

Pneumonia in Beef Cattle

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Technical Note

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SUMMARY

- **Calf pneumonia is a significant source of financial loss in beef production.**
- **It is a multifactorial disease and husbandry and management factors are important triggers for common infectious micro-organisms to multiply and cause pneumonia.**
- **RSV, Pi3 and IBR are the most important viruses and vaccines exist to protect against them.**
- **Assessing and correcting the management and vaccination of calves is necessary to control costs and improve the efficiency of production.**
- **A pneumonia control programme should be part of the health plan for the beef herd.**

Introduction

Calf pneumonia is a disease of considerable financial significance to the beef industry. Costing of outbreaks has identified that in the average outbreak £22 will be lost per calf at risk. For a group of 100 calves where a quarter of them are treated the total loss will be around £2200. Losses arise from the cost of treatment, reduced weight gain, increased work for those looking after the cattle and most significantly of all from calf deaths. The disease is one of the so-called multifactorial diseases. This means that in addition to the range of infectious micro-organisms that cause the disease, husbandry and management factors have an essential role in precipitating outbreaks. The micro-organisms that cause the disease are by and large to be found in every herd of cattle whether or not pneumonia is a problem. The factors that allow the micro-organisms to cause the disease are those that are under the control of the management or are a result of the husbandry system.

While early antibiotic treatment can be very effective in reducing the losses caused by the disease the most cost effective approach to managing pneumonia lies in a preventive programme that includes vaccination and a positive management programme to control the contributory factors. Furthermore there is widespread concern over the development of antibiotic resistance in the bacterial



Calf with chronic pneumonia, the neck is stretched out to make breathing easier.

micro-organisms found in animals and the possible transfer of that resistance to bacteria that cause disease in humans. Responsible use of antibiotics in beef production must be an objective for all beef farmers. Prevention of pneumonia is also clearly justifiable from a welfare perspective.

Background

The term pneumonia means inflammation of the lungs. The disease process will result in damage to the animal's lungs that will reduce its ability to breathe, reduce feed intake and increase feed conversion. At its most severe it will result in so much damage that the animal can no longer breathe effectively and will die because of oxygen starvation. In the course of the disease process animals will be

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fevered and suffer toxaemia (feel bad). The majority of animals will recover completely and indeed are likely to show compensatory growth subsequently so that by the end of the feeding or housing period affected animals will be as well grown as their unaffected pen mates. A small number of affected calves will suffer lung damage that will not repair. These animals are termed respiratory cripples and will appear ill-thriven and suffer recurrent bouts of pneumonia.

While damage to the lungs is the critical part of the disease process often the entire respiratory tract between the nose and the lungs may be affected. Indeed this part of the breathing system, known as the upper respiratory tract is important in protecting the lungs from pneumonia. Diseases such as infectious bovine rhinotracheitis (IBR) will cause so much damage to the windpipe that fatal pneumonias commonly develop. But damage does not need to be so dramatic; a range of factors can overcome the natural disease resistance of the upper respiratory tract. Dust and poor air quality is the most common factor, but acidosis caused during the acclimatisation period to a concentrate ration, trace element or vitamin deficiencies and husbandry routines such as dehorning and castration are all of importance.

The micro-organisms that are involved are split between the viruses and the bacteria. The viruses cause the early phase of the disease and will further reduce the natural disease resistance of the upper airways. Bovine respiratory syncytial virus (RSV), parainfluenza 3 (Pi3) and the IBR virus are the ones of importance. Bovine virus diarrhoea virus (BVD) does not damage the respiratory tract but lowers the immunity of the calves and so makes them more susceptible to the effects of the other infections. The RSV virus can cause pneumonia of such severity that calves can die after a very short illness, but more commonly the viral phase of the disease is less severe and a rapid recovery is seen where there is no lung damage caused by bacteria.

The bacteria that cause pneumonia usually do so following on from the viral infections or when the air quality or husbandry is very poor. The important bacteria are *Pasteurella haemolytica* (now known as *Mannheimia haemolytica*), *Pasteurella multocida*,

Histophilus somni and *Mycoplasma bovis*. All can be found in the nasal passages of groups of healthy calves. They cause severe lung damage if they are allowed to penetrate the lower airways and it is this part of the disease that causes the majority of deaths that arise from pneumonia.

A further cause of pneumonia that has to be considered is lungworm. These parasites may have caused damage to the lungs before housing or failure to treat at housing may mean that calves are still infected when housed. Either way their significance in contributing to pneumonia problems should not be over looked.

Pneumonia is almost exclusively a disease of young cattle. The younger the calves are the more severe is the disease and the more difficult it can be to control. In calf rearing units where insufficient attention is paid to providing good quality naturally ventilated buildings calf pneumonia can be almost impossible to control adequately. However the disease can also be severe in older weaned calves that may be mixed from several sources at housing or subjected to a range of stressors simultaneously such as housing, weaning and dehorning. The difference between pneumonia problems in the young calves and that seen in the older calves is that attention to management can result in very good control of the disease in the older calves.

Signs of pneumonia

The first sign of pneumonia in a calf is a reduction in feed intake. In some calves this may be seen as a lack of gut fill. At this stage the calf will almost certainly have a fever (rectal temperature more than 39.5 degrees C.), but yet still appear bright. A watery discharge at the nose may be apparent, but often goes unnoticed, as calves are fairly adept at licking their noses clean. As the disease progresses coughing may occur and the animal may develop a "lift" as the increased effort to take air into the damaged lungs becomes obvious. The nasal discharge may now become thicker and flecked with white material (mucus and pus). As the animal progresses through this phase it will appear depressed and ill even to those not used to dealing with stock.

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By the time calves are seen clearly to be ill there is likely to be several more already in the early stages of the disease.

It is important to recognise that increased effort to breathe in young calves with or without a fever need not indicate pneumonia. The dehydration and acidosis that is seen with calf scour results in more frequent deep breaths and can fool even the most experienced into thinking that it is pneumonia. Failure to make this distinction may result in the death of the calf, as fluid therapy will be required for calf scour cases showing these signs.

Assessing the environment

Naturally ventilated buildings rely on the heat of the calves to generate an effective thermal current as the air is warmed by the calves and rises to exit the building through the outlets in the roof and draws fresh air in through inlets in the walls. This system must be able to provide the calves with the required air changes even on the stillest of days. In a well-ventilated building the air will appear fresh without excessive smells of ammonia or slurry gasses. Cobwebs will not be evident. If pneumonia is a recurrent problem in a building then it is necessary to review the ventilation. There are standards for design and the inlet and outlet areas can be measured for the numbers and type of stock and matched to the design requirement. Your vet or a buildings engineer will be able to advise on the adequacy of the ventilation and suggest ways in which ventilation can be improved.

Sources of dust should be avoided. Rations should not be ground or mixed in the same air space as the calves.

Drainage too is critical. If surfaces within the building are constantly wet then the relative humidity within the building will increase and favour the survival of the bacteria and viruses that cause the disease. Attention to external drainage and down pipes is important.

Assessing the management

The key is to avoid stress at the times of the year when there is a high risk of pneumonia. The two

critical periods are the month after housing and the four weeks either side of the New Year. Dehorning and castration should be done when calves are young, not when they are weaned. Weaning can be done outside, but if it has to be done inside then the mothers of the calves should be kept in the next pens. Worm treatment for spring-born calves can be given prior to housing if a wormer with persistent action is used. This allows lungworm to be removed from the lungs while they are at low risk of pneumonia, prevents new infections and allows a period for the lungs to recover from the lungworm damage before housing. The final point is to ensure that the introduction of any concentrate ration is done as gradually as possible to minimise the risk of acidosis. It helps if concentrates have been available prior to housing.

The situation is less easily managed with young dairy bred calves. A good supply of colostrum is required to ensure the calves have some protection and there is little that can be done except source even batches. However colostrum is also a source of vitamins A and E that help the body to fight infection. Multi-vitamins can be administered to calves on arrival as a precaution against a poor supply from their mother. Suckled calves are unlikely to be affected in this way if born in the summer or autumn or if spring born and the winter ration of the cows is supplemented with a proprietary mineral and vitamin supplement at the correct rate.

Diagnosing the cause

There are a range of diagnostic techniques that can be employed to show what agents may be active in any herd, however enough is known about the pneumonia complex to make diagnosis of precise cause unnecessary in the majority of cases. We know that RSV and Pi3 are common in young calves and that in older calves RSV is likely to be much more important than Pi3. We know that if the herd is open with market purchased animals added then the calves would be at risk of IBR. Using this assessment your vet will usually have enough information to guide him or her in constructing a vaccination programme for your situation. Monitoring for bacteria to assess their antibiotic resistance pattern is certainly advisable where the entire group of calves may require antibiotic treatment. This can be

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done with nasal swabs submitted to the diagnostic lab. Nasal swabs can also be used to diagnose IBR provided early cases with a clear nasal discharge are swabbed. This can be of importance as vaccination in an outbreak of IBR is considered to be beneficial.

Where a pneumonia control programme is in place and losses occur more detailed investigation can be carried out to find out the reason in order to correct the programme.

It is recommended that where deaths occur after a very short illness or suddenly in the course of the outbreak that a post mortem examination is carried out. This is best achieved by taking the carcass to the Veterinary Investigation Centre (VIC) or failing that having the pluck (lungs, with the heart and wind pipe) removed from the carcass and taken to the VIC. In general it is not worth examining animals that have been ill for a more prolonged period and have been treated with antibiotics.

Treatment

Antibiotics are very useful in the treatment of pneumonia and in many cases a response may be seen within 24 to 48 hours. A range of antibiotics exists and each may have a different place in the treatment of this condition. Blanket treatment of the group is sometimes employed, but consideration should always be given to the development of antibiotic resistance and the possible transfer of this to the bacteria that cause disease in humans. Responsible use of antibiotics is therefore vital. These products are prescription only medicines and should only be administered on the advice of the vet to animals that are under the care of the vet.

Anti-inflammatory agents are also used in severe cases. These reduce the damage caused by inflammation within the affected lung and make the calf feel better much as aspirin does for us when we suffer a cold.

Prevention

In addition to a management programme that seeks to minimise stress and improve air quality, vaccines are essential for control of pneumonia in herds that are troubled by this disease. For most

situations RSV vaccination is essential; Pi3 can be added for younger calves and IBR where calves are purchased through markets. BVD control can be achieved through vaccination of the breeding herd and so removing the risk of virus carrier calves being present, but where calves are purchased there may be a role for including protection against this agent. Multi-component vaccines exist that offer cover for all of these agents. There are also vaccines that claim protection against *Mannheimia haemolytica*, one of the bacteria in the pneumonia complex.

The key to using vaccines is to ensure that the course of injections is completed prior to the risk period for pneumonia. This means that for spring born suckled calves the vaccination should begin at six weeks before the projected housing date (for most vaccines). However it also underlines the difficulty for autumn born calves and dairy bred calves. That is it can be difficult to provide effective vaccine cover if the disease is occurring in the first six weeks of life.

A pneumonia control programme is an essential element of the health plan for a beef herd. The control programme should be drafted several months before cattle are purchased or due to be housed to allow time to assess ventilation and to correct any deficiencies, but also to ensure that the vaccination programme can be put into effect before the risk period.

Further sources of information

BS5502 Part 40. British Standards (Buildings and Structures for Agriculture). Part 40: Code of practice for design and construction of cattle buildings. 14pp.

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