Sixty-Ninth

ANNUAL REPORT

1956

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TENNESSEE AGRICULTURAL

EXPERIMENT STATION

THE UNIVERSITY OF TENNESSEE

KNOXVILLE

SIXTY-NINTH

ANNUAL REPORT

1956

Tennessee Agricultural Experiment Station



C. E. Brehm ..... President of the University

J. H. McLeod ..... Director

John A. Ewing ..... Senior Vice Director

F. S. Chance ..... Vice Director

Eric Winters ..... Associate Director

Florence L. MacLeod, Assistant Director,
Home Economics Research



THE UNIVERSITY OF TENNESSEE
KNOXVILLE

LETTER OF TRANSMITTAL

Knoxville, Tennessee
January 1, 1957

To His Excellency, Frank G. Clement, Governor of Tennessee:

Sir: I have the honor to transmit herewith, on behalf of the Board of Trustees of the University of Tennessee, a report of the work and expenditures of the Agricultural Experiment Station for the year 1956. This report is submitted in accordance with the law requiring that the Board having direction of the Experiment Station shall annually submit to the Governor of the State a report of its operations and expenses.

Very Respectfully,
C. E. BREHM,
President

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INTRODUCTION

Tennessee agricultural progress depends upon a comprehensive research program commensurate with the diversity of soils, climate, topography, types of farming, market facilities, etc., found in the State. To provide such a research program, the Agricultural Experiment Station of the University of Tennessee carries on work in all the major areas of the State, through branch stations; and, in some areas, through cooperative agreements with farmers and landowners. While all the work is centered at Knoxville, where heads of departments are headquartered, certain projects may be emphasized or pursued exclusively at the branch stations. Thus research can be centered upon problems affecting agriculture in all the different types-of-farming areas. The program as a whole moves agricultural technology forward year by year as new and important findings are brought out and proved. Many of the station projects are directed toward the solution of problems affecting everyday farming activities; and some fundamental research projects seek principles and facts which must be established before practical problems can be solved.

This continuous research brings to light worthwhile information every year; and over long periods the accumulation of information enables research workers and farmers to determine factors that contribute to the greatest possible efficiency in agricultural production and marketing. Work of the station has already helped to raise the total yearly income of the State by many millions of dollars. It is clearly indicated that the future holds promise of even greater gains provided that a sound, well executed research program is continued.

Funds for research at the station are derived from several sources. Most of the financing comes from the Federal and State governments. The station works cooperatively with many groups of the U. S. Department of Agriculture; and with the Atomic Energy Commission. In addition, substantial contributions are made by various industries related to agriculture.

Fields of research carried on by the various departments of the station are indicated in this report, under alphabetical listing of

departments. This report also contains citations of materials published by the station, and scientific journals.

Progress reports from the station are published in the Tennessee Farm and Home Science, which is issued quarterly. In addition, the station disseminates information in scores of ways, notably through press releases, radio and television programs, and through materials discussed and distributed at field days on the branch stations. The Department of Information supervises dissemination of information through mass media; distribution of bulletins and printed reports; and gives assistance with many information phases of the field days and other events held at branch stations. The number of people reached in this way every year runs into hundreds of thousands. In addition to the regularly scheduled field days, thousands of visitors receive information through informal visits.

The station maintains a library for reference use by station personnel. Some 70 new volumes were added to the library in 1956, making a total of almost 15,000 volumes. In addition, 256 completed periodical volumes were bound and put into circulation within the year.

Following are summaries of work programs at the branch stations.

Middle Tennessee Experiment Station

COLUMBIA

The research program on this station is devoted to dairy and beef cattle, sheep, pastures, forage crops and general problems peculiar to the central basin of Middle Tennessee. Emphasis is placed on pastures and forage crops, using animals to measure the differences. Fertility work to balance the high phosphorus content of central basin soils is carried on, using the principal crops grown in the area. Irrigation studies are under way. Strip mining of rock phosphate each year destroys the productivity of several acres of land. A project in reclaiming mined phosphate land has been initiated. At the present time bench marks are being established on the productivity of the land before it is mined. This land subsequently will be mined and leveled. Studies then

will be directed toward determining costs and methods of bringing the land back into production of crops.

Additional improvements in housing and facilities, needed especially on the new 285 acre tract, will be started.

West Tennessee Experiment Station

JACKSON

Since the principal crop in West Tennessee is cotton, much of the research work on this station is concentrated upon this crop. Variety tests, breeding, insect and disease control, weed control, fertility and irrigation are emphasized. In addition to cotton, horticultural crops adapted to the area are studied. Corn, small grains, soybeans, forage and pasture crops also are being studied in a wide variety of tests. Emphasis is placed on finding additional farm enterprises for cotton farms. The scope of the dairy work is being expanded and during the next biennium herd numbers should approach 100 milking cows. Large numbers of dairy animals are necessary for breeding and management experiments. The research on hogs will be reorganized with more emphasis on grazing.

The buildings and facilities on this station have been greatly improved within the past two years and this improvement plan should be completed during the next two years.

Tobacco Experiment Station

GREENEVILLE

The burley tobacco research on this station is a cooperative undertaking by the University and the U. S. Department of Agriculture. The main objective is to improve quality and yields of tobacco through breeding and management studies. Five superior varieties of burley tobacco have been released, the latest (1955) a very promising mosaic—and wildfire-resistant one. These new varieties have gained wide acceptance by farmers and their use should add millions of dollars to the income of Tennessee tobacco growers. In addition to tobacco research, the production of general crops, pastures and forage crops adapted to upper East Tennessee

are being studied. Breeding and management studies, involving beef cattle and sheep, are under way.

Additional housing for farm labor and facilities for handling beef cattle are planned.

Dairy Experiment Station

LEWISBURG

The Dairy Experiment Station is operated cooperatively by the University of Tennessee and the Dairy Branch of the Agricultural Research Service of the U. S. Department of Agriculture. The principal objective is the improvement of Jersey cattle, through a scientific breeding program. Progress in this field is being made. The mature equivalent milk production for the entire herd is now approximately 10,000 pounds of 4% milk in 305 days per cow. Production and utilization studies of forage crops (pasture, hay and silage) are progressing in terms of milk production. Rations containing large quantities of quality silage, hay and pasture have proved satisfactory for economical milk production from high producing cows.

During the past fiscal year an adjoining tract containing 135 acres was purchased. Funds accumulated from milk sales will be used to pay for this land over a five-year period. The addition of this land will materially improve the effectiveness of the dairy research work of this Station. The present barns, office building and housing facilities are inadequate. The Agricultural Research Service has requested additional funds to construct a new administration building, laboratory, and barns. There is need for land improvement and additional housing. Some of these needed improvements will be made, and paid from the milk receipts. The cooperative arrangement with the U. S. Department of Agriculture is working very satisfactorily.

UT-AEC Agricultural Research Laboratory

OAK RIDGE

The UT-AEC Agricultural Research Laboratory is jointly sponsored by the University of Tennessee and the Atomic Energy

Commission and is under the direction of the Tennessee Agricultural Experiment Station. The Atomic Energy Commission provides the major part of funds for the operation of this program under contract. The objectives of the program are threefold: first, to carry on fundamental studies on agricultural problems using radioactive isotopes and radiation; second, to provide opportunities for graduate students and scientists to become acquainted with the application of nuclear energy in the field of agriculture; and, third, to carry on certain related programmatic work requested by the AEC. Basic research in fields of animal nutrition, animal breeding, physiology of milk production, plant breeding and plant nutrition is under way. Under a revised contract with the AEC, the Experiment Station has considerable flexibility in the operations of this program and is permitted to expand and carry on additional work, thus making more efficient use of these facilities.

Highland Rim Experiment Station

SPRINGFIELD

The program of the Highland Rim Experiment Station has these general objectives: the improvement of dark tobacco, burley tobacco, general farm crops, pastures and livestock production practices especially adapted to the soils, climate, and topography of the Highland Rim Area. The breeding of disease resistant dark tobacco, testing varieties of field crops, pasture studies, irrigation studies, and the breeding of improved beef cattle are some of the important projects under way. The station, although relatively new, is fast becoming the source of agricultural research information for the Highland Rim.

Within the past fiscal year a new administration building, two houses for farm labor, and improved water systems have been completed. There still exists a need for additional housing for labor, storage facilities and fencing.

Plateau Experiment Station

CROSSVILLE

Horticultural work, including both fruits and vegetables, has the main objective of finding new crops that will provide new

sources of farm income for the Cumberland Plateau. Breeding, feeding and grazing studies with beef cattle and sheep are being carried on and enlarged as fast as the productivity of the land can be increased and new land cleared. This station is also carrying on research work with tobacco and general farm crops.

During the past fiscal year a new administration building, and house for the Assistant Superintendent were completed on the Grassland tract. The underground water in this area has a high mineral content, making it very unsatisfactory for household purposes. A new water purification system is planned for the next fiscal year. Also approximately 400 acres of cut-over woodland will be cleared and brought into pasture and crop production during the coming biennium.

Forestry Experiment Station

MORGAN AND SCOTT COUNTIES

The Forestry Experiment Station is in two blocks of land totaling 8,000 acres located in Scott and Morgan Counties in the Cumberland Mountain area. These tracts were conveyed to the University in 1937 by the Bryn-Mawr Mining and Land Company. The Experiment Station is primarily interested in research and demonstrational possibilities of this property. The program is designed to show landowners that good forestry practices pay; and to assist landowners in conserving and better utilizing this great replaceable resource. Forest conditions and topography of the station are typical of thousands of acres on the Cumberland Plateau.

Ames Plantation

GRAND JUNCTION

The Ames Plantation is being developed by the College of Agriculture. Five research projects have been approved and are under way. The five projects are: forestry, pilot farm, beef cattle breeding and management, swine breeding and management, and farm management work with tenant farmers. A new project in wild life management is being planned. In addition to the above projects, experimental plots of cotton varieties, cotton insect and

disease control, cotton fertilization, and seed increase of a new variety of cotton are being carried on. The operating expenses for carrying on this program are largely provided from a trust fund established by Mrs. Ames, and by the income from the Plantation. The personnel—project leaders—are jointly provided by the University and the Ames Foundation. The research program on the Plantation should provide answers for farm adjustments so badly needed in the cotton section of the state.

FINANCIAL STATEMENT

THE UNIVERSITY OF TENNESSEE AGRICULTURAL EXPERIMENT STATION

In Account With

The United States Appropriation under the Hatch Act Amended and Non-Federal Funds, 1955-56.

	Federal Funds		Non-Federal Funds
	HATCH	TITLE II	
Receipts			
From United States Treasurer	$660,989.04	$ 2,390.48	
From Other Sources			$897,619.96
Expenditures			
Personal Service	$530,466.36	$ 375.00	$439,172.39
Travel	15,781.81		21,238.63
Transportation of Things	875.73	3.00	4,722.57
Communication Service	466.79		10,607.02
Rents and Utility Services	546.26		14,375.71
Printing and Binding	974.85		11,176.20
Other Contractual Services	9,257.57		34,466.76
Supplies and Materials	54,094.26	481.30	174,227.87
Equipment	38,802.55	1,531.18	61,099.61
Land and Structures (Contractual)	9,722.86		102,444.31
Contributions to Retirement			24,088.89
Total Expenditures	$660,989.04	$ 2,390.48	$897,619.96

Agricultural Economics and Rural Sociology

Federal-State Research Projects

Farm Organization in Particular Type-of-Farming Areas.

Farmers' Financial Problems in Tennessee.

A Study of Rural Community Organizations as They Affect the Diffusion of Information on, and the Adoption of, New Farming and Homemaking Techniques.

Farmers' Capital Needs and Problems of Capital Acquisition.

Farming Adjustment in Tennessee, with Emphasis on Economics of Conservation Farming.

Impact of Industrial Development Upon Tennessee's Agriculture.

Labor Requirements and Supply on Tennessee Farms.

Factors Affecting Cotton Prices in Local Markets (contributing project to Regional Project SM-1, Revised).

Buying Policies and Other Practices of Vegetable Marketing Organizations in Tennessee; cooperative with the Department of Horticulture (contributing project to Regional Project SM-8).

Marketing Livestock in Tennessee (contributing project to Regional Project SM-7).

Economics of Milk Marketing in Tennessee.

Type and Breed as Factors Influencing Beef Carcass Characteristics and Consumer Acceptance; cooperative with the Department of Animal Husbandry and Veterinary Science.

Marketing Tennessee Horticultural Specialties; cooperative with the Department of Horticulture (contributing project to Regional Project SM-12).

Effects of Various Factors on the Demand for Poultry and Poultry Products (contributing project to Regional Project SM-15).

The Effect of Price, Price Relationships, Selected Population Characteristics and Income, on Fluid Milk Utilization (contributing project to Regional Project SM-10).

Marketing Forest Products—Practices of First Buyers and Producers of Forest Products in Tennessee; cooperative with the Department of Forestry.

A Study of Cooperative Prices Paid Producers for Milk of Manufacturing Grade in Tennessee and the Midwest.

An Economic Analysis of the Effects of Fires on Insurance and Other Costs at Gins in Tennessee (contributing project to Regional Project SM-17).

Financial Management and Related Problems Affecting the Success of Tennessee Cooperatives.

Improving the Usefulness of Livestock Marketing Information (contributing project to Regional Project SM-20).

Economic Analysis and Evaluation of the Use of Fiber Tests in the Marketing of Cotton (contributing project to Regional Project SM-18).

An Economic Study of Feed and Forage Production and Use on Beef and Dairy Farms in Specified Areas of Tennessee (contributing project to Regional Project S-27).

Buying Policies and Other Practices in the Tennessee Vegetable Industry; cooperative with the Department of Horticulture.

The Market Potential for U. S. Tobacco in Italy.

Fluid Milk Supplies, Prices and Movement in the Lower Mississippi River Valley Marketing Area (contributing project to Regional Project SM-10).

A Study of the Costs and Margins Involved in the Manufacture and Marketing of Cheddar Cheese.

State Research Projects

Economics of Part-Time Farming.

Over-all Management and Land Use for Ames Plantation.

The Pulliam Tract—Ames Plantation.

Tenant Operations on the Ames Plantation.

Projects Concluded in 1956

Financial Problems of Farmers' Purchasing Associations in Tennessee.

Possibilities of Farm Enlargement and Resulting Influences on Farm Organization and Returns Under Varying Economic Conditions.

Bulletins, Articles, and Reports

Badenhop, M. B.
Marketing Cattle and Calves Through Auction Markets in Tennessee. Tennessee Agricultural Experiment Station Bulletin 247.

Downen, M. Lloyd
Pricing of Milk in Tennessee Schools. Tennessee Agricultural Experiment Station, Farm Economics Bulletin No. 10.

Martin, Joe A.
Problems of Low Income in Agriculture. Tennessee Agricultural Experiment Station, Farm Economics Bulletin No. 9.

Raskopf, B. D.
Factors Affecting Cotton Prices in Ginner Markets in Tennessee. Tennessee Agricultural Experiment Station Bulletin 251.

Agricultural Engineering

Federal-State Research Projects

Development of Food Processing Machinery.

Investigations in Structures and Mechanical Equipment for Storing, Drying, and Handling of Hay and Silage.

Moisture Sorption Characteristics of the Major Soils of Tennessee; cooperative with the Department of Agronomy (contributing project to Regional Project S-24).

Harvesting and Processing of Grass and Legume Seeds Under Southern Conditions.

New Type Concrete Block for Building a Farm House (contributing project to Regional Project S-8).

Investigations in the Improvement of Sprayers and Non-Solid Fertilizer Distributors.

Chemical Weed Control; cooperative with the Departments of Agronomy and Horticulture.

Curing of Air-Cured Tobacco.

Electromagnetic Radiation Effects on Living Organisms of Plants, Seeds and Plant Products.

State Research Projects

Paints for Galvanized Roofs.

Development of Electric Heating Panels.

Construction of an All-Concrete House; cooperative with the Department of Home Economics Research.

Bulletins, Articles, and Reports

Arnold, H. A.
Liquid Fertilizer Hose Pump. Tennessee Farm and Home Science, Progress Report No. 19, July-August-September, 1956.

Morgan, A. H.
Strawberry Capping Machines to Benefit Growers and Processor. Market Growers Journal, August, 1956.

Sharp, M. A.
New Block Builds All-Concrete House. Tennessee Farm and Home Science, Progress Report No. 19, July-August-September, 1956.

Sharp, M. A.
Paint of the Roof. Tennessee Farm and Home Science, Progress Report No. 18, April-May-June, 1956.

Stone, R. B.
Curing Better Tobacco. Tennessee Farm and Home Science, Progress Report No. 19, July-August-September, 1956.

Agronomy

Evaluation of the Performance of Varieties of Field Crops.

Corn Improvement; cooperative with the U. S. Department of Agriculture.

Conservation of Organic Matter in the Soil as Affected by Degree of Neutralization (Liming).

Nutrient Phosphorus Value of Rock Phosphate to Various Plants under Various Soil Treatments Such as Organic Matter and Ammonium Salts.

Production of Burley Tobacco; cooperative with the U. S. Department of Agriculture.

The Comparative Value and Relative Efficiency of Various Phosphate Fertilizers (including roch phosphate) Under Different

Soil and Cropping Conditions; cooperative with the Tennessee Valley Authority.

Improvement of Cultivated Grasses.

Pasture Fertilization Studies, Including Chemical Analyses of Forage.

Subsoiling.

Potassium Fertilization of Farm Crops on Different Soil Series in Tennessee.

Moisture Sorption Characteristics of the Major Soils of Tennessee; cooperative with the U. S. Department of Agriculture and the Tennessee Valley Authority (contributing project to Regional Project S-24).

Study of the Poisoning of Cattle Pastured on Fescue.

Movement and Persistence of Herbicides in the Soil (contributing project to Regional Project S-18).

The Effects of Various Management Variables on Grass, Fescue, Clover, and Alfalfa (contributing project to Regional Project S-12).

Establishment and Maintenance of Turf.

Soil Survey to Help Determine Crop Adaptations and Management Requirements; cooperative with the U. S. Department of Agriculture and the Soil Conservation Service.

Pesticide Residues (contributing project to Regional Project S-22).

Atmospheric Effluents; cooperative with the Tennessee Valley Authority.

Chemical Weed Control.

Root Development of Farm Crops as Related to the Physical and Chemical Characteristics of the Soil; cooperative with the Tennessee Valley Authority.

Orchard Grass vs. Fescue. Fall Fescue and Ladino Clover—Nitrogen Fertilization as Reflected in Beef Cattle, Gains, etc.

Effect of Certain Insecticides and Herbicides upon the Biochemical Activities of the Soil.

The Influence of Chemical, Physical, and Mineralogical Properties of Soils on Nutrient Availability and Plant Growth.

The Role of Trace Elements in Tennessee Agriculture.

New Plants (contributing project to Regional Project S-9).

Agronomic Research on Soil and Fertilizer Problems relating to Evaluation and Efficient Use of TVA Experimental Fertilizers in Tennessee; cooperative with the Tennessee Valley Authority.

Research on Soil Productivity and Management in Tennessee; cooperative with the Tennessee Valley Authority.

Breeding for New and Extended Properties in Cottons in the Southeast; cooperative with the Tennessee Valley Authority.

Improving Breeding Methodology; cooperative with the Tennessee Valley Authority.

Methods for Controlling Seedling Diseases of Cotton; cooperative with the U. S. Department of Agriculture.

State Research Projects

Comparison of Perennial and Winter Annual Grass-Legume Mixtures for Winter Grazing.

Research Projects Concluded in 1956

Influence of Fertilization and Soil Properties on Yield and Composition of Alfalfa (contributing project to Regional Project S-14).

Bulletins, Articles and Reports

DeMent, Jack D.; and Seatz, Lloyd F.
Crop Response to High-Alumina Nitric Phosphate Fertilizers. Agr. & Food Chem. 4:432-435, May 1956.

Fribourg, H. A.; and Bartholomew, W. V.
Availability of Nitrogen From Crop Residues during the First and Second Seasons After Application. Soil Science Society of America Proceeding 20 (4) :505-508. 1956.

Hein, L. B.; Hicks, G. C.; Silverberg, Julius; and Seatz, L. F.
Granulation of High-Analysis Fertilizers. Agr. & Food Chem. 4:318-330, April 1956.

Landstreet, C. B.; and Simpson, D. M.
Irregularities in Fiber Properties of Cotton Used in Commercial

Mill Mixes. Jour. Agron. 48:463-466. 1956.

Long, O. H.
Divide N Applications For Clover-grass Pasture. Farm Forum No. 58. Dec. 1956.

Long, O. H.
Superphosphate or Rock Phosphate. Hoard's Dairyman, Vol. 101, No. 8. April 25, 1956.

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Report on Soils and Liming Materials. Jour. A.O.A.C. 39:328-329. 1956.

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Spanish Moss and Filter Paper Exposures for Detection of Airborne Fluorides. Agr. & Food Chem. 4:613-620. 1956.

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Fertilizer Tests With Burley Tobacco. Tennessee Experiment Station Bulletin 252. Oct., 1956.

Nichols, B. C.
Fertilizing Burley Tobacco Plant Beds. Tenn. Farm and Home Science 20: Oct.-Dec., 1956.

Nichols, B. C.; and McMurtrey, J. E., Jr.
Top and Sucker Burley. Tenn. Farm and Home Science 18: April-June, 1956.

Parks, W. L.
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Parks, W. L.
Alfalfa Fertilization. Tenn. Farm and Home Science. January, February, and March, 1956.

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Parks, W. L.
Methodological Problems in Agronomic Research Involving Fertilizer and Moisture Variables. Chapter 7, pages 113-133, Methodological Procedures in the Economic Analysis of Fertilizer Use Data. The Iowa State College Press. 1956.

Shaw, W. M.
Report on Exchangeable Cations. Jour. A.O.A.C. 39:329-330. 1956.

Shaw, W. M.; and Veal, N. Claire
Flame Photometric Determination of Exchangeable Calcium and Magnesium in Soils. Soil Sci. So. of America, Proc. 20:328-333. 1956.

Simpson, D. M.; and Duncan, E. N.
Varietal Response to Natural Crossing in Cotton. Jour. Agron. 48:74-75. 1956.

Simpson, D. M.; and Duncan, E. N.
Cotton Pollen Dispersal by Insects. Jour. Agron. 48:305-308. 1956.

Simpson, D. M.
Strains of Cotton Resistant to Bacterial Blight. Plant Disease Reporter. 40-549-555. 1956.

Skold, L. N.; and Gibson, R. H.
Alfalfa Varieties for Tennessee. Tenn. Farm and Home Science. January-February-March, 1956.

Stinson, J. M.; Striplin, M. M.; Brown, N. A.; and Seatz, L. F.
Pilot Plant Production and Greenhouse Tests of Fertilizer From Ammonia and Phosphorus Pentoxide Vapors. Agr. & Food Chem. 4:248-254, March 1956.

Terman, G. L.; and Seatz, L. F.
Crop Response to Metaphosphate Fertilizers. Soil Sci. Soc. of Amer., Proc. 20:375-378. July 1956.

Winters, Eric; and Parks, W. L.
Zinc Deficiency of Corn in Tennessee. Commercial Fertilizers. March 1956.

Gibson, R. H.
Performance Trials of Field Crop Varieties. University of Tennessee Agricultural Experiment Station Bulletin No. 246. January 1956.

Gibson, R. H.
Small Grains Need Large Amounts of Nitrogen. Farm Forum No. 56, p. 15. March 1956.

Gibson, R. H.
Recommended Cotton Varieties. Tennessee Farm and Home Science. No. 20, October-November-December, 1956.

Animal Husbandry-Veterinary Science

Federal-State Research Projects

Carcass Yield Investigations With Pork.

Ripening of Beef From Cattle Produced Under Different Feeding Methods as Related to Palatability, Tenderness and B-Vitamin Content; cooperative with the Department of Home Economics Research.

Carcass Value Investigations With Beef.

Types and Breeds as Factors Influencing Beef Carcass Characteristics and Consumer Acceptance; cooperative with the Department of Agricultural Economics and Rural Sociology.

Studies of Endocrine Relationships in Swine.

Studies of Endocrine Relationships in Sheep.

Studies of Endocrine Relationships in Beef Cattle.

Effects of Various Levels and Sources of Fluorine on Animals; cooperative with the Department of Agronomy.

The Improvement of the Producing Ability of Beef Cattle (contributing project to Regional Project S-10).

Evaluation of Roughages for Beef Cattle.

Evaluation of Different Pasture Species in Various Combinations and at Varying Rates of Nitrogen Fertilization as Reflected in Beef Cattle Gains and Forage Yields; cooperative with the Department of Agronomy.

A Study of the Poisoning of Cattle Pastured on Fescue; cooperative with the Department of Agronomy.

Mineral Metabolism in Animals: Absorption, Distribution and Physiological Behavior of Calcium and Phosphorus in Farm Animals; cooperative with the U-T A. E. C. Research Program.

Mineral Metabolism in Animals: Interrelationships of Calcium and Phosphorus with Vitamins, Minerals, Hormones and Other Factors; cooperative with the U-T A. E. C. Research Program.

The Detection of Animals Heterozygous for Recessive Bovine Dwarfism (contributing project to Regional Project S-10).

The Effects of Radiation on Reproductive Physiology in Farm Animals; cooperative with the U-T A. E. C. Research Program.

Evaluation of the Adaptability of Existing Breeds and Commercial Types of Sheep for the Production of Early Milk Fat Lambs (contributing project to Regional Project S-29).

Expanded Study and Evaluation of Diagnostic Measures in Vibrio Fetus Infection of Cattle and Sheep (contributing project to Regional Project S-30).

Factors Affecting Feed Utilization by Ruminants.

Effects of (a) Various Methods of Wintering and (b) Irrigation of Bluegrass-Hop and White Clover and Orchardgrass-Alfalfa-Ladino Pastures on the Production of Slaughter Yearlings.

The Influence of Different Methods of Wintering and Nitrogen and Water Applications on Bluegrass Pastures during the Summer on the Production of Slaughter Yearlings.

The Improvement of the Producing Ability of Swine Through Performance Testing and Breeding Methods.

Evaluation of Control Measures Against Anaplasmosis.

State Research Projects

Degossypolized Cottonseed Meal in Growing Fattening Swine Rations.

The Use of Urea in Rations for Cattle and Sheep.

The Value of Sugar or Sugar Substitutes in Creep Rations for Baby Pigs.

Pasture Investigations With Swine.

Projects Concluded in 1956

Sheep Production for Tennessee: (a) Replacement Ewes for Tennessee Sheep Flocks; (b) Improvement of the Producing Ability of Sheep.

The Relationship of Pathology of the Reproductive Tract of Cattle Affected with X-Disease (Hyperkeratosis) and Breeding Efficiency.

Bulletins, Articles and Reports

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Fasting Effects on Dressed Yield, Shrinkage and pH of Contractile Tissue in Swine. Journal of Animal Science 15 (4) :1273. 1956.

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Positive Check Measures for Shorter Type Dwarfism in Beef Cattle. Southern Livestock Journal, September, 1956.

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Urea in Protein Supplements for Wintering Beef Cattle. Journal of Animal Science 15 (4) :1261. 1956.

Smith, H. J.; Hobbs, C. S.
Selecting Beef Breeding Stock for High Performance. Tennessee Farm and Home Science. Agricultural Experiment Station Progress Report No. 17. Jan.-Feb.-March, 1956.

Botany

Federal-State Research Projects

Breeding and Genetic Studies of Crimson Clover; cooperative with the Department of Agricultural Engineering.

Breeding and Genetic Studies of Vetch; cooperative with the Department of Agricultural Engineering.

Breeding and Genetic Studies of Lespedeza; cooperative with the Department of Agricultural Engineering.

Plant Radiation; cooperative with the U. S. Atomic Energy Commission.

Improvement of Cotton Varieties; cooperative with the Departments of Plant Pathology, and Physics.

Oat Breeding; cooperative with the Department of Plant Pathology, and the U. S. Department of Agriculture.

Barley Breeding; cooperative with the Department of Plant Pathology and the U. S. Department of Agriculture.

State Research Projects

Wheat Breeding; cooperative with the Department of Plant Pathology.

Bulletins, Articles, and Reports

Osborne, T. S.
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Chemistry

Federal-State Research Projects

Factors Affecting Technology, Quality, and Consumer Opinions of Colloid-Treated Strawberries Preserved by Freezing; cooperative with the Department of Bacteriology.

Factors Affecting the Quality of Strawberry and Other Fruit Juices.

Preservation of Fruits and Vegetables by Freezing.

Home Preservation of Fruits and Vegetables by Dehydration; cooperative with the Department of Home Economics Research.

Quality of Frozen Green Snap Beans as Affected by Methods of Transportation, Processing, Duration and Temperature of Storage; cooperative with the Department of Bacteriology.

Relative Costs and Effects on Quality and Market Value of Hand-Capping and Machine-Capping of Strawberries for Processing; cooperative with the Department of Agricultural Economics and Rural Sociology.

Determination of the Presence of Coliform Bacteria on and in Fresh and Frozen Small Fruit, and Study of Methods of Elimination; cooperative with the Department of Bacteriology.

Bacteriology of Green Beans and Other Frozen Vegetables by Direct Microscopy; cooperative with the Department of Bacteriology.

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Factors Affecting the Quality of Green Snap Beans. Tennessee Farm and Home Science, Progress Report No. 20, October-November-December, 1956.

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Home Freezing of Foods. Agricultural Extension Service Publication 345, Revised, 1956.

Dairy

Federal-State Research Projects

Feeding Thyroidally Active Materials to Dairy Cows; cooperative with representatives of the dairy industry.

Maintaining or Improving Fertility of Dairy Bulls or their Semen Used for Artificial Insemination.

The Effect of Supernormal Growth of Dairy Heifers Upon Their Milking Qualities.

Importance of the Dry Period, and Management of Dairy Cows During the Dry Period.

Raising Dairy Calves: I. A Comparison of Two Methods of Milk Feeding, With and Without Rumen Inoculation, Upon the Growth and Feeding Efficiency of Dairy Calves; II. Comparison of an Extracted-Fat Milk Replacement Fed Unchanged or with 25 Percent Whole Milk for Dairy Calves; III. Comparison of Open Outdoor Pens with Indoor Barn Pens for Raising Dairy Calves to Four Months; IV. The Effect of Reconstituting Milk for Calf Feeding at 10, 15 or 20 Percent Solids Upon Growth, Feed Intake, and Efficiency.

Study of the Enzymes in the Milk Secreting Tissue of the Mammary Gland as They are Related to Cheddar Cheese Ripening; cooperative with representatives of industry.

Development of Strains of Dairy Cattle Especially Adapted to Southern Conditions (Contributing Project to Regional Project S-3).

Use of Radio-Isotopes in a Study of the Physiology of Milk Secretion; cooperative with the U. S. Atomic Energy Commission.

Winter Grazing for Dairy Cows.

Elements of a Program to Control Mastitis in Pen-Type Barns.

State Research Projects

The Influence of a Previous Lactation Upon the Milk Production of Three-Year-Old Heifers.

Fresh Green Harvested Forage vs. Concentrated Rotational Grazing.

The Proteolytic Activity of Bacteria in the Ripening of Pasteurized Milk Cheddar Cheese.

The Influence of Holding Raw Milk at 4° C. Upon the Bacterial Content and the Flavor.

Study of the Factors Responsible for the Normal Development of the Cheddar Cheese Flavor.

Ice Cream Made from Lactose Hydrolized Milk.

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The Effect of Nursing Calves on Milk Production of Identical Twin Heifers. J. Dairy Sci., 39, No. 1, pp. 73-79.

Swanson, E. W.; Monroe, R. A.; Zilversmit, D. B.; Visek, W. J.; and Comar, C. L.
A Study of Variations in Secretion Ca^{45} by the Mammary Glands of Dairy Cows. J. Dairy Sci., 39, No. 11, pp. 1594-1608.

Swanson, E. W.
Nursing Calves Reduce Milk Production. Hoard's Dairyman, January 10, 1956.

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Take the Beef out of Veal. Texas Holstein News, Fall, 1956; Progressive Farmer, October, 1956.

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Use of Finger Electrodes for Electro-Ejaculation. National Association Artificial Breed. News, July, 1956.

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Irrigation of Pastures for Dairy Cows. Tennessee Agricultural Experiment Station Bulletin 248, June, 1956.

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Effects of Early and Delayed Grazing on Orchardgrass—Alfalfa—Ladino Clover Pastures. Tennessee Agricultural Experiment Station Bulletin 249, September, 1956.

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Enzymatic Hydrolysis of Lactose to Control Sandiness Defect in Ice Cream. The Ice Cream Review, 40, 5, 22: December, 1956.

Wylie, C. E.
Developing Educational Personnel. Journal of Dairy Science. 39:1079-1081, July, 1956.

Entomology

Federal-State Research Projects

A Study of Insects Attacking Legumes.

A Study of the Life History, Ecology, and Control of Army Worms and Related Species (contributing project to Regional Project S-25).

A Study of the Life History and Means of Control of Insects that Affect the Growth of Cotton.

Control of Insects that Inhabit the Soil.

Evaluation of New Insecticides.

Control of Insects Attacking Strawberries.

Breeding for Improvement of Wheat Varieties to Include Resistance to Disease, the Hessian Fly, and Changes in Morphological Characters; cooperative with the Departments of Plant Pathology, and Botany.

Determination of Residues from Certain Pesticides When Applied for Normal and Experimental Control of Insects and Diseases of Fruits and Forage Crops; cooperative with the Departments of Agronomy, and Plant Pathology (contributing project to Regional Project S-22).

State Research Projects

Control of Woolly Apple Aphis and Other Soil Inhabiting Pests in Nurseries.

Projects Concluded in 1956

Ecology and Control of Tobacco Insects.

Control of Flea Beetles Attacking Sweet Potatoes.

New Insecticides Derived from Coal Tar Products.

Bulletins, Articles and Reports

Breeland, S. G.; and Stanley, W. W.
Housefly Control. Tennessee Farm and Home Science, Progress Report 17, January-February-March, 1956

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Control of Bean Insects. Experiment Station Circular 97 (Revised) 1956.

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Fruit Pest Control Schedules. Extension Service and Experiment Station S. C. 438.

Insecticides, Fungicides, and Herbicides List. Extension Service S. C. 394.

Forestry

Federal-State Research Projects

Forest Management.

Study of Forest Tree Species Adapted to the Cumberland Mountain Area of Tennessee.

Chemical Debarking of Post-Size Hardwood Trees.

Stand Conversion Studies; cooperative with the Tennessee Valley Authority.

Forest Genetics (contributing project to Regional Project 2-23).

Relationship of Soil and Site Factors to Forest Composition and Production.

Marketing Forest Products—Practices of First Buyers and Producers of Forest Products in Tennessee; cooperative with the Department of Agricultural Economics and Rural Sociology.

State Research Projects

Pine Pulpwood Thinning Study; cooperative with the Tennessee Valley Authority.

Pine Seed Source Tests; cooperative with TVA.

Pine Regeneration Studies; cooperative with TVA.

Home Economics

Federal-State Research Projects

Ripening of Beef from Cattle Produced under Different Feeding Methods as Related to Palatability, Tenderness, and B-Vitamin Content; cooperative with the Department of Animal Husbandry-Veterinary Science.

Influence of Rate of Cooling and Water Absorption on Shelf Life of Poultry; cooperative with the Poultry Department.

Bone Density Measurements as a Method of Assessing Calcium and Phosphorus Status.

Retailing and Family Buying Practices as Related to Purchase of Fruits and Vegetables by Rural Mountain Families (contributing project to Regional Project SM-13).

The Utilization of and Requirements for Calcium, Phosphorus, and Magnesium, and Their Interrelationships with Other Nutrients in Preadolescent Children (contributing project to Regional Project S-28).

Relationships Between Specified Body Measurements and Space Used for Sitting, Rising, Reaching, and Bending.

The Relationship Between Child Rearing Attitudes of Rural Parents and Selected Behaviors of Their Children.

The Inter-relation of Certain Fundamental Properties of Cotton Fibers and Fabric Characteristics, cooperative with the Physics Department.

Income and Expenditure Patterns of Tennessee Farm Families.

A Study of Procedures to Use With Washing Machines to Obtain Results Satisfactory to Families, from the Standpoint of Cost and Soil Removal.

Projects Concluded in 1956

Functional Requirements and Facilities for Southern Homes; Analysis of Space Requirements for Meal Preparation and Service.

A Study of Tennessee Cotton: Certain of Its Chemical and Physical Properties Related to Its Ultimate Consumer Serviceability.

Bulletins, Articles and Reports

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Gas Production and Yeast Roll Quality After Freezer Storage of Fermented and Unfermented Doughs. Food Technology, 10: 165-168.

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Breads, Cakes and Pastries from the Home Freezer. Agri-

cultural Experiment Station Bulletin No. 342, (Revised).

Schofield, Frances A.; Williams, Dorothy E.; Morrell, Elise; McDonald, Bonnie B.; Brown, Elizabeth; and MacLeod, Florence L. Utilization of Calcium, Phosphorus, Riboflavin and Nitrogen in Restricted and Supplemented Diets. J. Nutrition, 59: 561-577.

Horticulture

Federal-State Research Projects

Buying Policies and Other Practices of the Vegetable Processing and Marketing Industry in Tennessee; cooperative with the Department of Agricultural Economics and Rural Sociology.

Factors Related to Demand for and Expansion of Horticultural Specialties; cooperative with the Department of Agricultural Economics and Rural Sociology.

Fireblight Resistance; cooperative with the Departments of Chemistry, and Plant Pathology.

Raspberry Improvement; cooperative with the Department of Chemistry.

Blackberry Improvement; cooperative with the Department of Chemistry.

Breeding Commercial Strawberries in Tennessee.

Improvement of Garden Beans.

Sweetpotato Improvement.

Minor Element Nutrition.

Substitution of Sodium for Potassium.

Chemical Weed Control.

Mineral Nutrition of Fruit Crops.

Vegetable Variety Investigations.

Fruit Variety Investigations.

Propagation of Fruit and Ornamental Plants.

Kind and Variety Investigations of Ornamentals.

Management and Evaluation of Plants for Hedges, Screens, and Windbreaks.

Projects Concluded in 1956

Varietal Trials (of all kinds)

Peach Variety Trials

Nut Crops

Apple Variety

Improvement of Nursery Stock

Strawberry Rotation Studies

Strawberry Fertilization

Grape Variety Trials

Bean Variety

Cole Crops Variety Test

Ornamentals

Bedding Petunia Variety Trials

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Irrigation

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Petunia Variety Trials. Tennessee Farm and Home Science, Progress Report No. 17, January-February-March, 1956.

Physics

Federal-State Research Projects

Textiles.

Staple Length of Cotton.

Cotton Improvement.

Development and Organization of Small Scale Spinning Tests.

Development of Apparatus and Equipment for Processing Small Quantities of Cotton into Yarns for Testing Purposes.

Studies of Relationships Between Fiber Properties and Spinning Processing.

Experimental and Theoretical Studies of the Strength and Structure of Cotton Yarns, Rovings, and Slivers.

Development of Instruments for Measuring and Controlling the Strength and Uniformity of Cotton Yarns, Rovings, and Slivers in the Spinning Process.

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Significance of Fiber Properties and the Need for Progress in the Field of Instrumentation. Textile Bulletin, 110-112, March, 1956.

Plant Pathology

Federal-State Research Projects

Breeding of Disease-Resistant Tobacco; cooperative with the United States Department of Agriculture.

Strawberry Root Diseases.

Tomato Fruit Rots; cooperative with the U. S. Department of Agriculture.

Control of Cotton Verticillium Wilt.

Breeding Wheat for Resistance to Disease, Hessian Fly, and Changes in Morphological Characters; cooperative with the Departments of Botany, and Entomology; and the U. S. Department of Agriculture.

Root Diseases of Small Cereals and the Nematode Relationship.

Utilization of Soil Fumigants and Control of Certain Diseases Incited by Nematodes (contributing project to Regional Project S-19).

Soil Microbiology of Plant Diseases (contributing project to Regional Project S-26).

Evaluation of New Fungicides.

State Research Projects

Strawberry Virus Indexing.

Projects Concluded in 1956

Alfalfa Crown Rot.

Barley Scald.

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Poultry

Federal-State Research Projects

Drugs in the Control of Internal Parasites.

Pastures for Chickens with Particular Reference to Parasites.

Improvement of Poultry Through Breeding (contributing project to Regional Project S-7).

Influence of Environment on Performance of Hens.

Evaluation of Antibiotics in the Control of Salmonellosis; cooperative with the Bacteriology Department.

Amino Acid Supplementation of Hydrolized Poultry Feathers for Use in Poultry Feed.

Relationship of Protein to Energy for Laying Hens.

Feed Additives for Poultry.

Improvement of Broiler Qualities Through Crossbreeding and Selection.

The Influence of Light Upon Performance of Domestic Chickens.

Influence of Rate of Cooling and Water Absorption on Shelf Life; cooperative with the Departments of Bacteriology, and Home Economics Research.

State Research Projects

Tennessee Random Sample Laying Test.

Tennessee Random Sample Broiler Test.

Comparative Feeding Value of Different Grades of Yellow Corn for Broilers.

Nutritional Value of Grains and Various Grades of Grains for Broilers.

Vegetable Protein Investigations with Chicks.

High Efficiency Rations for Poultry.

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Fission Products Metabolism in Animals.

Mineral Metabolism in Animals.
I. Absorption and Internal Distribution.
II. Interrelationship of Minerals, Vitamins, Hormones, and Other Factors.

Radiation Effects on Reproductive Functions in Farm Animals, Sperm Physiology. 1. Use of Radioisotopes. 2. Effects of Radiation.

External Radiation Studies with Large Animals.

Plant and Seed Irradiation.

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SUBSTATIONS

BEN P. HAZELWOOD, Superintendent, West Tennessee Experiment Station, Jackson
E. J. CHAPMAN, Superintendent, Middle Tennessee Experiment Station, Columbia
J. HUGH FELTS, Superintendent, Tobacco Experiment Station, Greeneville
JOHN A. ODOM, Superintendent, Plateau Experiment Station, Crossville
E. L. BOHANAN, Assistant Superintendent, Plateau Experiment Station, Crossville
LAWSON M. SAFLEY, Superintendent, Highland Rim Experiment Station, Springfield
A. G. VAN HORN, Superintendent, Dairy Experiment Station, Lewisburg
J. MERRILL BIRD, Farm Superintendent, UT-AEC Research Program, Oak Ridge

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[1]Cooperative with U. S. Department of Agriculture
[2]Cooperative with U. S. Army