

Student Sessions

Bovine nutrition and ration formulation basics in veterinary medicine

Kevin Hill, DVM

447 N. Angel Street, Merck Animal Health, Kaysville, UT 84037, kevin.hill@merck.com

Abstract

One of the most needed services by clients in food animal production is nutritional consulting. While many of the management tools needed by successful food animal producers can be acquired by experience, hard work, and good instincts, the understanding and application of sound nutritional principles is not easily obtained. Because food animal veterinarians are well educated, trusted, and in close proximity to their clients and their animals, they are in a unique position to bridge this nutritional knowledge gap. The important relationship of nutrition to disease, healing, and productivity make sub-optimal nutrition a significant deterrent to the goals of both veterinarian and producer. While most veterinary students receive a relatively brief course on food animal nutrition, many opportunities exist to supplement that education with post-doctoral courses, both formal and informal, that can elevate their nutritional expertise to a level that can have a significant impact on the health of animals, the productivity of producers, and the growth of a veterinary practice. This presentation highlights a few of the ways that an innovative bovine practitioner can acquire and provide these needed services to the beef and dairy communities.

Key words: nutrition, consulting, veterinary practice

Résumé

La consultation en nutrition est l'un des services les plus demandés par les clients impliqués dans l'élevage d'animaux destinés à l'alimentation. Bien que plusieurs des outils de gestion requis par les producteurs performants d'animaux de production peuvent s'acquérir avec l'expérience, le travail acharné et le gros bon sens, une bonne compréhension et l'application de solides principes de nutrition ne s'obtiennent pas aussi facilement. Parce que les médecins vétérinaires pour les animaux de production sont bien éduqués, fiables et proches de leurs clients et de leurs animaux, ils sont dans une position unique pour combler cet écart en matière des connaissances nutritionnelles. En raison du lien étroit entre la nutrition et la maladie, la guérison et la productivité, l'alimentation sous-optimale n'est pas compatible avec les

but du médecin vétérinaire et du producteur. Bien que la plupart des étudiants en médecine vétérinaire suivent une brève formation en nutrition des animaux de production, il existe d'autres chances d'enrichir ses connaissances avec des cours formels ou informels suivant l'obtention du diplôme. Cette nouvelle formation peut élever l'expertise en nutrition à un niveau tel qu'elle permet d'avoir un impact significatif sur la santé des animaux, la productivité de l'élevage et l'expansion de la pratique vétérinaire. Cette présentation illustre comment un praticien innovateur dans les bovins peut acquérir et fournir les services requis par les éleveurs de bovins laitiers et de boucherie.

Introduction

If there is any single area of veterinary education that is both sorely needed and sadly neglected it may well be the understanding and application of the principles of animal nutrition. In bovine medicine specifically and in food animal production generally, good nutrition, or the lack of it, affects virtually every aspect of animal health and well-being. Undernourished animals get sick more often, heal more slowly, and produce less efficiently than those properly fed. It is not difficult to identify a nutritional component to nearly every case of sickness, injury, or poor performance. Even if adequate nutrition is not an element in the etiology of a disease or injury, it almost certainly will impact the duration and severity of pathology and the length and degree of recovery. Because feed costs are the largest single expense in most animal production systems, the veterinarians' understanding of feeds and feeding is essential to deliver effective whole-herd health programs. It is therefore hard to over estimate the value of a sound understanding of nutrition and the ability to deliver nutritional services to the bovine industry.

The Basics of Nutrition

What most veterinary students do learn are the basic elements of nutrition. Water, energy, protein, minerals, and vitamins are the groupings under which we organize the essential elements of nutrition for optimal health and performance. It is easy to get sidetracked by the details of balancing for energy and protein, as these change by age,

stage of production, and even by environmental conditions. Minerals and vitamins can often be neglected because of their complexity, and water because of its simplicity. “Energy” is perhaps mistakenly labeled as a nutrient, when in reality it is a heading under which we list molecules that supply efficient sources of energy such as glucose and carbohydrates. One could argue that “fiber” is missing from the list of essential nutrients. In diets where fiber is abundant little attention to that detail is necessary, but in “hotter” rations where concentrates are high and fiber may be low, maintaining adequate levels of fiber are critical. In the end, the art of nutritional consulting is the ability to keep sight of all the critical elements of good nutrition while focusing on the category of immediate concern.

Relationship to Health and Healing

Nutrition plays a pivotal role in the immune response and nutrients can influence several, if not all, aspects of the immune response. In a detailed literature review of periparturient immune suppression in dairy cattle the major energetic fuels used by immune cells (i.e. glucose, NEFA, BHBA, and glutamine) were examined in detail.¹ It is clear that deficiencies in basic nutrients can have direct impacts on immune effector cells, thereby defining the direct links between altered states of nutrition and resultant disease. For example, increased levels of ketones and fatty acids resulting from negative energy balance can inhibit phagocytosis and secretion of IgM antibodies. Conversely, upregulation of immune responses such as increased cytokine production and antigen presentation can also be observed in low energy states.

Every practitioner should be trained to consider the nutritional components of each case they are called to manage. Whether the apparent complaint is infectious, environmental, injury caused, or a production decline, the complete art of healing requires that one answer correctly the questions 1) “What nutritional problem may be contributing to this case?” and 2) “What nutritional adjustments are necessary to effect rapid and complete recovery?”

Economic Impact

Beyond the financial losses associated with morbidity and mortality, the economics of poor performance related to nutritional imbalance are also significant. For example, dairymen often test the delicate balance between reducing feed costs and maintaining a profitable level of milk flow. If a dairy of 1,000 cows reduced feed costs by \$0.05/cow/day, an apparent annual savings of over \$18,000 would result. However, if that cost reduction resulted in an improperly balanced ration, then milk production might decrease. If the same herd of 1,000 cows reduced milk production by just 2 lb (0.91 kg)/cow/day, the annual loss of revenue (@\$15.00/cwt) would exceed \$109,000. Thus, an ill-advised change of

ration resulted in a significant loss rather than the anticipated savings.

Beef producers often face a similar decision. Mineral supplements are a constant source of frustration for economic evaluation. If a 1,000 cow beef operation spends \$.05 per/cow/day for mineral, the annual bill is over \$18,000. That can be justified if the mineral increases weaning weights of calves and/or increases conception rates of the dams, but those effects are sometimes difficult to measure over time. If the value of gain in this example was \$2.00/lb (0.45 kg) then an increase in weaning weight of 9 lb (4.1 kg)/calf would cover the entire cost of the mineral program.

Services to Provide

A veterinarian with the desire to provide nutritional guidance can focus on a handful of services ranging from very basic to very complex. A good beginning point for any practitioner is to facilitate feed testing. This is a relatively simple process, but commonly regarded by producers as an optional exercise. The default use of “average” values for energy, protein, fiber, and dry matter can be a costly mistake in diet evaluation as the variation can be large between fields, seasons, and years. A regular herd health service of collecting and testing feed samples can be simple and rewarding.

Another basic service to provide is an analysis of the relative economy of available feedstuffs. It is easy for a producer to rank feeds in the order of cost/ton, (and then select what appears to be the cheapest), but they often lack the information necessary to rank them in order of cost/unit of nutritive value. For example, which is a better source of supplemental protein to a cow herd, 22% alfalfa hay priced at \$200/ton or a 14% “hay replacer” block that is \$175/ton? Simple math concludes that a unit of protein from alfalfa in this scenario costs \$9.09 compared to \$12.50 for the block. By providing ranked lists of protein and energy sources available to the producer, informed and effective decisions become more likely.

Mineral evaluations can be more complex, but the correct answer is still primarily a matter of good math. Every producer is looking for the mineral mix that costs \$500/ton that will be just as effective as the \$1,100/ton mineral suggested by a local salesman. A good spreadsheet can do the work of matching the mineral requirements for the animals in question and compare them to the labeled ingredients. The opportunity for an unbiased third opinion in these cases is invaluable and very difficult to find for most livestock owners. This is a skill that can rapidly build a nutritional reputation in the cattle community.

Acquiring Nutritional Skills

Veterinary practitioners do not need to be PhD nutritionists in order to offer valuable and correct nutritional advice. However, “above all else, do no harm” is a phrase

worth remembering in regards to nutrition consulting as well as other areas of veterinary medicine. One must be careful not to masquerade as an experienced nutritionist while in the developmental phase of acquiring nutritional skills. Honesty is the best policy, and clients appreciate the practitioner who readily admits “I don’t know” followed by “but I do know where to find your answer”. Often a working relationship with a PhD nutritionist is highly desirable.

Fortunately, there are a variety of good resources that can lay the foundation for a successful career in nutritional counseling. AABP seminars are a great place to start, as well as continuing education offered from other professional associations. The NRC publications for beef and dairy cattle are the basic text books for nutritional training. Excellent software programs are available to facilitate diet evaluations and ration formulation once the underlying processes are well understood. Each of these come with a community of experienced mentors that will prove invaluable to your professional progress.

Conclusions

The level of nutrition education commonly offered in veterinary schools appears to be inversely related to the importance of nutritional expertise in bovine medicine and production. The health and economic goals of veterinarians and producers are intricately intertwined with the principles of optimal nutrition. Those veterinarians who have an interest in providing these services can set themselves apart from their competition and grow their practice by accessing the resources available to obtain advanced education in this arena.

Reference

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