

THE SEARCH FOR NEW FARM FACTS (Announcing New Projects)

By H. L. Walster, Director

The Agricultural Experiment Station is dedicated to the search for new farm facts. The method used in that search is the "project" method. A project is simply a plan for obtaining, in orderly fashion, the answer to some particular problem. During the conduct of a project, progress reports are obtained by the director. When it appears that the main questions raised by the project are answered, the results are published and the project closed so that available funds may be used to obtain the answers to other questions.

Each year many new questions and problems demand solution. At the beginning of the present fiscal year (July 1, 1949) a large number of new projects have been launched. Some of these projects may run only one year, most of them will run several years, and some of them have to run many years before a satisfactory answer is obtained. As newer knowledge is obtained projects are frequently revised so that new approaches and new techniques may be used.

Each project has a leader who is a specialist in his field. Many projects touch many aspects of agriculture. In such cases several staff members from different departments participate in conducting the experiment. Some projects are cooperative with other state agencies, many are cooperative with federal agencies including the United States Department of Agriculture, the Bureau of Reclamation of the U.S. Dept. of Interior, etc. Cooperation with other agencies may be purely advisory; frequently, however, it involves the assignment of personnel to the Station staff.

The research projects of the North Dakota Agricultural Experiment Station are supported by State appropriations and Federal Grants.

New Projects

The new projects beginning July 1, 1949 have been made possible by the additional funds provided by the appropriations of the Legislative Assembly of 1949 and by a slight increase in federal grants.

The new projects listed below reflect the widening interest in irrigation, in marketing, in plant and animal diseases and their control, and in plant breeding as well as in a variety of other projects. The general title of each new project appears in bold face type, then follows a brief statement of the objectives and the names of the leader or leaders. Progress reports upon these projects will appear from time to time in the Bimonthly Bulletin or in other publications of the Station.

Increasing Market Value of North Dakota Potatoes Through Reducing Defects and Coordinating Seed, Table Stock and Feed Industrial Out. ts.

A POTATO MARKETING PROJECT

This project has a four-fold purpose:

1. To appraise the economic losses caused by bruising and other defects.
2. To estimate costs and potential benefits to farmers involved in reducing bruising and other defects.
3. To determine the economic relation between the seed and table-stock outlets for North Dakota potatoes.
4. To evaluate the potential economic returns from other uses of low grade and cull potatoes.

Cooperation will be maintained with the North Dakota Agricultural Extension Service and with the Red River Valley Potato Growers' Association.

Leader: Perry V. Hemphill, Assoc. Agr. Economist

The Development and Testing of Equipment to Measure the Resistance of Potatoes to Bruising and Injury.

A POTATO MARKETING PROJECT

Bruises are the most common grade defect of potatoes. Types of equipment which have been developed elsewhere will be tested first and changes in design will be worked out so as to adapt these tests to both field and laboratory use. Such a device, if perfected, might be most useful in the timing of the best period for vine-killing, digging and picking and in testing the resistance of new varieties to injury. The research will be first directed to studying impact and pressure bruises; later abrasion injury will be studied.

Cooperation will be maintained with P. V. Hemphill, Associate Agr. Economist and with the research workers at the Potato Research Center at East Grand Forks, Minnesota.

Leaders: R. L. Witz, Assoc. Agr. Engineer
H. Mattson, Potato Breeder
Eunice Kelly, Human Nutritionist

Bacterial Ring-rot of Potatoes

A POTATO DISEASE PROJECT

The organism causing ring-rot of potatoes and certain other bacteria are frequently confused. The objective of this project is to develop rapid and certain techniques for indentifying the bacterial ring-rot organism in potato tubers and sick plant tissues. The research will also try to discover whether or not there is any relationship between the organism causing ring-rot and other micro-organisms in the plant tissues of the potato plant; also whether or not the presence of such other organisms found in the tissues of apparently disease-free potato plants do or do not threaten the acceptability of such potatoes for certification. The research will include also a general study of the physiology, life history, life cycle, and classification of *Corynebacterium sepedonicum*, the bacterium causing ring-rot of potatoes.

Leaders: C. I. Nelson, Bacteriologist
Wm. G. Hoyman, Plant Pathologist

Pricing and Storing Process in Marketing North Dakota Grains

A GRAIN MARKETING PROJECT

The objectives of this investigation are to determine the characteristics of the pricing process for the various types and grades of North Dakota grains; to trace the effect of various storage facilities and costs upon grain marketing practices in North Dakota; and to study the effect of various marketing practices upon producer prices and incomes.

Some of the questions which this investigation will try to answer are:

Are there significant consistent price differentials for the same kind and grade of grain between various localities? If so, what are the determining factors? How uniform are storage and handling charges? How do storage facilities and costs affect farmers' marketing practices? To what extent is grade and protein content of grain reflected in the prices farmers receive. And numerous other questions.

Cooperation will be maintained with the Cooperative Research and Service Division of the Farm Credit Administration.

Leader: Perry V. Hemphill, Assoc. Agr. Economist

Marketing Position of Farm Products Adaptable to Proposed Irrigation Areas in North Dakota.

AN IRRIGATION AND MARKETING PROJECT

This investigation conducted in cooperation with the Bureau of Reclamation will inquire into the relative priority in the markets for dairy products, vegetable, truck and canning crops, potatoes, sugar beets, beef cattle, sheep, alfalfa, and others giving attention to the following considerations:

1. Nature and capacity of local market outlets including home use.
2. Evaluation of the intermediate and national markets and the competition with other areas.
3. Determine for irrigation areas selected
 - (a) quantity and quality requirements for effective marketing
 - (b) facilities necessary
 - (c) historical and present price relationships, market differentials and transportation costs, as compared with other competing areas.

Leader: L. W. Schaffner, Asst. Agr. Economist.

The Malting and Feed Value of North Dakota Barley Hybrids and Varieties

A BARLEY "QUALITY" PROJECT

Barley variety trials are going forward at the Station at Fargo and at the Branch Stations. The crop is steadily becoming a more important source of income in the State. The quality of the barley produced determines its reception in the markets. In general substantial premiums are paid for prime malting barley. An extensive barley breeding program is under way at this Station. That program is now producing many hybrids which require testing for quality. New varieties produced elsewhere must be tested for their quality when produced under North Dakota conditions. This new project proposes to measure the suitability of hybrids and new varieties by determinations of the hull content, ease of removal of hull, protein content, diastatic power, and amount and character of malt extract.

Informal cooperation will be maintained with the Barley and Malt Laboratory at the University of Wisconsin, with the Midwest Barley Improvement Association, with the American Society of Brewing Chemists, and with the Dominion Grain Research Laboratory of Winnipeg, Canada.

Leaders: R. H. Harris, Cereal Technologist
A. J. Lejeune, Barley breeder
T. E. Stoa, Agronomist

The Effect of Durum Wheat Flour and Potato Constituents on the Staling of Bread.

A DURUM USE PROJECT

Durum wheat production is based largely upon marketing the grain for grinding into semolina out of which macaroni is made. Durum flour is, at present, largely a little demanded byproduct of semolina milling. If new uses can be discovered for durum flour not only could this byproduct flour command a higher price, but also some durum might be converted entirely into flour.

The opinion exists that durum flour causes bread to remain moist and soft longer, i. e., it retards staling. Cooked potato increases bread volume, improves color, and is said to improve keeping quality.

The objectives of this research project are to make exact tests using varying proportions of durum flour with hard red spring wheat flour. Similar experiments will be made with potato. Staling rates will then be determined.

Leaders: R. H. Harris, Cereal Technologist; L. D. Sibbitt and O. J. Banasik, Asst. Cereal Technologists; and G. M. Scott, Miller

Improvement of Sweet Clover

A FORAGE CROP BREEDING PROJECT

COUMARIN IS THE BETTER PRINCIPLE IN SWEET CLOVER

This plant breeding project will attempt to combine low coumarin content with suitable leafiness, stem fineness and maturity for North Dakota conditions in the breeding of a better sweet clover. Attention will be given to securing resistance, if possible, to the sweet clover weevil and to various diseases. Greater seed coat permeability is also one of the hoped-for objectives so as to reduce the proportion of hard seed.

This is a long-time project which will involve collection of useful breeding material, the making of crosses, the making of selections, and following through constantly with chemical analyses for the proportion of the coumarin or bitter principle in the sweet clover.

Cooperation will be maintained with the Division of Animal Industry and the departments of Botany and Plant Pathology.

Leaders: Wm. Sisler, Asst. Agronomist.
T. E. Stoa, Agronomist
C. O. Clagett, Agr. Chemist and Staff

"Black Chaff" of Wheat**A WHEAT DISEASE PROJECT**

This project proposes a systematic study of the fungus organisms causing black chaff of wheat. Measures of possible control will be tested. The sources of infection and spread will be sought, the relation of time of infection to the stage of development of the wheat plant will be investigated and the influence of weather will be studied.

Leaders: W. E. Brentzel, Associate Plant Pathologist
L. R. Waldron, Plant Breeder

The Growth Habits and Value of Native Legumes**A FORAGE CROP PROJECT**

A statewide survey will be undertaken to determine the abundance and forage yield of the principal species of native legumes in natural vegetation, the extent to which they are used by wild life and by livestock, and of the possibilities of cultivating some of them.

This investigation will include:

1. Determining the percentage of legumes in natural grassland vegetation.
2. Examining native legumes in natural vegetation for the presence of nitrogen fixing nodules.
3. Observing seedlings and the establishment of seedlings in natural vegetation.
4. Noting seed production of native legumes.
5. Transplanting and seeding native legumes. Seed supplies of native legumes will be built up for further investigation.

Cooperation will be maintained with the State Game and Fish Department and with the Soil Conservation Service.

Leaders: W. C. Whitman, Associate Botanist
O. A. Stevens, Botanist
T. E. Stoa, Agronomist

The Role of Cobalt in Swine Nutrition**A SWINE NUTRITION PROJECT**

Up to the present cobalt has not been found essential for the non-ruminant animal. Since, however, numerous mineral and salt mixtures are being sold for feeding to all classes of livestock, a well planned series of trials to test have been set up to test the effect of feeding cobalt carbonate to swine.

Leaders: W. E. Dinusson, Associate Animal Husbandman
D. W. Bolin, Associate Animal Nutritionist
Earl L. Lasley, Assistant Animal Husbandman

Economic Qualities of Outbred, Inbred, and Hybrid Chickens**A POULTRY BREEDING PROJECT**

The objectives of this necessarily long-time research are fourfold:

1. To develop inbred lines of poultry, the goal being to produce chickens genetically superior in economic qualities.
2. To test the combining ability of the inbred lines.
3. To determine the heritability of characters of economic importance.
4. To compare the performance of inbreds, hybrids, and outbreds in growth, viability, production and other economic qualities.

The work will be begun with one strain of White Plymouth Rocks that the Station has maintained as a closed flock for at least 20 years; and with a second strain of White Plymouth Rocks secured 2 years ago and maintained closed since their work with strains of New Hampshires is also contemplated.

Cooperation will be maintained with the Regional Poultry Testing Station, Purdue University, Lafayette, Indiana where the major part of the testing of the inbred lines will be done.

Leaders: R. L. Bryant, Poultry Husbandman
Kermit F. Schlamb, Poultry Husbandman
Earl L. Lasley, Asst. Animal Husbandman

Pasteurellosis

A POULTRY DISEASE PROJECT

The infectious disease of birds known as fowl cholera is caused by the microorganism, *Pasteurella multocida*. A study of this organism and investigations into the most practical methods of decreasing losses due to fowl cholera was reported upon by Dr. D. F. Eveleth, Veterinarian, Alice I. Goldsby, Assistant in Veterinary Science, and C. I. Nelson, Bacteriologist in Veterinary Medicine Vol. 44, No. 2, February 1949.

This new project proposes a further study of the course of this infection in mammals and in birds. Attempts will be made to learn more about the physiology and disease-causing character of the microorganism; to find out what factors make birds and animals susceptible to the disease and to develop treatments for the disease.

Leaders: D. F. Eveleth, Veterinarian
F. M. Bolin, Associate Veterinarian
C. I. Nelson, Bacteriologist

The Use of Protein-Vitamin Concentrates in Feeding Farm Laying and Breeding Flocks

A POULTRY FEEDING PROJECT

This experiment will test the relative effectiveness of a 20% protein mash, a 23% protein mash, a 27% protein mash, and a 31% protein mash, each fed with a free choice grain ration made up of 40% yellow corn, 40% wheat, and 20% oats in the feeding of White Leghorn and White Plymouth Rock hens. The rations are planned to use a maximum of North Dakota feedstuffs. All feeds will be analyzed for protein and vitamins, especially riboflavin and Vitamin A.

Leaders: K. F. Schlamb, Asst, Poultry Husbandman
R. L. Bryant, Poultry Husbandman
D. W. Bolin, Assoc. Animal Nutritionist

Determining the Effectiveness of Killed Virus Vaccine Against Newcastle Disease of Turkeys

A POULTRY DISEASE PROJECT

The use of a killed virus vaccine in chickens gives those birds a high degree of immunity or resistance against either natural or artificial infection with Newcastle disease virus.

Newcastle disease has appeared among North Dakota turkeys this year. The purpose of this experiment is to test the effectiveness of a killed virus vaccine in protecting turkeys.

Leader: F. M. Bolin, Associate Veterinarian

**Germination and Development of Common Annual Weeds:
Frenchweed, mustard, ragweed, marsh elder, lambsquarter,
pigweed, burning bush, prickly lettuce, pepper grass, catchfly,
wild buckwheat, and pigeon grass**

A WEED PROJECT

Because new chemical methods of weed control are coming into common use more information is needed about the stage of development of these weeds in order to be able to use the chemicals to the best advantage.

Observations will be made on fall germination, seedling development and survival as well as upon spring development.

Leader: O. A. Stevens, Botanist

Why does 2,4-D, the Weed-killer Kill Some Weeds and Not Kill Other Weeds and Economic Crops?

(Scientific title: Biochemical Action of Herbicides in Plant Enzymes)

A WEED PROJECT

This well-known weed-killer kills certain families of plants readily but has little or no effect upon other families of plants. If we can discover how it acts upon the physiology of the plant we should be able to predict more accurately the effect of these weed-killers upon a greater variety of plants than have now been tested. If the method of action upon plants can be more fully understood it should be possible to tailor-make weed-killers better suited to the job.

**Leaders: C. O. Claggett, Agr. Chemist and Assistants
E. A. Helgeson, Plant Physiologist**

Control of Insect Pests of the Household and of Industrial Buildings.

AN INSECT CONTROL PROJECT

Many new insecticides are coming on the market. This project will test their usefulness in controlling household and industrial insect pests. Observations will be made upon how long after treatment the newer insecticides are effective. Special attention will be given to the mothproofing possibilities of the new insecticides.

Insects whose control will receive attention in this project are such household insects as roaches, silver fish, carpet beetles, and clothes moths, and others.

The leader will cooperate with the City Health Departments of Fargo and other municipalities, and with the owners of infested premises who may be willing to cooperate in a study of the killing and lasting effects of the newer insecticides.

Leader: R. L. Post, Associate Entomologist

Tests of a Fog-Making Machine in Application of Insecticides.

AN INSECT CONTROL PROJECT

Through a grant of funds from Mr. John J. Dwyer an extensive test of the Todd (TIFA) Fog Generator is underway. Tests including experiments on the control of mosquitoes, on the control of sweet clover weevil, of cankerworms on trees, of roaches, of field crickets, and of grain aphids have been tried using the recommended insecticides in each instance. A summary of the results of these tests will be published at the close of the season.

**Leaders: J. A. Munro, Entomologist
R. L. Post, Associate Entomologist**

Farm Management and Organization of Typical Dry-Land Farms in Proposed Irrigation Areas

AN IRRIGATION AND FARM MANAGEMENT PROJECT

This project, to be conducted in cooperation with the Bureau of Reclamation of the U.S. Dept. of Interior, undertakes a budget analysis of various typical non-irrigated farming systems now prevailing in selected proposed irrigation project areas in the State. Out of these analyses it is hoped that suitable methods may be developed for estimating the probable effects of various farming systems under irrigation, especially as regards farm size, labor and capital requirements, gross and net returns per acre and per farm family and the effect upon land value.

Leader: L. W. Schaffner, Asst. Agr. Economist

Changes in Farm Population as Affecting Living Standards and Rural Institutions

A RURAL LIFE PROJECT

The farmer, his wife, and family are not only making a living on the land but they also live amid rural surroundings. The population of a community affects the level of living, the social activities, and the maintenance of the rural institutions such as the church, the school, and service enterprises.

The object of this investigation is fourfold:

1. To determine the differences in population numbers and age and sex composition of rural farm and non-farm population by minor civil divisions. (Examine census data for 1930, 1940, and later if possible)
2. To estimate prospective population outlook in different population groups and in representative areas, particularly with respect to school enrollment and school district organizations.
3. To determine the effect of different age compositions in rural areas upon the rate of retirement of farmers from active farming and the opportunity for younger farm families in those areas.
4. To determine the relationship between population composition; major rural institutions and levels of living.

This project will be conducted in cooperation with the Bureau of Agricultural Economics, USDA.

Leader: Rainer Schickele, Chief Agr. Economist

JULY MILK OUTPUT DOWN IN NORTH DAKOTA WHILE U. S. MILK OUTPUT INCREASES¹

July milk production slumped in North Dakota, although in the U. S. as a whole it increased.

According to USDA figures from the bureau of agricultural economics, North Dakota milk cows produced 199,000,000 pounds of milk in July, 1949, a decrease from the 212,000,000 pounds in July of 1948. Both figures are far below the 10 year (1938-47) average for July of 246,000,000 pounds.

Nationally, however, the trend is the opposite, U. S. milk production climbing from 11, 514,000,000 pounds in July 1948 to 11,544,000,000 pounds in July, 1949. Both figures are an increase over the 10-year average for July of 11,422,000,000.

For the same month North Dakota egg production eased slightly, from 4,435,000 in July 1948 to 4,334,000 in July 1949. U. S. production for those comparable months dropped from 50 to 48 million.

(¹Condensed from figures of USDA bureau of agricultural economics, Fargo.)