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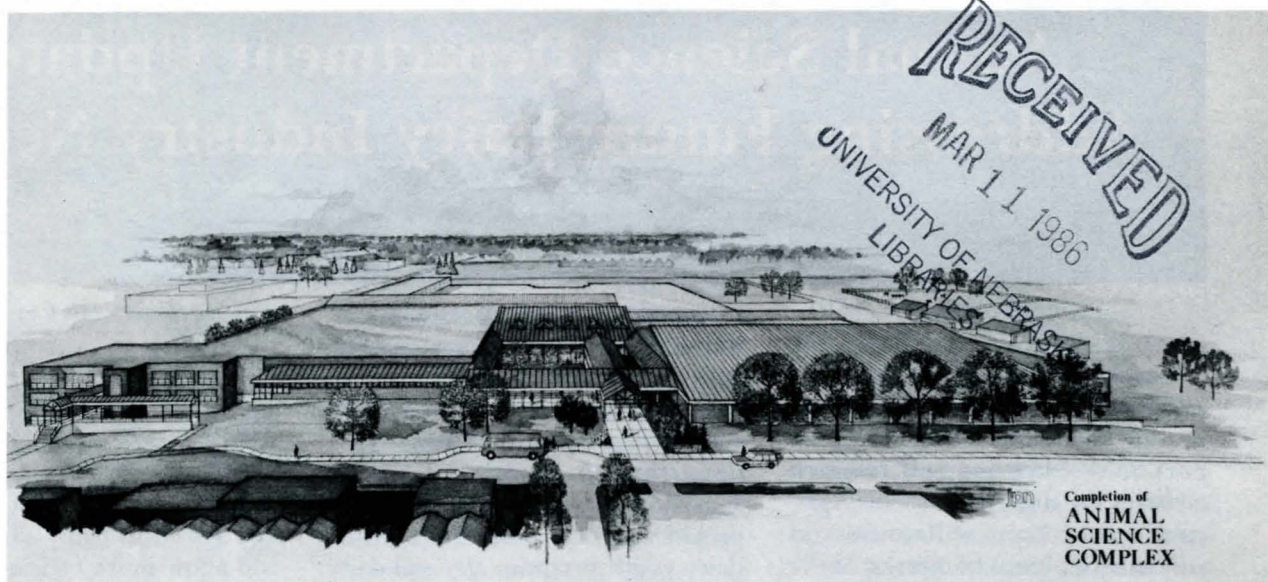
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Nebraska Cooperative Extension Service—EC86-220



1985 - 1986 DAIRY REPORT

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U.S. Department of Agriculture. Leo E. Lucas, Director of
Cooperative Extension Service, University of Nebraska,
Institute of Agriculture and Natural Resources.



Animal Science Department Update

Addressing Future Dairy Industry Needs

Elton D. Aberle¹

We are proud to present the 1985-86 Dairy Report. This publication is issued biennially to report dairy extension and research activities in the Institute of Agriculture and Natural Resources as well as other items of interest to the dairy industry. Our objective is to make the Dairy Report a key source of information to dairy producers, as well as the feed, equipment, animal health and other dairy-oriented agricultural industries to help improve the efficiency and profitability of dairy production.

Several changes in faculty and related duties have occurred since the last Report. Phil Cole retired in August 1984 and Don Kubik has relocated from the Northeast Research and Extension Center at

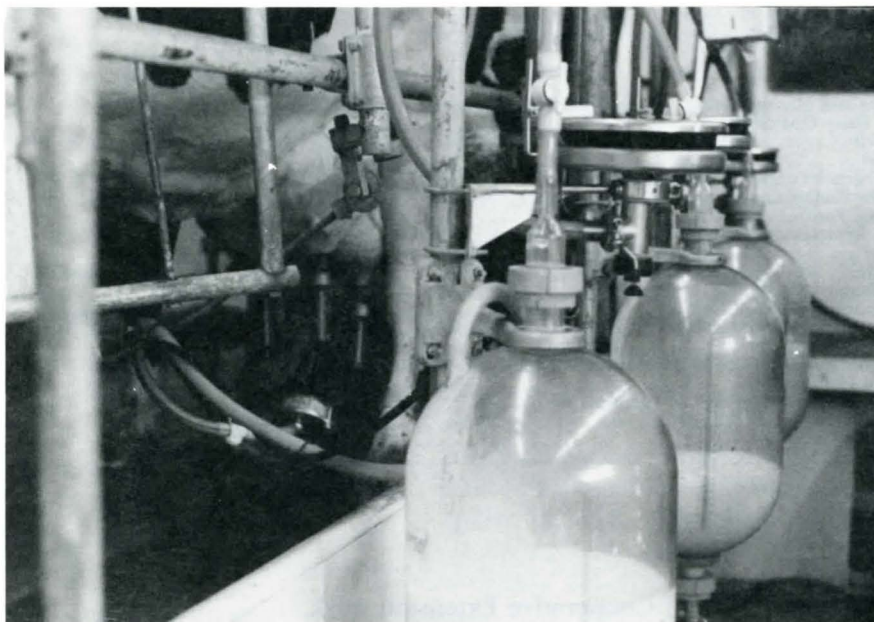
Concord to assume a portion of the duties formerly assigned to Phil. Don coordinates the dairy extension program in animal science and coordinates, with specialists in other departments, to achieve a total IANR dairy extension program. He provides primary leadership for the dairy youth program, general dairy herd management and mastitis control extension efforts. Jeff Keown joined the Department in January 1985, with primary responsibility for extension programs with DHIA, genetic improvement of dairy cattle and computer applications in dairy herd management. Jeff also has a research appointment in dairy management and applied breeding.

Significant facility improvements have been made at the Dairy Unit of the Agricultural Research

and Development Center at Mead, particularly in expanding and consolidating silage and haylage storage nearer the unit. Two upright silos are now available to replace an older Harvestore unit, which will reduce the amount of ensiled forage stored in bags. These changes will allow more efficient use of labor and equipment in our nutrition program. In the near future, we must direct attention toward remodeling the milking facilities and remodeling and replacement of free stall housing. This will be a challenge in view of the current moratorium on planning new facilities at the University.

Completion of the Animal Science Complex on the Lincoln East Campus is progressing on schedule. These facilities will give us capability on campus for intensive physiology and nutrition research with dairy cattle, something we do not have at present, and will add to our ability to teach dairy management to undergraduate students.

In the next year, IANR extension specialists are planning a renewed emphasis on mastitis control with a series of informational meetings followed by on-farm workshops. This effort is modeled after and will use materials developed in the very successful mastitis control program begun several years ago. Sire selection will receive additional emphasis with several NebGuides and newsletters prepared by Jeff Keown. He is also developing programs on effective use of DHIA records in manage-



Milking parlor at University's dairy at the Research and Development Center at Mead.

ment decision making. Emphasis is also being given to improved practices in raising replacement heifers and feeding management. New research initiated by Larry Larson in the last year will evaluate reproduction-protein nutrition interactions, particularly in the early part of lactation. Foster Owen will expand research on the nutritional value in dairy rations of grain processing and alcohol fermentation by-products.

The Department's Dairy Advisory Council continues as an important source of direction and feedback for our dairy extension, research and teaching efforts. New members in the last year are Jerry Hoffart, Neu Cheese Co., Hartington; Doug Temme, Wayne; and Tim Volk, Battle Creek. They replace Ed Price, Kraft Cheese, O'Neill; Galen Hartmann, AMPI, Laurel; and Menno Murman, Glenvil. Lea Fairley, Fairbury, continues as Council President for the next year. Other Council members are Norm Barney, Norfolk; William Hamm, Beatrice; Gary Mather, Seward; Dale Engleman, Jansen; Randy Meier, Grand Island; Dennis Traeger, Fairbury; Max Kimmerling, Beatrice; and Beth Stark, Hastings. We appreciate the dedication and interest of all Council members.

The dairy industry is a strong, essential part of Nebraska's agricultural economy. Our mission in the Animal Science Department is to provide trained, highly qualified people from our teaching program, new information and technology from our research efforts and dissemination of information through extension programs to maintain and improve the efficiency, profitability and competitive position of dairy production in Nebraska. We appreciate your support and interest.

¹Elton D. Aberle is Head, Department of Animal Science.

Nebraska State Dairymen's Association 100 Years Old and Forging Onward

C. W. Nibler¹
Randy Meier

The Nebraska State Dairymen's Association (NSDA) celebrated its 100th birthday at a centennial meeting in Columbus on March 29, 1985. Two very significant events took place at this annual meeting. One was the display and explanation of dairy equipment by Mr. George Woolsey of Clay Center, member of the NSDA Centennial Committee. The other was the distribution of quart glass milk bottles listing presidents and secretaries from 1885 to 1984.

The NSDA was organized in Lincoln in 1885 as a "spin-off" of the Fine Stock Breeders Association. It was at this time that a few individuals interested in dairying met and organized the NSDA. Mr. S. C. Bassett of Gibbon, first president of the Association, stated the following at the first annual meeting held December 9 and 10, 1885 in the opera house at Fremont, "The object of the founders of this Association was the promotion of the dairy interests of the State, and to this end we invite the cooperation of everyone in developing resources of the State, and most earnestly desire the hearty encouragement and support of all manufacturers of, or dealers in dairy goods. Nebraska offers unusual advantages of those desiring to engage in dairying. The climate is healthy and all kinds of livestock are free from disease".

The following was added to Mr. Bassett's remarks by the Honorable L.S. Coffin, guest speaker of Fort Dodge, Iowa, "The mission of this Association is to be a school of instruction. It is not a dress parade.

What we want to make is better farms, better farmers and a richer state".

The first secretary-treasurer of the Association was Mr. H.H. Wing, Professor of Dairy Husbandry, University of Nebraska. A survey of four farms conducted by the Sutton Creamery in 1884 indicates the status of milking cows. Cash income from the sale of cream from these farms milking 29 cows was \$728.38 or \$25.11 per cow. Twenty-nine calves from these farms were valued at \$432.00 or \$14.90 per calf. The total value was \$1160 or \$40 per cow. The Sutton Creamery manufactured 131,200 pounds of butter the first eleven months of 1884 valued on the New York market at \$12,230, slightly more than nine cents a pound.

For 100 years the Association has operated on small budgets derived from state appropriations and membership dues. For example, in 1888 the Association received and spent \$337. The largest annual budget was \$3,000. Officers and directors served without salaries or expense reimbursement.

The Association motivated dairy farmers to improve their conditions by resolutions, press releases and awards. For example, at the 1938 annual meeting the following resolution was passed, "We believe that the best interests of the dairy industry in Nebraska, demands that Bang's disease be completely eradicated". The Association also was a dedicated supporter for the eradication of tuberculosis in cattle. Dairy production testing was supported and encouraged by presenting awards to dairy producers

(Continued on next page)

Association . . .

(Continued on from page 3)

for achieving specified production goals.

Activities and Projects

Annual meetings. The highlight of the annual meetings, in addition to conducting business of the Association and presenting achievement awards, was the talk by guest speakers and discussion of topics by members either on organized panels or individually. Below are a few examples of subjects presented by guest speakers: 1885 - "Bogus Butter" - D.P. Ashburn, Gibbon; 1887 - "Women in the Dairy" - Mrs. Glissman, Millard; 1944 - "Feeding for Health and Production" - Professor T.W. Gullickson, University of Minnesota; 1944 - "What AI Can and Cannot do for the Farmer" - Philip I. Higley, American Dairy Cattle Club; 1948 - "Minerals for Animals - Facts Versus Fiction" - Dr. C.F. Huffman, Michigan State University.

Most of the annual meetings have been in Columbus, Fremont, Lincoln and Omaha or other towns in the eastern one-third of the state. At the first annual meeting 57 people were in attendance and in later years the number has increased to about 200. A highlight of the first annual meetings, that covered 2 to 3 days, was the very well attended banquet the evening of the first day.

Exhibits. The Association for many years used part of their budget for preparing exhibits displayed at county fairs and the state fair. The exhibits were prepared, scheduled and sent to county fairs where they were displayed and returned to Lincoln, or sent to another fair. State fair exhibits were of two kinds, an educational exhibit that included color and moving parts portraying all segments of the dairy industry, and an exhibit made from butter sculptures and maintained in a refrigerated



Past presidents of the Nebraska State Dairymen's Association: Back row, left to right: Rudolph Griess, 1958; Clare Wiltse, 1966; Gene Flynn, 1964; Clinton Stahly, 1957; Meno Murman, 1978; Merle Severe, 1958; Reuben Meier, 1970; Ted Martin, 1972. Front row, left to right: Dick James, 1983-84; George Woolsey, 1981; Dwayne Wittstruck, 1975; Don Olson, 1974; Frank Timmerman, 1977; Lea Fairley, 1973.

chamber or very small room. The exhibits sculptured from butter in the old Ag Hall were very popular with fairgoers. Every year the exhibit was different: one year a mature cow, the next year a cow and calf, followed by a farm scene with the Old Oaken Bucket or during the war years, Victory was the theme.

Awards. For 75 years the NSDA has presented awards to members of Cow Testing Associations, later renamed Dairy Herd Improvement Associations. Producers have taken great pride in displaying gold, silver or bronze medals or in later years properly engraved plastic and metal plaques for reaching and maintaining herd production (milk and butter fat) goals. The NSDA also encouraged the use of progeny tested sires by recognizing dairy farmers who proved their herd sires based on a comparison of production of daughters to dams.

One of the most continuous awards has been the five-year production plaque based on the average butterfat production for five years. A few dairymen have re-

ceived this award for 25 or more years. Over this 100-year period the NSDA had supported and encouraged, in various ways, production testing, evaluation of sires, selection of cows with high lifetime production and regular reproduction and additional traits that influence profitability of dairying.

Projects for young people. The NSDA has always been a very strong and dedicated supporter of programs and projects for young people. Financial assistance has been given to 4-H clubs and college judging teams so they could participate in regional and national contests. The 1944 annual report of the NSDA shows the University of Nebraska Dairy Cattle Judging Team ranked first in the National Contest in 1902, 1912, 1916, 1918 and 1931 with the number of teams competing varying from 3 to 23. In addition to financially assisting the Dairy Cattle Judging Team, the NSDA also assisted the Dairy Products Judging Teams by helping finance trips to participate in national contests.

The 4-H dairy club projects have been helped by providing funds

and personnel to further the accomplishment of members and leaders. Space does not permit listing all the projects and personnel assisted; however, parts of this eight-page report by Charlotte Mines of Dodge County after a trip to the 1939 National Dairy Show on Treasure Island in San Francisco express what this trip meant to a group of 4-H folks. Charlotte writes, "On October 15, 1939, thirteen happy 4-H folks left Grand Island on what was to be the grandest and most interesting trip any of us had ever experienced. In conclusion we traveled 4,450 miles without a flat tire or accident. Back in North Bend again safe and sound, my head was filled with memories of the most wonderful two and one-half weeks of my life. It was a grand trip and a grand group of people for traveling companions. I made many new friendships which I prize very highly and will be forever grateful to 4-H club work for making this trip possible".

Look Forward to Future

The future of the Nebraska State Dairymen's Association has a special purpose today. That is to be "the voice of all Dairymen throughout the state". As more and more dairymen are leaving the industry, it is time we all unite behind one strong voice. We must be able to speak up and be heard to promote ourselves, as well as our product. We must have a close working relation with the people that can help and support us, our marketing personnel, our extension and research people, our medical professionals and our state promotional arm, the dairywomen of our state. Specific objectives of NSDA are to:

1. enhance dairy industry image and products through support of educational functions (extension, research and teaching) and overall industry activities;
2. generate interest in youth by encouraging their participation

- in junior dairy programs and recognizing their achievements;
3. provide dairymen with latest technical and research information to help them improve their herds;
4. encourage efficient and profitable production through an awards program that recognizes outstanding production in herds and individual animals.

"NSDA has a major task", says Randy Meier, current president, "to lend a helping hand in solving the many problems that face our dairymen today. We must develop ways of instructing our dairymen to become better managers and more efficient operators, and to use the new technology that is available today. With all of our help and cooperation, we can obtain many of these goals".

Summary

The NSDA has been, and can continue to be, an important organization in the improvement of the dairy industry. Tremendous progress has been made in the production and quality of the milk produced on dairy farms and the future offers many opportunities in breeding, feeding and management of our dairy herds and the marketing of milk and its products. The NSDA has always cooperated closely with the University of Nebraska in teaching, research and the Cooperative Extension Service. For further information about the NSDA, histories are available at the C. Y. Thompson Library on the East Campus of the University of Nebraska.

The NSDA has demonstrated that when dedicated and cooperative people work together helping a little here and contributing a little there they can help change a farming enterprise into a scientific, dignified and professional business.

¹C.W. Nibler is Extension Dairyman, Emeritus; Randy Meier is Dairyman, Grand Island and President of NSDA.

Future of Nebraska Dairying I

Housing Facilities And Feeding

Foster Owen¹
Don Kubik

During the last 20 years the dairy farmstead has taken on a "new look". Feeding facilities, methods of feeding, and even ingredients used, have changed considerably. Furthermore, as we look ahead we face many more changes in facilities and feeding which are expected to make possibly even greater advances in efficiency of production.

Housing and Facilities

Since the early 60's most of the dairy operations in Nebraska have used the parlor system of milking their cows. Some of our smaller herds have used the flat barn (stall barn) arrangement with just a few stalls; commonly four to eight cows at a time can be in the barn for milking.

In the past, most of the larger and more specialized dairy herds have used a loose housing system. During the past 15-20 years more of the larger herds have built stalls in these sheds to provide individual stalls for their cows; this constitutes

(Continued on next page)

Future I . . .

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what is called the free-stall system.

Milking facilities. In the future we expect more herds to utilize the parlor system of milking. The herringbone milking parlor appears to be the most efficient for herd sizes up to three hundred cows. It is expected that the use of the herringbone parlor, now the most popular of the pit type parlors, will continue in popularity. The double four and double six parlors are ideal for smaller and medium sized herds of 50 to 150 cows.

We expect to see increased adoption of the automatic take-off milker units by herds greater than one hundred cows. Up to fifty percent of the chore time can be saved, using the automatic detacher in double six parlors. Use of back flush systems for cleaning the milking cups and bowls between cows are also expected to increase, especially when they can be installed as parlors are renovated or when new parlors are built.

Automatic cow identification systems are becoming available for identifying cows as they enter the milking parlor. Associated computer systems will also record milk weights, allocate feed, flag abnormal production, etc. Since these systems are very new and expensive, their adoption will probably be slow.

We anticipate that as herds increase in size, greater attention will be given to allotting cows to group pens to segregate cows of different production levels or stages of lactation. Dry cows will also be grouped separately from milking cows. This will facilitate the feeding of special rations to cows having widely different needs and provide economic benefits as well as facilitate breeding and simplify management.

Waste disposal. The handling of manure becomes a greater concern

as herd size increases. At the present most of our herds use the scrape-and-haul system. This involves a considerable amount of labor and equipment time because of the quantities involved. With larger herds it becomes more practical to use systems which reduce the quantity of material to haul, and thus, the labor and equipment time. Among the systems that appear to offer the most advantages is the slotted dam system. It separates much of the liquid from solid material and facilitates disposition of the separate waste products.

Feeding Facilities and Feeding

We also expect feed storage, handling and feeding systems to change considerably as our dairy industry develops in the next ten years. Where haying is the most practical method of handling forage for relatively small dairy herds, ensiled forages offer many advantages for the larger size herds. For herds of about 60 to 120 cows and less, the upright silos will often be the most economic storage for this type of feeding. However, with larger herds (120 cows or more) the bunker and trench type silos have distinct economic advantage; therefore, as herd sizes expand

during the years ahead we would expect to see more bunker and trench type silos in use on our dairy farms. We should also see some developments related to better preservation of silage in these two types of silos. In terms of the supplemental feeds to use on the dairy farms we anticipate greater use of by-product type feeds and special locally available products. Therefore, more feed storage facilities; both feed tanks and feed sheds will likely be a part of future facility developments.

Methods of feeding. As herds enlarge, the methods of feeding will likely shift to those that offer better control of rationing and those that are more adaptable to mechanization. We expect many of the larger size herds (greater than 120 cows) to adopt the complete mixed ration concept. This would necessitate the construction of at least three lots for separating cows into production groups. Bunk-line feeding of rations prepared in a mixer box is one of the most practical systems. Therefore, the considerably greater expense or investment in feeding equipment would have to be offset, primarily by a larger herd size.

Also there will likely be a further increase in the number of herds



Nebraska dairy herds are expected to become larger and many will be group-fed complete mixed rations.

using computer-type feeders for feeding some or all of the grain portion of the ration to their herd. This system appears to offer economic advantages to many herds which are too small to justify the complete mixed ration system. Computer feeders will provide for very accurate control of the grain feeding levels for individual cows and can make possible the feeding of different rations to cows in different production levels. Consequently, they especially offer potential for both increasing production per cow and reducing feed wastage of herds with 50 to 120 cows. In the future we expect newer and improved computer programs will provide additional benefits related to feeding the herd.

Ration ingredients and ration formulation. We also look for considerable changes in the ingredients our dairy farmers will be using in their rations and the accuracy with which they are formulated into rations. An area which has received sporadic emphasis through many years and must receive even stronger emphasis in the immediate years ahead, is forage quality. In spite of the well known importance of forage quality, Nebraskans have not taken advantage of high quality forage programs on many of our dairy farms.

Recent research shows that the forage quality is even more significant when feeding high ability cows than for ordinary producing animals. Because of the reduced

weather hazard related to ensiling, a shift to greater use of silage will facilitate preservation of high quality forage.

We have been conservative in our state in selecting feed ingredients for dairy rations. In the future and with larger size specialized dairy herds we look toward even greater use of locally available by-product feeds. Often these feeds can supply nutrients much more economically than traditional ingredients. We will make better use of computer technology for formulating rations, selecting ingredients and allocating rations to avoid waste. As more research is done on high producing cows we will be able to even more accurately balance rations and use all the feeds available. Also as the method of testing, mixing and feeding become more refined and by the use of scale and mixer equipment, dairy herds will be fed more accurately and economically.

In formulating our rations we will give a greater attention to the minerals, vitamins and additives that may be needed for special purposes in specific rations. As herds become larger it will be practical to give greater attention to many aspects of feeding, especially as they relate to getting high consumption by cows with high ability and to restricting the intake of more expensive ingredients to cows that are in the later part of lactation and whose requirements are much lower.

Feeding and care of replacements.

We also expect to see some signif-

icant modifications in the way our replacement animals are raised. These changes will be important toward improving both livability and economics of raising replacements. Since raising of replacements constitutes the second largest cost in producing milk, greater attention must be given to minimizing the cost of the calf raising program. At the same time we will probably need to modify some of our calf raising practices to take into account the significance of rate of growth of replacements to milk production by these animals after they begin lactating. It appears that rate of growth, especially before puberty, needs to be restricted.

We expect to see greater use of waste milk, excess colostrum and mastitis treatment milk for feeding young calves. The use of this material, in addition to programs of earlier weaning, will result in the use of little, if any, saleable milk. This could save \$60 to \$80 per animal. In addition, we expect to see greater attention given to selecting rations for feeding growing heifers. Depending on feed prices, large savings are possible by using the most economic commonly available feeds for heifer growing programs.

¹Foster Owen and Don Kubik are Extension Dairy Specialists, Animal Science Department.

Future of Nebraska Dairying II

Milk Production, Breeding And Management

Foster Owen
Don Kubik
Jeff Keown¹

The dairy industry must continually look toward the future. This is a necessity if we are to meet the anticipated changes and challenges ahead.

In the past, most changes have been gradual; however, recent changes in federal milk pricing programs plus changes in farm values and farm financing have apparently been primary causes of some radical and rapid changes in the dairy industry. As we view recent technical developments, plus those on the horizon, we project that our dairy industry will undergo further rapid change. Advances in communications, computer technology, biology of the dairy cow along with the higher degree of education and training of our producers, set the stage for phenomenal improvements in the dairy industry.

Cows, Herds and Production

Over the past twenty years we have seen a gradual decline in cow numbers in Nebraska, decreasing from 280,000 to 107,000 from 1964 to 1984. Herd numbers have decreased from 29,100 to under 2,400. During this same period annual milk production per cow has increased from 6,600 to 11,344 lb.

During the last two years changes have been even more dramatic. After an increase in cow numbers in the early 80's, we have seen cow numbers decline from 122,000 to 100,000 in the two years before April, 1985. Production per cow increased about three percent between March, 1984 and March,

1985. Herd size has remained relatively constant, but herd numbers have dropped from about 3,000 to 2,400.

Thus, it can be seen that the changes during the past two years have been greater than the average of the past twenty years. Undoubtedly, one of the reasons for the sharp change between 1983 and 1984 was the government's diversion program for reducing the milk surplus. Regardless of the reason(s), the changes were more drastic in the past few years and the future portends further rapid developments.

In the immediate period ahead, herd size, as well as per cow production is expected to increase. This may be necessary to reduce the overhead cost of buildings and equipment and to improve labor efficiency. As milk price decreases, higher production per cow will be essential to keep down cost per unit of milk production.

Breeding

Many changes in the area of breeding both in genetics and in reproduction, are anticipated in the next few years. Some of those, still in the research and technical development stages include advances in embryo transfer, genetic engineering, sex control and cow-side tests for diagnosis of pregnancy and for heat detection.

Artificial Insemination. The average change in milk production per cow in Nebraska has not improved as rapidly as it might have. The use of artificial insemination as a means of genetic improvement has developed more slowly in Nebraska than in more specialized

dairy areas. In a 1978 survey of Dairy Herd Improvement Association (DHIA) herds, 58 percent of these dairymen were using AI for their cows but only 32 percent were using AI for breeding their heifers.

In the future we expect that more of our cows and heifers will be bred AI to high predicted differences (PD) bulls resulting in increased genetic progress. This will be associated with an increase in larger, more specialized dairy farms. Fortunately, we have many good schools available to teach artificial insemination techniques. We also have access to semen from any stud desired through a national distribution system.

Breeding: Genetics. DHIA and other popular dairy publications provide periodic ranking of bulls available through AI. In the past Nebraska dairy producers have ranked very low compared with other states in selecting bulls for high PD milk. There is only one other state in the contiguous 48 that ranks below Nebraska in the average genetic merit of 2-year-olds that freshened in 1984.

The Price Value Index, now available for ranking bulls can be adapted to include a dairyman's own milk price structure. Computerized bull selection programs are available. These are designed to help in bull selection by customizing the process to each producer's goals. In the future we expect producers will utilize these more extensively.

The use of unproven and non-dairy bulls for breeding dairy heifers has certainly slowed genetic progress. Nationally using non-AI proven sires has lowered the genetic potential of the U.S. milking herd by \$130 per cow per lactation over the average AI sire of today. This genetic advantage of \$130 by using just an average AI sire compared to average non-AI sires could be the difference between a profitable and unprofitable dairy enterprise.

The development of estrus synchronization has made the use of AI for heifers more practical for even small herd operators. The problem of calving difficulty from heifers bred to dairy bulls has been a concern. Recent efforts by bull studs to gather calving ease information on bulls, plus producers growing heifers larger before freshening offers opportunity for minimizing this problem. Dairy-men can now select among bulls for calving ease.

Since the future of a dairy enterprise rests with the young stock, a producer who does not use AI on heifers is writing off over 20 percent of potential replacements. We expect to see more dairymen breeding more heifers to top AI sires and increasing the herd culling standard to bring into production those heifers that were the result of heifer breedings. This is because the best genetics in the herd will be found in those heifers from heifers continually bred to top AI sires.

Breeds

The Holstein breed is expanding continually throughout Nebraska, and the United States. This trend

will likely continue, due largely to the selection of top genetic sires available to Holstein breeders of today. While all breeds have increased their sampling programs for young sires, the Holstein breed has more than doubled the number sampled in AI organizations during the past 10 years. The future genetic potential available will be enormous.

Based on DHIA data, the number of cows representing breeds other than Holstein in Nebraska probably account for less than 5 percent in total. A higher percentage of these cows are in registered herds.

Although popular, the significance of shows and fairs in the future of dairy cattle improvement is uncertain. The interest in shows has changed little over recent years and the projection is that they will continue with similar numbers of participants over the next 5 to 10 years.

Herd Management

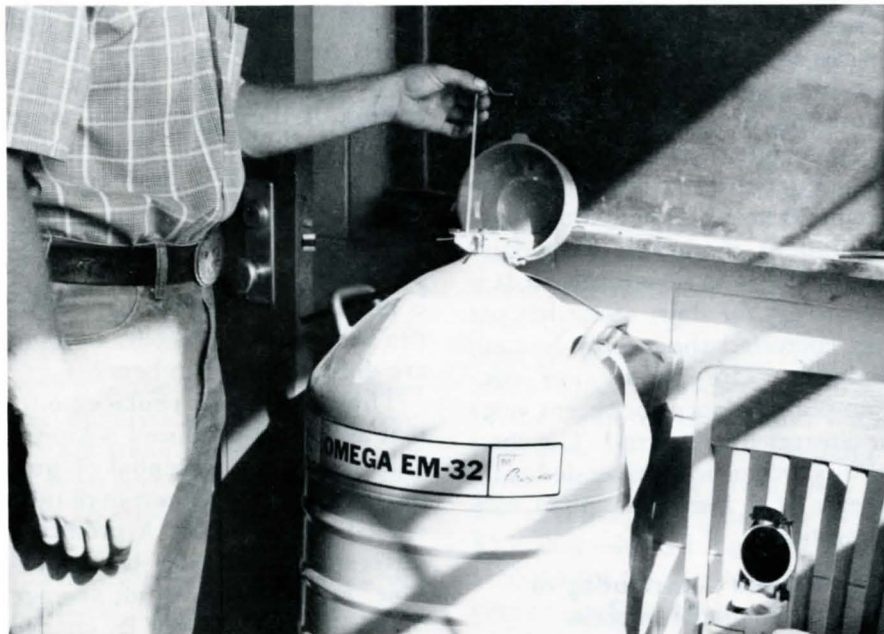
The amount of time and attention given to herd management on most of Nebraska's dairy farms has been limited primarily by the over-extension of manpower resources

to also include diversified farming. As herds become larger and the operations are more specialized, greater attention will undoubtedly be devoted to this area. In addition, the technology of management has advanced considerably in recent years and will likely continue to develop. Where many decisions in the past were based principally on broad judgements than on objective analyses, with advancements in computer technology, we expect more of the management decisions in the future will be determined more objectively by using better data sets and projections.

Health. An increasing number of herds are establishing regular programs with veterinarians for monitoring and maintaining herd health. Emphasis has concentrated on reproductive health and mastitis. More veterinarians specializing in dairy herd health and operating on a contract basis are likely as we develop larger herds which need specialized help, even if this means breaking traditional geographic barriers.

Specialized veterinary attention to herd health problems becomes more essential as production levels increase. High producing cows are known to encounter more problems related to reproduction, digestion and metabolism. Therefore, dairymen will need to work closely with their veterinarians as a part of a total health management team. A team for health management will also include a nutritionist, dairy equipment specialist, fieldman and possibly others who will work in harmony with the dairy producer toward a common goal of good herd health.

Records and finance. Records are a necessity for financial purposes as well as for production. The financial records are similar to those for most any business. However, production records are more specialized. These records will be re-



One of the keys to maintaining future profitable milk production is the use of artificial insemination for breeding the entire dairy herd. Frozen semen from all U.S. A.I. organizations is available to Nebraska producers.

(Continued on next page)

Future II . . .

(Continued on from page 9)

quired on individual animals as well as for the total herd.

An excellent production record system is available through the DHIA program. They not only provide milk production data but many optional data sets to serve as aids to management. At present, we have about 40 percent of the cows in Nebraska on this testing program but only about 22 percent of the herds.

As we look to the future we expect far more of our dairymen to be using the DHIA program and many will also have individual computer programs for maintaining inventory and business records and detailed individual cow records. Computers will also be involved in helping dairymen make critical management decisions based on projected profitability. For example, these will help the dairy producer determine which feeds to put in their rations, which investments to make, whether to cull a particular cow and make numerous other decisions on the basis of the best possible data and projections available.

These systems will also aid in calculating cash flows and will be a necessity for analyzing the dairy enterprise's financial situation at any given time. These are not only important to the dairyman in projections required for sound operations but will be a practical necessity when requesting additional loans from potential lenders. Those with crops and young stock will need records listing cost and returns. Conceivably such data may become available as an expansion of our current DHIA records programs.

Conclusion

To maintain economic competitiveness in the years ahead, dairy producers must keep abreast of the new technological developments

and adopt those that improve the potential for profitability. Cost of milk production must be minimized and cow yields maximized. As a total industry we expect our producers to make the adjustments needed to obtain the efficiency

necessary for a strong, viable dairy industry in Nebraska.

¹Foster Owen, Don Kubik and Jeff Keown are Extension Dairy Specialists, Department of Animal Science, University of Nebraska.

Economic Planning For The Dairying Operation

H. Doug Jose¹

Dairy production has rebounded in 1985 after a decline in 1984. Production is expected to rise about 4.5 percent to a record of about 141.5 billion pounds in 1985. The previous record was 137 billion pounds in 1983. Meanwhile consumption has been rising at the rate of 1 to 2 percent per year. If consumption in 1985 reaches 126 billion pounds, a 1.6 percent increase above 1984, the surplus could reach 15.5 billion pounds which will also be a record.

The above data do not generate optimism in the dairy industry. Their presentation is not intended to cast another shadow over the agriculture industry, as the financial situation in agriculture has received considerable documentation. But before we can address the financial health of individual dairy operations, the health of the dairy sector needs to be addressed. It is fair to say the dairy sector has not yet corrected the supply-demand balance. The production consumption balance for recent years is illustrated in Figure 1. The chart shows production has tended to increase at a faster rate than consumption.

Factors Contributing to Financial Success

Farmers are subject to the vagaries of weather and uncontroll-

able input prices. However, there are a number of factors which directly contribute to financial success which are controllable. A study completed earlier this year investigated factors which affect the economic viability of dairy operations in 11 southern states. The study investigated factors which are correlated or directly associated with long run solvency of dairy farms. It tried to identify characteristics and factors that are associated with farms which are in a good solvency position as opposed to those which are not.

The study found the highly solvent farms had a higher proportion of the dairy herd born and raised on the farm, had a higher production per cow and the operators of these farms had more experience than the farms with a high debt situation. Those findings support the strategy of using proven sires with high predicted difference for milk production. It is not a strategy which pays short run dividends but it is obvious there are definite long run benefits.

The ancestry of replacements that are home-produced is known and hence their potential of productivity is more certain than purchased replacements. A predicted difference of 1,000 lbs. is very feasible. For a herd with an average of 12,500 lbs., a 1,000 lb. change represents an increase of only eight percent but it could make a signif-

icant difference in the profit picture.

Feed cost is another variable controlled by the operator. The impact of feed costs is discussed in another article in this report in detail. According to estimated production costs, feed costs account for over 40 percent of the cash costs of producing milk. This does not include the interest on the animals and the fixed costs on the facilities. A report from the University of Missouri's farm record project shows feed costs were 54.6 percent of total production costs for 1985 for dairy farms. The feed costs in this study ranged from \$7.56 per cwt for the group of farms which had an average production of 10,000 - 12,000 pounds per cow to \$8.09 per cwt for the 12,000 to 14,000 pound group. Even with the current low commodity prices, substantial savings can often be achieved by adjusting feed inputs and developing least cost rations.

Financial Trends

Now let's turn to financial analysis of the farm business. The aggregate situation makes it even more critical that individual operators carefully review their current financial situation and make informed projections on the financial stability of their operations. Now is not the time to ignore either the aggregate situation or the financial signals that your own records are giving you. Records can give you the "vital signs" of the operation. We need to know which vital signs to consider and how they can be used to help in financial decisions.

One of the best ways to monitor the financial situation is to complete a trend sheet over a period of years and to follow the year-to-year changes and the trends over time.

There are two trend sheets which are particularly useful. The first of these is the financial statement or the balance sheet. As you complete

a financial statement each year, transfer the major totals such as current assets and liabilities, intermediate assets and liabilities, long term assets and liabilities and net worth to a summary table. A simple columnar pad can be used for this purpose. The other trend sheet is an income and expense trend sheet. This trend sheet can be put together using the income and expense items directly off the 1040F income tax forms. One thing we often look at is the change in income over time relative to the change in expenditures over that period. For example, if expenses are consistently increasing at a faster rate than the average increases in revenues, changes need to be made.

Financial Ratios

Financial ratios are often used to analyze a business. It is possible to calculate a large number of these ratios. This discussion focuses on only three. The first of these, cash farm expenses as a percentage of the value of production, relates directly to the discussion of trend sheets above. This ratio indicates the margin left for family living and the recapitalization of the business to cover depreciation and maintenance of equipment and facilities. There is no set number which distinguishes operations which are financially viable from those that are not. This depends on the type of operation, the capital investment in the business and the rate of turnover of that investment. For example, the turnover is faster for a grain operation than a cow-calf operation. The important consideration to look at is what percentage of the value of production is required to maintain the operation and to meet family living costs. If, for example, the gross income is \$100,000 and cash farm expenses account for 85 percent of that income only \$15,000 is left to cover family living and the maintenance of the production unit.

Another key ratio is interest as a percentage of the value of production. To calculate this ratio, take the total interest bill for the year and divide it by the value of production for that year. Include interest only, do not include principal portions of debt payments. Remember to include all interest payments including the interest portion of term debts. From experience in working with farmers, we have found 15 percent to signal the point at which an operator should look carefully at the interest being paid. If the ratio reaches the 17 to 20 percent range there is cause for concern and if it is in the 20 to 25 percent range immediate action should be taken.

The last ratio to be discussed here is the debt-asset ratio or the percent debt. To calculate this ratio, take the total value of all outstanding debts and divide it by the value of assets. Traditionally, 40 to 50 percent has been considered a safe range. If the ratio reaches 60 percent, careful evaluation is needed and if it is in excess of 65 percent, immediate action is required.

Summary

The aggregate dairy situation necessitates producers thoroughly review the financial situation in their own farm business. There are a number of factors which operators directly control which have been demonstrated to directly contribute to financial success. These factors include using proven sires, producing replacements on the farm, increasing production per cow and using least cost rations.

An analysis of financial ratios is helpful in checking the "vital signs" of the business. Charting the trends in assets and liabilities and in the level of expenditures and income is particularly helpful in determining where the business is headed.

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Managing The Research Herd

Franklin Eldridge¹
Milan Shipka

Managing a research herd, as with any dairy herd, demands a great deal of time, effort, and coordination. A dairy herd manager must have a love for the cattle and be driven by the challenge of constant change. These points keep a dairy manager "on his toes" and provide opportunities to apply knowledge gained from both formal education and past experience.

The manager of the research herd faces many of the same challenges and has many of the same goals as commercial dairymen. Obviously one of the primary goals is to produce the greatest quantity of high quality milk in the most efficient manner. Another goal is to manage the breeding of the herd so as to provide high quality replacements of sound functional type for the future herd.

While these goals are shared with all other dairymen, the research herd manager must also be constantly aware of the fact that this is not a commercial dairy. The primary function of the Dairy Unit at Mead is for research work. This demands a somewhat different point of view and creates additional challenges. Modifications of milking procedures, grouping of cattle, separation of calves into different treatment groups, variations in dairy rations, and treatment of heifers for different breeding experiments are necessary for research. Some of these practices re-

quired for research are not models for dairymen since they may not be the most efficient methods for a commercial dairy herd.

In a cow's lifetime, she may have been involved in several nutritional and/or physiological research projects which may, or may not, be conducive to the establishment of a high lifetime record. They will, however, help increase the body of knowledge about dairy management practices and, therefore, ultimately benefit the commercial dairyman. Personnel employed at the Dairy Research Unit need to be interested in accurate research results in addition to performing the duties needed for efficient operation of the dairy herd.

The dairy faculty members at UNL are interested in economical operation of this dairy using good dairy practices, as well as the research projects in their specialized areas. Some of the goals established for this herd as a research herd are:

A. While breeding research will take place:

1. The quality of cattle from a genetic potential for production should be high so that research results are applicable to good commercial dairies, and

2. Functional type should be maintained at a level at least equal to the better herds of the state. These two points will permit research to be done on the same kind of cattle that are typical of the better herds.

B. Good dairy practices in breeding, raising calves, and milking should be followed so that these practices can serve as a demonstration for dairymen.

C. The basic feeds should be similar to those readily available to Nebraska dairymen. Feeding trials can then be superimposed on these bases.

D. Milk marketing practices must follow the best procedures to help pay for the cost of operating the dairy research unit.

While our facilities at Mead are not the most modern or "state of the art", we do install some innovative and new management tools such as the computer feeding system. In the future, as opportunities arise, we will undoubtedly see further technological improvements. We invite state dairymen, and other interested persons, to visit the Mead dairy. We have pride in our cattle and are always willing to share interests and ideas with other dairy people.

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Calf hutches have been found to be the most economical and healthy method for raising calves in Nebraska.

Butterfat Testing Is Essential

Jeffrey F. Keown¹

There are many private milk testing programs available to producers that do not offer butterfat tests on individual cows. Since these programs may be cheaper than official DHIA testing, one can logically ask the questions: Is it worth the extra time, effort and cost to know the fat test on an individual cow? Isn't the tank test sufficient to monitor the herd?

Many manufacturers are selling equipment that automatically records daily milk weights but do not offer butterfat, protein or solids not fat testing options. Monitoring daily milk weights is an excellent way to spot potential individual cow or herd problems, but this information should be used in conjunction with a regular DHIA testing program.

Only your state Dairy Herd Improvement Association (DHIA) offers options for butterfat, protein

and somatic cell count testing. You can monitor the overall herd butterfat content by using the tank test, but this is not sufficient to maximize your income from the sale of both milk and butterfat. It is essential to know the butterfat produced by an individual cow to make sound culling and selection decisions. Such decisions are required for high profitability. Producers are paid for the pounds of milk as well as the pounds of fat produced. As long as your payment schedule is based on fat, protein, or solids not fat (SNF), it is essential to have information on these components.

Culling Decisions

Let us use the following example of production on three cows to show the importance of knowing the butterfat produced to make informed culling decisions:

Cow A

18,000 M at 4.0% butterfat

Cow B

18,000 M at 3.4% butterfat

Cow C

18,000 M at 3.0% butterfat

All three cows rank the same based on their milk production but there is a substantial difference in the value of the product when butterfat production is taken into account.

Let's assume the current price for milk is \$13.50/cwt with a butterfat differential of 16.5¢ for each tenth of a point over 3.5 percent.

The following table shows the value of the product produced for each cow divided into the non-fat (milk) as well as fat portions.

Table 1. Value of Non-Fat (Milk) and Fat Produced For Cows A, B and C

Cow	Non-fat milk	Fat
A	\$1390	\$1188
B	\$1390	\$1010
C	\$1390	\$ 891

The total value of product produced by Cow A is \$2,578 (1390 + 1188); Cow B is \$2,400 (1390 + 1010); Cow C \$2,281 (1390 + 891). If you did not know the butterfat

percentage, you might think that all three cows were returning the same income to the dairy enterprise since the milk produced is the same in all three cases. If you needed to cull one of these three cows, you could be making a \$297 mistake by culling Cow A instead of Cow C.

Culling is More Complicated

Even in our simple example, the income difference among cows is \$297. How many incorrect \$297 culling decisions can a producer afford to make in a year and still maintain profitability? Individuals rarely have three cows to cull, all giving the same amount of milk with differing butterfat percentages. In real life, all three cows would be eating different levels of roughage and concentrates. All three would be in different lactations and be producing differing levels of milk and butterfat. This is where DHIA information is essential for proper culling decisions. DHIA will calculate an income over feed cost for each cow, taking into account all of these differences.

Income Over Feed Costs

DHIA will take the amount of milk and butterfat reported each month on an individual cow and list the amount of grain needed to maintain profitable production, adjusting it for the cow's age, weight and the quality of forages reported. This information is reported on your DHIA sheet as a feeding guide for profitable herd production levels.

Income over feed cost is reported for each cow on a daily and lactation basis. The figure is calculated by taking into account the amount of milk and fat produced using this information based on your market price to calculate the value of the product. This value of product produced is then subtracted from the value of feed that you report as being fed to an in-

(Continued on next page)

Butterfat . . .

(Continued on from page 13)

dividual cow. The resulting figure is the income-over-feed costs generated by each cow. You can then decide which cows are culling candidates based on these customized figures.

DHIA offers many other options that will make your herd's production more profitable. Many times you do not think about all the factors that must be taken into account in making informed management decisions. Only a simple example of culling has been discussed here. If a producer is going to maintain herd profitability and remain in business, all production and cost figures must be taken into account. This is the reason for the existence of your state DHIA organization. By testing your herd for milk and butterfat content, using the DHIA feeding recommendations and reporting your actual feed costs, you will have available the most up-to-date culling recommendations. Many producers could cull the bottom 5-10 percent of their herds without seriously affecting income and may even increase net returns. Using your DHIA records properly will increase your profit.

In today's dairy economy, a producer needs all of the tools available to make informed management decisions. Culling of unprofitable cattle and freshening genetically superior heifers is one way to increase your profit potential. Your DHIA reports serve as the most accurate management tool for culling your herd. The added income from being on DHIA and using the culling recommendations correctly will more than offset the testing costs. Remember **"Test Don't Guess."**

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The Veterinarian: For Emergencies Only Or Consultant, Too?

Duane Rice¹

Many correct management decisions are necessary to realize maximum returns on investment in any dairy operation. Dairy producers may assume there is a quick fix for most health problems that are frequently created by mismanagement. In reality, this is not so. Prevention, instead of treatment, is the most effective approach.

Preventing health problems in the dairy herd goes much further than use of a veterinarian as an animal doctor. A veterinarian with experience and a genuine interest in dairy cattle is the single, best qualified consultant available to assist the dairy producer with herd health problems. The value of herd health is recognized but, unfortunately, not enough dairy producers have implemented a sound, total herd health program. Whether one needs or should adopt a preventive health program is no longer the question. Due to economic pressures, a program which incorporates minimum standards of management practices is necessary. These standards should involve the entire scope of livestock handling from birth to culling time.

It is no secret that a healthy animal is necessary for maximum productive efficiency but there are

many factors excluding health that can also limit production. A veterinarian who is familiar with total dairy production, and has sincere concern for his client, will consider and help establish cost effective management procedures in all areas of production, including business management.

Investments in disease control procedures are many, and include buildings and equipment frequently equal to or better in preventing and maintaining health than some of the medications used. For example, mastitis control efforts are better when the environment is controlled for cow cleanliness and comfort. A mismanaged environment and/or feeding techniques can cancel the advantages of otherwise apparently healthy animals. Differences in management practices might allow one producer to develop his replacement heifers for 25 percent less than another. To reap benefits from improved animal health factors that hinder production must be identified and eliminated. Among the factors to be assessed in determining productivity and cost-effectiveness are: genetic base, how the calf and heifer is raised, feeding, mastitis control, reproductive efficiency, culling, labor and interest on investment.

An effective program will have several components. First, the veterinarian must be proficient and interested in you and your problem. Second, **your** full cooperation is needed. Your knowledge of day-to-day happenings, trends and changes, and adequate records will supply the necessary information that will help the veterinarian in his diagnosis and decisions.

Production goals should be set. As changes are implemented these goals should be periodically assessed as a means of determining progress in achieving total production efficiency. Generally, herds producing less than 15,000 lbs. are break-even herds. Production goals, such as having lactating cows in milk 80 percent of the time, less than 3 to 4 percent calf loss, somatic cell counts of 300,000 or less, and cows with calving intervals of less than 13 months are reasonable and realistic. These cost-effective goals require the use of many management procedures.

As the herd owner you must realize that a consultant team may be necessary to get to the root of some problems. Your veterinarian, nutritionist, dairy fieldman and milking equipment dealer are part of this consultant team. To fully analyze specific problems a consultant will spend time and effort working on your problems away from the farm, that is, in his office or laboratory. This time should be paid for, rightfully so, just as if the time were spent on the farm. Frequently the analysis and recommendations by a consultant can provide thousands of dollars in savings over a period of time, if those recommendations are accepted and implemented. A relatively small fee for the advice of a good consultant will be returned manyfold. The dairy producer should have the ability to evaluate his consultant. Be patient and allow the results to speak for the effectiveness of the program, and try to avoid snap first impres-

sions — they are frequently wrong, since a good program may take months or years to fully reach its potential.

Although herd health is the area in which the veterinarian has the greatest expertise, some are very knowledgeable in other management areas due to their years of experience from visiting many dairy operations.

Animal health information provided may include:

a) **Vaccination.** Vaccination is one part of an effective health program, as it helps to prevent disease, and in most cases is more cost-effective than treating sick animals. There are certain diseases that occur so often, that routine vaccination is a must, such as IBR (rednose) or blackleg. There are other diseases that may not warrant the expense of vaccination because disease incidence in that herd and area may be very low. A veterinarian familiar with the herd and the diseases in the area is the best counsel in making decisions concerning the use of vaccines. It also should be recognized that no vaccine is perfect and all animals may not be capable of building immunity from vaccination, thus, vaccine failures can occur.

b) **Zoonoses.** The veterinarian's participation is also important in recognizing and taking precautions in handling animal diseases that can be transmitted to humans (zoonotic diseases). Examples of diseases of this nature may include brucellosis, salmonellosis and tuberculosis.

c) **Sick animals.** Handling sick animals is another part of an effective herd health program. There are some instances where "on the spot" diagnoses can be made quite accurately, as with milk fever or tetanus. Unfortunately, accurate disease diagnosis is not generally simple, and requires the use of follow-up laboratory tests.

d) **Diagnosis.** The University of Nebraska Veterinary Diagnostic

Laboratories in Lincoln, North Platte, and Scottsbluff help veterinarians to more consistently make accurate diagnoses, thus treatment selection is improved. Anyone can use the UNL laboratories and services; however, greater laboratory effectiveness is accomplished when a practicing veterinarian is involved.

Laboratory reports alone are rarely significant in making a diagnosis without additional information, such as that possessed by the veterinarian familiar with the specific farm and herd. Based on all this information, animal owners and veterinarians together can make better decisions on proper treatment or prevention of future problems.

Summary

Dairy operations can become more efficient when the dairy producer is aware of, and practices preventive medicine. He must be able to recognize the capabilities of those he selects to help him, and make personnel decisions which use these talents to work toward the program goals.

Characteristics of a successful and effective consultant are frequently similar to the characteristics of an outstanding producer. Such characteristics include one who spends over half of his time in dairy work, participates in dairy or professional association activity, maintains high continuing educational levels through reading or meeting attendance, and is a competent, confident worker. The animal doctor should be used not only as a consultant in the area of preventive herd health, but in some cases as a resource person in other areas of dairy herd management. The experienced veterinarian's advice, due to his familiarity with the health problems in the area as they relate to total management, can be very valuable.

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Use of computer feeders have been effective on many farms as a means of attaining higher milk yields and reducing feed costs by preventing over-feeding of low producers.

New Concepts in Feeding The Concentrate Ration

Foster G. Owen¹

The main purpose of a concentrate ration (concentrates) is to supplement the roughage being fed the herd. The concentrate ration will raise the energy content of the cow's diet, as well as provide any extra protein, minerals, vitamins and other additives that might be required for the cow to perform to her ability.

When herds were small and were fed in stall barns it was not very difficult to remember each animal and to feed according to individual needs and preferences. However, as herds increased in size, many producers installed a parlor system for milking, equipped for feeding during milking. In addition, cows have increased in producing ability, so they need higher amounts of supplemental concentrate. Parlors have also become more automated, which has increased the rate

of milking and passage of animals through the parlor so they have less time to eat.

The milking parlor presents dairy producers with several problems in feeding concentrates. It has now become difficult for cows to consume an amount of concentrate to meet their requirements during the short time they are being milked. Feeding high levels of concentrates sometimes causes cows to go off feed or may reduce their milk fat test, or both. For these reasons new methods of feeding were developed.

Methods of Feeding the Concentrate Ration

Lot feeding of concentrate.

Many dairy producers have begun to feed a portion of the concentrate allowance on a group basis in the lot. Often this is fed on top of the silage or mixed in with the silage. A low level of concentrate,

such as 10 lbs./head/day can be fed in this way with the remainder being fed on an individual basis as cows are milked in the parlor. It is recommended that this parlor fed concentrate be formulated according to the requirements of the high producers.

An even better method of concentrate feeding involves use of two lots for the milking herd. One lot receives only roughage. The other lot receives both roughage and a portion of their concentrate ration. With one lot receiving no concentrate, it is possible to feed at least a low level of concentrate to all cows during milking and yet avoid over-feeding those cows needing only a small amount of extra concentrate. Consequently, the dairy producer has more flexibility and control over concentrate feeding levels.

Computer feeders.

A recent development, computer feeders, permits individual feeding of cows. With this system each cow has an identifier attached to a neck strap. Using the computer, every cow has a specific allowance for concentrate which she receives via a feeder station located outside the parlor. Her allowance can be changed as needed by simply putting a new value into the computer. This has special advantages for those dairy producers who are not able to otherwise provide their high ability cows with the quantity of extra concentrate needed to reach peak production. In addition, it helps to avoid the excessive consumption of concentrate by cows that would, otherwise, get more concentrate than required.

The two major potential benefits of the computer feeder are higher milk yields and savings in feed. In addition, the concentrate can be portioned in several feedings per day. This helps to maintain a more stable condition in the cow's rumen and promotes better fiber digestion. This, apparently, is the reason why cows fed more frequently

maintain a slightly higher milk fat test.

The average cost of computer feeders is about \$200 per cow for herds of approximately 60 cows and is less for larger herds. However, survey data indicates that this cost can be recovered in about two years. A NebGuide will be published in 1986 giving more detailed information on this type of feeding.

Complete rations.

A complete ration is a ration preparation that contains all the ingredients that the cow is to receive. The roughage and the concentrates, including all supplements, are provided in one feed mixture. These rations are usually prepared by conveying the feed ingredients into a mixer box or mixer wagon directly from silos or via front-end loader, then mixed before feeding. When feeding complete rations the herd should be divided into at least three groups—a high-, medium- and low-producing group.

The main advantage of the complete ration compared to computer feeders is that the cow is forced to eat the proportion of roughage and concentrate which is ideal for her level of production. Each bite is a properly balanced ration for that group. At the time of freshening cows are usually started in the high group and then are moved to the middle group when production drops to about herd average. Then they are moved to the low group during the latter part of lactation. For more information about the preparation and feeding of complete rations see a NebGuide to be published in 1986.

Because of the cost for the necessary equipment and the need to divide the herd into three or more lots, this system is not practical for most herds of less than 100 cows.

Combination system: complete mixed ration plus computer feeder.

Probably the best method of using computer feeders is in combination with a complete mixed ration fed free-choice from a bunk. We

call this a "bunk mix". This method involves the feeding of the "bunk mix" to all cows. It is formulated for a low production level, for example, 35 to 45 lbs. of milk. Cows producing more than this amount of milk are given computer neck tags so they can obtain additional concentrate.

The concentrate rations formulated for use in the computer stations are designed for higher milk production by balancing them with the nutrients supplied in the "bunk mix". This "bunk mix" will help assure that cows receive a certain minimal amount of roughage and will also help maintain production of cows during the period when they are becoming adapted to computer feeders or changing feeder stations. This system also minimizes the number of computer feeder stations required for a given herd size.

Summary

High milk yields per cow are closely related to profitability in our present economic climate. To obtain the high milk yield of which many of the better cows are ge-

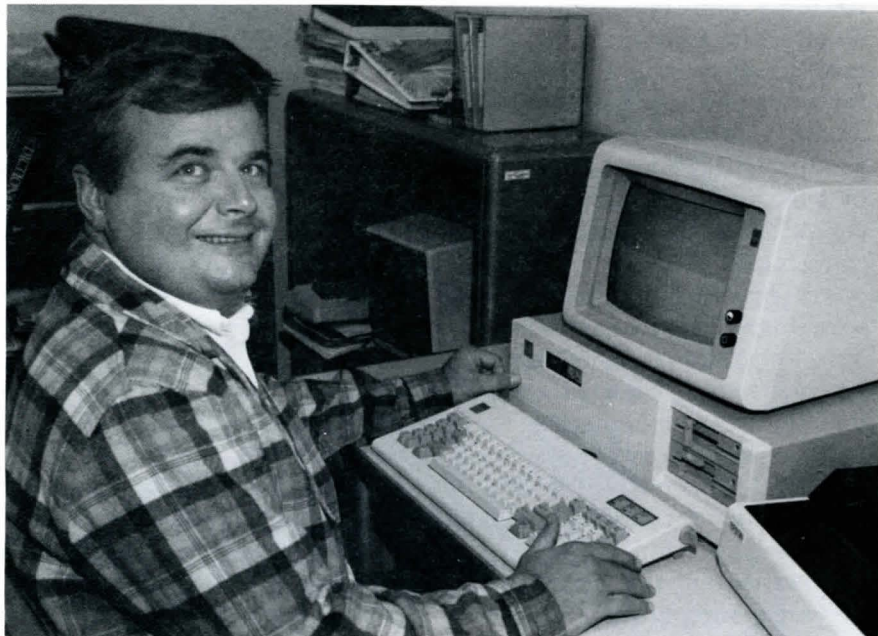
netically capable, it is essential that high levels of concentrate feeding be provided. However, to avoid waste of feed and excessive costs, it is necessary to restrict the level of concentrate being fed to cows in late lactation to only the amount needed. A dairy producer using the parlor system of milking and providing concentrate only through this system, finds it difficult to adequately control concentrate feeding. Therefore, the practice of feeding a limited amount of concentrate to all cows in a lot feeding situation, or feeding complete mixed rations, or using computer feeders, are methods of solving the problem.

The computer feeders appeared to offer considerable advantage and economic benefit to herds with 50 cows or more. The complete feed system has certain nutritional advantages over the computer feeders, but requires about 100 or more cows to be practical for most dairy operations.

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Herds of 100 cows or more often prepare rations as complete feeds, in which all ingredients are mechanically combined in a mixer box.



Jeffrey Keown¹

During the past three years, dairy producers have been bombarded from all sides concerning the use and purchase of on-farm computers. The salespersons have extolled the virtues of computers from every corner of the country. Let's step back and look more objectively at the on-farm computer and see how it fits in with the Dairy Herd Improvement Association (DHIA) program.

Questions to Ask

There are a few things to ask when purchasing an on-farm computer. Who is going to enter the data (milk weights, breeding dates, freshening dates, feed rations, etc.)? Does anyone in your operation have enough time to sit down and enter data daily or at least twice a week to be certain that everything is updated? Remember, keypunching data into a computer can be a tiring and boring job.

Who is going to verify the data to be certain it is entered correctly? Entering incorrect data, in many cases, could create problems worse than not entering it at all. What type of software programs are available to do the calculations you need to manage your herd? How reliable are these software pack-

ages? Have they been tested under your herd conditions to be certain all errors in programs have been found and corrected?

These are just a few of the many factors that must be taken into account when purchasing a computer. One other major concern if you are not on DHIA test, is how will you obtain Somatic Cell Count information to monitor the quality of your milk in order to return the most profit to your enterprise? How will you know which cows are producing the most fat, protein and solids-not-fat and therefore are returning the most profit? Monitoring the overall herd S.C.C. or components in a bulk tank are not enough. This information must be available on individual cows to make informed culling and selection decisions.

And finally there is the cost. Can you, in the current dairy economy, justify the added expense involved in purchasing a computer? A computer, like any other purchase, must be justified based on the expected return you feel is reasonable over and above the initial purchase costs. If you can't see that you will improve your current management skills by purchasing a computer, then the cost can't be justified.

In most cases, a producer could

Is There A Computer In Your Future?

better use the time spent on entering data on his own computer by looking more closely at the records currently supplied by the DHIA processing center. Most producers don't use their current records to their utmost advantage.

DHIA Computer Technology

National DHIA is embarking on a well thought out and rational approach to the on-farm computer. DHIA plans to offer to producers all of the advantages of having on-farm computers without the hassles involved in entering the data. Plans are well underway to have supervisors equipped with small computers to directly enter milk weights from farms to the processing center. Once these records are entered, your DHI sheets will be printed and left at the farmstead; also action sheets will be updated from the farmstead and sent back before the supervisor leaves. (Of course, the samples for testing fat, protein, solids-not-fat and S.C.C. will need to be sent to the lab for analysis.) This is just a first step in moving the dairy industry into the computer age. This approach will enable you to have the accuracy, reliability and credibility that you are currently enjoying with your DHIA system. This system is being

tested in several areas of the country and as computer terminals continue to become less expensive, these options will be available to a greater number of producers.

Another option being investigated requires that a small terminal be permanently installed in your milk room. From this terminal, you could access your records at the processing center at any time so you could have daily updated reports on feeding, breeding, and other DHIA management options. This will be especially useful to producers who have large herds and do not want to page through the large amounts of computer print-out generated each month.

National DHIA is working on a systematic plan to have systems available that will offer each herd the best available computer technology regardless of the herd size. DHIA has a commitment to provide the best options to all producers, not only the large herd.

There is a computer in your future—it may not be in your milk room, but you can be sure that many supervisors will use computer technology to transmit your records and print out your herd sheets within the next ten years. At that time, you will have entered the computer era. You will have the expertise available through DHIA to solve your herd problems; you will have the assistance of a trained supervisor who will enter your data and record your herd management information, and finally, you will have the same accuracy and credibility that you have become accustomed to from the Dairy Herd Improvement Program.

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Raising replacement heifers is the second-most costly item behind feed in the production of milk.

Cutting the Cost of Raising Replacement Heifers

Foster G. Owen¹
Doug Jose

Most successful dairymen find that raising their own replacement heifers is necessary to realize greatest genetic progress. It also eliminates the hazard of bringing in disease problems with purchased replacements. However, it is not generally recognized that the cost of the replacements ranks second, only to feed, as a cost item of milk production.

A recent study estimated the cost of raising a replacement Holstein heifer in the midwest at \$1,200. The replacement rate in most good herds is about 30 percent. Using this basis, the annual cost of replacements for a 100-cow herd would be \$36,000 (30 x \$1,200). In a herd with 14,000 lb. average yearly milk per cow this equals about \$2.57/cwt milk produced.

To improve the cost efficiency of milk production we must eliminate all unnecessary costs in producing replacement stock. New calf raising

programs based on research findings, and experience in applying these findings to farm conditions, demonstrate how hundreds of dollars can be saved compared to the costs of a more traditional program of calf raising. The main area of potential savings is in feed costs. However, important savings can also be made in labor and housing costs, as well as from minimizing death losses.

Cost of Feed

Liquid diets. Feeding calves whole milk diets from the bulk tank or milk replacers to seven or eight weeks of age will cost around \$40 to \$65 per calf. We now know that we can safely and successfully replace whole milk or milk replacers with waste milks, such as excess colostrum, milk from cows with mastitis and even the "throw-away" milk from treated cows. Since calves can be weaned at a young age (at three to five weeks for Holsteins), there is usually plenty of unsaleable milk

(Continued on next page)

Replacement . . .

(Continued on from page 19)

available. Therefore, all the traditional liquid diet costs can be saved. This amounts to about \$40 in milk replacer or \$60 in milk.

Starter ration. We would not suggest economizing by shifting to a low quality, although low priced, starter ration. The approach toward savings on the starter ration is to eliminate excessive feeding. Some dairy farmers feed starter long after the calf could have successfully shifted to a grower ration. For example, feeding a starter three months longer than needed would add about \$25 per calf. As soon as a calf reaches an intake of four pounds of starter daily, it is ready to switch to a grower ration, which is considerably less expensive. Starter rations can be home mixed (see NebGuide G83-645). However, it is usually more practical to purchase a commercial starter. This is because on most Nebraska dairy farms the amount needed is small and formulating a high quality starter requires a number of ingredients which are not readily available on most farms.

Grower ration. This is usually the area of highest savings potential.

With available feed resources one must determine among the possible well balanced grower rations, which will be least expensive, based on a dairy farm's specific feed prices. In Table 1 we have taken four rations from NebGuide G83-650 (Grower Rations for Dairy Replacements) and calculated daily costs for heifers between 300 and 800 lb, as an example.

With our assumed prices, we see that Rations 1 and 4 have almost the same daily cost which is considerably less than the cost of Rations 2 and 9.

If Ration 9 were fed, daily cost per heifer would be 16.9¢ higher than for Ration 1. For the nine-month period when this ration is recommended, this equals \$46 higher feed costs.

We estimate the potential savings at \$80 to \$130 per calf for many of our dairy operations, simply from making a more economic selection of grower rations for the total feeding program.

Forage or roughage. It can be seen from Table 1 that the roughage source is tied directly with the amount and composition of the required grower ration. Generally, at least one forage which is a good source of protein should be in-

cluded. This means a legume, such as alfalfa, or grasses harvested or grazed while still immature. High energy forages, such as corn silage or early cut hay-crops, reduce the amount of grains needed in the grower. This is especially important in cost savings when the grower, or grains, are expensive. Pasture is often the most economic forage, but the pasture needs careful management to maximize returns.

Housing. Warm confinement buildings are especially appealing to caretakers of calves, but are the most expensive type of housing to use. Fortunately, both experience and research at Nebraska and elsewhere have shown that calves can be raised in individual huts, using no supplemental heat, with fewer health problems than those raised in confinement. Table 2 shows that using the hut system can save \$77 per calf annually compared with the cold barn system and even more (\$165) when compared with the complete confinement, warm barn system. The decision on calf housing often pertains only to the early period of calf life, to about 10 weeks of age. For this period only, this data shows that the hut system will save \$37 per calf, or over \$1100 a year for a 100 cow herd (30 heifers per year) compared to warm housing, and \$666 compared to the cold housing facility.

Labor. Data available on chore time (labor costs) required to raise replacements show wide variation. Costs appear to differ by as much as \$100 per calf. With small herds having only a few calves in different phases of development at a given time, efficiency of time use per animal will not be as high as for larger herds. However, on most farms there are many opportunities to improve efficiency. Here are some suggestions: a) reduce liquid feeding chore time by earlier weaning and feeding once-a-day rather than twice; b) organize routine chores to reduce time require-

Table 1. Example Calculation of Cost of Grower Rations for 300-800 Lb. Heifers

Rations from NebGuide G83-650					
	Price	Ration 1	Ration 2	Ration 4	Ration 9
Daily ration lb/day					
Alfalfa hay (14% protein)	\$ 50/T	11		7	
Grass hay (10% protein)	\$ 50/T		11		2
Corn silage (35% DM)	\$ 25/T			15	
Sorgo silage (30% DM)	\$ 20/T				35
Grower mix (as below)		4	4	2	3
Feed cost/day (¢)		45.9	52.7	46.0	62.8
Grower mix lb/ton					
Corn	\$2.50/bu	1974	1330	1920	1030
Soybean meal	\$200/T		650		
Commercial supplement	\$220/T				970
Limestone	\$ 60/T		5		
Dical	\$400/T	10		40	
Trace-mineral salt	\$160/T	16	15	40	
Cost of mix,\$/Ton		\$92	\$126	\$98	\$153

ments; c) store feed and bedding near animals; d) simplify feeding by using bucket holders for liquid feeds, fence-line bunks, self-feeders for forages, etc., and e) plan for practical manure handling. Examples include movable huts for calves and movable sheds with skids for heifers, both permitting use of front-end loaders for manure handling.

Calf savings. With adoption of recommended calf raising practices, average calf deaths can be reduced from the present estimated loss of 18 percent to 5 percent. If we assume calves average a value of \$175 (original calf value of \$100 plus feed, etc.) at the time of death, this 13 percent savings equals about \$23 each. By reducing calf losses we also increase the herd's genetic potential.

Summary

Dairy producers can save hundreds of dollars per replacement heifer raised by applying the current knowledge gained through research and experience in calf raising. Major savings (\$120 to \$200/calf) can be realized in feeding, by eliminating cost of the liquid diet shifting from starter to grower rations earlier, and by selecting the most economic forage and grower ration. As much as \$100 can be saved on some farms per heifer in chore labor and, compared to warm confinement houses, huts will save at least \$40 per calf. These and other savings could amount to hundreds of dollars per replacement.

¹Foster Owen is Extension Dairy Specialist, Animal Science Department; Doug Jose is Extension Agricultural Economist, Agricultural Economics Department.

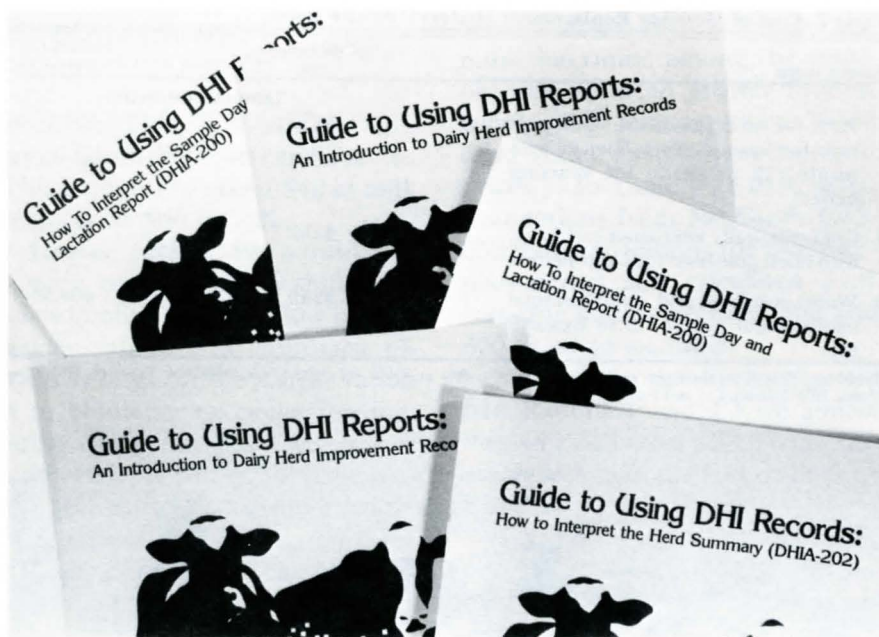
Table 2. Cost of Housing Replacement Heifers*(100 cow herd)

Housing system	Total facility cost	Facilities first 10 weeks only
	(annual cost/heifer)	
1. Huts for milk fed calves, open pole barn for weaned calves, open lot with windbreak or shade for yearling heifers	\$ 75	\$31.50
2. Cold, naturally ventilated calf barn, with open pole barn for older heifers	\$152	\$53.70
3. Warm, insulated and ventilated total confinement unit, birth to freshening	\$240	\$68.50

*Based on 30 heifers raised per year. Calculated from data in Table V-J Dairy Cattle Principles: Practices, Problems, Profits. 1978 Edition. Lea and Febiger.



Group housing and feeding is an excellent way to reduce the labor costs involved in the raising of heifers.



Will You Survive The 1980's?

Jeffrey Keown¹

The dairy business is facing more rough times and if you are going to be a survivor, you will be forced to make some changes. You will not be able to manage your herd the same way tomorrow as you do today and still maintain a profitable enterprise. Some of the changes that have been forecast within the next five years could directly influence not only the manner in which you manage your herd, but also the way that you market your milk.

Marketing Quality

During the next five years, there will be extra emphasis placed on marketing a quality product. Why? Because not only the consumer, but also the milk processor will require and demand a higher quality product. The processing plant can obtain higher yields from high quality milk and the consumer is beginning to demand a higher solids product. How are many plants monitoring quality? Many plants

are requiring a maximum Somatic Cell Concentration (S.C.C.) to receive a bonus payment for quality. If you are going to profit from these extra bonus payments on quality, you will need to monitor your herd Somatic Cell Count. Is monitoring your bulk tank enough to reduce the S.C.C. in your milk? No, for a producer to effectively reduce the bulk tank S.C.C., a knowledge of the S.C.C. on individual cows is essential. Culling cows with high S.C.C. readings can greatly reduce your bulk tank readings so you will be eligible for the bonus payments. If bonus payments increase in the future, how do you plan to monitor individual cows so that the proper culling decisions are made? How do you plan to be a survivor?

Component Pricing

As the consumer changes eating habits and consumes more cheese, yogurt and other non-fluid dairy products, the pricing system will also change. There will be more

emphasis placed on component pricing for fat, protein and solids-not-fat. The payment for the fluid portion of the milk will gradually decrease due to the change in consumer eating habits. If you cannot monitor the components produced on an individual cow, how will you know which cows are producing the most components and returning the most profit?

Culling of poor component producers in your herd could actually increase your herd's profit. In several Western European countries, a producer is paid for the pounds of fat and pounds of protein produced with a strong negative value placed on the total pounds of water produced. If you don't know what an individual cow produces, how do you plan to increase the components in your bulk tank by culling unprofitable cows? How do you plan to be a survivor?

Ration Balancing

Are you feeding your cattle a profitable ration? Do you have your cattle grouped by stage of lactation, production, age or lactation number? If you don't, then how do you know if your cattle are being under or overfed considering the amount of milk they are producing? You should be gearing your feeding requirements directly to the amount of milk produced. The surest way for a producer to lose money is to overfeed poor producers and underfeed top producers. Over and under feeding can greatly increase your costs.

Many producers can increase their income by proper feeding of cattle based on the cows' current milk production level. You can feed the same amount and just distribute it differently among your cattle and increase income. How do you monitor, balance, or change rations for your cattle? How do you plan to be a survivor?

Reproductive Performance

The key to success in any dairy enterprise is a sound reproductive

program. A cow just won't give milk unless she freshens. How are you managing your reproductive program? Do you ever lose track of freshening dates and have cows freshen before being dried off? Do you ever fail to keep track of breeding dates? Are you certain that your freshening dates are accurate so you know when to start breeding? Research has shown that the most profitable dairy enterprises are those that maintain near a 365-day calving interval with 60 days dry and begin breeding their cattle 60 days after freshening. How well are you meeting these criteria in your herd reproductive program? What type of record system do you have for your reproductive program? Are you satisfied with your herd's reproductive performance? How do you plan to be a survivor?

Survivors Packet Available

There is a system already in place that will help you to become a survivor. It is a program that monitors the S.C.C. level on your cattle; it will record components for you, it will monitor and balance rations for your feeding program and it will aid you in maximizing reproductive performance. The program is called the Dairy Herd Improvement Program (DHIA). For a reasonable fee, a trained professional will visit your herd monthly to record all the information that we have mentioned in this article. DHIA should become an integral part of your herd program. If you follow the recommendations made by DHIA, you will actually make money by being on test. DHIA does not cost—it pays. If the recommendations made by DHIA are followed, you will increase your income over feed costs and have a more profitable dairy enterprise. Wouldn't you like to increase your profits next year? By following the recommendations provided by your DHIA, your income will certainly increase next year. Join now—every day you waste is one

less chance you may have to be a survivor.

Not all producers using DHIA will be survivors. Being on test does not assure your survival in the dairy business—but it does offer you the management tools that, if used properly, will help you to survive. There certainly will be more survivors among those producers on

test than those not on test. Why jeopardize years of hard work and investment by not having the management tools at hand to help you? The tools are as close as your telephone.

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Ovarian Cysts In Dairy Cattle

Larry L. Larson¹

Cystic ovaries were identified as a major problem in dairy herds in a recent survey of Nebraska dairymen. The incidence in U.S. dairy herds is estimated at 10 percent of the cows with a range of 3 to 18 percent. About 10 to 40 percent of the cows can be expected to have a cystic ovary problem at least once in their lifetime. Economically, cystic ovaries are important because they prolong the time needed to get a cow pregnant. One study found that the calving interval averaged 26 days longer in cows experiencing cystic ovaries compared to normal cows. It has been estimated that it costs \$3.00/day for each day the calving interval is longer than 365 days.

There are several types of cysts, but the cyst involving the ovarian follicle is usually the type that causes a problem. These cysts are thought to form when the pituitary gland at the base of the brain fails to release sufficient luteinizing hormone (LH) to cause the follicle to ovulate (rupture and release the egg). These follicles remain in the ovary and usually continue to greatly increase in size.

Diagnoses

The most easily recognized symptom of ovarian cysts is the cow that exhibits signs of heat every few days. However, about 80 percent of the cystic cows become anestrus (fail to cycle) and do not show any external signs of heat. If these cows were recently bred, the dairyman would probably assume that they were pregnant. Therefore, the only reliable method of diagnosis is by rectal palpation of the reproductive tract by a veterinarian with expertise in dairy reproduction.

Factors Contributing to Ovarian Cysts

Factors that influence the incidence of ovarian cysts include heredity, milk yield, age of the animal, postpartum interval, multiple births, calving difficulties, stress, nutrition and other health problems, including retained placenta and metritis. The incidence of ovarian cysts is associated with high milk production. Low producing cows have few cysts.

Ovarian cysts occur more frequently in older cows and following the birth of twins. The incidence of ovarian cysts is highest during

(Continued on next page)

Ovarian Cysts . . .

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the early post-calving period and is increased if the cow had experienced a difficult calving, other health problems or is under general stress.

Treatment

Recovery rates are improved by early, accurate diagnosis and prompt treatment of the problem. There are three general approaches to correct ovarian function due to follicular cysts: (1) wait for spontaneous recovery; (2) manual rupture of the cyst; and (3) injection of a hormone (GnRH, LH, or HCG) that will cause either luteinization or rupture of the cyst. Recovery rates are highest following one of the hormonal treatments compared to the other two methods. Another treatment that has shown merit is to use GnRH followed in 10 to 14 days with a prostaglandin $F_{2\alpha}$ injection, however, the use of this combination of drugs has not yet been approved by FDA. An accurate diagnosis is essential before prostaglandin $F_{2\alpha}$ is used since it will cause abortion if the cow is pregnant.

Prevention

A. Herd health program.

Establish with your veterinarian a complete herd health program. Include in the program the routine examination of all cows during the postpartum period. This routine examination allows for prompt diagnosis and treatment of the cystic condition itself or other abnormalities that might contribute to the development of the cystic condition.

B. Care and feeding of the dry cow (See NebGuide 77-373).

Following recommended management practices during the dry period can reduce the incidence of certain problems which appear to predispose cows to the cystic ovar-

ian condition. These problems include difficult births, retained placentas, uterine infections, milk fever and mastitis. Administer an approved dry cow treatment for mastitis to all cows at the time of drying off. Feed to maintain cows in good body condition, but do not allow cows to become overly "fat". Provide the cow with a clean, stress-free area for calving. Feed heifers to obtain adequate growth and breed to easy-calving sires to reduce calving difficulties.

C. Cull cystic cows.

The incidence of ovarian cysts in Sweden was decreased markedly by slaughtering all cows that developed cysts and all bulls whose daughters developed cysts. The heritability of cysts appears to be great enough to be make some progress by selecting against the condition. The decision to cull a cystic cow will sometimes be difficult because of the relationship between cysts and high milk production. However, culling of problem cows should be considered and for cows that fail to respond to treatment it is a necessity.

D. Reduce the postpartum interval to rebreeding.

The longer one waits before trying to rebreed a cow, the greater the chances that the cow will develop an ovarian cyst. It is important to initiate the breeding program between 45 and 60 days postpartum to obtain the optimum herd average postpartum interval to conception of 85 days.

E. Administer GnRH at 14 to 21 days postpartum.

Some studies have indicated that cows injected with GnRH between 14 and 21 days postpartum might cycle earlier and have a lower incidence of ovarian problems.

F. Nutrition.

Several aspects of nutrition undoubtedly influence the incidence of ovarian cysts, however, evidence that cysts can be specifically prevented by altering the nutritional program is not strong. Various

studies and observations have suggested that the following might be beneficial and could be justified since they are not costly or impractical on most farms.

1. Avoid excess calcium.

Calcium levels fed prepartum should be .35 to .50 percent on a dry matter basis with about .25 percent phosphorus. Limiting prepartum calcium intake will help prevent milk fever. After parturition the diet should contain .6 to 1.0 percent calcium and at least .4 percent phosphorus on a dry basis. However, the ratio of Ca:P should not exceed 2.3:1. An excessively high Ca:P ratio might occur if legumes (naturally high in Ca) are fed at high levels along with a high calcium supplement in the grain mixture.

2. Avoid excessive manganese.

Cows require a minimum of 40 ppm in their diet, but supplemental manganese should not exceed 100 to 200 ppm.

3. Avoid excessive grain feeding.

Use high quality forage to avoid the need for feeding excessive grain to the high producers. Incidence of ovarian cysts might increase if more than 60 percent of the total ration dry matter is from grain (about 30 lbs. grain per day for Holsteins).

4. Avoid feeds high in estrogens.

Moldy feeds should be avoided because of their potentially high estrogen activity. Legumes fed fresh or as a silage have higher estrogen levels than when fed as a dry hay. Estrogens should be considered as a possible cause of cystic follicles if a large quantity of a high estrogen feed is being fed to a herd that is experiencing a high incidence of this problem.

5. Provide nutrients to prevent anemia.

Ovarian cysts have been associated with anemia. Providing adequate copper, cobalt and iron in the diet will help prevent anemia.

6. Beta-carotene.

European studies indicated that feeding high levels of beta-car-

tene reduced the incidence of ovarian cysts, but results in this country have not been conclusive. Other studies suggest that providing beta-carotene in the diet might help to prevent mastitis. High levels of beta-carotene are found in most fresh green forages but the levels decrease rapidly during storage. Therefore, beta-carotene is highest in immature pastures and green chop. Carotene levels remain higher in forages stored as silage as compared to dry hay. Even in good quality hay the carotene levels decrease rapidly in storage.

Carotene levels can be near zero in forages that have been rain or heat damaged or have been stored for a year or more. For example, the beta-carotene content of very good quality hay might be about 80 mg/lb., average hay 40-50 mg/lb. and poor hay 20 mg/lb.

Conclusion

Many factors can contribute to the development of ovarian cysts in dairy cattle. While it is not yet possible to totally prevent ovarian cysts, their incidence and detrimental effects can be reduced by the follow-

ing management practices. Establish a total herd health program for early, accurate diagnosis and treatment of the condition. Manage the dry cow to prevent calving difficulties and postpartum disorders. Maintain the cows in a stress-free environment. Use high quality feeds to formulate nutritionally balanced diets to satisfy the cow's requirement. Cull problem cows.

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Genetically We Can Do Better!

Jeffrey F. Keown¹

The key to your herd's profit potential lies not only with your herd management skills but also with the genetic quality of your cows. Your herd's genetic potential is the key that unlocks the door to profitable production. A herd of superior genetic potential cows is more efficient—they are able to convert more of the feed to milk production than cattle from inferior sires.

Genetics vs Herd Production

Let's take a look at the genetic level of the herds in the nine-state

area served by the Mid-States Processing Center in Ames and the corresponding herd level for milk production. As can be seen in Table 1, there is a direct relationship between the average level of herd milk production and the genetic potential of the milking herd, heifers and service sires. The value used as an estimate of genetic potential is called Predicted Difference Milk (PDM) and Fat (PDF). This value is calculated by the United States Department of Agriculture and is the average increase in production due to genetics that one would ex-

pect to achieve in the herd if these bulls were used in a breeding program. The difference in genetic potential of the milking herds vary in Table 1 from -74 lbs. of milk to +190 lbs. of milk. Of course the 10,000 lb. increase in herd average milk can't be attributed totally to increased genetics. Those producers who are using better sires are also using better management, feeding and reproductive practices which are significantly increasing the herd production level. These are also the same producers that are using the higher genetic potential sires to produce their heifers and also for use as service sires. By using better and better A.I. sires, you have made a commitment to increasing production and profitability of the next generation of cattle.

Nebraska Genetics vs U.S. Averages

How are herds in Nebraska comparing with the national average in genetic potential? Table 2 lists the genetic potential of Holstein heifers that freshened during the past five years in Nebraska compared with the national averages for the

(Continued on next page)

Table 1. Average sire PD as associated with herd average milk.

Avg. herd level milk (lb)	Average sire PD 82 of:		
	Milking Herd (lb)	Heifers (lb)	Service Sires (lb)
10,500	-74	+482	+367
12,500	-33	+407	+382
14,500	+37	+490	+511
16,500	+80	+492	+566
18,500	+71	+569	+648
20,500	+190	+606	+575

Table 2. Genetic potential Nebraska of heifers for milk and fat production in pounds compared with the national average.

Year of freshening	Nebraska		National Avg.	
	Milk	Fat	Milk	Fat
1979	-475	-19	-314	-11
1980	-378	-15	-207	-8
1981	-258	-12	-93	-5
1982	-153	-8	9	-1
1983	-45	-4	102	-2

Genetically . . .

(Continued on from page 25)

same five-year period.

The overall trend for both groups is in the proper direction but Nebraska is almost 150 lbs. of milk and 2 lbs. of fat behind the national average. Both groups should be making more genetic progress.

Upgrade Your Herd

Now is the time to start upgrading your herd's genetics. The sires

are available to dramatically increase your herd's profit potential. On the Summer USDA Sire Summary list, there are 108 Holstein bulls with a production proof in excess of +1,000 lbs. of milk. There are 82 between +800 and +999 lbs. of milk and 79 between +600 and +799 lbs. of milk. There is no reason why every producer cannot be using sires above the +800M level in Nebraska. Remember, when you produce milk, you are not just competing with producers in your own state, you are competing with all producers in the country, most

of whom are using higher genetic potential sires than Nebraska producers. One way to get the upper hand and produce your product more profitably is to use high Predicted Difference (PD) sires. The investment you make in using high PD sires will be permanent. The genetics will be there during a cow's entire lifetime. What cheaper investment can you make in your herd's future than by using top PD sires?

When looking at the potential for genetic improvement in Nebraska, we have a long way to go. We must all work together to increase the state herd's genetic potential. The very survival of our dairy industry is at stake. The next time your A.I. representative calls, why not increase your minimum standards by at least 500 lbs. of milk. It will be the best investment you can make for your future.

Where to get Help

Sire Summaries are published twice a year in *Hoards' Dairyman* as well as *Dairy Herd Management* magazine. When the reports are published, take a few minutes and check over the list of sires and see where your breeding program ranks. If you are using sires near the bottom of the list, then why not upgrade your selection criteria? If any producer needs help in defining a breeding program, there are three NebGuides available that will help: G85-755, "How to Set Goals for Your Breeding Program"; G85-754, "How to Use Dairy Sires Evaluated on the 1982 Genetic Base" and G85-756, "How to Calculate PD\$ for Your Own Milk Market".

If after reading these articles, you would like additional help, please feel free to give me a call. We'll be more than happy to assist you in designing a profitable herd genetic program.

¹Jeffery Keown is an Extension Dairy Specialist, Department of Animal Science.

The Hoard's Dairyman Bull List

(SUMMER 1985)



315 top A.I. bulls ranked on PD\$\$

This is our 18th consecutive year of providing a list of top A.I. bulls, based on USDA's Sire Summaries. This, our 25th list, is based on the July 1985 Summary.



Knowing which additives to add to the diet and in what quantity can reduce your feed costs by not overusing many supplements.

Reducing the Cost Of Producing Milk: Feed Cost

Foster G. Owen
Ted Nakamura¹

Dairy producers are always faced with the problem of keeping costs of producing milk below the price they receive. This challenge has become even greater with the recent decline in milk prices. Feed usually amounts to about 50 percent of the cost of producing milk and about 75 percent of the non-labor cost. Therefore, even a small reduction in cost per ton of feed can be converted into a sizeable increase in income in a short time.

Can Nebraska farmer-dairy pro-

ducers do anything to decrease feed costs even though they raise much of their feed? Fortunately, the typical dairy operation, which uses home-grown feeds as well as those that purchase most of their feed, has many opportunities to save on feed costs.

Save on Supplements

Considerable savings are possible in purchasing proteins, minerals and other supplements. These savings result from finding a means of reducing the amount of supplements purchased and finding the

"best buy" for those that are needed.

Protein supplements. To save on the amount of protein supplement one can select types of forages with higher protein. For example, use alfalfa as part or all of the forage portion of the ration. This is especially helpful in cutting feed cost when protein is expensive. An example of this is shown in Table 1. With 40 lbs. of corn silage fed per head daily along with free-choice mid-bloom alfalfa hay, each cow requires 7.5 lbs. of protein supplement. But when no corn silage is fed, more of the protein needs are supplied by alfalfa and each cow requires only 3.6 lbs. of supplement. More corn is needed in the ration without corn silage replacing some of the supplements. This results in a monthly net savings of \$8.10 per cow or \$810 for a 100 cow herd.

Another means of reducing the amount of supplement is to upgrade forage quality. For example, if alfalfa can be cut at the immature stage rather than at mid-bloom, supplemental protein could be eliminated from the ration of average cows or lower producers. In our example this would save \$.50 in ration cost per cow daily or \$1,500 per month for a 100 cow herd (Table 2).

When selecting the protein supplement itself one usually has more than one brand to consider and a particular company may offer at different prices a 32 percent, a 40 percent and a 50 percent protein supplement. To find which will minimize ration cost, one needs to formulate a ration with each and calculate the cost. The preformulated rations in EC83-256, "Cattle-log of Dairy Rations" could possibly save the formulation step in this process.

If a commercial supplement has special protein value because of "bypass" protein, the company producing this feed will need to pro-

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Table 1. Effect of Including Corn Silage on Cost Of Dairy Ration for 55 lbs. Milk Per Day

	(Price)	Ration A	Ration B
Alfalfa hay (MB), lb	(\$50/Ton)	11.20	22.50
Corn silage, lb	(\$22.40/Ton)	40.00	---
Corn, lb	(\$2.40/bu)	10.70	19.20
32% supplement, lb	(\$240/Ton)	7.50	3.60
Daily ration cost/cow		\$ 2.09	\$ 1.82
Daily difference in cost/cow			
ration A-B		\$.27	
Monthly difference/cow		\$ 8.10	

Feed Cost . . .

(Continued on from page 27)

vide you the factor for increasing its protein value. Then you will use this adjusted protein percentage in ration formulations. If the supplement with by-pass protein does not have extra protein value, it should be less expensive than regular supplements.

Mineral and vitamin supplements. If you are now using a commercial protein supplement, additional minerals and vitamins are generally not needed and may even be harmful. Minerals can be supplied adequately by simply using a trace mineralized salt plus a calcium-phosphorus supplement in most home mixed rations using basic proteins like soybean meal. It is a sound principle to purchase the supplement with lowest cost of phosphorus. A supplement with vitamins A, D and E is usually advisable for dairy rations, especially when cows are not on pasture or fed green chop. Purchase on the basis of lowest cost per unit of vitamin A. To avoid unnecessary costs, purchase from reputable dealers only the minerals and vitamins needed.

Other supplements. Only a few tested and proven supplements are available for general use in dairy rations. Buffers are often needed when fat test is below normal and antibiotics (chlortetracycline or oxytetracycline) will likely produce economic benefits when foot rot or respiratory problems are prevalent. Niacin and methionine (methionine hydroxylanalog) may be beneficial for high producing cows in the first three or four months of lactation. Carotene seems unlikely to produce an economic benefit in most herds; however, it may be advisable for herds with serious reproductive problems.

Various fermentation products and many other additives are currently available and are sold for

dairy rations. However other than those indicated above, none are recommended because evidence of economic value has not been consistently and adequately demonstrated. Thousands of dollars can be saved by using only proven products. For example, including an additive costing \$.25 per head daily results in a cost of over \$9,000 per year for a 100-cow herd.

Save on Energy Feeds

Fortunately, the dairy cow is very adaptable to use of many feed

sources of energy. For example, although corn and milo are the main ingredients in most Nebraska grain mixes, we can substitute one for the other, as well as many other ingredients for part or all of the milo and corn. Maximum recommended substitutions into the grain mix are: barley 100 percent, oats and wheat 50 percent, rye 33 percent.

During the last year there has been strong interest in a number of by-product feeds, all of which have been priced below corn. These

Table 2. Effect of Hay Maturity on Cost of Daily Ration for 55 lbs. Milk Per Day

	Price	Ration A	Ration B
		Immature alfalfa	Mid-bloom alfalfa
Alfalfa hay, lb	(\$50/Ton)	22.10	14.00
Corn silage, lb	(\$22.40/Ton)	30.00	30.00
Corn, lb	(\$2.40/bu)	10.70	12.80
32% supplement, lb	(\$240/Ton)	(0.45*)	6.50
Daily ration cost/cow		\$ 1.51	\$ 2.01
Daily difference in cost/cow		\$.50	
Monthly difference/cow		\$15.00	

*Mineral and vitamin supplement (\$710/Ton).

Table 3. Effect of Forage Selection on Cost of Producing Milk

	(Price)	Feeding Program			
		A	B	C	D
Forage					
Alfalfa hay (EB), lb	(\$50/Ton)	28.10	14.10	12.50	---
Corn silage, lb	(\$22.50/Ton)	---	40.00	---	---
Sorgo silage, lb	(\$20/ton)	---	---	30.00	---
Oatlage*, lb	(\$35/ton)	---	---	---	35.50
Grain ration					
Corn, lb	(\$2.40/bu)	17.15	9.85	17.25	11.70
32% supplement, lb	(\$240/ton)	---	5.40	5.45	9.65
Cost/head/day					
(at 55 lb milk/day)		\$ 1.44	\$1.87	\$ 2.01	\$2.28
Cost/cwt milk		\$ 2.62	\$ 3.40	\$ 3.65	\$ 4.15

*60% D.M.

Table 4. Potential Annual Saving in Feed Costs*

	Herd size			
	50	75	100	200
Reduce protein supplement 3 lb/day	\$4,106	\$6,159	\$8,212	\$16,424
Price of protein supplement feeding avg 6 lb/head/day @ \$230 vs \$250/T	\$1,095	\$1,642	\$2,190	\$ 4,380
Eliminate unproven additive @ \$.25/head/day	\$4,562	\$6,844	\$9,125	\$18,250
Substitute by-product \$50/ton for 8 lb (corn grain)	\$3,650	\$5,475	\$7,300	\$14,600
Reduce corn silage loss by 15% (feeding 40 lb/day)	\$1,369	\$2,054	\$2,738	\$ 5,475
Reduce overfeeding grain (\$150/T) by 3 lb/hd/day which increases hay eaten by 1.5 lb per day	\$3,285	\$4,927	\$6,570	\$13,140

*Corn price \$2.80/bu, supplement \$250/ton, corn silage \$25/ton, hay at \$60/T.

include soyhulls, corn gluten feed and hominy feed. The net energy value of each of these feeds is at least equal to corn and each can be substituted for one-third (corn gluten) to one-half (soyhulls and hominy feed) of the grain ration. For example, during one period this year soyhulls were priced at less than \$50 per ton. At this price, simply substituting soyhulls for 10 lbs. of corn (\$2.50/bu.) in a ration for high producers reduces daily feed cost by \$.20 per cow, or \$600 per month for a 100-cow herd.

Save on Home-Grown Forages

The true price of forages is generally underestimated. For example, when corn is raised for silage, we should include not only the cost of production, but also the cost of storage (ensiling). Finally, this total price must be adjusted for losses during storage. To make the necessary comparison of forages, dairy farmers must determine the true cost of the various forages available, whether produced on the farm or purchased. Then the most economic forage or forages to feed can be determined by calculating rations for the average cow in the herd with each of these forages or combinations. Computer ration formulation programs can make an easy job of this. Our "Cattlelog of Dairy Rations", with 600 dairy rations, may help make these comparisons. See Table 3 for an example of using this method.

These data show that selecting the forage system can be critically important to saving money. Feeding program A, with early bloom alfalfa results in the lowest feed cost per unit of milk. Compared to feeding program D, with oatlage, program A saves \$2,520 per month for a 100-cow herd. Such answers can guide dairy farmers in planning their forage production program or purchases. This is essential for keeping feed costs for producing milk as low as possible.

Other Savings

There are four major areas that may be overlooked when trying to reduce feeding costs (Table 4).

- 1) Many dairy farmers can save 15 percent to 30 percent of the cost of silage by taking the time and extra precautions in preserving their silage, especially that stored in stacks. A carefully sealed plastic cover can produce a savings of \$3 to \$6 per ton compared to no cover or a poorly applied plastic. Reducing loss of corn silage (\$20/Ton) by 15 percent will produce a savings of \$180 per month in a 100-cow herd feeding 40 lbs. per cow daily.
- 2) Avoid bunk or feeder waste.
- 3) Avoid overfeeding grain to poor producers. Dairy men have reported \$800 to over \$1,000 a month savings in grain fed by changes to avoid over feeding in herds of 80 to 100 cows.
- 4) Overformulation can produce a sizeable waste. Whenever possible at least two rations should be formulated for the herd, a special highly fortified ration for the high producers and another for the remainder of the herd.

Conclusion

Feed cost is the major cost of producing milk. Fortunately, Nebraska dairy farmers have many opportunities to reduce this cost. Table 4 gives illustrations of potential savings from various approaches to this problem. Our generally favorable feed prices compared to the other regions of the United States should give Nebraska a distinct advantage in its ability to produce milk competitively. We must take full advantage of this by applying feed cost-minimizing ideas such as described in this article.

¹Foster G. Owen is Extension Dairy Specialist; Ted Nakamura is a graduate student.

Relationship Of Dietary Protein And Reproduction

Larry L. Larson¹

Economic loss due to reproductive problems in dairy cattle in the U.S. is estimated at \$43 to \$83 per cow per year. Based on these estimates, poor reproductive performance costs Nebraska dairy men an estimated 5 to 10 million dollars annually. This cost is greater than many realize, because about 70 percent of the estimated loss is "hidden". It is not out-of-pocket expense. The major portion is lost income from milk due to lower lifetime milk production. This loss results because calving intervals are longer than the optimum of 12 months.

Kansas workers indicate that reproductive performance in dairy cattle has declined over the years. The stress of high milk production and changes in management practices have contributed to an in-

(Continued on next page)

Dietary Protein . . .

(Continued on from page 29)

crease in metabolic and reproductive disease problems. With advances in genetic ability for milk secretion, satisfying the nutritional requirements for both maximum milk production and optimum reproductive efficiency has become more difficult.

While the effect of protein content of the diet on milk yield has been extensively studied, its effect on reproduction is unclear. Several studies found that excessive or high dietary protein levels were detrimental to reproduction, while other studies indicated that there was no relationship between dietary protein levels and reproductive performance. Some of the differences in response might be due to the type of protein fed and the feeding method (i.e., blended into a complete mixed ration that is continuously available or the concentrate portion fed separately once or twice daily). An Illinois report suggested that intakes of dietary protein that maximizes milk yield are detrimental to reproduction and fertility unless release of ammonia in the rumen is controlled.

Oregon workers have been examining the relationship of dietary protein level and reproduction. They fed cows during the first 14 weeks of lactation diets that contained 12.7, 16.3 or 19.3 percent crude protein. The protein levels were adjusted by replacing barley with soybean meal.

Cows fed the highest protein level returned to heat sooner but required more services per conception and had more days open (Table 1). Milk yields were similar.

Table 1. Effect of dietary protein on reproduction

Protein in diet	12.7%	16.3%	19.3%
Days to first heat	36	45	27
Services/conception	1.5	1.9	2.5
Days open	69	96	106

Israeli workers examined the effect of a "protected protein" on reproduction. They fed cows diets containing either 16 or 20 percent crude protein, primarily from soybean meal, for the first 122 days of lactation. Formaldehyde treated soybean meal was also used in one 16 percent diet. This treatment protects the protein and reduces the rate of breakdown in the rumen. Therefore, more of the "protected protein" reaches the intestine where it is digested and absorbed.

Table 2. Effect of protein level and type on reproduction

Protein in diet	Protected	Not protected	
	16%	16%	20%
Days to first heat	37	40	8
Conception rate	69%	56%	44%
Services/conception	1.5	1.8	2.3
Days open	84	98	102

As shown in Table 2, cows fed the "protected protein" had the highest conception rate and the fewest days open.

Other studies in Israel suggest that feeding a diet high in protein is only detrimental to reproduction in older cows. Also, that high protein is more detrimental to cows under heat stress.

The reason why excess dietary

protein might be detrimental to reproduction and the specific sites of action is not known. Two possibilities are: (a) excess ammonia absorbed from the rumen alters biochemical, hormonal or tissue function; and (b) additional absorbed protein alters the balance of net protein and net energy to cause a relative energy deficiency. Oregon workers reported that blood concentrations of the hormone progesterone were lower and the uterine environment was altered by feeding a high protein diet.

Results of these and other studies suggest that excessive or high protein diets might be detrimental to reproduction in certain situations. However, this needs to be confirmed by more studies in this country, using feeds common to our area. Also, the level of protein fed, the value of low degradable protein and the feeding method (concentrate fed separately or in a complete mixed ration) all need to be examined to determine their effect on reproduction. For these reasons we have initiated a project to study the relationship between dietary protein and reproduction.

In conclusion, feeding of excess protein is costly, wasteful and might be detrimental to reproduction. Feed balanced rations that promote high milk production and good health. Watch for additional information concerning the effects of protein levels and types and feeding methods on reproductive performance.

¹Larry L. Larson is an Associate Professor, Department of Animal Science.

Mastitis Control Demonstration Herds

Don J. Kubik¹

The Mastitis Control Demonstration Herd project was an extension of Area Dairy Days '79-“Mastitis”. The 32 Mastitis Control Demonstration Herds were established in 1980 to show how a program could work and to provide hands-on experience for Nebraska equipment dealers, veterinarians, and fieldmen in the prevention and control of mastitis.

The demonstration herd approach assisted cooperating dairy producers in adopting those procedures and techniques presented at the Area Dairy Days. The UNL Mastitis Control Team helped these dairy producers identify problems existing at each farm and within their herd and offered suggestions of how to best deal with deficiencies in the dairy operation.

Education Program

The program was designed to update the education of veterinarians, equipment dealers, and fieldmen to deal more efficiently with mastitis problems. We have had excellent cooperation and support from these groups and generally feel they are now better able to meet the needs of Nebraska dairymen.

Figure 1 shows the average somatic cell counts (SCC) in milk of demonstration herds from 1979 to the present. These herds averaged 577,000 in 1979 and only 217,000 for 1984-85. This represents a 62.4 percent reduction.

Many of these dairymen made changes as a result of Area Dairy Days '79-“Mastitis” and have since made additional improvements as a result of the UNL demonstration herd control program. The re-

duced SCC levels are the result of a long-range total sustained effort over a long period. Continuation of a good control program is essential to maintaining low bulk tank SCC and herd infection levels.

Figure 2 shows the herd progress from 1979 to 1984-85 when divided into four different groups based on the average somatic cell counts before the start of the program. Herds with the highest SCC initially have shown the greatest improvement. Herds that began with low SCC have maintained their low level.

Demonstration herds, during the program's first years (Figure 2), increased production an average of 1191 lbs. milk and 47 lbs. fat — about \$156 in more income per cow.

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SOMATIC CELL COUNT

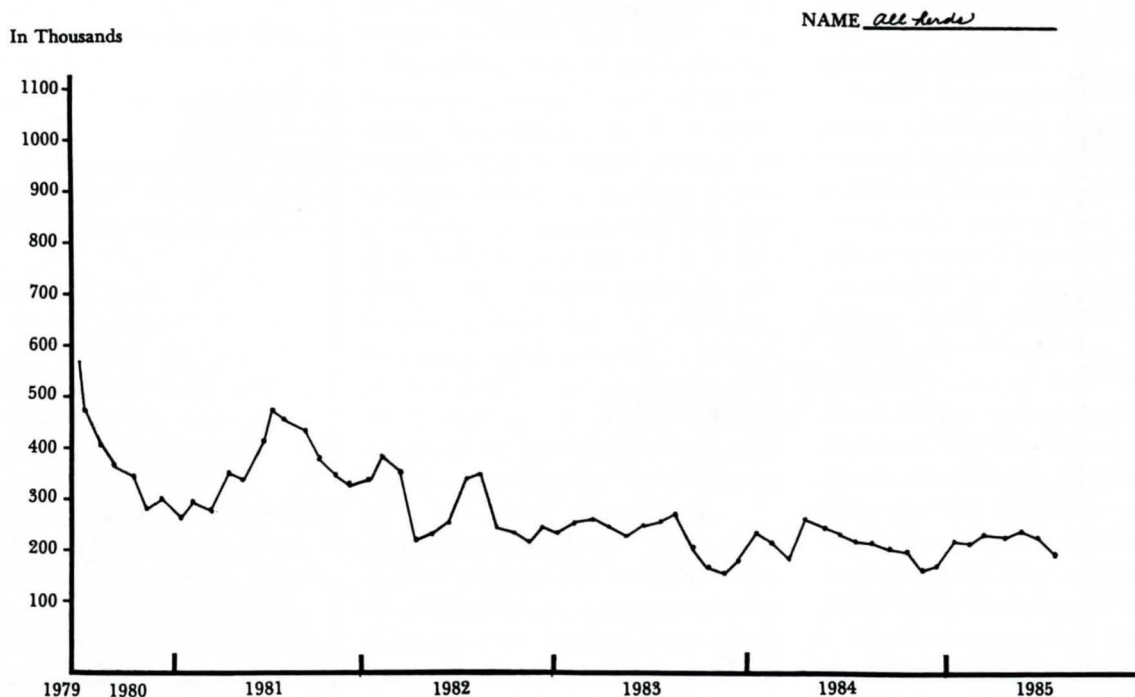


Figure 1. UNL Mastitis Control Demonstration Herds Average S.C.C. 1979 to Present (All Herds).

Mastitis . . .

(Continued on from page 31)

Problems Identified

Many different, but common problems have been identified. Six major problem areas are:

Milking Procedures. Areas which needed improvement are: cow preparation for milking, udder and equipment cleanliness, stimulation for milk let-down, drying the udder with sanitary towels, fore-milk stripping, on unit time-off time, milker unit adjustment, and lack of teat dipping.

Milking Equipment. Problems were found in nearly every conceivable area. These included overall system vacuum capacity, vacuum leaks, poor responding or insensitive regulators, small line sizes, restrictions in lines, lack of needed pipeline slope, too many units per milkline slope, and poor maintenance of the milking system.

Extraneous Voltage. Unacceptable levels have been identified in over half the dairies surveyed.

These have been primarily caused by poor wiring. Poor or lack of grounding and neutral wires and deteriorated wire insulation were most common causes of problems. Malfunctioning meters, pumps and waterers were next — with problems originating off the farm of least importance.

Veterinary. Most farms are using a dry cow treatment program. Common areas needing improvement were: 1) identification of causative organisms and treating with most effective products; 2) treatments to begin early and maintained long enough; 3) multiple dry cow treatment of selected cows; 4) use of more sterile techniques in treatment and sampling of infected quarter.

Rations. Ration balancing was generally good, but energy, protein and phosphorus levels were identified as too low or in excess in many herds. In some herds, full expression of milk yield was apparently restricted by nutritional limitations. In other herds costs were high due to unnecessary types

and amounts of ingredients.

Housing and Lots. Low spots in lots, drop-offs at the edge of concrete and lack of mounds in lots were common. Nearly all free-stalls and loafing sheds lacked adequate natural ventilation and many free-stalls showed lack of regular maintenance.

Looking Ahead

All cows can not be cured, nor can all deficiencies in all herds be corrected. At the same time, herd owners on this program are doing many important things and making as many improvements as practical in their operation.

The program's long range objective is to reduce herd mastitis level. Our goal is to reduce somatic cell counts of all herds to below the 300,000. For some herds, 100,000 is realistic and reasonable. This level can be attained by using modern mastitis control which is designed to reduce new infections and shorten the duration of existing infections. This will ensure higher milk production, lower drug costs,

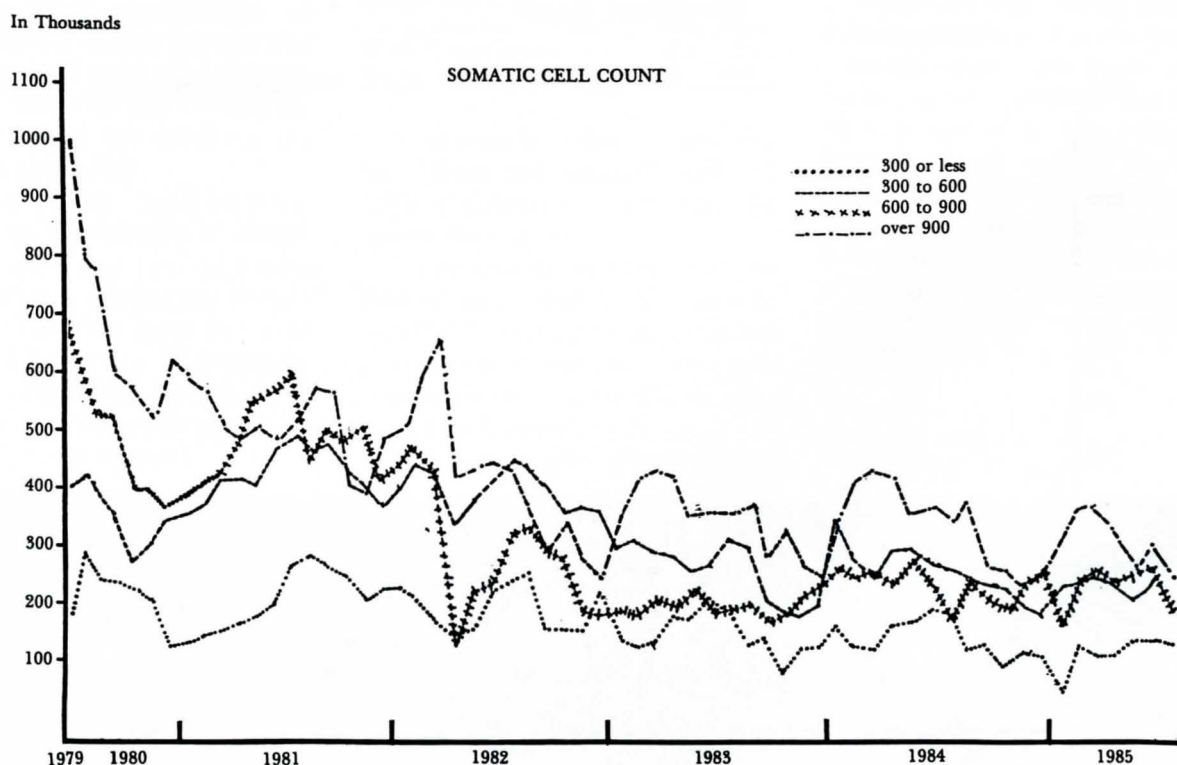


Figure 2. UNL Mastitis Control Demonstration Herds Average S.C.C. 1979 to Present (Divided by Groups on the Basis of 1979 Average S.C.C.).

and reduced culling due to mastitis — resulting in higher profits from milk and breeding stock and higher quality milk for the consuming public.

Necessary Practices

Here is a partial list of practices (with UNL literature numbers related to the problem) that may effectively help control mastitis on your dairy farm.

- Check milking equipment at least every six months. (MCP-10,13)
- Service milking equipment regularly. (MCP-12,14,29,30,32)
- Prepare udders correctly. (MCP-6)
- Stimulate for milk let-down. (MCP-22)
- Attach and remove milkers properly. (MCP-6)
- Avoid contamination when treating teats. (MCP-7,11,17)
- Dip teats only with approved product. (MCP-9)
- Use screening tests regularly and on all new additions to the herd. (NebGuide G81-556)
- Sample clinical cows and new additions. (MCP-7,11,17)
- Maintain yards and housing. (MCP-4,15)
- Treat for minimum of three days. (MCP-11)
- Provide fresh cow care. (MCP-15)
- Feed for production. (NebGuide G77-331,G77-373,G79-459)
- Keep adequate records. (MCP-7)
- Treat all dry cows.
- Cull chronic cows.

You must employ the practices continually and correctly over a long period of time if you are going to effectively control mastitis in your herd.

The success of the herds on the program has not come from magic drugs, secret techniques, or other miracle cures. Success has come from a positive attitude, identification and correction of problems, the desire and willingness to change, and the adoption of a total

mastitis control program. All producers attending Area Dairy Days '79—"Mastitis" have had access to the UNL Mastitis Control Guides by the Team, and some have made great progress. The same approach can work for you. Obtain and use the

mastitis control guides with the assistance of your fieldman, equipment dealer, and veterinarian.

¹Don J. Kubik is an Extension Dairy Specialist, Department of Animal Science, University of Nebraska.

Effect of Roasting And Grinding on the Value Of Soybeans for Dairy Cows

Foster Owen¹
Alex Edionwe

Soybeans are a widely available alternative source of protein for dairy rations. In addition to their high protein value, soybeans are also higher in energy than the traditional oil meal types of supplements. This could potentially increase energy intake and thereby, raise milk yield, especially during the first two months of lactation when intake of energy is below that needed by many high ability cows.

Use of soybeans in dairy rations, however, presents several problems. Currently, it is recommended that soybeans be cracked or ground before feeding. When raw beans are prepared in this way they will become rancid in a few days, except under cool environmental conditions. In addition, soybean protein is lower in by-pass protein and higher in unsaturated fat than desirable. High levels of unsaturated fats interfere with the function of bacteria in the rumen and decrease fiber digestion.

Two experiments were conducted to determine whether the value of soybeans was improved by roasting or by feeding them whole (unground), rather than ground, and to learn whether all other supplemental protein can be fully re-

placed with soybeans in dairy rations with common Nebraska feed ingredients.

Experiment I

The purpose of this experiment was to learn whether roasting (230-260°F) would improve the soybeans for dairy rations. Based on other research, roasting should increase the by-pass value of the protein. Roasting also destroys certain enzymes, including lipoxidase. Thereby, roasting could reduce the rancidity problem.

In this experiment the possible value of feeding whole or unground beans was also tested. Half the roasted beans and half the raw beans were ground and half were left unground. Feeding the beans unground, we speculated, might reduce the breakdown of protein in the rumen and thus, raise the by-pass quality of the soy protein. Also, if the amount of soybean digestion in the rumen was reduced, the adverse effect of the unsaturated fat should be reduced.

The basal ration included alfalfa haylage, corn silage, corn, oats, the assigned soybean preparation plus minerals and vitamins. In addition, each cow was offered 3 lbs. of long brome hay daily. Rations were all

(Continued on next page)

Soybeans . . .

(Continued on from page 33)

prepared as complete mixed feeds and were full-fed.

Results: Roasting and grinding of soybeans. The results of this trial (Table 1) show that consumption of all the soybean rations was very good, averaging about 48 lbs. of dry matter intake per day.

Roasting the beans increased intake by 3.6 lbs. per cow daily and resulted in 3.0 lbs. more daily milk. Fat percentage was also a little higher for roasted beans, whereas solids-not-fat percentage was similar for roasted and raw beans.

Surprisingly, grinding of the soybeans seemed to have practically no effect on lactation whether raw or roasted compared with feeding the soybeans whole or unground. That is, in terms of intake, milk yield or milk composition, feeding the beans just as they come from the combine was equally as satisfactory as ground beans.

Therefore, these results indicate that raw beans may be fed unground during summer months when rancidity and reduced palatability could be a problem with ground beans.

Experiment II

The purpose of this experiment was to determine how roasted and raw soybeans compare with soybean meal as protein sources. In addition we wanted to evaluate bentonite as an additive in a pellet containing roasted soybeans. A previous experiment showed an improvement in milk yield when roasted soybeans were pelleted with bentonite, compared with soybean meal. Feeding this pellet also resulted in an improvement in milk yield compared with cooked beans, fed either ground or unground. However, it was not known whether the advantage of this pellet was due to the bentonite or to pelleting.

The basal ration was similar to

that of Experiment I, except no brome hay was fed. The soybean meal ration was compared with three rations containing soybeans in pelleted (3/8") form as follows: raw beans, roasted beans and roasted beans with bentonite at 19 percent added to the pellet. In these rations about 25 percent of ration protein was supplied by the soybean treatments. All rations were full-fed as complete type rations.

Results: Whole soybean prepara-

tions compared with soybean meal. Voluntary consumption of the roasted soybean rations was significantly greater than for the raw soybean and soybean meal rations. This confirms results of our first experiment with roasted soybeans compared to raw beans, but also suggests a possible superiority of roasted beans to soybean meal. Milk yield and 4 percent fat-corrected milk were somewhat higher for the roasted pellet ration compared to the other rations, but difference in

Table 1. Effect of Method of Soybean Preparation on Milk Yields and Composition

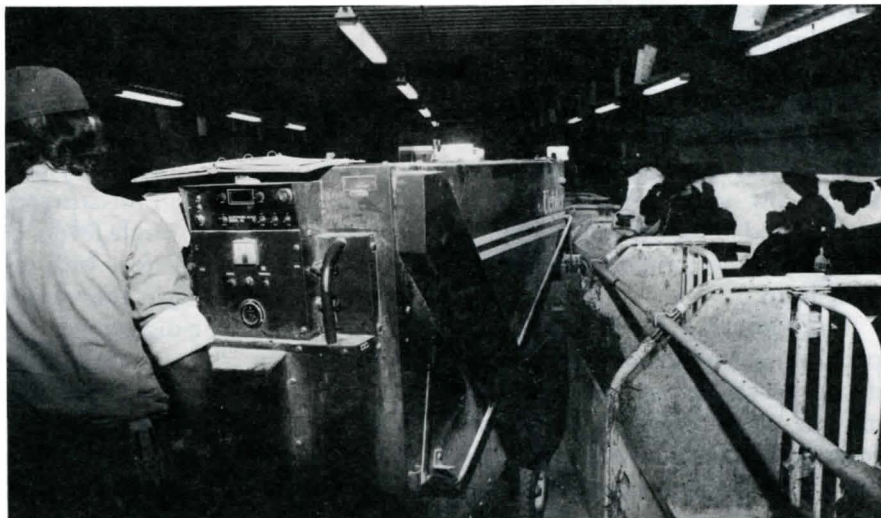
Response	Soybean Meal (44%)	Whole soybeans		
		Raw pelleted	Roasted pelleted	Roasted pelleted w/bentonite
Dry matter intake, lb/day	45.2	46.2	50.4	51.0
Milk yield, lb/day	62.6	61.3	64.1	62.6
Fat, %	3.38	3.49	3.49	3.41
Solids-not-fat, %	8.79	8.64	8.64	8.64
FCM ^a , lb/day	56.3	57.3	59.0	55.9
FCM/dry matter intake	1.36	1.23	1.17	1.10

^a4% fat-corrected milk.

Table 2. Effects of Roasting and Grinding of Soybeans For Lactating Cows

Soybean preparation	Dry matter intake	Milk yield	Milk fat	Solids-not-fat	FCM yield ^a
	(lb/day)	(lb/day)	(%)	(%)	(lb/day)
Roasted/ground	49.2	67.6	3.57	8.35	63.0
Roasted/whole	50.3	69.2	3.46	8.47	63.4
Raw/ground	45.2	65.7	3.40	8.42	59.5
Raw/whole	47.2	65.0	3.29	8.46	57.4
Averages					
Roasted	49.8	68.4	3.52	8.42	63.2
Raw	46.2	65.4	3.34	8.44	58.6
Ground	47.2	66.6	3.48	8.38	61.3
Whole	48.8	67.1	3.38	8.46	60.4

^a4% fat-corrected milk.



Using an automatic unloading feed-mixer wagon with a weight cell is an excellent way to regulate the amount and kinds of feed that dairy cattle receive when on a nutrition experiment.

milk yields and composition were not significantly affected by treatments. It was noted that milk fat test was not lowered by the higher fat content of the bean rations, as sometimes results from adding fat to the ration. Also, the efficiency value for conversion of dry matter to milk was highest for the soybean meal ration. The reason for this is not known. The addition of bentonite did not produce any apparent benefits compared with roasting and may have had a negative effect on milk yield in this experiment.

Conclusions

Roasting of soybeans, whether fed as whole beans, ground or pelleted beans, increased milk yield by about 3 lbs. daily compared with feeding the beans raw. Compared with soybean meal, roasted beans also appear to be superior in fat-corrected milk yield, but this comparison needs further testing. Addition of bentonite gave conflicting results between this and a previous experiment, thus, it also needs further testing.

Soybeans did not benefit from grinding and therefore, could be fed in either form. Feeding whole bean could avoid rancidity problems with raw beans. Although further testing in longer term trials is needed, it would appear that if the cost of using roasted beans compared to raw beans could be offset with the added income from 2 to 4 lbs. of milk, roasting would be economically beneficial. The difference favoring roasted soybeans over soybean meal is about 2 to 3 lbs. milk, based on the one experiment of this report and a previous study. The economics of using soybeans to replace soybean meal or other supplemental protein depends on the cost of **rations** using each, since 19 percent more soybeans are required than soybean meal to supply an equal amount of protein.

¹Foster Owen is Extension Dairy Specialist, Alex Edionwe is a graduate student.

Increasing the Proportion of Heifers

Franklin Eldridge¹

Every dairyman who has been in the business for any period of time has had **too many bull calves** at one time or another. Most feel that they must be getting more than their fair share of bull calves. Studies with large amounts of data usually show that about 52 percent of calves born are bulls. In the unusual years when larger numbers of heifers are available, culling and replacement decisions are much easier. If the percentage of heifers could be increased to nearly 100 percent, herd production averages could be increased more rapidly because higher selection of replacements would be possible.

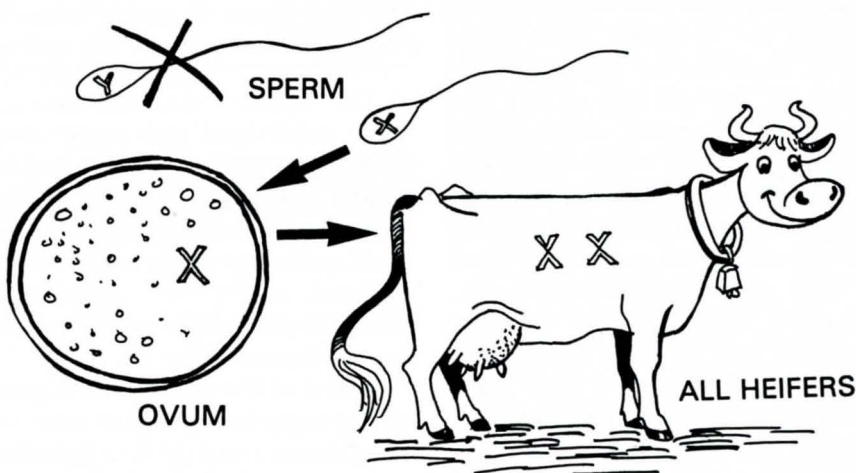
Although several different methods (chemical, physical, and electrical) for sexing semen (separating X- and Y-chromosome bearing spermatozoa) have been reported, these methods either have not been effective or consistent. Scientists are searching for other ways of sexing semen, including biological treatments of spermatozoa before fertilization. One example is the use of antibodies which might bind to the surface of the spermatozoa that are carrying the Y chromosome (which produce bull calves), permitting the separation of these from the X-

bearing spermatozoa (that result in female offspring).

The H-Y antigen is a male-specific antigen which is involved in the development of the testicles. Monoclonal antibodies to the H-Y antigen will bind to cell membranes of cells from males. Since a major gene for the H-Y antigen is located on the Y chromosome, Y-bearing sperm may be H-Y antigen positive and X-bearing sperm may be H-Y antigen negative. Some published results with laboratory animals indicate that this is true, and using these techniques to separate the spermatozoa into two groups the sex ratio of the offspring has been modified considerably.

We are currently testing the hypothesis that monoclonal H-Y antigen antibodies may be used to sort all or a portion of the Y-chromosome bearing spermatozoa from a bovine semen sample, thus enriching the sample with X-chromosome bearing spermatozoa. If these efforts are successful, then semen with higher numbers of X-bearing spermatozoa could be used to breed dairy cattle artificially, which would result in a higher percentage of female calves.

¹Franklin Eldridge is Professor, Animal Science Department.



X- and Y-bearing sperm are produced in equal numbers. If the Y-bearing sperm were separated and discarded before insemination, all progeny would be females.



A paste from this tube was administered to all calves on the Probiocin treatment soon after birth and at weaning.

Effect of Probiocin And Starter Preparation On Calf Performance

Foster G. Owen¹
Larry L. Larson

Since dairy calves are afflicted more often with scours and digestive upset than any other health disorders, efforts continue to find means for reducing these problems. Lactobacillus organisms appear to beneficially affect the intestinal bacteria in some animals. Therefore, this experiment was designed to determine if they would improve health and performance of calves under our conditions.

The specific treatments were: controls, which received no lactobacillus, and treated, which were given orally 10 cc of a paste (Probios Bovine OneTM) soon after birth and at weaning (21 days of age). They were also given 5 gm of the powdered product (Probios 180 D) each day in their liquid diet.

Table 1. Starter Rations Composition

	Control meal	Control meal	Cob pellet
	(%)	(%)	(%)
Corn, rolled	48	48	30
Oats, rolled	25	25	25
Corn cobs	--	--	15
Soybean meal	24	24	27
Vit. - mineral premix	3	3	3

The control and treated animals were subdivided into three additional groups to test three starter ration preparations. The starter rations were as follows (Table 1): a meal type starter, this same starter pelleted, and a third starter into which 15 percent ground corn cobs were substituted for corn.

A total of 96 calves were assigned to the experiment. Calves were on experiment from the first day after birth until 63 days of age. They were housed in individual huts and were fed a mixture of surplus co-

lostrum and waste milk at a rate of 10 percent of birth weight, once daily, until being weaned at 21 days of age. Starter rations and water were made available, free-choice, from the first day.

Results

Effects of lactobacillus. Results of adding Probios to the diet are shown in Table 2. Starter intake before weaning (0-21 days), during the critical period just following weaning, and during post-weaning periods were similar for the controls and treated calves. Body weights were also practically equal yet the treated calves tended to be taller at the withers.

The findings suggest that the lactobacillus culture may have improved health. The incidence of scours, elevated body temperature and scours treatments were all reduced. However, the severity of scours was not different between treatments. General health was very good and only one calf on each treatment died during the study.

Effect of starters. Previous experiments with pelleted calf starter diets have produced variable effects. We had never evaluated pelleting of the starter we have been using for a number of years. Our previous starter studies have shown improved intake and gains from adding ground corn cobs to pelleted starters. However, we had not compared our meal starter with the ground corn cob starter fed in pellet form.

Data in Table 3 show that the inclusion of cobs in the pelleted starters improved intake of the starter by 17 percent in the week following weaning and 14 percent for the period from birth to 63 days of age. The difference was smaller between the meal ration and the pelleted cob starter. However, these differences in intake were not reflected in benefits to weight gain or wither height.

Health data for the three starters were similar, indicating no rela-

Table 2. Effect of ProbiocinTM on Calf Performance and Health

	Control	Probiocin	Effect of Probiocin
No. calves/treatment	48	48	
Starter intake	(lb./day)	(lb./day)	(%)
0-21 days	.33	.31	-6
(22-28 days)	1.52	1.56	+3
22-42 days	2.57	2.66	+4
43-63 days	4.88	5.02	+3
0-63 days	2.68	2.80	+4
Body weight			
21 days	108	109	+1
42 days	131	131	(equal)
63 days	170	170	(equal)
Incidence of:	(No.)		
Scours	25	17	-32
Elevated temp.	8	3	-62
Treatments for scours:			
Reduced milk	15	13	-13
Scours boluses	22	11	-50
Electrolytes	6	2	-67
Death losses	1	1	(equal)

^aProducts of Pioneer HiBred International, Des Moines, IA.

Table 3. Effect of Pelleting and Addition of Ground Corn Cobs to Calf Starters on Calf Performance

	Starter		
	Control (meal) ration	Pelleted control ration	Pelleted cob ration
Calves assigned, No.	32	32	32
Starter intake (lb/day)			
0-21 days	.31	.31	.33
(22-28 days)	1.50	1.45	1.69
22-42 days	2.62	2.51	2.75
43-63 days	4.88	4.60	5.37
0-63 days	2.65	2.60	2.97
Body weight (lb)			
21 days	109	108	109
42 days	134	128	132
63 days	173	167	171

tionship to well-being. There were no differences in response to the lactobacillus treatments related to type of starter preparation fed.

Summary

Administration of a lactobacillus culture to young calves reduced the incidence of scours, elevated body temperatures and the number of scours treatments. However, lactobacillus had no effect on voluntary starter intake, weight gains or other growth measures. The inclusion of ground corn cobs in the pel-

leted starter ration at 15 percent of the dry matter improved intake, but effects on growth and health responses were similar to that of the control starter in meal form. Pelleting did not improve starter use by young calves.

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TMPioneer HiBred International, Des Moines, IA.

'By-Pass' Protein In Dairy Rations

Foster G. Owen¹
Manuel De Gracia

Feeds containing protein which are relatively resistant to breakdown in the cow's rumen are sometimes called by-pass proteins. However, by-pass protein refers specifically to that portion of the ration protein which is not broken down or degraded in the rumen. Since this protein escapes degradation it is also called "escape" or "undegraded protein". All proteins are partially broken down in the rumen; therefore, feed ingredients may be classified in terms of their percentage by-pass (Table 1). Estimates are still tentative and subject to modification when more data is available.

(Continued on next page)

By-Pass . . .

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"By-pass" proteins are a topic of great interest to researchers, dairy producers, and the feed industry. Much of the interest has come from experiments with growing beef cattle in which a number of the "by-pass" proteins were found to have 150 to 200 percent the value per unit of nitrogen compared to soybean meal.

In theory, the dairy cow should benefit even more from by-pass proteins because of her high protein requirement and the smaller percentage of this requirement which can be produced by rumen bacteria.

The requirements of the dairy cow for protein are complex, and as we "Monday morning quarterback" the research done so far, we frequently see one or more elements which could have prevented expression of the real potential of the test ingredient(s). Whatever the reason(s), results from experiments using by-pass proteins in dairy rations have been disappointing.

Protein Requirement Of The Dairy Cow

The cow's ration requirement for crude protein (nitrogen) must be provided to meet two types of requirements within the animal, that needed by the rumen microorganisms, mainly bacteria, and that required to be absorbed by the small intestine to meet the needs of the animal itself.

Rumen or bacteria requirement. The rumen bacteria appear to need two types of crude protein. Most of their nitrogen needs can be supplied by non-protein nitrogen (NPN) sources, such as urea or ammonia. This ammonia may come from the ration or may be produced in the rumen as a product of protein breakdown. In addition to a nitrogen requirement, rumen

Table 1. By-Pass Estimates for Some Common Feedstuffs^{a,b}

Low by-pass (<30% undegraded protein)	Medium by-pass (30% through 44% undegraded protein)	High by-pass (45% and higher undegraded protein)
Alfalfa silage (20) <% DM	Corn silage (30)	Brewers wet grains (45)
Barley (20)	Cottonseed meal (sol) (30)	Alfalfa (Dehy) (45)
Oats (20)	Soybean meal (30)	Sorghum grain (45)
Soybeans (20)	Cottonseed (35)	Corn grain (45)
Peanut meal (20)	Linseed meal (35)	Brewers dried grain (50)
Sunflower meal (25)		Corn gluten meal (55)
Alfalfa hay (25)		Distillers dried grain (55)
		Fish meal (65)
		Meat meal (65)
		Meat & bone meal (65)

^aFrom Satter and Stehr. 1984. Proceedings Distillers Feed Conference p 59.

^bSee Nebguide G84-694 for values for additional feeds.

bacteria may also benefit from other products of protein breakdown, such as the branched chain fatty acids.

The rumen requirement for crude protein has an important relation to the use of by-pass proteins. If the proteins in a ration are primarily by-pass sources, the rumen may be deficient in ammonia and, thereby, retard the production of bacterial protein. Including NPN in this ration would improve performance and would also offer the potential for reducing feed cost.

In contrast, if the ration contained mostly rumen degradable, or a low level of by-pass protein, then the level of ammonia in the rumen may exceed that which the bacteria can use. Much of this excess nitrogen will pass through the cow's system and be excreted in the urine, and thus, wasted. In this case, substituting high by-pass proteins for a part of the nitrogen needs could reduce this waste and, thereby, lower the ration requirement for protein. This also affords the potential to reduce ration cost.

Requirement for milk. The cow has specific requirements for amino acids, which are the products of protein digestion in the intestine. This protein comes from two main sources, the by-pass protein from feed and the protein from bacteria.

One must also be concerned about the digestibility of the by-pass protein and its amino acid makeup. Chemical and heat treatments increase the resistance of proteins to rumen breakdown. However,

excessive treatment, or over-protection can reduce intestinal digestion and may considerably reduce the productive value of the protein. Excessive heating may occur in drying of many by-product feeds.

We have only recently begun to give attention to the cow's amino acid requirements, so our knowledge of requirements is poor. It appears that methionine and lysine are the amino acids most likely to be deficient in cows fed common feeds. For example, we may not realize a benefit from corn gluten meal as a by-pass protein when fed with corn silage as forage and corn grain as the main concentrate ingredient. This is because all these corn-based products are low in lysine. Although ample protein may reach the small intestine to satisfy the cow's needs, it cannot be efficiently used by the cow when lysine is deficient.

Thus, the cow's dietary protein requirement is very complex. It involves rumen nitrogen, by-pass protein and digestibility and amino acid content of by-pass protein. Since values for by-pass of proteins in lactating cows are minimal and amino acid requirements are unknown, it is not surprising that we cannot use the concept very effectively at this time.

Results Of Experiments

Distillers Grains. Distillers dried grains (DDG) have been researched more than any of the high by-pass protein sources. However, most of the studies were done be-

fore we knew of by-pass proteins, so the experiments were not designed specifically to test DDG's by-pass value. The average improvement in milk production in six experiments summarized was 2.7 percent.

Corn gluten meal. Corn gluten meal has also been tested in lactation rations. In one study, corn gluten meal and distillers grains with solubles were combined into one supplement and in another ration this mixture was combined with extruded soybeans. Milk yields were significantly lower for the first mixture than for the soybean meal control and was slightly lower for the combined mixture. Another experiment showed an increase in milk yield of 7 lbs. per day for corn gluten meal, but when the yields were adjusted for milk solids, the benefit disappeared.

Nebraska experiments. We have recently conducted two experiments to evaluate corn gluten meal and blood meal in combination for lactating cows. (This mixture has given excellent results as by-pass proteins in beef grower rations). Table 2 presents the results of the first study in which ammoniated corn silage with 12 percent protein served as the forage. The rations contained the following supplemental protein sources: 1) urea, 2) low corn gluten meal plus blood meal, 3) high corn gluten meal and blood meal, and 4) high soybean meal. Milk yields were somewhat higher for the natural protein rations compared with urea, but the by-pass mixtures were not superior to soybean meal. Fat-corrected milk (3.5% base) yields were surprisingly similar for all treatments. Protein efficiency was highest for the urea ration and similar for the other supplements.

Another experiment was conducted with cows in early lactation to compare the by-pass mixture of corn gluten meal and blood meal with soybean meal and the same by-pass mixture at two levels. The forage was also corn silage in this

Table 2. Value of Corn Gluten Meal - Blood Meal Mixture for Lactating Cows (Mid-Lactation)

Protein source	Ration protein (%)	Milk (lb/day)	FCM (lb/day)	Fat (%)	SNF (%)	Protein efficiency (%)
Urea	12.2	52.8	55.0	3.84	8.9	33.0
Low CGM-BM	14.3	53.8	55.0	3.73	9.0	28.4
High CGM-BM	16.3	56.6	56.8	3.56	9.1	26.4
High SBM	15.1	54.5	55.7	3.65	9.0	26.4

^aProtein in milk/protein intake.

Table 3. Value of Corn Gluten Meal—Blood Meal Mixture for Lactating Cows (Early-Lactation)

Protein source	Ration protein (%)	Milk (lb/day)	FCM (lb/day)	Fat (%)	SNF (%)	Protein efficiency (%)
Low CGM-BM	11.6	63.1	58.7	3.52	8.85	31.9
Medium CGM-BM	13.6	65.6	59.6	3.28	8.86	30.7
Medium soybean meal	13.6	64.7	59.8	3.41	8.97	32.5
High soybean meal	17.5	65.8	63.8	3.62	8.92	22.8

^aProtein produced in milk/protein fed.

study plus 3 lbs. brome hay per day. Data from this trial (Table 3) indicated no benefit in lactation performance from the by-pass mixture compared to soybean meal. Efficiency was also similar for soybean meal and the by-pass mixture, but was poorer for the high soybean meal ration, indicating that cows on this ration received excessive protein.

The reason for the difference in results of these studies and those with beef cattle is not known. The digestive function of a producing dairy cow is quite different from a beef animal, in terms of the amount of feed consumed. The higher intake is known to speed the rate of passage of feed through the rumen of dairy cows and may affect considerably the amount of ration protein that by-passes the rumen. However, the basal protein levels may have been too high for the by-pass sources to express a response or the procedures insufficiently sensitive to detect them in our experiments.

Conclusions

At present, the knowledge necessary to use the concept of by-pass protein is insufficient for detailed recommendations. Generally, it seems advisable to use the information in Table 1 to serve as a guide

for selecting feed sources. Medium by-pass proteins or a mixture of low and high by-pass sources may be better than either all low or high. Excessive use of low by-pass proteins may result in considerable waste of protein, whereas feeding mainly high by-pass sources may not supply enough non-protein nitrogen to the rumen bacteria. Effective use of by-pass proteins requires attention to digestibility of the by-pass sources and to their amino acid make-up. For economic benefit from the by-pass proteins, they must reduce the feed cost of producing milk. To accomplish this, either the amount of supplemental protein must be reduced, or the supplement itself must be less expensive, or both.

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Grain Feeding of Cows In Late Lactation

L. L. Larson¹
F. G. Owen

The amount of grain needed by dairy cows for economical production is a subject of considerable practical importance. Much of the research on this subject has involved cows in early and mid-lactation and little has been conducted on cows in late lactation. Recent research findings suggest that over-conditioning of cows in late lactation may contribute to the fat-cow syndrome, producing various health and reproductive problems at calving time or soon thereafter. However, it is commonly recommended that cows be fed sufficient energy during late lactation to replace the body condition lost while in high production in early lactation. We need to know just how much grain is needed to supplement our common forage rations in Nebraska - corn silage and alfalfa haylage - to condition cows adequately, but to avoid fat-cow problems after freshening.

The computer feeding system has made it possible to feed more accurately the concentrate portion of the ration to individual cows. Using this system, coupled with a better knowledge of the requirement for concentrates could result in both feed cost savings and better cow health. Therefore, the objective of this trial was to determine the effect of the level of grain feeding in late lactation on milk yield and body condition in the current lactation and health and reproductive performance after the subsequent calving.

Experimental plan. As cows started the seventh month of lactation they were randomly as-

signed to one of the three grain feeding levels given in Table 1. The amount of grain allocated was adjusted weekly based on the cow's milk production and according to her assigned grain feeding level. The concentrate ration was individually fed via a computer controlled feeder. All of the animals were Holstein, 45 were first calf heifers and 66 were in their second or later lactations. They were maintained in one group in a confined concrete lot with access to free-stalls and were full-fed a mixture of corn silage and alfalfa haylage (50:50 dry basis).

Cows were turned dry six weeks prior to expected calving or when milk production dropped to less than 20 lbs. daily, whichever occurred first. During the dry period all animals were in the same group, so that the feeding, housing and management conditions were similar for all cows during this time. The dry cow feeding program consisted of brome pasture in the summer and brome hay plus limited corn silage in the winter. This was supplemented with two to four pounds of grain in the winter. Starting about 10 days before calving, 10 lbs. of grain was fed daily

Table 1. Grain Feeding Schedule

Daily milk yield, lb	Cows in 2nd or later lactation			1st calf heifers ^a		
	Grain feeding level			Grain feeding level		
	Low	Medium	High	Low	Medium	High
	(lb/day)					
20	0	0	6	0	4	10
30	0	5	11	3	9	15
40	4	10	16	8	14	20
50	9	15	21	13	19	25
60	14	20	26	18	24	30
70	19	25	31	23	29	35

^aHeifers were allocated 4 lb grain more than cows at similar milk production levels to allow for growth.

Table 2. Effect of Grain Feeding Level in Late Lactation on Milk Production in Current and Following Lactation

Item	Grain feeding level		
	Low	Medium	High
Length of current lactation, days			
Heifers	321	336	344
Cows	320	331	308
Milk yields (lb/day), current lactation ^a			
Weeks on treatment			
1-4 ^b	44.1	46.0 (+4%) ^c	46.1 (+5%)
5-8 ^c	38.9	43.6 (+12%)	44.3 (+11%)
9-12 ^d	38.9	41.4 (+6%)	42.8 (+10%)
(Heifers)			
1-4 ^b	41.8	44.9 (+7%)	44.9 (+7%)
5-8 ^c	41.0	40.2 (-2%)	39.5 (-4%)
9-12 ^d	33.6	35.2 (+5%)	34.0 (+2%)
(Cows)			
Milk yields (lb/day), following lactation			
first 8 wk	69	67	68

^aMilk yields adjusted for previous milk production level and days open.

^bMonth 7 of lactation.

^cMonth 8 of lactation.

^dMonth 9 of lactation.

^e% increase compared to low grain level in parentheses.

until calving. Following the subsequent calving, cows on this experiment were also fed and managed without regard to previous treatment.

Data were collected starting at the 7th month of lactation until drying off, which was during the time the cows were fed their assigned grain level. The month before starting the trial (month 6) was used in the analyses as a base period to measure the effect of grain level on milk production in months 7, 8 and 9. Data were also collected at the subsequent calving and for the first 8

weeks of the following lactation.

Results. Table 2 shows the milk yield response of cows to the three treatments. Higher levels of grain feeding increased the length of lactation of heifers, but had no effect on lactation length of older cows. This effect probably resulted from the greater response of heifers to grain feeding and their higher persistence of milk production. The milk yield data were adjusted during computer analysis to remove differences in production before starting the trial and to remove the effect of days open. This is why

milk production from heifers is as high or higher than that from older cows.

Increasing grain from the low to medium level resulted in only 2 lbs. higher milk yields, with no greater milk yields from the high grain level. However, statistical analysis revealed that only in the first four weeks were differences significant. Most of the response in milk yields was from heifers. Their average milk yield was 7 percent higher for the medium and 9 percent for the high levels of grain feeding compared to the low level. Persistency of actual milk production was lowest for the heifers fed the low grain level compared with those fed the medium and high grain levels.

The older cows responded with only 3 percent more milk with the medium level of grain and less than 2 percent at the higher grain level. Most of the response of older cows was during the first four weeks, whereas the response of heifers was greater after the first four weeks. Grain feeding level did not have a measurable effect on percent fat or protein in the milk or the somatic cell counts.

Milk production in the first eight weeks of the following lactation was not affected by the late lactation grain feeding treatments; neither was milk content of fat or protein.

Reproduction and health. No apparent detrimental or beneficial effects of previous grain feeding were observed in calf birth weights, cow's ability to "clean" following calving, calving difficulty, still births, days to first signs of heat, or incidence of various post-calving problems (Table 3). The interval from calving to conception was shorter for the cows on the low grain feeding level in late lactation compared to the cows fed the high grain ration. This difference was 66 days for heifers, but only 16 days for cows. The reason for this difference is not apparent as the incidence of health problems and milk yield during the subsequent

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Table 3. Grain Feeding Level in Late Lactation on Reproductive Performance and Health in the Following Lactation

Item	Grain feeding level		
	Low	Medium	High
Calf birth weight, lb	97	98	99
Dystocia score ^a	1.08	1.12	1.17
Placental release score ^b	1.32	1.45	1.50
Days to first estrus	52	59	52
Days to conception (all animals)	89	110	129
Heifers	79	102	145
Cows	98	120	114
Somatic cells	418	491	790

^a1 = no assistance; 4 = extremely difficult or caesarean.

^b1 = within 12 hr of calving; 2 = between 12 and 24 hr; 3 = more than 24 hr after calving.

Table 4. Effect of Grain Feeding Level in Late Lactation on Actual Grain Consumption

Month of Lactation	Grain feeding level		
	Low	Medium	High
(lb grain consumed per day)			
Month 6 (before Exp. start)			
Heifers	12.4	11.9	13.8
Cows	13.1	13.7	13.1
Month 7 (1st Exp. mo.)			
Heifers	8.3	11.4	16.9
Cows	7.8	13.1	15.3
Month 8 (2nd Exp. mo.)			
Heifers	5.4	11.3	15.7
Cows	5.5	11.3	14.3
Month 9 (3rd Exp. mo.)			
Heifers	5.5	11.1	16.3
Cows	3.8	9.2	13.6

Table 5. Effect of Grain Feeding Level in Late Lactation on Income Over Feed Cost^a

	Grain feeding level		
	Low	Medium	High
(dollars per day)			
Month 7			
Heifers	3.80	3.00	3.30
Cows	4.40	4.20	3.40
Mean	4.10	3.60	3.30
Month 8			
Heifers	3.60	2.60	3.00
Cows	3.60	3.50	2.70
Mean	3.60	3.10	2.90
Month 9			
Heifers	2.60	2.40	2.40
Cows	2.50	2.40	2.00
Mean	2.60	2.40	2.20

^aIncome over feed costs from DHI report based on value of milk produced and level of grain fed. This does not account for the assumed increase in roughage consumption by the cows restricted in grain consumption.

Grain Feeding . . .

(Continued from page 41)

lactation were similar among treatment groups. Heifers fed the high level of grain gained the most weight from the start of the trial to drying off and also tended to have higher body condition scores. These heifers then tended to have the greatest loss in body condition at the subsequent calving. However, only two animals, one heifer and one cow, both on the high level of grain, were scored extremely overconditioned.

Economics. The net economic effect of these grain feeding treatments was the primary concern of this study. Milk yield is shown in Table 2 and the average daily grain consumption for the cows assigned to each grain feeding level is given in Table 4. A final conclusion on the most economical grain feeding level in late lactation must await the completion of data summary and evaluation, however Table 5 gives the average daily income above feed costs from the DHI records. Feeding the lower level of grain produced the greatest income over feed cost compared to higher grain levels. The advantage to feeding the lower level compared to the highest level of grain is twice as great for cows (\$.80/day) as for heifers (\$.40/day). The difference would be reduced some by the anticipated increase in forage consumed by cows fed less grain.

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Brief Reports On Current Research

Larry L. Larson
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Jeffrey F. Keown¹

Raising Calves in Isolation

Preliminary results from trials in Utah suggest that heifer calves raised in isolation (unable to see other animals) from birth to 10 weeks of age produced more milk during their first lactation than calves raised by conventional methods. Nebraska is cooperating with other states in a regional project to determine if the preliminary results can be confirmed. Visual isolation is accomplished by making a 4x8 ft. exercise pen in front of their hutches from plywood sheets. This is a long-term project as results will not be available until the heifers complete their first lactation.

Mastitis Vaccination Program

Most earlier research indicated that vaccination was of little value for preventing mastitis. However, recent studies have shown some potential benefit. Vaccination might be more effective if started at a younger age than was done in some trials. We have initiated a trial to determine the effect of a vaccine against *Staphylococcus aureus* mastitis. One-half of our animals from one year of age and older are being vaccinated at 6-month intervals. The other half of the animals are serving as the controls. The effect of vaccination on the number of treatments for clinical mastitis, somatic cell counts and milk yield will be determined. Also, we will be able

to determine whether the response is improved by starting the vaccination series in young heifers compared to older cows.

Uterine Infusions in Repeat Breeder Cows

Failure of apparently normal cycling cows to conceive is a problem reported by many dairymen. Subclinical metritis (infection of the uterus) is suspected as one factor contributing to this problem. Increased conception rates in repeat breeder mares was obtained by intrauterine infusions with the mare's own blood plasma. It was suggested that opsonins (a substance from blood plasma) improved the uterine defense system by increasing destruction of the organisms causing the uterine infection. Colostrum whey products have been reported to be a benefit in the treatment of uterine infections and for improving conception rates. Since the antibodies found in blood serum and colostrum are similar it seems logical that either one could serve as a source of the antibodies. Also, it seems that antibodies derived from the same herd or from the same animal might be more beneficial than commercial products derived from animals subjected to different conditions.

The objective of this study is to determine the effect of blood serum or colostrum infusions into the uterus upon conception rates in repeat breeder cows. The infusions are made 24 hours after insemination.

Use of Embedded Rubber Tires in Free-Stalls

It is difficult to find a free-stall surface which is economical to construct and requires little maintenance and that cows like to use. Concrete stalls with rubber mats require little maintenance but are expensive to construct and have low cow preference. Dirt stalls with bedding have high cow preference but require frequent maintenance to prevent holes from being formed. It has been reported that stalls with used rubber car tires embedded in dirt required little maintenance and had high cow acceptability. We have initiated a trial to compare clay-based stall surfaces with stalls containing rubber car tires embedded in the clay. Cow preference (usage) and maintenance requirements of the stalls will be compared.

Value of Distillers Grains in Dairy Rations

As the number of grain alcohol plants increase in the midwest, the potential value of distillers grains in livestock rations gains in importance. Nebraska research with growing beef cattle indicates that the protein in distillers grains is considerably more efficient than soybean protein. This improvement is attributed to the greater resistance of the protein in distillers grains to breakdown in the rumen. Extensive breakdown in the rumen results in waste of protein.

Because of this resistant quality of its protein and its high energy, high fiber content (low starch), distillers grains contain a combination of nutrients which are needed in rations of high producing cows, but which generally not adequately supplied from commonly available ingredients. Therefore, we have begun an experiment to compare the protein in distillers grains with that in soybean meal for cows in early lactation. We are making the comparison with both high and low

levels of protein.

Several experiments have indicated that high protein rations may interfere with normal reproduction. The basic theory of this effect would suggest that resistant protein would be less detrimental. Therefore, we are also evaluating the effects of these rations on reproduction.

Effects of Dietary Protein on Reproduction

Some studies suggest that fertility is reduced in cows fed high levels of protein as described earlier in this publication. A series of trials will be conducted to examine the possible effects of levels and types of dietary protein on reproduction. The first studies will examine the effects of protein levels and the types of proteins (low and high solubilities) on blood hormone levels.

Factors Affecting the Feed Cost for Producing Milk

Since feed costs represent the single largest cost item in producing milk, it is important that efforts be made to minimize feed costs, while maintaining economic production. Using our AgNet FEED MIX DAIRY program we are examining various factors which would appear important, and determining their effects on the cost of producing milk under several pricing patterns.

These factors include: the prices of corn (corn silage), alfalfa and soybean meal, use of a fixed amount of corn silage in the ration, including ammonia or urea in corn silage, alfalfa quality, and use of a number of by-product feed ingredients which may be available to Nebraska dairy producers. These results should help dairy producers select feeds for rations which will reduce the feed cost for producing milk under various feed price conditions: a) by providing guides to selecting the most economic forages, b) by allowing projection of future feed costs, and c)

by determining when various by-products can be used in the ration to reduce feed costs.

New Dairy Breeding Project Initiated

A new project in dairy cattle breeding and management areas has recently been initiated. The project is entitled "Improving the profitability of dairy cattle production by the use of Dairy Herd Improvement Records".

This new project will cover a wide range of research objectives all directly or indirectly involved in the DHIA records programs. Within this project are the following sub-projects:

1) Estimation of midwestern age-month adjustment factors for use in sire and cow evaluations.

2) Estimation of major environmental influences that affect somatic cell count, including the relationship between protein content of milk and somatic cell count concentration.

3) Investigations on the relationship between bulk tank butterfat percentage tests and the DHIA herd test.

4) Investigate the importance of selecting sires on production traits under different Predicted Difference Type (PDT) selection standards.

5) Undertake a major environmental herd study to investigate which herd management factors are most influential in improving efficiency and profitability of production.

All five projects will have a direct influence on the profitability of dairying in the midwest. These projects will take several years to complete but should yield valuable answers to the major problems in maintaining a profitable and viable Nebraska Dairy Industry.

¹Larry L. Larson is an Associate Professor; Foster G. Owen is an Extension Dairy Specialist; and Jeffrey F. Keown is an Extension Dairy Specialist; all in the Department of Animal Science.

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