

Nutrition for health and performance in cow/calf and feedlot operations

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Abstract

Nutrition has long been recognized as important for maintaining health, but recent research has more clearly established the link between dietary energy, protein, mineral, and vitamin concentrations and immune function, health, and ultimately production and performance. The focus of this session will be to review some of the most common nutritional challenges that practitioners will face when serving beef clients, and identify potential interventions with the goal of enhancing overall herd health and individual well-being and performance.

Key words: body condition score, nutrition, cow/calf

Résumé

On reconnaît depuis longtemps l'importance de la nutrition pour le maintien de la santé. Des travaux récents mettent mieux en évidence l'impact de l'apport énergétique alimentaire et de la concentration de protéines, de minéraux et de vitamines sur la fonction immunitaire, la santé et ultimement la production et la performance. Cette session fait le point sur les défis nutritionnels les plus communs auxquels font face les praticiens dans le secteur des bovins de boucherie et identifie les interventions envisageables afin d'améliorer la santé globale du troupeau et le bien-être individuel et la performance.

Introduction

Nutrition has long been recognized as important for maintaining health, and recent research has more clearly established the link between dietary energy, protein, mineral, and vitamin concentrations and immune function, health, and ultimately production and performance. Certainly, a literature search of any of the aforementioned links between nutrition and health will result in many well-executed and often referenced studies, but a thorough review would require much more time than has been allotted and would be beyond the scope of a presentation for this conference. Instead, the focus of this session will be to review some of the most common nutritional challenges that practitioners will face when serving beef clients, and identify potential interventions with the goal of enhancing overall herd health and individual well-being and performance.

Veterinarians serve a unique role in most of their beef clients' herds and operations. In addition to maintaining a valid VCPR and providing appropriate oversight and guidance regarding the health management of the animals that these clients care for, they are also often presented with situations where a greater understanding of the link between nutrition and health would benefit both the client and the veterinarian. A recent survey conducted by US Department of Agriculture's National Animal Health Monitoring System (NAHMS) studied beef cow-calf health and management practices in herds across 24 states that represented nearly 80% of US beef cows, and found that not surprisingly, the veterinarian was the primary source of information related to disease prevention, diagnosis, and treatment. Interestingly, however, they also found that 27% of these operations considered the veterinarian to be the most important source of nutritional information, compared to 31% and 4% for feed salespersons and independent nutritionists, respectively.³¹ The economic implications of nutritional management are substantial, given that for most cow-calf enterprises the largest expense is feed. Grazed and harvested forages along with supplements typically make up 40 to 60% of the costs associated with cow-calf production, and effectively controlling feed costs is a critical component to keeping production cost in check.¹ It is also well documented that the most important factor regarding profit and cost differences between cow/calf producers is how well they manage their non-pasture feed costs.^{19,22}

Becoming Comfortable with Assessing Pre-Partum Nutritional Status: Body Weight and Body Condition Score

From a practical perspective, if practitioners can become comfortable with the relationships between body weight, body condition score (BCS), and expected intake during the different stages of the beef cow production cycle, they can assist their clients in becoming better cattle managers and more efficient in the production of beef cattle. BCS is generally a reflection of nutritional management and is correlated with outcomes such as postpartum interval, services per conception, calving interval, and improved calf performance through weaning.³⁰ Acceptable body condition scores for beef cattle are generally considered to range from 4 to 7, with a BCS of 5 to 6 considered optimal.³² It has been demonstrated that cows that entered late gestation and maintained optimal body condition after parturition, had enhanced reproductive

performance compared with cows that lost body condition.²⁸ In addition to improved calf performance, one of the benefits to helping your clients manage their herds to optimal BCS is the impact on calf health, as previous studies have demonstrated that cows in moderate BCS at calving also tend to have healthier calves. While Perino reviewed factors that influence the success of passive transfer and found the effect of nutritional status of the dam to be inconclusive, Odde found that calves nursing cows in a condition of 3 or 4 had lower serum immunoglobulin concentrations than calves nursing dams in BCS 5 or 6, whereas thin cows and those that have been fed poorly tend to produce less colostrum and can result in weaker calves that are more susceptible to disease.^{21,23} Additionally, Hough et al found that colostrum produced from cows that were subject to nutrient restriction pre-partum appeared to be altered in some manner that decreased absorption of immunoglobulins into circulation by the calf.¹¹ There is also evidence that BCS at calving influenced calf vigor and time to standing for the newborn, which has a direct influence on intake and absorption of colostrum immune factors. Calves born to cows with BCS 4 took approximately 60 minutes to stand in contrast to calves born to cows with BCS 5, which took 43 minutes to stand.²¹ The interactions that veterinarians have with their beef clients around the time of pregnancy diagnosis and weaning provide opportunities to assess gestating and pre-partum nutritional status, and to make recommendations when nutritional status needs to be adjusted. In most instances, this is also the best time to make any needed adjustments to BCS of cows because calves have been weaned, and the nutritional requirements of cows are at their lowest because lactation has ceased. In general, and while it will vary depending on cow size, it is recognized that each BCS represents about 75 to 85 lb (34 to 39 kg) of body weight. This should assist veterinarians and producers design supplementation strategies to address the additional weight gain that needs to occur to achieve the desired BCS.¹⁰ As veterinarians, you should also be aware and be able to reassure clients that in situations where additional weight gain is needed, there is substantial evidence that while calf birthweight will increase, there will be no impact on the incidence of dystocia.^{2,12}

Fetal Programming

One of the areas that has received significant attention from a research perspective is fetal programming, or the concept that maternal nutrition and environment during critical periods of fetal development have long-term implications in the offspring. Recent research now indicates nutrient status of cows during pregnancy can influence performance of their calves measured throughout life. In fact, some of this research focused on compromised maternal nutrition during gestation has demonstrated increased neonatal mortality, intestinal and respiratory dysfunction, decreased postnatal growth rates, and reduced meat quality.³³ The reality that appropri-

ate nutrition, or conversely, avoiding nutritional restriction during late gestation cannot only impact the immediate health of the newborn calf, and postnatal performance, but also have long-term positive consequences on reproductive productivity of those animals.^{7,18} Some of these studies that have evaluated the impact of late gestation nutrition have also described an impact on calf health during the feeding phase, with steer calves from non-supplemented cows experiencing higher rates of bovine respiratory disease.^{14,20} Although the mechanisms by which placental and fetal programming occur are not fully understood, taking steps and managing resources to ensure proper cow nutrient intake during critical points of gestation can improve lifetime performance and progeny health.⁸

The Importance of Feed and Nutrient Intake During the Weaning and Receiving Period

Another critical area where practitioners can be a nutritional resource for their clients is that of weaned and received calf management. While most veterinarians would feel comfortable designing evidence-based animal health management protocols that include appropriate prevention (vaccines, anthelmintics, etc.) and control (antimicrobial) strategies, bovine respiratory disease (BRD) continues to be the primary health challenge during the receiving period.⁶ One of the most critical aspects for successfully starting weaned and newly received cattle is managing feed intake, as success during the initial days of the receiving period can largely determine the overall health and productivity of those animals throughout the feeding period. Unfortunately, however, intake can be substantially disrupted in cattle that experience BRD.³⁹ It is also well established that calves received into the feedlot after experiencing the stressors of weaning, marketing, commingling, shipping, and likely pathogen exposure, generally have much lower feed intake and loss of body mass (aka shrink) than animals that had not been exposed to intensive periods of distress.¹³ In addition, calves are often unfamiliar with feed bunks, automatic waterers, and many of the feedstuffs that are offered during this critical period. While preconditioning of steers before feedlot placement has reduced the incidence and severity of BRD, different supplementation strategies with various minerals and vitamins to alter immune function after arrival have not consistently reduced the incidence of BRD.^{5,9,24,26,29}

In some of the most commonly referenced studies, Lofgreen summarized his observations on the dietary preferences of stressed calves as follows: 1) stressed calves have an abnormally low feed intake relative to their body weight, and 2) stressed calves prefer a diet with a higher level of concentrate ingredients than a diet with a higher proportion of roughage. These findings were a result of a series of studies that demonstrated that calves preferentially selected a diet with a 72% concentrate level.^{16,17} These studies also indicated that while performance was enhanced, calves fed the 75%

concentrate diet experienced more BRD. The most common approach to increase energy intake in stressed cattle is to decrease the concentration of roughage offered. However, in a re-analysis of Lofgreen's data on the relationship between dietary concentrate level and BRD morbidity, Rivera et al concluded that while there can be a slightly lower incidence of BRD in calves fed receiving diets with higher proportions of roughage, this did not compensate economically for the loss in performance associated with these types of roughage diets.²⁷ He also concluded that the optimum nutritional strategy for starting lightweight, highly stressed, newly received cattle would be to feed a 50 to 75% concentrate, highly palatable diet which seems to allow cattle to perform well without limited increase in BRD.²⁷ However, application of this dietary strategy depends on the available feed resources and the ability of the client/producer to manage this approach.

Conclusions

As veterinarians, you are committed to serving your clients and the animals that they care for. While many veterinarians, particularly recent graduates, would not consider themselves to have appropriate training to be a nutritional resource to their clients, within most practices there are opportunities for veterinarians to utilize some very basic nutritional principles to not only improve the overall health and productivity within your client's beef operations, but further support your efforts to become indispensable.

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