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## 93rd Annual Report of the Nebraska Agricultural Experiment Station

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# 93<sup>rd</sup> ANNUAL REPORT



JULY 1, 1978 to  
JUNE 30, 1979

## **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 January 1980, 1,000

The Agricultural Experiment Station provides information and educational programs to all people without regard to race, color or national origin.

## **FOREWORD**

The 93rd Annual Report of the Nebraska Agricultural Experiment Station contains a list of all active projects during July 1, 1978 to June 30, 1979, 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, Acting Dean and Director  
Agricultural Experiment Station

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E. D. Kerr <sup>2,3</sup> Ph.D., Professor-Plant Pathology  
L. A. Nelson <sup>1,2</sup> Ph.D., Associate Professor-Agronomy  
D. S. Nuland <sup>2,3</sup> M.S., Assistant Professor-Horticulture  
R. B. O'Keefe <sup>2,3</sup> Ph.D., Professor-Horticulture

P. E. Reece <sup>2,3</sup> Ph.D., Assistant Professor-Agronomy  
 R. E. J. Retzlaff <sup>2,3</sup> Ph.D., Associate Professor-Agricultural Economics  
 I. G. Rush <sup>2,3</sup> Ph.D., Associate Professor-Animal Science  
 W. L. Trimmer <sup>2,3</sup> M.S., Instructor-Agricultural Engineering  
 A. Wiess <sup>2</sup> Ph.D., Assistant Professor-Agricultural Meteorology  
 R. G. Wilson <sup>2,3</sup> Ph.D., Assistant Professor-Agronomy

**South Central Station, Clay Center**

C. L. Stonecipher <sup>2,3</sup> Ph.D., Professor and District Director  
 D. E. Eisenhauer <sup>2,3</sup> M.S., Assistant Professor-Agricultural Engineering  
 K. D. Frank <sup>2,3</sup> Ph.D., Associate Professor-Agronomy  
 L. L. Peters <sup>2,3</sup> Ph.D., Associate Professor-Entomology  
 F. W. Roeth <sup>2,3</sup> Ph.D., Associate Professor-Agronomy  
 L. S. Svec <sup>2,3</sup> Ph.D., Associate Professor-Agronomy  
**U. S. Meat Animal Research Center, Clay Center]**

R. R. Oltjen <sup>5</sup> Ph.D., Director  
 Y. R. Chen <sup>2,5</sup> Ph.D., Agricultural Engineer  
 J. R. Chenault <sup>5</sup> Ph.D., Research Physiologist  
 R. K. Christenson <sup>2</sup> Ph.D., Research Physiologist  
 J. D. Crouse <sup>2,5</sup> Ph.D., Research Physiologist  
 L. V. Cundiff <sup>2,5</sup> Ph.D., Research Geneticist  
 G. E. Dickerson <sup>2,5</sup> Ph.D., Research Geneticist  
 S. E. Echternkamp <sup>5</sup> Ph.D., Research Physiologist  
 R. D. Eichner <sup>2,5</sup> Ph.D., Research Chemist  
 C. L. Ferrell <sup>5</sup> Ph.D., Research Chemist  
 J. J. Ford <sup>2,5</sup> Ph.D., Research Physiologist  
 S. P. Ford <sup>5</sup> Ph.D., Research Physiologist  
 K. E. Gregory <sup>4</sup> Ph.D., Research Geneticist  
 G. L. Hahn <sup>5</sup> Ph.D., Agricultural Engineer  
 V. L. Harrison <sup>2,5</sup> Ph.D., Agricultural Economist  
 A. G. Hashimoto <sup>2,5</sup> Ph.D., Agricultural Engineer  
 T. G. Jenkins <sup>5</sup> Ph.D., Research Geneticist  
 R. M. Koch <sup>2</sup> Ph.D., Research Geneticist  
 K. A. Leymaster <sup>5</sup> Ph.D., Research Geneticist  
 D. D. Lunstra <sup>5</sup> Ph.D., Research Physiologist  
 R. C. Manak <sup>5</sup> Ph.D., Microbiologist  
 R. R. Maurer <sup>5</sup> Ph.D., Research Physiologist  
 J. A. Nienaber <sup>2,5</sup> M.S., Agricultural Engineer  
 W. G. Pond <sup>2,5</sup> Ph.D., Research Animal Scientist  
 R. L. Prior <sup>2,5</sup> Ph.D., Research Chemist

L. L. Richer <sup>5</sup> Ph.D., Research Chemist  
 B. D. Schanbacher <sup>5</sup> Ph.D., Research Physiologist  
 R. A. Scott <sup>2,5</sup> Ph.D., Research Animal Scientist  
 R. T. Stone <sup>5</sup> Ph.D., Research Physiologist  
 V. H. Varel <sup>5</sup> Ph.D., Microbiologist  
 W. E. Wheeler <sup>5</sup> Ph.D., Research Animal Scientist  
 J. T. Yen <sup>5</sup> Ph.D., Research Animal Scientist  
 L. D. Young <sup>2,5</sup> Ph.D., Research Geneticist

### **College of Home Economics**

#### **Education and Family Resources**

G. Newkirk <sup>1,2,3</sup> Ed.D., Professor and Chairman of Department  
 E. R. Combs <sup>1,2</sup> Ph.D., Assistant Professor-Consumer Economics and Housing  
 S. M. Kreutz <sup>1,2</sup> Ed.D., Associate Professor-Development of Teaching Skills  
 F. Walker <sup>1,2</sup> Ph.D., Associate Professor-Home Management Family Economics

#### **Human Nutrition and Food Service Management**

H. M. Fox <sup>1,2,3</sup> Ph.D., Professor and Chairman of Department  
 C. Kies <sup>1,2</sup> Ph.D., Professor-Nutrition  
 H. Kohn <sup>2,3</sup> M.S., Associate Professor-Nutrition  
 M. E. Knickrehm <sup>1,2</sup> Ph.D., Professor-Food Service Management  
 T. A. Shaffer <sup>2,3</sup> M.S., Assistant Professor-Food Service

#### **Human Development and the Family**

N. Stinnett <sup>1,2,3</sup> Ph.D., Professor and Chairman of Department  
 B. Chesser <sup>1,2</sup> Ph.D., Associate Professor-Rural Family Crisis  
 J. DeFrain <sup>1,2</sup> Ph.D., Associate Professor-Rural Family Crisis  
 V. Kalyan-Masih <sup>1,2</sup> Ph.D., Associate Professor-Cognitive Development (Piaget)  
 L. O. Schwab <sup>1,2</sup> Ed.D., Professor-Rehabilitation of Handicapped Women

#### **Textiles, Clothing and Design**

A. E. Newton <sup>1,2,3</sup> Ph.D., Professor and Chairman of Department  
 J. Laughlin <sup>1,2</sup> 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 1978-1979.

### **Administration**

- 01-001 General administration of federal fund research. H. W. Ottoson.
- 01-004 Regional research coordination, North Central Region. H. W. Ottoson.
- 02-001 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.
- 10-034 Economics of resource use in the Sandhills area of Nebraska. G. Pfeiffer.
- 10-057 Alternative institutional arrangements in area management of ground water. L. K. Fischer.
- 10-064 Impact of public policies on Nebraska's agricultural and rural development. J. G. Kendrick, L. L. Bitney, E. E. Peterson.
- 10-070 Economics aspects of vertical coordination between cow-calf and feedlot operators. J. G. Kendrick, J. B. Hassler, A. Wellman.
- 10-071 Evaluation of alternative rural freight transportation, storage and distribution systems. D. G. Anderson.
- 10-072 Economic analysis of the U.S. grain exporting systems. D. A. Linsenmeyer.
- 10-073 Economics analysis of factors associated with financial success of farm firms. L. L. Bitney, R. J. Hanson, J. B. Hassler.
- 10-074 Objective decision procedures and advisory information services for economic management of swine and beef firms. J. B. Hassler, L. L. Bitney.
- 10-075 Economic analysis of off-farm employment and income among farm families in eastern Nebraska. R. J. Hanson, B. B. Johnson.

- 10-076 An economic evaluation of managing market risks in agriculture. G. A. Helmers, J. B. Hassler, L. Lutgen.
- 10-077 Reporting and analyzing farm real estate values and market developments in Nebraska. B. B. Johnson, R. J. Hanson.
- 10-078 Legal-institutional arrangements affecting water development, use, and management. J. D. Aiken.
- 10-079 Forward pricing alternatives for Nebraska livestock and grain producers. L. H. Lutgen.
- 10-080 Economics of water management options for selected areas in Nebraska. R. J. Suppala.
- 10-081 Analysis of multi-county intergovernmental units and impacts on local governments. P. H. Gessaman.
- 10-082 Analysis of operational experience with rural water systems. P. H. Gessaman.
- 10-083 Organization and control of the U.S. food production and distribution system. L. H. Lutgen.
- 10-084 Analysis of returns to agricultural and related research in the North Central Region. G. J. Vollmar.

#### **Agricultural Education**

- 24-014 New clientele and program needed for occupational education in agriculture. R. D. Dillon.
- 24-016 An assessment of the Nebraska vocational agriculture core curriculum. J. T. Horner.
- 24-017 An appraisal of innovative approaches to leadership education action. J. T. Horner.
- 24-018 Assessment of time utilization, use of advisory councils, and the *core curriculum* in Nebraska. R. D. Dillon.

#### **Agricultural Engineering**

- 11-001 Evaluation of belt and drawbar performance of new tractors. M. L. Mumgaard, L. Leviticus.
- 11-003 Planning farmstead buildings and livestock production systems. E. A. Olson, J. A. DeShazer.
- 11-008 Engineering phases of tillage, land treatment and livestock waste disposal for resource conservation. H. D. Wittmuss, E. Dickey, A. Rider.
- \* 11-021 Operations research on mechanized systems for cutting, curing and handling hay. G. M. Peterson, K. L. VonBargen.
- \* 11-025 Operator safety and health protection in mobile agricultural operations. G. W. Steinbruegge, R. D. Schneider.
- 11-030 Development and operation of irrigation systems. P. E. Fischbach, W. E. Splinter, W. W. Sahs.



- 11-034 Animal waste management with pollution control. C. B. Gilbertson, J. A. Nienaber.
- 11-037 Safety, reliability and operational characteristics of electrical irrigation equipment. L. E. Stetson.
- 11-042 Application of information water-soil-plant relations to use and conservation of water. P. E. Fischbach, J. R. Gilley, B. R. Somerhalder, R. J. Edling.
- 11-043 Equipment and construction materials to meet environmental design criteria for livestock facilities. N. C. Teter, B. D. Moser, P. W. Lytle.
- 11-044 Improvement of thermal processes for proteinaceous foods. M.A. Hanna.
- 11-045 Determination and evaluation of energy utilization for on-farm use in production agriculture. L. L. Bashford.
- 11-047 Physical properties of agricultural materials. M. A. Hanna, K. L. VonBargen, T. L. Thompson.
- 11-049 Turbulent transport of evapotranspiration and photosynthesis. N. J. Rosenberg, S. B. Verma.
- 11-050 Remotely sensed temperature to evaluate crop moisture and heat stress conditions. B. L. Blad, N. J. Rosenberg.
- 11-051 Chemical changes in atmospheric deposition and effects on land and surface waters. S. B. Verma.
- 11-052 Application of mathematical models to reduce energy consumption in irrigated agriculture. J. R. Gilley.
- 11-053 Physiological crop simulation models for improved conservation and use of water. G. E. Meyer.
- 11-054 Damage evaluation and reduction of soybean harvest losses. J. D. Summers, M. A. Hanna.
- 12-001 Corn breeding and genetics. W. A. Compton.
- 12-002 Improvement and evaluation of oats and barley. J. W. Schmidt.
- 12-005 Development and applying principles of alfalfa improvement. W. R. Kehr.
- 12-006 Cultural, ecological and physiological studies with various agronomic crops. A. D. Flowerday.
- 12-007 Weed control in changing crop production systems. O. C. Burnside.
- 12-008 Improvement of forage grasses by breeding. K. P. Vogel.
- 12-009 Sorghum breeding and genetics. W. M. Ross.
- 12-011 Properties of Nebraska soils as related to soil genesis, classification, survey and land use. D. T. Lewis.

- 12-012 Soybean breeding and genetics. J. H. Williams.
- 12-023 Optimizing the productive capacity of irrigated soils through effective soil management. R. A. Olson, D. H. Sander, K. D. Frank, G. W. Rehm.
- 12-034 Cytogenic studies on wheat. R. M. Morris, J. W. Schmidt, P. J. Mattern, V. A. Johnson.
- 12-046 Market quality in wheat. P. J. Mattern, V. A. Johnson, J. W. Schmidt.
- 12-049 Quantitative genetic investigations. C. O. Gardner.
- 12-055 Breed and evaluate wheat varieties for Nebraska. V. A. Johnson, J. W. Schmidt, P. J. Mattern.
- 12-057 Genetic, physiological, morphological and anatomical studies of wheat. V. A. Johnson, P. J. Mattern, J. W. Schmidt, S. L. Kehr.
- 12-069 Physiological processes affecting growth and development of grain sorghum. J.D. Eastin, M. D. Clegg, J. W. Maranville.
- 12-070 Seed production of breeding lines of insect pollinated legumes. W. R. Kehr.
- 12-071 Environmental implications and interactions of pesticide usage. R. C. Leavitt.
- 12-072 Introduction, multiplication, preservation and evaluation of new plants for industrial and agricultural utilization. W. R. Kehr, K. P. Vogel.
- 12-073 Subsoil chemical properties in relation to nutrient requirements of field crops. G. A. Peterson.
- 12-076 Field crop variety evaluation. A. F. Dreier, R. S. Moomaw, L. S. Svec, P. H. Grabouski.
- 12-077 Field evaluations of weed control systems. A. R. Martin.
- 12-078 Environmental accumulation of nutrients as affected by soil and crop management. R. A. Olson, D. Sander.
- 12-079 Physiological investigations of forage plants. L. E. Moser.
- 12-080 Soil factors and the mineral nutrient uptake by plants grown on selected northern Nebraska soils. R. C. Sorensen.
- 12-081 Utilization and disposal of waste products and pollutants in soil. L. Chesnin.
- 12-083 Forage production and utilization systems as a base for beef and dairy production. S. Wallen.
- 12-084 Evaluating plant nutrient needs and product quality. D. Knudsen.
- 12-085 Improving grain, sorghum, wheat, and forage crop production through improved soil fertilizer practices. D. H. Sander.

- 12-086 Soil fertility investigations related to corn and soybean and to irrigated production of these crops. R. A. Wiese.
- 12-089 Integrating crop culture, chemicals and life cycles to control persistent weeds. L. C. Haderlie.
- 12-090 Management and production of forage crops and range. L. E. Moser.
- 12-091 Soybean physiology in varietal improvement. J. E. Specht.
- 12-092 Weed control: Weed biochemistry and physiology. L. C. Haderlie.
- 12-094 Pasture and rangeland weed control systems. M. K. McCarty.
- 12-095 Mineral nutrition of sorghum. R. B. Clark.
- 12-096 Influence of conservation-tillage systems on soil fungi and their effects on plants and inorganic nitrogen in plants and soil. J. R. Ellis, T. M. McCalla.
- 12-097 Physiology of nutritive value in grain sorghum. J. W. Maranville.
- 12-098 Evaluation of chemical properties, nutrient availability and nitrogen utilization of residue-management systems. J. S. Schepers, T. M. McCalla, D. G. Hanway.
- 12-099 Conservation crop production as related to microbial and biogeochemical changes. J. W. Doran, T. M. McCalla.
- 12-100 Nitrogen metabolism of green plants. L. A. Klepper.
- 12-101 Environmental and morphological crop physiology. M. D. Clegg.
- 12-102 Crop growth and development under conservation-production systems. W. W. Wilhelm.
- 12-103 Influence of conservation-production systems on the physical character of soil and plant growth. L. M. Mielke, T. M. McCalla.
- 12-104 Breeding for physiological efficiency and adaptation in grain sorghum. C. A. Francis.
- 12-201 Foundation seed. R. N. Mills.

#### **Animal Science**

- 13-011 Utilization and requirements of protein and energy for swine. B. D. Moser.
- 13-022 Mineral requirements of swine. E. R. Peo, Jr., B. D. Moser.
- 13-023 Meat manufacturing, restructuring and processing. R. W. Mandigo, D. G. Olson.
- 13-024 Physiological mechanisms in bovine reproduction. J. E. Kinder

- 13-029 Genetic improvement of efficiency in the production of quality pork. R. J. Johnson, D. R. Zimmerman.
- 13-036 Improving large dairy herd management practices. P. H. Cole, L. L. Larson, F. G. Owen.
- 13-037 Nutrition of high producing dairy cows. F. G. Owen, L. L. Larson.
- 13-038 Improving reproductive performance in cattle. L. L. Larson, F. G. Owen.
- 13-039 Maximizing use of forage and protein by growing beef cattle. T. J. Klopfenstein.
- 13-040 Improving utilization of energy in beef finishing rations. S. D. Farlin, R. Britton.
- 13-041 Cytogenetics of livestock (with special reference to fertility in dairy cattle). F. E. Eldridge.
- 13-041R Improving dairy cattle through breeding with special emphasis on selection. F. E. Eldridge.
- 13-042 Increased utilization of crop residues by beef cattle through chemical treatment. T. J. Klopfenstein.
- 13-043 Physiological and genetic aspects of ovulation rate and embryo survival in swine. D. R. Zimmerman, R. J. Kittok, R. K. Johnson.
- 13-044 Factors affecting acidosis and feed intake of ruminants fed high energy diets. R. Britton, T. J. Klopfenstein, S. Farlin.
- 13-045 The effect of level of milk production in crossbred beef cows. M. K. Nielsen.
- 13-045R Improvement of beef cattle through breeding methods. M. K. Nielsen.
- 13-047 Utilization of wheat straw and other crop residues by beef cows. J. Ward, I. Rusk, T. J. Klopfenstein.
- 13-048 Physiological and management aspects of puberty and estrous activity in gilts in confinement. R. K. Christenson, D. R. Zimmerman.
- 13-050 Factors affecting texture of fresh and processed meat producers. D. A. Olson, R. W. Mandigo.
- 13-051 Food intake regulators and nutrient requirements of laying hens. E. W. Gleaves, F. B. Mather.
- 13-052 The requirements for and utilization of protein and amino acids by swine. A. J. Lewis, E. R. Peo, Jr., B. D. Moser.
- 13-053 Factors influencing uterine competency in swine. R. J. Kittok, D. R. Zimmerman.
- 13-054 Preparturient diseases of cattle. L. L. Larson, D. G. Olson, E. D. Erickson.

- 13-055 Biophysical factors affecting energy requirements for poultry production. F. B. Mather, J. A. DeShazer.
- 13-056 Nutrient levels and sources for layers and turkeys. T. W. Sullivan.
- 13-057 Improving utilization of starch in high grain rations for finishing cattle. D. R. Brink, R. A. Britton, S. D. Farlin
- 22-005 Nutrient interrelationships, feed additives and mineral sources in poultry diets. T. W. Sullivan.
- \*22-017 Physiological responses of chickens to varying environments. F. B. Mather, J. A. DeShazer.
- 22-020 Physiology of energetics of egg production and egg shell formation. F. B. Mather, E. W. Gleaves, J. A. DeShazer.
- 22-021 Composition, nutritive value and stability of poultry meat and egg products. G. W. Froning, R. Dam.

#### **Biochemistry Laboratory**

- 15-004 Raw soybean growth inhibitor in raw soybeans. R. L. Borchers.
- 15-005 Harvesting, processing and evaluating alfalfa and other forage crops. R. L. Ogden.
- 15-011 Analytical advisory and service laboratory. R. M. Hill.
- 15-017 Biochemistry of plant disease. J. M. Daly.
- 15-018 Metabolism and biological functions of lipids. H. W. Knoche.
- 15-019 Chemistry and metabolism of proteins. F. W. Wagner.
- 15-020 Biological nitrogen fixation. R. V. Klucas.
- 15-022 Cellular photosynthetic processes and the regulation of photosynthesis. R. Chollet.
- 15-024 Senescence in legume root nodules. R. V. Klucas.
- 15-025 Function of the subunits of the CO<sub>2</sub> fixing enzyme. R. Chollet.

#### **Entomology**

- 17-007 Photosensitivity in insects. H. J. Ball.
- \*17-024 Pest management of the greenbug and other arthropods in sorghum and small grains. R. Staples, S. D. Kindler.
- 17-025 Genetics and ecology of the European corn borers. F. J. Witkowski.
- \*17-026 Range and pasture insects. K. P. Pruess.
- 17-028 Insects affecting corn in Nebraska. Z B Mayo, H. J. Ball, T. O. Holtzer.

- 17-029 Modeling for insect pest management. K. P. Pruess.
- 17-030 Pest management strategies for leafhoppers, spittlebugs, and aphids on alfalfa. G. R. Manglitz.
- 17-031 Biology and control of insects injurious to forage legumes. G. R. Manglitz.
- 17-032 Biology and integrated control of the greenbug and other arthropods on grain sorghum. R. Staples, S. D. Kindler.
- 17-033 Integrated management of flies on livestock. I. L. Berry, W. M. Rogoff, P. J. Scholl, J. B. Campbell.
- 17-034 Insects affecting tree planting in Nebraska. J. A. Jones.

#### **Environmental Programs**

- 25-001 Nebraska AES participation in national ag pesticide impact assessment program. R. E. Gold.
- 25-001-A Continuing participation in the national agricultural pesticide impact assessment program. R. E. Gold.

#### **Food Science and Technology**

- 16-023 Irradiation processing of meat for quality protection. R. B. Maxcy.
- \*16-024 Food processing influences on nutrient composition. T. E. Hartung.
- 16-026 Significance, study, and use of enzymes in the food industry. K. M. Shahani.
- 16-027 Quality and safety of foods in households and institutions. R. B. Maxcy.
- 16-028 Use of animal and plant resources as extenders in human foods. L. D. Satterlee.
- 16-029 Occurrence, significance and control of potentially toxic molds in foods. L. B. Bullerman.
- 16-030 Composition and modification of edible fats and oils. A. P. Handel.
- 16-031 Use, recovery and monitoring of microorganisms in food. S. E. Wallen.
- 16-032 Enzymatic modification of foods and food wastes. K. M. Shahani.
- \*91-017 Influence of production and preparation practices and chemical changes in meat palatability. F. Caporaso.

### **Forestry, Fisheries and Wildlife**

- 20-023 Windbreak shelter effects. J. R. Brandle.
- 20-028 Tree improvement by selection and breeding. W. T. Bagley, R. A. Read, D. VanHaverbeke.
- 20-041 Vegetation selection and management for fire prevention. J. R. Brandle.
- 22-019 Interfacing of agriculture and wildlife resources. R. M. Case.

### **Horticulture**

- 20-014 Evaluation of varieties and cultural practices in vegetables. R. B. O'Keefe, D. P. Coyne.
- 20-036 Genetics, breeding and cultural interactions of beans. D. P. Coyne.
- 20-037 Climatic resources and agroclimatic relationships. R. E. Nield.
- 20-037R The climatic resources of the North Central Region. R. E. Nield.
- 20-038 Cultural and physiological studies of turf and herbaceous ground covers. R. C. Shearman, E. J. Kinbacher.
- 20-039 Improvement of native plant materials for Nebraska landscapes. S. S. Salac, R. K. Sutton.
- 20-040 Genetic improvement of beans (*Phaseolus vulgaris* L.) for yield, pest resistance and nutritional value. D. P. Coyne, M. L. Schuster, J. R. Steadman.
- 20-042 Biology and control of bacterial diseases in Nebraska. M. L. Schuster.
- 20-043 Renewable plant materials as components of horticultural plotting media. S. S. Salac, E. E. Pierson, W. R. Kehr, R. C. Soresen.
- 20-044 Breeding turfgrasses for the Central Great Plains. T. P. Roirdan.

### **Plant Pathology**

- 21-001 Plant disease survey and special investigations. D. S. Wysong, J. G. Watkins, M. G. Boosalis.
- 21-003 Identification and control of plant viruses. L. C. Lane.
- 21-005 Fundamental studies on root diseases of plants. M. G. Boosalis, G. N. Odvody.
- 21-006 Diseases of forest and shade trees. J. W. Riffle, M. G. Boosalis.

- 21-010 Plant pathology outstate testing. D. W. Wysong, M. G. Boosalis, J. E. Watkins.
- 21-012 Electron microscopy in agricultural research. W. G. Langenberg, M. K. Brakke, E. M. Ball.
- 21-015 Epidemiology of vegetable diseases in Nebraska. J. R. Steadman.
- 21-017 Physiology of fungal spore germination. J. W. VanEtten.
- 21-021 Isolation, purification and characterization of bacterial plant pathogens, their viruses and bacteriocins. A. K. Vidaver.
- 21-022 Development of root disease control technology with emphasis on biological control in corn and soybeans and other crops with common pathogens. M. G. Boosalis, B. L. Doupanik, L. D. Dunkle.
- 21-023 Detection, survival and control of plant pathogenic bacteria on seeds and plant propagative material. A. K. Vidaver.
- 21-026 Stalk rots of corn and sorghum. J. E. Partridge.
- 21-027 Identification of genetic factors in soybean iron metabolism. L. C. Lane, J. E. Specht, F. W. Wagner.

#### **Biometrics & Information Systems Center**

- 23-001 Application of statistics to research in agriculture. W. M. Schutz.

#### **Veterinary Science**

- 14-001 Animal disease diagnosis and surveillance in Nebraska. O. D. Grace.
- 14-002 Diseases of young pigs. N. R. Underdahl.
- 14-004 Bionomics, etiology and control of the parasites of Nebraska livestock. D. L. Ferguson, E. O. Dickinson, M. B. Rhodes.
- 14-009 Prevention and control of enteric diseases of swine. N. R. Underdahl, B. Torres-Medina, E. O. Dickinson.
- 14-012 Immunological properties of parasite enzymes in sheep and swine. M. B. Rhodes, D. L. Ferguson, E. O. Dickinson.
- 14-014 Bovine respiratory diseases. M. L. Frey, M. B. Rhodes.
- 14-017 Pathophysiology of acute fluid and electrolyte imbalances in baby pigs. C. L. Kelling, G. A. Kennedy.
- 14-018 Protection of livestock against internal parasites by management methods. M. B. Rhodes, D. L. Ferguson, E. O. Dickinson.



- 14-019 Respiratory diseases of swine. N. R. Underdahl, C. L. Kelling, E. O. Dickinson, M. B. Rhodes, A. S. Ramos, A. Torres-Medina.
- 14-020 Infectious diseases of young calves. A. Torres-Medina, M. L. Frey, N. B. Wren, N. R. Underdahl, M. B. Rhodes.
- 14-021 Microvascular pathophysiology of lactic acidosis and endotoxin in ruminants. J. F. Amend, R. A. Britton, W. B. Wren, A. S. Ramos.

### **Regional Station**

#### **Northeast Station**

- 42-001 Influence of housing and management on confinement rearing of growing and finishing pigs. R. D. Fritschen, J. A. DeShazer, N. R. Underdahl.
- 42-002 Growing and finishing beef cattle using feedstuffs in northeast Nebraska. V. E. Krause.
- 42-003 Biology and control of the European corn borer and other selected insects in northeast Nebraska. J. E. Witkowski.

#### **North Platte Station**

- 43-002 Development of principles of weed control for west central Nebraska. G. A. Wicks.
- 43-006 Relating nutrition and management to growth and development in programming pork production. D. M. Danielson.
- 43-007 Culture and improvement of agronomic crops in central and western Nebraska. P. Nordquist.
- 43-020 Animal disease surveillance in western Nebraska. R. G. White, C. M. Hibbs, D. B. Hudson.
- \*43-022 Development of ornamental plants for Nebraska as a great plains state. D. T. Lindgren.
- 43-024 Injurious insects affecting livestock in Nebraska. J. B. Campbell.
- 43-025 Irrigated pasture investigations. J. T. Nichols, D. C. Clanton, B. R. Somerhalder.
- 43-026 Agricultural production systems for the Nebraska Sandhills. R. G. White.
- 43-027 Optimum utilization and integration of range and complementary forages for beef. D. C. Clanton, J. T. Nichols.

- 43-028 Development and culture of herbaceous ornamental plants. D. T. Lindgren.
- 43-029 Development and demonstration of planting systems for water, soil and energy conservation. N. L. Klocke.
- 43-030 Evaluate changes in the nutritional and management practices of beef cattle production and ranching systems. D. C. Clanton
- 43-031 Optimization of the use of range and complementary forages for red meat production. D. C. Clanton, J. T. Nichols.

#### **Panhandle Station**

- 20-010 Improvement of potatoes. R. B. O'Keefe.
- 20-034 Quality and nutritive value of processed potatoes. R. B. O'Keefe.
- 44-004 Fertilizer and manure application for production of continuous corn. F. N. Anderson.
- 44-005 Testing small grain corn, sorghum, and other crop varieties for adaption to western Nebraska. L. A. Nelson.
- 44-011 Development of dryland cropping systems for western Nebraska. C. R. Fenster.
- 44-012 Improvement of millet production by breeding and cultural practices. L. A. Nelson.
- 44-013 Biology and control of insect pests of western Nebraska. A. F. Hagen.
- \*44-014 Wheat production costs and returns in relation to farm size, southwest and panhandle areas of Nebraska. R. E. J. Retzlaff.
- 44-015 Cultural and nutrient investigations for irrigated crops in western Nebraska. F. N. Anderson.
- 44-016 Weed control for western Nebraska crops and conditions. R. G. Wilson, Jr.
- 44-017 Investigation of irrigation management in western Nebraska. W. L. Trimmer.
- 44-018 Surveillance of animal diseases in western Nebraska. D. A. Darling.
- 44-019 Soil fertility investigations in the Nebraska Panhandle. L. A. Daigger.
- 44-020 Design and use of irrigation systems. R. J. Edling, L. A. Daigger, R. E. J. Retzlaff.
- 44-021 Micrometeorology of sprinkler irrigation. A. Wiess.
- 44-022 Varietal evaluation of irrigated crops in western Nebraska. F. N. Anderson, D. S. Nuland, A. F. Dreier.

#### **South Central Station**

- \*48-002 How cultural practices affect root and stalk rot diseases of corn and sorghum. B. J. Doupnik.
- 48-003 Biology and control of crop insects in south central Nebraska. L. L. Peters.
- 48-004 Occurrence and effects of mycotoxins in feeds and foods. B. L. Doupnik, T. L. Thompson.
- 48-005 Biology and control of troublesome weeds - south central Nebraska. F. W. Roeth.
- 48-006 Management of water and energy on irrigated farms in south central Nebraska. D. E. Eisenhauer.
- 48-007 Popcorn production factors affecting yield and quality. L. S. Svec.
- 48-008 Cultural and physiology studies for efficient crop production on south central Nebraska. L. S. Svec.

#### **Roman L. Hruska U.S. Meat Research Center**

- 46-001 Development and operation of the U.S. Meat Animal Research Center. R. R. Oltjen.
- 46-002 Improvement of beef cattle through breeding methods. R. M. Koch, G. E. Dickerson, L. V. Cundiff.
- 46-004 Improvement of beef cattle through breeding methods -(Germ Plasm valuation). L. V. Cundiff, D. B. Laster, R. M. Koch.
- \*46-005 Increase reproductive efficiency of swine, sheep and cattle. R. K. Christenson, D. B. Laster, H. S. Teague.
- 46-006 Improvement of beef cattle through breeding methods (heterosis retention). R. M. Koch, D. B. Laster.
- 46-007 Improvement of beef cattle through breeding methods. K. E. Gregory, L. V. Cundiff, R. R. Maurer, R. M. Koch, D. D. Lunstra, J. D. Crouse.

#### **University Field Laboratory**

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

## **College of Home Economics**

### **Education and Family Resources**

- 92-005 Quality of life as influenced by areas of residence. F. Walker, D. Olsen.
- 92-006 Rules for selecting and organizing home economics objectives for an educational goal. S. M. Kreutz.
- 92-007 Decision factor in residential retrofitting affecting energy consumption. E. R. Combs.
- 92-008 Vocational agricultural and home economics education program in rural multi-district schools. G. Newkirk.

### **Human Development and the Family**

- 93-012 A life span analysis of rural children's mental and social development. V. Kalyan-Masih.
- 93-013 Rehabilitation of persons in homemaking and independent living. L. O. Schwab.
- 93-014 Rural families cope with crisis. J. C. Woodward, J. DeFrain.

### **Human Nutrition and Food Service Management**

- 91-007 Metabolic interrelationships affecting nutrient and energy requirements of humans. C. Kies, H. M. Fox.
- 91-012 Nutritional impact of fat-altered diets. C. Kies, H. M. Fox.
- 91-014 Productivity of food service operations. M. E. Knickrehm.
- 91-015 Nutrition improvement in the northeast region. C. Kies, H. M. Fox.
- 91-018 Communications strategies to improve nutritional practices of families. H. M. Fox, L. Vaughan.
- 91-019 Dietary practices and nutritional status of maternal and infant populations. L. Vaughan, H. M. Fox.
- 91-020 Nutrient bioavailability - a key to human nutrition. C. Kies, H. M. Fox, L. Vaughan.
- 91-021 Changing food and nutrition attitudes and practices for improved nutrition. H. M. Fox, C. Kies, L. Vaughan, W. Crumley.
- 91-022 Food preservation practices of Nebraska consumers. T. A. Shaffer.
- 91-023 The impact selected food and nutrition education programs on food intake behavior of learners. H. Kohn, H. M. Fox.

### **Textiles, Clothing and Design**

- \* 94-002 Factors affecting consumer satisfactions of clothing and textile purchases. A. E. Newton.
- 94-007 Selected factors affecting the consumer use performance of flame retardant fabrics. J. Laughlin.
- 94-008 Determining levels of clothing comfort with emphasis on individuals with physical limitations. A. E. Newton.

### **EXPERIMENT STATION PUBLICATIONS**

Ninety-second Annual Report (72 pages). Presented to the Governor, November 28, 1978, 1,000 copies.

Nebraska Farm, Ranch and Home Quarterly, Summer, 1978 (24 pages). 12,000 copies.

Nebraska Farm, Ranch and Home Quarterly, Fall, 1978 (20 pages). 12,000 copies.

Nebraska Farm, Ranch and Home Quarterly, Winter, 1979 (28 pages). 12,000 copies.

Nebraska Farm, Ranch and Home Quarterly, Spring, 1979 (20 pages). 6,000 copies.

### **Bulletins**

- 543. Better Forecasts Can Reduce Risks for Placement & Futures Market Decisions (23 pages). Wen-Shan Lee and James B. Hassler. 1,500 copies.

### **Bulletins (reprints)**

- 519. Vegetable Gardening in Nebraska (19 pages). R. E. Nield and Dale T. Lindgren. 5,000 copies.

### **Research Bulletins**

- 283. Forage Quality Evaluations of Twelve Grasses in Relation to Season for Grazing (43 pages). L. C. Newell and W. J. Moline. 1,000 copies.
- 284. Sulfur Fertilization of Alfalfa and Corn on the Sandy Soils of Nebraska (26 pages). G. W. Rehm. 1,000 copies.
- 285. Results of the Eighth International Winter Wheat Performance Nursery Grown in 1976 (232 pages). K. D. Wilhelm, S. L. Kuhr, V. A. Johnson, P. J. Mattern and J. W. Schmidt. 2,000 copies.

286. A Forecasting-Programming Method for Placement-Sales Decisions for a Beef Feedlot (32 pages). Franz Schwarz and J. B. Hassler. 1,000 copies

#### **North Central Regional Publications**

NCR 253. Consumer Perceptions of Selected Community Services in the Great Plains Published at the University of Nebraska-Lincoln.

#### **Nebraska Farm, Ranch and Home Quarterly Articles**

Good Management Controls Feedlot Flies. John B. Campbell and C. D. McNeal. Vol. 25 (2) 3-4.

Tractor Day—Something for Everyone. Rollin Schnieder. Vol. 25 (2) 5-6.

How Not to Hit Your Children. John DeFrain. Vol. 25 (2) 7-9.

Cottonwoods for Nebraska. W. T. Bagley, W. R. Lovett and C. C. Ying. Vol. 25 (2) 9-10.

Agricultural Job Openings Forecast. Roy D. Dillon. Vol. 25 (2) 11-12.

Range Judging—An Outdoor Classroom. James T. Nichols and Peter N. Jensen. Vol. 25 (2) 12-13.

To Expand—or Not to Expand? Larry J. Held and Glenn A. Helmers. Vol. 25 (2) 14-15.

Dry Bean Disease Plagues Farmers. John E. Watkins, James R. Steadman and Eric D. Kerr. Vol. 25 (2) 16-18.

Pest Center Serves Growers, Gardeners. Jack Riesselman, Tim Miller and John Furrer. Vol. 25 (2) 19-20.

Joint Venture Beef Fabrication. J. C. Hafer and J. G. Kendrick. Vol. 25 (2) 21-22.

Rural Services: Worth the Cost? Gayle Ann Morris and P. H. Gessaman. Vol. 25 (2) 23-24.

EFNEP Teachers Learn, Too. Harriet Kohn, Constance Ahlman and Robert J. Florell. Vol. 25 (3) 3-4.

Learning To Live With Death. Barbara Chessser. Vol. 25 (3) 4-5.

How Prepared Were They to Teach? Gwendolyn Newkirk and Vicki Scholting. Vol. 25 (3) 7-8.

Effects of Production, Marketing Choices. Lynn H. Lutgen and Glenn A. Helmers. Vol. 25 (3) 9-10.

Close Rows Can Boost Yields. Russell Moomaw. Vol. 25 (3) 11-12.

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Black Walnut is Prized Crop. Frank Hershey. Vol. 25 (3) 15-16.

Profits Fly Out When Insects Invade Stored Grain. Leroy L. Peters and Mary Garbacz. Vol. 25 (3) 17-18.

Computer Makes Drapery Calculations Easier. Audrey Newton, Anne Parkhurst and Anna Nevius. Vol. 25 (3) 19-20.

Weed Escapes—Your Future Problems. O. C. Burnside and R. G. Wilson, Jr. Vol. 25 (4) 3-4.

Where Do Babies Come From? Children Answer the Question. Deanna Gilkerson and Violet Kalyan Masih. Vol. 25 (4) 5-7.

Mycorrhizae—Good for Our Trees. Jerry W. Riffle and Michael G. Boosalis. Vol. 25 (4) 8-10.

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Unchecked Wheat Diseases Can Cause Millions in Losses. John E. Watkins, Ben L. Doupnik, Jr., Eric Kerr and Randall R. Carlson. Vol. 25 (4) 16-18.

What the Burn Study Means to Nebraskans. Joan Laughlin. Vol. 25 (4) 19-21.

Production, Marketing Risk on Eastern Nebraska Grain Farms. Glenn A. Helmers and Lynn H. Lutgen. Vol. 25 (4) 21-23.

Is There A Parent Expert in Your Mirror? Deanna Eversoll and Barbara Chesser. Vol. 25 (4) 24-26.

House Goal is Energy Conservation in Homes. Kathy Sullivan, Ardis Hutchins, Jerry Bodman, Tom Thompson and Chuck Anderson. Vol. 25 (4) 26-28.

Youth County—Juniors Find Action in County Government. Marilyn Fox. Vol. 26 (1) 3-4.

Farmer's Market—From Farm to Fork. Dale Lindgren and Larry Benner. Vol. 26 (1) 4-5.

Dog Owners Beware—Mosquitoes Spread Heartworm in Nebraska. Susan E. Moos and Donald L. Ferguson. Vol. 26 (1) 6-7.

Tap and Sap—Making Maple Syrup in Nebraska. Stan Wallen. Vol. 26 (1) 8-9.

How Do Children Cope When Parents Break Up? John DeFrain and Patricia Welker. Vol. 26 (1) 10-11.

Growing, Going, Gone!—Free-Wheeling Garden Is Edible, Educational. Barbara Voigt-Boltes'. Vol. 26 (1) 12-13.

Citizenship Comes Alive—With Impact '78. Janet Wilson. Vol. 26 (1) 14-15.

Nebraskans Play a Role in Care Labeling. Joan Laughlin. Vol. 26 (1) 16-17.

Town or City—There's No Place Like Home. Florence W. Walker.  
Vol. 26 (1) 18-20.

### **Departmental Reports**

#### **Biometrics and Information Systems Center**

Report Number 18. Multidimensional Scaling on the OSIRIS System.  
A. M. Parkhurst.

#### **Department of Agronomy**

Report Number 27. Performance of Winter Wheat Varieties in Nebraska Tests. A. F. Dreier, J. W. Schmidt, L. S. Svec, P. H. Grabouski and P. T. Nordquist.

Report Number 28. Performance of Winter Wheat Varieties in Nebraska Tests. A. F. Dreier, J. W. Schmidt, L. S. Svec, P. H. Grabouski, L. A. Nelson and C. R. Fenster.

Report Number 29. A Comparison of Suggested Fertilizer Programs Obtained from Several Soil Test Laboratory Services. Soil Fertility Staff.

Report Number 30. Influence of TIBA (2,3,5-Triiodobenzoic Acid) on the Yield and Quality of Alfalfa (*Medicago sativa* L.) Forage. F. N. Anderson, A. D. Flowerday, W. R. Kehr and R. L. Ogden.

#### **Department of Animal Science**

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Report Number 2-78. Survey of Nebraska Dairymen. F. G. Owen.

#### **Department of Agricultural Economics**

Report Number 84. Nebraska Farm Real Estate Market Developments in 1977-78. Ronald Hanson and Bruce Johnson.

Report Number 85. 1976 Sugar Beet Production Costs for Sioux, Scotts Bluff, Box Butte, and Morrill Counties, Panhandle of Nebraska. Robert E. J. Retzlaff.

Report Number 86. An Analysis of Marketing Strategies for Soybean Producers. Lynn Lutgen.

Report Number 87. Nebraska Governmental Finance Statistics. Bruce Johnson and Everett Peterson.



Report Number 88. The Impact of Rate Regulation Upon Common Carrier Back Hauls. John Richard Felton.

Report Number 89. The AGNET Program Users Guide for Long Range Financial Planning: Simulators for Ag Business. Michael Turner and Lewis May.

Report Number 90. Estimated Crop and Livestock Production Costs -Nebraska 1979 (Updated). Larry Bitney, Lynn Lutgen, Leslie Sheffield, Robert E. J. Retzlaff, Robert E. Perry, Paul E. Miller and Douglas Duey.

Report Number 91. Selected Economic Characteristics of Nebraska's Farming Sector. Stuart Bartruff and Bruce Johnson.

Report Number 92. Alternative Methods of Financing Section 208 Water Quality Programs in Nebraska. Raymond Supalla and Henry J. Geu.

Report Number 93. Transporting Western Coal: Railroads; Slurry Pipelines; or Both. Everett Peterson

Report Number 94. Trucking Grain? What Does It Cost? Michael Turner and Joseph Atwood.

Report Number 95. Economic Integration and Nebraska's Agricultural-Industrial Complex. F. Charles Lamphear.

#### **Department of Agricultural Engineering**

Report Number 3. Fuel Use Survey and Energy Management & Conservation for Production Agriculture in Nebraska. D. P. Shelton, Kenneth VonBargen, N. W. Sullivan, D. E. Rolofson and L. L. Bashford.

#### **Department of Education & Family Resources**

Report Number 1. Planning Curriculum That Reflects the Purpose of Home Economics. Shirley Kreutz.

#### **Department of Entomology**

Report Number 7. Effect of Insecticides Applied to Resistant and Susceptible Varieties of Alfalfa on Spotted Alfalfa Aphid and Alfalfa Weevil. J. M. Mueke, G. R. Manglitz and W. R. Kehr.

Report Number 8. Bibliography of the Stable Fly *Stomoxys calcitrans* (L.). R. L. Rasmussen and J. B. Campbell.

### **Department of Environmental Programs**

Report Number 1. Nebraska Pesticide Use Survey - Structural. Shripat T. Kamble, Roger E. Gold and Edward F. Vitzthum.

Report Number 2. Nebraska Pesticide Use Survey - Grain Handling and Processing. Shripat T. Kamble, Roger E. Gold and Edward F. Vitzthum.

### **Department of Human Development and Family**

Report Number 2. Independent Living Techniques and Concepts: Level of Use vs. Importance to Independent Living as Perceived by Professionals in Rehabilitation. K. Walton, L. Schwab, M. Cassatt-Dunn and V. Wright.

Report Number 3. Vocational Services Programs: A Comprehensive Project Involving Physically Handicapped Participants with Developmental Disabilities. L. Schwab and G. Hogg.

### **Department of Human Nutrition and Food Service Management**

Report Number 36. A Comparison of Protein Nutritional Status of Human Subjects on Wheat and Rice Bran Supplemental Diets. Jill Jank and Marie E. Knickrehm.

Report Number 37. Use of Individualized Instruction in Quantity Food Production for Students. Marion Bracey and Marie E. Knickrehm.

Report Number 38. Development of Audiovisual Aids to Instruct Students in the Operation of Institutional Food Service Equipment. Pamela Murray and Marie E. Knickrehm.

### **Department of Textiles, Clothing and Design**

Report Number 9. Textile Library Resource System. Audrey Newton and Joan Laughlin.

Report Number 10. Selected Factors Affecting the Performance of Flame Retardant Work Garments. Joan Laughlin and Anne Fehringer.

Report Number 11. Clothing and Sex Role Stereotyping: an Annotated Bibliography. Joan Laughlin and Rogene McPherson.

Report Number 12. Textile Consumer Problems and Practices: an Annotated Bibliography. Joan Laughlin and Rita Loveday.

Report Number 13. Clothing: A Nonverbal Communicator: an Annotated Bibliography. Bette Tweten and Audrey Newton.

### **North Platte Station**

Report Number 1. Sandhills Agricultural Laboratory Field Day Booklet. North Platte Staff.

Report Number 2. Horticulture Booklet - 1978. Dale Lindgren.

Report Number 3. Edible Dry Bean Cultivar Trials. Dale Lindgren.

Report Number 4. Ecofallow in Wheat-Sorghum or Corn-Fallow Rotation. Gail Wicks, Paul Nordquist and Norm Klocke.

### **South Central Station**

Report Number 16. Corn Lethal Necrosis - A New Virus Disease of Corn. Ben Doupnik.

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Report Number 19. Weed Control in Irrigated Corn at Clay Center, 1978. Fred Roeth.

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Report Number 28. 1979 Budgeted Costs & Returns of Crops for Central Nebraska Test Plot in 1978. Paul Miller.

Report Number 29. Stalk Rot Incidence in Corn Varieties at Two Outstate Corn Performance. Ben Doupnik.

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Report Number 7. Defoliation of Short-Season Corn at Seedling State 1977-78 Trial. Leroy Svec.

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#### **(Technical Articles and Papers Published or Submitted for Publication)**

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## PUBLICATIONS OF THE STAFF

### Key to Abbreviations

SB—Station Bulletin  
 RB—Research Bulletin  
 DR—Departmental Report  
 Q2—Summer Quarterly 1978  
 Q3—Fall Quarterly 1978

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**THE UNIVERSITY OF NEBRASKA  
AGRICULTURAL EXPERIMENT STATION**

**REPORT OF INCOME AND EXPENDITURES<sup>1</sup>  
For the Year Ended June 30, 1979**

**GENERAL CURRENT FUNDS**

Funds Available<sup>2</sup>

Received from United States Government

Hatch Fund . . . . . \$1,383,540

Budgeted by the University . . . . . 8,352,606

Total . . . . . \$9,736,146

Expenditures:

Salaries, Wages & Staff Benefits . \$7,895,808

Operating Expenses . . . . . 1,301,102

Equipment and Improvements . . . . . 539,236

Total . . . . . \$9,736,146

**RESTRICTED CURRENT FUNDS**

Income:

From United States

Government Agencies . . . . . \$2,426,311

From State of Nebraska Agencies . . . . . 177,961

From Industry . . . . . 569,995

From Foundations & Health

Organizations . . . . . 61,317

Total . . . . . \$3,235,584

Expenditures:

Salaries, Wages & Staff Benefits . \$1,741,599

Operating Expenses . . . . . 1,118,739

Equipment and Improvements . . . . . 375,246

Total . . . . . \$3,235,584

## **CASH REVOLVING FUNDS**

### **Income:**

Sales and Services . . . . . \$2,784,241

### **Expenditures:**

Salaries, Wages & Staff Benefits . \$ 681,205  
Operating Expenses . . . . . 1,834,672  
Equipment and Improvements . . 268,364

Total . . . . . \$2,784,241

## **AGENCY REVOLVING FUND<sup>3</sup>**

### **Income:**

Sales and Services . . . . . \$3,849,671

### **Expenditures:**

Salaries, Wages & Staff Benefits . \$2,605,106  
Operating Expenses . . . . . 987,284  
Equipment and Improvements . . 257,281

Total . . . . . \$3,849,671

<sup>1</sup>These amounts do not include capital construction expenditures totaling \$811,349

<sup>2</sup>Includes University Research Council funds from state appropriations 7,973

<sup>3</sup>Includes Meat Animal Research Center, Foundation Seed, Tractor Testing, and the Basic Seed Potato Program