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90th Annual Report of the Nebraska Agricultural Experiment Station

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

3
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D. J. Schepers 2,5 Ph.D., Assistant Professor-Soil Chemistry
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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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F. G. Owen\textsuperscript{1,2,3}, Ph.D., Professor-Dairy Nutrition
E. P. Peo, Jr.\textsuperscript{1,2}, Ph.D., Professor-Swine Nutrition
A. B. Schultz\textsuperscript{1,2}, Ph.D., Associate Professor-Dairy Physiology (Emeritus)
J. K. Ward\textsuperscript{1,2}, Ph.D., Professor-Beef Nutrition
D. R. Zimmerman\textsuperscript{1,2}, Ph.D., Professor-Swine Physiology

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R. L. Borchers\textsuperscript{1,2}, Ph.D., Professor-Nutritional Biochemistry
J. M. Daly\textsuperscript{1,2}, Ph.D., Professor-Plant Intermediary Metabolism
R. Dam\textsuperscript{1,2}, Ph.D., Assistant Professor-Nutritional Biochemistry
R. M. Hill\textsuperscript{1,2}, Ph.D., Associate Professor-Protein Biochemistry
R. V. Klucas\textsuperscript{1,2}, Ph.D., Associate Professor-Nitrogen Fixation
R. L. Ogden\textsuperscript{2}, B.S., Assistant Professor-Alfalfa Processing
F. W. Wagner\textsuperscript{1,2}, Ph.D., Associate Professor-Enzymes

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J. H. Bell\textsuperscript{2,5}, B.S., Assistant Professor-Plant Pest Control
T. J. Helms\textsuperscript{1,2}, Ph.D., Associate Professor-Insect Morphology and Pathology
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S. D. Kindler\textsuperscript{2,5}, Ph.D., Assistant Professor-Forage Crops Insects
G. R. Manglitz\textsuperscript{2,5}, Ph.D., Professor-Forage Insect Investigations
Z. B. Mayo, Jr.\textsuperscript{1,2}, Ph.D., Assistant Professor-Corn Insects, Soil Insects
K. P. Pruess\textsuperscript{1,2}, Ph.D., Associate Professor-Biology and Ecology of Crop Insects
R. Staples\textsuperscript{1,2}, Ph.D., Professor-Insect Transmission of Plant Pathogens

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T. E. Hartung\textsuperscript{1,2}, Ph.D., Professor-Food Quality and Composition
R. B. Maxcy\textsuperscript{1,2}, Ph.D., Professor-Food Microbiology
L. D. Satterlee\textsuperscript{1,2}, Ph.D., Professor-Food Protein Chemistry
K. M. Shahani\textsuperscript{1,2}, Ph.D., Professor-Food Chemistry
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W. T. Bagley\textsuperscript{1,2} M.S., Associate Professor-Forestry
J. R. Brandle\textsuperscript{2} Ph.D., Associate Professor-Forestry
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D. F. Van Haverbeke\textsuperscript{2,5} Ph.D., Associate Professor-Forestry

Horticulture
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R. B. O'Keefe\textsuperscript{1,2,3} Ph.D., Professor-Horticulture
S. S. Salac\textsuperscript{1,2,3} Ph.D., Assistant Professor-Ornamental Horticulture
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R. C. Shearman\textsuperscript{2,3} Ph.D., Assistant Professor-Turf
J. O. Young\textsuperscript{4} Ph.D., Professor-Horticulture

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L. Wilcox, B.A., M.A.L.S., Agriculture Campus Librarian
A. L. Smith, A.B., B.S.L.S., Agriculture Campus Librarian

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E. M. Ball\textsuperscript{2} Ph.D., Associate Professor-Virus Diseases
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G. W. Peterson\textsuperscript{2,5} Ph.D., Professor-Tree Diseases
J. W. Riffle\textsuperscript{2,5} Ph.D., Associate Professor-Tree Diseases
J. R. Steadman\textsuperscript{2} Ph.D., Associate Professor-Epidemiology of Vegetable Diseases
J. L. Van Etten\textsuperscript{1,2} Ph.D., Associate Professor-Microbial Physiology
A. K. Vidaver\textsuperscript{1,2} Ph.D., Associate Professor-Bacterial Diseases
L. C. Lane\textsuperscript{2} Ph.D., Assistant Professor-Virus Diseases
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A. M. Parkhurst\textsuperscript{1,2} M.S., Instructor-Statistical Consultant

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G. W. Rehm\textsuperscript{2,3} Ph.D., Associate Professor-Agronomy
J. F. Witkowski\textsuperscript{2,3} Ph.D., Assistant Professor-Entomology
North Platte Station, North Platte

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G. A. Wicks\textsuperscript{2,3} M.S., Associate Professor-Agronomy (Weed Science)

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A. F. Hagen\textsuperscript{2,3} M.S., Assistant Professor-Entomology
E. D. Kerr\textsuperscript{2,3} Ph.D., Associate Professor-Agronomy
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A. Weiss\textsuperscript{2} Ph.D., Assistant Professor-Agricultural Meteorology
R. G. Wilson\textsuperscript{2,3} Ph.D., Assistant Professor-Agronomy

South Central Station, Clay Center

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B. L. Doupnik\textsuperscript{2,3} Ph.D., Associate Professor-Plant Pathology
D. E. Eisenhauer\textsuperscript{2,3} M.S., Assistant Professor-Agricultural Engineering
K. D. Frank\textsuperscript{2,3} Ph.D., Associate Professor-Agronomy
L. L. Peters\textsuperscript{2,3} Ph.D., Associate Professor-Entomology
F. W. Roeth\textsuperscript{2,3} Ph.D., Associate Professor-Agronomy
L. L. Svec\textsuperscript{2,3} Ph.D., Associate Professor-Agronomy

U.S. Meat Animal Research Center, Clay Center

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

College of Home Economics

Education and Family Resources

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S. M. Kreutz\textsuperscript{1,2} Ed.D., Associate Professor-Development of Teaching Skills
F. Walker\textsuperscript{1,2} Ph.D., Associate Professor-Home Management Family Economics

Food and Nutrition

H. M. Fox\textsuperscript{1,2,3} Ph.D., Professor and Chairman of Department
F. Caporaso\textsuperscript{1,2} Ph.D., Assistant Professor-Food Science
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

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16-025 Improvement in quality of various cheese and other dairy foods. T. A. Evans.
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42-002  Growing and finishing beef cattle using feedstuffs in northeast Nebraska. V. Krause.

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43-002  Principles and practices of weed control for west central Nebraska. G. A. Wicks.
43-007  Culture and improvement of agronomic crops of central and western Nebraska. P. Nordquist.
43-020  Animal disease surveillance in western Nebraska. R. G. White, C. M. Hibbs.
43-022  Development of ornamental plants for Nebraska as a Great Plains state. R. D. Uhlinger.
43-024  Injurious insects affecting livestock in Nebraska. J. B. Campbell.
43-026  Agricultural production systems for the Nebraska Sandhills, L. E. Lucas.

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40-004  Engineering systems for water control in crop production. R. Edling.
44-002  Dry bean variety test. F. N. Anderson, D. S. Nuland.
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44-011  Development of dryland cropping systems for western Nebraska. C. R. Fenster.
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44-015 Cultural and nutrient investigations for irrigated crops in western Nebraska. F. N. Anderson.

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91-007 Metabolic interrelationships affecting nutrient energy requirements of humans. C. Kies, H. M. Fox.
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76-541. Hatching Fluid of Ascaris suum (The Large Intestinal Roundworm of Swine) Used as an Immunizing Agent in Pigs. Carol A. Klucas and Marvin B. Rhodes.


## PUBLICATIONS OF THE STAFF

### Key to Abbreviations

- **SB**—Station Bulletin
- **RB**—Research Bulletin
- **DR**—Departmental Report
- **OTC**—Outstate Testing Circular
- **MP**—Miscellaneous Publication
- **Q2**—Summer Quarterly 1975
- **Q3**—Fall Quarterly 1975
- **Q4**—Winter Quarterly 1976
- **Q1**—Spring Quarterly 1976
- **J**—Journal Series
- **A**—Journal Abstracts

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THE UNIVERSITY OF NEBRASKA
AGRICULTURAL EXPERIMENT STATION

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

GENERAL CURRENT FUNDS

Funds Available

- 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