

SEVENTIETH ANNUAL REPORT

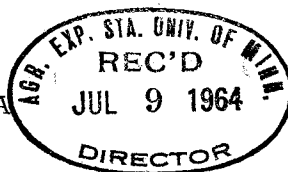
Agricultural Experiment Station
University of Minnesota

July 1, 1962 to June 30, 1963



UNIVERSITY OF MINNESOTA

ST. PAUL CAMPUS



LETTERS OF TRANSMITTAL

University of Minnesota, Minneapolis, Minn.

July 1, 1963

*To His Excellency, Karl F. Rolvaag,
Governor of Minnesota*

Sir: I have the honor to transmit to you herewith the report of the Agricultural Experiment Station of the University of Minnesota for the fiscal year ending June 30, 1963.

Respectfully transmitted,

O. MEREDITH WILSON,
President of the Board of Regents

University of Minnesota, Minneapolis, Minn.

July 1, 1963

*To The Honorable Board of Regents,
University of Minnesota*

Gentlemen: I have the honor to transmit herewith the report of the Director of the Agricultural Experiment Station of the University of Minnesota for the fiscal year ending June 30, 1963.

Respectfully transmitted,

O. MEREDITH WILSON,
President of the University of Minnesota

University of Minnesota, Minneapolis, Minn.

July 1, 1963

*O. Meredith Wilson,
President of the University of Minnesota*

Sir: I have the honor to submit herewith the report of the Agricultural Experiment Station for the fiscal year ending June 30, 1963.

Respectfully submitted,

H. J. SLOAN,
Director of the Agricultural Experiment Station

SEVENTIETH ANNUAL REPORT

July 1, 1962 to June 30, 1963

H. J. Sloan, Director

William F. Hueg, Jr., Assistant Director

WITH DEAN HAROLD MACY'S RETIREMENT ON June 30, 1963, another major era in the growth of the Institute of Agriculture ended. It is timely, therefore, to reflect on some changes that took place in the Agricultural Experiment Station during the 10-year period, 1953-63.

An increase in the availability of information resulting from research is partly reflected in the publication series known as "newsletters." These popular, short articles on specific subject matter areas are normally available to specialized clientele. In 1952-53 the circulation of these newsletters totaled 116,000; in 1962-63 the total was 174,000.

Ten years ago there were 16 publications in this series, representing different areas of subject matter. Over the years some have been dropped and others added—there are now 20. The three newest are *Poultry Patter*, *Heart of the Home Newsletter*, and the *Minnesota Tourist Travel Notes*. The latter reached an audience of 11,000 during the year. *Minnesota Farm Business Notes* continues to have great popular appeal. It relates current topics of interest on agricultural economics.

The *Minnesota Tourist Travel Notes* represents a new area of interest in which the experiment station is developing a research program. Tourism, we believe, has great potential but research is needed to provide information on more effective use of our natural resources.

Other publications show similar increases. In the earlier years there were 167 Scientific Journal Series Papers issued from the various departments. In the past year the total was 209. These articles go to scientific journals and report in a technical manner the results of our research.

While the numbers do not indicate the change in the nature of the station bulletins, a review of manuscripts makes it clear that there has been a significant shift toward the more fundamental types of research.

The change in the magnitude of the research effort can be partly measured by the number of research projects underway. Ten years ago there were 254 active projects; in the past year there were 338. This increase reflects three major changes in the research program:

1. A refinement of many problems into more specific areas. This means better definition of areas of work.

2. Some increase in funds supporting research. Increases in both Federal and State appropriations have made it possible to modestly increase the total research program.

3. A major change—the availability of funds during recent years from new sources. These are particularly the National Science Foundation, the National Institute of Health, the Atomic Energy Commission, and the Department of the Army. Smaller increases have been available from other Federal sources. These granting agencies have significantly contributed to both the amount and depth of research in agriculture. Most departments now avail themselves of these sources of support.

A serious effort is being made to keep the research program current with rapid changes in the natural and social sciences. Earlier the annual rate of change was about 7 percent; in the past year 14 percent of the projects were new.

While the dollar increase for support of the research program has been significant, increased costs have absorbed a great share. About \$2.5 million were available 10 years ago and \$4.5 million for the past year. Increased costs reflect higher salaries and the higher cost of standard research materials.

Another aspect of increased cost is that research, generally, is more expensive. We use more expensive chemicals and, particularly, more expensive apparatus. But in the process, the total research output is increased and improved in quality. Such items as high-speed computers and automatic nitrogen analyzers were not available 10 years ago for general use. They make it possible to do more refined research and, in some cases, to do research that could not have been attempted before because of the time involved to carry out required procedures. The increased cost of doing research has absorbed over one-half—perhaps as much as two-thirds—of the total increase in funds.

Some interesting shifts have taken place also in the sources of funds. Ten years ago, approximately 60 percent of total research funds came from general University support and special agricultural research appropriations. At the same time the Federal appropriations amounted to about 11.7 percent. The total from endowments, grants, and similar sources amounted to 8.3 percent.

In the past year the total percentage coming from grants from various sources including foundations and the relatively new Federal granting agencies greatly increased. These sources now represent approximately 25 percent of our total funds. The State presently provides about 45 percent as compared to 60 percent 10 years ago. This decrease reflects the considerable increase in grant funds from Federal granting agencies.

This 10-year period saw significant growth of physical facilities. Some major additions were the library, the Student Center, a major

wing on the School of Home Economics, the Soil Science Building, the Forest Products Laboratory, the Plant Science Building, and additions to the College of Veterinary Medicine. Veterinary Medicine became a separate college in 1957 but the experiment station continues to provide major support for the study of disease and parasite problems of farm animals. The work at the Agricultural Experiment Station, Rosemount, has been greatly expanded, partly as a result of the transfer of some major research activities from the St. Paul Campus.

The 10-year period brought a major change in personnel. The University has fortunately been able to retain a staff of high competence and has added people of particular competence in a few areas where such specialized talents were needed.

So, while the various departments could use significant additions to the present facilities and could effectively add many new staff positions, we believe the Agricultural Experiment Station can make significant contributions to the welfare of agriculture and agribusiness and to the people of Minnesota over the next decade.

CHANGES IN STAFF

Appointments

R. S. Adams, Jr., Ph.D., research fellow, Department of Soil Science, September 1, 1962.

R. V. Anderson, Ph.D., assistant professor, Department of Plant Pathology and Physiology, July 1, 1962.

W. K. Bryant, M.S., assistant professor, Department of Agricultural Economics, April 1, 1963.

L. Calpouzos, Ph.D., plant pathologist, USDA, Department of Plant Pathology and Physiology, April 1, 1963.

H. J. Dirks, M.S., research fellow, Department of Agricultural Economics, July 1, 1962.

S. D. Evans, Ph.D., assistant professor, West Central Experiment Station, January 23, 1963.

J. G. Haygreen, Ph.D., associate professor, School of Forestry, June 16, 1963.

J. D. Hyslop, M.S., instructor, Department of Agricultural Economics, September 16, 1962.

F. K. Johnson, M.S., assistant professor, Northwest School and Experiment Station, June 16, 1963.

L. W. Johnson, D.V.M., instructor, Department of Veterinary Medicine and Clinics, January 1, 1963.

R. A. Kleese, Ph.D., research associate, Department of Agronomy and Plant Genetics, December 1, 1962.

P. Li (Pen Hsiang Li), Ph.D., research fellow, Department of Horticultural Science, September 1, 1962.

D. M. Manbeck, M.S., research fellow, Department of Agricultural Engineering, July 1, 1962.

G. C. Marten, Ph.D., assistant professor, without salary, Department of Agronomy and Plant Genetics, July 1, 1962.

B. J. McCandless, M.S., instructor, School of Home Economics, September 16, 1962.

C. J. Mirocha, assistant professor, Department of Plant Pathology and Physiology, March 1, 1963.

J. D. Photiadis, Ph.D., visiting lecturer, Department of Sociology, and acting supervisor of research, Division of Rural Sociology.

J. Priedkalns, D.V.M., instructor, Department of Veterinary Anatomy, July 1, 1962.

E. B. Radcliffe, Ph.D., research fellow, Department of Entomology, Fisheries, and Wildlife, January 1, 1963.

R. W. Romig, Ph.D., plant pathologist, USDA, Department of Plant Pathology and Physiology, August 1, 1962.

J. W. Rust, Ph.D., research fellow, Department of Dairy Husbandry, March 16, 1963.

R. E. Schoenike, Ph.D., assistant professor, School of Forestry, January 1, 1963.

R. C. Shoup, D.V.M., instructor, Department of Veterinary Medicine and Clinics, June 15, 1963.

S. C. Srivastava, Ph.D., research fellow, Department of Entomology, Fisheries, and Wildlife, June 1, 1963.

R. D. Thompson, B.S., instructor, School of Forestry, March 1, 1963.

Promotions

G. E. Ahlgren, M.S., instructor, Department of Horticultural Science, July 1, 1962.

E. T. Andersen, Ph.D., assistant professor, Department of Horticultural Science, July 1, 1962.

E. E. Banttari, Ph.D., assistant professor, Department of Plant Pathology and Physiology, January 1, 1963.

G. A. Bean, Ph.D., research fellow, Department of Plant Pathology and Physiology, May 1, 1963.

R. Behrens, Ph.D., professor, Department of Agronomy and Plant Genetics, July 1, 1962.

W. M. Bugbee, M.S., research fellow, Department of Plant Pathology and Physiology, January 1, 1963.

R. S. Caldecott, Ph.D., professor, Department of Agronomy and Plant Genetics, July 1, 1962.

M. D. Doyle, Ph.D., associate professor, School of Home Economics, September 16, 1962.

M. R. Fedde, Ph.D., research associate, Department of Poultry Science, June 1, 1963.

R. J. Gerrits, Ph.D., instructor, Department of Dairy Husbandry, July 1, 1962.

R. L. Glass, Ph.D., associate professor, Department of Biochemistry, July 1, 1962.

I. M. Gourley, D.V.M., Ph.D., assistant professor, Department of Veterinary Surgery and Radiology, July 1, 1962.

A. J. Holmblade, Ph.D., professor, School of Home Economics, July 1, 1962.

B. L. Keeling, M.S., research fellow, Department of Plant Pathology and Physiology, June 1, 1963.

Samuel Kirkwood, Ph.D., professor, Department of Biochemistry, July 1, 1962.

F. I. Lauer, Ph.D., associate professor, Department of Horticultural Science, July 1, 1962.

E. W. Learn, Ph.D., professor, Department of Agricultural Economics, July 1, 1962.

B. B. North, M.S., assistant professor, School of Home Economics, September 16, 1962.

V. Perman, D.V.M., Ph.D., assistant professor, Department of Veterinary Pathology and Parasitology, July 1, 1962.

D. Reimer, Ph.D., associate professor, Northwest School and Experiment Station, July 1, 1962.

R. H. Shimabukuro, M.S., research fellow, Department of Plant Pathology and Physiology, July 1, 1962.

F. A. Spurrell, D.V.M., Ph.D., professor, Department of Veterinary Surgery and Radiology, July 1, 1962.

B. E. Youngquist, Ph.D., professor, Northwest School and Experiment Station, July 1, 1962.

Resignations

D. Ashhurst, Ph.D., research fellow, Department of Entomology, Fisheries, and Wildlife, September 30, 1962, to return to England.

E. V. Caruolo, Ph.D., instructor, Department of Dairy Husbandry, June 30, 1963, to accept position in the Department of Animal Science, Animal Disease Section, School of Agriculture, North Carolina State College, Raleigh.

J. B. K. Clark, Ph.D., research fellow, Department of Dairy Husbandry, July 31, 1962, to return to England.

S. M. Dennis, B.V.Sc., assistant professor, Department of Veterinary Pathology and Parasitology, July 31, 1962, to return to Australia.

K. D. Fezer, assistant professor, Department of Plant Pathology and Physiology, September 12, 1962, to accept a temporary position, University of Minnesota, Morris.

R. J. Gerrits, Ph.D., instructor, Department of Dairy Husbandry, June 30, 1963, to accept position at Swine Research Branch, ARS, USDA, Beltsville, Maryland.

L. I. Harmon, M.S., soil scientist, Soil Conservation Service and Department of Soil Science, July 1, 1962, to accept position as senior soil scientist, Soil Conservation Service, Iowa.

S. E. Held, D.V.M., instructor, Department of Veterinary Medicine and Clinics, August 31, 1962, to go into private practice.

Shin-ya Iyama, Ph.D., research fellow, Department of Animal Husbandry, April 30, 1963, to return to position with National Institute of Genetics, Mishima, Japan.

R. G. Johnson, Ph.D., instructor, Department of Agricultural Economics, July 21, 1962, to accept position as assistant professor, University of Wisconsin, Madison.

T. B. Kinney, Ph.D., instructor, Department of Poultry Science, January 31, 1963, to accept position as biometrician, Biometrical Services, USDA, Beltsville, Maryland.

R. F. Line, Ph.D., research fellow, Department of Plant Pathology and Physiology, May 30, 1963, to accept position as research plant pathologist, Fort Detrick, Maryland.

R. W. Lutey, Ph.D., research fellow, Department of Plant Pathology and Physiology, January 16, 1963, to accept position as microbiologist, Buckman Laboratories, Memphis, Tennessee.

D. L. Mumford, Ph.D., research fellow, Department of Plant Pathology and Physiology, May 30, 1963, to accept position as plant pathologist, Michigan State University, East Lansing.

R. M. Prouty, Ph.D., research fellow, Department of Animal Husbandry and School of Public Health, June 1, 1963, to accept position with Patuxent Wildlife Research Center, Section of Chemical and Physiological Studies, Laurel, Maryland.

L. P. Schertz, Jr., Ph.D., research fellow, Department of Agricultural Economics, September 30, 1962, to accept position in the Grain and Feed Division, FAS, USDA, Washington, D. C.

A. C. Strafuss, D.V.M., instructor, Department of Veterinary Pathology and Parasitology, June 30, 1963, to accept position at Iowa State University, Ames.

J. C. Wilk, Ph.D., instructor, Department of Dairy Husbandry, July 31, 1962, to accept position in dairy extension, University of Kentucky, Lexington.

Retirements

H. Macy, Ph.D., dean, Institute of Agriculture and professor, Department of Dairy Industries, June 30, 1963.

Leaves of Absence

J. P. Arnold, D.V.M., Ph.D., professor and head, Department of Veterinary Surgery and Radiology, May 1, 1963 to June 30, 1963, to act as special consultant for the Agency for International Development in Colombia, South America.

G. R. Blake, Ph.D., professor, Department of Soil Science, August 1, 1962 to June 30, 1963, to study at the Institute für Bodenbearbeitung, Braunschweig, Germany.

C. M. Christensen, Ph.D., professor, Department of Plant Pathology and Physiology, January 1, 1963 to June 30, 1963, to serve as special scientific aid to Rockefeller Foundation project on Mexican agriculture, Mexico City, Mexico.

D. H. Clifford, D.V.M., M.P.H., Ph.D., assistant professor, Department of Veterinary Surgery and Radiology, July 1, 1962 to June 30, 1963, to carry out special work at Brookhaven National Laboratories of the Associated Universities, Upton, New York, and to gain experience and training in the use of radioactive isotopes and radiobiology.

W. W. Cochrane, Ph.D., professor, Department of Agricultural Economics, July 1, 1962 to June 30, 1963, to serve as Director of Agricultural Economics, USDA, Washington, D.C.

R. P. Dahl, Ph.D., associate professor, Department of Agricultural Economics, August 1, 1962 to June 30, 1963, to serve as consultant, Soybean Council of America, Brussels, Belgium.

C. E. Gates, Ph.D., associate professor, Agricultural Experiment Station, July 1, 1962 to August 31, 1962, to study advanced mathematics, Oklahoma State University, Stillwater.

E. F. Graham, Ph.D., professor, Department of Dairy Husbandry, January 2, 1963 to March 26, 1963, to conduct experiments on artificial insemination and physiology of reproduction in swine, National Institute of Agricultural Science, Chiba City, Japan.

Robert Jenness, Ph.D., professor, Department of Biochemistry, July 1, 1962 to September 15, 1962, to study at the Netherlands Institute for Dairy Research, Ede, and to represent the University at the meeting of the International Dairy Congress, Copenhagen.

D. R. Johnson, B.S., research fellow, July 30, 1962 to August 12, 1962, to participate in 2 weeks of active duty in the Naval Reserve.

C. L. Larson, M.S., associate professor, Department of Agricultural Engineering, September 15, 1962 to June 30, 1963, to pursue Ph.D. studies at Stanford University, Stanford, California.

R. J. Meade, Ph.D., professor, Department of Animal Husbandry, August 15, 1962 to September 15, 1962, to participate in livestock and poultry seminars in Europe in cooperation with the Soybean Council of America.

H. A. Morris, Ph.D., professor, Department of Dairy Industries, July 9, 1962 to July 21, 1962, to perform military reserve duty at Ft. Lee, Virginia.

W. M. Myers, Ph.D., professor and head, Department of Agronomy and Plant Genetics, February 1, 1963 to February 25, 1963, to be a member of the U.S. delegation to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas, Geneva, Switzerland.

J. C. Olson, Jr., Ph.D., professor, Department of Dairy Industries, July 23, 1962 to August 4, 1962, to perform military reserve duty at the U.S. Army Veterinary Detachment, Holland Branch, The Hague, The Netherlands.

R. N. Shoffner, Ph.D., professor, Department of Poultry Science, July 1, 1962 to December 31, 1962, to serve as a Fulbright lecturer, University of Queensland, Brisbane, Australia.

H. J. Sloan, Ph.D., director, Agricultural Experiment Station and professor, Department of Poultry Science, September 1, 1962 to October 31, 1962, to serve as consultant on research organization for Ghana under sponsorship of Agency for International Development.

L. A. Stedman, Ph.D., professor and director, School of Home Economics, March 25, 1963 to September 21, 1963, to visit selected foreign countries to gain a better understanding of undergraduate and graduate programs in home economics.

T. W. Sudia, Ph.D., assistant professor, Department of Plant Pathology and Physiology, May 1, 1963 to June 18, 1963, to participate in exchange under Section VI(3) of exchange agreement, State Department and USSR in the Soviet Union.

M. J. Taves, Ph.D., professor, Department of Sociology, and supervisor of research, Division of Rural Sociology, to accept position as Chief, Field Operations Branch, Special Staff on Aging, Department of Health, Education, and Welfare, Washington, D.C.

R. L. Thompson, M.S., assistant professor, West Central Experiment Station, January 1, 1963 to December 31, 1963, to do advanced study, Pennsylvania State University, University Park.

Raimunds Zemjanis, D.V.M., Ph.D., professor and head, Department of Veterinary Obstetrics and Gynecology, August 1, 1962 to December 15, 1962, to act as a special consultant in Colombia, South America to aid in revision and improvement of curriculum and teaching methods, under a program of the Agency for International Development.

Deaths

P. A. Anderson, associate professor emeritus, Department of Animal Husbandry, March 30, 1963.

T. H. Fenske, D.Sc., associate dean, Institute of Agriculture, March 28, 1963.

L. W. Rees, Ph.D., professor, School of Forestry, November 10, 1962.

T. H. Stewart, supervisor in charge, Plant Pest Control Division, ARS, Minnesota, November 1962.

A. N. Wilcox, Ph.D., professor, Department of Horticultural Science, February 26, 1963.

PUBLICATIONS

Agricultural Experiment Station

General Bulletin Series

458. (North Central Regional Publication No. 142.) *Career Choices of Rural Youth in a Changing Society*. L. G. Burchinal with A. O. Haller and M. J. Taves, 32 pages, 11,500.

462. *Herd Size Effects on Labor for Loose Housing Chore Tasks*. E. I. Fuller and H. R. Jensen, 32 pages, 7,500.

463. *Public Knowledge and Attitudes Regarding a Rural Minnesota Library System*. M. J. Taves with Krishan Nanda, Gary Hansen, Ronald Pitzer, and Marie Samanisky, 44 pages, 5,000.

464. *The Feed Grain Program in Minnesota*. J. L. App and W. B. Sundquist, 36 pages, 4,000.

465. *Interplant Milk Transportation Costs*. R. G. Thompson and E. F. Koller, 24 pages, 5,500.

466. *Income-Improving Farm Adjustments in Southeastern Minnesota*. W. B. Sundquist, L. M. Day, and H. R. Jensen, 28 pages, 5,000.

467. *Minnesota Farmers and Social Security*. M. J. Taves and G. D. Hansen, 44 pages, 5,000.

468. *Population of Minnesota, 1950-1960*. J. D. Photiadis, 32 pages, 10,000.

469. *Cost Advantages to Size of Farm in Red River Valley Farming*. L. C. Rixie and H. R. Jensen, 16 pages, 4,000.

Technical Bulletin Series

240. *Inheritance of Seedling Reaction to Stem Rust in Four Hexaploid Wheats*. D. W. Sunderman and E. R. Ausemus, 40 pages, 3,000.

241. *Administrative Controls on Quantities Marketed in the Feed-Livestock Economy*. L. P. Schertz and E. W. Learn, 72 pages, 5,000.

242. *The Effect of Air Blockage Upon the Permeability of Wood to Liquids*. W. C. Kelso, Jr., R. O. Gertjensen, and R. L. Hossfeld, 40 pages, 3,000.

243. *Climate of Minnesota: Part I. Probability of Occurrence in the Spring and Fall of Selected Low Temperatures*. D. G. Baker and J. H. Strub, Jr., 40 pages, 3,000.

244. *Demand and Price Analysis of the U.S. Soybean Market*. J. P. Houck, 80 pages, 4,000.

245. *Climate of Minnesota: Part II. The Agricultural and Minimum-Temperature-Free Seasons*. D. G. Baker and J. H. Strub, Jr., 32 pages, 3,000.

Minnesota Farm and Home Science

Volume XX, Number 1, 20 pages, 18,500.

Volume XX, Number 2, 24 pages, 18,500.

Volume XX, Number 3, 24 pages, 19,000.

Reprints of articles (27), 51 pages, 11,100.

Miscellaneous Report Series

*24. *Varietal Trials of Farm Crops*. Department of Agronomy and Plant Genetics staff, 32 pages, 16,000.

*28. *1962 Minnesota Hybrid Corn Performance Trials*. R. H. Peterson, E. H. Rinke, and J. C. Sentz, 36 pages, 11,000.

50. *A New Garden Chrysanthemum—Tenstrike*. R. A. Phillips and R. E. Widmer, 2 pages, 5,000.

51. *A New Flowering Crabapple—Vanguard*. L. C. Snyder, R. A. Phillips, and A. G. Johnson, 2 pages, 5,000.

52. *University of Minnesota Landscape Arboretum*. 24 pages, 5,500.

Other

Sixty-Ninth Annual Report of the Minnesota Agricultural Experiment Station, July 1, 1961 to June 30, 1962. 44 pages, 1,750.

Publications List of the Agricultural Extension Service and the Agricultural Experiment Station. Two issues, October 1962 and April 1963, 16 pages and 20 pages, respectively. 2,500 copies each; total: 5,000.

Purposive Communications. Extension Studies Series 6. Agricultural Extension Service—Agricultural Experiment Station. P. J. Tichenor, G. A. Donohue, and C. N. Olien, 24 pages, 1,000.

* Revised annually

Agricultural Extension Service

Bulletin Series

196. (Revised) *Planting Trees for Farmstead Shelter*. Marvin Smith and William Miles, 16 pages, 7,500.
232. (Revised) *Know Your Cooperative Association*. W. H. Dankers, 16 pages, 10,000.
258. (Reprinted) *Evergreens*. M. E. Smith, C. G. Hard, A. C. Hodson, and D. W. French, 28 pages, 5,000.
263. (Revised) *Insecticides*. J. A. Lofgren and L. K. Cutkomp, 66 pages, 3,500.
274. (Reprinted) *Care of House Plants*. R. E. Widmer, L. K. Cutkomp, H. G. Johnson, and N. A. Anderson, 48 pages, 20,000.
278. (Revised) *Soils of Minnesota*. H. F. Arneman, 8 pages, 50,000.
279. (Reprinted) *Pictures*. Myra Zabel, 20 pages, 6,000.
280. (Reprinted) *Letting Color Work for You*. Myra Zabel, 16 pages, 18,000.
282. (Reprinted) *Home Laundering*. Elizabeth A. Rivers, 24 pages, 5,000.
284. (Revised) *Culinary Herbs*. A. E. Hutchins, O. C. Turnquist, and Verna Mikesh, 16 pages, 7,500.
289. (Reprinted) *Window Treatments*. Myra Zabel, 20 pages, 6,000.
293. (Reprinted) *Outdoor Cookery for the Family*. 32 pages, 10,000.
294. (Reprinted) *Popular Ways to Serve Vegetables*. Grace Brill, 16 pages, 10,000.
295. (Reprinted) *Perennials for Minnesota*. C. G. Hard, 36 pages, 5,000.
303. *Judging Minnesota Land*. R. S. Harris, 20 pages, 4,000.
303. (Reprinted) *Judging Minnesota Land*. R. S. Harris, 20 pages, 4,000.
304. *Town and Country Sewage Systems*. D. M. Ryan, 16 pages, 20,000.

Pamphlet Series

134. (Reprinted) *Custom Rates for Farm Operations*. T. R. Nodland and H. G. Routh, 12 pages, 3,000.
184. (Reprinted) *Home Fruit Spray Guide*. J. A. Lofgren, H. G. Johnson, and O. C. Turnquist, 8 pages, 4,000.
194. (Revised) *1963 Crop Production Guide for Minnesota*. H. J. Otto, C. J. Overdahl, Merle Halverson, and L. D. Hanson, 2 pages, 7,500.

207. *Garden Information*. C. G. Hard, O. C. Turnquist, J. A. Lofgren, and H. G. Johnson. 1 sheet, 5,000.

Extension Folders

154. (Revised) *1963 Vegetable Varieties*. O. C. Turnquist, 12 pages, 12,500.
165. (Revised) *The Home Lawn*. Donald White, 10 pages, 20,000.
167. (Reprinted) *Summer Care of Vegetable Gardens*. O. C. Turnquist, 10 pages, 8,000.
200. (Reprinted) *Barbecuing Poultry*. Milo Swanson, 10 pages, 7,500.
200. (Revised) *Barbecuing Poultry*. Milo Swanson, 10 pages, 10,000.
210. (Revised) *Liming Minnesota Soils*. John Grava and Merle Halverson, 8 pages, 10,000.
212. (Revised) *Cultural and Chemical Weed Control in Field Crops*. R. Behrens, H. J. Otto, R. G. Robinson, and R. N. Andersen, 32 pages, 20,000.
217. (Reprinted) *One-Row Windbreaks*. M. E. Smith, 6 pages, 10,000.
220. *Food for Young Children*. Grace Brill and Charles Martin, 8 pages, 25,000.
221. *Barbecuing Poultry for Large Groups*. Robert W. Berg and Milo H. Swanson, 10 pages, 2,500.

4-H Club Bulletin Series

38. (Revised) *4-H Woodworking*. 20 pages, 15,000.
40. (Reprinted) *Snacks and Little Lunches*. Verna Mikesh and Gwen Bachellor, 36 pages, 15,000.
53. (Reprinted) *4-H Junior Leadership*. Wayne Bath, 12 pages, 20,000.
56. *Creative Foods*. Verna Mikesh, 20 pages, 13,500.
57. *Advanced 4-H Home Improvement-Family Living*. 28 pages, 15,000.
58. *Cooking Outdoors for Fun*. Grace Brill, 16 pages, 15,000.

Miscellaneous

- Special Report 5. (Revised) *Commercial Vegetable Pest Control Guide*. 50 pages, 2,500.
- Special Report 6. (Revised) *Commercial Fruit Pest Control Guide*. 30 pages, 2,000.
- Special Report 8. *A Look at Minnesota Agriculture*. B. G. Crewdson, H. C. Pederson, and K. H. Thomas, 52 pages, 5,000.

Special Report 9. *Milkhouse and Milkroom Construction for Quality Milk Production*. V. S. Packard, 12 pages, 1,000.

Special Report 10. *Farmers' Bargaining Power*. M. K. Christiansen, G. A. Donohue, H. R. Jensen, H. G. Routhe, and D. F. Fienup, 6 pages, 5,000.

Sheep Production Guide. R. E. Jacobs, J. A. Lofgren, and R. B. Solac, 1 sheet, 22,250.

Minnesota Sheep Scabies Eradication Drive. 6 pages, 10,000.

The Small Wheat Grower and the Wheat Referendum. 16 pages, 10,000.

M-130. *Build a Separate Barn for Dairy Calves*. D. W. Bates, 6 pages, 5,000.

M-131. *Selecting and Constructing Vertical Farm Silos*. D. W. Bates and C. K. Otis, 6 pages, 5,000.

RCD-1. *Medical Self-Help Training*. 4 pages, 10,000.

RCD-2. *National Emergency*. 6 pages, 10,000.

RCD-3. *Family Fallout Protection Rating Guide*. 6 pages, 10,000.

Fertilizer Recommendations. 6 pages, 16,000.

Woodland Trail Guide. C. G. Hard and L. C. Snyder, 8 pages, 7,000.

Newsletters

Name of publication	Issues	Pages	Circulation
<i>Best Buys</i>	10	40	20,400
<i>DHIA Newsletter</i>	6	28	39,650
<i>Dairy Products Newsletter</i>	4	16	3,625
<i>Garden Fact Sheet</i>	7	19	1,400
<i>Hardwood Forest Products Newsletter</i> ...	3	11	5,250
<i>Helps for Home Agents</i>	23	96	3,140
<i>Home Agent Newsletter</i>	4	41	500
<i>Minnesota Farm Business Notes</i>	12	48	29,120
<i>Minnesota Feed Service</i>	3	18	4,050
<i>Minnesota Florists' Newsletter</i>	5	76	2,700
<i>Minnesota Tourist Travel Notes</i>	2	8	11,000
<i>Nurserymen's Newsletter</i>	6	23	2,900
<i>Our Land</i>	13	54	8,645
<i>Radio Topics</i>	51	168	11,730
<i>Reaching People with Information</i>	11	39	3,520
<i>Soil Fertility Notes</i>	4	18	11,400
<i>Visual Aids Tip Sheet</i>	12	22	8,400
<i>Yard 'n Garden</i>	8	32	2,055
<i>Poultry Patter</i>	3	6	4,925
<i>Heart of the Home Newsletter</i>	1	2	375
Total	188	765	174,785

Graduate Study in Home Economics. 8 pages, 1,000.
Home Economics Summer School 1963. 6 pages, 2,000.
Welcome to the St. Paul Campus (Reprinted). 10 pages, 5,000.
Heart of the Home Classes. 4 pages, 1,000.
Nursery Management. 6 pages, 5,000.
Wheat. 6 pages, 40,000.

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Rural Sociology

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Soil Science

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College of Veterinary Medicine

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4928. Comparative anatomical and physiological studies of gustatory mechanisms. R. L. Kitchell. *Proceedings of the First International Symposium on Olfaction and Taste-Pergamon Press, London* pages 235-55. 1963.

Miscellaneous Journal Series Papers

Agricultural Economics

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1124. Some recent developments in European land policy. P. M. Raup. Pages 379-99 in H. W. Ottoson, editor, *Land Use Problems and Policy in the United States*. Lincoln: University of Nebraska. 1962.

Agricultural Engineering

1135. Parallel terraces for Minnesota. C. L. Larson and R. E. Machmeier. *Minnesota Farm and Home Science* 20(1):3-4. Fall 1962.

1139. Hay wafering trials with Massey-Ferguson equipment. John Strait. *Proceedings of Massey-Ferguson Seminar*, Chicago, December 10-11, 1962.

1148. A batch drier for small bales. John Strait. *Hoard's Dairyman* 108(7):458-59. April 10, 1963.

Agronomy and Plant Genetics

1113. Narrow-row soybeans without weeds. J. W. Lambert and Richard Behrens. *Soybean Digest* 23:10-11. April 1963.

1136. Minnesota's new soybean research program. J. W. Lambert. *Soybean News* 14:2. January 1963.

Animal Husbandry

1131. Minnesota beef cattle research report. O. E. Kolari. *Feed-stuffs* 34(50):10, 12, 14, 77-78. December 15, 1962.

Dairy Husbandry

1127. The kick that counts. E. C. Frederick, W. R. Dukelow, and C. H. Kvamme. *Hoard's Dairyman* 107(22):1242. November 24, 1962.

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Entomology, Fisheries, and Wildlife

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1129. Unwanted guests of honeybee colonies. M. H. Haydak. *American Bee Journal* 103:129-31. April 1963.

1141. The economics of honey production. M. H. Haydak. *American Bee Journal* 103:211-13. 1963.

School of Forestry

1116. Land management for recreation. D. P. Duncan. Pages 261-68 in Richard O. Sielaff, *Economics of Outdoor Recreation in the Upper Midwest*. Duluth: University of Minnesota. 1963.

1138. What forestry research should be done at the state level? F. H. Kaufert. *Proceedings of the 53rd Western Forestry Conference*. December 13, 1962.

1142. Avoiding excessive deterioration in picnic areas. D. P. Duncan. *Park Maintenance* 16(2)30-36. February 1963.

1144. Adjusting the staff compass. J. R. Host and R. M. Brown. *Minnesota Forestry Notes* No. 126. January 15, 1963.

1145. Minnesota tree growth law: tax rates and acreage 1962. R. D. Lindmark and R. A. Skok. *Minnesota Forestry Notes* No. 127. January 15, 1963.

1149. The forest products industry. F. H. Kaufert. *Proceedings of the 3rd Minnesota Industry-Educations Conference*. March 1963.

Horticultural Science

1126. Plastic greenhouse report, 1962. R. E. Widmer. *Minnesota State Florists Bulletin* pp. 5-7. October 1, 1962.

1153. Poinsettia height control with chemicals. R. E. Widmer. *Minnesota State Florists Bulletin* pp. 1-9. June 1, 1963.

Plant Pathology and Physiology

1118. The land-grant movement and its influence on scientific agriculture in Minnesota. B. W. Kennedy. *Minnesota Academy of Science* 30(1):91-97. 1962.

Summary of Journal Series Papers

Department	Scientific journal series		Miscellaneous journal series	
	Number issued	Number of pages	Number issued	Number of pages
Agricultural Economics	0	0	2	33
Agricultural Engineering	4	42	3	6
Agronomy and Plant Genetics	18	67	2	3
Animal Husbandry	15	29	1	5
Biochemistry	16	103	0	0
Dairy Husbandry	10	11	5	7
Dairy Industries	3	10	0	0
Entomology, Fisheries, and Wildlife	24	185	6	147
School of Forestry	23	73	6	23
School of Home Economics	0	0	0	0
Horticultural Science	6	7	2	12
Plant Pathology and Physiology	61	218	3	51
Poultry Science	21	91	0	0
Soil Science	2	11	0	0
College of Veterinary Medicine	6	65	0	0
	209	912	30	287
Total publications—239				

1119. Corn smut caused by *Ustilago maydis*. J. J. Christensen. *American Phytopathological Society Monograph* No. 2. 21 pp. 1963.
1123. Microbes and feed quality. C. M. Christensen. *Minnesota Nutrition Conference for Feed Manufacturers and Dealers* pp. 33-35. September 10-11, 1963.

Summary of Publications, July 1962-June 1963

Kind of publication	Number issued	Number of pages	Number of copies
General bulletin series	9	592	79,500
<i>Minnesota Farm and Home Science</i>	3	68	56,000
Report series	6	140	44,250
Agricultural Extension Service			
Bulletins	17	418	191,500
Pamphlets	4	23	19,500
Folders	10	116	125,500
4-H Club bulletins	6	132	93,500
Miscellaneous	21	255	174,750
Fact sheets	35	70	139,500
Information service series	8	16	9,500
Communications bulletins	6	14	4,500
Newsletters	188	765	174,785
	<hr/> 313	<hr/> 2,609	<hr/> 1,112,785

NEW EXPERIMENT STATION PROJECTS

Administration

2817R. Administration—symposium development by NC-59 committee.

Agricultural Economics

1151HM. Study of changes and adjustments to change in the Minnesota dairy industry.

1152HM. Structural adjustment in the agribusiness sector of the Minnesota economy.

1153H. Problems of economic growth and development in rural areas.

1154. The impact of the 1961 emergency feed grain program on farm organization and operation in Minnesota.

1155RH. Identification of personal factors and their relationship to financial success in farming.

1156H. Study of consumption patterns of moderately high income families.

1157H. Economic analysis of the structure and performance of potato marketing firms in the Red River Valley.

1158. Dairy plant managers' perception of the Minnesota Agricultural Extension Service, its programs and personnel.

Agricultural Engineering

1223. A study of design and efficiency of structures and equipment as they affect the handling of materials and animals for milk production.

1224. Effect of soil and water conservation practices upon surface and subsurface water resources.

1225. The performance requirements of conditioning equipment for potato storage.

Agronomy and Plant Genetics

1333H. The biochemical nature of cold hardiness in plants.

1334. Soybean breeding.

1335. Effect of environment on the growth, development, and control of weeds.

Biochemistry

1525. Details of the chemical constitution of the hemicelluloses of forage crops.

1526. Modification of starch for industrial uses.

1527. The use of microorganisms in the determination of the structure and the utilization of the carbohydrates of agricultural products.

Dairy Husbandry

1627. Selection of Holstein cattle for the production of meat and milk protein.

1628. Comparison of mating systems likely to be important in the future genetic improvement of dairy cattle.

1629. Iodine metabolism in the cow and goat.

1630. Effects on yields of milk in total lactations imposed by certain forage variables.

Dairy Industries

1814. Comparison of pricing methods for milk.

Entomology, Fisheries, and Wildlife

- 1749. Studies of parasitic egg-laying behavior in redhead ducks.
- 1750H. Investigation of causes of population changes in Red Lakes commercial fish species.
- 1751H. Taxonomy and biological investigations of bird lice.

School of Forestry

- 1930HM. Study of the competitive market position of Minnesota forest products industry.

Plant Pathology and Physiology

- 2236. Translocation in fungi.
- 2237. Diseases of corn.
- 2238. Diseases of barley.
- 2239. Oat diseases.
- 2240. Diseases of grasses.
- 2241H. Diseases of forage legumes.
- 2242. Development of disease-resistant wheats.
- 2243. Diseases of flax.
- 2244H. Diseases of fruit crops.
- 2245H. Diseases of canning crops.
- 2246. Potato diseases.
- 2247H. Diseases of vegetables other than potatoes and canning crops.
- 2248. Minnesota fungi.
- 2249. Studies in plant physiology.
- 2250H. Genetics of plant pathogens.

Poultry Science

- 2330. Consumer acceptability of poultry meats as related to processing methods, market handling, and physical-chemical properties.
- 2331. Effect of physical environment upon management practices.

Rural Sociology

- 2715H. Studies in social change: Isanti County.
- 2716H. Attitudes toward present economic trends in the rural community.

College of Veterinary Medicine

2639. Enteric diseases of young pigs.

2640. Role of mycoplasma and related infections in the nature and control of airsacculitis of poultry.

Summary of Projects

Department	Active	Closed	New
Administration	9	0	1
Agricultural Economics	37	3	8
Agricultural Engineering	18	0	3
Agronomy and Plant Genetics	28	3	3
Animal Husbandry	17	2	0
Biochemistry	15	2	3
Dairy Husbandry	17	0	4
Dairy Industries	14	0	1
Entomology, Fisheries, and Wildlife ...	30	1	3
School of Forestry	20	2	2
School of Home Economics	13	3	1
Horticultural Science	19	1	0
Plant Pathology and Physiology	30	16	15
Poultry Science	18	3	2
Rural Sociology	7	4	2
Soil Science	25	0	0
College of Veterinary Medicine	21	2	2
Total	338	42	47

FINANCIAL STATEMENT

Income 1962-63

Sources of revenue	Branch stations										
	St. Paul Campus	Crookston	Morris	Grand Rapids	Itasca	Duluth	Waseca	Cloquet	Lamberton	Total	
Federal appropriations											
Hatch Fund	\$ 701,160.00										\$ 701,160.00
Regional Research Fund	161,070.00										161,070.00
State appropriations											
General University support	1,337,217.77	\$62,962.30	\$41,974.70	\$44,284.63	\$2,931.71	\$91,640.64	\$88,277.28	\$11,641.28	\$44,499.92		1,725,430.23
Special appropriations	849,596.00										849,596.00
Endowments, fellowships, etc.	395,689.05										395,689.05
Fees, sales, miscellaneous	489,131.25	24,086.32	26,217.17	18,023.00	2,104.22	43,578.42	80,402.12	6,560.75	13,668.68		703,771.93
Total	\$3,933,864.07	\$87,048.62	\$68,191.87	\$62,307.63	\$5,035.93	\$135,219.06	\$168,679.40	\$18,202.03	\$58,168.60		\$4,536,717.21

Expenditures by station 1962-63

Classification	Branch stations										
	St. Paul Campus	Crookston	Morris	Grand Rapids	Itasca	Duluth	Waseca	Cloquet	Lamberton	Total	
Service and labor	\$2,662,020.97	\$45,740.82	\$41,746.72	\$37,483.83	\$2,441.45	\$ 77,264.89	\$ 84,693.48	\$13,650.97	\$30,789.38		\$2,995,832.51
Travel expense	66,835.79	280.39	194.85	122.74	77.13	519.60	267.16	11.33	210.35		68,519.34
Equipment	255,108.67	1,617.68	4,530.45	1,496.99	590.91	5,215.33	19,697.75	186.69	5,327.94		293,772.41
Lands	29,043.03	2,385.38		2,184.31	37.68		6,859.84	164.32			40,674.56
Personal benefits	32,683.49	175.03	210.41				51.12		1,283.12		34,403.17
Supplies and materials	407,883.51	17,230.49	11,484.63	12,227.40	1,021.06	30,020.23	29,876.50	1,327.43	9,473.65		520,544.90
Other services	480,288.61	19,618.83	10,024.81	8,792.36	867.70	22,199.01	27,233.55	2,861.29	11,084.16		582,970.32
Total	\$3,933,864.07	\$87,048.62	\$68,191.87	\$62,307.63	\$5,035.93	\$135,219.06	\$168,679.40	\$18,202.03	\$58,168.60		\$4,536,717.21

Expenditures by fund 1962-63

Classification	Hatch Fund	Regional Research Fund	Nonfederal	Total
12 Services and labor	\$542,344.44	\$ 94,943.03	\$2,344,236.82	\$2,981,524.29
Administration	14,308.22	14,308.22
21 Travel	16,737.14	10,601.99	41,180.21	68,519.34
31 Equipment	31,538.33	10,582.30	251,651.78	293,772.41
32 Lands	11,200.64	29,473.92	40,674.56
41 Personal benefits	10,433.29	2,159.54	21,810.34	34,403.17
42 Supplies	55,965.77	25,004.34	439,574.79	520,544.90
43 All other	29,832.81	6,578.16	546,559.35	582,970.32
Total	\$701,160.00	\$161,070.00	\$3,674,487.21	\$4,536,717.21

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