

Historical Document
Kansas Agricultural Experiment Station

EXPERIMENT STATION

OF THE

KANSAS STATE

AGRICULTURAL COLLEGE.

REPORT FOR 1898,

CONSISTING OF THE

ELEVENTH ANNUAL REPORT

AND

BULLETINS 76 TO 80.

MANHATTAN, KANSAS.

1899.



KANSAS STATE AGRICULTURAL COLLEGE.

BOARD OF REGENTS.

- Hon. J. N. LIMBOCKER (1901*), President,
Manhattan, Riley county.
- Hon. MRS. SUSAN J. ST. JOHN (1901), Vice-President,
Olathe, Johnson county.
- Hon. C. B. HOFFMAN (1901), Treasurer,
Enterprise, Dickinson county.
- Hon. T. J. HUDSON (1899), Loan Commissioner,
Fredonia, Wilson county.
- Hon. GEORGE M. MUNGER (1901),
Eureka, Greenwood county.
- Hon. WILLIAM H. PHIPPS (1899),
Belleville, Republic county.

— — — — — (1899).

- Pres. THOS. E. WILL, Secretary (*ex officio*),
- I. D. GRAHAM, Assistant Secretary,
Manhattan.

*Term expires.

EXPERIMENT STATION STAFF.

COUNCIL.

- THOMAS ELMER WILL, A. M.,
Chairman.
- IRA D. GRAHAM, A. M.,
Secretary.
- HENRY M. COTTRELL, M. S.,
Agriculturist.
- ALBERT S. HITCHCOCK, M. S.,
Botanist.
- JULIUS T. WILLARD, M. S.,
Chemist.
- ERNEST E. FAVILLE, M. S. A.,
Horticulturist and Entomologist.
- PAUL FISCHER, B. Agr., M. V. D.,
Veterinarian.

ASSISTANTS.

- F. C. BURTIS, M. S. Assistant in Field and Feeding Experiments.
- D. H. OTIS, M. S. Assistant in Dairying.
- GEORGE L. CLOTHIER, B. S. Assistant Botanist.
- PERCIVAL J. PARROTT, A. B. Assistant Entomologist.
- WM. L. HALL, B. S. Assistant Horticulturist.

Historical Document
Kansas Agricultural Experiment Station

KANSAS STATE AGRICULTURAL COLLEGE,
Manhattan, Kan., July 1, 1898.

To his Excellency, John W. Leedy, Governor of Kansas:

Dear Sir: I herewith transmit, as required by act of Congress approved March 7, 1887, the eleventh annual report of the Experiment Station of the Kansas State Agricultural College, for the year ending June 30, 1898, including the financial statement for that period.

Respectfully,

THOS. E. WILL,
Secretary Board of Regents.



EXPERIMENT STATION
 OF THE
KANSAS STATE AGRICULTURAL COLLEGE,
 MANHATTAN.

ELEVENTH ANNUAL REPORT—FOR THE YEAR 1898.

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, 1897, and June 30, 1898:

Received from the treasurer of the United States.	\$15,000 00
Received cash credits on vouchers and cash sales of products.	528 04
Total	\$15,528 04
Paid approved vouchers Nos. 1 to 319, including credits.	15,528 04

C. B. HOFFMAN, 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, 1898, 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 and the Board of Regents:

Experiment Station, Kansas State Agricultural College, in account with the United States appropriation, 1897-'98:

DR.

To receipts from the treasurer of the United States as per appropriation for fiscal year ending June 30, 1898, as per act of Congress approved March 2, 1887.....\$15,000 00

CR.

By salaries	\$9,301 04	
Labor	1,938 30	
Publications	2,340 50	
Postage and stationery.....	114 81	
Freight and express	157 85	
Heat, light, and water	25 00	
Chemical supplies	161 06	
Seeds, plants, and sundry supplies.....	313 27	
Feeding stuffs	5 60	
Library.....	206 74	
Tools, implements, and machinery.....	132 66	
Furniture and fixtures.....	3 00	
Scientific apparatus	248 82	
Live stock	12 00	
Contingent expenses	10 25	
Building and repairs.....	29 10	
Totals	\$15,000 00	\$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, 1898; 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.

[SEAL.] (Signed) J. N. LIMBOCKER, }
 C. B. HOFFMAN, } Auditors.
 GEO. M. MUNGER, }

Attest: THOS. E. WILL, Custodian.

Supplementary Statement.

DR.

To receipts from other sources than the United States for the year ending June 30, 1898:

Farm and garden products..... \$528 04

CR.

Labor \$330 26
 Postage and stationery... 9 00
 Travling expenses 188 38
 Contingent expenses. 40

Totals \$528 04 \$528 04

The accounts covering the Station fund are kept in a separate set of books, as provided in the act of Congress under which the Station was organized, and duplicate vouchers covering every item of expenditure made during the year are on file in the office of the Secretary.

See statement of expenditures by departments on next page.

All correspondence of this office concerning the issue of bulletins is on record. Nearly 7,000 copies of each bulletin have been distributed upon the revised lists of the year, 1,000 of each being retained for binding with the annual report, for future needs.

EXPENDITURES BY DEPARTMENTS, 1897-'98.

	Farm.	Horticultural and Entomological.	Chemical.	Botanical.	Veterinary.	Irrigation.	General.	Total.
By Salaries	\$2,880 00	\$2,067 68	\$915 00	\$1,724 16	\$827 82	.....	\$906 88	\$9,301 04
Labor	1,026 43	809 51	189 52	206 75	16 75	\$18 40	1 20	2,268 56
Publications	23 72	131 43	.....	56 81	20 07	.....	2,108 47	2,340 50
Postage and stationery	21 91	81 95	23 55	16 25	1 25	.....	28 90	123 81
Freight and express .....	.....	49 58	27 33	12 85	.....	.....	68 09	157 85
Heat, light, and water .....	.....	.....	25 00	.....	.....	.....	.....	25 00
Chemical supplies	6 31	26 43	29 76	.....	98 56	.....	.....	161 06
Seeds, plants, and sundry supplies,	14 83	237 86	38 03	14 45	8 10	.....	.....	313 27
Feeding stuffs .....	.....	.....	2 70	.....	2 90	.....	.....	5 60
Library .....	.....	.....	.....	205 99	75	.....	.....	206 74
Tools, implements, and machinery,	40 80	62 30	16 07	11 40	2 09	.....	.....	132 66
Furniture and fixtures .....	.....	.....	.....	.....	3 00	.....	.....	3 00
Scientific apparatus	20 25	.....	.....	7 68	229 89	.....	.....	248 82
Live stock .....	.....	.....	.....	.....	12 00	.....	.....	12 00
Traveling expenses .....	.....	53 99	.....	79 79	5 30	.....	49 30	188 38
Contingent expenses .....	.....	.....	.....	.....	.....	.....	10 65	10 65
Building and repairs .....	.....	29 10	.....	.....	.....	.....	.....	29 10
Totals	\$4,014 25	\$3,490 83	\$1,266 96	\$2,336 13	\$1,219 48	\$18 40	\$3,172 99	\$15,528 04

REPORT OF THE COUNCIL.

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

Gentlemen: We present, as required by law, the following outline of the Station work for the fiscal year ending June 30, 1898, leaving all detailed statements for bulletins already issued or to be issued on completion of experiments already under way.

Five bulletins, covering 160 pages of valuable information, have been published, in an edition of 8,000 copies, about 6,000 of which have been distributed to the press and to the farmers of the state. The subjects treated are shown in the following

Outline of Bulletins.

BULLETIN 76. February, 1898. Botanical Department.

FIFTH REPORT ON KANSAS WEEDS—Vegetative Propagation of Perennial Weeds. (Pp. 1-24.)—Containing descriptions of the underground parts of our common weeds and suggested methods for eradication. Also notes on the ability of the cut roots of some weeds to produce new plants. There are twelve full-page plates illustrating the descriptions.

BULLETIN 77. March, 1898. Horticultural and Entomological Department.

SOME INSECTS INJURIOUS TO THE ORCHARD. (Pp. 25-64.)—Description of the habits of the most common injurious insects, with pictures of the insects, and directions for combating them. The following kinds are mentioned: Cankerworm, codling moth, tent caterpillar, plum curculio, plum gouger, peach tree borer, flat-headed borer, roundheaded borer, San Jose scale, elm twig girdler. A spraying calendar was prepared, and sent out with this bulletin.

BULLETIN 78. April, 1898. Chemical Department.

SUGAR BEETS. (Pp. 65-80.)—Giving tables of results of analyses of sugar beets the previous year, with comments thereon, consideration of obstacles to success, and plans for the next season.

BULLETIN 79. April, 1898. Veterinary Department.

BOVINE TUBERCULOSIS. (Pp. 81-112.)—This bulletin discusses the character and causes of tuberculosis; shows prevalence of disease in America and Europe; how to prevent it; detection by means of tuberculin; methods of extermination and procedure for disinfection; also temperature records of the College herds, photographs and charts.

BULLETIN 80. June, 1898. Botanical Department.

SIXTH REPORT ON KANSAS WEEDS—Distribution and other notes. (Pp. 113-101.)—Containing the results of several years' observations upon methods of dispersal, ability of plants to occupy new soil, number of seeds produced by our common weeds, and various other notes. Sixteen plates of maps illustrate the distribution in Kansas and also in the United States.

Work in Progress.

FARM DEPARTMENT.

The funds available for the four months beginning September 1, 1897, were used to harvest the crops on plats planted under the direction of my predecessor. January 1, 1895, work on the old line of field experiments was closed up and the experiments will be discontinued. This line of experiments had been in progress for seven or more years, most of the experiments repeated yearly during this time, and it was considered that a repetition of these experiments was not needed. We have started on a new line of field work embracing conservation of soil moisture, seed breeding and the inoculation of the soil with root tubercle forming microbes. These experiments require the co-operation of the Chemical, Botanical and Farm departments, and must be pursued years before definite results can be obtained. Feeding experiments were made with alfalfa, kaffir corn and soy beans for dairy cows, and kaffir corn and soy beans for pigs. No bulletins were published, as the work was not sufficiently advanced at the close of the year. Interesting facts developed during the progress of the experiments have been reported to the press.

VETERINARY DEPARTMENT.

The Veterinary department has experimented along the following lines, viz: (1) Tuberculosis and the tuberculin test, in connection with which three herds (comprising a total of ninety five animals) were tested, and post-mortem examinations made on the reacting animals, all of which showed positive evidence of disease. (2) A bulletin entitled "Bovine Tuberculosis" was published. (3) Experiments were made to study the cause and nature of stringy milk and mastitis in cows. (4) An infectious disease of the genital organs of yearling heifers was studied, and a remedy found. (5) Experiments with remedies for roup in poultry. (6) Experiments to determine efficacy of sulphur fumes for disinfecting buildings. (7) Experiments with rabies in horses. (8) Protective inoculation against swine plague. (9) Bacteriological analysis of milk and butter. (10) A bacteriological laboratory for the manufacture of blackleg protective virus has been equipped and put into operation. Still other experiments have been inaugurated.

CHEMICAL DEPARTMENT.

The Chemical department has continued the work upon soil moisture, and has inaugurated additional experiments to test the effects of various fertilizers upon moisture conservation. It is also

continuing the investigation of the adaptability of our state to the production of sugar beets of good quality. Plats are being grown upon a somewhat larger scale this year than last, and it is hoped that the results obtained may be so decisive as to make further work in this line unnecessary. Digestion experiments upon alfalfa hay have been performed, the alfalfa being cut at three different stages of development. A digestion test of prairie hay has also been made. The analyses incident to this work are now in progress, but will be more or less delayed because of the limited force available for the work. Analyses connected with a digestion experiment of the previous year upon kaffir corn are also in hand. The department has, in connection with a seed breeding experiment in co-operation with the Farm department and the Botanical department, made a large number of determinations of the protein content of corn. These analyses show that this cereal varies greatly in this respect, and leads to the belief that seed selection based on chemical composition may lead to the perpetuation of varieties and types much richer in protein than the average crop is at present.

BOTANICAL DEPARTMENT.

The observations upon grasses and other forage plants have been continued. Various parts of the state have been visited for the purpose of studying the question in the field. This department, in co-operation with the departments of the farm and chemistry, has undertaken a series of experiments upon seed-breeding. With a view of inducing variation, a number of crosses have been made of wheat, oats and corn. The results of these crosses will be planted and desirable individuals retained for further experiment. It is hoped by proper selection to produce varieties of these plants which will be more suited to the needs of the Kansas farmers, in being more productive, better adapted to the climate, or richer in protein.

HORTICULTURAL AND ENTOMOLOGICAL DEPARTMENT.

Experiments in horticulture have been carried on as follows:

Variety Tests.—Tests of the productiveness and value of orchard and small fruits.

Fruit Improvement.—An attempt to improve present varieties by breeding. Several hundred crosses have been made.

The Sand Plum.—Cultivation of the species, with the aim of improving the fruit in size and quality.

Nut Trees.—A nut grove comprising several species has been

planted. Information has been collected from various parts of the state.

Vegetables.—Variety tests have been in progress; also comparison of cauliflower and cabbage plants wintered over in cold-frames with hot-bed plants grown in the spring.

Cover Crops and Mulches.—A test to determine the value of cover crops for the orchard, and crops best suited for the purpose.

Peach Test.—The co-operative test of races of peaches outlined by the American Association of Experiment Stations.

Vineyard Trellis.—The following systems of trellising are being tried: The two-arm Kniffin, the overhead Kniffin, the Wakeman, the Wakeman system modified, and a system using posts with horizontal cross-bars.

Storing and Marketing Fruit.—The investigations have covered the points of thinning, picking, packing, shipping, storing and marketing of fruit. The department has had the co-operation of the Cold Storage Department of the Armour Packing Co., of Kansas City, and the Moeser Ice and Cold Storage Co., of Topeka, in these operations. Experiments are being carried on with tomatoes, cucumbers, plums, grapes, peaches and apples. A bulletin on Cold Storage for Fruit will soon be forthcoming.

The entomological investigations and experiments have been chiefly as follows:

Injurious Insects.—A study of the more important insects injurious to farm and orchard crops was taken up in the fall of 1897. The investigations have included grain insects, scales, leaf-rollers, bud moths, the cigar case bearer, the cabbage worm, the corn weevil and the potato-stalk weevil.

Spraying.—Experiments in spraying for insect pests have been carried on, patent insecticides tested, new remedies tried, and data concerning each carefully tabulated.

Field Work.—Different sections of the state have been visited by representatives of the department for the study of special local conditions.

The Staff.

No changes have been made in the Station staff since the last annual report. The composition of the staff is as follows:

COUNCIL.

PRESIDENT WILL	Chairman (ex officio).
PROFESSOR COTTRELL	Agriculture.
PROFESSOR HITCHCOCK	Botany.
PROFESSOR WILLARD	Chemistry.
PROFESSOR FAVILLE	Horticulture.
PROFESSOR FISCHER	Veterinary Science.
PROFESSOR GRAHAM	Secretary.

ASSISTANTS.

F. C. BURTIS	Field and Feeding Experiments.
D. H. OTIS	Dairy.
GEORGE L. CLOTHIER	Botany.
PERCIVAL J. PARROTT	Entomology.
WM. L. HALL	Horticulture.

General Statements.

The Station is in a flourishing condition. The work which is being carried on is of a practical nature and is upon problems specially pertaining to the state of Kansas. The annual inspection of the Station on behalf of the United States Department of Agriculture was made by Dr. E. W. Allen, who expressed himself as highly pleased both with the work attempted and methods used and with the general condition of the Station. Following is a quotation from the report of the Office of Experiment Stations in the United States Department of Agriculture:

“The work of the Kansas Station has been actively pursued during the past year, and its affairs have been managed in an orderly and energetic way. There has necessarily been considerable reorganization of the lines of work. A number of the more important investigations carried on under the former administration have, however, been continued, and the new inquiries undertaken are along lines which are of much importance to the agriculture of the state.”

The expense of printing the annual report of the Experiment Station has always been borne by the Station, the report being treated as a bulletin; yet it is not, in fact, a bulletin to farmers, but is a report to the governor, and corresponds precisely to the biennial report of the College, which is printed by the state. It would therefore be in accordance with both precedent and propriety to have the Station report printed by the state. It is an improper expense to

be put upon the Experiment Station, which, even without that item, is greatly stinted for funds.

On other grounds it is recommended that the bulletins also should be printed by the state instead of by the Station. The United States government helps by paying postage on the bulletins; the state government should be willing to do its part in printing them; both of these are necessary in order that the benefit of the research at the Station may actually reach the farmer. The expense during the past year for printing bulletins was \$2,340.50, a sum which might have been much better spent by the Station in carrying on experimental researches, for which more means are needed, since in the past, despite the exceeding value of the Station work, the legislative clouds have not poured down the needed showers of funds wherewith the crops of useful knowledge might be made to grow. Drouths in the sky outdoors cannot be prevented; but that the state should be "drouthy Kansas" in a kind of weather which is under our control is a great mistake.

Respectfully submitted,

THOS. E. WILL.
H. M. COTTRELL.
A. S. HITCHCOCK.
J. T. WILLARD,
PAUL FISCHER,
E. E. FAVILLE.