Five Year Program of Agricultural Research

By H. L. WALSTER, Director

I **PROPOSE to review briefly** the record of accomplishments of the Station and Substations in the last five years. In the course of that review it is hoped to establish the fact that agricultural research conducted in North Dakota by the Agricultural Experiment Station, its Substations, and its cooperating agencies has enabled North Dakota farmers to earn more, to reduce costs of production, to save and prevent waste, to ease the burden of farm labor, and to reduce their risks. Only those who have used the findings of the Station can have been thus benefited. The big job of carrying out findings to the farms of North Dakota is carried by the Extension Service through its county agents and extension specialists, through the state system of vocational agricultural education in the high schools of the State, through the cooperation of the State AAA committee and its statewide agencies, through the cooperation of the weekly and daily press, the radio broadcasting stations, and the agricultural journals which circulate in the State. Federal agencies with considerable personnel in the State such as the Soil Conservation Service and the Farm Security Administration are always alert to see to it that their clients avail themselves of the new ideas, new seeds, etc., originated by the Station. The Station itself publishes its findings in bulletins, and maintains a Bimonthly Bulletin in which matters of current interest and recent progress are reported. The present mailing list of the Bimonthly Bulletin is 5894; so that it probably reaches directly less than 10 percent of the farmers of the State. There are serious difficulties in maintaining a free mailing list because federal postoffice requirements insist upon an annual revision based upon requests for its continuance. The Bimonthly Bulletin has been popular. We wish we could extend its distribution but if that is to be done, substantially larger sums will have to be expended and the personnel of the Information Service increased.

Serving The Poultry Industry

Let me begin with what some have regarded as an insignificant industry in North Dakota, the poultry industry.

In 1942 the total cash income in North Dakota from livestock and livestock products marketed was $129,219,000, of which poultry and poultry products contributed $19,187,000, or nearly one sixth of the total. The total cash farm income of crops and livestock and livestock products in 1942 exclusive of government payments was $306,604,000, of which the poultry income was roughly one-fifteenth of that amount. The poultry industry has been a home industry, receiving in most instances major attention from only a few men. The recent establishment of a State Poultry Improvement Board has done much to help the industry. Figures which I have used are all from the volume of Agricultural Statistics for 1943 published by the United States Department of Agriculture.

Since the poultry industry is so tremendously important, the Experiment Station has devoted much of its time to that industry. It has never had a large department, at no

time the equivalent of more than one full-time man devoted to research, plus such practical helpers as could be obtained. During the past four years the department has published seven Experiment Station Bulletins. Four of these bulletins relate to turkey production and three are on the subject of feeding chickens. This would be quite a record for a larger department but for a small department it is quite remarkable.

Proso Millet Found Equal to Yellow Corn for Chickens and Turkeys

We believe that the results of the experiments on feeding proso or grain millet to chickens and turkeys reported in Bulletins 303, "Turkey Feeding," and 329, "Comparison of Proso Millet and Yellow Corn for Feeding Laying Hens," are worth many times more to the industry than the entire amount spent on poultry research since the establishment of the poultry department. Yellow corn has been rated high in feeding value and many poultry men have pinned their faith solely on yellow corn. No poultry ration was considered complete without it. At times during the past two years, yellow corn has not been available and since the work at the Experiment Station has shown that proso millet could replace yellow corn pound for pound in chicken and turkey rations, poultry men have accepted it and have not been disappointed. Many Eastern feed manufacturers are now using it in commercial feeds. This pioneer research has been of tremendous value to the poultry industry and it has been of even more value to the grain farmers who produce increasing acreages of proso each year. As recently as July, 1944, this Station has been praised by the United States Egg and Poultry Magazine for its work on proso. Unpublished results show that when turkeys were fed a large number of feeds under a free choice system throughout their growing period, the highest feed consumption was the proso millet. One-fourth of the total feed consumed was proso. Turkeys demonstrated a marked preference for this feed especially after they were 16 weeks old. Speltz, or emmer as it is more rightly called, is another feed which our results indicate worthy of further consideration.

Shrunken Wheat Good Poultry Feed

Another investigation by the poultry department that has helped the grain farmers as much or more than the poultry raisers was one that has shown that shrunken wheat, 40 pounds to the bushel, is as good for poultry as is plump wheat. It is certain that money spent on these shrunken wheat investigations has been repaid a thousand fold or more.

Bolstering the Turkey Industry

Turkey production has declined recently in North Dakota for a number of reasons; one has been the difficulty in obtaining poults. Bulletin 317 published by this Station in 1942 has indicated some of the problems likely to be encountered in our own incubation of turkey eggs. Other experiments on feeding turkeys published in Bulletin 328 in 1943 have demonstrated that the feeding of regular growing mash with whole grains fed separately produced the heavier toms and hens after an 8-week finishing period, and at the lowest cost of feed per pound of gain. This experiment demonstrated the more complicated ration and laborious feeding of wet mash were not necessary for finishing turkeys to the highest degree. The Station has underway through the reorganized Veterinary Department and with the cooperation of the Bacteriology Department and the Poultry Improvement Board a program for the eradication of the Pullorum disease of turkeys.

Poultry Management Investigations

The poultry department has also, during the past five years, given much attention to enabling the poultry producer to save and prevent waste. Investigations reported in Bulletin 303 on feeding of mash in pellet form to growing turkeys indicated the advantage of that method. Birds produced were heavier, of better market finish, and more free from pin feathers than those fed the mash in dry loose form.

A circular prepared by Mr. Goodearl was issued showing the poultry producers how to construct feed hoppers, waterers, electric water

heaters, nests, catching and carrying coops, and rain shelters.

Several experiments with both chickens and turkeys have demonstrated that the birds themselves will do a good job of mixing the necessary ingredients if the feeds are offered them, that it is not necessary to spend time and money mixing ordinary farm-grown feeds.

The Experiment Station Poultryman cooperates with the College and Extension poultry staff annually in a school for chicken flock selectors and pullorum testers and a school for turkey flock selectors and pullorum testers. It cooperates with the Veterinary Department of the College and Station and with the North Dakota Poultry Improvement Board. Other subdivisions of College and Station also cooperate. In August, 1944, 75 hatcherymen attended a five-day school for chicken flock selectors and we have had annually a two-day school for turkey flock selectors.

The Poultry Husbandry Department of the Station was in charge of Mr. George P. Goodearl for nearly ten years. In May, 1944 he was succeeded by Dr. Jesse E. Parker of the University of Tennessee. New poultry husbandry research projects now under way include the following:

Bankhead-Jones 31—Efficient Utilization of Farm-Produced Feeds by Laying Hens.

Purnell 124—The Use of Artificial Insemination in a Chicken Breeding Program.

State Project—Reproduction in Broad Breasted Bronze Turkeys.

Animal Industry

The livestock and poultry work in the Experiment Station and the School of Agriculture is headed up by a Chief in Animal Industry in the person of Dr. John H. Longwell, who joined our staff July 1, 1941. The Division of Animal Industry consists of the department of Animal Husbandry (beef cattle, swine, sheep and horses), the department of Dairy Husbandry (dairy cattle and dairy manufacturing), Animal and Human Nutrition, Poultry Husbandry, and Veterinary Science. Since Dr. Longwell joined the staff the department of Animal Husbandry has completed two experiments begun by Professors E. J. Thompson and the late J. H. Shepperd, one on the breeding of ewe lambs and the other on cross-breeding of beef cattle. The results of the lamb breeding experiment were written up by Dr. Longwell in Bulletin 316 published in June, 1942. Those results proved that breeding young ewes to drop their first lambs at one year of age was not as good a practice as delaying first breeding until the ewes were eighteen months old, to lamb at two years.

The several years work on the cross-breeding of Aberdeen-Angus and Shorthorn cattle showed no significant improvement as compared with purebreds. Results of the experiment were statistically analyzed by Dr. Longwell in his article in the Bimonthly Bulletin, Vol. V, No. 3, published in January, 1943.

Sheep and Hog Feeding Experiments

Under the leadership of Longwell the following new experiments were begun and completed in the last three years:

1. A lamb feeding trial at the Williston Substation in which three rations, (a) grain and crested wheat hay, (b) grain, protein supplement and crested wheat hay, and (c) grain and alfalfa hay, were compared. This trial emphasized, (a) the need to supplement grain and grass hay with protein, (b) the value of alfalfa hay for fattening lambs and (c) the practicability of lamb feeding in the Williston area. Superintendent W. H. Huber of the Williston Substation had immediate charge of the experiment. Results were published in the Bimonthly Bulletin in Vol. IV, No. 5, May, 1942.

2. Pig feeding trials at the Williston and Edgeley Substations in which cereal grains alone and cereal grains supplemented with proteins, minerals and vitamins were compared. These trials demonstrated (a) the need to supplement cereal grains for pigs and (b) the value of corn, wheat and barley, properly supplemented, for growing fattening pigs. Superintendent W. H. Huber of the

Williston Substation and Superintendent J. P. Tiernan of the Edgeley Substation had immediate charge of the experiments at the respective substations. Results were published in the Bimonthly Bulletin Vol. 6, No. 4, March-April, 1944.

3. Compared a simple low cost mineral mixture with complex, expensive minerals for growing pigs. The results indicate a slightly higher value for the simple mixture. Results published in Bimonthly Bulletin, Vol. 6, No. 4, March-April, 1944. The experiment was in active charge of Al Severson, formerly Associate Animal Husbandman.

4. Compared a ration consisting of equal parts dehydrated potatoes and yellow corn with a ration of yellow corn only. Both rations were supplemented with protein and mineral. The potato ration was substantially equal to the corn ration. Substituting more than half potatoes for corn was found unsatisfactory.

5. Compared copper sulfate, phenothiazine, tetrachlorethylene, and arsaformin as worm remedies in lambs. Found (a) copper sulfate and phenothiazine effective in removing worms and (b) that a liberal quantity of a balanced ration is more effective than medication. Further more extensive experiments on internal parasites of sheep are now being conducted in the Department of Veterinary Science by Dr. Eveleth.

6. Fed three grades of wheat which had been stored for three years to fattening pigs. No differences were found in feeding value nor in palatability. This experiment was conducted in cooperation with the AAA. Wheat of different periods of storage was provided from the federal wheat storage bins at Jamestown.

Other activities of Dr. Longwell during the past three years have been the annual grading in and grading out of the steers used in the grazing trials conducted cooperatively with the Office of Dry Land Agriculture, Bureau of Plant Industry, Soils and Agricultural Engineering, United States Department of Agriculture, at the Northern Great Plains Field Station at Mandan, North Dakota. As Chief of the Division of Animal Industry he has worked with the Extension Animal Husbandman, Mr. M. H. McDonald, in preparing circulars and bulletins on improved production practices in livestock production, prepared weekly news items on timely information related to improved production practices, assisted in the preparation of about 25 radio broadcasts in the past year, attended meetings of 15 county livestock associations in the last two years, and has written annually about 450 letters to farmers on production and livestock marketing problems.

Dr. Longwell devotes fully half of his time to non-Station duties including the teaching of courses in Animal Husbandry, an introductory course for the general student in Human Nutrition, which course has been widely elected by both men and women, and has served as chairman of the College curriculum committee.

As chairman of the Production Goals Committee of the North Dakota Agricultural Advisory Council, he, Mr. T. E. Stoa, Station Agronomist, and other members of the Station's staff have devoted much time to making the State recommendations to the AAA as to desirable crop and livestock goals under these war-time conditions. The Department of Animal Husbandry needs additional staff members. Mr. M. L. Buchanan, a graduate of Oklahoma Agricultural College with post-graduate work at the University of Wisconsin, joined the staff of the Station and School of Agriculture on January 1, 1945. He will take over some of the elementary instruction and responsibility for the conduct of experiments, and will initiate experimental and instructional work in animal genetics and breeding.

Fighting Animal Diseases—The Work of the Veterinary Department

Just as the entomologist and the plant pathologist devote their energies to fighting insect pests and disease, so, too, do the veterinarians. On November 1, 1943, we greatly strengthened our Department of Veterinary Science by employing Dr. Donald F. Eveleth.

During the past year the Veterinary Department has written 1375 letters to inquiring farmers, ranchers, and veterinarians. The diagnostic laboratory has made examina-

tion of 2504 specimens of animals and fowl. A full-time laboratory technician, Miss Alice Goldsby, has been employed. The Veterinary Science building has been rehabilitated, a flying loft for pigeons has been built, a brick chimney and concrete surroundings were provided for the incinerator, and a post mortem room has been constructed in the veterinary barn.

The department has experimented with worm remedies under farm conditions. Treatments for control of sheep parasites have been tested under farm conditions near Bowman and Scranton in Bowman county, near Hettinger in Adams county, near Mandan in Morton county, near Price in Oliver county, near Garrison in McLean county, near Sawyer in Ward county— all points in the western part of the state. Flocks have been experimentally treated near Fairmount in Richland county; near Lisbon in Ransom county; near Fargo, Davenport, Durbin, Casselton and Wheatland in Cass county; near Buxton and Hillsboro in Traill county; near Hope in Steele county and near Pisek in Walsh county—all in the eastern part of the state. The Department expects to devote at least another year to complete the picture for the entire State.

During the past year Dr. J. O. Foss and Dr. D. F. Eveleth have published a significant paper on "Vitamin A deficiency in the production of pregnancy disease of sheep", and more recently Alice Goldsby and Dr. Eveleth have published a survey of the distribution of species of gastro-intestinal parasites of sheep in this State and adjacent areas.

In cooperation with North Dakota poultry improvement, the Station veterinarian and his staff are conducting a research and testing program aimed at the eradication of pullorum disease in North Dakota turkeys. The pullorum antigen being used in this program is being prepared in the Bacteriology Department under the direction of Dr. C. I. Nelson. The cooperative poultry disease diagnostic work is in cooperation with the Extension Service, the Livestock Sanitary Board, the Poultry Improvement Board, producers and hatcherymen. It is aimed at improvements in the quality of chicks put out by hatcheries and is being well received.

The department noted the appearance of a disease of ducks and turkeys that has not been commonly reported. Controlled experiments are being conducted on intradermal vaccination against brucellosis in the cattle in the NDAC herd.

A detailed report of the work of the veterinary diagnostic laboratory appears in the September-October, 1944 issue of the Bimonthly Bulletin of the Station. This story of research will be continued in future issues in which the work of other departments will be described.

Linseed Oils—Because of increased military requirements for linseed oil and the uncertainty of receiving sufficient imported flaxseed, the WFA has amended WFO No. 42a, reducing from 60 to 50 percent (of 1940-41 use) the quantity of oils to be used in manufacturing protective coatings, coated fabrics and floor coverings. The order is effective for the first calendar quarter of 1945, and will have to be continued until conditions change. The 1944 crop of flaxseed was approximately 50 percent of the 1943 crop. Congress has appropriated $30,000,000 to be used in an endeavor to increase production of flaxseed in 1945. This seed, however, will not be available until next fall. Press Release USDA (156-45)