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Tackling respiratory disease

Part 1: Pathogen factors

Pneumonia, is common in beef youngstock leading to inflammation of the lung tissue and airways. It causes irreversible lung damage in affected animals and causing poor welfare and a significant economic loss. Costs to the UK industry associated with treatments, lower growth rates and calf mortality are significant, with estimates of £50m annually. Up to 20% of all growing calves may present anti-mortem with respiratory disease, but 36.6% present with some lung pathology at slaughter indicating that in a significant number of cases the disease problem is going unnoticed whilst the calf is alive. Such lesions may lower growth rates by >0.2 kg daily and cost the producer around £30-£80 per animal at risk: that financial loss is increased to £500 when an animal dies.

Symptoms

- Coughing
- Nasal discharge
- Increased breathing rate and effort
- Heads down and depressed
- Reduced feeding
- Raised temperature
- Death

Pneumonia – main causative agents

Pneumonia can be caused by viruses, bacteria and mycoplasma. Frequently, respiratory infection will follow a pattern where the calf will become infected with a primary agent, usually a virus and the resultant damage to the lung allows a secondary bacterial infection to develop.

Viruses

The main viral pathogens of pneumonia are respiratory syncytial virus (RSV), parainfluenza-3 (PI-3), infectious bovine rhinotracheitis (IBR) and bovine viral diarrhoea virus (BVD). Although the above pathogens are potentially well controlled with effective vaccination, other pathogens are emerging with increased significance and have either less effective vaccines or no available vaccines. Lungworm (*Dictyocaulus viviparus*) may be responsible for severe outbreaks of pneumonia in animals with poor immunity and exposed to high levels of challenge at pasture. Proactive control is available through use of a pre-turnout oral vaccine or through a strategic use of wormers as part of veterinary herd health planning.

Bacteria

The bacterial causes of pneumonia include *Mannheimia haemolytica*, *Pasteurella multocida*, *Histophilus somni* and *Mycoplasma spp.* *Mycoplasma spp.* are bacterial pathogens that can play a role in a number of cattle diseases including pneumonia, arthritis and mastitis and have often been underestimated and less well monitored than other causes. Many difficulties are encountered in therapy of mycoplasma; there are currently no effective vaccine control measures in the UK and treatment is continually threatened by antimicrobial resistance.

Treatment options

There are no anti-viral treatments available for livestock so the mainstay of treatment is antibiotics and non-steroidal anti-inflammatories (NSAIDs). NSAIDs are anti-inflammatory, reduce fever and relieve pain and importantly, help to reduce the damage to the lungs. Antibiotics have a role in treatment of both secondary infection and primary bacterial pathogens. There is increasing pressure on the industry to use antibiotics responsibly.

Key environmental variables

The key environmental variables that can influence the prevalence and severity of pneumonia are moisture levels, air quality, and air speed. Temperature can have an influence at lower and higher temperatures but is not a consistent factor. Floor design and bedding contribute to how the three key variables above may be managed.

Table 1: Three key environmental factors: symptoms of and contributions to health problems

Factor	Condition	Contribution	Symptoms*
Moisture	Too much	<ul style="list-style-type: none"> ~ Supports microbial activity ~ Promotes bacterial growth (some species) ~ Acts as a transport medium ~ Increases slippery floors – causes stress 	<ul style="list-style-type: none"> • Lying dirty water • Dirty cattle • Damp floors in areas that could be dry • Leaking drinkers • Condensation • Staining of underside of roof • Animal health problems
Fresh air	Too little	<ul style="list-style-type: none"> ~ Lack of fresh air increases survival time of airborne pathogens ~ Lack of fresh air increases concentration of gaseous emissions. ~ Lack of fresh air can reduce oxygen concentrations 	<ul style="list-style-type: none"> • Smell ~ ammonia, dampness • Dark corners – no light, no ventilation • Elevated air temperatures • Animal health problems
Air speed	Too much	~ Too much: associated with excessive energy losses	<ul style="list-style-type: none"> • Animals avoiding certain areas • Huddling • Hairy coat • High intake/ low production rates • Animal health problems
	Too little	~ Too little: associated with lack of fresh air	<ul style="list-style-type: none"> • Animals avoiding certain areas • Smell • Animal health problems

* Consider the whole housing season, not only the current situation

Part 2: Animal/Immunity factors

Pneumonia occurs when the challenge of infection from pathogens overwhelms the animal’s immune defences. Many factors influence the immune defences of a growing animal, including:

Colostrum management

Calf health hinges significantly on the provision of adequate amounts of good quality colostrum. Passive immunity is passed from mother to calf through colostrum, providing the only means of protecting newborn calves against disease. As many as 35% of calves do not receive adequate amounts of colostrum which attributes to 7.9% of calf deaths.

o **Quantity – Deliver sufficient colostrum into the animal**

Traditional recommendations of intakes of around 5% of bodyweight in the first six hours are likely to be highly inadequate in most cases. Requirements are likely to be nearer to 15% bodyweight in the first six hours

o **Timing – Every minute counts**

The calf must have colostrum as soon as possible. Within six minutes of birth is better than within six hours

o **Quality - Is key. Colostrum quality varies widely**

Test supplemental colostrum with a colostrometer to ensure it is of good quality. Hygiene is important. Use clean implements. Do not use mastitic/dirty milk; high bacterial loads may significantly reduce absorption of colostrum through the gut. Freeze excess colostrum from separate cows, unless you are going to use it immediately. Bacteria can reproduce rapidly in warm colostrum and this can be harmful to the calf. Rapid cooling in iced water or a farm refrigerator to less than 5°C will reduce this effect if colostrum is not to be used within an hour or so – this colostrum will be good to use for up to 48 hours. Bought in colostrum represents risks of importing disease such as Johnes disease; try and buy from lower risk herds with known health status.

Providing adequate nutrition

In animals which are malnourished the immune system is weakened. The opportunity to intervene in beef suckler systems is more challenging than in intensively reared calves. However, creep feed may be offered to growing beef calves and monitoring of adult beef cow body condition can offer early warning that grazing or forage may be inadequate.

Palatable starter pellets or a home mix coarse mix of 18% crude protein should be gradually introduced from the first week onwards. Concentrates should be fed fresh daily. Forages are not digested by pre-ruminants but their physical presence offers behavioural enrichment and for this reason forages should be available from as early as possible. Concentrates are vital for development of the rumen papillae.

Stress Factors

Stressors are additive and so are the negative impacts so the more stressors present the lower the performance will be. The highest risk period is usually at weaning, but risk is farm specific and may result from some or all of:

Exposure	Physiological Stress	Environmental Stress	Emotional Stress
<ul style="list-style-type: none"> • Mixing of cattle • Housing after grazing at pasture • Exposure of disease from other animals 	<ul style="list-style-type: none"> • Castration • Disbudding 	<ul style="list-style-type: none"> • Insufficient feeding space or water provision • Transport and handling • Change of environment • Change of diet 	<ul style="list-style-type: none"> • Loss of contact with dam

The defences of calves against disease can be improved by reducing stress, for example:

- Avoid disbudding and castration at stressful times such as weaning. It should be performed when calves are young when they have circulating immunity from colostrum
- Disbud when calves are less than two months of age if at all possible to avoid the more stressful dehorning later on
- Keep herd groups stable
- Handle calves quietly
- Maintain a regular routine when managing calves

Purchased weaned calves/stores

There are inevitable risks from buying any animal within a group of animals where the purchaser has minimal knowledge about the colostrum intake, milk quality and quantity, feed quality and treatment history.

Concurrent disease stress

Diseases such as Bovine Viral Diarrhoea (BVD) and coccidiosis specifically suppress the immune system in the growing calf. Concurrent infection with these diseases represents a large risk for pneumonia. BVD specifically targets the respiratory cells so has a direct respiratory effect and is a major control factor for pneumonia.

Vaccination

Infection frequently starts with primary agents and once the viruses or Mycoplasma have caused primary damage, the bacteria can enter as secondary invaders resulting in extensive damage to the lungs. Vaccination against the key four viruses can have a dramatic effect on reducing calf pneumonia outbreaks in some cases. Vaccination will not only increase resistance to disease but will also have the benefit of reducing shedding of infection from infected animals, thereby reducing the overall pathogen load within the environment.

