of success in destroying pocket-gophers. By slightly changing the combination of poisons in the mixture we found it better adapted for this purpose, and corn was found to be an effective bait. Several areas of alfalfa badly infested with these pests were treated by the writer in October and November 1902. Only one application of the poison was made to each area treated, but repeated examinations of the fields since then have proved that all the gophers were destroyed. The announcement of this success was made in Press Bulletin No. 119, and partly in Bulletin No. 116, the latter being a report of progress, intended partly to inform the legislature of the work accomplished under the Cave law of 1901.

The field-agent of the Station, Prof. D. E. Lantz, has visited many portions of the state in making experiments and to observe the results of the work done by the different communities. He estimates that at least 600,000 acres of land formerly infested with prairie-dogs have been entirely reclaimed since the work began. A partial destruction of the animals over a much larger area was also accomplished, but as total extinction is desired, this can hardly be regarded as satisfactory, since the work will have to be repeated at some future time.

In several places meetings were held in the field, where the agent made practical demonstrations of his methods in destroying pocket-gophers. That these meetings were productive of great good to the communities where they were held cannot be doubted, from the interest manifested.

A steady demand for poison has continued. This has been considerably increased by its use for pocket-gophers. During the past eighteen months of poison distribution, we have used over half a ton each of strychnine and of potassium cyanide in its preparation. A large number of applications for the poison have been received from outside of Kansas, but our contract with Mr. Staples, who owns the patent, will not permit us to fill such orders. Owing to an advance of twenty per cent, in the price of strychnine, we were compelled on

February 3 to increase the price of the poison to \$1.75 per half-gallon can.

At the last session of the legislature three laws were enacted which have a bearing on this work: An act was passed (chapter 324, Session Laws of 1903) permitting boards of county commissioners, at their discretion, to pay a bounty of from five to twenty cents per head for the destruction of gophers or gray ground-squirrels. Under this law, as far as reports have come to this office, but one county (Wabaunsee) has offered such a bounty. The commissioners of that county have agreed to pay, for a limited time, ten cents for each gopher scalp. Cloud county had for more than two years been paying a similar bounty, but the commissioners discontinued it at the April meeting of the board.

A law was enacted (chapter 25, Session Laws of 1903) providing for a continuation by the College of the experiments in destroying prairie-dogs and gophers, the preparation of poisons, and their sale to the citizens of the state at the cost of the materials used. At the same time the work of the Station in this connection was considerably enlarged in scope by including a study of the food habits of mammals and birds, and authorizing a report thereon.

A third law enacted (chapter 378, Session Laws of 1903) relates to prairie-dogs alone, and provides for their extermination through the levy and collection of a special tax upon the real estate of the township affected. This law is as follows:

AN ACT to provide for the extermination of prairie-dogs, prescribing additional duties for the township trustees in counties infested by prairie-dogs, and for the levy and collection of a tax for the purpose of carrying this act into effect.

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

SECTION 1. That in addition to the duties now prescribed by law for township trustees or assessors, in counties infested by prairie-dogs, they shall do and perform the following services: While assessing the property of their respective townships, inspect all the territory infested by prairie-dogs and make an estimate of the probable expense to exterminate the same, and report said findings to the board of county commissioners of their respective counties, which said report will be filed with the county clerk at the time of making their return of their assessment books.

SEC. 2. The county clerk of each of such counties shall present the report of the assessors to the county commissioners at their annual meeting in August of each year, when they convene to make the annual tax levy.

SEC. 3. The commissioners of the respective counties are hereby authorized to levy on real estate assessed for taxation in each township the approximate amount estimated by the several assessors as herein provided, or any part thereof: provided, however, that no assessment for this purpose shall be greater than fifty cents on each \$100 valuation as herein provided.

SEC. 4. It shall be the duty of the trustees of the several townships of this state infested with prairie-dogs to enter upon all lands in their respective town-

ships and make diligent efforts to exterminate all prairie-dogs thereon. For the purpose of enabling them to carry into effect the provisions of this act, the trustees are authorized and empowered to employ all such assistance and to purchase the poison recommended and furnished by the State Agricultural Experimental Station, or such appliances and materials as they may deem necessary to exterminate such dogs. The work of such extermination shall all be done under the supervision and direction of the trustee.

SEC. 5. That the trustees shall receive as full compensation for such services the sum of two dollars per day for the time actually and necessarily employed; their assistants to be paid at the rate of one dollar and fifty cents per day for the time actually employed. They shall be paid only out of the fund of the county created by this act for that purpose.

SEC. 6. The township treasurers shall be the custodians of the fund created by this act, and disburse the same on vouchers audited by the township boards at their regular quarterly meetings and warrants drawn on the treasurers for the same: provided, that no part of this fund shall be subject to the payment of claims other than those specified in this act.

SEC. 7. The county treasurers of the several counties of this state are hereby authorized and directed to pay over to the several township treasurers of their respective counties all the moneys collected for the purpose designated in this act, in the mode and manner as other township funds are paid over to said township treasurers.

SEC. 8. It shall be the duty of the county clerk to provide the several township trustees or assessors with suitable blanks for their use in carrying out the provisions of this act, upon which said trustees or assessors shall make their estimates and reports as herein provided.

SEC. 9. Whenever any township of this state shall have rid itself of the prairie-dogs and there shall cease to be a necessity for any future procedure under this act, which question shall be determined by the board of county commissioners, the surplus fund, if any, in the hands of the township treasurers shall be merged into the general township funds of said townships and to be used for general township purposes.

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

Approved March 7, 1903. Published March 24, 1903.

As the assessors' returns are made for March 1, the foregoing law was not compulsory upon township assessors for the present year. However, in a portion of the counties the assessors took action, and the commissioners will make the levies provided for in this law. In the meantime, the law of 1901 was not repealed, and the provisions permitting township boards to appropriate money for destroying prairie-dogs upon petition are still in force.

Experiments in destroying gophers and prairie-dogs are still in progress. At the present time we have experiments in killing moles in progress, using our gopher poison with various baits. Many inquiries as to the best method of destroying these pests in lawn sods have been received.

*Cooperative Experiments.*

The Station has been conducting experiments in cooperation with two of the offices of the Bureau of Plant Industry, United States Department of Agriculture, during the past year, which are continuations of similar work the preceding year. In connection with the office of agrostology, the experiments have been in the testing of grasses and forage plants here and at the Fort Hays Branch Station. Some of the results of this work are mentioned in connection with the work of the branch station. Others will appear later in bulletins, in so far as their importance warrants it. One of the special experiments was one in the propagation of buffalo-grass by means of sod cuttings, the results of which are quite encouraging.

In connection with the office of vegetable physiology and pathology, experiments have been continued in cereal breeding and testing. Although the Station was in cooperation with that office during the preceding year the connection was little more than nominal. During the past year work has been conducted at the Fort Hays Branch Station and at another station near Halstead, in Harvey county. At the former place it has been in charge of the superintendent, J. G. Haney; at the latter, the work was in charge of Mr. Leslie A. Fitz, a graduate of the Kansas State Agricultural College, who was appointed to this work by the United States Department of Agriculture. By the terms of the cooperative agreement, the Station bears the expense of the officer in charge at Hays and the department that of the one at Halstead. The season at Hays this year has been extremely favorable and the results correspondingly gratifying. At Halstead the results have been entirely satisfactory, considering the extreme wetness of the early spring followed by the drought and the injury wrought by the Hessian fly. Many of these experiments are with very small quantities of seed produced by crossing. At Halstead over 2000 plats were grown, varying from a few plants to a tenth of an acre in size. In these experiments the Station furnished the land, fencing, thrashing-machines, and other permanent fixtures, and the Department of Agriculture contributed \$400 toward the current expenses for labor and temporary supplies, in addition to the salary of the agent at Halstead. These cooperative experiments in cereal testing and breeding will be continued the ensuing year, but the station at Halstead will be moved to McPherson.

***Concluding Statement.***

The scope of the work of the Station is substantially the same as a year ago. With the large demands upon the force for assistance at farmers' institutes and in College work, the necessity for larger resources, to enable more men to give their time to experimentation, is apparent. In many of the states the federal appropriation is supplemented by liberal state appropriations, and we suggest that an attempt be made to get such assistance from the legislature of our own state.

E. R. NICHOLS.	D. H. OTIS.
J. T. WILLARD.	N. S. MAYO.
E. A. POPENOE.	ALBERT DICKENS.
H. F. ROBERTS.	A. M. TEN EYCK.