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Control of BRD in large dairy calf populations

Terry W. Lehenbauer[1,2]

[1] *Department of Population Health and Reproduction, School of Veterinary Medicine, University of California, Davis, California, USA*
[2] *Veterinary Medicine Teaching and Research Center, School of Veterinary Medicine, University of California, Davis, California, USA*

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Abstract

Bovine respiratory disease (BRD) is a leading cause of morbidity and mortality in dairy calves. As the number of calves being raised on the dairy farm or at a calf-raising operation has become larger, both opportunity and risk have increased. Opportunities for applying economies of size and scale exist in these large dairy calf populations while meeting specific needs of the dairy calf. BRD control requires effective biosecurity and biocontainment efforts, adequate passive transfer of immunoglobulins, a strategic immunization program, and appropriate diagnostic strategies for ongoing disease surveillance. These components are necessary to achieve an evidence-based approach for preventing and reducing severity of BRD cases. Proper nutrition, housing, and environmental management are important for achieving optimal dairy calf health and performance. Good record keeping and analysis of outcomes are needed to document dairy calf health and performance and to efficiently identify new problems that require attention in these large dairy calf populations. Proper management of calves to prevent and control BRD requires careful planning and follow through to achieve those results but will likely pay big dividends in improved calf health and future productivity.

Keywords: bovine respiratory disease, dairy calves, health, management.

As dairy cattle herd sizes have increased, there has been a concomitant increase in the number of dairy calves being raised as replacement heifers on those dairy farms. A dairy farm that milks a few thousand cows and raises its heifer calves will typically have a few hundred or more pre-weaned calves at any point in time. Additionally, in regions of the country such as the western USA, where large concentrations of dairy cattle exist, specialized operations have developed that are dedicated to raising dairy calves, including both bull calves for beef production, and sometimes heifer calves raised mostly under contract as dairy replacement heifers. These calf ranches may have as many as 40,000 pre-weaned calves and a similar number of weaned calves in group pens. With increasing specialization that is occurring in the dairy industry, dairy families that have several milking herds among family members in a local area may choose to combine calf-raising operations at a centralized location for all calves from those dairies. This situation can result in several thousand calves being raised for those dairies at that calf ranch location.

As calf-raising operations have become larger, both opportunity and risk have increased. One of the goals of herd health programs is to meet the needs of the individual animal in a manner that is appropriately specific and yet efficient from a resource and labor perspective. Larger calf-raising operations provide the opportunity to apply economies of size and scale to the raising of dairy calves, and at the same time create the possibility for adverse outcomes due to the multiplication effect when health or other risk factors become uncontrolled. Although many of today's calf-raising operations strive for optimal health and growth and achieve satisfactory or better results, calf welfare and performance can quickly become unacceptable if health and management conditions result in increased levels of dairy calf morbidity and mortality.

Bovine respiratory disease, or BRD, is the leading cause of death in weaned dairy heifers and the second most common cause of mortality in pre-weaned calves in dairy cattle herds in the USA (USDA, 2010). The susceptibility of newborn or young calves to a variety of pathogens, including those attributed

Corresponding author. E-mail: tlehenbauer@vmtrc.ucdavis.edu

to BRD, makes biosecurity and biocontainment efforts a top priority for preventing disease. Research continues to confirm the importance of colostral immunoglobulin concentration for health and growth in dairy calves (Furman-Fratczak *et al.*, 2011; Priestley *et al.*, 2013). Failure of passive transfer, especially in dairy bull calves, continues to be an ongoing concern for dairy calf health and welfare. Clinical experience has shown, however, that otherwise normal, healthy calves with adequate passive transfer of immunoglobulins can be overwhelmed and become morbidly ill if exposed to large numbers of even mildly virulent pathogens. Efforts to achieve suitable sanitation and hygiene become paramount in large populations of dairy calves if disease and death loss are to be avoided.

Strategic immunization programs including antigens associated with BRD play an important role in promoting health and reducing disease morbidity and severity. Antigen characteristics (such as killed or modified-live), potential for interference with maternal antibodies, route of administration (such as intranasal or subcutaneous), timing of administration to avoid concurrence with stressors, and timing so that immune response can occur prior to anticipated challenges or exposures, are just some of the factors that need to be considered in designing an effective vaccination program. Appropriate diagnostic strategies involving both clinically ill and dead calves in the context of an ongoing surveillance program are important for achieving an evidence-based approach for preventing and reducing BRD incidence.

Although primary prevention of BRD is the preferred goal, secondary prevention by accurately and quickly identifying calves that need treatment for BRD is important for promoting dairy calf health, performance, and welfare. Implementing a scoring system for consistent, early detection of BRD will provide the opportunity for better response to BRD treatment and reduce the risk of more severe, chronic cases of disease (McGuirk, 2008; Love *et al.*, 2014).

Optimal dairy calf health and performance requires proper nutrition. Current research is providing insight into the benefit of increased levels of nutrition for achieving healthier calves that may have a resulting positive impact on future lactational performance (Le Cozler *et al.*, 2008; Moallem *et al.*, 2010; Lohakare *et al.*, 2012). Interactions between nutrition and immunological function are critical for preventing BRD and other common calfhood diseases. Regrettably, it seemed to take much too long during past decades for veterinarians and producers to understand the most basic impacts of environmental (cold) stress on nutritional requirements for supporting health and growth of calves, even in southwestern regions of the USA where winter conditions are considered to be mild. Prevalent dogma during that time promoted reduced nutritional intake as a misplaced effort for reducing diarrhea and other disease conditions. More research is needed for developing improved housing and environmental management systems that will not only improve dairy calf health, but will also consider normal behavioral activities within the context of controlling exposure to pathogens. Existing facilities may be an important limiting factor for preventing BRD and achieving calf health; management protocols and inadequate facilities can lead to mixing of too many calves of different ages during stressful periods such as weaning, leading to increased rates of disease.

Proper management of these critical aspects of calf raising to achieve prevention of BRD in large calf populations requires a systems approach. Essentially, a system of good record keeping combined with analysis of outcomes is needed to document acceptable performance and to identify new problems that require attention. In practical terms, managers and veterinarians need to be involved with caregivers responsible for calves, so that adherence to protocols can be assured and that any procedural drift or inadequate protocols can be quickly identified and corrected.

Proper management of calves to prevent and control BRD requires careful planning and follow-through to achieve those results, but will likely pay big dividends in improved calf health and future productivity.

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