NINETEENTH ANNUAL REPORT

OF THE

Agricultural Experiment Station

OF THE

UNIVERSITY OF TENNESSEE

FOR 1906



A Group of Experimental Feeders, Winter of 1906-07

KNOXVILLE
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1908

The Agricultural Experiment Station

OF THE UNIVERSITY OF TENNESSEE

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W. N. GARRETT, Assistant in Plot Work
JAMES TYLER, Poultryman
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The Station has facilities for analyzing fertilizers and cattle foods; for testing milk and dairy products; for examining seeds with reference to their purity or germinating power; for identifying insects, grasses and weeds; and for investigating insect enemies and diseases of fruit trees, grains and other useful plants.

Packages by express, to receive attention, should be prepaid.

All communications should be addressed to the

AGRICULTURAL EXPERIMENT STATION,
Knoxville, Tennessee.

☞The Experiment Station building, containing the offices and laboratories, and the plant house and part of the Horticultural Department, are located on the University campus, 15 minutes walk from the Custom House in Knoxville. The experiment farm, the barns, stables, dairy building, etc., are located one mile west of the University, on the Kingston pike. The fruit farm is adjacent to the Industrial School and is easily reached by the Lonsdale car line. Farmers are cordially invited to visit the buildings and experimental grounds.

Bulletins of this Station will be sent, upon application, free of charge, to any farmer in the State

LETTER OF TRANSMITTAL

KNOXVILLE, TENN., January 1, 1907.

To His Excellency, John I. Cox, Governor of Tennessee:

Sir:—I beg to transmit herewith, on behalf of the Board of Trustees of the University of Tennessee, the report of the operations of the Agricultural Experiment Station for the year 1906, including an account of its work and a classified statement of its expenditures. This report is submitted in accordance with the requirements of the law that the Board of Trustees should annually submit such a report to the Governor of the State.

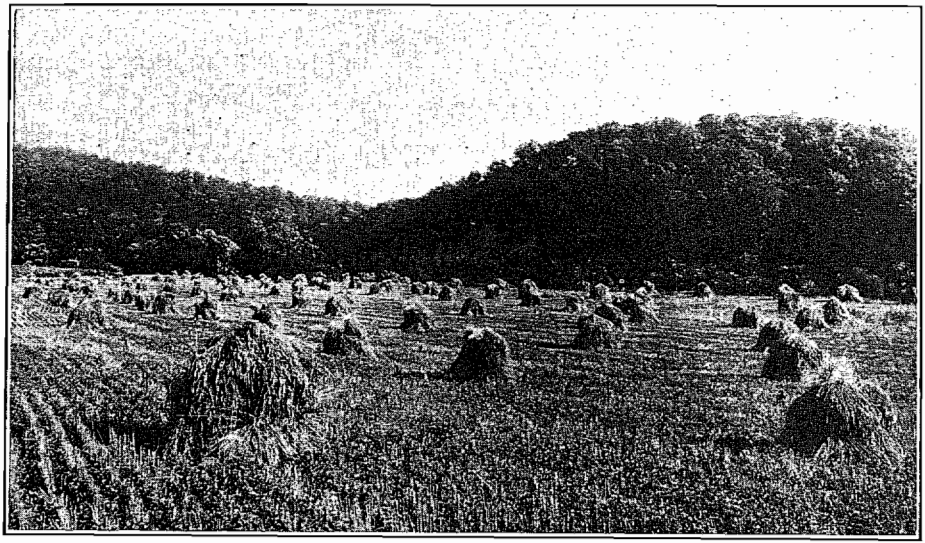
The excellent work carried on during the past two years by the Director, Prof. H. A. Morgan, and his associates has been continued and expanded in many directions, as is shown by the reports of the Director and the various other officers of the Station herewith given. The most cordial relations have continued to exist between the State Department of Agriculture and the University in all its departments, and the institutes conducted by Commissioner Ogilvie have been largely attended by the members of the agricultural staff, who have held themselves in readiness to respond to the call of the Commissioner at any time. It is our hope that this close relationship between the State Department of Agriculture and the Experiment Station will continue to be thoroughly cordial, as by such cooperation the best interests of agriculture can be secured.

The needs of the Station are set forth in the report of Director Morgan. It is earnestly hoped that the Legislature may give to the University such aid as will enable it to widely extend the benefits of its investigations and teaching to all divisions of the State by the establishment of branch stations, or cooperative experiments with farmers, or in other ways that experience may indicate as best adapted to secure the purpose desired.

Very respectfully,

BROWN AYRES,

President.



OAT CROP ON THE EXPERIMENT STATION FARM

NINETEENTH ANNUAL REPORT OF THE AGRICULTURAL EXPERIMENT STATION OF THE UNIVERSITY OF TENNESSEE FOR 1906

REPORT OF THE DIRECTOR

To President Brown Ayres:

Introduction

The past year has given an opportunity of studying more in detail the experiments in progress throughout the departments of the Station and of developing their relation to the needs and interests of the State.

The obligation upon the Station to serve the farmers has oftentimes been erroneously interpreted to mean the mere matter of demonstrating methods or systems of farming by which money can be made. This idea of the purpose of the Station is fast disappearing, and the exact relation of agricultural research, investigation, and demonstration to the farmer and his interests is much better understood and appreciated, as is indicated by the character of inquiries now coming to us from all parts of the State, and the demand for bulletins of the Station.

The additional appropriation by Congress in March, 1906, "for the more complete endowment and maintenance of the agricultural experiment stations," makes possible a more permanent organization of the forces of the Station for work which can be successfully accomplished only by continuous and uninterrupted investigations. The increase of the corps of workers and of facilities in a building already overcrowded emphasizes more and more the need of a new agricultural building of such design as will adequately house equipment necessary for the investigations of the Station and give room for the expansion of departments planned to meet the demands made upon the Station by a progressive agricultural spirit and people. It is not generally understood that the money made available by the Hatch Act of 1887 and the Adams Act of 1906 can not be used for the erection of buildings. The obligation to furnish buildings rests upon the State, and it is hoped that at the session of the Legislature about to assemble ample provision will be made for a modern building of sufficient size to meet the needs of the Station for years to come.

Additions to the staff

The following-named persons have been recommended for positions on the staff and accepted by the board: Aug. 1, Mr. Maurice Mulvania, assistant in bacteriology, in the Department of Botany; Sept. 1, Mr. E. C. Cotton, assistant entomologist, and Mr. H. H. Hampton, analyst. These gentlemen came to the Station with excellent

training for their respective positions and their work has been organized and begun in a most satisfactory manner.

Changes in the staff

On July 1, Mr. S. E. Barnes, for the past six years dairyman of the Station, resigned to accept the position of field expert in dairying for the Station and special agent of the Dairy Division of the Bureau of Animal Industry, U. S. Department of Agriculture. Mr. Jas. N. Price was recommended and accepted for the position of dairyman. Mr. J. E. Converse, assistant in plot work, resigned July 1, and his place was filled by Mr. S. M. Spangler. Mr. J. B. Garrett was appointed second assistant in plot work. In the Poultry Department, Mr. James Tyler was appointed to the position formerly occupied by Mr. J. H. Sledd.

Agronomy

In the Department of Agronomy the investigations started two years ago in conncetion with soils, fertilizers, varieties and rotations of crops, introduction of new crops, and a study of seasons of planting, have given promise of finally establishing systems of fertilization and cropping for the various soil areas of the State that will be a permanent guide to the agricultural interests of these areas.

Failure of red clover

The failure of any crop within any well established rotation involves not only the immediate loss of the crop but a change in the entire plans of farm management. This has been very strongly emphasized by the failure of red clover throughout our State, and the losses accruing from this failure are beyond estimation. Clover has been the farmer's main dependence for the restoration of worn-out land, as well as providing a stable article of stock food, and its failure in the majority of the counties of the State has been nothing short of agricultural calamity. In 1905, the Experiment Station, through the Department of Botany, began investigations which determined the specific cause of the clover failure, and during the past year efforts have been made in the direction of remedial measures and by providing substitutes for red clover and by developing rotations into which these substitutes might be logically placed.

Alsike clover

As reported last year, alsike clover has been extensively introduced, and upon neutral soils it has given general satisfaction. The results of this year's work upon the Station farm have shown that where limestone rock is used to the amount of one and two tons per acre this crop may be grown very successfully upon a large variety of lands where without lime it proves a complete failure; and thus with alsike, a strong competitor of red clover, the corn, wheat, and meadow rotation, formerly a common one in the State, may be re-established.

Alfalfa

The Station has continued its investigations and trials with alfalfa. This has been in response to the many inquiries coming to us with reference to this crop. Many farmers throughout the State have tried alfalfa, and

failed largely because the habits of the plant were not known and insufficient preparation was given to the land prior to seeding. Alfalfa is produced at much more expense on some lands than on others. Our experiments indicate that with phosphates, lime, and manure, the land being two years in clean-culture crops prior to seeding, alfalfa may be more generally grown. It should, however, be undertaken on small areas until its habits of growth are thoroughly known to the grower. The importance of this crop as a stock food and a soil builder warrants its being more extensively tried on all soil areas of the State, and the Station hopes by its experiments to demonstrate the importance of a more liberal planting of this crop under conditions that warrant its success.

Red clover investigations

The efforts of Professor Bain and his assistants in the Department of Botany to select and perpetuate a strain of clover resistant to disease have met with a degree of success that is most encouraging. For two years the strains selected have indicated distinct resistance to the specific red clover anthracnose. Should the resistance continue—and there is every evidence that it will—sufficient seed will be available within the next few years to re-establish this important crop throughout the State. Thousands of cuttings, in addition to the seed saved, are being made each year, and the rapidity with which the resistant strains are being propagated is most encouraging. The investigations of the Station in connection with the failure of red clover indicate in a very direct way the real purpose of agricultural investigation and the relation of research to practical farm operations.

Feeding experiments

The Station has during the year inaugurated a series of experiments to be carried through a number of years with the view of making a logical comparison of farm and market values of crops grown and fed upon the farm. There can be little doubt of the influence of market values of crops upon the farmer's rotation and general farm management. Unless the point of view of the large majority of farmers is changed the investigations of the Station, directed as they are in accordance with natural laws and with the view of maintaining and adding to soil fertility under crop production, can not produce the results intended.

Tennessee can not expect to realize her full agricultural development by growing crops for market. The general live stock farm is not enough in evidence for the economical use of crops and for soil building, and any system that will encourage the feeding of more live stock upon the average farm of the State will be of untold value.

We began this year by growing three crops—corn, cowpeas, and soy beans—in acre areas for comparison of yields and feeding values. The crops from the respective acres are being fed to carefully selected animals to determine, (1) the feeding period of each acre; (2) the pounds of meat produced from each; (3) the relative cost per pound of meat produced—the cost of the feed being estimated upon a basis of farm value;

that is, what it cost the farmer to produce the feed, including a fair rental for land used.

These experiments contemplate a test of a large number of crops, the effect upon production when the manure from the animals fed on each acre is annually returned to the soil, the length of time to which the feeding period can be extended on each acre, and the discovery of a more logical and economical system than has yet been found of maintaining and feeding more live stock upon the average farm of the State.

Experiments have been continued in connection with pasture crops for pork production as well as for comparison of home-grown and purchased protein foods.

Cooperative experiments

Many sections of Tennessee are preeminently dairy sections, and in cooperation with the Dairy Division of the Bureau of Animal Industry, U. S. Department of Agriculture, the Station is studying the dairy conditions in the State and assisting in developing this industry upon more economical and modern lines.

The cooperative work of the Department of Botany with the Bureau of Plant Industry, U. S. Department of Agriculture, in cotton investigations, and of the Department of Agronomy with the same Bureau in cereal investigations, has continued with gratifying results.

In a limited way the Station has cooperated with farmers in well-known soil areas with the view of comparing and checking the results upon the Station farm and of introducing systems of rotation, fertilization, seed selection, and farm management. The results of this work have been gratifying and warrant the extension of this service to all the soil areas of the State. As a means of assisting the farmers to interpret results more accurately, of extending the services of the Station in a material way to the farmers of the State, and of indicating to the Station workers the logical lines for investigation, the cooperative plan is most effective. It is hoped that through liberal appropriations the cooperative system of agricultural investigation may extend at least to all the important soil areas of the State.

Needs of the Station

Aside from the pressing need of a building planned and constructed to meet the requirements of modern agricultural investigation and extension, the Station is sorely in need of funds that will permit of a more liberal issue of its publications. The mailing list has been added to until nearly all of the past issues of bulletins have been exhausted, many of which should be reprinted; and if the bulletins are printed in sufficient number to meet the demand even within the State the present fund for publication is wholly inadequate to publish the results of the various departments.

The restrictions placed upon the funds coming to the Station from the Hatch and Adams Acts presuppose State aid for land, buildings, repairs, publications, and the extension of the investigational results to the farmers of the State. Without this aid complete service of the Station

to the State is impossible. An appropriation of $10,000 for each biennial period would in a great measure relieve the Station of its present embarrassment and would extend to the agricultural interests of the State the results now so urgently demanded.

Respectfully submitted, HARCOURT A. MORGAN, *Director.*

REPORT OF THE BOTANIST

The report of the Botanical Department for the year 1906 is rather one of progress than of the institution of new lines of investigation. On Aug. 1, Mr. Maurice Mulvania was appointed assistant in bacteriology and assigned to this Department. Mr. Mulvania has begun investigations in soil bacteriology in cooperation with the Department of Chemistry and Agronomy. The botanist and assistant botanist have devoted much time during the year to the investigation of the clover anthracnose, the discovery of which was announced in the last report. Rather unexpected results were obtained in the selection of red clover for disease resistance, which will probably mean the ultimate solution of the clover question for this State, if future results continue as successful as the first year's work indicates. The results of this investigation are published in detail in Bulletin No. 75 of the Tennessee Station, and are also given in substance in the Proceedings of the American Breeders' Association for 1907. The investigation of this disease will be continued, and it is hoped that sufficient data will have been obtained by another season's work to publish an account of the life history of the fungus causing the disease of clover and alfalfa in Tennessee. Pending the completion of this work, a technical description of this parasite was published during the year.* Besides the clover disease, some progress has been made toward a pathological and physiological study of legumes in general.

The plant breeding work of the Botanical Department is conducted in cooperation with the Bureau of Plant Industry of the U. S. Department of Agriculture. This work at present comprises selection for disease resistance and general improvement of clover, and for earliness and increased oil content in the seed of cotton. A cotton plot for breeding purposes is being maintained in Fayette County, some thirty miles east of Memphis. Plots are also being cultivated at the Experiment Station farm for the purpose of determining the effect of climate on earliness of maturity of cotton. These cotton-breeding experiments are making satisfactory progress and it is believed will eventually prove of material benefit to the cotton growers of Middle and West Tennessee.

The investigations into the important field of soil bacteriology have been fairly begun, and it is believed that cooperation between the Departments of Botany and Chemistry will be of mutual advantage.

Important additions to the equipment of the Botanical Department have been made during the year. Especial mention may be made of bac-

* Bain and Essary, "A New Anthracnose of Alfalfa and Red Clover," Journ. Mycol., Vol. 12, p. 192, 1906.

teriological apparatus. A fairly complete outfit has been secured for research work in this subject. Valuable apparatus has also been secured for general investigation in mycology and botany, such as microscopes, photomicrographic lenses, etc.

Too much importance can not be attached to the library equipment as an indispensable aid to agricultural investigation; hence, a large percentage of the funds available to this Department has been expended for books. A list of the botanical works purchased may be found in the report of the librarian.

It is perhaps hardly necessary to emphasize the fact that the Botanical Department suffers for lack of room in common with the other departments of the Station.

Respectfully submitted, SAMUEL M. BAIN, *Botanist.*

REPORT OF THE CHEMIST AND AGRONOMIST

AGRONOMY

By far the largest part of the field experiments with farm crops during the year 1906 were continuations of work begun in 1905. Both seasons were very favorable for crop production of all kinds.

The following is an outline of the experiments conducted in 1906:

CORN—1. Tests of 27 varieties grown on three types of land, viz: (1) river bank, (2) rich bottom land, (3) medium upland.

2. Distance in planting experiments, in which late, medium, and early-maturing varieties were tested, both when early and when late planted.

3. Fertilizer experiments on both upland and bottom land.

4. Vitality experiments to test producing capacity of weakest and strongest plants as indicated by early growth.

5. Improvement of varieties by selection and breeding.

WHEAT—1. Tests of 20 varieties, including four of spelt.

2. Fertilizer experiments on both upland and bottom land.

3. Selection for improvement from five varieties.

4. Planting of amber and yellow berries on soils of widely different fertility and character.

5. Rate of seeding tests with a number of typical varieties.

6. Experiments with large versus small grains for seed.

OATS—1. Tests of five varieties for fall sowing (winter oats) and three for spring sowing.

2. Date of seeding experiments for both fall and spring-sown varieties.

3. Selections for improvement of winter oats.

BARLEY—1. Tests of two winter varieties when planted at different dates.

2. Spring barley compared with spring oats.

BUCKWHEAT—Date of planting experiments.

CORN AND COWPEAS, ETC.—Test of three varieties of cowpeas and of three varieties of soy beans when grown with corn.

KALE AND RAPE—A comparison between kale and rape when (1) fall-sown and (2) spring-sown for forage.

MILLET AND COWPEAS, ETC.—1. A series of fertilizer experiments on millet and cowpeas when grown separately and in mixtures year after year on the same land.

2. Experiments with various mixtures of millet with (1) varieties of cowpeas and (2) varieties of soy beans for hay production.

PEANUTS—1. Tests of four varieties.

2. Selections for improvement.

SOY BEANS—1. Tests of 24 varieties.

2. Date of planting experiments.

SORGHUM—1. Tests of five varieties for (1) syrup and (2) forage.

2. Distance in planting experiments with five varieties to test effect on both syrup and forage production.

VETCH—1. Experiments with mixtures of hairy vetch and (1) wheat, (2) oats, (3) barley, and (4) rye for hay production.

2. Dates of seeding for all four of the mixtures.

CROP ROTATION, ETC.—Various crop rotations, with special reference to soil fertility, are being continued on the same land and are expected to be of considerable practical importance. The results already obtained are especially valuable in connection with the chemical investigation being made on the soil and the analyses of the crops for their plant-food contents.

Data from all these experiments have been carefully collected with the view to publication in bulletin form, but in most instances, the results for a series of years are necessary in order to get trustworthy averages.

GREEN MANURING—A number of experiments have been carried out for now the second year on green manuring. Especial attention has been given to green manures in connection with the use of ground phosphate rock. Entirely satisfactory and conclusive results can not, however, be gotten in a brief time. Furthermore, various types of soils as found in different parts of the State must be experimented on. This can be done only in cooperation with the farmers. The subject at this time is one of much interest to the farmers, especially to those on soils naturally very poor in phosphoric acid. The results thus far obtained on soils of the Barrens type of the Highland Rim are somewhat favorable to the use of the ground rock.

CHEMISTRY

The Chemical Department has been materially strengthened by the addition of H. H. Hampton, who began work as assistant chemist Sept 1. Mr. Hampton is to pay particular attention to soil investigations.

Some of the problems under consideration are, the composition of Tennessee soils, soil acidity, humus formation, composition of crops as grown on the Station farm, and the preservation of stable manure.

Mr. W. E. Grainger, associate chemist, has in addition to the work

of the fertilizer inspection been of much valuable assistance in both soil and miscellaneous feeding-stuff analyses.

Some time has also been spent on the improvement of certain analytical methods.

The following is a resume of the year's analytical work, but does not include the work done on methods of analysis:

	No. of analyses
Soils	39
Fertilizers for State inspection	310
Feeding stuffs, etc.	45
Miscellaneous manurial materials	30
Minerals for examination (about)	75

Respectfully submitted,

CHARLES A. MOOERS, *Chemist and Agronomist.*

REPORT OF THE DAIRYMAN

Upon taking charge of the Dairy Department July 1, 1906, I found the herd in excellent condition, and made up largely of animals of good type and above the average in production. From July 1, 1905, to June 30, 1906, the average yield per cow was 5500 pounds of milk and 330 pounds of butter. Considering that the herd contained a number of heifers in their first period of lactation, this is a good yield.

During the last six months several of the older and less profitable cows have been disposed of, and their places have been taken by heifers that calved during this time. At present almost one-half of the herd is composed of young cows in their first and second milking periods. Several of these young cows are yielding well and give promise of making very satisfactory records.

The young bull purchased last year is now being used on some of the cows. He has developed well, and possesses excellent type and style. This bull carries some of the best blood of the country, being a grandson of Flying Fox, and is out of Bachelor's Juliana (test 15 pounds and 13 ounces in 7 days), which is a full sister to Bachelor's Juliette (test 26 pounds and 3 ounces in 7 days). With these lines of breeding back of him, this bull is expected to produce some good individuals from our best cows.

It is the policy of the Department to keep careful records of milk and butter yields, and of feed consumed for each cow, and to sell off the poorest animals, and keep heifers from the best producers to take their places. By this method of selection and elimination, and the use of good bulls, the herd is being improved from year to year.

On January 1, the Department installed a Burrell-Lawrence-Kennedy milking machine. It is intended to make a thorough test of the machine over a long period, and the trial will continue throughout the year. The principal points to be observed in the test are, thoroughness of milking, speed of milking, final effect on yield, effect on udder, and sanitary advantages of the milking machine. When this test has been carried on long enough to draw definite conclusions the result will be published.

The values of different rations for milk production are being compared in an experiment started recently. The Department will take up some investigations with milk with particular reference to pus cells.

Respectfully submitted, JAMES N. PRICE, *Dairyman*

REPORT OF THE FIELD EXPERT IN DAIRYING

On July 1, 1906, the Experiment Station, in cooperation with the Dairy Division of the Bureau of Animal Industry, began a study of the dairy work of Tennessee, with a view to giving active assistance in the improvement of the dairy herds and general conditions in the State, and I was placed in charge of the work. During the last six months 65 dairy farms have been visited, some of these many times. Up to the present time 12 dairymen have been induced to cooperate with us, the object being to improve their herds and improve their methods of raising feed and feeding their cows. The scales and Babcock test are in constant use and many poor cows will be culled out as a result.

We have encouraged and aided in the building of 11 silos, and many more doubtless will soon be built. Over 350 cows are now under test, and this work is being extended as fast as possible. Interest is growing rapidly and the dairymen are very anxious for help.

Two dairy associations have been organized, and are doing much to extend this important branch of agriculture.

Respectfully submitted, S. E. BARNES, *Field Expert in Dairying*

REPORT OF THE HORTICULTURIST

During the year 1906 experiments previously undertaken were continued, and an investigation into the fruiting habit of the grape was begun.

The peach orchard bore a heavy crop, and opportunity was thus given to test Bordeaux mixture as a remedy for the brown powdery mildew of the peach. Previous experiments, conducted by Prof. S. M. Bain, indicated the necessity of a more dilute Bordeaux mixture for the peach than can be safely used on the apple. And in our work Professor Bain's results were used as a basis. The formula used was 3 pounds copper sulphate, 10 pounds lime, 50 gallons water. The first application was made just after the peaches were formed—the largest were the size of hazelnuts. There were no fully grown leaves on the trees at this time. A very little damage resulted, but not enough to retard growth. In about two weeks a second application of the same strength was given to a part of the trees. For over a week afterward no injury was observed; then, after a heavy rain, the leaves began to fall and almost every leaf fell from the trees within the next ten days. The fruit shriveled, and in all varieties later than Carman it dropped or was so imperfect as to be worthless. On the trees that had received only one spray a full crop set and was remarkably free from rot. In a neighboring orchard of Alexander

peaches the entire crop was ruined by rot, while in our orchard no rot was observed in this variety. Additional experiments with dilute Bordeaux mixtures will be made to determine what amount of copper sulphate can be applied in this form without danger to the foliage while killing the fungus.

In the work with grapes, 40 vines of the four leading commercial varieties were grown under different training systems, and a record was kept of the number of bunches, with the location of each on the cane, and its weight. The results indicate the importance of adapting the system of pruning and training to the fruiting habit of each variety. While the record of a single year can not be conclusive, it is believed that the data are of sufficient value to warrant their publication as a bulletin.

A number of farmers' institutes and educational rallies were attended by the horticulturist, and at all such meetings great interest was manifested in the educational and experimental work of the Department.

In November and December the horticulturist, by invitation of the Commissioner of Agriculture, made an investigation of the trucking industry of West Tennessee, and embodied his observations in a report to the Commissioner to be included in his biennial report.

During the year a substantial cottage for the teamster was built, the proceeds from fruit sales being used for this purpose.

An increasing number of visitors indicates the active public interest in the Department and its work.

Respecfully submitted, CHARLES A. KEFFER, *Horticulturist.*

REPORT OF THE POULTRYMAN

A Poultry Department was established at the beginning of the fiscal year, and much interesting information has already resulted, though little definite experimentation has been attempted. The flock has been divided into groups, each of which is given a separate house and yard. Careful records have been kept of the kinds and amounts of rations, weight and egg production. The hens of each group have been trap-nested and the tabulation of results shows a very great difference in egg production, not only among the breeds, but among individuals of the same breed. Some hens laid 79 eggs during four months, while others did not lay at all. The cost of producing eggs has ranged from less than 5 cents to more than $2.50 per dozen.

The following lines of investigation indicate the general character of the work of the Department: Influence of age on egg production—a probable egg type; influence of size on egg production in individuals of the same breed; establishment of heavy-laying strains; study of different rations to determine their value in egg and flesh making. It is hoped with increased facilities that the Department can be made of great practical value to the rapidly increasing poultry interests of the State.

Respectfully submitted, JAMES TYLER, *Poultryman.*

REPORT OF THE VETERINARIAN

There has been no material change in the character of the work in veterinary science during the past year. The demand for research work is becoming more and more apparent, but with the present means and facilities but little progress can be made.

There occurred quite a severe outbreak of necrotic stomatitis among cattle throughout East Tennessee last fall. Even though the mortality from this disease was very small, it was of considerable economic importance, since it affected milk cows principally and made the animals unprofitable and unthrifty for several weeks. One outbreak was also noticed among a herd of deer, which were kept on a farm where necrotic stomatitis existed among the cows, and in these animals it was almost invariably fatal. The deer probably contracted the disease from the cattle, which were grazing in an adjoining field.

Another very peculiar and extremely fatal disease occurred among a herd of dairy cattle in Hamilton County. This disease was characterized by the following symptoms: At first a slight swelling in the region of the eyes or on the cheeks; marked itching—the animal would rub the swollen parts against any object with which it came into contact; more or less excitement; swelling increasing in a few hours; itching more intense; slobbering and frothing at the mouth; incoordination of movement; temperature elevated from 2 to 4 degrees; respiration accelerated; pulse becoming weaker and more rapid. These symptoms would gradually become more marked, and after they had run a course of from 12 to 18 hours, the animal would die, often during an apparent convulsion. The marked peculiarity about this bovinal disease was the intense swelling, which was localized about the head, and the extreme itching. Out of a herd of 60 cattle, 12 died. Calves as well as more mature animals contracted the disease. Every affected animal died.

The increased demand upon the Veterinary Department emphasizes our lack of facility for investigation. The Department greatly needs quarters and increased facilities, and we hope that the coming session of the Legislature will make ample provisions.

Respectfully submitted, M. JACOB, *Veterinarian.*

REPORT OF THE LIBRARIAN

There are 3420 bound volumes in the library, and a number of volumes, obtained by subscription and purchase, that are ready for binding. 46 volumes, chiefly of periodicals for 1905, have been bound and catalogued during the year.

Extensive additions have been made to the library through the Adams Fund. These have been principally in the Departments of Botany and Chemistry, and have consisted for the most part of sets of periodicals, although a considerable number of single volumes were included in the purchases. The sets thus secured are as follows:

Berichte der Deutschen Botanischen Gesellschaft, 20 vols., complete.

Kryptogamen-Flora v. Deutschland, 7 parts, complete.

Comptes Rendus, 4 vols., completing set.

Centralblatt f. Bakteriologie, 62 vols., complete.

Jahresbericht uber die Agrikultur-Chemie, 48 vols., completing set.

Parts of other sets have been ordered but have not yet been received.

The following-named breeders' associations have presented to the Station complete, or nearly complete, sets of their records: American Aberdeen-Angus Breeders' Association, American Devon Cattle Club, American Galloway Breeders' Association, American Hereford Cattle Breeders' Association, American Short-Horn Breeders' Association, Dutch Belted Cattle Association, Polled Durham Breeders' Association, Red Polled Cattle Club of America, American Cheviot Sheep Breeders' Association, American Oxford-Down Sheep Record Association, American Rambouillet Sheep Breeders' Association, American Shropshire Association, Continental Dorset Club, Hampshire-Down Breeders' Association, American Duroc-Jersey Association, American Essex Association, National Duroc-Jersey Association, French Coach Horse Association of America, American Breeders' Association of Jacks and Jennets, German Hanoverian and Oldenburg Coach Horse Association, National Saddle Horse Breeders' Association, and Suffolk Horse Association. The total number of volumes donated by these associations is 213.

The current volumes of 14 periodicals have been added to the library by subscription.

Besides bulletins, circulars, and reports from the U. S. Department of Agriculture, state experiment stations, and other institutions, about 100 papers are received in exchange for bulletins.

It was announced in the last report that the library was to be catalogued by the Dewey System, which is in use in the main library of the University. This work was undertaken, and almost completed, under the direction of Miss Sabra W. Vought, the librarian of the University, who was assisted by Mrs. Delia Lee Cawood and Miss Nell Kellum. Since the first of April Miss Kellum has been regularly engaged as an assistant in the library and in general office work.

The bulletin mailing list shows an increase of 3,379 names since the last report. It contains, at the end of the year, a total of 11,290 names, distributed as follows:

MAILING LIST

U. S. Dept. of Agr., Agr'l Colleges, and Exp. Stations	1,375
Tennessee Newspapers	235
Exchanges	176
Individuals in Tennessee	8,900
Other States	544
Foreign, other than Exchanges	60
Total,	11,290

The mailing of bulletins will be facilitated by the use of an addressing machine, which has recently been installed.

Respectfully submitted,

FREDERICK H. BROOME, *Librarian.*

TREASURER'S REPORT

JULY 1, 1905, TO JUNE 30, 1906

HATCH FUND

The Agricultural Experiment Station of the University of Tennessee

IN ACCOUNT WITH THE UNITED STATES

	Dr.	Cr.
To unexpended balance on hand July 1, 1905	$ 18.34	
United States Treasurry Draft July 8, 1905	3,750.00	
" " " " October 6, 1905	3,750.00	
" " " " January 11, 1906	3,750.00	
" " " " April 10, 1906	3,750.00	
By Salaries		$ 8,580.00
Labor		3,785.03
Publications		370.95
Postage and Stationery		293.44
Freight and Express		91.45
Heat, Light and Water		300.85
Chemical Supplies		142.61
Seeds, Plants, and Sundry Supplies		286.97
Fertilizers		178.30
Feeding Stuffs		162.07
Library		192.79
Tools, Implements and Machinery		19.30
Scientific Apparatus		235.72
Traveling Expenses		324.32
Contingent Expenses		15.00
Building and Repairs		21.20
Balance		18.34
Totals	$15,018.34	$15,018.34

This is to certify, that, as the authorized Auditing Committee of the Board of Trustees of the University of Tennessee, we have examined the accounts of the Treasurer of the Agricultural Experiment Station for the fiscal year ending June 30, 1906, and find them correct; that the above is a true balance sheet corresponding with said accounts; that the said accounts show no more than $21.20 was expended for building and repairs, and that there is $18.34 cash balance.

C. DEADERICK,
WM. RULE,
Auditing Committee.

We hereby certify that C. Deaderick and Wm. Rule are the authorized Auditing Committee of the Board of Trustees of the University of Tennessee.

BROWN AYRES, *President.*
WM. RULE, *Secretary.*

STATE OF TENNESSEE, COUNTY OF KNOX:

Before me, Thos. D. Morris, a Notary Public in and for said State and County, personally appeared the foregoing signers, personally known to me to be trustees and officers of the University of Tennessee, who made oath, in due form of law, that the above statements are true to the best of their knowledge, information and belief.

Witness my hand and official seal at office in Knoxville, Tennessee, this 19th day of December, 1906.

THOS. D. MORRIS,
Notary Public.

TREASURER'S REPORT

(Concluded)

JULY 1, 1905, TO JUNE 30, 1906

ADAMS FUND

The Agricultural Experiment Station of the University of Tennessee

IN ACCOUNT WITH THE UNITED STATES

	Dr.	*Cr.*
To United States Treasury Draft June 30, 1906.....	$5.000.00	
By Seeds, Plants, and Sundry Supplies		1.14
Library		852.02
Scientific Apparatus		4,146.84
Totals	$5,000.00	$ 5,000.00

This is to certify, that, as the authorized Auditing Committee of the Board of Trustees of the University of Tennessee, we have examined the accounts of the Treasurer of the Agricultural Experiment Station for the fiscal year ending June 30, 1906, and find them correct; that the above is a true balance sheet corresponding with said accounts; that the said accounts show that nothing was expended for building and repairs, and that there is no cash balance.

C. DEADERICK,
WM. RULE,
Auditing Committee.

We hereby certify that C. Deaderick and Wm. Rule are the authorized Auditing Committee of the Board of Trustees of the University of Tennessee.

BROWN AYRES, *President.*
WM. RULE, *Secretary.*

STATE OF TENNESSEE, COUNTY OF KNOX:

Before me, Thos. D. Morris, a Notary Public in and for said State and County, personally appeared the foregoing signers, personally known to me to be trustees and officers of the University of Tennessee, who made oath, in due form of law, that the above statements are true to the best of their knowledge, information and belief.

Witness my hand and official seal at office in Knoxville, Tennessee, this 21st day of January, 1907.

THOS. D. MORRIS,
Notary Public.