UNIVERSITY OF IDAHO

AGRICULTURAL EXPERIMENT STATION

# WORK AND PROGRESS OF THE AGRICULTURAL EXPERIMENT STATION FOR THE YEAR ENDED DECEMBER 31, 1919

BULLETIN 119 JANUARY, 1920

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# UNIVERSITY OF IDAHO

## Agricultural Experiment Station

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### EXPERIMENT STATION STAFF

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J. E. NORDBY, M.S. ..... Associate Animal Husbandman
O. E. McCONNELL, B.S.(Agr.) ..... Assistant Animal Husbandman
W. M. GIBBS, Ph.D. ..... Bacteriologist
C. H. WERKMAN, B.S. ..... Assistant Bacteriologist
R. E. NEIDIG, M.S. ..... Chemist
C. L. von ENDE, Ph.D. ..... Associate Chemist, Fruit Storage
R. S. SNYDER, B.S. ..... Assistant Chemist
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H. P. DAVIS, M.S. ..... Vice-Director, Dairy Husbandman
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R. H. SMITH, M.A. ..... Associate Entomologist
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* BYRON HUNTER, M.S. ..... Specialist in Farm Management
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C. C. VINCENT, M.S.(Agr.) ..... Horticulturist
L. E. LONGLEY, M.S.(Agr.) ..... Assistant Horticulturist
C. V. SCHRACK, B.S.(Agr.) ..... Gardener
C. W. HUNGERFORD, M.S. ..... Plant Pathologist
S. P. SMYTH, B.S. ..... Poultry Husbandman
P. P. PETERSON, Ph.D. ..... Soil Technologist
E. B. HITCHCOCK, M.S.(Agr.) ..... Associate Soil Technologist
F. L. BURKHART ..... Assistant in Soil Technology
WILBUR R. KIDWELL, D.V.M. ..... Veterinarian
* L. C. AICHER, B.S.(Agr.) ..... Superintendent Aberdeen Substation
C. M. EKLOF, B.S.(Agr.) ..... Superintendent Caldwell Substation
* L. L. CORBETT, B.S.(Agr.) ..... Superintendent Jerome Substation
F. H. LAFRENZ, B.S.(Agr.) ..... Superintendent Sandpoint Substation
W. A. MOSS, B. S.(Agr.) ..... Superintendent High Altitude Substation at Felt

* In cooperation with the U. S. Department of Agriculture.

## REPORT OF THE DIRECTOR

Effects of the World War continued to influence the work of the Agricultural Experiment Station well into 1919. Several projects had been held at least partially in abeyance; certain station workers were on leave for military service; equipment and supplies of all kinds materially advanced in price; both in retaining members of the staff and in filling vacancies it was found that men with the desired training and experience demanded salary rates much higher than had before prevailed.

### Progress Made.

The Station is fortunate, however, in being able to record considerable progress for the year in spite of difficulties indicated above. New buildings and equipment have been secured; success has been had in securing well trained men to fill vacancies; important results have been achieved in connection with a number of projects; the 1919 legislative session, for the first time in the State's history, made a small general experiment station appropriation to supplement the funds provided by the federal Hatch and Adams acts.

Three full time station workers have been added during the year, in plant pathology, farm management and animal husbandry. The two last named are supported by the special appropriation for investigation before mentioned. A new part time worker has undertaken an Adams fund project in plant physiology. Fifteen new projects have been approved during the year as follows: Hatch fund five, Adams fund four and state funds six. Work was in progress at the close of the year on a total of seventy-eight projects. Seven resignations have been presented and ten new appointments made during the year.

### New Buildings and Equipment.

A service building is nearing completion for the department of Poultry Husbandry at a cost of $1500. A greenhouse, seventy-five feet in length, was completed during the year, and is utilized almost entirely by the various departments for experimental work. Two students' army training corps buildings have been moved to a suitable location to provide for a storage building, each for farm crops and horticulture. A feeding plant of permanent construction has been erected for investigations in the feeding of steers and sheep on the Caldwell Substation. This plant will provide for 144 head of cattle and 1,000 head of sheep with racks for forage, bunks, troughs, concrete water troughs and a reserve water storage tank holding 9,000 gallons. This plant cost approximately $3,500. A new residence for the farm superintendent was completed early in the year on

the High Altitude Substation at Felt at a cost of $2,700. A new horse barn has been recently built there at a cost of $1,000. A machinery shed and a small sheep barn have been erected on the Sandpoint Substation. A flock of twenty Shropshire sheep was purchased for this station. Twenty-two Hampshire sheep were purchased for the Caldwell Substation. For use on the farm at Caldwell and for cutting silage, and work in connection with feeding investigations, a Fordson tractor and a Blizzard cutter were purchased and are now in use. A new thresher for plot work and a smaller thresher for nursery rows were purchased for the department of Farm Crops. Eight head of very fine specimens of pure bred sheep have been donated to the Home Station at Moscow, consisting of the following breeds: four Suffolks donated by the Suffolk Society of England; one Cheviot, one Delaine and two Rambouillets. Two very fine pure bred Percheron mares have been purchased for the University Farm.

**Hatch Projects Yield Results.**

A trained and experienced man has been employed in the department of Agricultural Engineering to handle the teaching and investigational work in irrigation. This man, Mr. W. G. Steward, has apparently already impressed the irrigation interests of the state with the serious purpose of the Experiment Station to assist irrigation development.

It is a matter of importance that Prof. H. P. Davis, head of the department of Dairy Husbandry, was able to enter into an agreement with the Dairy Division of the U. S. Department of Agriculture for the cooperative study of inbreeding and line breeding of dairy cattle as compared with out-crossing. Two valuable bulls, one a Holstein and the other a Jersey, have been loaned to the Idaho Station by the U. S. Dairy Division as a part of the cooperative plan. In order to pave the way for accurate work, all the cows of the station herd have been placed on advanced registry test. During the calendar year of 1919 the University dairy herd produced 111,708 pounds of milk containing 4632.65 pounds of butterfat, an average production per cow of 8059.7 pounds of milk and 334.24 pounds of butterfat.

In spite of the unfavorable season, excellent results were secured in the extensive plots handled under the direction of the leaders in crop breeding and crop production investigations. Sudan grass appears to be a promising forage crop for use under north Idaho conditions. Rustlers White Dent corn has again yielded well and something like one hundred farmers have grown this variety, using the seed furnished by the Experiment Station.

The plant pathologist has been able during the year to initiate work on three station projects and in addition to make a rather thoro survey of the plant disease situation in the state. The work so far done has resulted

in calls for service that indicate the need for additional help in plant pathology. Preliminary study has been made by the School of Forestry of the adaptability of some of the state's logged-off areas for agriculture. In cooperation with the Aberdeen Substation the department of Agricultural Chemistry has initiated a study of sugar beet improvement.

**State Funds Aid.**

Special state appropriations for the Home Station, and for insect pests and soil survey have rendered possible the undertaking of important investigations.

Noteworthy progress has been made in animal husbandry in establishing a permanent animal feeding plant on the substation farm at Caldwell. Mr. J. E. Nordby, appointed associate animal husbandman, directed the construction of this plant and is charged with responsibility for animal husbandry investigations. His entire time is given to station projects. One hundred steers are now on feed at Caldwell and valuable data are in prospect.

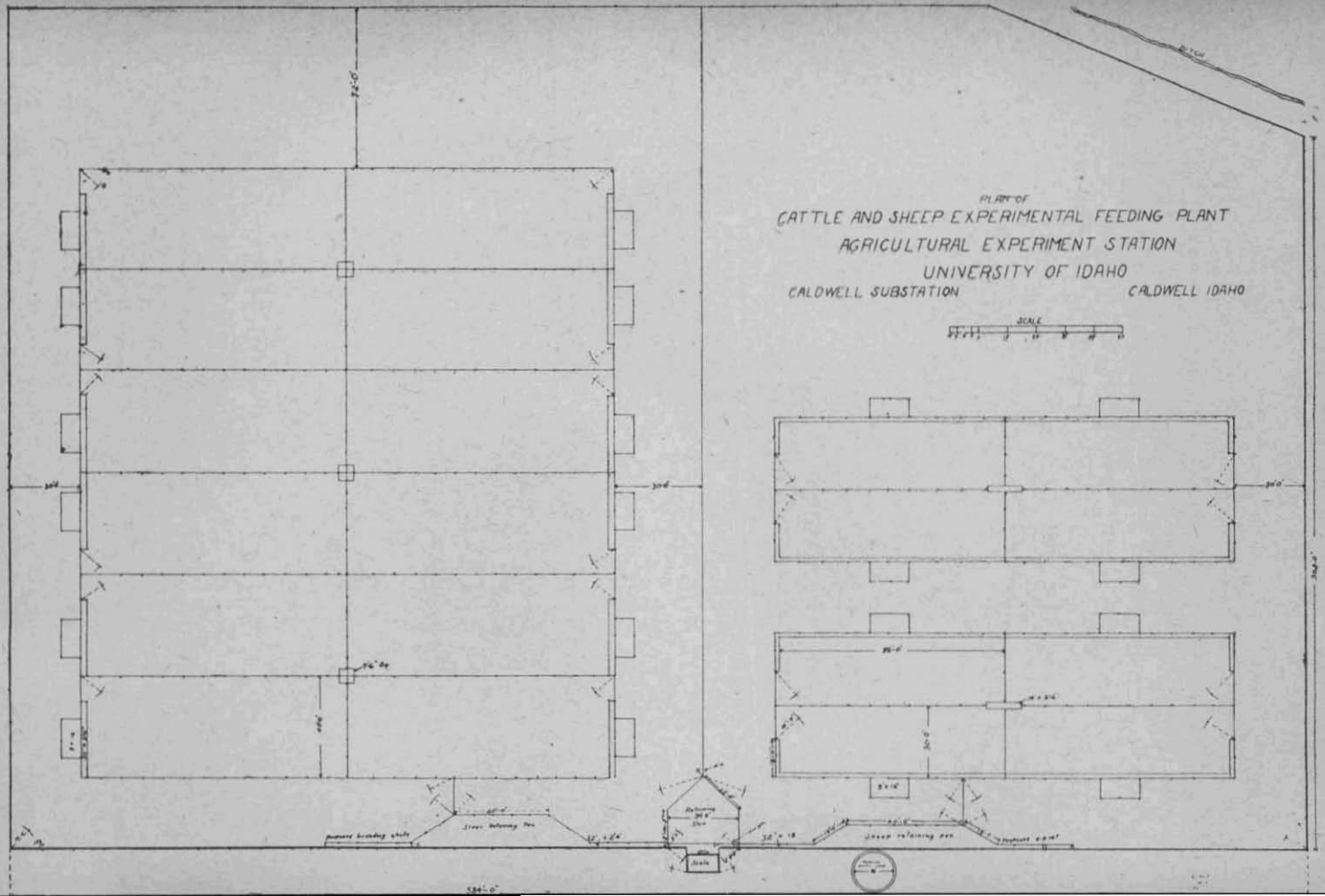
In addition to supporting the livestock investigations the home station appropriation has been used for farm management studies. The initial farm management investigation is in cooperation with the Office of Farm Management of the U. S. Department of Agriculture. A study has been undertaken of farm organization under irrigation conditions in southern Idaho. Two hundred and forty records were taken in November and December in the Twin Falls district, and this study will be continued each year for five years. The aim of the investigation is to obtain information of value to farmers of the irrigated regions and secure such data regarding well-organized irrigated farms as will undoubtedly serve as a guide in such community colonization as may be attempted in irrigated regions.

The associate entomologist, who has been stationed at Twin Falls, made marked progress in planning control measures in connection with the study of the clover aphis. While carrying on the clover aphis study, Mr. Ralph H. Smith, associate entomologist in charge, found evidences of the destructive work by the clover crown rot, or "eel worm disease." An agreement has been made with the Bureau of Plant Industry by the terms of which the Bureau and the Idaho Experiment Station will enter upon a cooperative investigation of the "eel worm disease."

During the summer of 1919 a soil survey, in cooperation with the Bureau of Soils, was made of Kootenai County. The survey in 1920 will be carried on in Twin Falls County.

**The Substation Farms.**

The 1918 session of the Idaho state legislature provided more generously for the substation farms than has ever been done before. At Aberdeen, Superintendent Aicher has continued the excellent work that he has been


PLAN OF
CATTLE AND SHEEP EXPERIMENTAL FEEDING PLANT
AGRICULTURAL EXPERIMENT STATION
UNIVERSITY OF IDAHO
CALDWELL SUBSTATION
CALDWELL IDAHO
SCALE

doing for several years. The land heretofore used for dry farming has now been carefully leveled and prepared for irrigation. This adds something like fifty acres to the area available for experiments in crop breeding and crop production under irrigation. A drouth prevailed in 1919 in southeastern Idaho causing such light yields that results of no importance were secured on the newly established substation at Felt.

The substation farm at Caldwell has been in operation for a number of years. It has not been possible, however, to place all of the land below the ditch, approximately 275 acres, under cultivation. Such progress has been made during the last year in the direction of clearing, leveling, and plowing the land not heretofore farmed, that the entire area below the ditch is in cultivation, or is ready for the plow. An experimental feeding plant has been added, as before indicated, and a flock of twenty-two Hampshire ewes have been purchased for the farm. Due to certain soil conditions, all attempts at variety testing of grain and forage crops have been abandoned. The farm will henceforth be devoted to lines of work dealing with the problems of diversified farming as found in southwestern Idaho.

Not enough moisture fell in northern Idaho the past year to support normal crop production on the Sandpoint Substation. Something like fifteen acres of land have been cleared of stumps. New buildings have been constructed and in other ways the Sandpoint Substation has been made ready for more effective work.

Very cordial relations have been maintained with the Office of Horticultural and Pomological Investigations, which office is now charged with the operation of the Jerome Experiment Station. As a result of conferences regarding the work of that station, its program has been broadened to include the study of seed production in addition to investigations with the potato.

### Adams Fund Investigation

Two projects are recognized in the department of Bacteriology. Some progress has been made with each. Unavoidable changes in the staff retarded investigational work. The department is now reorganized with one man's entire time available for research and another will devote one-third of his time to research.

The fourth year's results of analysis of spring wheat grown under the scheme of rotation, provided for in the project dealing with the factors influencing the protein content of wheat, have been compiled. This year's results agree with the data of the previous three years, which indicates that no great differences are noted in the quality of protein of wheats grown under the different rotations. Present indications show increased yields rather than increase in the quality of protein in this scheme of ro-

tation. With four years completed and no great differences noted, it was concluded to abandon the field work and initiate greenhouse studies, thereby reducing the number of uncontrolled factors. Further work is reported done with the project, "Factors Influencing Ripening of Fruits, particularly Apples". The chief feature of this season's work has been the extension of both the physical and chemical determinations employed, by means of which it is hoped to arrive at a more definite conception of the analysis of the apple and the changes which take place during its growth, maturation, and storage.

Investigations dealing with the types of organisms in cottage cheese after storage for various lengths of time and at various temperatures have been completed during the year and a written report submitted to the director.

Substantial progress has been made with the project entitled, "Apple Breeding." Some of the seedling apples seem to promise commercial importance. A preliminary report is in preparation.

During the past year, two new Adams fund projects have been proposed and accepted under the leadership of C. W. Hungerford, plant pathologist of the Experiment Station. Project number one of this department is entitled, "Relation of Soil Moisture Content to Bunt Infection in Wheat." Tests with spring grains at Nez Perce, Lewis County, and at Moscow, on the University Farm, indicate an apparent close correlation between the amount of bunt in wheat and the amount of moisture in the soil at planting time. Smutty wheat planted in infected soil, containing under 15 per cent of moisture, gave almost no smut in the resulting crop. Soils containing above 15 per cent of moisture, gave a progressively larger amount of smut until at 38 per cent, which approaches saturation, there was 100 per cent smut in the crop. Project number two under Mr. Hungerford's direction, entitled "A Study of Calico and Streak Diseases of the Potato," was approved in August. This study is of considerable importance to certain sections of southern and eastern Idaho.

Dr. V. H. Young, plant physiologist of the Station, has during the year started work upon the project, "Apple Structure, Micro-chemistry, and Enzyme Formation," supplementing the chemical studies of changes occurring during apple storage.

Satisfactory results were secured from the duty of—water project at Moscow. The work has been discontinued at Jerome and Idaho Falls. The alkali investigation has been carried on at Caldwell and at Moscow. At Moscow, observations have been made upon the growth of plants at various concentrations with attention to height of plants, vigor of growth, green weight and dry weight and relative weights of the vegetative and fruity parts. A new project in soils entitled, "Timber Soils Investigations," has been approved during the year.

Dr. J. E. Wodsedalek has accomplished much during the year in cytological studies of the reproductive cells of cattle and of sheep. A technical paper dealing with sex determination in cattle shows clearly the function of accessory chromosomes in determining sex.

**Publications During 1919.**

| No. | Bulletin, Title and Author. | Pages | Copies. |
|---|---|---|---|
| 114 | The "Slick Spots" of Middle Western Idaho with Suggestions for Their Elimination, P. P. Peterson, February, 1919 | 12 | 5,000 |
| 115 | Field Pea Production in North Idaho, H. W. Hulbert, March, 1919 | 28 | 7,000 |
| 116 | Swine Management in Idaho, O. E. McConnell, March, 1919 | 36 | 10,000 |
| 117 | Feeding for Egg Production, Pren Moore, August, 1919 | 12 | 7,500 |
| 118 | Soil and Climatic Factors in Relation to Crop Production on the Palouse Silt Loam of Idaho, P. P. Peterson, September, 1919 | 20 | 5,000 |
| | Circular, Title and Author. | | |
| 7 | Innoculation of Legumes, Paul Emerson, March, 1919 | 8 | 10,000 |
| | March, 1919 | 8 | 10,000 |
| 8 | Pure Seed Law and Weed Control Act, Paul Wenger, April, 1919 | 12 | 7,500 |
| 9 | Advanced Registry Testing, H. P. Davis, April, 1919 | 12 | 1,000 |

Journal of Agriculture Research, April 15, 1919, Quantity and Composition of Ewes' Milk; its relation to the growth of lambs. Ray E. Neidig and E. J. Iddings.

Journal of Agricultural Research, December 15, 1919, Sunflower Silage. Ray E. Neidig and Lulu E. Vance.

Journal of Economic Entomology, Vol. 12, No. 6, 1919, A Preliminary Note Concerning a Serious Nematode Disease of Red Clover in the Northwestern States, Ralph H. Smith.

**The Mailing List.**

| | |
|---|---|
| Total Experiment Station Mailing List | 12,475 |
| The summarized mailing list is as follows: | |
| Residents of Idaho | 9,325 |
| Residents of other states | 2,975 |
| Foreign | 175 |
| Total | 12,475 |

**Cooperation.**

At the annual meeting of experiment station directors in Chicago in November there was much said in favor of cooperation in research. It was pointed out that elimination of duplication of effort and special measures for coordination and cooperation in research would assist materially in getting greater returns for money expended. The Idaho station policy has been in harmony with this point of view.

Cooperative projects are as follows: With the U. S. Dairy Division, a study of line and in-breeding of dairy cattle as compared with out-crossing; with the Office of Cereal Investigations, cooperative relations in handling the work of cereal investigations on the Aberdeen Experimental Farm; with the Office of Horticultural and Pomological Investigations, a cooperative agreement providing general plans for operation of the experiment station farm at Jerome; with the Plant Disease Survey, cooperation thru the Station plant pathologist in a survey of plant diseases within the state of Idaho; with the Bureau of Soils, cooperative soil survey of Kootenai county; with the Bureau Plant Industry, a proposed study of the "eel worm disease" of clover.

**Station Needs.**

The cultivated area in Idaho is rapidly expanding, agriculture is becoming more diversified in nature and special crops are coming to have constantly greater importance. This expanding agriculture brings with it an increased demand for investigation of problems of soils, orchard and garden, animal breeding and feeding, crop production, dairying, power farming, irrigation, insect pests, plant and animal diseases, farm operation and business management, markets, and others of a similar nature.

The Extension Division of the University has grown rapidly in field of operation and in personnel. Back of the instructor in the class room and laboratory and the extension worker in the field has always been and is yet the work of the Experiment Station. An active, aggressive station policy is vital to success of extension. Enlarged and more efficient experiment station service must be had, therefore, to keep pace with agricultural development within our state and to furnish subject matter for a greatly enlarged educational organization.

**Salaries.**

The present experiment station salary scale is inadequate. Of immediate and pressing importance is a fundamental readjustment of salaries: 1. To adapt them to the present cost of living; 2. To make compensation for research commensurate with the importance of the work and the time and effort expended in preparing for accomplishment in research.

## FINANCIAL STATEMENT

**University of Idaho Agricultural Experiment Station in account with the United States Appropriations.**

| Dr. | | Hatch. | Adams. |
|---|---|---|---|
| To balance from appropriation 1917-1918 | | None | None |
| Receipts from the Treasurer of the U. S. for the year ending June 30, 1919 | | $15,000.00 | $15,000.00 |
| **Cr.** | **Abstract.** | | |
| Salaries | 1 | 9,217.11 | 9,594.27 |
| Labor | 2 | 2,145.16 | 2,137.59 |
| Publications | 3 | 309.00 | |
| Postage and Stationery | 4 | 227.32 | 32.23 |
| Freight and Express | 5 | 52.77 | 168.07 |
| Heat, Light, Water and Power | 6 | 52.40 | 68.90 |
| Chemicals and Laboratory Supplies | 7 | 201.80 | 583.43 |
| Seeds, Plants and Sundry Supplies | 8 | 313.47 | 354.11 |
| Fertilizers | 9 | 15.00 | |
| Feeding Stuffs | 10 | 1,481.60 | 121.40 |
| Library | 11 | | 13.00 |
| Tools, Machinery and Appliances | 12 | 148.90 | 278.09 |
| Furniture and Fixtures | 13 | 14.60 | 148.95 |
| Scientific Apparatus and Specimens | 14 | 109.93 | 728.80 |
| Livestock | 15 | | |
| Traveling expenses | 16 | 475.94 | 531.00 |
| Contingent | 17 | 20.00 | |
| Buildings and Land | 18 | 215.00 | 240.16 |
| Balance | | $15,000.00 | $15,000.00 |

## RECEIPTS ON LOCAL STATION FUND
**January 1, 1919—December 31, 1919.**

| Source. | Amount. |
|---|---|
| Interest on Deposits | $ 221.71 |
| Horticulture | 1,830.24 |
| Agricultural Chemistry | 15.00 |
| Farm Crops | 324.05 |
| Animal Husbandry | 280.00 |
| Soils | 294.92 |
| Rental from U. S. on Jerome Station | 1.00 |
| | $ 2,966.92 |

## DISBURSEMENTS

| Items. | Adm. | Agr. Chem. | An. Husb. | Farm Crops | Hort. | Plant Path. | Soils | Total |
|---|---|---|---|---|---|---|---|---|
| Labor | $ 3.30 | $ 47.40 | | $287.28 | $427.87 | | $142.23 | $908.08 |
| Freight and Express | 6.28 | 1.02 | 13.38 | 7.56 | 7.76 | | 1.18 | 37.18 |
| Supplies | 21.30 | 71.41 | 216.60 | 97.97 | 345.03 | $1.50 | 24.12 | 777.93 |
| Stationery and Post. | 153.43 | 27.30 | | 22.50 | 24.00 | | | 227.23 |
| Traveling expense | 8.15 | | | | 150.00 | | 39.84 | 197.99 |
| Feeding Stuffs | | | 370.84 | | 187.96 | | | 558.80 |
| Library | | 19.05 | | | | | | 19.05 |
| Tools and Machinery | | | | | 134.96 | | | 134.96 |
| Scientific Apparatus | | 11.28 | | | | | | 11.28 |
| Furniture and Fixtures | 112.00 | | | | | | | 112.00 |
| Bulletins | | | | | | | | |
| Building and Repairs | | | | | 95.43 | | | 95.43 |
| Contingent Expenses | | 5.00 | | | | | | 5.00 |
| | $304.46 | $182.46 | $600.82 | $415.31 | $1373.01 | $1.50 | $207.37 | $3084.93 |

## FINANCIAL STATEMENT

**The following receipts from Substations have been remitted to the State Treasurer for period January 1, 1919 to December 31, 1919.**

| | Aberdeen. | Caldwell. | Sandpoint. |
|---|---|---|---|
| Station receipts from sale of livestock, hay, grain, potatoes, milk, etc | $756.97 | $1410.10 | $1136.56 |

## RECEIPTS FOR BIENNIUM

**January 1, 1919 to December 31, 1920.**

| | Aberdeen. | Caldwell. | Sandpoint. |
|---|---|---|---|
| Legislative Appropriation | $7650.00 | $20,200.00 | $13,150.00 |

**Expenditures January 1, 1919 to December 31, 1919.**

| | | | |
|---|---|---|---|
| Salaries | $1687.50 | $2876.00 | $2604.04 |
| Sundry Labor | 1196.65 | 1044.70 | 212.00 |
| Stationery and Office Supplies | 6.90 | 19.00 | |
| Freight and Express | 12.09 | 2.50 | 81.29 |
| Bulletins and Publications | | | |
| Sundry Supplies | 341.33 | 859.24 | 719.64 |
| Travel Expense | 222.33 | 90.59 | 135.74 |
| Heat, Light and Power | 42.11 | | 25.92 |
| Water | | 1657.71 | 3.00 |
| Postage | 1.00 | | 7.00 |
| Telephone and Telegrams | 50.93 | 36.42 | 24.60 |
| Feeding Stuffs | | 121.33 | 780.42 |
| Insurance | | 87.16 | 47.81 |
| Repairs | 113.45 | 631.40 | 169.00 |
| Tools, Implements and Machinery | 414.80 | 1133.86 | 421.22 |
| Scientific Apparatus | | 4.00 | |
| Furniture and Fixtures | | 65.25 | 200.40 |
| Livestock | 275.00 | 515.00 | 40.00 |
| Other Equipment | | | 392.75 |
| | $4364.09 | $9134.16 | $5864.83 |