1971

Eighty-Fourth Annual Report of the Tennessee Agricultural Experiment Station, 1971

University of Tennessee Agricultural Experiment Station

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Eighty-fourth Annual Report of the Tennessee Agricultural Experiment Station 1971

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

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
Eighty-fourth
Annual Report
1971

Tennessee
Agricultural Experiment Station

Edward J. Boling ....................... President of the University
Webster Pendergrass .................... Vice President for Agriculture
E. J. Chapman ........................... Assistant Vice President
John A. Ewing ............................ Dean
Eric Winters .............................. Associate Dean

The University of Tennessee
Knoxville
LETTER OF TRANSMITTAL

Knoxville, Tennessee
January 2, 1972

To His Excellency, Winfield Dunn
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 1971.

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

Respectfully submitted,
Edward J. Boling, President

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<td>Horticulture</td>
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<td>Nutrition</td>
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<td>University of Tennessee at Martin—Agriculture Department</td>
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<td>Station Personnel</td>
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<td>Personnel Changes</td>
<td>48</td>
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</tbody>
</table>
Foreword

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

1) Research projects active as of December 31, 1971;
2) Research projects terminated during the calendar year 1971;
3) Bulletins, articles, and reports prepared by Experiment Station staff members and published during the calendar year 1971.

In addition, this report contains the financial statement for the Agricultural Experiment Station covering the period July 1, 1970, to June 30, 1971. Also included is a list of the Experiment Station personnel for the calendar year 1971.

Active Projects

As of December 31, 1971, there were 147 Hatch projects and 25 active 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 12 McIntire-Stennis and 20 University of Tennessee-Atomic Energy Commission projects, and 1 Special Grant project (CSRS).

The headquarters of the Tennessee Agricultural Experiment Station is located on the agricultural campus of the University of Tennessee at Knoxville. The U-T/AEC Agricultural 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 the locations are shown on the inside front cover.
# Financial Statement

**July 1, 1970-June 30, 1971**

**The University of Tennessee Agricultural Experiment Station**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hatch Act - Amended</th>
<th>Co-op Forestry Research</th>
<th>Research Facilities</th>
<th>Specific Grants</th>
<th>Non Federal</th>
<th>Totals All</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regular</td>
<td>Regional Res.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Receipts</strong></td>
<td>$1,444,141.00</td>
<td>$274,106.00</td>
<td>$106,164.20</td>
<td>$75,000.00</td>
<td>$21,279.82</td>
<td>$3,952,360.37</td>
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<tr>
<td><strong>Expenditures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Personal Services</td>
<td>$1,404,544.55</td>
<td>$256,716.13</td>
<td>$93,967.69</td>
<td>$6,295.79</td>
<td>$1,513,950.41</td>
<td>$3,275,474.57</td>
</tr>
<tr>
<td>Travel</td>
<td>5,117.21</td>
<td>3,185.42</td>
<td>653.65</td>
<td>228.51</td>
<td>64,397.71</td>
<td>73,582.50</td>
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<tr>
<td>Equipment</td>
<td>7,789.44</td>
<td>11,027.72</td>
<td>9,470.31</td>
<td>1,912.49</td>
<td>345,274.43</td>
<td>375,474.39</td>
</tr>
<tr>
<td>Land and Structures</td>
<td>75,000.00</td>
<td></td>
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<tr>
<td>Personnel Benefits</td>
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<td></td>
<td></td>
<td></td>
<td>153.44</td>
<td>327,438.72</td>
</tr>
<tr>
<td>All Other</td>
<td>26,689.80</td>
<td>3,176.73</td>
<td>2,072.55</td>
<td>3,391.75</td>
<td>1,144,092.71</td>
<td>1,179,423.54</td>
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<tr>
<td>Unexpended Balance*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9,297.84</td>
<td>436,989.39</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>$1,444,141.00</td>
<td>$274,106.00</td>
<td>$106,164.20</td>
<td>$75,000.00</td>
<td>$21,279.82</td>
<td>$3,952,360.37</td>
</tr>
</tbody>
</table>

*Includes Obligations for Capital Improvements and Working Capital
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 1971, 20 projects were terminated. Reports on these projects have either been published or are being prepared for publication.

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 14 Station Bulletins published during the year, and 3 were reprinted. The number of technical, semi-technical, and popular articles prepared by staff members and published during 1971 was 179. In addition, staff members published 1 Extension-type publication, and 3 regional bulletins.

AGRICULTURAL BIOLOGY

<table>
<thead>
<tr>
<th>Proj. No.</th>
<th>Research Project Titles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatch 98</td>
<td>Life History, Ecology, and Control of Major Cotton Insects.</td>
</tr>
<tr>
<td>Hatch 132</td>
<td>Breeding Disease-Resistant Tobacco.</td>
</tr>
<tr>
<td>Hatch 138</td>
<td>Biology and Control of Plant Parasitic Nematodes; Cooperative with the U. S. Department of Agriculture.</td>
</tr>
<tr>
<td>Hatch 139</td>
<td>Associations Among Soil Microorganisms as Related to the Incidence and Severity of Plant Diseases (contributing to Regional Proj. S-26).</td>
</tr>
<tr>
<td>Hatch 140</td>
<td>Evaluating New Fungicides.</td>
</tr>
<tr>
<td>Hatch 203</td>
<td>Control of Insects Attacking Nursery Plants.</td>
</tr>
<tr>
<td>Hatch 213</td>
<td>Biology, Distribution, and Control of Corn Insects.</td>
</tr>
<tr>
<td>Hatch 241</td>
<td>The Disposition of Pesticides in the Soil (contributing to Regional Proj. S-62).</td>
</tr>
<tr>
<td>Hatch 251</td>
<td>Diseases of Small Grains.</td>
</tr>
<tr>
<td>Hatch 260</td>
<td>Diseases of Ornamentals and Associated Nursery Crops.</td>
</tr>
<tr>
<td>Hatch 263</td>
<td>Snap Bean Diseases.</td>
</tr>
<tr>
<td>Hatch 264</td>
<td>Distribution, Biology, and Control of Tobacco Insects.</td>
</tr>
<tr>
<td>Hatch 280</td>
<td>Remote Multispectral Sensing in Agriculture; cooperative with the Agronomy, Agricultural Engineering, and Forestry Departments.</td>
</tr>
<tr>
<td>Hatch 289</td>
<td>Cotton Diseases.</td>
</tr>
<tr>
<td>Hatch 292</td>
<td>Forage Crop Insect Control.</td>
</tr>
<tr>
<td>Hatch 294</td>
<td>Engineering Systems for Cotton Production; cooperative with the Agricultural Engineering Department.</td>
</tr>
<tr>
<td>Hatch 299</td>
<td>Relation of House Dust Mites to Allergic Reactions in Humans.</td>
</tr>
<tr>
<td>Hatch 311</td>
<td>Biology and Control of Arthropods on Soybeans (contributing to Regional Proj. S-74).</td>
</tr>
<tr>
<td>Hatch 315</td>
<td>Nature and Extent of Variation in Root-Knot and Cyst Nematodes (contributing to Regional Proj. S-76).</td>
</tr>
<tr>
<td>Hatch 343</td>
<td>Biology and Culture of Selected Fishes.</td>
</tr>
<tr>
<td>Hatch 349</td>
<td>Catfish Breeding, Production, and Marketing (contributing to Regional Proj. S-83).</td>
</tr>
<tr>
<td>State 47</td>
<td>Biology of Farm Ponds.</td>
</tr>
</tbody>
</table>

**Bulletins, Articles, and Reports—1971**

Brasher, Charles, J. A. Mullins, and S. E. Bennett  

Burgess, E. E. and N. B. Shamiyeh  
Burgess, E. E. and S. E. Bennett  

Chambers, A. Y.  

Chambers, A. Y. and C. H. Hadden  

Chambers, A. Y. and T. C. McCutchen  

Cherry, E. T. and C. D. Pless  

Epps, J. M.  

Epps, J. M.  

Epps, J. M.  

Feldmesser, Julius and J. M. Epps  

Hilty, J. W. and Beverly Ausmus  

Hilty, J. W. and L. M. Josephson  

Johnson, Leander F.  

Johnson, L. F. and A. Y. Chambers  
Josephson, L. M., C. R. Graves, H. C. Kincer, and J. W. Hilty

Matheny, E. L. and E. A. Heinrichs

Miles, J. T., B. J. Demott, S. A. Hinton, M. J. Montgomery, and S. E. Bennett

Pless, C. D., E. T. Cherry, and Herman Morgan, Jr.

Priest, M. F. and C. J. Southards

Reed, H. E. and A. Y. Chambers

Reed, H. E. and A. Y. Chambers

Reed, H. E. and A. Y. Chambers

Shamiyeh, N. B., Stelmon E. Bennett, R. P. Hornsby, and N. L. Woodiel

Sievert, R. C.

Sievert, R. C.

Southards, C. J.

Southards, C. J.
Wilson, J. L. and R. P. Mullett

AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

<table>
<thead>
<tr>
<th>Proj. No.</th>
<th>Research Project Titles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatch 249</td>
<td>Human Resource Development and Mobility in the Rural South (contributing to Regional Proj. S-61).</td>
</tr>
<tr>
<td>Hatch 259</td>
<td>Egg Marketing Systems for the South (contributing to Regional Proj. SM-37).</td>
</tr>
<tr>
<td>Hatch 270</td>
<td>The Management of Insurable Risk in Tennessee Agriculture.</td>
</tr>
<tr>
<td>Hatch 274</td>
<td>Migration Patterns of the Tennessee Population.</td>
</tr>
<tr>
<td>Hatch 281</td>
<td>The Economic Impact of the Wholesome Meat Act on Tennessee’s Livestock Industry.</td>
</tr>
<tr>
<td>Hatch 283</td>
<td>Potentials of the Beef Production Industry in the South (contributing to Regional Proj. S-67).</td>
</tr>
<tr>
<td>Hatch 285</td>
<td>Farm Labor in Tennessee.</td>
</tr>
<tr>
<td>Hatch 286</td>
<td>Relationship of Fiber Test Data and Other Factors to Prices Paid for Cotton (contributing to Regional Proj. SM-39).</td>
</tr>
<tr>
<td>Hatch 290</td>
<td>Golf Associations in Tennessee.</td>
</tr>
<tr>
<td>Hatch 295</td>
<td>Efficiencies in Grocery Wholesaling in Tennessee.</td>
</tr>
<tr>
<td>Hatch 303</td>
<td>Regional Income and Employment Effects of Investments in Natural Resources (contributing to Regional Proj. S-71).</td>
</tr>
<tr>
<td>Hatch 312</td>
<td>Economic Evaluation of Alternative Forms of Vertical Coordination in the Livestock-Meat Industry (contributing to Regional Proj. SM-41).</td>
</tr>
<tr>
<td>Hatch 316</td>
<td>Predicted Effects of Selected Policy and Technology Changes on the Grain Marketing System (contributing to Regional Proj. SM-42).</td>
</tr>
</tbody>
</table>
Hatch 322  Financial Management Strategies of Farm Business Managers.

Hatch 326  Factors Affecting Utilization and Expansion Potential for Ornamental Plants and Turf (contributing to Regional Proj. SM-44).

Hatch 327  Delineation of Functional Economic Areas in Tennessee.

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

Hatch 331  Rural Development and the Quality of Life in the Rural South (contributing to Regional Proj. S-79).

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 350  Demand for Food (contributing to Regional Proj. SM-45).

Projects Concluded in 1971

Proj. No.  Research Project Titles

Hatch 205  An Economic Appraisal of Agricultural Credit Used by Tennessee Farmers.


Hatch 226  Income Potentials from Alternative Farm Organizations in Various Types of Farming Areas.

Hatch 252  Demand for Food (contributing to Regional Proj. SM-34).

Hatch 262  Civil Defense and Food Stocks.

Hatch 313  Air Pollution and Economic Loss.

Hatch 318  Estimates of Corn Yield Response to Precipitation Variables in Selected Areas of West Tennessee.
T-2 (S-38) Reducing the Cost of Producing Cotton Through the Management and Application of Technology (USDA, CSRS Grant 616-15-23).

**Bulletins, Articles, and Reports—1971**

Badenhop, M. B. and Julian E. Holmes  

Badenhop, M. B. and Julian E. Holmes  

Badenhop, M. B. and Julian E. Holmes  

Bauer, Larry L. and John P. Jordan  

Bauer, Larry L. and C. B. Sappington  

Bauer, Larry L. and James A. Culver  

Bomar, William J. and C. B. Sappington  

Dubov, Irving, et al.  

Elam, Thomas E. and C. B. Sappington  

Hicks, B. G. and M. B. Badenhop  

Keller, Luther H. and James M. Anderson  
Keller, Luther H.


Leuthold, Frank O.


Leuthold, Frank O.


Sappington, C. B., et al.


Whatley, T. J.


Wilson, Charles M. and Joe A. Martin

An Interindustry Analysis of the Tennessee Economy Emphasizing Agriculture. Tennessee Agricultural Experiment Station Bulletin 475, January 1971.

AGRICULTURAL ENGINEERING

<table>
<thead>
<tr>
<th>Proj. No.</th>
<th>Research Project Titles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatch 204</td>
<td>Factors Affecting Water Yields from Small Watersheds in Tennessee; cooperative with the Agronomy Department, UT/AEC Agricultural Research Laboratory, and the Soil Conservation Service (contributing to Regional Proj. S-53).</td>
</tr>
<tr>
<td>Hatch 228</td>
<td>Snap Bean Production Mechanization; cooperative with the Horticulture, Food Technology, Agricultural Biology, and Agricultural Economics Departments.</td>
</tr>
<tr>
<td>Hatch 277</td>
<td>Farm Waste Disposal; cooperative with the Dairying, Food Technology, and Sanitary Engineering Departments, and the University of Tennessee Water Resources Research Center.</td>
</tr>
<tr>
<td>Hatch 280</td>
<td>Remote Multispectral Sensing in Agriculture; cooperative with the Agronomy, Agricultural Biology, and Forestry Departments.</td>
</tr>
</tbody>
</table>
TENNESSEE AGRICULTURAL EXPERIMENT STATION 15

Hatch 294  Engineering Systems for Cotton Production (contributing to Regional Proj. S-69).

Hatch 324  Equipment for Minimum Tillage Practices.

Hatch 333  Evaluation and Improvement of Low-Cost Rural Housing in Tennessee.

Hatch 338  Reducing Labor and Costs in the Dark-Fired Tobacco Harvest-Curing Operation; cooperative with the Agricultural Biology Department and Highland Rim Experiment Station.

T-3  Quality of Humid Region Cotton Harvested by Mechanical Stripper (USDA, CSRS Grant 816-15-06).

State 7  Electric Treatment of Plant Materials; cooperative with the Agronomy and Food Technology Departments and the U.S. Department of Agriculture.

State 25  Land Forming for Drainage and Furrow Irrigation; cooperative with the West Tennessee Experiment Station and the Soil Conservation Service.

Projects Concluded in 1971

<table>
<thead>
<tr>
<th>Proj. No.</th>
<th>Research Project Titles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatch 32</td>
<td>Chemical Weed Control; cooperative with the Agronomy and Horticulture Departments.</td>
</tr>
<tr>
<td>Hatch 214</td>
<td>Behavioral Responses of Chickens to Environmental Factors; cooperative with the Poultry Department.</td>
</tr>
<tr>
<td>State 50</td>
<td>Cotton Production Studies; cooperative with the Agricultural Biology and Agronomy Departments and the Tennessee Farm Bureau.</td>
</tr>
</tbody>
</table>

Bulletins, Articles, and Reports—1971

Baxter, D. O., Thomas E. Maddox, and Herschel V. Shirley


Brasher, Charles, J. A. Mullins, and S. E. Bennett

Cheng, C. C. and K. E. Duckett

Duckett, K. E. and Paul Elliott

Duckett, K. E. and R. S. Krowicki

Henry, Z. A., K. L. Hertel, K. E. Duckett, and J. N. Grant

Henry, Z. A., K. L. Hertel, K. E. Duckett, and J. N. Grant

Infante, A. L., J. A. Mullins, and Z. A. Henry

Morgan, A. H., D. G. Brown, and T. H. Thomas

Mullins, J. A. and Joseph R. Overton

Mullins, J. A., Joseph R. Overton, and Tom McCutchen

Mullins, J. A., Joseph R. Overton, and Tom McCutchen

Sewell, John I.

Sewell, John I.

Sewell, John I., John R. Owen, and Joe W. High, Jr.
<table>
<thead>
<tr>
<th>Proj. No.</th>
<th>Research Project Titles</th>
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</thead>
<tbody>
<tr>
<td>Hatch 28</td>
<td>Moisture Sorption Characteristics of the Major Soils of Tennessee and the Relation of Moisture Tensions to Plant Growth and Fertilizer Utilization.</td>
</tr>
<tr>
<td>Hatch 33</td>
<td>Evaluation of the Performance of Varieties of Field Crops.</td>
</tr>
<tr>
<td>Hatch 34</td>
<td>Corn Improvement; cooperative with the Agricultural Biology Department and the U. S. Department of Agriculture.</td>
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<tr>
<td>Hatch 38</td>
<td>The Comparative Value and Relative Efficiency of Various Phosphate Fertilizers under Different Soil and Cropping Conditions.</td>
</tr>
<tr>
<td>Hatch 42</td>
<td>Potassium Fertilization of Farm Crops on Different Soil Series in Tennessee.</td>
</tr>
<tr>
<td>Hatch 47</td>
<td>Establishment and Maintenance of Turf.</td>
</tr>
<tr>
<td>Hatch 48</td>
<td>Soil Survey of Tennessee to Help Determine Crop Adaptation and Management Requirements; cooperative with the U. S. Department of Agriculture.</td>
</tr>
<tr>
<td>Hatch 56</td>
<td>Trace Elements in Tennessee Agricultural Crops.</td>
</tr>
<tr>
<td>Hatch 79</td>
<td>Production and Improvement of Cotton Varieties Suitable to Tennessee Conditions; cooperative with the U. S. Department of Agriculture.</td>
</tr>
<tr>
<td>Hatch 163</td>
<td>Culture of Dark Tobacco.</td>
</tr>
<tr>
<td>Hatch 164</td>
<td>Nitrogen Fertilization of Farm Crops.</td>
</tr>
<tr>
<td>Hatch 183</td>
<td>Crop Response to Liming.</td>
</tr>
<tr>
<td>Hatch 186</td>
<td>Forage Crops Management: Establishment, Persistence, and Productivity.</td>
</tr>
<tr>
<td>Hatch 208</td>
<td>Breeding for Improvement in Small Grain (wheat, oats, barley, and rye): cooperative with the Agricultural Biology Department.</td>
</tr>
<tr>
<td>Hatch 211</td>
<td>Breeding and Genetics of Forage Crops.</td>
</tr>
<tr>
<td>Hatch 224</td>
<td>Physiological Responses of Forage Crops to Management and Environment.</td>
</tr>
</tbody>
</table>
Hatch 237  The Disposition of Pesticides in the Soil (contributing to Regional Proj. S-62).

Hatch 245  Effects of Pesticides on Turf Pests and Turfgrasses.

Hatch 250  Influence of Mineralogy of Southern Soils on Certain Chemical and Physical Reactions.


Hatch 256  Burley Tobacco Breeding; cooperative with U. S. Department of Agriculture.

Hatch 279  Selectivity and Mode of Action of Herbicides.

Hatch 280  Remote Multispectral Sensing in Agriculture; cooperative with the Agricultural Biology, Agricultural Engineering, and Forestry Departments.

Hatch 287  Effectiveness and Efficiency of Physical and Chemical Mutagens; cooperative with UT/AEC Agricultural Research Laboratory.

Hatch 291  Plant Constituents Controlling Cotton Fiber Initiation, Growth and Maturation; cooperative with the U. S. Department of Agriculture.

Hatch 293  Phenology and Physiology of Soybeans.


Hatch 301  Viruses and Mycoplasma-like Organisms (MPLO) Causing Diseases of Corn (contributing to Regional Proj. S-70); cooperative with U. S. Department of Agriculture.

Hatch 320  Weed Control in Agronomic Crops.

Hatch 335  Herbicide Movement from Application Sites and Effects on Non-Target Species (contributing to Regional Proj. S-78).

Hatch 337  Diagnosis and Correction of Zinc Problems in Corn and Rice Production (contributing to Regional Proj. S-80).
Hatch 341  Fertilizers and Organic Wastes Applied to Soils in Relation to Environmental Quality (contributing to Regional Proj. S-82).

State 60  Soybean Production Potentials and Production Economics of Some Major Tennessee Soils.

**Project Concluded in 1971**

State 50  Quality Cotton Varietal Adaptation.

**Bulletin, Articles, and Reports—1971**

Barber, W. D.

Callahan, L. M.

Callahan, L. M.

Callahan, L. M.

Callahan, L. M.

Callahan, L. M.

Callahan, L. M.

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Hatch 321  Hypomagnesemia Relationship to Grass Tetany in Ruminant Animals.

Hatch 325  Endocrinology of Reproduction in Cattle; cooperative with the UT/AEC Agricultural Research Laboratory.

Hatch 339  Mineral Studies in Large Animals Using Radiation and Radioisotope Tracers; cooperative with the UT/AEC Agricultural Research Laboratory.

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State 2  Swine Testing; in cooperation with the UT Agricultural Extension Service.

State 3  Effects of Fluorine Levels of Soil and Water on Grazing Cattle Under Different Systems of Management.

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Hatch 63  Mineral Metabolism in Animals: I. Absorption, Distribution, and Physiological Behavior of Calcium and Phosphorus in Farm Animals; cooperative with the UT/AEC Agricultural Research Laboratory.

Hatch 66  The Effects of Radiation on Reproductive Physiology in Farm Animals; cooperative with the UT/AEC Agricultural Research Laboratory.

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Hatch 161 Efficient and Economical Use of Forages in Dairy Cattle Rations; co-operating with the U. S. Department of Agriculture.
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MS 11   Physiological Response of Wildlife to Different Forest
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Knoxville, Tennessee

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Neil L. Woodiel, Assistant in Agricultural Biology

1 In cooperation with U. S. Department of Agriculture.
AGRICULTURAL COMMUNICATION

R. L. Hamilton, Head of Department
A. H. Mitchell, Agricultural Librarian
F. E. Berggren, Assistant Professor
C. A. Reinhardt, Assistant Professor

AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

T. J. Whatley, Distinguished Service Professor and Head of Department
Russell Harris, III, Graduate Research Assistant
John L. Adrian, Graduate Research Assistant
R. J. Hopkins, Graduate Research Assistant
J. A. Atchison, Graduate Research Assistant
T. Morris Jones, Graduate Research Assistant
M. B. Badenhop, Professor
L. H. Keller, Professor
H. E. Barnhill, Instructor
F. O. Leuthold, Associate Professor of Rural Sociology
L. L. Bauer, Associate Professor
Joe A. Martin, Professor
Joseph A. Bras her, Graduate Research Assistant
D. E. Matthews, Graduate Research Assistant
D. W. Brown, International Professor of Agricultural Economics
B. S. McFatter, Graduate Research Assistant
C. L. Cleland, Professor of Rural Sociology
B. R. McManus, Associate Professor
J. A. Culver, Graduate Research Assistant
Merle R. Menegay, Graduate Research Assistant
C. M. Cuskaden, Assistant Professor
S. Darrell Mundy, Instructor
Raymond Daniel, Assistant Professor
D. E. Phillips, Assistant in Agricultural Economics
Hugh G. Dorminy, Jr., Graduate Research Assistant
B. D. Raskopf, Associate Professor
Irving Dubov, Professor
Robert M. Ray, Assistant Professor
Gerald V. Eagan, Assistant in Agricultural Economics
C. B. Sappington, Associate Professor
W. E. Goble, Assistant Professor
J. G. Snell, Associate Professor
R. J. Goddard, Assistant Professor, Grand Junction
B. J. Trevena, Instructor

AGRICULTURAL ENGINEERING

J. J. McDow, Head of Department
R. J. Goddard, Assistant Professor
W. H. Allen, Assistant in Agricultural Engineering
K. E. Duckett, Assistant Professor
J. C. Barker, Graduate Research Assistant
P. R. Ewald, Associate Professor
D. O. Baxter, Assistant Professor
Z. A. Henry, Associate Professor
B. L. Bledsoe, Associate Professor
W. H. Kilgore, Graduate Research Assistant
J. D. Davenport, Assistant in Agricultural Engineering
R. S. Krowicki, Assistant Professor

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R. B. Stone, Associate Professor
L. J. Thompson, Assistant Professor
L. R. Wilhelm, Assistant Professor
J. B. Wills, Graduate Research Assistant

AGRONOMY

Lloyd F. Seatz, Head of Department
William Anderson, Assistant in Agronomy
William D. Barber, Assistant Professor
Frank F. Bell, Professor
George J. Buntley, Associate Professor
L. M. Callahan, Associate Professor
Timothy Campbell, Graduate Research Assistant
Harold Carpenter, Assistant in Agronomy
Bob V. Conger, Assistant Professor
John T. Connell, Assistant Professor, Grand Junction
Henry A. Fribourg, Professor
David K. Glover, Graduate Research Assistant
Charles R. Graves, Assistant Professor
C. L. Gupton, Assistant Professor, Greeneville
Larry Heatherly, Graduate Research Assistant
Jesse S. Hickey, Graduate Research Assistant
P. E. Hoskinson, Assistant Professor, Jackson
Larry S. Jeffery, Assistant Professor
L. M. Josephson, Professor
H. C. Kinser, Assistant Professor
Samuel Kincheloe, Assistant in Agronomy
William A. Krueger, Assistant Professor
Gary M. Lessman, Assistant Professor
Russell J. Lewis, Associate Professor
Steven D. Livingston, Graduate Research Assistant
Oddest H. Long, Professor
Buford Maner, Jr., Instructor
T. H. Morgan, Jr., Assistant Professor, Spring Hill
B. C. Nichols, Associate Professor, Greeneville
J. R. Overton, Associate Professor, Jackson
W. L. Parks, Professor
Terry K. Porter, Graduate Research Assistant
Vernon H. Reich, Assistant Professor
J. H. Reynolds, Associate Professor
Brooks Robinson, Research Instructor
J. Marcus Safley, Jr., Graduate Research Assistant
K. B. Sanders, Assistant Professor
L. N. Skold, Professor
Carl W. Smith, Graduate Research Assistant
H. C. Smith, Associate Professor
Marshall Smith, Assistant in Agronomy
M. E. Springer, Professor
James McD. Stewart, Assistant Professor
Rodney Strand, Graduate Research Assistant
Michael Wade, Graduate Research Assistant
William Keith Wesley, Graduate Research Assistant
Smith Worley, Associate Professor

1 In cooperation with U. S. Department of Agriculture.
ANIMAL HUSBANDRY-VETERINARY SCIENCE

K. M. Barth, Associate Professor
M. C. Bell, Professor
S. P. Bertsch, Assistant in Animal Husbandry
W. T. Butts, Jr., Associate Professor
L. D. Carver, Graduate Research Assistant in Animal Husbandry
C. C. Chamberlain, Professor
J. A. Corrick, Assistant Professor
H. M. Crowder, Research Instructor
G. Eisele, Assistant in Animal Husbandry
M. E. Fryer, Research Instructor
S. P. Hammack, Assistant in Animal Husbandry
S. L. Hansard, Professor
H. M. Jamison, Associate Professor
D. T. Lafferty, Assistant Professor
E. R. Lidvall, Associate Professor
J. B. Loy, Assistant in Animal Husbandry
J. E. Martin, Manager, Blount and Alcoa Farms
F. D. Masincupp, Assistant Professor
J. B. McLaren, Associate Professor
C. C. Melton, Assistant Professor
G. M. Merriman, Professor
J. F. Murphey, Graduate Research Assistant
R. L. Murphree, Professor
J. B. Neel, Assistant in Animal Husbandry
R. A. Reynolds, Assistant Professor
R. R. Shrode, Professor
J. D. Smalling, Assistant Professor
S. L. Winfree, Graduate Research Assistant

CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS

Arthur E. Gravatt, Head of Department
J. T. Miles, Head of Department
D. B. Batson, Assistant in Dairying
H. D. Baxter, Assistant Professor, Lewisburg
B. J. Bearden, Assistant Professor, Spring Hill
H. N. Carringer, Creamery Manager
B. J. Demott, Associate Professor
H. H. Dowlen, Graduate Research Assistant
C. D. Griffin, Assistant in Dairying
S. A. Hinton, Associate Professor
R. D. Holder, Graduate Research Assistant
C. R. Holmes, Farm Manager

Helen Reed, Assistant Professor
Lois Ellen Southworth, Lecturer

DAIRYING

W. M. Hopper, Assistant Professor, Jackson
H. O. Jaynes, Assistant Professor
D. W. Mackens, Graduate Research Assistant
M. J. Montgomery, Associate Professor
E. D. Moore, Assistant Professor, Lewisburg
R. B. Moore, Graduate Research Assistant
W. W. Overcast, Professor
D. O. Richardson, Associate Professor
E. W. Swanson, Professor

1 In cooperation with the U.S. Department of Agriculture.
FOOD SCIENCE AND INSTITUTION ADMINISTRATION

Grayce E. Goertz, Head of Department
Mia Armitage, Graduate Research Assistant
Barbara Bayne, Instructor
Ada Marie Campbell, Professor

Sharon Melton, Graduate Research Assistant
Bernadine Meyer, Professor
Marjorie Porter, Graduate Research Assistant
Jane Shellabarger, Graduate Research Assistant

FOOD TECHNOLOGY

M. R. Johnston, Head of Department
J. L. Collins, Associate Professor
J. G. Fair, Graduate Research Assistant
S. T. Hord, Graduate Research Assistant

I. E. McCarty, Assistant Professor
J. O. Mundt, Professor
J. C. Taylor, Graduate Research Assistant

FORESTRY

J. W. Barrett, Head of Department
R. C. Belden, Graduate Research Assistant
E. R. Buckner, Assistant Professor of Forestry
H. A. Core, Professor
R. A. Cox, Graduate Research Assistant
D. M. Cress, Graduate Research Assistant
R. W. Dimmick, Associate Professor
R. H. Martin, Assistant in Forestry
T. M. McCall, Graduate Research Assistant

D. M. Ostermeier, Assistant Professor
M. R. Pelton, Assistant Professor
J. C. Rennie, Assistant Professor
G. Rink, Assistant in Forestry
R. H. Saunders, Graduate Research Assistant
K. F. Schell, Associate Professor
M. D. Strickland, Graduate Research Assistant
E. Thor, Professor
G. R. Wells, Assistant Professor
E. M. Witt, Graduate Research Assistant
F. W. Woods, Professor

HORTICULTURE

Barzillai S. Pickett, Head of Department
Joe S. Alexander, Assistant Professor
Stephen A. Black, Graduate Research Assistant
Robert J. Black, Graduate Research Assistant
David L. Coffey, Assistant Professor
Effin T. Graham, Associate Professor
Thomas E. Knight, Graduate Research Assistant

Alan R. McDaniel, Graduate Research Assistant
Charles A. Mullins, Instructor, Crossville
William E. Roever, Associate Professor
Homer D. Swingle, Professor
Hendrik van de Werken, Associate Professor
NUTRITION

Mary Rose Gram, Head of Department
Roy E. Beauchene, Associate Professor
Gail W. Disney, Instructor
Sarah E. Feland, Graduate Research Assistant
Rossie L. Mason, Assistant Professor
Frances A. Schofield, Professor
John T. Smith, Professor

POULTRY

R. L. Tugwell, Professor and Acting Head of Department
J. K. Blettner, Professor
H. C. Goan, Assistant Professor
C. D. Leeper, Assistant in Poultry
G. C. McGhee, Research Technician
H. V. Shirley, Associate Professor
Elizabeth Rhodes, Graduate Research Assistant

TEXTILES AND CLOTHING

Anna Jean Treece, Head of Department
Paullette Milligan, Graduate Research Assistant

UNIVERSITY OF TENNESSEE-ATOMIC ENERGY COMMISSION AGRICULTURAL RESEARCH LABORATORY

N. S. Hall, Laboratory Director
M. C. Bell, Professor
J. M. Bird, Superintendent
D. G. Brown, Professor
W. F. Byrne, Assistant Professor
B. V. Conger, Assistant Professor
M. J. Constantin, Professor
G. R. Eisele, Assistant in Animal Husbandry
B. H. Erickson, Associate Professor
E. T. Graham, Associate Professor
R. F. Hall, Associate Professor
D. F. Johnson, Jr., Professor
D. D. Killion, Assistant Professor
W. D. Klobe, Assistant Professor
A. F. McFee, Associate Professor
Polly G. Martin, Assistant Professor
J. K. Miller, Associate Professor
F. R. Mraz, Professor
R. L. Murphy, Professor
T. R. Noonan, Professor
R. A. Reynolds, Assistant Professor
W. L. Sanders, Assistant Professor
L. B. Sasser, Assistant Professor
G. E. Spalding, Associate Professor
D. L. Stoddard, Assistant Professor
L. Wade, Jr., Assistant Professor
J. L. West, Professor
M. H. Wykoff, Associate Professor

THE UNIVERSITY OF TENNESSEE AT MARTIN

H. J. Smith, Dean, School of Agriculture
B. R. Hathcock, Assistant Professor of Agronomy
E. W. Culvahouse, Associate Professor of Dairying
B. N. Duck, Assistant Dean and Associate Professor of Agronomy
H. A. Henderson, Farm Manager
N. W. Robinson, Associate Professor of Animal Husbandry
MAIN STATION, KNOXVILLE
J. N. Odom, Superintendent of Farms

BRANCH STATIONS

Dairy Experiment Station\(^1\), Lewisburg, J. R. Owen\(^1\), Superintendent
Highland Rim Experiment Station, Springfield, L. M. Safley, Superintendent
Middle Tennessee Experiment Station, Spring Hill, J. W. High, Jr., Superintendent
Plateau Experiment Station\(^1\), Crossville, J. A. Odom, Superintendent, R. Q. Snyder, Manager
Tobacco Experiment Station\(^1\), Greeneville, J. H. Felts\(^1\), Superintendent
West Tennessee Experiment Station, Jackson, D. M. Gossett, Superintendent

FIELD STATIONS

Ames Plantation, Grand Junction, James M. Bryan, Manager
Cumberland Forestry Field Station, Wartburg, J. S. Kring, Manager
Highland Rim Forestry Field Station, Tullahoma, T. M. Seay, Manager
Milan Field Station, Milan, Tom C. McCutchen, Manager
Oak Ridge Forest and Arboretum, Oak Ridge, J. S. Kring, Manager

APPOINTMENTS, TERMINATIONS, LEAVES, CHANGE OF TITLES

Appointments

John L. Adrian, Graduate Research Assistant in Agricultural Economics, August 23, 1971
Mia Armitage, Graduate Research Assistant in Food Science, September 1, 1971
Gary M. Boring, Graduate Research Assistant in Agronomy, September 16, 1971
Joseph A. Brasher, Graduate Research Assistant in Agricultural Economics, September 16, 1971
Larry D. Carver, Graduate Research Assistant in Animal Husbandry, January 1, 1971
Edward T. Cherry, Assistant Professor of Agricultural Biology, September 1, 1971
Richard U. Clark, Graduate Research Assistant in Agronomy, January 1, 1971
Russell A. Cox, Graduate Research Assistant in Forestry, January 1, 1971
David H. Cress, Graduate Research Assistant in Forestry, September 1, 1971
Hugh G. Dorminy, Jr., Graduate Research Assistant in Dairying, January 1, 1971
H. H. Dowlen, Graduate Research Assistant in Agronomy, October 1, 1971
David K. Glover, Graduate Research Assistant in Agronomy, September 16, 1971
Larry Heatherly, Graduate Research Assistant in Agronomy, January 1, 1971
Jesse S. Hickey, Graduate Research Assistant in Agronomy, January 1, 1971

\(^1\) In cooperation with the U.S. Department of Agriculture.
Terminations

R. D. Holder, Graduate Research Assistant in Dairying, September 16, 1971
Stanley T. Hord, Graduate Research Assistant in Food Technology, June 1, 1971
Philip P. Hunter, Graduate Research Assistant in Agricultural Biology, June 7, 1971
Tommy Morris Jones, Graduate Research Assistant in Agricultural Economics, September 1, 1971
W. H. Kilgore, Graduate Research Assistant in Agricultural Engineering, September 20, 1971
Donald T. Lafferty, Assistant Professor of Animal Husbandry, October 11, 1971
Frank D. Masincupp, Assistant Professor of Animal Husbandry, February 15, 1971
Merle R. Menegay, Graduate Research Assistant in Agricultural Economics, September 16, 1971
Paulette Milligan, Graduate Research Assistant in Textiles and Clothing, September 1, 1971
S. Darrell Mundy, Instructor of Agricultural Economics, March 1, 1971

Ann Akin, Assistant in Food Science, August 31, 1971
William A. Alexander, Assistant in Agronomy, June 15, 1971
John R. Anania, Graduate Research Assistant in Agricultural Economics, October 31, 1971
Beverly S. Ausmus, Assistant in Agricultural Biology, March 31, 1971
William H. Baker, Assistant in Forestry, August 31, 1971
Edward D. Baldwin, Assistant in Agronomy, September 30, 1971
David M. Ostermeier, Assistant Professor of Forestry, October 15, 1971
Marjorie Porter, Graduate Research Assistant in Food Science, September 1, 1971
Terry K. Porter, Graduate Research Assistant in Agronomy, July 1, 1971
J. W. Rugh, Graduate Research Assistant in Agricultural Engineering, January 1, 1971
Jane Shellabarger, Graduate Research Assistant in Food Science, September 1, 1971
Carl Wayne Smith, Graduate Research Assistant in Agronomy, September 1, 1971
Rodney Strand, Graduate Research Assistant in Agronomy, March 15, 1971
L. K. Stuart, Research Assistant in Agricultural Engineering, April 16, 1971
J. C. Taylor, Graduate Research Assistant in Food Technology, June 1, 1971
Michael K. Wade, Graduate Research Assistant in Agronomy, September 1, 1971
L. R. Wilhelm, Assistant Professor of Agricultural Engineering, September 1, 1971

Gary M. Boring, Graduate Research Assistant in Agronomy, December 31, 1971
Amelia Brown, Assistant in Food Science, August 31, 1971
Ludwrick E. Brown, Assistant in Agricultural Engineering, December 8, 1971
Richard U. Clark, Graduate Research Assistant in Agronomy, May 31, 1971
Donald L. Cline, Assistant in Agricultural Economics, November 30, 1971
Change of Title

Larry L. Bauer, to Associate Professor of Agricultural Economics, July 1, 1971

J. K. Bletner, to Professor of Poultry, July 1, 1971

William F. Byrne, to Assistant Professor, UT/AEC, July 1, 1971

Charles C. Chamberlain, to Professor of Animal Husbandry, July 1, 1971

Albert Y. Chambers, to Associate Professor of Agricultural Economics, July 1, 1971

Milton J. Constantin, to Professor, UT/AEC, July 1, 1971

Henderson M. Crowder, to Research Instructor of Animal Husbandry, August 1, 1971

Ralph W. Dimmick, to Associate Professor of Forestry, July 1, 1971
Marvis E. Fryer, to Research
   Instructor of Animal Husbandry, August 1, 1971
Ralph F. Hall, to Associate Professor,
   UT/AEC, July 1, 1971
Luther H. Keller, to Professor of
   Agricultural Economics, July 1, 1971
James B. McLaren, to Associate
   Professor of Animal Husbandry, July 1, 1971
Benny R. McManus, to Associate
   Professor of Agricultural Economics, July 1, 1971

Charles A. Mullins, to Instructor of
   Horticulture, September 1, 1971
Charles D. Pless, to Associate
   Professor of Agricultural Biology,
   July 1, 1971
Gary E. Spalding, to Associate
   Professor, UT/AEC, July 1, 1971
Eyvind Thor, to Professor of
   Forestry, July 1, 1971
R. L. Tugwell, to Professor and
   Acting Head, Poultry Department,
   September 1, 1971

Retirements
S. A. Hinton, Associate Professor of
   Dairying, December 31, 1971
Phyllis Ilett, Associate Professor
   Emeritus, Home Management,
   Equipment, and Family Economics,
   September 1, 1971

   Thomas J. Longwell, Assistant
   Professor of Agronomy;
   November 30, 1971
Kenneth B. Sanders, Assistant
   Professor of Agronomy, December
   31, 1971

Returned from Leave
O. H. Long, Professor of Agronomy
   (Advisor in Soil Science 4 years,
   UT India Program), December
   1, 1971

Leave of Absence
James F. Brown, Assistant Professor
   of Horticulture, November 1, 1971

Deceased
Frank S. Chance, Emeritus Director
   of the Agricultural Experiment
   Station, April 15, 1971
O. E. Goff, Professor and Head of
   the Department of Poultry, July
   15, 1971

   Charles S. Hobbs, Professor and Head
   of the Department of Animal
   Husbandry-Veterinary Science,
   December 25, 1971