Control of calf pneumonia

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Bovine respiratory disease (BRD) remains an important condition of calves that leads to reduced weight gain and productivity, as well as incurring significant cost in terms of management, treatment and prevention.

The disease is multi-factorial with numerous viruses (bovine herpesvirus 1 [BoHV1], bovine respiratory syncytial virus [BRSV], parainfluenza 3 virus [PI3] and bovine viral diarrhoea [BVD]) and bacteria (Mycoplasma bovis, Pasteurella multocida, Mannheimia haemolytica, Histophilus somni) being implicated.

Evidence is increasing for the role of bovine coronavirus in BRD – both in young calves and feedlot operations – where it has been linked with disease outbreaks around period of stress, for example, animal movements (Saif, 2010).

Risk factors

Avoid mixing stock of different ages in the same airspace.

The risk factors for calf pneumonia are well documented. In young calves, disease outbreaks are frequently associated with poor immunity from failure of passive transfer from colostrum. Colostrum management can be investigated fully by examining farm practices and checking for failure of passive transfer in their young stock. Zinc sulphate turbidity tests or total protein measurement of
calves in the first week of life provide a quantitative measure of passive transfer and can identify deficiencies in a farm’s management of colostrum feeding.

The measurement of total solid content of serum by refractometer can be rapidly performed in practice and is a relatively inexpensive means of screening animals in a group situation. Using a cut-off of more than 55g/L is indicative of sufficient passive transfer with a sensitivity of 0.94 (Tyler et al, 1996).

Other factors that can predispose to outbreaks of pneumonia include poor environment, management stress (for example, weaning or transport), mixing animals from different sources and age groups as well as deficiencies in nutrition. It is important when approaching a disease outbreak the veterinary surgeon has a thorough understanding of the farm’s management system to prevent future outbreaks.

**Identification and investigation**

Effective treatment and control of respiratory disease is determined by rapid and accurate identification of disease. All too frequently there are delays in identifying animals requiring treatment or an acceptance of a low level of chronic disease within a group. Cattle are highly adept at concealing signs of sickness, thus, subjective assessment of sick cattle is highly variable and the diagnosis of BRD based on clinical signs is often inaccurate.
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Studies in abattoirs have shown high incidence of lung lesions in animals with no history of being identified as having had, or being treated for, respiratory disease. In one study, 37% of animals with no recorded history of respiratory disease showed lung lesions at slaughter: such levels of disease would have undoubtedly had an impact on performance (Wittum et al, 1996).

Producers need to realise effective treatment must begin with a commitment to accurate and early identification of sick animals and one of the key roles of vets is the provision of education to enable this to take place. Sivula et al (1996) showed keeper diagnosis is only 56% sensitive, but 100% specific, and since implementation of early treatment is one of the most important factors to prevent treatment failure, accurate recognition of the disease by the producer is key.

Technology is beginning to be implemented as a means of aiding disease detection on farm. Accelerometers, pedometers, appetite monitors, feed consumption detection systems, remote temperature recording devices, radiant heat detectors, electronic stethoscopes and thoracic ultrasound are all being looked at; however, most are limited by the cost and practical implementation at a farm level.
Clinical scoring systems have been proposed for respiratory disease diagnosis in calves, including the Wisconsin (WI) system (McGuirk and Peek, 2014), which uses five clinical signs, each partitioned into four levels of severity to assign a composite score from which a decision to treat can be made. Other scoring systems are also in use, such as the one described by Aly et al (2014), which requires less calf handling and consists of six clinical signs, each classified as normal or abnormal.

Whichever system is chosen, the aim is for it to be applied regularly as a screening to identify preweaned calves with respiratory disease – thereby facilitating early detection. On farms where such screening is not regularly carried out, the performance of a one-off assessment provides a useful snapshot of what is happening on the unit. When considered in combination with the recent treatment records, it can prove a useful discussion point on disease recognition with the farmer.

When considering diagnostic testing, it is important to decide on the exact question and how the information it generates will be used before submitting any samples. The information gained from diagnostic investigations may have limited impact on the management of the outbreak at hand as the time delay will frequently mean the required information is not available when the therapeutic decision is made, but if steps are to be taken to reduce the likelihood of future outbreaks in a particular system (for example, through the use of vaccination) the results can be extremely useful.

To this end, diagnostic test selection needs to be appropriate – both to the disease being looked for and the animal being examined. Always sample animals that are both representative of the group affected and also have exhibited representative symptoms. The animals chosen for sampling should be in the early stages of disease; sampling the chronically affected calf with a history of repeated treatments will yield very little useful diagnostic information.

Various diagnostic techniques are available.

- Deep nasopharyngeal swabs. These can be used for identification of bacterial and viral agents, with laboratories offering PCR packages for all main respiratory pathogens.
- Ocular swabs. These can be used in situations where infectious bovine rhinotracheitis is suspected.
- Bronchial alveolar lavage and transtracheal wash. This can be used to examine for bacterial, viral or mycoplasmal presence. Samples can be evaluated by cytologic techniques to establish the inflammatory process and can be used for culture as well as PCR and immunohistochemistry.
- Paired serology. Take two blood samples from affected animals – one at the beginning of an outbreak and a second 14 to 21 days later to look for serological conversion. At least six animals should be tested.
- Postmortem investigation. In severe outbreaks where there are mortalities, postmortem examination can provide valuable diagnostic material.
Measurement of serum total protein is a useful tool for monitoring colostrum feeding.

Given the large number of pathogens that have been implicated in calf pneumonia, treatment tends to be symptomatic with a broad spectrum of effect.

Antimicrobials are the main component of most treatment regimes and a wide selection of products is at the vet’s disposal. The exact choice of antimicrobial depends on several factors, including the vet’s previous experience on the farm and elsewhere, and reported susceptibility patterns. Practical considerations include cost, ease and frequency of administration, potential carcase damage and, for some products, human safety.

The most important determinant of antimicrobial efficacy in treating pneumonia is rapidly attaining and maintaining an effective antimicrobial concentration at the site of infection, that is, the biophase in the lower respiratory tract.

The use of antimicrobial metaphylaxis in the management of BRD has been widely employed as a means of controlling the disease in groups of animals and also potentially as a means of overcoming the issues of disease recognition discussed previously.

When exactly to employ metaphylaxis has long been debated and little evidence shows when it is best to move from individual treatments to treating an entire group. Figures in the region of 30% affected are often discussed as the point at which people move from treating individuals to treating
the entire group, although this may be influenced by a number of things such as group size, severity of disease and speed of spread, as well as client expectations/management.

The decision to treat groups of animals should also be made within the context of responsible use of antimicrobials, with such use being employed only where absolutely necessary and alongside the implementation of long-term management strategies.

NSAIDs are often employed alongside antimicrobials in the management of BRD to decrease the severity of clinical symptoms, increase appetite and decrease the lung damage associated with inflammation. The use of NSAIDs as an ancillary treatment to BRD results in a more rapid decrease in rectal temperature and data suggests NSAIDs may decrease lung lesions at slaughter (Francoz et al, 2012).

Once an outbreak is under control it is important changes are made where appropriate to reduce the likelihood of future outbreaks. Make use of the available data on farm management practices and the disease processes, to identify the farm-specific risk factors and use them to make recommendations.

In combination with improvements in management practices, vaccination programmes can be a key component of pneumonia control on farm. Vaccines are available to provide effective control of the most common bacterial and viral causes of calf pneumonia and should be used prior to high-risk periods to minimise the potential for disease. Vaccination programmes should be designed to take into consideration the circumstances on individual farms and should be based around knowledge of the risk factors and the circulating pathogens.

Summary

Control of bovine respiratory disease requires concerted effort on a number of fronts, such as appropriate environment, adequate passive transfer of immunoglobulins, a strategic vaccination programme and appropriate diagnostic strategies for ongoing disease surveillance. These components are necessary to achieve an evidence-based approach for preventing and reducing the severity of BRD cases.

Proper nutrition, housing and environmental management are important for achieving optimal calf health and performance. Proper management of calves to prevent and control BRD requires careful planning and follow through to achieve these results, then farmers will see the reward in terms of improved calf health and future productivity.

References