

Design of management and preventive strategies for neonatal calf diarrhea in beef systems – How do I get to implementation?

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Abstract

Neonatal calf diarrhea outbreaks in beef herds are a common clinical entity that involves a complex association of factors. Calf treatments, diagnostic investigations, and prevention are frequent outcomes of involvement of veterinary practitioners. Preventive interventions to address immediate and future outbreaks are often management related and more difficult to implement. Evidence-based recommendations can be accomplished by addressing research derived risk factors that are known to impact likelihood for outbreaks. The Sandhills Calving System is 1 intervention option. Implementation of preventive strategies requires knowledge that includes, but is not limited to, client priorities, decision making, and risk tolerance. Client communication and understanding are keys to implementation. Thorough understanding of the system, including potential impacts of any interventions, is very important to insure successful implementation of preventive strategies.

Key words: bovine, calf, neonatal diarrhea, Sandhills Calving System

Résumé

Les flambées de diarrhée néonatale chez les veaux dans les troupeaux de boucherie constituent une entité clinique courante impliquant une association complexe de facteurs. Le traitement des veaux, les tests de diagnostic et la prévention découlent souvent de l'intervention des praticiens vétérinaires. Les interventions préventives pour résoudre les flambées actuelles et futures sont souvent associées à la régie et sont plus difficiles à mettre en place. Des recommandations fondées sur des données probantes peuvent être faites en faisant ressortir de la recherche des facteurs de risque reconnus pour influencer l'occurrence de flambées. Le système de vêlage *Sandhills* est un type d'intervention. La mise en place de stratégies préventives demande au minimum de bien connaître les priorités des clients, leur prise de décision et leur tolérance au risque. La mise en place se fonde sur la communication avec le client et sa bonne compréhension. Une connaissance approfondie du système, incluant les impacts possibles de chaque intervention, est très importante pour assurer le succès de la mise en œuvre de stratégies préventives.

Introduction

Neonatal calf diarrhea in beef calves is the most common clinical entity encountered during the immediate post-calving phase in beef cow-calf operations.^{14,22} It involves a complex association of factors related to immunity and exposure to causative agent or agents. Neonatal calf diarrhea occurrence is not a random event. It is known that herds possess certain characteristics, or risk factors, that impact likelihood for outbreaks of the disease. Both healthy and diarrheic calves shed organisms recognized as causative of diarrhea. Also, diarrhea-causing organisms are widespread in cattle populations, including herds with recognized scours problems. Etiologic causations include a number of infectious agents, and diagnostic tests frequently report mixed infections. However, etiologic diagnoses often do not yield treatment or preventive solutions that provide reliable and predictable results.

Veterinarians frequently become involved in neonatal calf diarrhea outbreaks when epidemics reach severity levels beyond the risk tolerance levels of herd owners and managers. Thus, immediate response from veterinary practitioners usually involves treatment and management of existing cases. Often it is only then that plans to prevent new cases during the present outbreak are considered. Prevention plans for subsequent years, although having significant impact on production and profitability, are often given only cursory attention, leaving affected herds at risk. Therefore, it is important for the veterinary practitioner to be adamant about addressing 1) short-term or immediate prevention involved with management of the outbreak; and 2) long-term prevention strategy for subsequent years.

Diagnostic Investigation

Attention to managing the immediate outbreak is often the most urgent goal. Implementation of recommended interventions to prevent continuation of the ongoing epidemic or prevention strategies for future years typically receives lesser priority.¹⁸ An important component is an appropriate diagnostic investigation.^{18,19} Establishment of necessity of this effort is needed, as is owner/manager agreement to proceed. It should be recognized that etiologic diagnoses often do not yield enough information to make effective preventive

recommendations. Owner prioritization and risk tolerance is of primary importance. Other factors impacting the need for diagnostic investigations include: severity of the outbreak, such as morbidity and mortality; history suggesting occurrence of multiple diarrhea outbreaks in past years; treatment response and costs; labor availability; and involvement of valuable animals, all of which precludes owner/manager communication and evaluation.

It is recognized that optimal conditions for thorough investigational efforts are not always present, leaving the practitioner with assembling the best approaches for treatment, control, management, and prevention that can be achieved under the circumstances.

An excellent publication describing diagnostic investigations of neonatal calf diarrhea has outlined key components of these important efforts.¹⁸ Establishment of diagnoses through laboratory submissions is especially important to address the appropriateness of treatments. Neonatal calf diarrhea outbreaks are usually herd-based epidemics, so establishment of factors responsible for the outbreak at the population level are critical. Steps in this process include establishing a usable record system, case definition, defining of the population at risk, characterization of the outbreak, determining the nature of the outbreak—including an epidemic curve—development of hypotheses about causal risk factors, agent and host factors of concern, environmental and temporal factors, and hypothesis testing. At that time, preventive strategies that are focused strongly on biocontainment principles may be considered.

Interventions

Evidence-based interventions for neonatal calf diarrhea management and prevention are available and can be implemented.^{12,16,17} Changes based on some form of risk assessment are appropriate. These include addressing risk factors present in the operation experiencing the outbreak, including lack of immunity,²⁰ new herd introductions around the time of calving,^{4,5} feeding cows and heifers together,¹⁵ managing cows and heifers in the same group,¹⁵ extended length of calving season,¹³ calving more heifers relative to cows,⁵ passive immunity,^{10,20} and others. Vaccination prior to calving is likely the most frequent preventive intervention to be considered. Vaccines, when administered appropriately and according to label, provide opportunity to augment herd immunity and can successfully reduce risk for neonatal calf diarrhea. However, it should be remembered that antigens present in vaccines represent only a portion of diarrhea-causing agents involved. Also, it is believed that exposure levels to neonatal calves often overwhelm the immunity, that vaccines are capable of eliciting.⁸ Failure and partial failure of passive immunity transfer should be considered as potential risk factors in outbreaks, including when vaccine intervention has been or is used.

There is epidemiological evidence that neonatal calf diarrhea outbreaks are impacted by herd dynamics at various levels.¹⁷ Management and prevention of neonatal calf diarrhea in beef herds is associated with various risk factors related to biosecurity and biocontainment principles.² Increasing environmental contamination during the calving season, and older calves shedding infectious organisms to younger calves, are particularly common in traditionally managed calving systems.⁸ Implementation of the Sandhills Calving System is an option.^{16,17} This system utilizes scheduled movement of pregnant animals to reduce environmental exposure risk, as well as age segregation of calves. However, adoption and implementation of changes often requires alterations in thinking and can be difficult to accomplish.⁶

It is critical that proposed interventions are workable and appropriate for the particular system under consideration.⁶ Beef cow-calf systems vary widely, therefore, consideration of these aspects is very important. Implementation of recommended interventions can be dependent on ability to adapt within the production system. Gaps in production systems can impact risk for neonatal calf diarrhea outbreaks. Longer calving seasons and increased heifer-to-cow ratios can be risk factors for neonatal calf diarrhea and reproductive efficiency, including problematic pregnancy percentages leading to turnover with increased numbers of retained heifers. Poor calving distributions leading to prolonged calving seasons can impact diarrhea outbreak risk. Quantifying and addressing these parameters will be important for herd productivity and profitability from both a disease and reproductive perspective.

Implementation

Client communication and understanding are 2 important keys to implementation of intervention strategies. Understanding how the client prioritizes and makes decisions related to health and production in his/her systems is critical.³ Risk tolerance is also a key point of understanding when assessing potential recommendations for interventions for a neonatal calf diarrhea herd problem.

Animal health receives high priority when considering the broad array of management categories involved in complex beef cow-calf systems.⁷ Decision making in cow-calf operations is impacted by multiple factors that can be important considerations. These can include: percentage of income from the enterprise; profit motivation; passion for the enterprise; priority for working “on the business” verses “in the business”; priority for change and continuous improvement; as well as labor and expertise.⁶

Categorizing cow-calf enterprises as to type of producer may be helpful for understanding prioritization and decision making of the clients that veterinary practitioners are consulting with. The following has been proposed by Field:⁶

- Professional cattlemen (information driven, value creation and capture focus, innovation friendly)

- Professional cattlemen (tradition driven, commodity focus, change resistant)
- Professional farmer (cattle as a by-product of land ownership or as an alternative marketing option for grain production—significant variation in level of passion for the cattle enterprise)
- Professional in other industry (cattle as a secondary source of income)
- Recreational cattle producer (lifestyle is primary focus, income from cattle not the critical factor due to other income streams)
- “Cattle as cash” producer (margin operators, cattle marketing to meet specific needs of the family)

It is important to understand client motivation¹¹ when considering ability to implement recommended interventions for a complex problem such as neonatal calf diarrhea. Economic and productivity factors can be quantified. Neonatal calf diarrhea is associated with decreased weaning weights in affected animals.^{1,9,21} Partial budgets can be extremely useful tools; however, understanding of producer priorities and decision making is a key component of this process.

Impact Measurement

Implementation of production measures to quantify herd productivity is important for measurement of impact. Weaned calf crop percentages and pounds weaned per female exposed are especially important for measuring impact of neonatal calf diarrhea on herd productivity. Health parameters, especially those focusing on high-risk areas, in this case neonatal calf diarrhea, should receive strong consideration. These include, but are not limited to, epidemic/treatment curves, treatment costs, and morbidity and mortality rates.

Conclusions

Implementation of preventative interventions related to neonatal calf diarrhea epidemics is related to owner priorities and decision making. In typical situations addressing the outbreak as first priority is critical. Implementation of plans to prevent new cases in an immediate outbreak, and future interventions for prevention in future years, should be part of comprehensive plans to achieve desired impact.

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