Morbidity and Mortality in U.S. Preweaned Dairy Heifer Calves
NAHMS Dairy 2014 Study Calf Component

Information Brief   September 2021

INTRODUCTION

Calves are at the greatest risk of dying during their first 21 days of life, making the preweaning phase a critical period for dairy calves.[1,2,3,4] Overall, the health status of preweaned heifer calves can greatly impact lifetime production, including growth, reproductive efficiency, and milk production.

The USDA's National Animal Health Monitoring System (NAHMS) last reported national estimates of morbidity and mortality in preweaned dairy heifers in 1992 and 2007. In these two studies, morbidity was reported at 36.1 and 38.5 percent, respectively, and mortality was reported at 8.4 and 7.8 percent, respectively.[1,5] Morbidity and mortality estimates from both studies were higher than the target rates established by the Dairy Calf and Heifer Association: 25.0 percent for morbidity and 5.0 percent for mortality (DCHA Gold Standards). This information brief provides morbidity and mortality estimates, information on treatment practices, and discusses factors associated with increased morbidity and mortality.

NAHMS DAIRY 2014 STUDY CALF COMPONENT

NAHMS conducted the Dairy 2014 study, which collected data on dairy health and management practices from 17 of the Nation's major dairy States (figure 1). These States represented 80.5 percent of U.S. dairy operations and 81.3 percent of U.S. dairy cows in 2014. The Dairy 2014 Calf Component included 104 operations in 13 of the Nation's major dairy States.* One objective of Calf Component was to assess morbidity and mortality in preweaned dairy heifers.

To estimate the percentages of morbidity and mortality in preweaned dairy heifers, calf caretakers were given a Heifer Calf Health Card as a means of recording health information on each participating calf from birth to weaning. One section of the health card included disease incidence and treatment. This section allowed care takers to record all clinical signs seen in an ill calf and all treatments provided. The card had enough room to record six illness events during the preweaning period. Additionally, there was an area where caretakers could write in information regarding both the clinical signs seen and treatments provided to the ill calf.

Figure 1. States/regions that participated in the NAHMS Dairy 2014 study
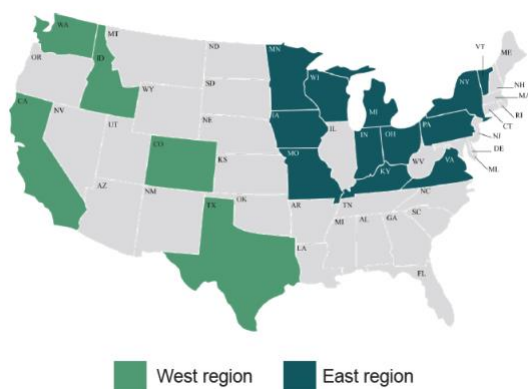

West region: California, Colorado, Idaho, Texas, Washington
East region: Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Vermont, Virginia, Wisconsin

*Idaho, Indiana, Kentucky, and Texas did not enroll calves in the calf component.

MORBIDITY

Overall, 33.8 percent of enrolled calves had at least one morbidity event, and 6.0 percent experienced more than one event. Morbidity signs were classified into primary disease categories to eliminate nondescript signs. Most sick calves (50.9 percent) displayed clinical signs of digestive illness (figure 2).

**Figure 2. Percent of ill calves by primary clinical sign**
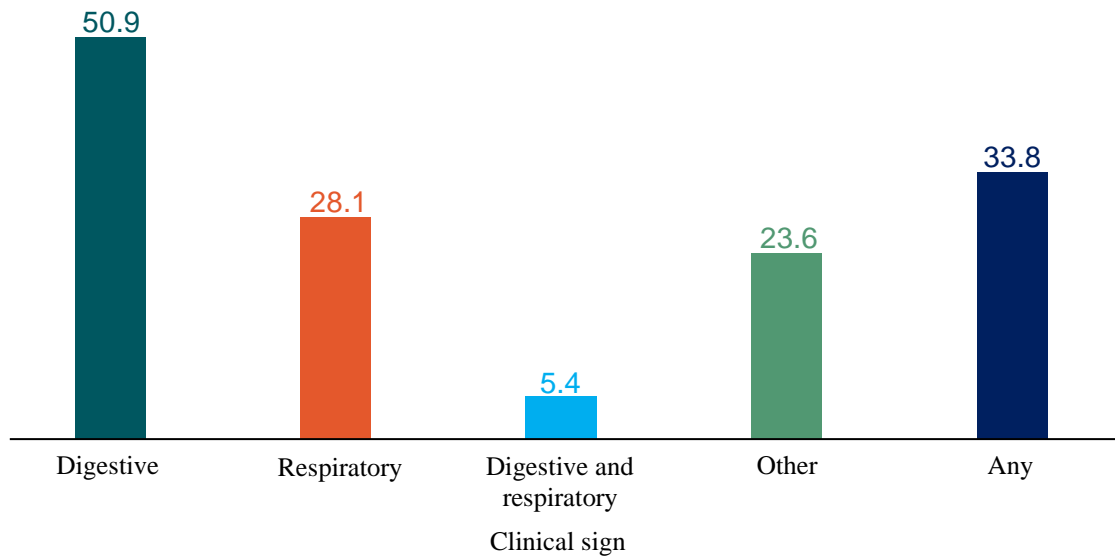
TREATMENT

Most ill calves (90.2 percent) received a treatment. The majority of sick calves (73.8 percent) received antibiotics, 40.5 percent received fluids (oral and/or injectable), 27.6 percent were given a nonsteroidal anti-inflammatory (NSAID), and 8.0 percent of ill calves received a decreased liquid diet (figure 3).

Of the calves that were treated with antibiotics 29.1 percent received fluoroquinolones, 23.5 percent received sulfonamides and 26.8 percent received penicillins. Sulfonamides were the most common antibiotics used for cases with digestive signs (30.2 percent). The primary antibiotics used for respiratory cases were macrolides (32.3 percent) and florfenicols (24.1 percent).

Figure 3. Percentage of ill calves by treatments provided
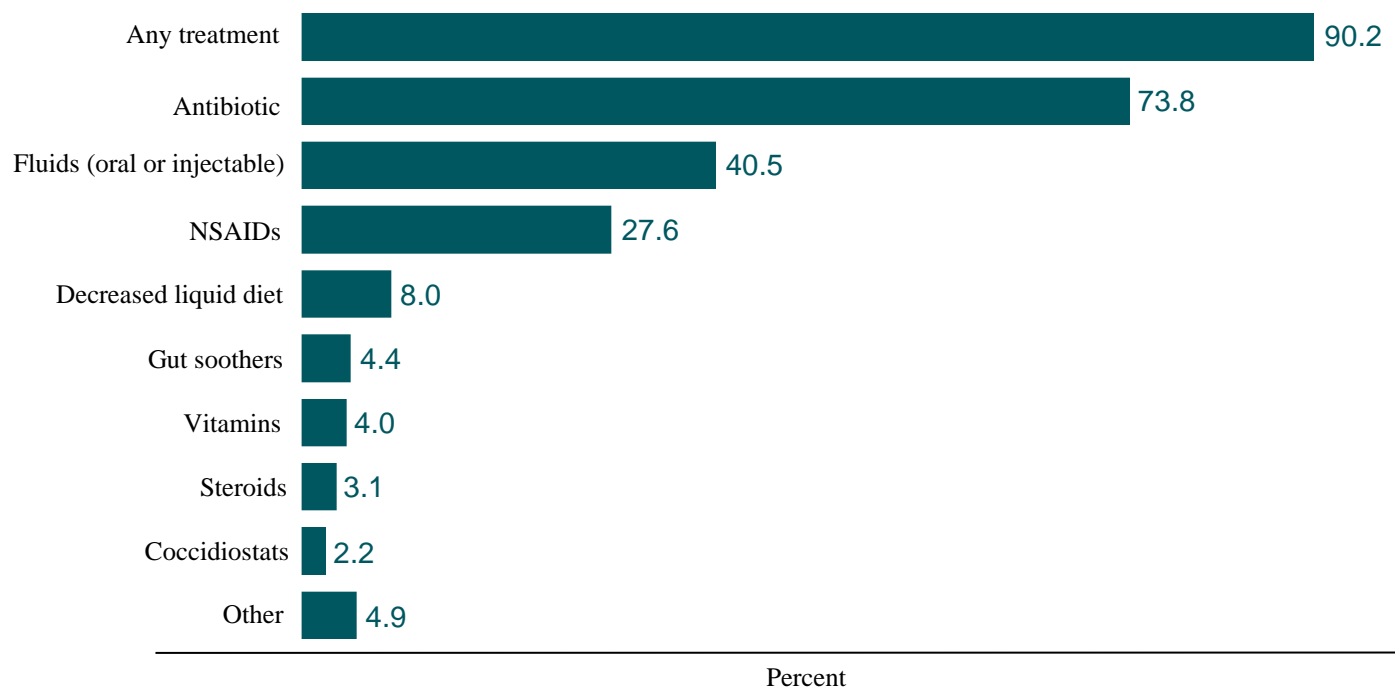
MORTALITY

The overall study mortality was 5.0 percent. Known causes of death were digestive (32.0 percent), respiratory (14.1 percent), digestive and respiratory (7.0 percent), and other causes (13.3 percent; figure 4.). One-fourth of deceased calves (25.0 percent) had an unknown cause of death and 8.6 percent had no reported cause of death. The mean age at death was 24.4 days. The mean age for digestive causes of death was 18.3 days, the mean age for respiratory causes of death was 37.5 days, and the mean age for concurrent respiratory and digestive causes of death was 18.6 days. Unknown causes of death had a mean age of 25.7 days.

Figure 4. Percentage of calf deaths by cause

32.0%
25.0%
14.1%
13.3%
8.6%
7.0%

- Digestive
- Unknown
- Respiratory
- Other
- Not reported
- Digestive and respiratory
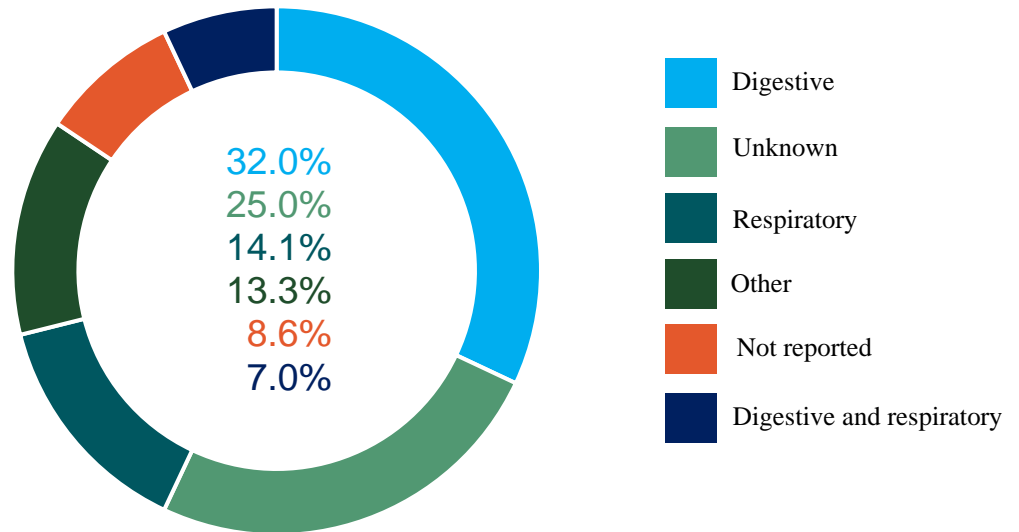
FACTORS ASSOCIATED WITH MORBIDITY

The following factors were associated with increased morbidity:

Birth weight: calves born at higher birth weights were less likely to become sick.

Serum IgG status: calves that had a higher serum IgG were less likely to become sick.

Cold weather: the colder the temperature during the preweaning period the more likely calves were to become sick.

Housing ventilation: calves housed in areas with natural ventilation had a lower risk of morbidity during the preweaning period compared to calves housed in forced ventilation systems.

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Serum IgG status: calves that had a higher serum IgG were less likely to die during the preweaning period.

**Cold weather:** the colder the temperature during the preweaning period the more likely calves were to die.

Fat in the liquid diet (milk or milk replacer): calves with a lower amount of fat in their liquid diet were more likely to die than calves that had a higher amount of fat in their liquid diet.

SERUM IgG STATUS IMPORTANCE

It is very important that calves receive a sufficient volume of high quality and clean colostrum in the first few hours following birth. Colostrum provides antibodies to the calf which helps protect them from disease and reduces the risk of preweaning mortality. To ensure calves have received an adequate amount of antibodies, a blood sample can be analyzed for IgG within the first 7 days of age. Researchers in the dairy industry published updated consensus recommendations on calf- and herd-level passive immunity.[6] These recommendations were created with the guidance of industry experts, the review of current literature, and the analysis of non-diseased probability – percent of calves that do not get sick – and survival probability by serum IgG level. For more information on colostrum management and serum IgG consensus recommendations please review the information brief titled 'Colostrum Feeding and Passive Immunity of Preweaned Holstein Heifer Calves'.

Non-diseased probability refers to the likelihood a calf will not become sick during the preweaning period.   Figure 5 shows that calves with an excellent serum IgG had a higher probability of staying healthy during the preweaning period than calves with a good, fair, or poor excellent serum IgG status. Therefore, ensuring calves receive an adequate amount of clean and high quality colostrum in a timely manner will help prevent disease throughout the preweaning period.

Figure 5. Non-diseased probability for preweaned heifer calves by days of age and serum IgG status
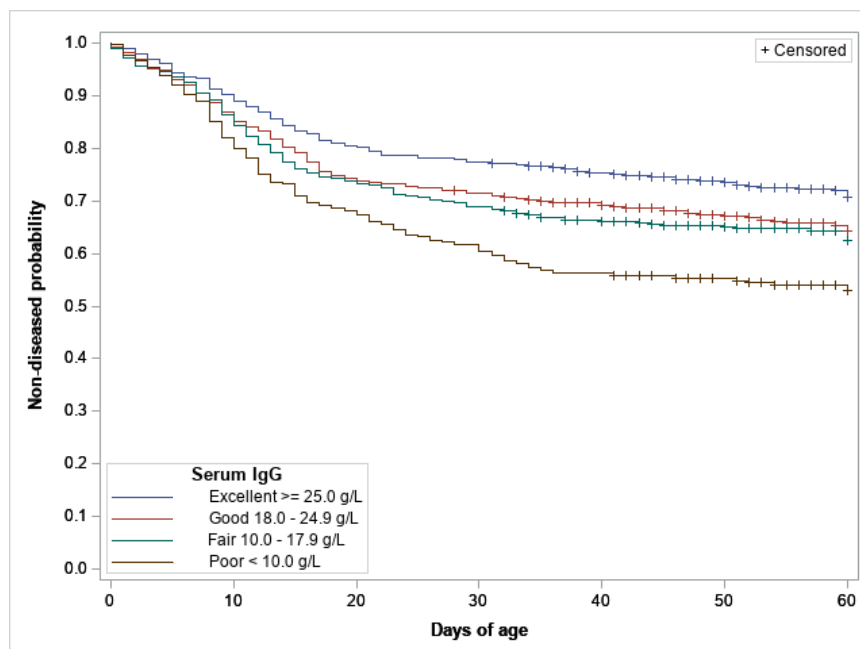
Survival probability refers to the likelihood that a calf will not die during the preweaning period. Calves that had poor serum IgG status (brown line) were more likely to die during the preweaning period than calves with higher levels of serum IgG. Individual serum IgG status and herd-level standards should be used on dairy operations to help minimize preweaning morbidity and mortality.

Figure 6. Survival probability for preweaned heifer calves by days of age and serum IgG status
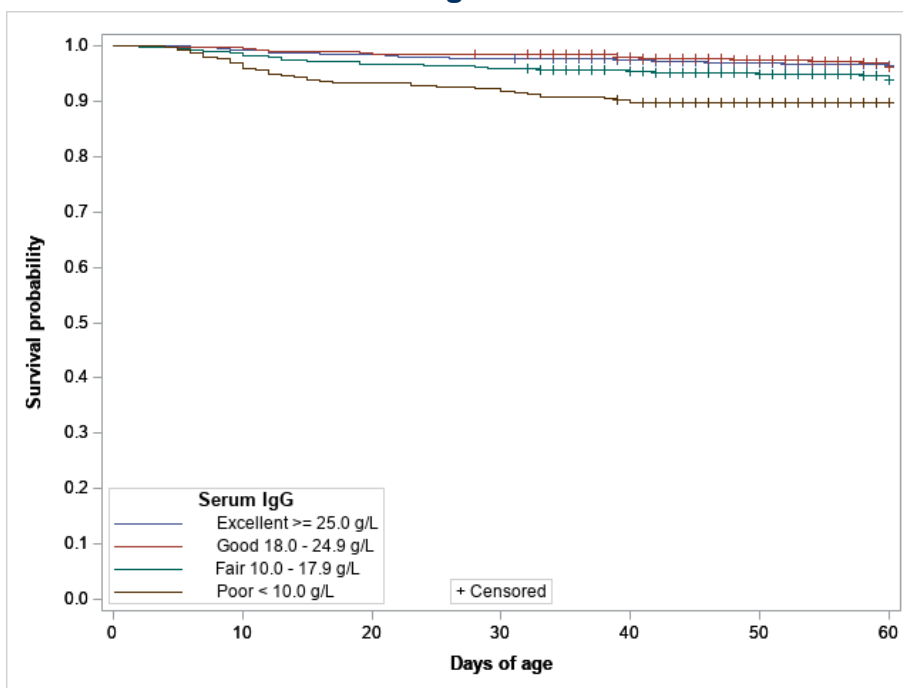
CONCLUSION

The morbidity rate of 33.9 percent and mortality rate of 5.0 percent in this study suggest that overall calf health care has improved. However, there are still areas for improvement including properly treating calves with antibiotics, feeding calves through viral scours events, and classifying causes of death.

Furthermore, various management factors can help minimize morbidity and mortality. For example, ensuring that cows receive adequate nutrition to support calf growth during gestation helps increase calf birth weight and decreases the risk of morbidity and mortality. Providing calves with high quality colostrum increases serum IgG concentration and decreases the risk of disease and death. Additionally, maintaining calves in a warm, well-ventilated environment and supplying them with adequate nutrition during the preweaning period will help minimize morbidity and mortality.

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FOR MORE INFORMATION
USDA–APHIS–VS–CEAH
NRRC Building B, M.S. 2E7
2150 Centre Avenue
Fort Collins, CO 80526-8117
970.494.7000
E-mail: NAHMS@aphis.usda.gov
http://nahms.aphis.usda.gov