



NORTH DAKOTA Farm Research

Bimonthly
Bulletin

Vol. 39, No. 3

November-December, 1981



Guest Column



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Chairman

Department of
Animal Science

Animal agriculture serves human needs by providing nutritious food products and a variety of useful by-products including clothing, pharmaceuticals and cosmetics. Three-fourths of the protein, one-third of the dietary energy, most of the calcium and phosphorus, and substantial quantities of essential vitamins and other minerals in the American diet are from animal products.

The American consumer depends on animal products to meet many nutritional and personal needs at a reasonable cost. Previous accomplishments in animal research have made this possible. For example, during the past 25 years, milk production per cow has doubled, beef marketed per breeding female has increased 150% on a live weight basis, feed needed to produce a pound of broiler chicken has been cut in half and pork production per breeding female has increased about 25%.

Agricultural and livestock research is the foundation for improving the quality and cost of food available to the consumer. Nationally, public support for animal research has declined, even though it has been demonstrated that the dollars put into livestock research make an average return of 46% annually. Agricultural research requires from five to seven years before resulting in an increase in output. Certain areas of basic research require two or three times longer than applied research to produce results.

In the production and utilization of food from animals, certain fundamental processes occur. Every species reproduces; feed is converted at varying efficiencies into body tissue or products such as milk and eggs, and all products must go through a processing, marketing and distribution system. For animal agriculture to become more efficient in order to provide the world's population with animal products, increased support in several areas of research is necessary.

Recognizing the need for innovative research programs, an intersociety research committee was formed in 1978 by the American Dairy Science Association, the American Meat Science Association, the American Society of Animal Science and the Poultry Science Association. The committee's assignment was to develop a comprehensive research plan for the animal sciences. As the committee studied this challenge, com-

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On the cover: Meats laboratory facilities at NDSU are used for both research and instructional purposes. In this issue, Clayton Hauge gives an overview of research work in the animal sciences. Photo by James Berg.



Vol. 39, No. 3 **November-December, 1981**

A BIMONTHLY progress report published
by the

**Agricultural Experiment Station,
North Dakota State University of
Agriculture and Applied Science**
Fargo, North Dakota 58105

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of Agricultural Experiment Station*
EDITOR

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NDSU entomologists hope to receive some within the next few years. The leafy spurge hawk moth was tested in Nebraska (Forwood and McCarty, 1980) and South Dakota where it fared poorly. The USDA, as well as Canadian researchers, are currently testing the spurge borer, *Oberea erythrocephala* (Schrank), a long-horned beetle. In addition, the Canadians are testing several European species of flea beetles the larvae of which feed in the roots of leafy spurge: viz. *Aphthona cyparissiae* Koch, *A. czwalinai* Weise, and *A. flava* Guillebeau. In addition, they hope to collect and screen two species of caterpillars, *Lobesia* sp. and *Clepsis* sp., and two gall producers, *Dasyneura* sp., a gall midge, and *Eriophyes* sp., a gall mite.

Although the initial investment for biological control of weeds is costly, successful introductions have proved economically worthwhile.

Acknowledgments

The authors sincerely wish to acknowledge the cooperation of the following persons: Dr. Paul H. Dunn and Mr. Jerry Johnson of the USDA, Biological Control of Weeds Laboratory, Albany, California, supplied insects and advice on rearing for releases involving musk thistle. Dr. Norman Reese, USDA, ARS, Rangeland Insect Lab. Bozeman, Montana, hosted and conducted a field trip for collecting *R. conicus* for releases on musk thistle. Dr. P. Charles Quimby, Jr. USDA, Southern Weed Laboratory, Stoneville, Mississippi, tested and supplied specimens of *D. glabrata* for release on pigweed. The following cooperators permitted us to make releases of insects and/or place cages on their property: Mr. Paul Horn, Mrs. Sodderholm, Mr. Harlen L. Grovom, and Mr. Robert Nowatzki, former Superintendent of the Langdon Experiment Station.

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Figures

Figs. 1-4. Adults of beetles that feed on weeds in North Dakota. 1. Seed feeding weevil, *Rhinocyllus conicus* (Froelich) and 2. Root and lower stem thistle weevil, *Ceutorrhynchidius horridus* (Panzer), both in-

roduced against musk or nodding thistle. 3. Pigweed flea beetle, *Disonycha glabrata* (Fab.) introduced against rough or redroot pigweed. 4. *Chelymorpha cassidea* (Fab.), the argus tortoise beetle, a native species that feeds on bindweed.

continued from Guest Column

mittee members realized that an interdisciplinary approach was required — an approach involving more than animal scientists alone. A steering committee was formed to design a national conference on "Animal Agriculture: Research to Meet Human Needs in the 21st Century." During May, 1980, 210 producer and industry representatives, nutritionists and political scientists convened at Boyne Mountain, Michigan. Following are the research priorities presented by the American Society of Animal Science for discussion at this meeting.

- Improving reproductive capacity.
- Identification of cellular mechanisms controlling the synthesis of animal proteins and lipids.
- Beneficial manipulation of microflora in the intestinal tract.
- Genetic engineering for production traits in disease resistance.
- Increased utilization of cellulose.

These five research areas are similar to research priorities identified by livestock producers in North Dakota. Some of you will be quick to point out that one major area of concern is missing and that is the concern of animal health and animal behavior. Needs in this research area have been prioritized by others and were not included in the American Society of Animal Science thrust area. The same is true of the food processing and acceptability. There is much need to develop technology for conserving animal products for human consumption and minimizing energy, water, product distribution and marketing costs. We must also develop rapid methods for assessing product quality and safety and expand basic research to resolve problems associated with flavor characteristics, microbiological spoilage, safety, appearance and meat tenderness.

Research presently underway at North Dakota State University relates to the priority items which have been indicated. We are presently evaluating our research pro-

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Acknowledgments

In summary, the results of this study of the microbial environment of the calf with diarrhea indicate a reservoir of potentially pathogenic *E. coli* strains in barnyard soils contaminated with bovine feces. Investigation of the pathogenic properties of these strains demonstrated the presence of K99 pili in such strains. Furthermore, strains were isolated from diseased calves that bore both K88 and K99 pilar antigens that are associated with the ability of *E. coli* to cause disease in newborn calves.

Funds for this study were in part provided by the North Dakota Beef Commission, 107 South 5th Street, Bismarck, N.D. 58505, and by funds made available under Public Law 95-113, Section 1443 (Formula Funds). Our thanks go to H. W. Moon of the Animal Health Center, Ames, Iowa and to Steven Clegg of the University of Iowa, Iowa City, Iowa for their generous gifts of the typing sera used to confirm the results of this study.

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grams and are redirecting some of our resources to speak more directly to some of the short range problems. Promotion of nutrition misinformation is presently on the upswing. The department is presently determining the nutrient composition of meat from different species of animals, both in the raw and in the cooked form. The means to combat deceptive nutrition information which capitalizes on people's fears (of feed or food additives, pollution) and hopes (of freedom from disease, increased longevity) is a difficult task.

The basis for all of animal agriculture is grass. Producers often take for granted production of the optimum kinds and amounts of forage necessary for red meat and wool production for the livestock industry. North Dakota has approximately 13 million acres classified as native range. An increased effort is underway which will assist North Dakota livestock producers in the management of this resource. The complex relationships which exist between forages, soils, animals and weather mandate that an interdisciplinary approach is necessary to answer the appropriate research questions. Production and management research relating to each of the species, beef cattle, dairy cattle, sheep, swine and poultry, will be continued as in the past but with some redirection of effort.

I would like to close by mentioning some observations about research which were discussed by Dr. Roy Arnold of the Nebraska State Agricultural Experiment Station.

- A. Research seeks answers to questions or problems.
- B. Questions or problems which guide research come from a wide variety of resources.
- C. The nature of the answers sought ranges from fundamental knowledge to practical information.

- D. Answers cannot be predicted accurately in advance (if the answer is known the research is not needed).
 - E. Sometimes a research project does not provide an answer or a result.
 - F. Sometimes surprises occur which may lead research into new, exciting and productive directions.
 - G. Research takes time, requiring both ideas and effort.
 - H. Research costs money.
 - I. Research can't be turned on and off at will.
 - J. Like other facets of human enterprise, time spent planning research pays big dividends.
 - K. Research is of no value to society if no one knows about it.
 - L. In biological systems, variation is a fact of life.
 - M. It follows that replication is necessary for a single observation does not establish a fact.
 - N. Variables which influence agriculture and other biological systems are numerous and complex inter-relationships exist among these variables.
 - O. Biological systems adapt and change; new problems emerge over time.
 - P. Increasingly, research projects require team effort and broad integrated approaches.
 - Q. The nature of urgent problems cannot be predicted in advance or some flexibility in research programming is needed.
 - R. It is important not to lose sight of long range goals and not divert effort totally to shorter range problems.
 - S. Scientists are a lot like people.
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Agricultural Experiment Station
NORTH DAKOTA STATE UNIVERSITY
of Agriculture and Applied Science
University Station
Fargo, North Dakota 58105
Publication

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