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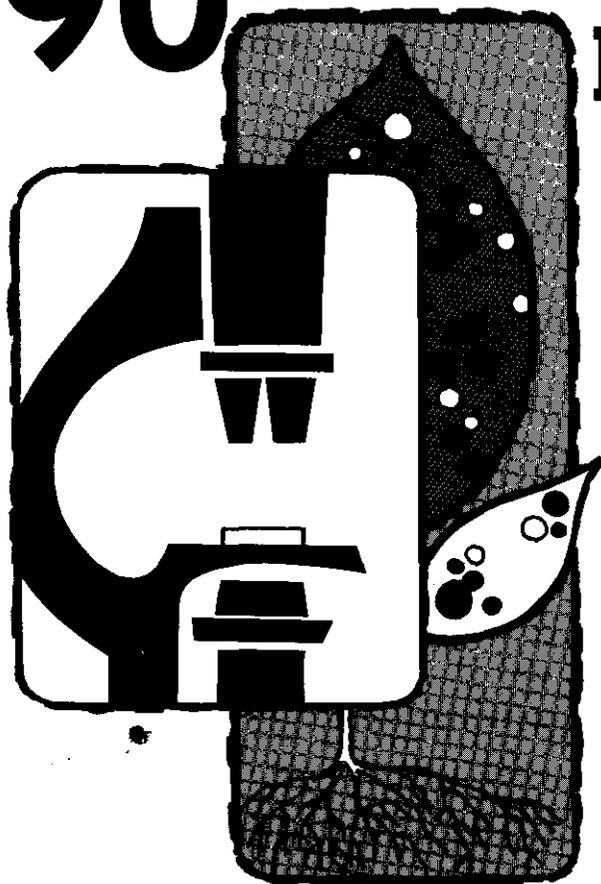
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90th ANNUAL REPORT



JULY 1, 1975 TO
JUNE 30, 1976●●

**The Nebraska Agricultural
Experiment Station**

The Agricultural Experiment Station
University of Nebraska-Lincoln
Institute of Agriculture and Natural Resources
H. W. Ottosen, Director

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Issued December 1976, 1500

FOREWORD

The 90th Annual Report of the Nebraska Agricultural Experiment Station contains a list of all active projects during July 1, 1975 to June 30, 1976, a list of Station publications, staff members, and a financial report. Information derived from the various research projects is published in bulletins, circulars, scientific and trade journals, in the *Nebraska Farm, Ranch and Home Quarterly* and as departmental reports. Station bulletins, circulars and the *Quarterly* may be obtained free from any county agricultural agent or by writing to the Director of the Experiment Station, University of Nebraska-Lincoln, Institute of Agriculture and Natural Resources, Lincoln, Nebraska, 68583. Reprints of most journal articles may be obtained by writing directly to the authors.

Howard W. Ottoson, Dean and Director
Agricultural Experiment Station

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The Regents of the University

- Robert G. Simmons, Jr., Scottsbluff
- Kermit R. Hansen, Omaha
- Robert R. Koefoot, Grand Island
- James H. Moylan, Omaha
- Robert J. Prokop, Omaha
- Robert Raun, Minden
- Edward Schwartzkopf, Lincoln
- Kermit Wagner, Schuyler

University Administration

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- Adam C. Breckenridge, Interim Chancellor of the University of Nebraska-Lincoln
- Francis L. Schmehl, Ph.D., Research Administrator

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Howard W. Ottoson, Ph.D., Dean and Director
Robert W. Kleis, Ph.D., Associate Director
Millard W. Hall, Ph.D., Assistant Director and Director, Nebraska Water Resources Research Institute
Warren W. Sahs, Ph.D., Assistant Director and Supervisor, University Field Laboratory
John C. Woodward, Ph.D., Assistant Director and Associate Dean, College of Home Economics

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Agricultural Communications

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Agricultural Economics

G. J. Vollmar^{1,2,3} Ph.D., Professor and Chairman of Department
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L. L. Bitney^{2,3} Ph.D., Professor-Farm Management
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J. B. Hassler^{1,2} Ph.D., Professor-Marketing and Price Analysis
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P. A. Henderson^{2,3} Ph.D., Professor-Farm Management
O. W. Holmes^{2,5} M.S., Associate Professor-Resource Economics

¹Teaching

²Station Staff

³Extension Staff

⁴Leave of Absence

⁵Cooperative, USDA

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 R. D. Johnson^{2,5} M.S., Associate Professor-Farm Management
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 D. A. Olsen^{2,3} Ph.D., Associate Professor-Rural Resource Development
 M. S. Turner^{1,2,3} Ph.D., Professor-Marketing
 A. C. Wellman^{2,3} Ph.D., Associate Professor-Marketing

Agricultural Education

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 J. T. Horner^{1,2,3} Ed.D., Professor-Methods of Instruction & Advanced Studies

Agricultural Engineering

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 B. L. Blad² Ph.D., Assistant Professor-Agricultural Meteorology
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 P. E. Fischbach^{2,3} M.S., Professor-Irrigation Engineering
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 J. R. Gilley² Ph.D., Associate Professor-Irrigation Engineering
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 L. I. Leviticus² Ph.D., Professor-Tractor Testing
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 D. M. Manbeck^{1,2} Ph.D., Associate Professor-Natural Resources
 M. L. Mumgaard² B.S., Assistant Professor-Tractor Testing
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 N. J. Rosenberg^{1,2} Ph.D., Professor-Agricultural Meteorology
 G. W. Steinbruegge^{1,2} M.S., Professor-Land Locomotion
 L. E. Stetson^{2,5} M.S., Instructor-Radio Frequency Energy
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 S. B. Verma⁵ Ph.D., Assistant Professor-Agricultural Meteorology
 K. L. VonBargen^{1,2} Ph.D., Associate Professor-Systems Engineering
 H. D. Wittmuss^{1,2} Ph.D., Associate Professor-Natural Resources

Agronomy

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M. D. Glegg^{1,2} Ph.D., Associate Professor-Crop Physiology
W. A. Compton^{1,2} Ph.D., Professor-Corn Breeding
E. C. Conard^{1,2} Ph.D., Associate Professor-Pasture Management
J. W. Doran^{2,5} Ph.D., Assistant Professor-Soil Biochemistry
A. F. Dreier^{2,3} M.S., Professor-Crop Variety Evaluation
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J. R. Ellis^{2,5} Ph.D., Assistant Professor-Soil Microbiology
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V. A. Johnson^{2,5} Ph.D., Professor-Winter Wheat Breeding
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A. C. Leopold² Ph.D., Professor-Plant Physiology
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M. K. McCarty^{2,5} Ph.D., Professor-Noncropland Weed Control
J. W. Maranville^{1,2} Ph.D., Associate Professor-Sorghum Physiology
A. R. Martin^{2,3} Ph.D., Associate Professor-Weed Science
P. J. Mattern² M.A., Professor-Cereal Quality
A. P. Mazurak^{1,2} Ph.D., Professor-Soil Physics
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R. N. Mills² M.S., Associate Professor-Foundation Seed
W. J. Moline^{2,3} Ph.D., Professor-Forage Physiology and Vice Chairman for
Extension

M. R. Morris^{1,2} Ph. D., Professor-Cytogenetics
 L. E. Moser^{1,2} Ph.D., Professor-Forage Physiology and Vice Chairman for
 Instruction
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 D. H. Sander^{2,3} Ph.D., Professor-Soil Fertility
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 J. W. Schmidt^{1,2} Ph.D., Professor-Small Grain Breeding
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 R. A. Wiese^{2,3} Ph.D., Professor-Soil Fertility
 J. H. Williams^{1,2} Ph.D., Professor-Soybean Breeding

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 W. T. Ahlschwede^{2,3} Ph.D., Associate Professor-Swine Breeding
 M. A. Alexander^{1,2,3} M.S., Professor-Sheep Production (Emeritus)
 V. H. Arthaud^{1,2} M.S., Professor-Beef Production
 M. L. Baker^{1,2} M.S., D.Sc., Professor-Beef Breeding (Emeritus)
 C. T. Blunn^{1,2} Ph.D., Professor-Breeding and Genetics (Emeritus)
 R. A. Britton^{1,2} Ph.D., Assistant Professor-Ruminant Biochemist
 P. H. Cole^{2,3} M.S., Professor-Dairy Production
 P. J. Cunningham^{1,2} Ph.D., Associate Professor-Swine Breeding
 G. E. Dickerson^{1,3,5} Ph.D., Professor-Breeding and Genetics
 T. H. Doane^{1,2,3,4} Ph.D., Professor-Sheep Production
 F. E. Eldridge^{1,2} Ph.D., Professor-Dairy Breeding
 E. F. Ellington^{1,2} Ph.D., Professor-Beef Physiology
 S. D. Farlin^{1,2} Ph.D., Associate Professor-Beef Nutrition
 W. R. Fulton^{2,3} M.S., Instructor-Ruminant Nutrition
 P. Q. Guyer^{2,3} Ph.D., Professor-Beef Nutrition
 P. L. Kelly^{1,2} Ph.D., Professor-Dairy (Emeritus)
 T. J. Klopfenstein^{1,2} Ph.D., Professor-Ruminant Nutrition
 L. L. Larson^{1,2} Ph.D., Assistant Professor-Dairy Physiology
 R. W. Mandigo^{1,2,3} Ph.D., Professor-Meats

B. D. Moser^{1,2} Ph.D., Associate Professor-Swine Nutrition
M. K. Nielsen^{1,2} Ph.D., Assistant Professor-Beef Breeding
F. G. Owen^{1,2,3} Ph.D., Professor-Dairy Nutrition
E. R. Peo, Jr.^{1,2} Ph.D., Professor-Swine Nutrition
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J. K. Ward^{1,2} Ph.D., Professor-Beef Nutrition
D. R. Zimmerman^{1,2} Ph.D., Professor-Swine Physiology

Biochemistry Laboratory

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F. W. Wagner^{1,2} Ph.D., Associate Professor-Enzymes

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Z. B. Mayo, Jr.^{1,2} Ph.D., Assistant Professor-Corn Insects, Soil Insects
K. P. Pruess^{1,2} Ph.D., Associate Professor-Biology and Ecology of Crop Insects
R. Staples^{1,2} Ph.D., Professor-Insect Transmission of Plant Pathogens

Food Science and Technology

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H. M. Barnhart, Jr.^{1,2} Ph.D., Instructor-Food Technologist
L. B. Bullerman^{1,2} Ph.D., Associate Professor-Food Microbiology
T. A. Evans^{1,2,3} M.S., Professor-Food Marketing Specialist
T. E. Hartung^{1,2} Ph.D., Professor-Food Quality and Composition
R. B. Maxcy^{1,2} Ph.D., Professor-Food Microbiology
L. D. Satterlee^{1,2} Ph.D., Professor-Food Protein Chemistry
K. M. Shahani^{1,2} Ph.D., Professor-Food Chemistry

Forestry

M. D. Ferrill^{1,2,3} Ph.D., Chairman of Forestry and State Forester
W. T. Bagley^{1,2} M.S., Associate Professor-Forestry
J. R. Brandle² Ph.D., Associate Professor-Forestry
R. A. Read^{2,5} M.F., Associate Professor-Forestry
D. F. Van Haverbeke^{2,5} Ph.D., Associate Professor-Forestry

Horticulture

R. D. Uhlinger^{1,2,3} Ph.D., Professor and Chairman of Department
D. P. Coyne^{1,2} Ph.D., Professor-Horticulture
E. J. Kinbacher^{1,2} Ph.D., Professor-Physiology
R. E. Neild^{1,2,3} Ph.D., Associate Professor-Horticulture
R. B. O'Keefe^{1,2,3} Ph.D., Professor-Horticulture
S. S. Salac^{1,2,3} Ph.D., Assistant Professor-Ornamental Horticulture
M. L. Schuster² Ph.D., Professor-Horticulture
R. C. Shearman^{2,3} Ph.D., Assistant Professor-Turf
J. O. Young⁴ Ph.D., Professor-Horticulture

Library

W. R. Collings, B.S., BLS, Head, Agriculture Campus Library
A. McIntosh, A.D., M.S.L.S., Agriculture Campus Librarian
L. Wilcox, B.A., M.A.L.S., Agriculture Campus Librarian
A. L. Smith, A.B., B.S.L.S., Agriculture Campus Librarian

Plant Pathology

M. G. Boosalis^{1,2,3} Ph.D., Professor and Chairman of Department
E. M. Ball² Ph.D., Associate Professor-Virus Diseases
M. K. Brakke^{2,5} Ph.D., Professor-Virus Diseases
L. D. Dunkle^{1,2} Ph.D., Associate Professor-Microbial Physiology
W. G. Langenberg^{2,5} Ph.D., Associate Professor-Virus Diseases
G. W. Peterson^{2,5} Ph.D., Professor-Tree Diseases
J. W. Riffle^{2,5} Ph.D., Associate Professor-Tree Diseases
J. R. Steadman² Ph.D., Associate Professor-Epidemiology of Vegetable Diseases
J. L. Van Etten^{1,2} Ph.D., Associate Professor-Microbial Physiology
A. K. Vidaver^{1,2} Ph.D., Associate Professor-Bacterial Diseases
L. C. Lane² Ph.D., Assistant Professor-Virus Diseases

Poultry and Wildlife Sciences

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D. H. Free^{1,2,3} B.S., Assistant Professor-Poultry Improvement
P. S. Gipson^{2,3} Ph.D., Assistant Professor-Wildlife Management
E. W. Gleaves^{2,3} Ph.D., Professor-Poultry Nutrition
F. B. Mather^{1,2,3} Ph.D., Associate Professor-Poultry Physiology
T. W. Sullivan^{1,2,3} Ph.D., Professor-Poultry Nutrition

Statistical Laboratory

W. M. Schutz^{1,2} Ph.D., Professor and Head of Department
R. F. Mumm^{1,2} Ph.D., Professor-Statistical Consultant
A. M. Parkhurst^{1,2} M.S., Instructor-Statistical Consultant

Veterinary Science

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T. E. Socha² B.S., M.S., Instructor-SPF Field Coordinator
A. Torres-Medina² D.V.M., M.S., Ph.D., Assistant Professor-Virology
N. R. Underdahl² B.S., M.S., Professor-Swine Diseases

Regional Stations

Northeast Station, Concord

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J. F. Witkowski^{2,3} Ph.D., Assistant Professor-Entomology

North Platte Station, North Platte

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D. M. Danielson² Ph.D., Professor-Animal Science (Swine)
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J. T. Nichols^{2,3} Ph.D., Professor-Agronomy (Range Management)
P. T. Nordquist² Ph.D., Assistant Professor-Agronomy (Sorghum Breeding)
B. R. Somerhalder^{2,3} M.S., Professor-Agricultural Engineering
D. G. Watts^{2,3} Ph.D., Associate Professor-Agricultural Engineering
G. A. Wicks^{2,3} M.S., Associate Professor-Agronomy (Weed Science)

Panhandle Station, Scottsbluff

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L. A. Nelson^{1,2} Ph.D., Associate Professor-Agronomy
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R. E. J. Retzlaff^{2,3} Ph.D., Assistant Professor-Agricultural Economics
I. G. Rush^{2,3} Ph.D., Assistant Professor-Animal Science
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A. Weiss² Ph.D., Assistant Professor-Agricultural Meteorology
R. G. Wilson^{2,3} Ph.D., Assistant Professor-Agronomy

South Central Station, Clay Center

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D. E. Eisenhauer^{2,3} M.S., Assistant Professor-Agricultural Engineering

K. D. Frank^{2,3} Ph.D., Associate Professor-Agronomy
L. L. Peters^{2,3} Ph.D., Associate Professor-Entomology
F. W. Roeth^{2,3} Ph.D., Associate Professor-Agronomy
L. L. Svec^{2,3} Ph.D., Associate Professor-Agronomy

U.S. Meat Animal Research Center, Clay Center

K. E. Gregory^{2,5} Ph.D., Kansas-Nebraska Area Director/USMARC Director
R. K. Christenson² Ph.D., Research Physiologist
J. D. Crouse^{2,5} Ph.D., Research Food Technologist
L. V. Cundiff^{2,5} Ph.D., Research Geneticist
G. E. Dickerson^{2,5} Ph.D., Research Geneticist
S. E. Echternkamp^{2,5} Ph.D., Research Physiologist
C. L. Ferrell^{2,5} Ph.D., Research Chemist
J. J. Ford^{2,5} Ph.D., Research Physiologist
R. L. Givens^{2,5} M.S., Agricultural Engineer
V. L. Harrison^{2,5} Ph.D., Agricultural Economist
A. G. Hashimoto^{2,5} Ph.D., Agricultural Engineer
R. M. Koch² Ph.D., Research Geneticist
D. B. Laster^{2,5} Ph.D., Research Physiologist/USMARC Assistant Director
D. D. Lunstra^{2,5} Ph.D., Research Physiologist
J. A. Nienaber^{2,5} M.S., Agricultural Engineer
D. R. Notter² M.S., Research Geneticist
R. L. Prior^{2,5} Ph.D., Research Chemist
B. D. Schanbacher^{2,5} Ph.D., Research Physiologist
R. A. Scott^{2,5} Ph.D., Research Geneticist
G. M. Smith^{2,5} Ph.D., Research Geneticist
H. S. Teague^{2,5} Ph.D., Animal Nutritionist
L. D. Young^{2,5} Ph.D., Research Geneticist

College of Home Economics

Education and Family Resources

G. Newkirk^{1,2,3} Ed.D., Professor and Chairman of Department
S. M. Kreutz^{1,2} Ed.D., Associate Professor-Development of Teaching Skills
F. Walker^{1,2} Ph.D., Associate Professor-Home Management Family Economics

Food and Nutrition

H. M. Fox^{1,2,3} Ph.D., Professor and Chairman of Department
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C. Kies^{1,2} Ph.D., Professor-Nutrition
 M. E. Knickrehm^{1,2} Ph.D., Professor-Food Service Management
 G. A. Miller^{1,2} Ph.D., Assistant Professor-Food Science
 T. A. Shaffer^{2,3} M.S., Assistant Professor-Food Science

Human Development and the Family

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 J. DeFrain^{1,2} Ph.D., Assistant Professor-Rural Family Crisis
 V. Kalyan-Masih^{1,2} Ph.D., Associate Professor-Cognitive Development (Piaget)
 L. O. Schwab^{1,2} Ed.D., Professor-Rehabilitation of Handicapped Women
 J. H. Voss^{1,2} Ed.D., Associate Professor-Parent-Child Relationships

Textiles, Clothing and Design

A. E. Newton^{1,2,3} Ph.D., Professor and Chairman of Department
 J. Laughlin^{1,2} Ph.D., Associate Professor-Textiles, Clothing and Design

**NEBRASKA AGRICULTURAL EXPERIMENT STATION
 RESEARCH PROJECTS**

Research projects are listed by departments. An asterisk (*) indicates that the project was discontinued in fiscal 1975-1976.

Administration

1-001 General administration of federal grant funds research. H. W. Ottoson.
 1-004 Regional research coordination, North Central Region. H. W. Ottoson.
 2-1 Title V - Identification of alternatives for local land use decisions. M. P. Carlson, R. H. Stoddard, P. H. Gessaman.

Agricultural Communications

18-001 Dissemination of research information. R. J. Graham, J. P. Holman

Agricultural Economics

10-001 Farm enterprise analysis. L. Bitney.
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Entomology

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Forestry

- 20-023 Windbreak shelter effects. W. T. Bagley, J. R. Brandle.
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Horticulture

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20-029 Adaptation, improvement and management of turfgrasses and other ground covers for Nebraska. R. C. Shearman, E. J. Kinbacher.
*20-030 Collection, propagation, culture, evaluation and maintenance of plant materials for landscaping. S. S. Salac, J. O. Young.

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Poultry and Wildlife Sciences

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- 22-010 Factors affecting the quality and characteristics of poultry meat products. G. W. Froning, T. E. Hartung.

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Veterinary Science

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- 14-004 Bionomics, etiology, and control of the parasites of Nebraska livestock. D. L. Ferguson, M. J. Twiehaus.
- 14-009 Prevention and control of enteric diseases of swine. N. R. Underdahl, L. McGill.
- 14-012 Immunological properties of parasite enzymes in sheep and swine. M. B. Rhodes.
- *14-013 Diseases of the central nervous system of cattle and swine. C. A. Mebus, N. R. Underdahl.
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Regional Stations

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Panhandle Station

- 40-004 Engineering systems for water control in crop production. R. Edling.
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- *44-003 Maximum production of crops under irrigation in western Nebraska. F. N. Anderson, R. Retzlaff.
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South Central Station

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- 48-004 Occurrence and effects of mycotoxins in feeds and foods. B. L. Doupnik, T. Thompson.

United States Meat Animal Research Center

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- 46-003 Improvement of beef cattle through breeding methods. L. V. Cundiff, G. E. Dickerson, R. M. Koch.
- 46-004 Improvement of beef cattle through breeding methods. D. B. Laster, K. E. Gregory, G. M. Smith.
- 46-005 Increase reproductive efficiency of swine, sheep and cattle. R. K. Christenson, D. B. Laster, H. S. Teague.

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- 45-001 Field Laboratory development. W. W. Sals.

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- 93-014 Rural families cope with crisis. J. C. Woodward, J. DeFrain.

Textiles, Clothing and Design

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Nebraska Farm, Ranch and Home Quarterly, Fall, 1975 (28 pages). 13,600 copies.

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Tractor Test Reports

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- Report of individual tractors tested during period of July 1, 1975 to June 30, 1976. Nebraska Tractor Tests 1183-1217. 2,000 copies.

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- NCR 222. Livestock Waste Management with Pollution Control. Published at Iowa State University.
- NCR 223. The Use of Public Limited Partnership Financing in Agriculture for Income Tax Shelter. Published at University of Wisconsin.
- NCR 225. Solar Radiation Reception, Probabilities, and Areal Distribution in the North-Central Region. Published at University of Minnesota.
- NCR 226. Factors Affecting Poultry Meat Yields. Published at South Dakota State University.
- NCR 227. Predicting Seed Yield of Birdfoot Trefoil Clones. Published at University of Illinois at Urbana-Champaign.
- NCR 230. Sampling and Analysis of Soils, Plants, Waste Waters, and Sludge: Suggested Standardization and Methodology. Published at Kansas State University.

Nebraska Farm, Ranch and Home Quarterly Articles

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Key to Abbreviations

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| SB—Station Bulletin | Q3—Fall Quarterly 1975 |
| RB—Research Bulletin | Q4—Winter Quarterly 1976 |
| DR—Departmental Report | Q1—Spring Quarterly 1976 |
| OTC—Outstate Testing Circular | J—Journal Series |
| MP—Miscellaneous Publication | A—Journal Abstracts |
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**THE UNIVERSITY OF NEBRASKA
AGRICULTURAL EXPERIMENT STATION**

**REPORT OF INCOME AND EXPENDITURES¹
For the Year Ended June 30, 1976**

GENERAL CURRENT FUNDS

| | |
|---|----------------|
| Funds Available ² | |
| Received from United State Government | |
| Hatch Fund | \$1,084,791.00 |
| Budgeted by the University | 5,854,728.77 |
| Total | \$6,939,519.77 |
| Expenditures: | |
| Salaries, Wages, and Staff Benefits | \$5,721,271.54 |
| Operating Expenses | 1,156,925.57 |
| Equipment and Improvements | 61,322.66 |
| Total | \$6,939,519.77 |

RESTRICTED CURRENT FUNDS

| | |
|--|----------------|
| Income: | |
| Gifts, Grants and Contracts | |
| From United States Government | |
| Agencies | \$3,282,100.17 |
| From State of Nebraska Agencies | 114,054.10 |
| From Industry | 445,795.49 |
| From Foundations & Health | |
| Organizations | 35,451.05 |
| From Other Sources | 66,885.15 |
| Total | \$3,944,285.96 |
| Expenditures: | |
| Salaries, Wages and Staff Benefits | \$2,731,730.36 |
| Operating Expenses | 872,854.24 |
| Equipment and Improvements | 339,701.36 |
| Total | \$3,944,285.96 |

CASH REVOLVING FUNDS

| | |
|---|----------------|
| Income: | |
| Sales and Services | \$2,637,324.34 |
| Expenditures: | |
| Salaries, Wages and Staff Benefits \$ | 641,870.10 |
| Operating Expenses | 1,813,031.12 |
| Equipment and Improvements | 182,423.12 |
| Total | \$2,637,324.34 |

AGENCY REVOLVING FUND³

| | |
|---|----------------|
| Income: | |
| Sales and Services | \$1,916,008.63 |
| Expenditures: | |
| Salaries, Wages and Staff Benefits \$ | 494,291.54 |
| Operating Expenses | 1,357,320.07 |
| Equipment and Improvements | 64,397.02 |
| Total | \$1,916,008.63 |

^{1/}These figures do not include capital construction expenditures totaling \$203,538.32

^{2/}Includes University Research Council funds from state appropriations - \$3,920.89

^{3/}Includes Meat Animal Research Center, Foundation Seed and Tractor Testing