1977

Ninetieth Annual Report of the Tennessee Agricultural Experiment Station, 1977

University of Tennessee Agricultural Experiment Station

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Ninetieth
Annual Report
of the
Tennessee Agricultural
Experiment Station
1977

The University of Tennessee
Knoxville
THE UNIVERSITY OF TENNESSEE
AGRICULTURAL EXPERIMENT STATION

1 Main Station
2 University of Tennessee at Martin

Branch Stations
4 Dairy Experiment Station
5 Highland Rim Experiment Station
6 Middle Tennessee Experiment Station
7 Plateau Experiment Station
8 Tobacco Experiment Station
9 West Tennessee Experiment Station

3 UT Energy Research and Development Administration Comparative Animal Research Laboratory

Field Stations
10 Ames Plantation
11 Cumberland Forestry Field Station
12 Friendship Forestry Field Station
13 Highland Rim Forestry Field Station
14 Milan Field Station
15 Oak Ridge Forest and Arboretum
Ninetieth
Annual Report
1977

Tennessee
Agricultural Experiment Station

Edward J. Boling ......................... President of the University
Webster Pendergrass ...................... Vice President for Agriculture
B. H. Pentecost ........................... Assistant Vice President for Agriculture
D. M. Gossett .............................. Dean
T. J. Whatley .............................. Associate Dean
John I. Sewell ............................. Assistant Dean
William L. Sanders ...................... Statistician

The University of Tennessee
Knoxville
LETTER OF TRANSMITTAL

Knoxville, Tennessee
January 2, 1978

To His Excellency, Ray Blanton
Governor of Tennessee:

SIR: I have the honor of transmitting 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 1977.

This report is submitted in accordance with the law requiring that such a report be submitted annually by the administrators of the Experiment Station to the Governor of the State.

Respectfully submitted,
Edward J. Boling, President

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The Ninetieth Annual Report

of the

Tennessee Agricultural Experiment Station

1977

Foreword

Included in this report are listings by departments of the following information:

1) Research projects active as of December 31, 1977;
2) Research projects terminated during the calendar year 1977;
3) Bulletins, articles, and reports prepared by Experiment Station staff members and published during the calendar year 1977.

In addition, this report contains the financial statement for the Agricultural Experiment Station covering the period July 1, 1976 to June 30, 1977. Also included is a list of the Experiment Station personnel for the calendar year 1977.

Active Projects

As of December 31, 1977, there were 150 Hatch projects and 12 State projects. Hatch projects are supported in part with Federal-Grant funds made available by Congress to the Agricultural Experiment Stations of the country under the Hatch Act Amended. State projects are supported entirely by University funds.

In addition, there were 13 McIntire-Stennis and 5 University of Tennessee-Department of Energy projects.

The headquarters of the Tennessee Agricultural Experiment Station is located on the agricultural campus of the University of Tennessee at Knoxville. The UT-Comparative Animal Research Laboratory is located some 20 miles distant at Oak Ridge, Tennessee. In addition, there are other research centers which represent soil and climatic conditions in the major regions of Tennessee. These other research centers are listed at the end of this report, and their locations are shown on the inside front cover.

Many of the projects involving studies of soils, crops, and livestock may include experimental work at one or more of the outlying stations as well as at the Main Station at Knoxville.

Projects Terminated

During 1977, 41 projects were terminated. Reports on these projects have either been published or are being prepared for publication.
# FINANCIAL STATEMENT

**July 1, 1976 — June 30, 1977**

The University of Tennessee Agricultural Experiment Station

<table>
<thead>
<tr>
<th>FEDERAL</th>
<th>Hatch Act-Amended</th>
<th>McIntire Stennis</th>
<th>Specific grants</th>
<th>Non-Federal</th>
<th>Totals All</th>
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<tbody>
<tr>
<td>ACTIVITY</td>
<td>Regular</td>
<td>Reg. research</td>
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<td>Reg. research</td>
<td>Regular</td>
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<tr>
<td>FUNDs AVAILABLE</td>
<td>$2,120,792.00</td>
<td>$442,058.97</td>
<td>$185,401.00</td>
<td>$98,727.48</td>
<td>$7,915,880.12</td>
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<tr>
<td>EXPENDITURES</td>
<td></td>
<td></td>
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<tr>
<td>Personal Services</td>
<td>$2,002,871.51</td>
<td>$397,317.31</td>
<td>$181,244.50</td>
<td>$42,612.14</td>
<td>$3,635,713.99</td>
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<tr>
<td>Travel</td>
<td>$26,192.01</td>
<td>$6,305.70</td>
<td>$2,958.18</td>
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<td>Equipment</td>
<td>$28,474.50</td>
<td>$11,441.70</td>
<td>$837.65</td>
<td>$2,788.22</td>
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<td>Land and structures</td>
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<td>Personnel benefits</td>
<td></td>
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<tr>
<td>All other</td>
<td>$27,247.28</td>
<td>$3,070.65</td>
<td>$9,451.35</td>
<td>$5,448.59</td>
<td>$2,435,778.62</td>
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<tr>
<td>Unexpended balances*</td>
<td>$36,006.70</td>
<td>$23,923.61</td>
<td>(9,090.68)</td>
<td>39,700.89</td>
<td>93,859.71</td>
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<tr>
<td>TOTALS</td>
<td>$2,120,792.00</td>
<td>$442,058.97</td>
<td>$185,401.00</td>
<td>$98,727.48</td>
<td>$7,915,880.12</td>
</tr>
</tbody>
</table>

*Includes Carryover Obligations
Publications

Published reports on research of the Tennessee Agricultural Experiment Station appear in Station Bulletins, in Tennessee Farm and Home Science, as well as in professional and technical periodicals and in various popular publications. There were 10 Station Bulletins published during the year. The number of technical, semi-technical, and popular articles prepared by staff members and published during 1977 was 184. In addition, staff members published 2 Extension-type publications, and 2 regional bulletins.

AGRICULTURAL BIOLOGY

<table>
<thead>
<tr>
<th>Proj. No.</th>
<th>Research Project Titles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatch 359</td>
<td>Biology and Management of Insects in Yellow-Poplar Seed Orchards.</td>
</tr>
<tr>
<td>Hatch 395</td>
<td>Effect of Soil Environmental Conditions on Occurrence and Quantity of Cotton Seedling Pathogens.</td>
</tr>
<tr>
<td>Hatch 398</td>
<td>Biology and Control of Insects Pests of Cattle in Tennessee.</td>
</tr>
<tr>
<td>Hatch 415</td>
<td>Breeding Disease Resistant Dark Tobacco.</td>
</tr>
<tr>
<td>Hatch 418</td>
<td>Diseases of Small Grains.</td>
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<tr>
<td>Hatch 419</td>
<td>Diseases of Ornamentals and Nursery Crops.</td>
</tr>
<tr>
<td>Hatch 420</td>
<td>Etiology and Control of Vegetable Diseases.</td>
</tr>
<tr>
<td>Hatch 421</td>
<td>Control of Tobacco Insects.</td>
</tr>
<tr>
<td>Hatch 423</td>
<td>Biology and Control of Cotton Diseases.</td>
</tr>
<tr>
<td>Hatch 431</td>
<td>Detection and Control of Soybean Diseases.</td>
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<tr>
<td>Hatch 440</td>
<td>Pest Management of Vegetable Insect Pests.</td>
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<tr>
<td>Hatch 467</td>
<td>An Integrated System for the Suppression of the Boll Weevil.</td>
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<td>Hatch 468</td>
<td>Host Plant Resistance in Cotton to Insects, Mites, Nematodes, and Diseases.</td>
</tr>
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<td>Hatch 469</td>
<td>Nature and Extent of Variation in Root-Knot Cyst Nematodes.</td>
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<tr>
<td>Hatch 472</td>
<td>Control of Target-Insect Pests on Vegetable Crops.</td>
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<tr>
<td>Hatch 473</td>
<td>Biology and Ecology of Culicidae and Tabanidae.</td>
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<tr>
<td>Hatch 514</td>
<td>Bio-systematics and Biological Control of Coccoidea Species in Tennessee.</td>
</tr>
<tr>
<td>Hatch 360</td>
<td>Mutation Breeding of Soybeans; cooperative with the Plant and Soil Science Department.</td>
</tr>
<tr>
<td>Tenn. 85</td>
<td>Pesticide Impact Assessment Research and Data Analyses.</td>
</tr>
</tbody>
</table>
Projects Concluded in 1977

Hatch 139R (S-90) Rhizosphere Ecology as Related to Plant Health and Vigor.
Hatch 320R (S-70) Viruses and Mycoplasma-like Organisms Causing Diseases of Corn and Sorghum.
Hatch 343 Biology and Culture of Selected Fishes.
Hatch 455 The Effects and Control of Ectoparasitic Nematodes and Associated Root-Inhabiting Fungi on Tomatoes, Soybeans, and Corn.
Hatch 491 (S-83) Freshwater Food Animals (Catfish).**

Bulletins, Articles, and Reports—1977


**Transferred to Forestry, Fisheries, and Wildlife.


**AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY**

<table>
<thead>
<tr>
<th>Proj. No.</th>
<th>Research Project Titles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatch 382</td>
<td>The Impact of Demographic Changes of Tennessee Rural Population.</td>
</tr>
<tr>
<td>Hatch 385</td>
<td>Economic, Locational, and Institutional Factors Affecting Industrial Plant Location in Non-Metropolitan Areas (contributing to Regional Proj. S-96).</td>
</tr>
<tr>
<td>Hatch 388</td>
<td>Social and Psychological Factors Related to Managerial Success.</td>
</tr>
<tr>
<td>Hatch 430</td>
<td>A Socioeconomic Study of Low Income and Part-Time Farmers in Selected Areas of Tennessee.</td>
</tr>
<tr>
<td>Hatch 432C</td>
<td>Alternative Systems of Swine Production.</td>
</tr>
<tr>
<td>Hatch 439</td>
<td>Tennessee Rural Change Perspectives.</td>
</tr>
</tbody>
</table>
Hatch 443  Economics of Producing and Marketing Woody Ornamentals in the South (contributing to Regional Proj. S-103).


Hatch 451  Economic Analysis of Selected Technologies for Producing Burley Tobacco.


Hatch 465  Analysis of Factors Affecting the Short-run and Long-run Demand for Broiler Meat at Wholesale and Retail Market Levels (contributing to Regional Proj. S-106).

Hatch 466  Marketing Performance of Selected Milk Pricing Systems for the Southern Region (contributing to Regional Proj. S-104).

Hatch 484  Assessed Needs Among Elderly in Rural Tennessee.


Hatch 488  Price Discovery and Informational Flows for Major Agricultural Commodities in the Southern Region (contributing to Regional Proj. S-115).


Hatch 493  Impact of Farmers Home Administration Financing on Rural Housing.

Hatch 495  The Potential Use of Futures Market Pricing Strategies for Tennessee Agricultural Products.

Hatch 496  Social Organization for Development of Low-Income Rural Counties (contributing to Regional Proj. S-120).

Hatch 497  Analysis of Domestic Food Demand and Consumption Behavior (contributing to Regional Proj. S-119).

Hatch 499  Soybean Production Systems in Tennessee.

Hatch 509  Farm Adjustment Opportunities on Commercial Farms in Tennessee.

Projects Concluded in 1977

Hatch 328  Socio-Economic Characteristics of Rural Development Areas in Tennessee.

Hatch 340  Systems Analysis of the Vegetable Subsector of the Food Industry of the South (contributing to Regional Proj. SM-46).

Hatch 346  Growth of the Farm Firm in Specified Farming Regions of Tennessee.
Hatch 364 Influences of Farm Supply Dealers on Technological Change by High and Low Income Farmers.

Hatch 422 Present Impact and Development of the Craft Industry in Rural Tennessee.

Hatch 427 Factors Determining Costs Incurred by Feeder Pig Buyers and Dealers Utilizing Tennessee Organized Feeder Pig Sales.

**Bulletins, Articles, and Reports—1977**


AGRICULTURAL ENGINEERING

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<th>Proj. No.</th>
<th>Research Project Titles</th>
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<td>Hatch 294</td>
<td>Engineering Systems for Cotton Production (contributing to Regional Proj. S-69).</td>
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<tr>
<td>Hatch 379</td>
<td>Development of Compatible Erosion-Control Practices and Machinery Systems; cooperative with Plant and Soil Science Department.</td>
</tr>
<tr>
<td>Hatch 424B</td>
<td>Management of Runoff and Effluent from a Dairy; cooperative with the Animal Science and Plant and Soil Science Departments and the Dairy Experiment Station.</td>
</tr>
<tr>
<td>Hatch 432B</td>
<td>Alternative Systems of Swine Production; cooperative with the Animal Science, Plant and Soil Science, and Agricultural Economics Departments, and Ames Plantation.</td>
</tr>
<tr>
<td>Hatch 477</td>
<td>Minimum Tillage Equipment for Corn and Vegetable Crops.</td>
</tr>
</tbody>
</table>
Hatch 480 Hydrologic/Water Quality Models for Agriculture and Forestry; cooperative with the Plant and Soil Science Department and the University of Tennessee Water Resources Research Center (contributing to Regional Proj. S-108).

Hatch 494 Evaluation of Selected Physical Properties Affecting Handling of Tennessee Vegetables.

Hatch 516 The Effect of Cotton Fiber Physical Properties on Dust Levels and on Yarn Characteristics.

State 66 Machines for Low-Cost Hay Making on Small Farms; cooperative with Plant and Soil Science and Animal Science Departments.

Projects Concluded in 1976

Hatch 383 Machinery for Harvesting Fruit and Pod Vegetables; cooperative with the Food Technology and Science and Plant and Soil Science Departments.


State 75 Electrical Equipment for the Treatment of Water; cooperative the U. S. Department of Agriculture.

Bulletins, Articles, and Reports—1977


Tompkins, F. D. Reduced Tillage Vegetable Production: Many Questions Remain to be Answered. The Grower (Supplement to The Packer) 84(42):4C-5C, October 1977.

ANIMAL SCIENCE

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<td>The Influence of Light Upon Performance of Domestic Chickens.</td>
</tr>
<tr>
<td>Hatch 284</td>
<td>Factors Affecting the Rate of Genetic Improvement of Dairy Cattle.</td>
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<td>Hatch 307</td>
<td>Efficiency of Beef Production—Amount of Variation and Criteria for Improvement.</td>
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<td>Hatch 317</td>
<td>Feeding Programs for Maximum Efficiency and Optimum Body Composition in Meat Type Swine.</td>
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<td>Hatch 342</td>
<td>The Mineral Nutrition of Egg-Production-Type Laying Hen.</td>
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<td>Hatch 345</td>
<td>Management of Pastures for Beef Cow Herds.</td>
</tr>
<tr>
<td>Hatch 432A</td>
<td>Alternative Systems of Swine Production.</td>
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<td>Hatch 433</td>
<td>Pre- and Post-Weaning Management of Beef Calves.</td>
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<td>Reproductive Efficiency in the Bovine Male.</td>
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<td>Hatch 457</td>
<td>Complete Feed Rations Using Home-Grown Forages for Dairy Cattle.</td>
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<td>Hatch 458</td>
<td>Photoperiods and Poultry Diseases.</td>
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<td>Hatch 459</td>
<td>Efficiency of Beef Production of Different Size Cows Giving Different Amounts of Milk on Different Quality Pastures.</td>
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<td>Hatch 460</td>
<td>Effect of Initial Weight and Winter Feeding Level on Subsequent Performance of Slaughter Beef Heifers.</td>
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<td>Hatch Code</td>
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<tr>
<td>Hatch 461</td>
<td>Maximum Utilization of High Quality Forages for Dairy Cattle.</td>
</tr>
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<td>Hatch 462</td>
<td>Winter Feeding &quot;Dry&quot; Brood Cows for Efficient Beef Production.</td>
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<td>Hatch 463</td>
<td>Improvement of Reproductive Performance in Cattle.</td>
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<td>Hatch 471</td>
<td>Development of Improved Feeder Calf Classification Procedures.</td>
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<td>Hatch 474</td>
<td>Effect of Feeding Regimen in Gestation on First Lactation of Dairy Heifers.</td>
</tr>
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<td>Hatch 475</td>
<td>Effect of Plane of Nutrition on Mammary Gland Development in Dairy Heifers.</td>
</tr>
<tr>
<td>Hatch 478</td>
<td>Quantitation of the Selenium and Vitamin E Requirements of Swine.</td>
</tr>
<tr>
<td>Hatch 481</td>
<td>Breeding Methods for Beef Cattle in the Southern Region (contributing to Regional Proj. S-10).</td>
</tr>
<tr>
<td>Hatch 482</td>
<td>Genetic Methods of Improving Dairy Cattle for the South (contributing to Regional Proj. S-49).</td>
</tr>
<tr>
<td>Hatch 498</td>
<td>Etiology and Control of Hypomagnesemia in Ruminants Utilizing Cool Season Grasses (contributing to Regional Proj. S-121).</td>
</tr>
<tr>
<td>Hatch 503</td>
<td>Mycoplasma Gallisepticum and Mycoplasma Synoviae Infections in Commercial Egg Producing Flocks.</td>
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<td>Hatch 504</td>
<td>Endocrine Relationship in the Mastitis, Metritis, Agalactia (MMA) Complex in Pigs.</td>
</tr>
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<td>Hatch 511</td>
<td>Hormonal Relationships in Egg Shell Formation.</td>
</tr>
<tr>
<td>Hatch 512</td>
<td>Alternatives for Finishing Cattle in Tennessee.</td>
</tr>
<tr>
<td>Hatch 515</td>
<td>Endocrine Factors Associated with Transport of Molecules into and out of the Uterus.</td>
</tr>
<tr>
<td>State 2</td>
<td>Swine Testing and Evaluation.</td>
</tr>
<tr>
<td>State 59</td>
<td>Bull Evaluation.</td>
</tr>
<tr>
<td>State 79</td>
<td>&quot;Exotic Breeds&quot; of Sheep to Increase Lamb Production in Tennessee.</td>
</tr>
<tr>
<td>State 80</td>
<td>Variation in Appetite of Angus Heifers Differing in Growth Pattern.</td>
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<tr>
<td>State 82</td>
<td>Nutritive Value of Agricultural and Industrial Waste Products.</td>
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**Projects Concluded in 1977**

<table>
<thead>
<tr>
<th>Hatch Code</th>
<th>Project Title</th>
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</thead>
<tbody>
<tr>
<td>Hatch 61</td>
<td>The Improvement of the Producing Ability of Beef Cattle; cooperative with the Aluminum Company of America (contributing to Regional Proj. S-10).</td>
</tr>
</tbody>
</table>
Hatch 371  Stress and Laying Hen Performance.
Hatch 390  Micro and Macro Elements in Animals.
Hatch 456  Etiology and Prevention of Hypomagnesemia in Ruminants.
State 42  Beef Cattle Improvement.

Bulletins, Articles, and Reports—1977


Chamberlain, Charles C.  


Dowlen, Henry H. and Don O. Richardson. Reproduction Management at the Dairy Experiment Station. Tennessee Farm and Home Science No. 102, pp. 5-6, 1977.


---

**CHILD AND FAMILY STUDIES**

**Proj. No.**

**Research Project Titles**

Hatch 405 Vocational and Educational Aspirations of Rural School Children and Their Mothers.

Hatch 513 Role Perception of Working and Non-Working Mothers in Rural and Urban Areas.


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**Bulletins, Articles, and Reports—1977**


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**COMPARATIVE ANIMAL RESEARCH LABORATORY**

**Proj. No.**

**Research Project Titles**

2204* Transport Interactions of Environmental Pollutants with Essential Nutrients.

2287* Development of Transport Models.


Mutagenesis in the Long-Lived Mammal.

Late Somatic Effects of Energy Pollutants.

Comparative Metabolism of Micro- and Macro-Elements in Animals.

Mutagenesis and the Development of Mutant Germplasm in Economic Plants.

Species Comparisons of Pre- and Post-Natal Utilization of Mineral Elements.

**Project Concluded in 1977**


**Bulletins, Articles, and Reports—1977**


*U.S. Department of Energy Project Numbers.*


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FOOD SCIENCE, NUTRITION, AND FOOD SYSTEMS ADMINISTRATION

<table>
<thead>
<tr>
<th>Proj. No.</th>
<th>Research Project Titles</th>
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</thead>
<tbody>
<tr>
<td>Hatch 353</td>
<td>Non-oxidative Reactions of Meat Lipids During Heating and Their Relation to Cooked Meat Quality.</td>
</tr>
<tr>
<td>Hatch 384</td>
<td>Patterns of Food Intake and Nutritional Health of Girls.</td>
</tr>
<tr>
<td>Hatch 396</td>
<td>Effect of Stress on Sulfur Metabolism.</td>
</tr>
<tr>
<td>Hatch 450</td>
<td>Effect of Vegetarian Diets on Bone Density and Nutrient Intakes of Aging Women.</td>
</tr>
<tr>
<td>Hatch 500</td>
<td>Functional Properties of Plant Proteins as Influenced by Other Ingredients of Formulated Foods.</td>
</tr>
<tr>
<td>Hatch 501</td>
<td>Effect of Dietary Sulfur on Protein Metabolism.</td>
</tr>
<tr>
<td>Hatch 502</td>
<td>Metabolic Alterations In the Genetically Obese Mouse.</td>
</tr>
<tr>
<td>Hatch 507</td>
<td>Influence of Dietary Protein on Renal Function, Protein Status, and Longevity of Male Rats.</td>
</tr>
</tbody>
</table>
Hatch 519  The Effects of Changing Food Prices and Other Intervening Variables on Food Acceptance.

Projects Concluded in 1977
Hatch 314  The Effect of Nutrition on Biological Aging in the Rat.
Hatch 355  Effect of Sulfur on Neutral Sulfur Metabolism.

Bulletins, Articles, and Reports—1977


FOOD TECHNOLOGY AND SCIENCE

<table>
<thead>
<tr>
<th>Proj. No.</th>
<th>Research Project Titles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatch 193</td>
<td>Enzymes as Related to Chemical and Physical Characteristics of Vegetables for Freezing.</td>
</tr>
<tr>
<td>Hatch 376</td>
<td>Food Color Identification, Notation, and Amelioration with Natural Compounds.</td>
</tr>
<tr>
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<td>Histological and Histochemical Relationships of Muscle to Meat Quality and Cutability.</td>
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</tr>
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Hatch 452  Use of Protein Isolates and Vegetable Fats in Manufactured Meat Products.

Hatch 453  Utilization of Acid Cheese Whey for Food Products.

Hatch 505  Utilization of Modified Proteins in Baked Goods.

Hatch 508  Quality Evaluation of Vegetable Cultivars and Development of Food Products.

State 73  Pesticides in/on Raw and Processed Foods.

Projects Concluded in 1976

Hatch 374  Development and Improvement of Vegetable Products and Processing: Quality Factors of Cultivars.

Hatch 387  Combined Enzymatic-Extraction Procedure for Protein Recovery from Selected Crops and Food Wastes.

Hatch 448  Safety Evaluation of Raw and Processed Foods.

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## FORESTRY, WILDLIFE, AND FISHERIES

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<td>Hatch 470</td>
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<td>McIntire 19</td>
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<td>Quail Management on Forests and Associated Lands in Tennessee.</td>
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<td>Characteristics of Juvenile and Branch Wood in Selected Eastern Hardwoods.</td>
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<td>Economic Importance of Tennessee's Forest Resource and Wood Products Industries.</td>
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<td>Stennis 16</td>
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</tr>
</tbody>
</table>
Projects Concluded in 1977

Hatch 271  Forest Tree Breeding.
Hatch 343  Biology and Culture of Selected Fishes.
McIntire 7  Blight Resistance in American Chestnut.
Stennis 8  Christmas Tree Breeding.
McIntire 14R  Effect of Seedling Root Deformation on Growth and Allocation of Auxins.
State 78  Economics of Timber Resource Availability in a Tennessee Timbershed.
State 81  Balsam Woolly Aphid in Great Smoky Mountains.

Bulletins, Articles, and Reports—1977


**ORNAMENTAL HORTICULTURE AND LANDSCAPE DESIGN**

<table>
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<td>Hatch 429</td>
<td>Chemical Control of Plant Growth in Florist Pot Plants and Bedding Plants.</td>
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*Omitted from the 1976 Annual Report.*
Project Concluded in 1977

Hatch 377 Production Systems of Nursery Stock.

Bulletins, Articles, and Reports—1977


PLANT AND SOIL SCIENCE

Proj. No. Research Project Titles


Hatch 399 Soil and Plant Nutrient Status and Environmental Factors in Relation to Crop Yields.

Hatch 400 Effect of Plant Environment on Its Photosynthetic Capability.

Hatch 402 Cotton Seed and Fiber Development.
Cotton Production and Varietal Adaptation.

Forage Crop Production and Metabolic Patterns Under Different Management and Environmental Conditions.

Small Grain Improvement Through Breeding (wheat, oats, barley, and rye).

Selectivity and Mode of Action of Herbicides and Antidotes.

Corn Improvement.

Development and Evaluation of Rootstocks for Peach (contributing to Regional Proj. S-97).

Vegetable Crop Production.

Interfacial Reactions in Soils.

Liming and Its Effect on Nutrient Availability.

Field Crop Variety Evaluation.

Plant Growth Regulator Effects on Fruit, Vegetable, and Agronomic Crops.

Fruit Crop Investigations.


Forage Crops Ecology and Management.

Soybean Breeding.

Forage Grass Genetics and Breeding.

Minimum Tillage and Double Cropping on Weed Populations and Persistence and Fate of Herbicides (contributing to Regional Proj. S-110).

Diagnosis and Correction of Manganese and Molybdenum Problems in Legumes (contributing to Regional Proj. S-117).

Burley Tobacco Genetics and Breeding.

Weed Control in Economic Crops.

Plant Germplasm—Its Introduction, Maintenance and Evaluation (contributing to Regional Proj. S-9).

Viruses and Mycoplasma-like Organisms Causing Diseases of Corn and Sorghum (contributing to Regional Proj. S-70).

Projects Concluded in 1977

Burley Tobacco Breeding.

Environment-Management Interactions in Forage Crops Ecological Systems.

Viruses and Mycoplasma-Like Organisms Causing Disease of Corn and Sorghum (contributing to Regional Proj. S-70).
Hatch 320  Weed Control in Agronomic Crops.
Hatch 341  Fertilizers and Organic Wastes Applied to Soils in Relation to Environmental Quality (contributing to Regional Proj. S-82).
Hatch 352  Weed Control in Horticultural Crops.

Bulletin, Articles, and Reports—1977


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**TEXTILES AND CLOTHING**

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<th>Proj. No.</th>
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Bulletins, Articles, and Reports—1977


THE UNIVERSITY OF TENNESSEE AT MARTIN

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<th>Proj. No.</th>
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<td>Hatch 428</td>
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<td>Hatch 510</td>
<td>Weed Control in Economic Crops.</td>
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<td>Hatch 512</td>
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STATION PERSONNEL—1977

The University of Tennessee
Agricultural Experiment Station
Knoxville, Tennessee 37901

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C. T. Cunnyngham, Graduate Research Assistant
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D. N. Good, Graduate Research Assistant
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G. N. Rhodes, Graduate Research Assistant
R. H. Rogers, Graduate Research Assistant
J. P. Ross, Graduate Research Assistant
A. B. Rowell, Graduate Research Assistant
D. B. Seaton, Graduate Research Assistant

¹In cooperation with the U. S. Department of Agriculture.
TEXTILES AND CLOTHING

Anna Jean Treece, Professor and Head of Department
Beth A. Thompson, Graduate Research Assistant

THE UNIVERSITY OF TENNESSEE AT MARTIN
SCHOOL OF AGRICULTURE

H. J. Smith, Dean, School of Agriculture
E. W. Culvahouse, Associate Professor of Dairying
B. N. Duck, Assistant Dean and Professor of Agronomy

B. R. Hathcock, Associate Professor of Agronomy
H. A. Henderson, Farm Manager
N. W. Robinson, Professor of Animal Science

MAIN STATION, KNOXVILLE

John Hodges III, Superintendent of Farms

BRANCH STATIONS

Dairy Experiment Station,\textsuperscript{1} Lewisburg, J. R. Owen,\textsuperscript{1} Superintendent
Highland Rim Experiment Station, Springfield, L. M. Safley, Superintendent
Middle Tennessee Experiment Station, Spring Hill, J. W. High, Jr., Superintendent
Plateau Experiment Station, Crossville R. D. Freeland, Superintendent; R. Q. Snider, Manager
Tobacco Experiment Station,\textsuperscript{1} Greeneville, Donald D. Howard, Superintendent
West Tennessee Experiment Station, Jackson, J. F. Brown, Superintendent

FIELD STATIONS

Ames Plantation, Grand Junction, James M. Bryan, Superintendent;

James M. Anderson, Associate Superintendent

\textsuperscript{1}\textit{In cooperation with the U. S. Department of Agriculture.}
PERSONNEL CHANGES

Appointments

Robert C. Abt, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, September 15, 1977
R. V. Acuff, Graduate Research Assistant in Food Science, Nutrition, and Food Systems Administration, July 1, 1977
C. W. Bales, Graduate Research Assistant in Food Science, Nutrition, and Food Systems Administration, September 1, 1977
R. E. Beauchene, Acting Head of the Department of Food Science, Nutrition, and Food Systems Administration, July 1, 1977
Kenneth W. Bell, Graduate Research Assistant in Plant and Soil Science, September 19, 1977
Susan Bentley, Graduate Research Assistant in Animal Science, July 1, 1977
Ernest C. Bernard, Assistant Professor of Agricultural Biology, July 13, 1977
Susan K. Betz, Graduate Research Assistant in Ornamental Horticulture and Landscape Design, July 1, 1977
P. L. Brady, Graduate Research Assistant in Food Science, Nutrition, and Food Systems Administration, September 1, 1977
M. L. Brown, Graduate Research Assistant in Food Technology and Science, January 1, 1977
William F. Brown, Graduate Research Assistant in Animal Science, September 19, 1977
C. R. Calkins, Graduate Research Assistant in Food Technology and Science, August 29, 1977
S. L. Cantrell, Graduate Research Assistant in Food Technology and Science, September 1, 1977
James E. Clark, Graduate Research Assistant in Agricultural Economics, July 20, 1977
C. G. Clemen, Graduate Research Assistant in Food Technology and Science, March 1, 1977
John P. Conn, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, September 15, 1977
Thomas D. Cordrey, Assistant Professor of Plant and Soil Science, September 12, 1977
E. E. Cox, Graduate Research Assistant in Food Technology and Science, September 1, 1977
R. F. Cullum, Graduate Research Assistant in Agricultural Engineering, September 19, 1977
S. D. Cunningham, Assistant Professor of Food Technology and Science, March 15, 1977
Walter Stephen Damron, Graduate Research Assistant in Animal Science, March 21, 1977
G. W. Davis, Assistant Professor of Food Technology and Science, August 15, 1977
Gary E. Day, Graduate Research Assistant in Plant and Soil Science, September 19, 1977
Glenda B. Denton, Graduate Research Assistant in Agricultural Economics, September 1, 1977
William F. Drake, Graduate Research Assistant in Plant and Soil Science, September 6, 1977
Richard E. Estell, Graduate Research Assistant in Animal Science, September 19, 1977
James T. Fain, Graduate Research Assistant in Animal Science, September 12, 1977
Robert R. Fincher, Graduate Research Assistant in Plant and Soil Science, September 19, 1977
Weyman P. Fussell, Graduate Research Assistant in Plant and Soil Science, September 19, 1977
Daniel N. Good, Graduate Research Assistant in Plant and Soil Science, September 6, 1977
Gerald F. Graham, Jr., Graduate Research Assistant in Agricultural Economics, September 12, 1977
Morgan D. Gray, Research Associate in Agricultural Economics, September 19, 1977
R. S. Guinn, Graduate Research Assistant in Agricultural Engineering, January 1, 1977
Robert H. Hicks, Graduate Research Assistant in Plant and Soil Science, September 19, 1977
P. M. High, Graduate Research Assistant in Agricultural Engineering, June 1, 1977
Joe Hope, Graduate Research Assistant in Agricultural Biology, September 14, 1977
H. G. Huber, Graduate Research Assistant in Food Science, Nutrition, and Food Systems Administration, July 1, 1977
David L. Hunter, Graduate Research Assistant in Agricultural Economics, June 6, 1977
Phil Hunter, Assistant Professor of Agricultural Biology, Springfield, April 15, 1977
D. A. Hutsell, Graduate Research Assistant in Food Technology and Science, September 6, 1977
C. Dayton Hylton, Graduate Research Assistant in Agricultural Biology, July 1, 1977
Barbara B. Ininns, Graduate Research Assistant in Animal Science, September 19, 1977
C. James, Graduate Research Assistant in Food Science, Nutrition, and Food Systems Administration, September 1, 1977
Kenneth G. Johnson, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, November 1, 1977
M. A. Johnson, Graduate Research Assistant in Agricultural Engineering, January 1, 1977
R. L. Johnson, Architectural Engineer, October 17, 1977
D. W. Jones, Graduate Research Assistant in Agricultural Engineering, June 13, 1977
Pedro Jones, Graduate Research Assistant in Agricultural Biology, September 1, 1977
R. G. Jordan, Systems Analyst, Comparative Animal Research Laboratory, June 1, 1977
Kimberly A. Kirnan, Graduate Research Assistant in Animal Science, September 1, 1977
Robert R. Lyle, Graduate Research Assistant in Animal Science, July 1, 1977
V. J. McDonald, Jr., Information Officer, Comparative Animal Research Laboratory, July 18, 1977
Charles D. Manning, Graduate Research Assistant in Plant and Soil Science, January 1, 1977
D. M. Merryman, Graduate Research Assistant in Agricultural Engineering, March 21, 1977
Timothy S. Moore, Graduate Research Assistant in Agricultural Economics, July 21, 1977
Bradley Mullens, Graduate Research Assistant in Agricultural Biology, January 1, 1977
H. J. Norman, Graduate Research Assistant in Agricultural Engineering, January 1, 1977
J. J. O'Donnell, Architectural Engineer, July 25, 1977
Carolyn L. Orr, Graduate Research Assistant in Animal Science, September 5, 1977
Jerry L. Parker, Graduate Research Assistant in Animal Science, September 1, 1977
M. G. Persall, Graduate Research Assistant in Food Technology and Science, September 12, 1977
K. L. Pierce, Jr., Graduate Research Assistant in Agricultural Engineering, January 1, 1977
Adlai L. Platt, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, September 1, 1977
Howard B. Quigley, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, September 15, 1977
Teresa J. Ragain, Graduate Research Assistant in Agricultural Biology, July 1, 1977
Nancy Ramsey, Graduate Research Assistant in Animal Science, September 1, 1977
G. Neil Rhodes, Graduate Research Assistant in Plant and Soil Science, September 12, 1977
Richard S. Ritter, Graduate Research Assistant in Animal Science, August 15, 1977
Linda L. Roys, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, April 1, 1977
L. M. Safley, Jr., Assistant Professor of Agricultural Engineering, August 1, 1977
Gerhardt Schneider, Professor and Head, Forestry, Wildlife and Fisheries, June 1, 1977
G. Lizabeth Self, Graduate Research Assistant in Textiles and Clothing, September 1, 1977
Ronald R. Sharpe, Graduate Research Assistant in Plant and Soil Science, September 16, 1977
S. L. Shoulders, Graduate Research Assistant in Agricultural Engineering, September 19, 1977
David N. Sloan, Senior Research Technician in Plant and Soil Science, October 3, 1977
Paul E. Su, Graduate Research Assistant in Animal Science, August 1, 1977
Curtis I. Taylor, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, January 1, 1977
Ronald W. Todd, Associate Professor in Agricultural Economics, November 7, 1977
H. O. Vaigneur, Professor and Associate Head of Agricultural Engineering, August 1, 1977
Harold B. Waddle, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, September 15, 1976
Gary L. Wade, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, September 15, 1977
Deborah K. Wagner, Graduate Research Assistant in Agricultural Economics, September 12, 1977
E. Eric Watson, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, July 21, 1977
J. Keith Watson, Graduate Research Assistant in Agricultural Biology, July 1, 1977
J. B. Wills, Jr., Assistant Professor of Agricultural Engineering, March 1, 1977
Terminations

M. B. Akins, Graduate Research Assistant in Plant and Soil Science, March 13, 1977
Leland R. Anderson, Graduate Research Assistant in Animal Science, May 13, 1977
Tommy A. Bowers, Graduate Research Assistant in Plant and Soil Science, May 30, 1977
Danny T. Brown, Graduate Research Assistant in Animal Science, October 31, 1977
Peter H. Bruno, Graduate Research Assistant in Plant and Soil Science, May 31, 1977
George R. Buckner, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, November 16, 1977
Thomas L. Burst, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, October 31, 1977
R. G. Carpenter, Graduate Research Assistant in Agricultural Engineering, February 1, 1977
Jimmy C. Castellaw, Graduate Research Assistant in Plant and Soil Science, September 30, 1977
John T. Connell, Assistant Professor of Plant and Soil Science, September 16, 1977
Thomas H. Copping, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, December 31, 1977
C. Christopher Eagar, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, August 31, 1977
D. D. Eiler, Graduate Research Assistant in Agricultural Engineering, June 11, 1977
William R. Gall, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, March 31, 1977
H. V. Gann, Graduate Research Assistant in Food Technology and Science, October 1, 1977
Gregory H. Hardy, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, December 31, 1977
J. F. Hefley, Graduate Research Assistant in Food Science, Nutrition, and Food Systems Administration, August 31, 1977
James T. Hopper, Graduate Research Assistant in Animal Science, May 31, 1977
Michael P. Hunter, Graduate Research Assistant in Animal Science, May 31, 1977
Dewayne Ingram, Graduate Research Assistant in Ornamental Horticulture and Landscape Design, October 1, 1977
C. P. Knauth, Graduate Research Assistant in Agricultural Biology, March 31, 1977
J. W. Lusby, Graduate Research Assistant in Food Technology and Science, March 1, 1977
John R. McCurley, Graduate Research Assistant in Animal Science, December 31, 1977
Thomas E. Morgan, Graduate Research Assistant in Plant and Soil Science, September 30, 1977
R. E. Moyers, Graduate Research Assistant in Food Technology and Science, January 1, 1977
J. J. O’Donnell, Architectural Engineer, October 1, 1977
Joe F. Pearson, Graduate Research Assistant in Animal Science, March 31, 1977
Anna T. Pec, Graduate Research Assistant in Forestry, Wildlife, and Fisheries, December 7, 1977
Robert B. Ratliff, Graduate Research Assistant in Plant and Soil Science, April 15, 1977
Jerome Reece, Graduate Research Assistant in Agricultural Economics, December 31, 1977
M. J. Riemann, Assistant Professor of Food Technology and Science, June 30, 1977
Morgan J. C. Scudi, Graduate Research Assistant in Agricultural Economics, August 31, 1977
Eddie Seagle, Graduate Research Assistant in Ornamental Horticulture and Landscape Design, December 30, 1977
Dennis Shepard, Graduate Research Assistant in Ornamental Horticulture and Landscape Design, December 30, 1977
J. L. Skogman, Information Officer, Comparative Animal Research Laboratory, June 30, 1977
M. B. Stone, Graduate Research Assistant in Food Science, Nutrition, and Food Systems Administration, August 31, 1977
Johnnie R. Vaughan, Graduate Research Assistant in Animal Science, August 31, 1977
E. M. Vigdorth, Graduate Research Assistant in Food Technology and Science, July 1, 1977
Sara M. Zimmerman, Graduate Research Assistant in Textiles and Clothing, August 31, 1977

CHANGES OF TITLES

J. L. Collins, to Professor of Food Technology and Science, July 1, 1977
R. R. Gerhardt, to Associate Professor of Agricultural Biology, July 1, 1977
Gary M. Lessman, to Associate Professor of Plant and Soil Science, July 1, 1977
Frank B. Masincupp to Associate Professor of Animal Science, July 1, 1977
S. L. Melton, to Associate Professor of Food Technology and Science, July 1, 1977
Charles A. Mullins, to Associate Professor of Plant and Soil Science, July 1, 1977
Robert M. Ray, to Associate Professor in Agricultural Economics, July 1, 1977
N. B. Shamiyeh, to Research Associate in Agricultural Biology, July 1, 1977
David Shannon, to Graduate Research Assistant in Animal Science, July 1, 1977
J. M. Stewart, to Associate Professor of Plant and Soil Science, July 1, 1977

TRANSFERS

James F. Brown, from Assistant Professor, Department of Plant and Soil Science, to Superintendent of the West Tennessee Experiment Station, May 1, 1977
Haywood W. Luck, from Superintendent of the West Tennessee Experiment Station, to District Supervisor, University of Tennessee Agricultural Extension Service, May 1, 1977
Lynda Roys, Graduate Research Assistant in Agricultural Biology, to Forestry, Fisheries, and Wildlife, July 1, 1977
Harold Waddle, Graduate Research Assistant in Agricultural Biology, to Forestry, Fisheries, and Wildlife, July 1, 1977
J. Larry Wilson, Associate Professor of Agricultural Biology, to Forestry, Fisheries, and Wildlife, July 1, 1977

RETIREMENTS

John W. Barrett, Professor and Head, Forestry, Wildlife, and Fisheries, June 30, 1977
D. H. Latham, Associate Professor of Agricultural Biology (Springfield), January 31, 1977