The importance of detecting subclinical cases of bovine respiratory disease

Bovine respiratory disease is a complex, multifactorial disease process which can have negative effects on growth rates and future performance within the herd. It occurs as a result of a combination of animal, management, environmental and pathogen factors, explains Sarah Campbell MVB MRCVS, Veterinary Advisor, MSD Animal Health

Early diagnosis remains key in limiting the impact and spread of infection however this is often difficult in the absence of clinical signs. Efficient farming systems are those in which animal growth and performance are maximised and infectious diseases are under control. Many Irish farms suffer the economic impact of subclinical disease especially in young stock. Many cases go undetected until animals are slaughtered, and lung lesions are observed during the post-mortem process. Illustrating the presence of subclinical infections can be a major challenge to veterinary practitioners and encouraging action to alleviate its effects is difficult. The use of modern imaging techniques may be a useful tool for veterinarians in highlighting the incidence of lung damage present in young stock groups.

HOW COMMON IS RESPIRATORY DISEASE IN BOVINES?

From the first month of life onwards, respiratory disease is the most common cause of mortality of bovine animals according to the Department of Agriculture, Food and the Marine's regional laboratory data.
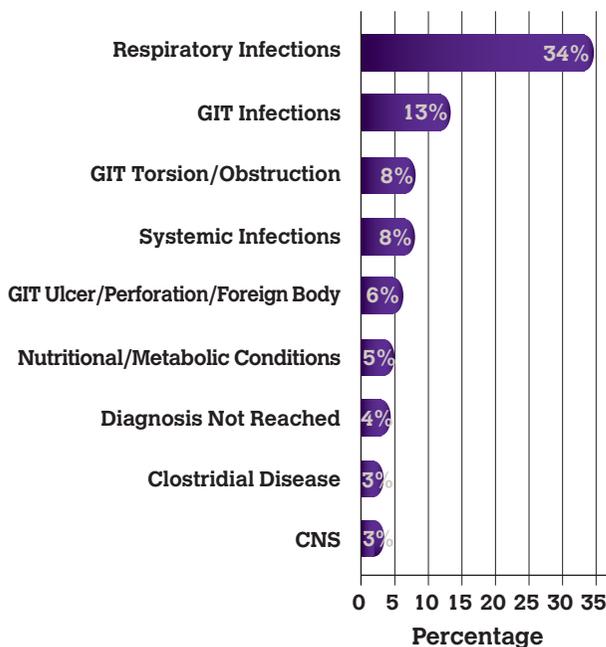

Figure 1: Conditions most frequently diagnosed on post-mortem examinations of calves (1-5 months old) in 2018 (n=669) Ref: All-Island Animal Disease Surveillance Report 2018.[1]
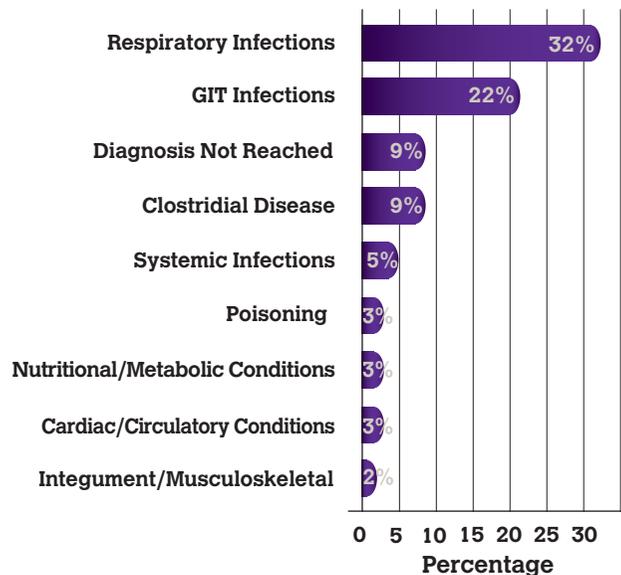

Figure 2: Conditions most frequently diagnosed on post-mortem examinations of weanlings (6-12 months old) in 2018 (n= 396) Ref: All-Island Animal Disease Surveillance Report 2018.[1]

This trend continues throughout life leaving respiratory disease as one of the most important challenges to profitability in Irish farming systems. Despite the vast amount of information that is currently understood about controlling respiratory disease, it remains the most frequently diagnosed cause of death. Considering this, in 2018 only 25% of calves received a respiratory vaccine according to Kynetec data for that year. That leaves around 75% of calves vulnerable to pathogens of the respiratory tract.

WHAT IS SUBCLINICAL BOVINE RESPIRATORY DISEASE?

Subclinical bovine respiratory disease (BRD) occurs in animals that are infected by a respiratory pathogen with abnormal lung tissue but do not show overt clinical signs of respiratory tract disease. Those affected suffer reduced feed conversion efficiency and lower than expected daily live weight gain.

HOW COMMON IS SUBCLINICAL RESPIRATORY DISEASE?

The prevalence of subclinical disease is likely to vary between farms and between groups within farms. A longitudinal study

of ninety-one pre-weaned Holstein heifers carried out by Ollivett et al demonstrated a high prevalence of abnormal lungs, as detected via thoracic ultrasonography, without significant clinical signs. This resulted in a relatively low treatment rate in these calves however growth is likely to be affected. In another study by the same author, the prevalence of subclinical disease as detected using thoracic ultrasound was between 23%-67%.[2] Having a baseline measurement of the prevalence of subclinical disease within a group before any interventions are carried out will allow progress to be assessed overtime.

WHAT IS THE IMPACT OF SUBCLINICAL RESPIRATORY DISEASE?

Many Irish farms do not measure key performance indicators, therefore the effect of subclinical disease goes unnoticed. A study of feedlot bulls in France demonstrated the invisible impact of respiratory pathogens on feed conversion efficiency and growth performance.

Data was recorded on 71 farms, representing over one thousand young beef bulls divided into one hundred batches. 18.1 % of the bulls had respiratory disorders. Compared with non-treated bulls in batches without any case, treated bulls had a decreased growth performance (61-108 g/day) and a longer fattening period (+44-59 days), depending on the severity of the clinical signs. Interestingly, bulls that did not show signs of clinical disease but were housed in the same pen as a treated animal, took an extra month to reach their slaughter target.

The data was used to estimate the economic impact by partial budgeting on a typical farm with a young bull-fattening unit. Respiratory disorders had a high economic impact, decreasing by 11.4%-26.4% the yearly net profit depending on the severity of the health situation.[3]

A US study of weaned Holstein heifer calves that were scanned at 60 days old demonstrated that those calves with
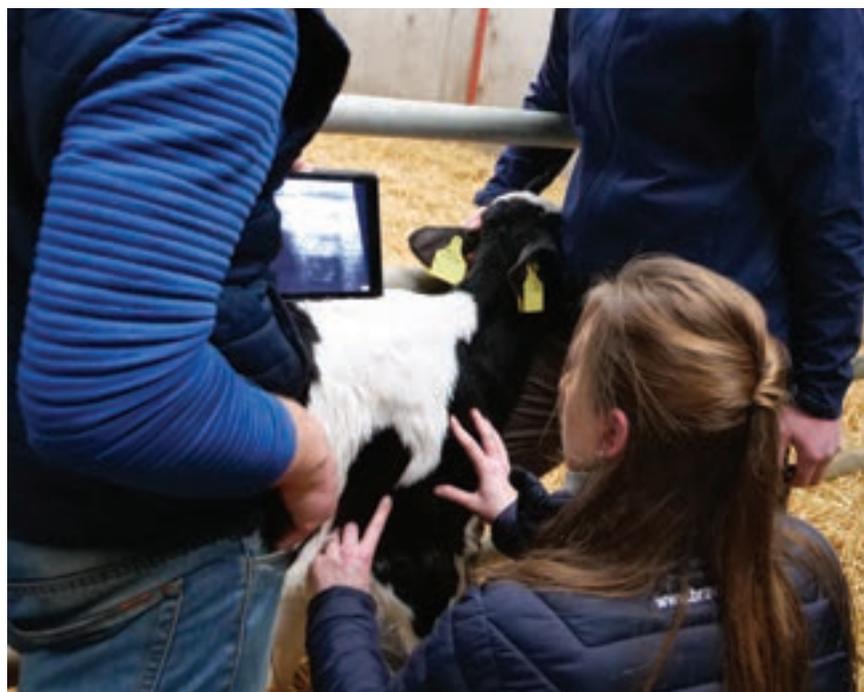

Figure 3: Demonstrating thoracic ultrasound technique.

lung consolidation present at weaning were less likely to get pregnant and more likely to be culled before their first parturition than heifers without lung consolidation.[4]

Similarly, a study on the effect of lung consolidation, as determined by ultrasonography, on the performance of Holstein dairy calves revealed that the presence of lung consolidation, at least once in the first eight weeks of life did not influence age of first calving but did result in a 525kg decrease in first-lactation 305-day milk production.[5]

HOW CAN VETS DETECT SUBCLINICAL DISEASE?

A fresh approach to identifying subclinical cases is the use of thoracic ultrasound (TUS). An ultrasonographic scoring system (0-5) can be used to categorise the level of subclinical lesions present in young cattle as described by Ollivett and Buczinski.[2] Many vets already have rectal scanners and are familiar with imaging reproductive organs. The same equipment can be used to visualise lung lesions associated with subclinical respiratory disease.

Clinical scoring charts have been developed to improve the detection of early clinical respiratory cases however the limitation of such an approach is that it fails to differentiate between upper and lower respiratory tract disease and misses subclinical cases completely.[2]

There is a benefit in using both approaches in combination to improve the diagnostic accuracy. TUS can be useful in differentiating between cases of upper respiratory tract disease, clinical pneumonia and subclinical pneumonia. Prognostic indicators such as a severe lung lesions including lobar consolidation, abscessation and necrosis can also be imaged.

TUS can be a helpful tool in monitoring the incidence of new cases as well as indirectly assessing the performance of certain interventions into young stock rearing such as changes to the feeding strategy, improving the calf environment or early vaccination. As a diagnostic imaging tool, it cannot aid in deciding on treatment choice but will be useful as a monitoring tool of the prevalence and severity of disease within young stock groups.

The accuracy of thoracic ultrasound has been compared to many other non-invasive antemortem techniques such as auscultation, clinical scoring charts, radiography and computed tomography, of which it compares

Figure 4: Lung lesions detected using ultrasound technique.

favourably.

There appears to be a high level of agreement between the amount of consolidated lung lesions identified using ultrasound when followed by post-mortem examination to confirm. Studies report the sensitivity (Se) of TUS between 79-94% and specificity (Sp) between 94-100% when using thoracic ultrasound as a diagnostic tool.[6] When precision is compared to the Wisconsin calf respiratory chart which had an accuracy of Se 62.4% and Sp 74.1%, TUS appears to have a higher sensitivity and specificity.[6] In further comparison, another study calculated the sensitivity and specificity of auscultation as 5.9% and 99% respectively.[2]

THE FUTURE OF HERD HEALTH – MEASURE TO MONITOR

In order to monitor, veterinary practitioners need to take accurate measurements at regular intervals. Given that respiratory disease remains the main cause of mortality in bovine animals, lung health should be a key focus for improvement on Irish farms.

Reducing the incidence of both clinical and subclinical respiratory disease requires a holistic approach that involves vaccinating against endemic pathogens, improving calf environments and creating appropriate management protocols. Utilising novel techniques such a thoracic ultrasound can aid in data gathering that subsequently leads to changes that improves animal health and welfare. Many of the effects of infectious diseases are subclinical but have an economic impact on farm profitability. Routine animal health visits by veterinary practitioners will allow time to gather data on various groups within herds and allow proactive interventions to occur rather than reacting to a disease outbreak. The future of veterinary involvement in sustainable agriculture systems relies upon responsible guidance to reduce the impact of endemic infectious diseases.

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