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## **HEALTH PROGRAMS FOR DAIRY HEIFERS**

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Replacement heifers are often the most neglected animals on the dairy farm. In actual numbers they represent 30–40% of animals on most dairies and may be the second or third largest expense. Considerable thought is often given to the genetic improvement of a dairy, yet without suitable heifer management this genetic potential is rarely utilized or realized.

### **Current Status of Heifer Management in Minnesota**

A recent study was conducted by the University of Minnesota where data was collected from 845 calves on 30 randomly selected farms in Rice and Dakota counties in Minnesota. The study described the population and epidemiology of the morbidity and mortality in these heifer calves between birth and 16 weeks of age.

Herd level data were collected by interviewing calf caretakers with a pretested questionnaire in November of 1991. Herd level data and management policies comprised herd risk factors for the study. Individual calf risk factors were identified by means of check-off forms that were provided to producers at the beginning of the study. The producers used these sheets to record individual heifer calf data for all heifers born on the farm from birth to 16 weeks of age over a 1 year period. The "birth sheet" was completed by producers at the time of birth of a heifer calf. It contained information about the sire and dam, as well as events surrounding the calf's birth (e.g., time of delivery, ease of delivery, treatments given at birth). The "treatment sheet" was used to record all

diagnoses and treatments given by producers. Every noted occurrence of illness was recorded for each calf. Outcomes of interest were any occurrence of enteritis, pneumonia, or death between birth and 16 weeks of age. Individual calf sheets were collected monthly and the data stored on a computer herd management program (DairyCHAMP®). Monthly herd visits were conducted to collect calf sheets.

Stated herd management practices were compared to individual calf data. From survey data, 53% of producers vaccinated pregnant cows with vaccines containing IBR, BVD, PI3, and BRSV before calving; 45% of all pregnant cows involved in the study were vaccinated in the last month of pregnancy. Calvings were said to be routinely assisted by 33% of producers, 27% of calvings during the study were assisted. Dipping navels in iodine and vaccinating newborn calves were stated management practices on 47% and 33% of all farms, respectively. Navels were actually dipped on 35% of all calves, while 25% of all calves were vaccinated against scours at birth. Assisted feeding of colostrum was a management practice on all farms, and 95% of all calves in the study were fed colostrum. Removal of the calf from the dam before 24 hours of age was a stated management practice on 97% of the farms; 88% of the calves were actually separated from their dams by 24 hours of age.

On 29 of the farms, the primary calf caretaker was the farmer or a member of the farmer's family. Only 17% of the farms in the study vaccinated pregnant cows against *E. coli* and rota virus/coronavirus. Maternity pens were used on 16 farms (53% of all farms), although only 4 of those farms located the maternity pens separate from the milking herd. Straw was the most common bedding used in the maternity area (73%), and the area was cleaned after every calf on

only 27% of the farms. Colostrum was hand-fed on all farms, while 16 of the farms would allow calves to suckle colostrum from the cow.

The adequacy of calf housing was also visually assessed using the previously described standards. A farm was considered "adequate" if it passed all listed criteria. For preweaning housing, 7 farms had adequate housing in the winter, 8 farms were adequate in the summer. Hutches were used in this study by 30% of the farms in the winter and 43% of the farms in the summer. Individual stalls were used by 60% of the producers in this study in the winter and 43% in the summer.

Postweaning housing was adequate on 6 farms in the winter and the summer.

#### Heifer Management in the Nation versus Minnesota

Stated herd management practices were compared to those found in the National Dairy Heifer Evaluation Project (NDHEP) conducted by the National Animal Health Monitoring System (NAHMS) in 1992. The NDHEP was conducted in 28 states on 1811 farms. The herds represented 78% of the National dairy cow population. Herd management practices found in this study were similar to those found in the NDHEP study, with some statistically significant ( $p < 0.05$ ) differences. Significantly more herds in this study vaccinated dry cows for leptospirosis (48.4%) than those 1811 herds in the NDHEP study (32.6%). Significantly more herds in this study vaccinated dry cows for respiratory viruses (Infectious Bovine Rhinotracheitis (IBR), Bovine Viral Diarrhea Virus (BVD), Parainfluenza Type 3 Virus (PI3), and Bovine Respiratory Syncytial Virus (BRSV)) (51.6%) than in the NDHEP herds (22.3-33%).

Calving areas differed slightly between the two studies. Fifty-two percent of herds in this study

used individual maternity pens, as compared to 41% of the NDHEP herds. Cleaning of the maternity area between calvings also differed between the two studies. In the NDHEP study, 46% of the herds cleaned maternity pens after every calving, while only 28% of the herds involved in this study cleaned pens this frequently, a significant difference. Forty-five percent of herds involved in this study cleaned the maternity area after every 4-6 calvings. Preweaned calves were housed similarly in both studies; approximately 30% of calves in both studies were housed in hutches in the winter. There were significant differences in group pen and individual pen use between the herds in this study and the NDHEP herds. Individual pens were used in the winter by 32.7% of NDHEP herds, while 60% of herds in this study used individual pens. Group pens were used in the winter by 31.9% of NDHEP herds, while only 10% of the herds in this study used group pens. Summer use of hutches increased, decreasing the use of individual pens. Feeding practices and weaning policies were relatively similar between studies.

Vaccination of weaned heifers differed significantly between the two studies. Leptospirosis vaccination was practiced by 38.3% of NDHEP herds, while 56.6% of herds in this study vaccinated weaned calves. Vaccination for respiratory viruses (IBR, BVD, PI3, BRSV) in calves from weaning to breeding was routinely practiced on 56.6% of all farms in this study, while approximately 45% of all NDHEP herds vaccinated weaned heifers for these viruses. Brucellosis vaccination of heifers was practiced on 86.6% of herds in this study, as opposed to 65.4% of the herds in the NDHEP study.

### Dairy Heifer Health in Minnesota

Eight hundred and forty-five heifer calves were born into the cohort. Calf-days at risk contributed

to the study averaged 2850 days per farm (range 951-5284, sd 1208). Producers treated 203 calves (24.0% of all calves) for illness during the study, yielding an overall morbidity rate of 0.2 calves treated/100 calf-days at risk (0-0.8, sd 0.2). Calves were treated most often for enteritis (128 cases) and pneumonia (64); other reasons for treatment included depression/off feed (5), navel ill (4), musculoskeletal disease (1), and ringworm (1). Treatment rates on all farms for enteritis averaged 0.15 cases/100 calf-days at risk (0-0.7, sd 0.2), while rates for pneumonia for all farms averaged 0.1 cases/100 calf-days at risk (0-0.7, sd 0.2). Risk of enteritis was highest at birth (0.9 cases/100 calf-days at risk) and declined rapidly to 3 weeks of age (0.1 cases/100 calf-days at risk). Risk of pneumonia was highest at birth (0.18 cases/100 calf-days at risk) and again at 10 weeks of age (0.12 cases/100 calf-days at risk). Case fatality rates on all farms averaged 11.8% for all diagnoses, 17.9% for enteritis, and 9.4% for pneumonia. No significant effects of season were seen for morbidity or mortality, using the chi square test.

Treatment of disease in the calves was consistent between farms. All calves with pneumonia were treated with injectable antibiotics. Calves with enteritis were treated with injectable antibiotics only (60 calves), oral electrolyte fluids (50 calves), and a combination of oral fluids and injectable antibiotics (12 calves).

Average daily rates of gain differed between farms in the study. Average rates of gain for calves from birth to 16 weeks of age were calculated at the farm level. Rates of gain averaged 0.8 kg/day for all farms (0.5-1.1,  $\pm$  0.2). For 22 farms with inadequate housing, daily rates of gain averaged 0.8 kg/day (0.5-1.0,  $\pm$  0.1), while farms with adequate calf housing (8 farms) averaged 1.0 kg/day (0.9-1.1,  $\pm$  0.1). Although the difference in rates of gain between farms that had

adequate calf housing when compared to those with inadequate housing was significant ( $p=0.004$ ), the association is confounded by rolling herd milk production average between the two groups.

Four hundred eighteen heifer calves were sampled from the month of birth to sixteen weeks of age for evidence of seroconversion to the respiratory viruses. Of these calves, only 19 showed a four-fold increase in serum titer: 16 calves to BVDV, 2 to IBR, and 1 calf to PI3. The 19 calves were from 12 different herds. One outbreak of enzootic calf pneumonia occurred on one farm during this study period. This outbreak was caused by BRSV. The mean age at time of seroconversion was 60 days (this does not include the 6 heifers that were involved in an outbreak of pneumonia on one farm and seroconverted to BRSV). Effectiveness of colostral transfer was assessed in 98 calves by using the sodium sulfite turbidity test. The 98 calves were a convenience sample from all 30 herds, with some herds represented more than others. Of these 98 heifers, 35 had failure of passive transfer (serum IgG level of less than 800 mg/dl). Comparing the 35 calves with failure of passive transfer (FPT) with the 63 calves that had adequate passive transfer, there were no significant differences between the two groups with respect to the number of calves that became ill (7 in FPT group versus 13 in the normal group) or calves that died (5 in each group).

Sixty-four heifers (7.6% of all calves) died during the study, yielding an overall mortality rate of 0.08 deaths/100 calf-days at risk (0-0.3,  $\pm 0.08$ ). The mortality rate was highest at 2 weeks of age (0.2 deaths/100 calf-days at risk) and then declined to 16 weeks of age. The most common cause of death was enteritis (28 deaths, 43.8% of all deaths), followed by pneumonia (19 deaths, 29.7% of all deaths). Of the 64 calves that died during the study, postmortems were performed

on 52 calves. Comparing producer diagnosis with postmortem result, producer diagnosis of mortality due to enteritis had a sensitivity of 58.3% and a specificity of 93%. Producer diagnosis of mortality due to pneumonia had a sensitivity of 56% and a specificity of 100%. Specific pathogens were identified at postmortem in some of the cases. The most common pathogens isolated from heifers that died of enteritis were rota virus (5), E. coli (4), and BVDV (1). Pathogens isolated from pneumonic lungs included P. multocida (3), H. somnus (3), and P. haemolytica (1). No respiratory viruses were isolated from pneumonic calves.

### Health Programs for Dairy Heifers

The goal of any heifer replacement program is to economically create a healthy replacement heifer that is genetically superior to the dam. The heifer should calve at 24 months of age at 1200-1300 pounds of body weight. If these goals can be achieved they will provide an adequate supply of replacement heifers for the dairy operation which will attain a high level of milk production upon entering the lactating herd.

Without proper management, housing, nutrition, vaccination and deworming programs, calves will be unable to grow adequately and will fail to calve at a suitable age. In addition, calves which experience calfhood diseases such as enzootic calf pneumonia are at greater risk from being culled once they are in the lactating herd when compared to those calves which did not experience calfhood diseases.

Housing must be adequate, from the maternity stall through the preweaning housing and into the postweaning facilities. Calf segregation achieved in calf hutches and super hutches is very difficult

to duplicate in indoor housing. Often individual calf pens located inside buildings fail to prevent nose to nose contact of calves, in effect failing to control spread of respiratory disease. Most mechanically ventilated buildings were classified as inadequate in the previously mentioned study because existing fresh air intakes, and exhaust fans were not being utilized. In addition, few mechanically ventilated buildings have proper age group segregation.

Colostrum management is of extreme importance in ensuring calf survivability. Calves should be given 150 gm of IgG in the first 12 hours of life. This is best achieved by giving 3–4 liters of colostrum which is good quality using an esophageal feeder. Good quality colostrum should contain at least 50 gm/liter of IgG. Success of colostrum management should be evaluated regularly in calves less than 2 weeks of age using immunoglobulin determination. Calves should have IgG levels greater than 1500 mg/dl.

### Infectious Diseases

Neonatal sepsis, calf scours and enzootic calf pneumonia represent the most significant threats to heifer health in the first few months. Colostrum management and proper housing are by far the most important factors in preventing these diseases. Additional management procedures important for preventing neonatal sepsis would be proper umbilical care and prevention of calf scours.

Calf scours may be a problem even on well managed farms due to highly contagious agents such as Cryptosporidiosis. Since there are not any products effective for prevention (or therapy) of

this disease, symptomatic therapy including proper hydration and nutrition are essential.

Prevention of other causes of scours can be achieved by vaccinating the cows with rota virus, corona virus and K99 E. coli vaccines given to cows 3 weeks prior to calving and to heifers 6 and 3 weeks prior to calving.

Enzootic calf pneumonia can also be controlled through proper housing, adequate colostrum management and limiting other diseases such as calf scours which can serve as predisposing stressors. Enzootic calf pneumonia in its endemic form is usually the result of bacterial pneumonia (*Haemophilus* or *Pasteurella*) secondary to environmental stressors. Initiating viral or mycoplasmal agents have been hard to document on farms with ongoing calf pneumonia problems. Rarely farms with concurrent IBR or BVD disease problems in the adult herd may experience forms of the disease in the heifers which result in pneumonia.

Outbreaks of enzootic calf pneumonia are most frequently caused by BRSV. Vaccination of the replacement heifers at 6 months of age and yearly prior to breeding using a modified live BVD, IBR, PI3 and BRSV vaccine will protect them from viral disease after passive immunity is lost. Vaccinating the breeding herd on a yearly basis will ensure greater passive immunity that lasts longer in the calves. Vaccinating calves under 6 months of age for *Pasteurella*, *Haemophilus* or BRSV may be indicated if these agents are isolated repeatedly from ongoing cases of enzootic calf pneumonia and other management changes cannot be implemented.

Bacterial diseases such as *Clostridia* and *Leptospira* should be vaccinated against in dairy herds, the former by 2-3 months of age and the latter by 6 months of age. For both agents the initial

shots should be followed with a booster. Yearly revaccination or twice yearly is recommended for Leptospirosis. With Clostridial vaccines, vaccination of herd cows is rarely done unless dry cows are being vaccinated with a *Clostridium perfringens* vaccine at the same time as the cows are vaccinated for other causes of calf scours. This may improve calf survival on farms where *C. perfringens* is suspected as a pathogen. Minnesota is currently certified free of Brucellosis.

Vaccination for Brucellosis is usually only carried out in herds which plan to sell heifers to states that are not certified free of Brucellosis. Vaccinations against Brucellosis may also be considered to prevent rare sporadic cases of Brucellosis which still occur even in certified free states.

### Parasitic Diseases

Routine use of anthelmintic is recommended for all dairy heifer raising operations. Anthelmintics that are effective against arrested L-4 Ostertagia such as Ivermectin Abendazole, Fenbendazole or Oxfendazole should be used before heifers are turned out on spring pasture. The frequency of worming will be determined by the pastures exposure each heifer groups. In addition heifers raised in fluke areas may need to be dewormed with Albendazole.

Coccidiosis can affect calves from 2-3 weeks of age until natural immunity is acquired (1-2 years). Coccidiosis may be clinical or subclinical. Often housing and weather stresses exacerbate the severity of clinical disease. Effective control can be achieved through medicating with products such as decoquinate, amprolium or monensin in the milk, feed or water. These products are frequently used at weaning or during periods of stress. Use of coccidiostats in the milk replacer is indicated if coccidiosis is a problem in milk fed calves.