ANNUAL REPORT OF THE DIRECTOR

OF THE

SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

FOR THE YEAR ENDED JUNE 30th, 1910

AS REQUIRED BY ACT OF CONGRESS, AUGUST 30th, 1890

ANNUAL REPORT OF THE DIRECTOR OF THE EXPERIMENT STATION

President Robert L. Slagle,

College.

Dear Sir:

I have the honor to make the following report of the South Dakota Agricultural Experiment Station, for the fiscal year ending June 30th, 1910.

ORGANIZATION

The Experiment Station includes the home Station at Brookings, supported by funds received from the federal government, and three sub-stations, located at Highmore, Eureka and Cottonwood, supported by funds received from the state.

At the State Stations the work is conducted exclusively along agronomy lines, while at the home Station the work is divided into seven different departments, namely: Agronomy, Animal Husbandry, Botany, Chemistry, Dairy, Horticulture and Veterinary. The professor of each of these subjects in the college is also head of the department in the Experiment Station. As a result of this arrangement the student becomes familiar with the experiments underway and also the results secured in the past.

During the past year, several assistants in the various departments have left us on account of better inducements. This, in a way, cripples the investigations, and in the end is a great financial loss to the institution, as their successors have other ideas which require new equipment. This condition may be remedied by paying as good salaries as

are paid at other state institutions for similar work. However, I am glad to state that the Experiment Station is better manned and the investigations cover a larger field than ever before.

At the beginning of the fiscal year, the Hatch and Adams Funds were apportioned to the departments as follows:

HATCH FUND

Agronomy	$1600 00	
Animal Husbandry	2020 00	
Botany	2000 00	
Chemistry	1330 00	
Dairy Husbandry	880 00	
Executive	5070 00	
Horticulture	1300 00	
Veterinary	800 00	
Total		$15,000.00

ADAMS FUND

Agronomy	$2940 00	
Chemistry	1700 00	
Dairy	2510 00	
Horticulture	5060 00	
Veterinary	790 00	
Total		$13,000.00
Grand Total		$28,000.00

These two funds are expended according to regulations promulgated by the United States Department of Agriculture, Washington, D. C. Part of the salary of each employee of the Experiment Station is paid from these funds.

For the year ending June 30th, 1911, this Station will receive $30,000.00 from the Federal Government.

PUBLICATIONS

During the fiscal year, July, 1909 to July, 1910 seven bulletins of twenty-five thousand copies each were published.

The following subjects were treated:

116. Acidity of Creamery Butter and its Relation to Quality.

117. Sugar Beets in South Dakota.

118. Corn.

119. Fattening Lambs.

120. Progress in Variety Tests of Alfalfa.

121. Sugar Beets in South Dakota.

122. Creamery Butter.

It is plain that these bulletins were along lines of agricultural industry, to which the state is eminently adapted. A new era in agricultural practice is dawning upon us. This is due to the general interest, both state and national, now taken in the conservation of the country's resources; also to the complex economic relations produced by the constantly increasing demand for food stuffs; the refusal of an exhausted soil to respond abundantly to the land-skinning system of farming, caused by the speculative tendency in land values; and the migration of pioneers to new land obtained on the public domain. In this new intensive program which has for its object increased yield per productive unit, Dairying will become an important factor, not only as a restorer of soil fertility, but also as a means of producing, under intelligent management, a high-priced product constantly in demand, from comparatively low-priced fodders, thus bringing about increased revenue for the farmer.

Bulletin No. 116, by the Dairy Husbandry Department, in considering acidity of butter, in relation to its quality, indicates through experimental conclusions certain defects in creamery butter that may be determined by the acid test.

No. 117, by the Chemistry Department, continues the record of the co-operative experiments by this Station and the U. S. Department of Agriculture, Bureau of Plant Industry, for the propagation of sugar beets.

No. 118, by the Agronomy Department, gives the results of the work in corn growing at this Station during the past five years. It treats of the seed-bed, seed-corn, its preservation, types, gives illustrations of good and poor ears, gives directions for testing seed-corn, and a table of varieties tested. An extra edition of this bulletin was printed to supply the requests. This is an important publication, and every corn grower in the state should have a copy.

No. 119, by the Department of Animal Husbandry, on Fattening Lambs, while it touches on the importance of the live stock industry as a means of maintaining soil fertility, gives the results of feeding four lots of twelve head each with different grain rations, on rape pasture for two seasons; and two lots of ten head each, with the same kind of a grain ration on alfalfa hay and prairie hay, with a final summary and comments on the results obtained. This is an important addition to the stock feeding literature of the state. Every sheep feeder should read it.

No. 120, by the Agronomy Department, on the Progress in Variety Tests of Alfalfa, gives valuable cultural directions for the production of this important fodder crop. It also gives the number of varieties tested, with results.

No. 121, Sugar Beets in South Dakota, by the Chemistry Department, is No. 117, continued, and gives the result of the co-operative efforts by this Station and the Department of Agriculture along the line of growing sugar beets in South Dakota, for the season of 1909.

No. 122, by the Dairy Department, treats on Creamery Butter, under the following divisions of the subject:

Factors Affecting Acidity,

The Acid Test and Measure of Deterioration,

Handling Cream to Improve Quality of Butter,

and is a continuation of No. 116. While it describes the effects of different operations, familiar perhaps only to

the creamery operator and expert butter-maker, it contains a great deal of information of importance to anyone who is connected in any way with the dairy industry.

With the increasing number, who, growing tired of the struggle for existence under the exacting conditions produced by the complex industrial system in the large cities, adopt the slogan "Back to the Land", the Western part of the state is fast being populated with a class who are eager to obtain the latest information pertaining to agricultural investigations in the state, and to meet the continually increasing demand for bulletins, the usual 25,000 edition is no longer adequate to supply the demand for the more popular subjects.

At a meeting of the Station Council during the first part of July, 1910, the following motion was passed:

"That the Board of Regents be requested to take the necessary steps to secure a printing fund of twenty-five hundred dollars annually, with emergency clause attached, from the next legislature; such fund to be used for the purpose of supplementing the Hatch Fund, for reprinting some standard exhausted bulletins and for printing popular substation bulletins."

The expense of printing and distributing the bulletins is borne entirely by the Hatch Fund, there being a regulation against using any of the Adams Fund for this purpose. There is also a regulation preventing us from using the Hatch Fund to pay for mere compilations of a popular nature. Neither of these funds can be used for general correspondence.

These matters ought to be considered in making your estimates for the coming year, as a great deal of good could be accomplished in these lines for the college and the state.

The demand for our bulletins by the high and common school teachers has been greater this year than ever before, showing that the awakening in agricultural thought is far reaching which will result in great benefit to the state.

The results of experiments at state stations aforementioned will be printed at the expense of the state appropriations for operating those stations.

AMERICAN PUBLICATIONS

Agricultural Epitomist, Spencer, Ind.
American Farm World, Chicago, Ill.
American Fertilizer, Philadelphia, Penn.
American Poultry Advocate, Syracuse, New York.
American Miller, Chicago, Illinois.
American Sugar Industry, Chicago, Ill.
American Swineherd, Chicago, Ill.
Better Fruits, Hood River, Oregon.
Children's Friend, Sioux Falls, South Dakota.
Chicago Markets, Chicago, Illinois.
Coleman's Rural World, St. Louis, Missouri.
Cotton Seed, Atlanta, Georgia.
Dairy Record, St. Paul, Minn.
Dakota Farmer, Aberdeen, South Dak.
Deutsch-Americanische Farmer, Lincoln, Neb.
Drovers Journal Stockman, South Omaha, Neb.
Elgin Dairy Report, Elgin, Illinois.
Farm and Real Estate Journal, Traer, Iowa.
Farm and Stock, St. Joseph, Mo.
Farm, Field and Fireside, Chicago, Ill.
Farm Life, Chicago, Ill.
Farm Progress, St. Louis, Mo.
Farm, Stock and Home, Minneapolis, Minn.
Farmer, St. Paul, Minnesota.
Farmer's and Drovers' Journal, Union Stock Yards, Chicago.
Farmers' Guide, Huntington, Indiana.
Farmers' Tribune, Sioux City, Iowa.
Farm World, Augusta, Maine.
Field and Farm, Denver, Colorado.
Flour and Feed, Milwaukee, Wisconsin.
Fruit Grower, St. Joseph, Mo.
Gos-Podarz, Omaha, Nebraska.
Hoards Dairyman, Ft. Atkinson, Wisconsin.
Holstein-Friesian World, Itacha, New York.
Homestead, Des Moines, Iowa.
Hospodarsky Listy, Chicago, Ill.

Indian School Journal, Chilocco, Okla.
Jersey Bulletin, Indianapolis, Ind.
Kimball's Dairy Farmer, Waterloo, Iowa.
Kansas Farmer, Topeka, Kansas.
Lebanon Independent, Lebanon, South Dak.
Louisiana Planter, New Orleans, Louisana.
Metropolitan and Rural Home, New York City.
Minnesota and Dakota Farmer, Brookings, South Dakota.
Missouri Agricultural College Farmer, Columbia, Mo.
National Farmer, St. Louis, Mo.
National Stockman and Farmer, Chicago, Ill.
Northwestern Agriculturist, Minneapolis, Minn.
Orange Judd Farmer, Chicago, Ill.
Pacific Dairy Review, San Francisco, Cal.
Poultry Topics, Lincoln, Nebraska.
Practical Dairyman, New York City.
Progressive Poultry Journal, Mitchell, South Dak.
Progressive Farmer and Southern Farm Gazette, Raleigh, North Carolina.
Pure Products, New York City.
Reliable Poultry Journal, Quincy, Ill.
The Republic, St. Louis, Mo.
Rural New Yorker, New York City.
Sioux Valley News, Canton, South Dakota.
Spoksman Review, Spokane, Washington.
Successful Farming, Des Moines, Iowa.
Successful Poultry Journal, 355 Dearborn St., Chicago.
Sugar Beet, Phila. Penn.
Wallace's Farmer, Des Moines, Iowa.
Weekly Live Stock Report, Chicago, Ill.

FOREIGN PUBLICATIONS

Agricultural Gazette, Sydney, New South Wales, Australia.

Agricultural Chemistry, Bangalore, Mysore, South India.

Abteilung fur Samenkontrolle, Hamburg, Germany.

Bureau of Science, Manila, P. I.

Boletin da Agricultura, Kingston, Jamica.

Division of Biology and Horticulture, Wellington, New Zealand.

Department of Agriculture, Melbourne, Victoria, Australia.

Die LandWirtschftlichen VersuchsStationen, Berlin, Germany.

Estacion Experimental Para cana de agucia, Lima, Peru.

El Cultivo Del Triog, Beunos Ayres.

Hokido Agricultural Experiment Station, Sapporo, Japan.

Journal of the Department of Agriculture, Adelaide, Australia.

Journal of the Department of Agriculture, Berlin, Germany.

Las Orges Culliness, Milan, Italy.

Les Ravines Et Les Sables, Toulous, France.

Natal Agricultural Journal and Mining Record, Maritzburg, South Africa.

New Zealand Dairyman, Wellington, New Zealand.

O Criador Pau Lista, Sao Paulo, Brazil.

Rothsmstad Experiment Station, Horpenen, London, England.

The above list of publications were received in exchange for the bulletin and furnish information from all parts of the world and could, to good advantage, be used by the students in the Agricultural courses. But on account of the limited space in the general library of the college, these daily, weekly and monthly periodicals are filed away in an inaccessible place and are of little value to the institution.

DEPARTMENT OF ANIMAL HUSBANDRY

The work of the year was a continuation of that outlined in last year's report, viz.: (1) Feeding lambs on different grain rations while on rape pasture; (2) Breeding

Western-bred ewes to pure-bred rams and feeding progeny the same kind of a grain ration; (3) Feeding steers of different ages on the same kind of grain ration, to determine relation of age to gain.

Experiment No. 1 was completed and the results were published in Bulletin No. 119.

Experiment No. 3 was finished and results will be printed next year.

The equipment of the College Farm is of great assistance to this department in conducting experiments along these lines. The demand for the bulletins is increasing annually.

This department co-operates with the Bureau of Animal Industry, United States Department of Agriculture, in the distribution of black-leg vaccine. Ten thousand, six hundred and twenty-four doses were sent out during the year. The reports submitted herewith give a more detailed account of the experiments in each department.

Respectfully submitted,

James W. Wilson,
Director and Animal Husbandman.

FINANCIAL STATEMENT

James W. Wilson, Director, South Dakota Experiment Station.

Dear Sir:

I have the honor to transmit herewith, schedules showing the receipts and expenditures from various funds for the Experiment Station, Sub-Stations and also for the work in Hog Cholera Serum for the fiscal year ending June 30th, 1910.

Yours truly,
R. A. Larson, Secretary.

EXPERIMENT STATIONS AND SUB-STATIONS

Receipts, 1909-1910

	Home Station	Highmore Sub-Station	Eureka Sub-Station	Cottonwood Sub-Station	Miscellaneous	Total
General Government Hatch Fund..	15,000.00	.....	.....	.....	.....	15,000.00
General Government Adams Fund..	13,000.00	.....	.....	.....	.....	13,000.00
State Appropriation	.....	3,000.00	2,000.00	2,000.00	3,000.00	10,000.00
Land Endowment for support of..	.....	.....	.....	.....	.....	.....
Sub-Stations	.....	.....	.....	.....	1,280.75	1,280.75
Sales of Produce	2,984.63	170.90	270.49	207.32	.....	3,633.34
Balance on hand July 1, 1909.....	1,314.27	135.01	13.71	.....	88.22	1,551.21
Total	$32,298.90	$3,305.91	$2,284.20	$2,207.32	$4,368.97	$44,465.30

DISBURSEMENTS, 1909-1910

	Hatch	Adams	Home Station Local	Highmore Sub-Station	Eureka Sub-Station	Cottonwood Sub-Station	Total
Salary	7,205.25	7,244.71	.....	1,708.60	752.01	752.97	17,663.54
Labor	2,452.78	2,502.25	1,056.55	935.78	593.53	785.98	8,326.87
Publications	2,054.55	.....	.....	.....	.....	.....	2,054.55
Postage and Stationery	249.96	44.40	128.70	12.50	27.92	17.38	480.86
Freight and Express	96.93	303.95	229.46	26.72	31.19	22.21	710.46
Heat, light, water, power	.....	120.23	6.83	6.00	5.85	.....	138.91
Chemical Supplies	455.08	681.46	.....	12.27	.....	.....	1,148.81
Seeds, plants sun. sup.	267.58	814.56	976.74	258.59	186.86	118.06	2,622.39
Fertilizer	.....	18.40	.....	18.40	.....	.....	36.80
Feeding Stuffs	133.10	345.20	655.87	7.70	56.69	71.21	1,269.77
Library	65.13	.....	.....	.....	.....	.....	65.13
Tools Imp. & machinery	66.32	78.02	51.85	96.55	502.02	365.46	1,160.22
Furniture & Fixtures	161.25	43.50	108.80	44.45	45.90	43.40	447.10
Scientific Apparatus	387.55	578.93	18.00	.....	.....	.....	984.48
Live Stock	1,122.09	150.00	.....	.....	.....	.....	1,272.09
Traveling Expenses	.....	.....	146.42	381.00	287.94	321.93	1,137.29
Contingent Expense	15.00	.....	.....	135.00	3.50	3.90	157.40
Buildings and Land	267.43	74.39	.....	5.80	129.20	5.52	482.34
Total amount expended	$15,000.00	$13,000.00	$3,379.02	$3,649.36	$2,622.61	$2,508.02	$40,159.01

Balance on hand Local Fund Home Station	919.88
Balance on Hand, Sub-Station Land Endowment Fund	401.13
Balance on hand Buildings at Sub-Stations	2,985.28
Total	$44,465.30

HOG CHOLERA SERUM FUND

Receipts

March 9, 1909, Special Appropriation	$5,000.00

Disbursements

Labor	1,476.20
Paid for pigs	805.34
Feed for pigs	277.54
Lumber for pig houses	146.49
Miscellaneous hardware and supplies	106.96
Pump and windmill	80.00
Hypodermic syringes, etc.	30.39
Express	3.05
Card Cabinet and cards for records	23.42
Ice	5.86
Towelling, cheese cloth, cotton, etc.	50.99
Balance unexpended June 30, 1910	1993.76
Total	$5,000.00

AGRONOMY DEPARTMENT

Brookings, S. Dak., Sept. 19, 1910.

Director James W. Wilson,
Brookings, S. Dak.

Dear Sir:

In compliance with your request I have the honor to submit the annual report of the Agronomy Department.

The principal lines of work for this Department, as in previous years, were rotation of crops which was started in 1897; adaptation and improvement of cereals and acclimatization test and yields with forage plants; also two systems of farming; grain farming vs. stock farming; also a complete fertility test of soils. This test began with the fourth crop from prairie sod.

In addition to the work at Brookings Station the Department has charge of all the work at the Substations at Highmore, Eureka, and Cottonwood.

On the whole the season was very favorable for experimental work at the Brookings Station.

PUBLICATIONS

Two Bulletins were prepared during the year. Bulletin No. 118, Corn. Bulletin No. 120, Progress of Variety Tests of Alfalfa.

Bulletin No. 118 records the variety tests of corn which had been in progress for five years; also a discussion of the following: Seed-bed, Seed Corn, Buying Corn, Preservation of Seed-bed, Preparation for Planting, Seed-testing, Seed and Market Conditions, Cultivations, and Harvesting.

Bulletin No. 120 considers the following: Type of Soil, Preparation of the Seed-bed, Pure Seed, Quantity to Sow, Method of Seeding, Management of the Fields, Harvesting, and Seed.

OATS

Seventeen varieties are here mentioned. Seeded at the rate of two bushels per acre. Sown May 3rd and harvested July 27th to August 11th.

Variety Test of Oats, 1909

VARIETY	Acres No.	Maturity			Resistance			Yield	
		Rate of Seeding	Date Sown	Date Ripe	% Smut	% Smut		W't per Bu.	Bu. per Acre
						Stem	Leaf		
Sixty Day	.....	2 bu.	5-3	7-27	100	25	50	27	58.1
Swedish Select	.....	2 bu.	5-3	8-2	100	40	50	30	44.0
North Finish Black	.....	2 bu.	5-3	7-31	98	40	50	23	28.6
Tobolsk	.....	2 bu.	5-3	8-2	100	55	60	37	40.0
Columbus	156	2 bu.	5-3	8-5	98	40	50	31	39.7
Bavarian	150	2 bu.	5-3	8-10	100	40	50	26	27.2
Lincoln	151	2 bu.	5-3	8-10	96	50	50	30	33.0
Abyssinian	155	2 bu.	5-4	8-11	100	80	70	25	27.5
Golden Beauty	159	2 bu.	5-4	8-11	100	60	70	26.5	22.5
Belyak	10269	2 bu.	5-4	8-11	100	60	70	27.5	28.9
American Triumph	162	2 bu.	5-4	8-11	100	60	60	25.5	31.4
American Beauty	163	2 bu.	5-4	8-11	99	70	35	26	25.9
Banner	160	2 bu.	5-4	8-11	100	75	40	23	22.2
Holstein Prolific	158	2 bu.	5-4	8-11	100	75	50	25	32.0
Wide Awake	.....	2 bu.	5-4	8-11	89	70	60	26	29.7
White Tartar	.....	2 bu.	5-4	8-11	100	65	60	24.5	25.8
White Schonen	.....	2 bu.	5-4	8-5	87	50	85	30.5	21.6

The average yield of 1909 of the seventeen varieties was 31.6 bushels.

WHEAT

Ten varieties of wheat were grown. The first six varieties were sown May 5th and the remaining four May 6th.

Variety Test of Wheat, 1909

VARIETY	Acres No.	Maturity			Resistance			Yield	
		Rate of Seeding	Date Sown	Date Ripe	% Smut	% Rust		W't per Bu.	Bu. per Acre
						Stem	Leaf		
Minnesota	171	6 pks	5-5	8-12	100	70	60	54	15.6
Minnesota	51	6 pks	5-5	8-14	100	80	75	51	14.2
Minnesota	169	6 pks	5-5	8-14	100	80	70	50.5	18.3
Blue Stem	.....	6 pks	5-5	8-14	100	50	60	53.5	15.2
Manchuria	2492	6 pks	5-5	8-2	100	95	50	54.5	14.7
Early Java	.....	6 pks	5-5	8-2	100	40	70	57	15.2
Red Fife	.....	6 pks	5-6	8-10	100	60	50	60	21.8
Minnesota	185	6 pks	5-6	8-12	100	65	50	56.5	16.0
Ghirka	1517	6 pks	5-6	8-12	98	50	65	53.5	17.7
Velvet Chaff	.....	6 pks	5-6	8-12	99	85	65	54.5	23.8

The average yield of the above ten varieties was 17.15 bushels.

BARLEY

Eleven varieties were grown during the season of 1909. Seeding was done May 6th, at the rate of two bushels per acre.

Variety Test of Barley, 1909

VARIETY	Acres No.	Maturity			Resistance			Yield	
		Rate of Seeding	Date Sown	Date Ripe	% Smut	% Rust		Wt per Bu.	Bu. per Acre
						Stem	Leaf		
Minnesota	6	2 bu.	5-6	7-27	100	90	70	44.5	36.9
Hanna	24	2 bu.	5-6	8-5	98	95	80	43.5	14.6
Kitzing	189	2 bu.	5-6	8-5	100	95	90	42.6	15.2
Odessa	182	2 bu.	5-6	7-31	100	90	85	43.0	26.3
Swan Neck	187	2 bu.	5-6	8-5	100	90	85	...	17.5
Chevalier	10584	2 bu.	5-6	8-5	100	90	85	42.5	19.4
Chevalier	35	2 bu.	5-6	7-31	100	90	85	44.0	15.4
Chevalier	200	2 bu.	5-6	8-2	100	95	85	42.5	17.9
Hannchen	10585	2 bu.	5-6	7-27	100	20	0	38.5	11.5
Moravian	343	2 bu.	5-6	7-31	100	95	90	43.5	18.7
Surprise	171	2 bu.	5-6	7-31	100	95	70	47.0	16.5

The average yield was 19.08 bushels.

The forage work was extended last year, and now includes six thousand, five hundred plants of alfalfas received from Professor N. E. Hansen of this Station. The seed of these plants was secured by Professor Hansen in his several trips into Siberia, Russia, and other countries as an explorer for the United States Department of Agriculture.*

The following is a brief history of the seeds and where obtained:

S. Dak. No. 35—*Medicago ruthenica*—S. P. I. No. 24451. Same source as S. P. I. No. 24456. This is a favorite wild forage for the stock kept by the Mongolian nomads of Eastern Siberia. It is a native of stony and sandy regions of eastern Siberia, extending west to the region of Lake Baikal, and into China.

S. Dak. No. 36—*Medicago sativa Turkestanica*—S. P. I. No. 20711. Seed originally from Tashkent, the capital of Russian Turkestan. Professor Williams of the Moscow Agricultural College has found this strain very hardy and very productive. Descended from a single plant.

S. Dak. No. 38—*Medicago media*—S. P. I. No. 20714. Originally from a single plant growing wild in the Voronezh province of the central Volga river region, Russia. It is a natural hybrid of *Medicago falcata* and *Medicago sativa* and found wild in the dry steppes. Sometimes has blue flowers on one branch, yellow on another, and sometimes both colors on the same branch. This seed was secured from Professor Williams.

S. Dak. No. 39—*Medicago media*—S. P. I. No. 20716. A sand lucern of hybrid alfalfa (*Medicago media*) descended originally from a single plant found wild on the steppes of the Voronezh province, southeastern Russia. The flowers are called black-green, but are really a very dark purple, changing to a rich green with dark purple veins; plant of strong, very upright growth; a heavy seeder here the past two years.

S. Dak. No. 40—*Medicago falcata*—S. P. I. No. 20718.

Plants found wild at Omsk in western Siberia. Very green early in the spring; endures severe drought; does well upon soils underlain with hardpan; somewhat resistant to alkali.

S. Dak. No. 41—*Medicago falcata*—S. P. I. No. 20719. Same source as S. Dak. No. 40. Seed picked from wild plants late in the fall when there was a little snow on the ground. Latitude 55 degrees.

S. Dak. No. 42—*Medicago falcata*—S. P. I. No. 24452. Picked a few miles from Obb, Tomsk province, where the Obb river crosses the Siberian railway. One of the most characteristic and dominant plants of the open steppes in Tomsk province, western Siberia. Highly regarded by the peasants as a pasture plant and for hay.

S. Dak. No. 43—*Medicago falcata*—S. P. I. No. 20724. Seed gathered from plants growing wild at Tomsk, Siberia.

S. Dak. No. 44—*Medicago falcata*—S. P. I. No. 24452. Seed gathered from north of Irkutsk, near western shore of Lake Baikal, eastern Siberia, and extending to a hundred miles north, among the Buriats.

S. Dak. No. 45—*Medicago falcata*—S. P. I. No. 20720. Picked from a load of wild hay brought in by the Buriats, native Mongolians, to the hay market at Irkutsk, on Lake Baikal, eastern Siberia.

S. Dak. No. 46—*Medicago falcata*—S. P. I. No. 20725. Sample of the third generation under cultivation by Professor Williams. Seed obtained from wild plants in the Don province of the lower Volga river region of southeastern Russia.

S. Dak. No. 47—*Medicago falcata*—S. P. I. No. 20717. Found wild in the Kharkov province of southeastern Russia.

S. Dak. No. 48—*Medicago falcata*—S. P. I. No. 20726. Seed obtained from wild plants in the province of Samara in the northern Volga river region of extreme east European Russia, on the edge of Siberia.

S. Dak. No. 49.—*Medicago falcata*—S. P. I. No. 20721. Found wild in the Samara province of the northern Volga region of extreme east European Russia, on the edge of Siberia.

S. Dak. No. 50—*Medicago falcata*—S. P. I. No. 20722. Found wild in the Saratov province of central Volga river region of eastern Russia, adjoining Siberia.

S. Dak. No. 51—*Medicago falcata*—S. P. I. No. 24455. This seed was gathered on the east bank of the Irtysh river, about ten miles north of Semipalatinsk, western Siberia. Plants with stems five feet eight inches long were found. Of erect habit. Both as growing in the wild pasture and as hay, the plant is well liked by stock.

S. Dak. No. 52—*Medicago falcata*—S. P. I. No. 20719 This seed was found wild on the open steppes at Omsk, Akmolinsk province, western Siberia.

S. Dak. No. 53—*Medicago falcata*—S. P. I. No. 24451. Seed gathered in almost pure sand at Station Charonte, in an arm of the Gobi desert, a few miles from Chinese territory, on the Siberian railway. This region is marked by extremes of heat and cold, and especially by the fact that often cold sufficient to freeze mercury is experienced with no snow on the ground.

S. Dak. No. 54—*Medicago media*—S. P. I. No. 20571. The native alfalfa taken from the twenty year old fields near Ultuma, near Upsala, Sweden, about sixty (60) degrees north latitude. Possibly there is some *Medicago falcata* mixed with it, as both are found in the same vicinity.

All varieties have stood the hard winter very well.

This is plant row work with the varieties described above. In addition to the plant row work, investigations are in progress along the following lines: Rate of seeding at different times and under different conditions as regards nurse corps; value of disking, harrowing, etc., of fields that are well set; test of seed from different sources.*

Varieties of Field Corn Tested in 1909

VARIETY	Source of Seed	Notes on Seed Planted				Date of Planting	Date of Harvesting	Total Pounds of Ears Harvested	Bushels Dry Ears per Acre, 80 lbs. per Bushel
		Ears in 100 Pounds	Per cent of Grain	Pounds per Bushel of Grain	Per cent of Germination				
Early Tuscarora	S. D.	420	83.3	53.	94.5	5-13	10-12	255	31.9
Gehu Yellow Flint	N. D.	448	83.3	59.	99.	5-13	10-12	225	28-1
N. D. White Flint	N. D.	425	82.	60.	95.5	5-13	10-12	215	26.9
Northwestern Dent	N. D.	303	82.	58.	94.	5-13	10-13	380	47.5
Dakota Sunshine	N. D.	305	82.	58.	92.5	5-13	10-13	395	49.4
Triumph Yellow Flint	Minn	239	80.	60.	90.	5-13	10-13	390	48.8
N. D. Golden Dent	N. D.	573	82.	56.5	98.	5-13	10-14	315	39.4
Minnesota 13	Minn	207	82.	57.	100.	5-12	10-14	425	53.1
Selection 133	Wis.	233	82.7	57.	99.	5-12	10-14	460	57.5
Rustler White Dent	Minn	203	82.7	56.	91.5	5-12	10-14	445	55.6
90-Day Yellow Flint	Conn.	270	86.	62.5	96.5	5-14	10-14	305	38.1
Moore's Premium	Mass.	268	86.7	63.	96.5	5-14	10-14	340	42.3
R. I. White Flint	R. I.	392	88.	61.	100.	5-14	10-15	350	43.8
Golden Ideal	Mich.	140	83.3	58.	98.5	5-14	10-15	425	53.1
Square Deal	N. D.	504	82.7	57.5	99.5	5-14	10-15	400	50.0

Amount planted: Ten rows each variety, each eight rods long, were planted in one locality in the field.

Method of planting, distances apart of rows, hills, etc.: Rows three feet, eight inches apart and hills twelve inches apart.

DURUM WHEAT

Nine varieties of Durum Wheat were grown. All varieties were seeded May 4th, at the rate of 6 pecks per acre.

Variety Test of Durum Wheat

VARIETY	Acres No.	Maturity			Resistance			Yield	
		Rate of Seeding	Date Sown	Date Ripe	% Smut	% Rust		W't per Bu.	Bu. per Acre
						Stem	Leaf		
Kubanka	5639	6 pks.	5-4	8-11	100	95	98	53.5	11.8
Kubanka	1516	6 pks.	5-4	8-12	100	96	96	53.5	15.7
Kubanka	1541	6 pks.	5-4	8-12	100	95	98	55.5	18.0
Kubanka	1354	6 pks.	5-4	8-2	100	..	..	54.0	16.2
Wild Goose	1547	6 pks.	5-4	8-2	100	95	95	56.0	13.5
Wild Goose	1493	6 pks.	5-4	8-2	100	92	90	58.0	17.3
Arnautka	....	6 pks.	5-4	8-14	100	85	85	56.5	16.5
Arnautka	1494	6 pks.	5-4	8-14	100	90	85	56.0	11.7
Arnautka	28.8	6 pks.	5-4	8-12	100	90	95	59.0	19.0

The average yield was 15.6 bushels.

Respectfully submitted,

Clifford Willis,

Agronomist and Supt. of Sub-Stations.

BOTANICAL DEPARTMENT

Professor James W. Wilson, Director,
Agricultural Experiment Station.

Dear Sir:

I beg leave to submit herewith the report of the Botanical Department during the fiscal year ending June 30, 1910.

I spent the months of July and August in the botanical laboratories of the University of Wisconsin, working on the sexual stages of the Rusts, particularly the aecidium cup forms of Rusts. In this work, I was most efficiently assisted by Mr. White, who prepared my sections. Of the many species of Rusts studied, only three have so far proved favorable for the study of the sexual fusions. This work is to be continued.

Some work on the fungous diseases of the potato, has been carried on, together with spraying experiments on the potato, in co-operation with the State Entomologist.

The weed work of the department has consisted largely in the study of the distribution of the more noxious kinds—Canada thistle and Quack Grass—and to a limited extent in a study of methods of eradication of noxious weeds.

Respectfully submitted,
Edgar W. Olive,
Botanist.

CHEMISTRY DEPARTMENT

Director James W. Wilson,

Dear Sir:

I herewith transmit the report of the Department of Chemistry of the South Dakota Agricultural Experiment Station for the fiscal year ending June 30th, 1910.

During the past year the same two lines of research have been carried on that were in progress the preceding year.

The work in sugar beets has been in every way successful. Old types have been improved and new ones created. This work, which is carried on in co-operation with the Bureau of Plant Industry, U. S. Department of Agriculture, has for its aim the establishment of purely American types of sugar beets adapted in every way to the climatic conditions prevailing in our sugar beet zone. At present a large portion of the commercial seed sown in this country is imported from France and Germany. Our tests have shown that much of this seed is not well selected and that the beets grown therefrom exhibit the widest variation in the sugar content among the different beets of the same strain. This variation sometimes reaches ten per cent sugar in the beet and over.

We now have upwards of forty different strains of selected beets and as many more of cross-bred varieties and singles selected on account of the unusual excellence of the individual beets chosen. These numbers from henceforth will diminish largely owing to the severe selective processes employed in weeding out beets with undesirable characteristics, such as low sugar content, inability to withstand hot and dry weather and early frosts.

Two Bulletins were issued on Sugar Beets during the year. Considerable quantities of seed were turned over to the Bureau of Plant Industry and they are now growing at various places on the Government trial grounds. This is a Hatch project.

The secondline of work is an Adams project. This work is fairly divisible into two parts. First, the determination of the Coefficients of Digestion for the grains and forage plants peculiar to the State of South Dakota. This work in this direction has been sadly needed since the establishment of the animal industries in the state to serve as a rational basis for feeding. But it is proposed to make this a basis for the second part of the work, viz, the determination of the effect of decidedly one-sided or unbalanc-

ed rations on the digestive system as well as upon the health and well-being of the animals themselves.

The first part of the work is now nearly completed. The experiments with sheep are concluded and a bulletin has been issued. The work with horses is now also nearly completed, there being two or possibly three more of the grains to be determined. This work will be completed and a beginning made on unbalanced rations this coming year.

Jas. H. Shepard, Chemist.

DAIRY DEPARTMENT

Director James W. Wilson,
College.

Dear Sir:

As per your recent letter I desire to submit the following report:

You already are aware that much of the experimental work has been of a preliminary nature. This department has also been short of funds. The experimental work in the Dairy Department was handicapped considerably by having our laboratory man, Mr. Miller leave us in the middle of the work and year.

With the Hatch, Two Hundred Dollars, ($200) we carried on some investigations on storage of ice. We have also kept up the milk butterfat and feed records of the dairy herd.

The question of acidity of butter and its relation to quality was taken up as a project under the Hatch fund. When I began to work at this institution it was soon found that this question involved much extended and technical work, more than we could possibly complete with the Hatch fund available. This question of acidity of butter, its relation to quality and keeping qualities of butter and the various factors affecting the acidity of butter and whether or not the developed acidity in butter is a measure of qualty or

deterioration of the butter was found to be closely related to the Adams' fund project in progress, namely, the effect of alkali water on dairy products and dairy cows. During the last year these questions have been investigated under the Adams' fund as in one sense they are prerequisite to the alkali water experiment now in progress. We published a bulletin on factors affecting acidity of butter and on the acidity test as a measure of the deterioration of butter in storage. During the coming year we are well organized to carry on our regular Adams' fund project and as a side issue we should continue the investigation upon the acidity of butter.

With thanks for your hearty co-operation, I am,

Respectfully yours,

C. Larsen,

Professor of Dairy Husbandry.

HORTICULTURAL DEPARTMENT

Brookings, S. D., Sept. 17, 1910.

James Wilson, Director,

South Dakota Agricultural Experiment Station.

Dear Sir:

I have the honor to submit the following report of the Horticultural Department of the South Dakota Agricultural Experiment Station for the year ending June 30, 1910. The experiments in breeding hardy fruits have been carried on along the lines outlined in previous reports. Special attention was paid to the apple in the Spring of 1910 and much hybridized seed was obtained as a result.

The work in breeding hardy raspberries was marked by the discarding of many thousands of seedlings and the selection, for propagation, of a few varieties deemed of special promise. During the Winter and Spring the hybridizing work with raspberries from many parts of the

world was continued on an extensive scale and much hybridized seed is now stratified in sand for Spring planting. So far the only variety sent out is the Sunbeam, mentioned in previous reports, which is winning much favor over a wide area of the prairie Northwest as the hardiest raspberry so far produced.

An extensive display of our hybrid stone fruits, mentioned in earlier reports, especially hybrids of the Japanese plums and Chinese apricots with the native sand cherry, was made at the State Fair last Fall. Several of them are now in extensive propagation by nurserymen who are satisfied as to their value for general planting. The combination of the Japanese plums with the native Dakota sand cherry appears to be an especially happy combination, such varieties as the Opata and Sapa combining the vigor of tree and choice quality and size of fruit of the Japanese plum with the early bearing and perfect hardiness of the native sand cherry. The union of native plum and Chinese apricot is also very promising as a profitable market fruit. Three of these have been named, the Hanska, Inkpa and Kaga.

Two new hybrids were sent out in the Spring of 1910, Sansoto and Cheresoto, of which the female parent is the sand cherry and the male parent the DeSoto, a well known standard native plum. The fruit is a perfect mingling of the sand cherry and DeSoto in looks and flavor and has the size of the DeSoto and color of the sand cherry.

The hybrids of the purple-leafed plum of Persia with the sand cherry turnout to be a a beautiful shrub, following the sand cherry in stature of plant and glossiness of leaf, but the foliage has the rich purple-red color which gives its Persian sire such wide popularity. It will probably be found valuable for single specimens, groups and for dwarf hedges, owing to its striking color.

The new-fruit breeding green-house, authorized by the legislature in 1909, was completed last Fall in time to be used during the winter for fruit-breeding experiments with orchard and small fruits. As a result a total of some five hundred lots of hybridized seed are now in sand for Spring

planting. A large amount of material for fruit-breeding work was imported during the winter, and year by year the collection of the best orchard and small fruits of the world is becoming larger. As much as possible this material is being used to further the work of breeding hardy fruits.

The new alfalfas brought over from Siberia, Mongolia, Manchuria, Turkestan and Western China in the course of my three trips as Agricultural Explorer for the United States Department of Agriculture, have been propagated in a limited way. The alfalfa work within the state has been turned over to the Agronomy Department of thos Station. Plants were propagated to aid in this work last year, and the plants sent to the sub-stations at Highmore, Eureka and Cottonwood and co-operators with the Agronomy Department in various parts of the State.. A small surplus was raised of the seven varieties which I named last spring, Hansen's North Sweden, Cossack, Cherno, Samara, Omsk Siberia, Obb Siberia and Gobi Desert, and was sent out to stations, specialists and private planters in other states. My personal estimate of these new alfalfas is that they will extend the alfalfa belt on this continent as far north as we will wish to farm.

The object of these experiments in breeding hardy fruits, which are now second to none in extent, is to originate better and hardier fruits for the prairie Northwest than any now known. To be compelled to protect fruit trees and plants is Horticulture on crutches and hence to be avoided if possible.

Yours truly,

N. E. Hansen, Horticulturist.

VETERINARY DEPARTMENT

James W. Wilson, Director

S. D. Experiment Station, Brookings.

Dear Sir:

I have the honor to submit herewith my report, for the

department of Veterinary Medicine, ending with the fiscal year June 30, 1910. It was the intention of the department at the beginning of the year to conduct an investigation on the adaptability of the agglutinating reaction of serum on glanders bacilli as a field method of diagnosis. Owing to an inability to obtain sufficient material for this work, the department was obliged to temporarily abandon this project and take up instead a test of the agglutinating reaction of immune sera to hog cholera bacilli as a measure of its potency. This work has not been completed.

As the department of botany has work in progress relative to ergot, it seems advisable during the present year to enter into co-operation of the so-called alkali disease prevalent in some portions of this state; as one of the theories advanced is that this disease is due to the ingestion of ergot.

With the Adams fund, a continuation of an enquiry into the histological and bacterological features of lumpy jaw has been continued. This work we shall attempt to complete during the ensuing year.

Very respectfully,

E. L. Moore.