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Fourteenth Annual Report of the Agricultural Experiment Station for 1901

University of Tennessee Agricultural Experiment Station

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FOURTEENTH ANNUAL REPORT

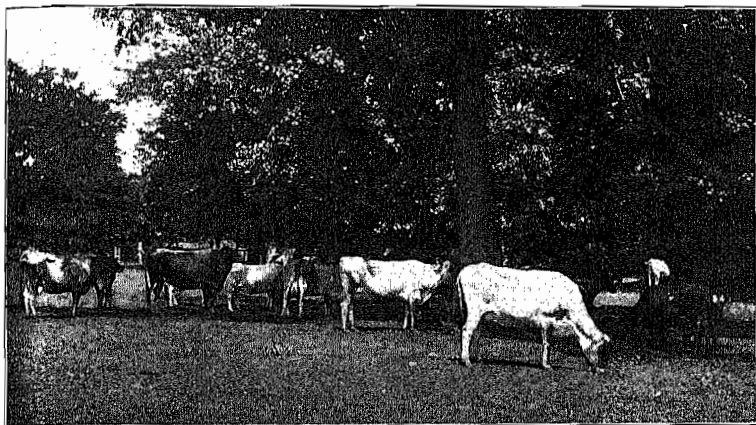
OF THE

Agricultural Experiment Station

OF THE

UNIVERSITY OF TENNESSEE

FOR 1901



A PART OF THE DAIRY HERD

PRINTED FOR
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1901

THE AGRICULTURAL EXPERIMENT STATION

OF THE UNIVERSITY OF TENNESSEE

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The station has facilities for analyzing and testing fertilizers, cattle foods, milk and dairy products; seeds with reference to their purity or germinating power; for identifying grasses and weeds, and studying forage plants; for investigating the diseases of fruits and 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 its offices, laboratories and museum, and the plant house and horticultural department, are located on the University grounds, 15 minutes walk from the Custom House in Knoxville. The experiment farm, dairy barn, stables, milk laboratory, etc., are located one mile west of the University, on the Kingston pike. The fruit farm is adjacent to the Industrial School, easily reached by the Middlebrook 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.

REPORT OF THE AGRICULTURAL EXPERIMENT STA-
TION OF THE UNIVERSITY OF TENNES-
SEE FOR 1901

To His Excellency, Benton McMillin, Governor of Tennessee:

Sir—I have the honor to submit herewith a report of the work and expenditures of the agricultural experiment station of the University of Tennessee for the calendar year 1901.

There have been no changes in the principal staff during the year. Professor Andrew M. Soule, agriculturist, entered upon his duties as vice-director of the station on February 1. Mr Samuel E. Barnes has succeeded Mr Flickinger, the dairyman, who resigned on July 1.

A hog barn was built during the year. The laboratories of soil physics, chemistry, and botany have received additional equipment. Several acres have been added to the horticultural farm, and many valuable implements and books have been added to the stock of the several divisions. The dairy herd has been increased and improved, and the equipment of the dairy laboratory still further enlarged.

The experimental work of all divisions has progressed as rapidly as is consistent with good work. For the subjects of these investigations and their general results you are respectfully referred to the accompanying reports of the heads of the divisions. Some investigations in the best methods of feeding cotton-seed products to cattle and dairy cows have recently been undertaken at the request, and with the cooperation of the United States secretary of agriculture.

I desire to commend most highly all the officers of the station. As the result of their faithful and excellent work the station continues to grow in the favor of the people.

Very respectfully yours,

CHARLES W. DABNEY, *President.*

REPORT OF THE AGRICULTURIST

During the year just closed the work of the division has been carried on along much the same lines outlined in previous reports. While the experimental work has been quite successful, a number of the field crops were very seriously injured by the drought, especially the corn and peas, the dry weather being so severe as to render the yields of the former comparatively insignificant, while in the latter part of the season the rainfall was so excessive as to sprout the peas in the pods, thus making it impossible to ascertain the yield of grain per acre.

INJURED BY THE FLOOD

About forty acres of the farm adjacent to the river were overflowed during the month of May and all the crops destroyed, including a series of plats laid down for the purpose of making an extensive inquiry into the digestibility of certain crops, such as teosinte, sorghum, soja beans, velvet beans, etc. As the experiment was planned on quite an elaborate scale, the destruction of these crops so late in the season was quite a serious blow. An experimental meadow, consisting of a mixture of grasses deemed to be well adapted to Tennessee conditions, was also destroyed by the flood. The greatest damage done, aside from the interruption of the work, was due to the severe washing of some of the land and to the deposit of sand on portions of it.

THE HOG BARN

Some material additions have been made to the equipment of the farm, the principal of these being the erection of a new frame hog barn, 18x100 feet, containing a feed room 18 feet square in one end and 16 pens, 7x10 feet. There are adjustable partitions between the pens so that two can be thrown together, when required. A passage four feet wide runs the entire length of the building, and on one side doors open out into yards. On the other side the pens, designed especially for feeding experiments, are closed. The doors into the pens are four feet wide and directly opposite each other, so that when they are both opened, they form a passage way for the transfer of stock from one side of the building to the other. The pens are part floored and part covered with cinders. The sections of the front partition walls over the feed troughs are hinged so as to swing back over the troughs, permitting the feeding to be done without the pigs getting into the trough. Ash boxes are built in each pen and water will be carried into the building. The barn has a shed roof and is 15 feet high in front and 12 feet behind. It is lighted by 16 large windows which also provide ample ventilation. The total cost will not exceed \$350 which implies that the barn is very plain though substantial and exceedingly practical. In fact it is just such a barn as any farmer who proposes to engage in swine husbandry can afford to erect.

The hog barn is situated contiguous to a two acre piece of land which will be devoted in the future largely to determining the value of forage

crops, among them the cowpeas, soja bean, rape, sorghum, etc., for pork production. It is probable that two breeds of swine will be maintained in the future. The completion of the hog house adds materially to the facilities of the station for carrying on work along certain lines of animal husbandry which are considered of the greatest economic importance to the state.

Some additions have been made to the equipment of the soil physics laboratory and to the dairy.

CHANGES IN THE STAFF

Mr George A. Flickinger resigned as dairyman on July 1. He was succeeded by Mr Samuel E. Barnes, a graduate of the Iowa Agricultural College. The increasing volume of experimental and teaching work has made it imperative that greater specialization be exercised in our work. In furtherance of this plan, Mr Fain spent some time in the Ohio State University the past fall studying problems relating to soil physics. With a well equipped soil laboratory, it is believed that experimental work of considerable value can be carried on the coming season. Mr Vanatter also spent several weeks in study and travel giving special attention to the subject of winter wheat. Owing to the increasing duties of Mr Fain, it has been found necessary to appoint a working foreman on the farm to look after much of the routine work. This arrangement permits the immediate preparation of much of the data connected with the feeding experiments, a manifest advantage considering the immense amount of clerical labor involved. Messrs Fain, Vanatter and Barnes have all evidenced unusual interest in their work and I commend their efforts and thank them for their cooperation.

PUBLICATIONS

Press bulletins have been issued on pertinent subjects every week or two throughout the year. Four regular bulletins have been prepared as follows: Experiments with corn, forage crops and spring cereals; Winter wheat; Winter cereals and legumes; and Hog feeding. A special bulletin on "The conformation of beef and dairy cattle" has been published as Farmers' Bulletin No. 143 by the U. S. department of agriculture.

FARMERS' INSTITUTES

Farmers' institutes were attended at the following places where from one to three addresses were made: Lawrenceburg, Bristol, Jonesboro, Greeneville, Morristown, Rogersville, Liberty Hill, Dumplin, Clinton, Dayton and Shelbyville.

The correspondence of the station during the past year has steadily increased. Information is sought on almost every subject relating to the farm and it requires a great deal of time and labor to answer these letters of inquiry satisfactorily. From the rapid increase in volume of our correspondence, it is evident that the work of the station is commending itself to the farmers of the state.

THE DAIRY HERD

Systematic work looking to the further improvement of our dairy herd is being continued. It is hoped in the near future to have a herd of pure

bred Jerseys and high grade Jersey cows. Our herd records for 1901 have been very satisfactory and we have now some twelve young heifers and heifer calves of our own breeding, half of them pure bred, which give promise of making excellent cows. It is our policy to raise all our heifer calves, as in this way the herd can be materially improved with the least cost and in the shortest possible time.

FEEDING EXPERIMENTS

For Milk and Butter: Experiments with the dairy herd are in progress looking to the final determination of the relative value of cowpea hay and cotton seed meal for supplying protein. Twelve cows are being employed and the trial will extend over a period of six months. The value of ensilage as a summer food when compared with freshly cut soiling crops constitutes both an important and interesting inquiry and arrangement for the continuance of the trials begun last year have been completed. If the proposed plans work out satisfactorily, it will enable us to determine quite accurately the milk and butter producing value of an acre of a well defined succession of spring, summer and fall forage crops.

For Beef: The feeding experiments with native steers to ascertain the relative value of a dry and a succulent ration and also the food value of cotton seed meal, corn meal and bran as compared with pea vine hay are being carried on for the third successive year. Probably a summary of the three years' trials will be ready for publication about the first of September. As 38 animals have been included in the several trials the final results ought to be fairly conclusive and furnish a fair basis for estimating the value of native cattle. In the future it will be desirable to employ only high grade cattle for the purpose of estimating the value of quality in beef animals, and it may be possible to establish a pure breed of beef cattle on the farm the coming year.

At the present time experiments are in progress to determine the relative feeding value of several of the grain crops that are best adapted for growth in Tennessee, and also the profits from using large and small amounts of skim milk in the daily ration.

THE FARM

The cost of producing farm crops has received careful attention and some of the results, especially those relating to the cost of producing hay from cereals, have already been published. The study of the cost of producing ensilage and the food value per acre of various crops will be continued through the coming year, when it is believed that the average of the three years' trials which will then be available for publication, will furnish some exceedingly useful and valuable data concerning these questions. Owing to the frequency of a summer drought, a knowledge of forage crops becomes especially valuable. Some of them are comparatively uninjured even by protracted dry weather. That these can be produced in succession and thus take the place of hay and pasture has already been shown, though much remains to be learned about the best combinations. These experiments and experiments relating to soil culture and the saving of soil moisture constitute the principal lines of work receiving attention on the farm.

THE EXPERIMENTAL PLATS

On the experimental plats the work has been continued as heretofore outlined. The wheat experiments were very successful the past year, especially the work with selection. The improvement of varieties of wheat adapted to Tennessee is a matter of grave importance and will receive even more consideration in the future than in the past. The introduction and culture of successful winter legumes means much to our agriculture and this line of work has been generously provided for. The plats put down to grasses and clovers singly, and in combinations, for the most part came through the summer in good condition and entered the winter looking well. It is impossible to say at the present time how they will come out next spring but the indications are that many of them will do well. The study of combinations of grasses and clovers adapted to the various situations met with in the state has already revealed many useful and interesting facts that are being disseminated as rapidly as possible.

The general work with forage plants and a study of new varieties introduced from foreign countries has not been overlooked nor neglected. As a result, we are able to record the discovery of an occasional quality in a variety that has previously escaped attention.

Respectfully submitted,

ANDREW M. SOULE, *Agriculturist*.

HORTICULTURAL DEPARTMENT

The work of the horticultural department during the past year has continued along the lines projected in 1900. An addition of four acres has been made to the apple orchard. Owing to delay in clearing the land, and the severe drought of early summer, a portion of the plantation failed and will have to be renewed. A small vineyard of representative varieties has been made at the fruit farm. Important additions to the equipment have been purchased during the year, so that now the department is in good shape for work.

A series of experiments in the growing of autumn vegetables has been very successful, the results having been published in the form of press bulletins. Throughout the growing season brief bulletins on timely horticultural topics have been supplied to the press of the state and have been very generally printed. Observations and measurements of young trees in the apple orchard have been taken monthly and form the basis of a bulletin soon to be issued.

The correspondence of the department covers a wide range of inquiries, and has increased very considerably in amount during the year.

The following notes on varieties of small fruits that have been under observation at the fruit farm may be of interest:

STRAWBERRY NOTES

Sixty varieties of strawberries fruited during the year. The plants at the station were set in a sandy clay loam, cleared of a mixed forest growth a few months before. The strawberries were thus the first crop from the land.

Among the largest varieties are Sampson, Emperor, Empress, Morgan,

Nick Ohmer, Woolverton, and Pride of Cumberland. Of these the best yielders are Pride of Cumberland, Nick Ohmer, Sampson, and Morgan, in the order named. Emperor and Empress are very large, rough, dark berries, not productive enough in this soil for profit. Nick Ohmer is the most attractive of these large berries, with Pride of Cumberland next. These are of good quality, large, and heavy croppers. The Pride of Cumberland may not prove firm enough for shipment, but otherwise seems the better of the two. Sampson is a flattish oval in shape, borne on long stems, making it a fine berry for serving with the stems. Morgan is roundish, rough-faced, and dark-colored. Woolverton is the oldest of the very large berries.

Without exception the largest fruits are misshapen, and have not the attractiveness of the fruits somewhat smaller. And so far as observed by the writer none of these very large strawberries compare in quality with the old Charles Downing or with Beder Wood. However, sugar liberally applied supplies their chief defect, and the large berry has come to stay.

As to earliness. Four varieties ripen several days in advance of the others. These are Michel's Early, Excelsior, Johnson's Early, and Earliest, the last being the latest of the four. On May 15, 92 fruits of Michel; 175 fruits of Excelsior, and 12 fruits of Johnson's Early were picked. On May 18 a second picking gave in addition to increased numbers of these over 200 berries of Earliest.

In our grounds Excelsior is equally as early as Michel; possibly a first picking might be made a day or two earlier. They are about of equal size, Excelsior grading a trifle larger in the first picking. Excelsior is brighter colored, but less sweet. It should prove in this soil an acceptable first early variety. It has the advantage of ripening up its fruit evenly so that two or three pickings will harvest the crop. Earliest is too small to be of use as grown here. Johnson's Early reddens on one side much sooner than on the other—a bad habit; it is larger than either Michel or Excelsior, a good cropper, but with us is decidedly later. A prominent Chattanooga grower tells me it is the earliest berry he has. It is worthy of extended trial. Michel is a standard first early market sort. All four are perfect-flowered and good pollenizers.

In yield, quality and lateness the leaders are as follows:

Heaviest yield: Pride of Cumberland, Clyde, Tennessee Prolific, Stone's 130, Sample, Gibson, W. J. Bryan, Glen Mary, Greeneville, splendid.

Best quality: Bennett, Parson's Beauty, Brownie, Downing's Bride, Margaret, Senator Dunlap, Pride of Cumberland, Tennessee Prolific, Clyde, Nick Ohmer.

Latest berries: Gandy (latest), Hunn, Michigan, Sampson, McKinley, Downing's Bride.

An experiment in the use of commercial fertilizers for strawberries has been begun. The plants being set in September, a full crop can not be had until the season of 1903.

OTHER SMALL FRUITS

In comparative raspberry tests, the Columbia, one of the newest kinds, proved much superior in yield and size of fruit to Sheffer's Colossal, the standard sort of the same color (purple). Gregg, a late variety, was the

best cropper among blackcaps. It should be useful for prolonging the season after Palmer, an earlier black sort that yields well. Cuthbert, the standard red variety, gave the best result among reds.

Of blackberries, Early Harvest proved a failure, owing to the dry weather. The best among 10 kinds tested was Snyder; but Wilson, Rathbun and Lawton gave good yields.

The red and white currants set in the spring of 1900 have made very little growth, though planted in rich soil on a northern slope. The prolonged season is unfavorable to this fruit. The bushes drop their leaves in August, indicating their liking for a cooler climate.

Among the gooseberries, Industry and Red Jacket, English varieties, have failed entirely, and Houghton has grown best of the six kinds tested. It has not made as good growth as is usual with the gooseberries of American origin in northern latitudes.

Respectfully submitted,

CHARLES A. KEFFER, *Horticulturist*.

REPORT OF THE BOTANIST

The botanist has continued uninterruptedly for the past year the investigation of the effect of fungicides on foliage. The past season's work has been most gratifying as to general results. We will not enter here into the details of this investigation, since they will soon be ready for publication. The following subjects have received experimental treatment and are to be considered in this publication:

- 1 Poisonous action of copper solutions entering plants through the roots.
- 2 Poisonous action of copper on leaves, and certain conditions affecting this action.
- 3 Leaf structure and permeability of the cuticle in their relation to the action of fungicides.
- 4 Wound healing of the leaves and leaf fall.
- 5 Action of copper on growth.
- 6 Influence of copper on starch production in the leaf.

Under nearly all of these heads results have been obtained which it is believed will lead to a clearer understanding of the physiological action of fungicides in general and will at the same time be of direct practical value in the treatment of certain plant diseases. It was found that in the case of the peach, whose foliage here is excessively sensitive to the poisonous action of spraying mixtures, practically no injury occurred when the Bordeaux mixture was followed as a spray by milk of lime. After the close of the growing season and the completion of field experiments some data were obtained which render it probable that a preliminary spraying with milk of lime will prove even more effective in the prevention of this injury to peach foliage. Several features of the work, however, demand further attention, and other field experiments on a larger and practical scale are being planned for the next season.

The occurrence has been recorded of several serious plant diseases, etc. Two apple diseases hitherto not reported for this section have come to light: viz. apple canker and a new, undetermined disease found by Pro-

fessor Garman in Kentucky and termed by him the "knot disease." Specimens of the canker have been received from Johnson City and from near Knoxville. The knot disease was seen by the writer in Rutherford county, and probably occurs over a large portion of the state. Other diseases especially abundant during 1901 were peach curl, peach rot, apple leaf rust, and fire blight of the apple and pear. The last disease has become so serious and so widely disseminated as to demand investigation, and it is hoped that some attention may be given it in the near future.

The general equipment for investigation in this department has been increased by the addition of a complete set of *Zeitschrift für Pflanzenkrankheiten*, one of the leading publications on plant diseases in the world. Several valuable pieces of apparatus have been added to the botanical laboratory.

Respectfully submitted,

SAMUEL M. BAIN, *Botanist.*

REPORT OF THE CHEMIST

During the past year the work of the chemical department has been along two distinct lines in the investigation of soils. One line of work has been in the field, carrying on cooperative fertilizer experiments on the different type soils; the other has been in the laboratory, making analysis of the different soils.

The crops experimented with in the field during the last season were clover and grass, cowpeas, velvet beans, corn, wheat, and sweet and Irish potatoes. Many of the results were of especial value on account of the unusually long continued dry weather from late in June to the early part of August. In no instance did the fertilizers as used shorten the yield under the unfavorable condition of dry weather, as is often claimed by farmers. A limit to their profitable use however was soon reached. For example, 250 pounds to the acre of a complete fertilizer for corn produced the same yield as 500 or 1000 pounds. This result would not have been expected on this soil in a good season. Similar results were obtained in experiments with cowpeas and velvet beans. To state the case in another way, the crops seemed to be limited by the moisture supply rather than by the supply of plant food. As in the past, the results indicated that the productiveness of the white gravelly soils of the dolomite formation is greatly increased by the use of acid phosphate. On this soil in particular the use of 300 pounds of acid phosphate alone to the acre is highly recommended as a profitable application for such crops as cowpeas and clover. On all upland soils thus far tested acid phosphate seems to furnish the most needed elements of fertility. On the bottom lands however but little good has followed its use. Of the three elements, phosphoric acid, nitrogen, and potash, the last seems to be the least needed. Probably the small amount of lime, (about .15 per cent) in the majority of the soils accounts for the little good gotten from heavy applications of potash salts. For non-leguminous crops, such as corn, wheat, etc., nitrogenous fertilizer materials mixed with the acid phosphate have been found to give profitable returns in nearly every instance on upland soils. As a result of all the fertilizer experiments made up to the present time the following

fertilizer formulas are being recommended as applying in general to the soils of East Tennessee, the Cumberland plateau, the Highland Rim, and other parts of the state where the soils need applications of phosphate:

Formula 1—Corn, sorghum, etc.

Total application per acre

300 lbs. high-grade acid phosphate	}200-400 lbs.
25 lbs. muriate of potash		
200 lbs. cotton-seed meal		

Formula 2—Cotton

300 lbs. high-grade acid phosphate	}200-400 lbs.
25 lbs. muriate of potash		
300 lbs. cotton-seed meal		

Formula 3—Potatoes (sweet and irish)

300 lbs. high-grade acid phosphate	}500-1000 lbs.
50 lbs. muriate of potash		
350 lbs. cotton-seed meal		

Formula 4—Wheat and other small grains

300 lbs. high-grade acid phosphate	}150-300 lbs.
25 lbs. muriate of potash		
350 lbs. cotton-seed meal		

Formula 5—Beans, peas, clovers, etc.

300 lbs. high-grade acid phosphate	}200-400 lbs.
25 lbs. muriate of potash		

Formula 6—Grass for lawns, etc.

300 lbs. high-grade acid phosphate	}300-1500 lbs.
50 lbs. muriate of potash		
600 lbs. cotton-seed meal		

Except for wheat and other small grains all the ingredients for each formula are to be shoveled over until the mixture is of a uniform color. Cotton-seed meal can not be drilled with safety for wheat, on account of its injurious effect on the germination of the seed, and the plan advised is, first to apply broadcast the cotton-seed meal, then to drill the acid phosphate and potash mixture with the seed. For the soils of the Central Basin of Middle Tennessee larger proportions of cotton-seed meal to acid phosphate are recommended, for the reason that so far as investigated these soils are better supplied with phosphoric acid than those of other sections of the state. More attention is expected to be given to the soils of Middle and West Tennessee during the coming year.

The analysis of the different type soils and other chemical investigations of soils considered to be the most important part of the laboratory work. The majority of the soils analyzed have come from East Tennessee, but some samples from other sections of the state have been examined. This analytical work is considered to be of much more importance than the field work, because the results will be both of more fundamental importance and of wider application. In fact, only by laboratory work can all sections of the state be reached in a satisfactory manner. Investigation of

the chemical composition of the different soils in this state is of particular value, for the reason that the upland soils are for the most part soils in situ; that is, they were formed by the disintegration of rock which was similar to the underlying rock formation. Soils of the same composition as well as of origin are found to extend over wide areas. In many cases the results are such as to leave no doubt as to the most important soil needs. This is particularly true of the phosphoric acid content. No agricultural chemist would question the need of phosphate for ordinary clay upland soils containing only from .01 to .05 per cent of phosphoric acid. Soils containing only the former amount of total phosphoric acid may be found in the East Tennessee valley and are characteristic of the Cumberland plateau and of the "barrens," .01 per cent by good authorities is recognized as a minimum amount of available phosphoric acid necessary for the production of satisfactory crops. Soils containing under .15 per cent of phosphoric acid have been generally found deficient in this element. The largest amount of phosphoric acid (.3 per cent) found in any soil was in a sample received from near Fayetteville, Lincoln county. Large areas thus well supplied can probably be mapped out. The use of acid phosphate on this soil was not found beneficial. On the other hand, crops were found to respond well to the use of nitrate of soda. One of the ultimate objects of the soil investigation is to map out the areas where phosphates are a necessity, where they can be used profitably and where their use is not to be recommended. At present the commercial fertilizers are fairly well adapted to East Tennessee and the other sections where phosphate is needed, but are not at all well adapted to the soils of the central basin, where phosphate is less required. Even for those soils deficient in phosphate the complete fertilizers are too low in nitrogen to produce the best results.

A line of work which received some attention in the laboratory during the past year was a study of potatoes. This was a continuation of the work begun a year ago, but was seriously interfered with on account of the dry weather. The problem under consideration is the effect of the fertility of the soil and the use of fertilizers on the starch content of potatoes. In cooperation with the horticulturist, the chemist is trying to improve the quality of the potato, as well as to find out how to get the maximum yields.

In addition to the lines of work mentioned above a part of the chemist's time has been taken up with miscellaneous analyses of fertilizers, feeding stuffs, minerals, etc., sent in for examination. The following is a resume of the chemical work:

Materials	No. of analyses
Soils	36
Ash analyses	15
Feeding stuffs	9
Fertilizers	13
Potatoes	7
Mineral waters	11
Minerals	70

Respectfully submitted,

CHAS. A. MOOERS, *Chemist.*

REPORT OF THE VETERINARIAN

The work on veterinary science in connection with the experiment station is at present entirely that of correspondence. There is a decided increase in this; it nearly doubled that of last year. The correspondence has been mostly in reference to diseases occurring among stock in different sections of the state, producing at times considerable loss to the owner and the community.

Several pathological specimens taken from diseased animals were sent to the station during the year for investigation, but as there are no laboratory facilities for pathological or bacteriological research connected with the experiment station, very little could be done.

Judging from the correspondence, the diseases most prevalent in this state are, Southern cattle fever, hog cholera, blackleg, contagious abortion, tuberculosis, infectious garget, mycotic gastroenteritis and osteoperosis.

The necessity for facilities to do research work, and investigate the conditions that occur among live stock in Tennessee is very apparent; and such investigations would be of great value to the farmers throughout the state.

Respectfully submitted,

M. JACOB.

REPORT OF THE LIBRARIAN

While the library has continued slowly to expand and improve, it is not yet entirely adequate to the needs of the station, being especially deficient in the departments of agriculture and chemistry. The bound volumes number 2465, among which are duplicate copies of 228 reports, chiefly of experiment stations and state boards of agriculture. Many hundreds of pamphlets are also on file. During the year, 13 volumes were donated to the station from the private library of President Dabney, and reports were received gratis from various institutions. A few books were purchased. The largest accessions, aside from experiment station and government publications, have been in the nature of scientific journals and farm papers obtained by subscription and exchange. The former are bound each year and placed on the shelves. The latter are kept for some time easily accessible to members of the staff and students of the University, and many are preserved for future reference.

Our practice of retaining extra copies of publications from other stations, and mailing them to correspondents in the state who ask for bulletins, has proved useful as a means of furnishing information not contained in any available bulletins of our own station.

The mailing list has had a steady, normal growth since the last report. Some names have been dropped on account of death or change of residence, but several hundred new ones have been received. The number could no doubt have been much increased by some plan of soliciting such as was used in 1899 and 1900, but this year we have confined the additions almost exclusively to persons sufficiently interested to make voluntary request for the bulletins. The list now stands as follows:

Experiment stations and U. S. Dept. of Agr.....	724
Tennessee newspapers	162
Exchanges	182
Residents of Tennessee	8036
Other states	494
Foreign, other than exchanges	25
Total	9623

A growing demand for our publications is rapidly exhausting the supply of back numbers, and many of them are already out of print. A list is given below of those still on hand, any of which can be had free of charge upon application.

LIST OF AVAILABLE BULLETINS AND REPORTS

VOLUME I—1888

- No. 1 History and reorganization. Dehorning cattle.
- No. 2 The experiment station; building and laboratories; Germination of seed corn. Analyses of commercial fertilizers.
- No. 3 Weeds of the farm.
First annual report.

VOLUME II—1889

- No. 1 Notes on fertilizers and fertilizing materials.
- No. 4 Grasses of mountain meadows and deer parks. Chemical composition and tests of varieties of strawberries.
Second annual report.

VOLUME III—1890

- No. 1 Experiments in growing potatoes.
- No. 4 Practical experiments in reclaiming "galled" or washed lands, with notes on mulch and mulch materials.
- No. 6 Index to Volumes I, II and III.
Third annual report.

VOLUME IV—1891

- No. 3 The true bugs, or heteroptera, of Tennessee.
- No. 4 Some fungous diseases of the grape.
- No. 5 A chemical study of the cotton plant.
Fourth annual report.

VOLUME V—1892

- No. 1—Fruit trees, and experiments with vegetables.
- No. 3 A contribution to the study of the economies of milk production.
- No. 4 Experiments with fruit trees and vegetables.
Fifth annual report.

VOLUME VI—1893

Sixth annual report.

VOLUME VII—1894

Seventh annual report.

VOLUME VIII—1895

Eighth annual report.

VOLUME X—1897

- No. 2 Pot culture of lettuce.
- No. 3 The soils of Tennessee.
- No. 4 Scale insects: San Jose and other species.
Tenth annual report.

VOLUME XI—1898

- No. 2 Grasses and forage plants of the south: I Domesticated grasses.
- No. 3 Grasses and forage plants of the south: II Leguminous plants.
- No. 4 Grasses and forage plants of the south: III Meadows and wild pastures.
Eleventh annual report.

VOLUME XIII—1900

- No. 2 Experiments with winter wheat.
- No. 3 Fertilizer experiments on potatoes, corn, cowpeas, peanuts, and effects of fertilizers on the germination of seeds.
- No. 4 Feeding native steers.
Thirteenth annual report.

VOLUME XIV—1901

- No. 1 Experiments with corn, forage crops and spring cereals.
- No. 2 Winter wheat.
- No. 3 Winter cereals and legumes.
- No. 4 The early growth and training of apple trees.
Fourteenth annual report.

PRESS BULLETINS.

- No. 11 The fertilizer question.
- No. 12 Cowpea vine hay.
- No. 14 Grades on country roads.
- No. 15 Calf feeding.
- No. 16 Live stock problems.
- No. 17 Winter gardening. Winter violets.
- No. 18 Advantages of dairying.
- No. 19 Formulas for spraying mixtures.

Respectfully submitted,

FREDERICK H. BROOME, *Librarian.*

TREASURER'S REPORT

JULY 1, 1900, to JULY 1, 1901

The Agricultural Experiment Station of the University of Tennessee

IN ACCOUNT WITH THE UNITED STATES

	<i>Dr.</i>	<i>Cr.</i>
To unexpended balance on hand July 1, 1900	\$ 18 34	
July 6, to United States treasury draft, 1900	3,750 ..	
Oct. 8, to United States treasury draft, 1900	3,750 ..	
Jan. 7, to United States treasury draft, 1901	3,750 ..	
April 9, to United States treasury draft, 1901	3,750 ..	
By Salaries		\$ 6,643 33
Labor		4,067 26
Publications		805 87
Postage and stationery		299 03
Freight and express		38 50
Heat, light and water		395 22
Chemical supplies		151 56
Seeds, plants and sundry supplies		279 33
Fertilizers		99 76
Feeding stuffs		556 89
Library		193 64
Tools, implements and machinery		499 47
Furniture and fixtures		1 25
Scientific apparatus		182 16
Live stock		75 38
Traveling expenses		398 65
Contingent expenses		173 41
Building and repairs		139 35
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, with the assistance of an expert accountant, the accounts of the treasurer of the agricultural experiment station for the fiscal year ending June 30, 1901, and find them correct; that the above is a true balance sheet corresponding with said accounts; that the said accounts show no more than \$139.35 was expended for building and repairs, and that there is \$18.34 cash balance.

(Signed)

EDWARD T. SANFORD,
HUG L. McCLUNG,
JAMES, MAYNARD,

Auditing Committee.

We hereby certify that Edward T. Sanford, Hugh L. McClung and James Maynard are the authorized auditing committee of the board of trustees of the University of Tennessee.

(Signed)

CHAS. W. DABNEY,
President University of Tennessee.
J. W. GAUT,
Secretary Board of Trustees.

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 31 day of January, 1902.

(Seal)

THOS. D. MORRIS.