ANIMAL SCIENCE

Clayton Haugse, Chairman

Many changes have taken place in the College of Agriculture during the past 22 years. Although similar changes have taken place in the Department of Animal Science, the mission and the goals of the department remain relatively similar. The research mission of the department is to conduct organized research through the Agricultural Experiment Station in the biological and physical sciences which will contribute to the advancement of the agricultural industry and improve the economic and social conditions of rural families and communities.

From a professional staff numbering five in 1956, the department has increased to 22 positions. In 1956 the Animal Husbandry Department was housed in Morrill Hall. After completion of Walster Hall in 1962 the department moved to the third floor of this new Ag Science building. In 1964, the Poultry Department was combined with Animal Husbandry and we became the Animal Science Department; in 1966, the Dairy Department became a part of Animal Science. Some of the staff from Animal Science remained housed in the dairy building until an exchange of space was made between horticulture and animal science in 1975. The department's most recent move occurred in December 1977 when the department moved into Hultz Hall.

The livestock barns were moved from campus to their present location from 1948 to 1952. Research work with certain classes of livestock continued on campus until the completion of the research center in 1959. This facility provided space for research work with swine, sheep and beef cattle, along with a feed processing plant. In the fall of 1969, a beef confinement unit was completed which provided the opportunity for cooperative work with Agricultural Engineering.

In the fall of 1959 , the Poultry Research Center burned and a new building was requested. This new facility was completed in 1962, and provided the opportunity for work with laying hens, chicks and turkeys in nutritional and animal breeding experiments. In the last two years, this unit has been modified to provide the opportunity for small animal research work and experiments to obtain information on digestibility and metabolism of feedstuffs for all classes of livestock.

Shepperd Arena was built in 1952 containing teaching and slaughter facilities. In the early 1970's a request was made to remodel the meat cutting facilities to meet the federal requirements for a slaughter facility. This two-phased construction was completed in 1975, providing additional space and facilities for both teaching and research activities for meats projects.

The dairy department was combined with the Department of Animal Science in 1966. Remodeling was initiated for a portion of the dairy barn in 1969, providing the opportunity for a different management program and new facilities for milking and processing of milk. We are presently remodeling and constructing a new wing to the dairy unit, providing the opportunity for loose housing and nutritional studies with calves, replacement heifers and lactating cows. This facility will be completed in 1978.

The Animal Science Department along with individual staff members have worked very closely with the livestock organizations in the state. Individual staff members have worked very closely with various breed organizations assisting them in their program development. In 1962, the North Dakota Beef Cattle Improvement Association was incorporated. The goals of this organization are to increase performance testing of beef cattle and identify sires that produce offspring with desirable meat characteristics. The Animal Science Department has been responsible for computer programming and record processing for livestock producers who are members of this organization. Both Extension and Experiment Station staff have contributed to the success of this organization.

In 1972, the North Dakota Pork Council was established. This organization is affiliated with the National Pork Council. Again staff members in both the Cooperative Extension Service and the Agricultural Experiment Station have assisted the pork producers in North Dakota in developing their program and achieving their goals.

Research goals for the Department of Animal Science are to 1) provide a highly competent research staff, adequate facilities and other support for the conduct of research programs of excellence which are in keeping with the overall objectives of the department and the Experiment Station; 2) conduct basic and applied research leading to new knowledge and improved application through existing knowledge for the benefit of the scientific community and animal agriculture; 3) provide scientific training and research experience to prepare developing scientists for leadership roles in a scientific community dealing with the development of new knowledge, both basic and applied, which relates to animal biology and production of livestock products; 4) more clearly define the biological processes involved in ani-

mals utilized in the production of meat, dairy and poultry products; 5) improve the quality, safety and variety of animal products to the consumer; 6) develop methods for improved utilization and conservation of natural resource inputs in animal agriculture; 7) define more efficient systems of livestock production that lead to reduction in the real cost of producing animal products; 8) maintain programs that contribute to interdisciplinary approaches to improve balances between the supply and demand, resource utilization, marketing efficiency and environmental quality; and 9) maintain programs that provide excellence in research training and experience for graduate students and visiting scientists.

Much of our research effort has been directed toward determining the best use of North Dakota grown grains and forages in production of meat, milk and eggs. Research results have provided the information for proper supplementation of protein, vitamins and minerals with North Dakota grown products. An indication of the research results can be indicated by titles of theses by students for M.S. and Ph.D. degrees. Examples of some of these publications in these areas of research are as follows: "A comparison of protein supplements to barley and oat rations for swine" (LaDon Johnson); "A study of the effects of various levels of cobalt with and without vitamin B_{12} in growing fattening swine" (George Strum); "Fiber protein energy relationshps in rations for growing fattening swine" (Dean McElroy); "Protein energy relationships in the laying diet for chickens" (George Olson); "The effects of lysine additions to barley rations for swine" (Duane Erickson); "The apparent digestibility of barley, oats, corn, alfalfa hay, brome hay and upland prairie hay by sheep" (Arthur Stewart); "Determinations of the chemical and physical composition of rumen digesta from sheep fed selected feeds" (Duane Erickson); "Nutritive value of feedstuffs"' (Howard Casper); "An evaluation of potato pulp and wheat bran for swine" (Wilfred Rosencrans); "Magnesium requirement in metabolism of the laying hen" (Raja Hajj); "The effect of protein level and lysine additions on the performance of swine" (Bert Moore); "Forage digestibility as affected by physiological growth stage" (Dale Ferebee); "The availability of magnesium from foodstuffs" (William Guenther); "Utilization of barley by early weaned pigs" (John Roers); "The effects of rations made up of different levels of alfalfa, barley or oats and calcium level on the digestibility in sheep" (Olafur Gudmundsson); "Ergot effects on ruminants" (Bert Moore); "Nutritive values of sedge, Kentucky bluegrass, blue grama, big blue stem, and little blue stem from the Sheyenne National Grasslands" (Luis Tenesaca); "An evaluation of molasses beet pulp and pigeon grass for steers" (Jesus Hernandez); "Effects of feed grade animal fat on efficiency of energy utilization by laying hens" (Farouk Horani); "The use of sunflower hulls in ruminant animal rations" (Myron Gross); "An evaluation of pigeon grass seed screenings as a substitute for barley in sheep rations" (Yoosef Rashid); "Nitrogen fractions in native range grasses as affected by fertilizers on growth stages" (Metha Wanapat); "Nutritional value of oats corn and sorghum cultivars for forage" (Kevin Koehn).

Other information has been published characterizing the live and carcass characteristics in slaughter lambs and in beef cattle; variation and tenderness in muscles in beef cattle and swine; the use of ultrasonics in live animal evaluation; the effect of breed, sex, age and weight on selected body measurements and calving difficulty in beef cattle; the productivity of selected crosses of sheep and related production and management recommendations for sheep producers; the influence of fasting and lactation length on swine reproduction; compensatory growth in large type turkeys; and feeding sprouted wheat or durum for fattening of cattle, swine and turkeys.

The day to day activities of an animal scientist involve a large number of organized commodity interest groups, subsector groups, public institutions and agencies. Whether the motivation of an animal scientist is rooted in science — purely for the love of it, for helping people, or solving world food problems; in a love of watching cattle or sheep grazing on grass; in thinking that pigs are beautiful; in the enjoyment of eating fried chicken, turkey, steak or eggs; or in the enjoyment of pets because of a belief that they are nicer than people — whatever motivates the animal scientist, the future crisis in the education of animal scientists for research activities will come in three areas. First, in attracting, identifying and serving animal science students; second, in communicating and appealing to all animal scientists in the world concerning a movement to solve the problems of the profession rather than sitting idly by and hoping that these problems will go away; and third, in creating and/or maintaining a favorable image for the profession and for 'animal products' in the eyes of the general public.

The future student in animal science will be influenced by both national and international affairs. Students will be far better informed due to worldwide communications capabilities. I expect that the percentage of nonfarm background students will increase. Our students will have had less background or contact with animals and less practical livestock experience than students in the past.

When the American Society of Animal Science was first founded students were predominately men of farm or rural origin. Now, 35% of the students are women and more than 50% are of nonfarm origin. In our early history, students were essentially nonmobile and pursued education in their state of origin. This has changed very significantly.

In the future it will be necessary that we have more hands-on involvement by students working with animals because of their nonfarm background. The use of closed circuit television tapes and the use of telelectures represent adjustments that can be made in the teaching program to add new dimensions to the classroom. Meaningful management internships with a variety of livestock operations will be a part of the instructional programs. Within the past decade there has been an increase in the use of the computer for simulation exercises in the genetic selection and in ration formulation phases of teaching animal science. Computer use will continue to expand as techniques are developed in other decision making areas.

One of the greatest concerns that exists for animal scientists is the negative publicity about the use of certain animal products in our diet. Information on the nutritional composition, processing, storage and preparation must be developed for use in grade school and high school courses and for communicating with people who are not livestock oriented.

The animal scientists of the future will face many challenges but I believe they will make many contributions and perform an outstanding service to mankind.

BACTERIOLOGY

Kenneth McMahon, Chairman

A review of the research that is being conducted by members of the Department of Bacteriology shows the emphasis that is being placed on agricultural and environmental microbiology. From the extensive research in public health that was done by the late Dr. Casper Nelson during the 40 years preceding his retirement in 1954, research has been expanded into areas related to agricultural production and the quality of the environment.

During the past several years investigators have responded to the need for providing information that could result in improvement of nitrification and nitrogen-fixation, increased efficiency of photosynthesis, improvement of water quality, more efficient waste disposal and better diagnosis and control of animal diseases.

Recently research activity has increased because the Department was given the opportunity to move to a new building and acquire an additional research scientist in 1975.

Nitrogen-Fixation and Nitrification Studies

Fixed nitrogen is essential for crop production. The probable doubling of the demand for food by the year 2000 has prompted research to provide the vast quantities of fixed nitrogen that will be needed. The growing awareness of envrionmental quality and limitations of nonrenewable resources has led to increased interest in nitrogen-fixation performed by bacteria.

In related research funded through the Science and Education Administration of the USDA with funds appropriated to the Agency for International Development, inoculant technology is being adapted to the needs of developing countries. Inoculants are preparations containing *rhizobia* which are applied to fields to establish nitrogen fixation.

In recent research in cooperation with the Department of Entomology, several insecticides were tested for possible harmful effects on important microbiological processes in soils. Among these processes were nitrification in soil and the nitrogen-fixing symbiosis between the *Rhizobium* bacteria and leguminous plants such as soybeans, alfalfa and sweetclover. No inhibition of nitrification at normal rates of pesticide application was found.

In cooperation with the USDA Northern Great Plains Research Center, microogranisms associated with grasses used in revegetation of reclaimed strip mining