

Bovine Respiratory Disease: Pneumonia in Young Cattle

Introduction

BRD or pneumonia is one of the leading causes of disease and losses in reared beef calves in the UK. BRD causes significant inflammation in the lungs and airways and sometimes the damage is **irreversible**.

The **cost** of disease is vast and each individual case is estimated to cost £82, with many hidden costs such as reduced daily weight gain (up to 0.2kg/day), reduced feed conversion efficiency and longer to reach breeding weights (approx 14 days longer). For example; from a recent study, the savings on a dairy bred beef calf with a severe/chronic respiratory problem are estimated at £327 per animal.

The 'tip of the iceberg' analogy applies to BRD; it was proven in a large study where 35% of the group had clinical signs of BRD and were treated. At slaughter, 72% of animals had lung damage despite these animals showing no outward signs of respiratory disease. This emphasises the serious impact on profitability.

The aim of this leaflet is to provide some guidance and advise on management and prevention of BRD.



Signs of BRD

An attentive stockman will recognise the signs of BRD relatively quickly but quite often this is limited by manpower and time! The **sooner** an animal is identified, the better the recovery and the **success** of treatment. Classical signs of BRD include:

- Reduced feeding
- Nasal Discharge
- Dull demeanour with dropping of ears
- Increased respiratory effort
 - Cough
- Temperature increase (pyrexia) **above 39.5°C**

As mentioned before, if some animals are showing these signs, the rest of the group are likely to be affected **sub-clinically**, still with reduced DWG and FCE.

The use of a thermometer cannot be emphasised enough. Every stockman should have one - they are cheap, easy to use and provide minimal stress. If an animal's temperature is above **39.5°C** then there is almost certainly an infectious process occurring (bacterial or viral) and it warrants treatment.

The role of NSAID's

Non Steroidal Anti-Inflammatory Drugs (NSAID's) are drugs which block inflammatory pathways in the body and penetrate lung tissue very well. They include; Meloxicam (Metacam), Flunixin (Finadyne), Ketoprofen (Ketofen). They are an extremely important drug of choice in both **treating** and **preventing** BRD. Their use has been extensively researched in all areas of cattle disease and husbandry but their use in relation to BRD is documented as being vital to the **success of treatment** and to the future productivity of an animal.

There are huge pressures on farmers about the **use of antibiotics**, and the aim of all farmers should be to minimise and reduce antibiotic use on farm. Some farms treat newly bought in calves with 'prophylactic' antibiotics (e.g. The use of tetroxy LA in an attempt to prevent the development of BRD). But a recent study on 258 calves has shown that by treating newly bought in stock with 'prophylactic' NSAID's, there was an overall **43% reduction** in the antibiotic use. There was no adverse effects on the calves and DWG was not affected either.

Another study looked at 200 hundred animals with BRD. Half were treated with Oxytetracycline (Tetroxy LA) and Meloxicam (Metacam) and half were treated with just Oxytetracycline. The animals that received the Metacam reached **significantly** higher body weights at slaughter, with higher DWG and also there was significantly less lung tissue affected by disease. This highlights the importance of the use of NSAID's at the time of a case of BRD for recovery and future production.

The Pathogens

BRD is caused by and involves many different factors - the pathogens, the environment and the animal. There are a number of pathogens which contribute to disease and include:

Viral:

Bovine Viral Diarrhoea (BVD)
Bovine Respiratory Syncytial Virus (RSV)
Parainfluenza Virus (PI3)
Bovine Herpes Virus- 1 (IBR)

Mycoplasma

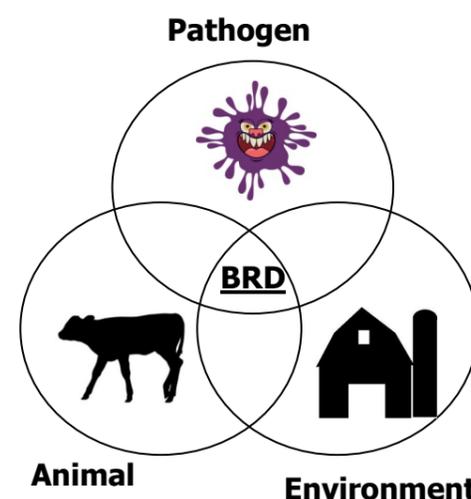
All these pathogens have potential to cause disease. Quite often, the animal is affected by a **primary pathogen** (normal a virus) and then subsequently affected by a secondary bacteria.

Antibiotics are not effective against viral disease hence why very early detection and treatment with an NSAID is often adequate to prevent disease. Mycoplasma species are widespread and are sometimes implicated in BRD cases, there is no current vaccination and antibiotic resistance is emerging. Lungworm can complicate disease and so an appropriate worming protocol is required to control lungworm. So how do we know exactly what pathogens are causing disease in our youngstock? Please continue reading..

Bacterial:

Mannheimia haemolytica
Pasteurella multocida
Histophilus somni

Lungworm



Pathogens cont'd

Animals produce **antibodies** to the pathogens that they encounter to try and fight them off. It's these antibodies which can be detected in the blood. Only certain pathogens are able to be detected in this way, and it also takes a variable time for antibodies to start to be produced so in an acute outbreak they may not be detectable. In this instance a **paired sample** - i.e. 2 samples taken 3 weeks apart is useful to identify the pathogen(s) involved.

Conjunctival or nasopharyngeal **swabs** are useful to diagnose some of the pathogens involved.

Faecal testing is used to detect lungworm.

The drug company Zoetis are currently running **subsidised testing** of calves at a very much reduced cost to the farmer. These are blood samples taken from up to 5 calves over the age of 4 months and tested for the most common pathogens involved in BRD. This is a great idea for those farms where they are unsure of what pathogens may be circulating the stock. This information can then be used to **target vaccination** to the specific pathogens and at certain risk periods based on the individual farm.

The Animal

Cattle actually have smaller lungs relative to body size and so probably does make them more susceptible to respiratory disease. The first **three to 10 months** of life are the biggest risk period for growing calves, so management at this time is vital for disease prevention.

- **Colostrum** is the most important factor in a newborn - it represents the **only** means of boosting immunity and defence against disease. The colostrum should be of good **quality**, gained **quickly** and in enough **quantity**. Heifers and older cows are at an increased risk of having poorer quality colostrum. The testing of colostrum using a **brix refractometer** can provide a good measure of the quality - good colostrum will have a reading of **above 22%**. Any less and it would be advisable for additional colostrum to be offered to the calf of better quality. A suckler calf that has sucked soon after birth will be bright and alert, the abdomen should appear slightly full/distended and the cows udder won't be tight. Ideally, a suckler calf would receive approx **3-4 litres** within the first **2 hours** of birth to maximise the efficiency of absorption.
- **Trace elements** are very important for both the suckler cow and calf. The colostrum quality as well as the vigor of the calf will be affected by the trace element status of the dam. Calves with trace element deficiencies as well will be more susceptible to BRD. Bolusing cows provides a supplementary source of the essential elements but it is advised that blood testing of cows is undertaken first.
- **Other disease - BVD** is the main disease we think about. This viral disease is widespread and lowers a calf's immunity so naturally, the calf is more likely to develop BRD. Knowing the BVD status of your herd is really important for management and prevention of disease, and is also necessary for creating a vaccination protocol for calves.
- **Avoiding Stress.** Stress of any sort will put extra **strain** on a calf's **immunity** and affect **productivity!** Weaning is one of the biggest stress periods in a calf's life and so there are some considerations when thinking about weaning strategy. Weaning **outside** can provide a good solution as they do not have to try to fight the greater pathogen exposure that exists in sheds. If inside, providing a **creep area** for calves and shutting them in this area for an increasing period each day over a period of 2 or 3 weeks weans the calves slowly, and reduces stress. Calves are most chilled with **cows around**, and not necessarily their own dam. Keeping a couple of 'fitter' cows with the calves can help. Obviously, most of these ideas depend on the individual farm and the practicality of achieving these things. Try to **avoid management procedures** such as disbudding/dehorning or castration at the same time as weaning or vaccination. The earlier castration and disbudding occur, the least stress is placed upon calves. Vaccinating under as minimal stress as possible aims to maximise the uptake and response to the vaccine - getting the most out of the protection.
- **Clipping backs** - clipping the hair of calves backs has been practised for a number of years and tries to avoid sweating which reduces the moisture in the air therefore reducing pathogen load.
 - **Vaccination** - will be talked about below.



Vaccination

As we have talked about previously, knowing the pathogens on your farm that are implicated in BRD is important to be able to design an individual vaccine protocol. As well as knowing the pathogens that are involved in BRD cases, knowing which vaccinations you use in adult cows (e.g. BVD, IBR etc) is important because that affects the age at which calves will respond to vaccination appropriately. If you buy in calves, this always poses a risk of bringing a variety of pathogens onto the farm.

Maybe a little obvious, but making sure that the strict vaccination **protocol** is followed, **administered in the right place** and **stored** appropriately, is important to maximise success and protection from the vaccine. As mentioned before, avoiding stressful events around vaccination also aims to maximise response.

There are a huge number of vaccines available. There are vaccines for IBR, BVD, RSV, PI3, Pasteurella and Lungworm. They come in a variety of different forms, include some or most of the pathogens and provide different durations of immunity. It's very important to realise that **vaccination alone does NOT** mean that you will never see a case of BRD again. Vaccination is **part of** a multifactorial approach to the prevention of BRD.

It's not really in the remit of this article to talk about the specific trade names and companies that produce vaccines but we will try to provide some advice on their use.

- **Intra-nasal** vaccines target the mucous membranes and the lining of the inside of the calf's nasal cavity. This enables very **quick** and **targeted** uptake of the vaccine to exactly where it needs to be. The intra-nasal vaccines can typically be used from a **very young age**, and because they are targeted to the mucous membranes they don't interfere with circulating antibodies in the blood that the calf has acquired from the dam via colostrum. Therefore, from 9 days of age they can be used and provide immunity in a single shot. However, they are more **difficult to administer** and the **duration of immunity** is less than other vaccines.
- There is more choice of vaccine via the more conventional **intra-muscular** route. These vaccines normally include 3 or 4 pathogens (PI3, RSV, Mannheimia/Pasteurella haemolytica +/- BVD). Depending on the make, they can be used as early as **2 weeks** of age but have to have **2 vaccines 4 weeks apart**. However, they do provide **6 months** immunity and are easier to administer.

Vaccination cont'd

The vaccinations via the intramuscular route can interfere with antibodies from the dam and so if using the vaccine which includes the BVD component and the farm vaccinates cows for BVD, this has to be borne in mind as to when best to administer. It's important to remember that vaccination needs to be done ideally 4 weeks **prior to housing** to maximise the protection gained from vaccinating.



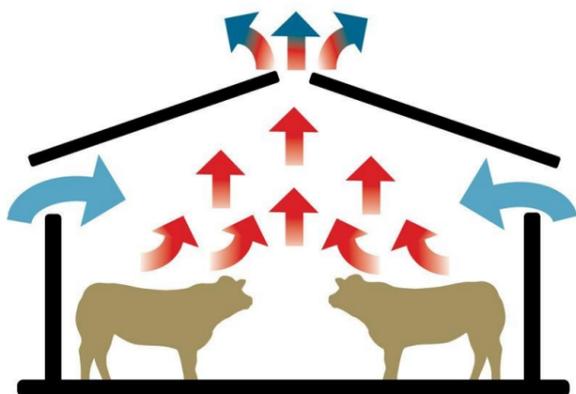
So vaccination is a very useful tool in the management of BRD but has to be based upon each **individual farm's circumstances** - autumn/spring calving, bought-in calves, housing, management and vaccination of cows are all factors to consider when choosing an appropriate protocol.

The Environment

The environment not only influences the animals defences but also influences the pathogens which are present. Therefore the environment is a **key** area to tackle on farm and a number of different factors play a role.

- **Temperature** - the **lower critical temperature** (LCT) of an animal is the temperature below which, the animal needs to use energy to create warmth. This clearly effects food conversion efficiency and daily liveweight gain, but also affects an animal's immunity. As cattle grow, their LCT increases but a calf of 100 kg for example has an LCT of 5°C - so anything below this is putting extra pressure on the animal's defences. Managing stocking density and improving ventilation are factors which effect the LCT.

Figure 1: The stack effect



- **Moisture** - pathogens thrive and multiply in moist conditions, so keeping moisture to a minimum aims to reduce the pathogenic load. Damp conditions also increase the rate of heat loss which increases the LCT of an individual or group. Both drainage and ventilation have an important role to play in the moisture levels of a building so adequate drainage is necessary. The cost of straw at the moment is going to put an extra strain on finances this year, but dry bedding is essential to the reduction of all disease in sheds, not just BRD. An easy test to do is the 'squelch' test - if you kneel down on the bedding (in waterproofs!) and you can hear a squelch or your knees become wet after a few seconds, the bedding is too damp.

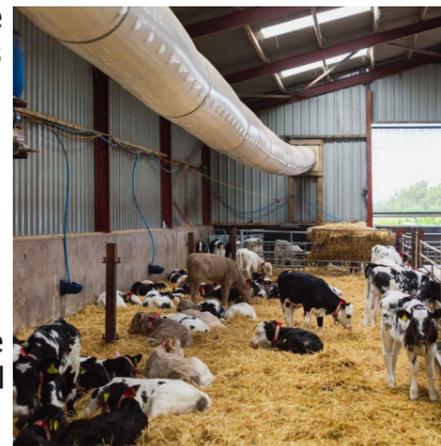
- **Air quality** is another very important aspect of the environment and comes down to **ventilation** which also affects moisture levels as well. Young stock need fresh clean air to breathe, not stale air where a number of pathogens are able to circulate and multiply. Ventilation removes stale air, removes excess moisture and removes excess heat and the aim is to provide this throughout the entire shed.

In order to create good ventilation, it is essential to have an adequate **outlet** in the roof. This should be **0.04m² per calf**. The **inlet** is ideally **4 times** the area of the outlet.

The **stack effect** (above) is needed when the air speed drops and is created by the warmth from the stock inside the building. The warm air rises and escapes from the outlet, allowing fresher, cleaner air in via the inlet. This is only achievable when the outlet is a big enough area, otherwise stale air accumulates in the shed containing many pathogens. This **natural ventilation** relies upon the heat generated by the resident cattle. Young calves of few in number will not generate enough heat and so providing **big straw bales** in the shed helps contribute to the stack effect and also gives calves warmth to lie against. The **inlets** should ideally **reduce wind speed** so that animals are **not exposed to draughts** or chills as this will contribute to disease. A single inlet i.e. **Open door** at one end of the shed do not control the wind speed at animal level and so do not help circulate air effectively. **Outlets** are best provided along the ridge of the roof and there are many designs out there depending on the shed.

Forced ventilation can be provided in the form of fans/tunnels. **Ventilation fans** force fresh air in and **extractor fans** remove stale air. Both have their place in certain circumstances but the shed as a whole needs assessing.

- How can we **assess ventilation** in our sheds? **Smoke bombs** are a very cheap and easy way to assess ventilation and can be used with the animals still within the shed. When a smoke bomb is let off, the smoke should rise quickly and pass out of the outlet areas. If the smoke lingers around, it gives you a visual impression of all that stale air containing harmful gases and pathogens which will be at animal level. If the smoke quickly travels across the shed and doesn't rise, it probably means that the wind speed is too high and could be providing wind chill to the youngstock.
- **Water** - sounds obvious but the provision of **clean, fresh** water reduces the risk of a number of diseases in youngstock. Dirty tanks are full of bacteria which are harmful in themselves but also allow the proliferation of secondary bacteria as well. This can again provide a **source** of potential pathogens, as well as affecting **immunity**.



TAKE HOME MESSAGES

- BRD costs the UK an estimate £50 million each year and is a significant issue in the cattle industry.
- The use of NSAID's should never be under-estimated in terms of treating and preventing disease.
- BRD is a **multifactorial** disease and is a complex interaction between the animal, the environment and the pathogens.
- Testing can be done to find out which pathogens are contributing to disease on your farm.
- Vaccination is useful but needs to be assessed on an individual farm basis as to which vaccine, when to vaccinate and other factors.
- Housing and ventilation are an essential area to tackle when dealing with a BRD problem.

Please get in touch with the practice if you wish to discuss any of the matter in this article further.