

A Century of Progress in Livestock Production

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BEEF PRODUCTION — PAST AND PRESENT

North Dakota cattlemen have seen a lot of change in the cattle business during the past 100 years. During the days of "open range," literally thousands of cattle were trailed into North Dakota from as far south as Texas. These were mostly two-year-old steers that were allowed to graze and fatten before being shipped by rail to the market in the East.

According to Bowman County history, one of the first Texas herds was trail-bossed by G.A. Cook in 1876, when he moved 2,500 Longhorn steers from the Neuces area of southern Texas through western North Dakota up to the Missouri River country. Other outfits that followed were the Hashknife, the Continental Land and Cattle Company, the Mill Iron, the Long X, the Deffenbach brothers, the Dickeyes and M.C. Connors.

Texas steers did indeed begin to grow when they hit the hardy Northern ranges. Southern stockmen were enthusiastic and soon agreed that a Longhorn steer brought here as a two-year-old would gain 200 or more pounds when ready to market at five to six years old.

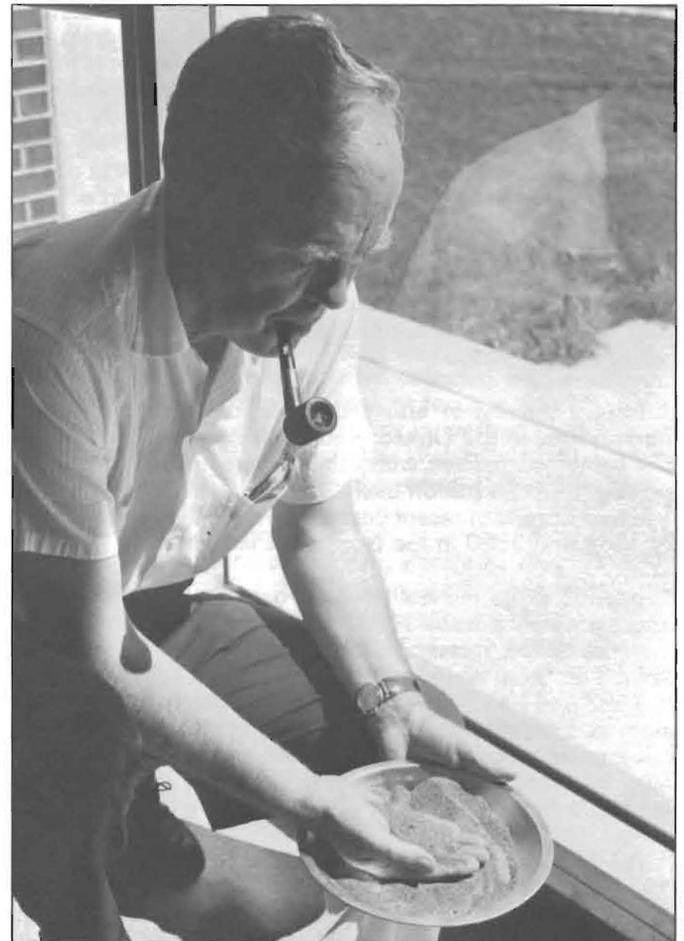
One of the large established ranches in western North Dakota was the Diamond "C" ranch located in the Killdeer Mountains. Hereford cows from the Diamond "C" ranch were purchased to start the beef herd at the Dickinson Experiment Station in the 1940s.

A portion of the early livestock research work in North Dakota focused on the native range and ways to extend and improve the grazing season. According to an early Bi-Monthly Bulletin article, some of the first brome grass pastures were seeded in 1921. Crested wheatgrass was seeded in 1932 and Russian wildrye in 1941. Superintendent LeRoy Moomaw of the Dickinson Station was one of the early promoters of crested wheatgrass and did much to propagate and distribute seed.

It is interesting to note that the year 1943 marked 28 years of long-term grazing trials at the Northern Great Plains Field Station near Mandan. From 1916 to 1935, two-year-old steers were used to study stocking rates and rate of gain. According to the report, these steers went on pasture at two years of age weighing just over 700 pounds. Today, many cattlemen are weaning calves at 205 days of age that average 600 pounds with individual calves over 700 pounds.

The goal of some producers is to market an 1,100 to 1,200 pound steer at one year of age.

Producers have been able to accomplish this by incorporating better genetics in their breeding program; by better understanding the nutritional needs of their cattle; by incorporating better pasture management; by utilizing the latest in disease and insect control; and, by better record keeping and performance testing.



Animal scientist William Dinusson evaluated North Dakota-grown feeds for livestock.

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In the late 1940s, cattlemen were encouraged to produce short, compact, early maturing cattle. In selecting for this type of cattle, the dwarfism gene was introduced and widely distributed. These "snorter" dwarf calves either died at birth or failed to make adequate gains, causing serious economic losses for North Dakota cattlemen.

Many livestock producers began to purchase bulls from the U.S. Range and Livestock Station at Miles City, Montana because these bulls were line-bred and had been selected strictly on the basis of their performance for growth. Other ranchers decided to cross their herds with breeds such as the Santa Gertrudis. The value of crossbreeding with imported breeds such as the Charolais and Simmental was soon recognized when producers found they had many more pounds of calf to sell. These early experiences with crossbreeding were not without problems, including calving difficulty and lower fertility. Producers found that feed requirements needed to be adjusted upward in order to maintain the larger, heavier milking crossbred cow to assure adequate energy necessary for timely rebreeding. Also, many of the steers failed to grade choice at the slaughter plant because even though they had enough weight, they lacked marbling.

As a result of North Dakota research and extension efforts, most cattlemen today are knowledgeable about beef cattle nutrition requirements. Producers are having their feeds tested and their rations balanced, often with the aid of computer programs. Research has identified the need for proper vitamin fortification, mineral levels, protein supplementation and energy requirement for all stages of livestock production.

In the 1944 Bi-Monthly Bulletin, NDAC entomologist J.A. Munro indicated that a new compound called DDT, developed by the military, did an outstanding job of controlling flies and also provided some control of lice on cattle. He also reported that almost 75 percent of the cattle raised in the United States were infested with cattle grubs, and that the loss caused by grubs could be estimated to be from \$50 to \$120 million. He pointed out that the grubs could be controlled by dusting the backs of infested cattle with a rotenone powder mix if it was carried out on a county by county scale. Today, the use of DDT is no longer allowed as an insecticide for control of flies and lice on cattle. However, due to research, today's livestock producers have a whole arsenal of safe products that control flies, grubs, lice, and mange. Today, the "heel-fly" is almost an endangered species and cattle grubs no longer cause an appreciable loss to the cattle industry.

Due to timely immunization programs and national and statewide testing and eradication programs, cattle are relatively free from disease. Major diseases such as foot and mouth disease, anthrax and brucellosis have almost been eliminated. Others, such as black leg, leptospirosis, vibriosis, and enterotoxemia, can be readily controlled by timely vaccinations.

Based on slow, painstaking research, today's cattlemen can direct the reproductive capability of the cattle they manage. New drugs like MGA (melengesterol acetate) and Syncro-Mate B mimic progesterone and prevent cows from cycling. Others like the prostaglandins and their analogs allow the cow to recycle and return to estrus.

Feedlot heifers and cows that get pregnant accidentally can be aborted with an injection of prostaglandin.

Owners of superior cows can enroll them in an embryo transplant program which involves superovulating the cow, breeding and then recovering the embryos. The embryos can be transplanted into surrogate mothers or they can be stored in liquid nitrogen for implantation at a later date. High quality semen from outstanding performance tested bulls can be obtained by simply picking up the telephone and placing an order after post breeding. Pregnancy in cows can be confirmed in less than thirty days using ultra-sound techniques or chemical assay of the milk.

SWINE PRODUCTION — PAST AND PRESENT

Swine production has evolved from pasture feeding that worked, but no one knew why, to the highly sophisticated enterprises of today that capitalize on the most recent technological advances.

At the turn of the century pigs couldn't be produced without pasture, which provided essential vitamins, minerals and amino acids not found in feed grains. Slop use was common, usually containing skim milk, and tankage was also used when available. Diets that contained protein, fats, carbohydrates, and the minerals sodium, chlorine, calcium and phosphorus were considered to be complete rations. It wasn't until the discovery of vitamin A in the early part of the 20th century that scientists began their quest to identify and later synthesize unidentified growth factors. During the 1930s most vitamins were identified, isolated and synthesized.

Refined feeding methods, micro ingredients discovered through research, and the genetic selection change from a "lard" type hog to the lean hog of today have had a dramatic impact on swine performance. Reports of early work indicate that it wasn't uncommon for pigs to require 500 pounds of feed to produce 100 pounds of pork and to require a year or more to reach market. Today, growing-finishing pigs reach market in five to six months on around 3 pounds of feed per pound of gain, and daily gains range from 1.75 to 2.1 pounds per day. The shift away from lard-type hog has reduced backfat thickness from 2.5 inches or more to 1.2 to 1.6 inches, and loin eye areas have increased from 3 to 5.0 square inches.

Advances in nutrition that eliminated the need for pasture literally opened the door for confinement rearing. The number of pigs being produced in confinement is steadily increasing as well as the number of pigs per farm. Production units of 300 to 1,000 sows are common today because of confinement, which reduces labor requirements by as much as 60 percent.

Farrowing frequency has also changed. For many years farmers farrowed once a year, with a few progressive producers farrowing twice a year, spring and fall. Refined management, manipulation of reproduction, confinement rearing and early weaning make farrowing monthly a common practice, making more efficient use of labor, equipment, and facilities. Weekly marketings from intensively managed units results in uniform cash flow throughout the year.

Rotational crossbreeding has virtually replaced straight breeding in commercial swine production. Through rotational crossbreeding hybrid vigor is obtained and breeds that compliment each other in production traits are combined resulting in sows that farrow larger litters, milk better and wean more pigs, and are better suited to farrowing crate environment. Astute managers are farrowing 10 to 14 pigs per sow and are weaning over 8.5 pigs per sow. Increased litter

size has come about through the use of pen mating and multiple sire breeding in confinement.

Swine production around the turn of the century was plagued with disease. Modern research techniques have eradicated one of the worst diseases, namely, hog cholera, and vaccines and antibiotics have brought other diseases of economic importance within manageable limits. The movement toward confinement rearing has aided parasite control since life cycle completion is more difficult, but other diseases peculiar to confinement have increased. Pseudorabies virus remains an industry challenge for the 1990s.

Tremendous improvements have been made in the commercial swine industry but there still is a significant amount of improvement to be made in efficiency, gain, and carcass performance. One only needs to look at the remarkable performance of test station pigs to see what will be attained by commercial producers in the future.

SHEEP PRODUCTION — PAST AND PRESENT

Sheep were one of the first animals domesticated dating back to 10,000 B.C., according to Wentworth. Historically sheep production has evolved from Biblical times with the nomadic tribes moving their flocks in search of available grazing. Present day operations in the United States vary from a similar flock herder situation to totally confined animals in comfortable environmentally controlled units.

Numbers of sheep in the United States steadily increased through the late 1800s to an all-time high of 56,000,000 head in 1942. Since 1942 numbers have decreased to around 11 million head. World sheep numbers have been on a steady increase and presently are in excess of 1.2 billion.

Lessened demands for wool for wartime garments, imports of foreign lamb and mutton, aggressive promotion of other meats, predation, conversion of grazing lands to crop farming, and availability of labor have been major factors in the sizing of the United States sheep industry. Numbers in the range area have been declining for a long time while numbers of operations in the farm flock area have steadily increased.

Expansion of sheep numbers in North Dakota began in the late 1800s. Prior to 1870 there were virtually no sheep in North Dakota. North Dakota has been traditionally a farm flock state, with sheep production recognized as a supplemental farm enterprise. North Dakota producers have recorded acceptable profitability over the long term.

Biologically the animal has gone through major changes in the last 100 years. Live market weight has increased from 85 pounds to 125 pounds and carcass weights from 42 pounds to 65 pounds in the past 100 years. Body weights of range ewes have increased over 20 pounds in the same time from approximately 120 pounds to more than 140 pounds. With present day sheep genetics, growth rates of commercial sheep have increased from early daily gains of .5 pounds to .75 pounds on similar rations. Genetics are now available for individual lambs to gain 1.5 pounds daily on 80 percent TDN rations. Efficiency has increased, with some individual lambs now that can put on a pound of gain on less than 4 pounds of 80 percent TDN feeds. Data in the early 1900s indicate lambs required in excess of 10 pounds of 65 percent TDN rations to make a pound of gain.

It is difficult to compare present day data to research that is 100 years old because of other changes in management, feeds and basic biology of sheep. Practicality tells us there have been major changes in technology in the last 100 years



Sheep come to the Hettinger Experiment Station in 1945.

Highlights of NDSU Animal Research

1892 — Sheep diseases and rheumatism in horses studied by the veterinary department.

1893 — **John Henry Shepperd** joins the NDAC. His investigations in the value of North Dakota feeds for livestock were an important contribution to the feeding of stock in the state. The livestock he developed won the grand championship at the International Livestock Exposition in Chicago in 1927; five steers won the grand championship in 1929. The steers as well as their dams were bred at the college farm. In the same year, the college was awarded the reserve championship on a carload of lambs.

Shepperd served as superintendent of the Collegiate Livestock Judging Contest for 27 years (1906-38). He served as president of the NDAC from 1927 to 1937.

1902 — **Leunis Van Es** joins the NDAES. His accomplishments will include working out a tuberculin test for avian tuberculosis, control programs for diseases in horses and cattle, and extensive work with hog cholera. Van Es was responsible for the organization of a Livestock Sanitary Board.

1905 — Dickinson Experiment Station established. After 1946, the Dickinson station became a center for livestock research for western North Dakota.

1906 — Herdsman **Dirk "Daddy" Geiken** joins the NDAES and remains on staff until 1939. Shepperd relied on Geiken's practical skills and down-to-earth language in developing popularized bulletins.

1910 — Shepperd helps organize the New Salem Holstein Breeders' Circuit.

1920s — A new veterinary technique, the Rumen fistula, a window on a cow's stomach, is developed, making possible a closer study and diagnosis of digestive disturbances in ruminants.

1927 — **D.J. Griswold**, an experienced sheep man, is employed. Experimental studies in animal nutrition are made by F.W. Christensen in cooperation with T.H. Hopper of the agricultural chemistry department.

1933 — Sweet clover poisoning of livestock, which resulted from feeding moldy or spoiled sweet clover hay, is first recognized and described. The knowledge gained was later used in medicine applied to humans, particularly in treatment of blood clots.

1945 — **M.L. Buchanan** accepts position at NDAC, becoming head of animal science in 1946. "Buck" challenged the livestock industry to develop programs to improve animal performance with emphasis on the genetics of farm animals.



Raymond Douglas, a 1927 graduate of NDAC, served as superintendent of the Dickinson Experiment Station from 1950 to 1969. The annual Livestock Research Roundup at Dickinson became a popular event under his leadership.



M.L. "Buck" Buchanan served as head of animal sciences from 1946 until his death in 1976.

1948 — A 320-acre farm west of the campus bought by popular subscription of Fargo businessmen, provides a new location for sheep and dairy barns.

1952 — New livestock pavilion is completed at NDAC and named Shepperd Arena.

1954 — **I.A. Schipper** joins veterinary science staff. In his 30-year career, he would teach classes, conduct extensive research on topics including bovine respiratory diseases, and become a prolific writer in popular farm magazines and extension service publications as well as scientific journals.

1961 — Turkey building given to NDSU by N.D. Turkey Federation. Feeding value of barley for turkeys was the first research study implemented.

1961 — Research Center completed, providing facilities for nutritional research on swine, lambs and beef cattle.

1962 — North Dakota Beef Cattle Performance Program established. Beef cattle performance data provides producers information for evaluating animal performance.

1965 — **James Tilton** joins the animal science staff, initiating increased research emphasis on reproductive physiology to improve the breeding performance of farm animals.

1972 — Carrington Experiment Station Livestock Unit established. Beef production on irrigated pasture research initiated.

1972 — Deferred grazing research conducted by Sheyenne Grasslands.

1972 — Complementary grazing research at the Dickinson station initiated.

1976 — Cow-calf beef production in irrigated pasture and in drylot at Carrington Branch Station.

1977 — Authorization for purchase of land and creation of the Central Grasslands Station at Streeter.

1979 — Establishment of sheep flocks free of ovine progressive pneumonia (lungers) by management techniques.

1979 — Free stall dairy barn remodeling completed. Nutritional research studies were initiated utilizing North Dakota grains and protein supplements.

1980s — Use of sunflower seeds, sun oil meal along with North Dakota grains in rations for beef cattle, dairy, swine, sheep and turkeys is studied.

1981 — Cow/calf grazing system research on native range initiated at Dickinson Station.

1982 — Compensatory growth feeding scheme developed for dairy cattle.

1982 — Grazing system research initiated at the Central Grasslands Station.

1984 — New swine facilities completed. A 150-sow confinement facility for research with sows and pigs from birth to market weights.

1985 — Range science is merged into the animal science department, name changed to Department of Animal and Range Sciences.

1988 — Advancing technology in swine production. A bioeconomical growth model for growing-finishing swine is developed.

1990 — With the advent of the NDSU Biotechnology Institute and the Cell Biology Center, physiologists are able to study how cells from reproductive organs communicate with each other and what regulates intercellular communication, helping understand overall control of reproduction in farm animals.

Merle Light provided leadership for sheep research at NDSU.



that have dramatically affected sheep production. The insight of Professor Merle Light of the NDSU Department of Animal Science had much to do with the availability of improved genetics in North Dakota.

In the late 1800s percent lamb crop on a national basis was just under 80 percent. In the 1980s the percent lamb crop exceeded 100 percent twice. On a statewide basis, North Dakota has indicated lamb crops in excess of 140 percent and is one of the higher percent lamb crop states in the United States. Individually the producers with ewe flocks in the 100 to 200 head size have indicated live lamb crop in excess of 200 percent for a 10-year average. Genetically, because of the advent of the Finnish Landrace breed and the Booroola Merino breed in the United States, prolificacy has increased. Purebred individuals have recorded birthings of more than five live fetuses. This is an indication of future potential of the sheep industry.

Technology that will further improve the United States sheep industry in the next century include: ultrasound pregnancy diagnosis, improved methods of artificial insemina-

tion, movement of the Booroola Merino F-Gene to existing breeds in the United States, breaking the seasonal breeding characteristics of sheep, improved growth rates, and utilization of production records. Biotechnology may help solve the seasonality issue allowing ewes to lamb and rear young every eight months. Putting sheep into the eight-month cycle will increase productivity of the United States sheep industry by 50 percent.

Considering the changes of the 1990s and the challenges of the 2000s the United States sheep industry will continue to serve as a supplemental farm enterprise. Sheep will also continue as the initial livestock enterprise for many beginning farmers because of low initial investment and rapid returns. Increases in farm flock sheep inventory and decreases in the range industry will continue sheep as utilizers of farm resources that otherwise would not have been utilized. If world population increases continue and world supplies of oil decline, an animal that produces fiber as well as two times its body weight in live weight of lambs sold on an annual basis will have increased importance in the next century.