Prevention of respiratory disease in cattle

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The high incidence of bovine respiratory disease (BRD) is accountable for important economic losses in the dairy sector. An average of 25% (ranging from 14-38%) of calves experience at least one episode of respiratory disease during the first year of life.

The clinical manifestation of BRD is usually seen in calves, but severe outbreaks in the breeding herd have also been reported. Economic losses from BRD result from

- Mortalities.
- Treatment costs.
- The long term consequences of resulting lung damage such as reduced growth performance (poor feed conversion rates) and suboptimal development of heifers.

Medical treatment of BRD is limited to antimicrobials and anti-inflammatory drugs. Sensitivity, pharmacokinetics, long duration of action and prevention of lung tissue damage are important aspects when deciding on a treatment schedule.

As BRD is a recurrent problem on most farms, prevention is more cost effective than treatment under most circumstances.

Different predisposing factors can be addressed by prophylactic measures, vaccination being one of the most important ones.

BRD is multifactorial

As many different factors pre-dispose cattle to BRD (see Table 1), the disease is also known as 'shipping fever' or 'crowding disease'. Animal factors, for example respiration volume, environmental factors such as climate (in the stable or environmental) and management parameters (animal density and stress factors such as weaning and transport) all play a role. These factors do not directly cause disease, but have a negative effect on the resistance of the animal against contagious agents and thus facilitate the clinical manifestation of respiratory infections.

The list of pathogens associated with BRD consists of viruses (bovine respiratory syncytial virus (BRSV), bovine parainfluenza type 3 virus (PI3) and bovine herpesvirus type 1 (BoHV 1) are the most commonly listed), bacteria (Mannheimia haemolytica, Pasteurella multocida, Mycoplasma bovis and H. somnus) and parasites (lungworm Dictyocaulus viviparus). Co-infections with two or more pathogens are possible and increase the severity of disease symptoms.

NON INFECTIOUS CAUSES	INFECTIOUS AGENTS
Animal factors Respiration volume Hair (temperature control)	**Viruses** Respiratory syncytial virus Parainfluenza virus Infectious bovine rhinotracheitis virus
Climate Temperature/humidity Ventilation/air flow	**Bacteria** Mannheimia haemolytica Pasteurella multocida Mycoplasma
Management Housing density Weaning Transport Handling Mixing	**Parasites** Lungworm

Table 1. Factors involved in the development of BRDC.

Prevention

- **Management**

BRD prophylaxis should start at calving. Simple management and nursing procedures around the birth of the calves help to optimise the development of full lung capacity.

As stated above, stress plays a central role in the development of BRD. Therefore, reducing stressful situations and conditions is essential in the prevention of bovine pneumonia.

Weaning should be done smoothly and mixing of calves from different herds minimised. With regard to the housing conditions, wet bedding, draughts and overcrowding should always be avoided. Sanitary measures and quarantining of animals can be useful to reduce the infectious pressure.

- **Vaccination of calves**

Apart from these general measures, vaccination of calves is widely applied to protect against BRD. Due to the complex aetiology of the disease, vaccines containing multiple respiratory pathogens are preferred. Under field conditions, the inclusion of bacteria (M. haemolytica) has been shown to be of great benefit .

A number of live and inactivated vaccines with different combinations of antigens are commercially available. As young calves have a high risk of developing BRD, vaccination should start as early as possible, for example from two weeks onwards to protect the young calves.

All animals should also be vaccinated prior to risk periods.

- **The integrated approach: Vaccination of calves and cows**

Severe clinical signs of BRD are mainly observed in calves, but might also be seen in adult cattle.

This usually occurs when a pathogen is introduced into a herd for the first time or the immune system of the adult animal is suppressed during periods of stress such as parturition. In general, re-infected animals still shed virus, for example BRSV even in the absence of clinical disease.

Therefore, the breeding herd can play an important role in the circulation of pathogens on a farm and the cows can be a source of infection for newborn calves. On

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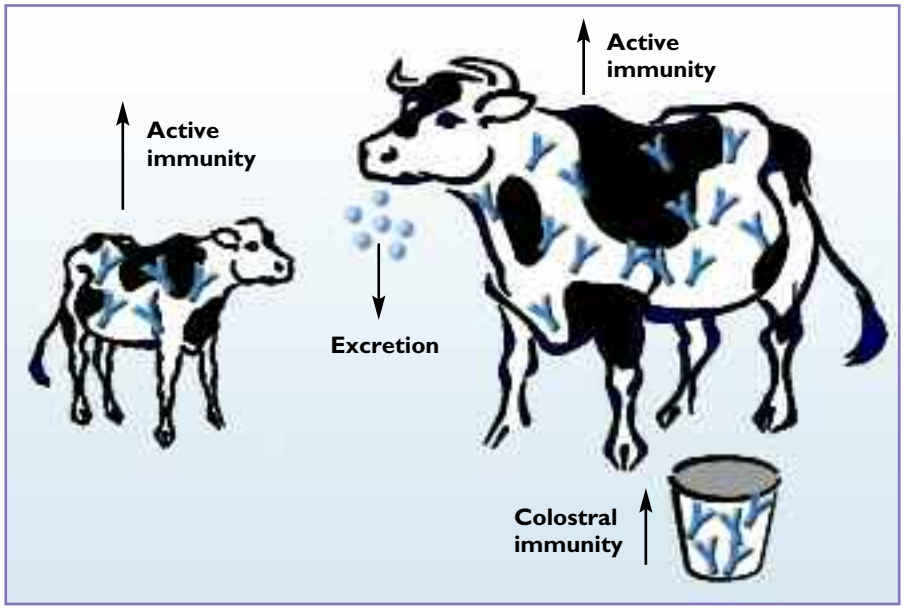

Fig. 1. Control of BRD: Effect of vaccination on calves and cows.

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the other hand, cows provide maternal antibodies to the calves via the colostrum.

It has been shown that maternal antibodies can not completely prevent infection with the different respiratory pathogens, but high antibody levels can reduce the severity of disease and help the newborn calf to overcome respiratory infections during susceptible periods. For this reason, sufficient colostrum intake is important.

Based on these considerations, pre-partum vaccination of pregnant cows with respiratory vaccines approved for use in pregnant and lactating cows (for example Intervet's Bovilis Bovipast RSP) can offer a number of benefits:

- Reduce the incidence of pneumonia in adult animals (cows and heifers) around the time of parturition.
- Reduce the incidence of pneumonia of young calves during the first weeks post calving by:

– Reducing virus shedding at calving by infected cows/heifers. The reduction in virus shedding results in decreased infectious pressure for the calves.

– Increasing maternal immunity against antigens included in the vaccine, providing at least partial protection against clinical disease in very young calves.

Conclusions

Due to the high prevalence and severity of the disease, BRD accounts for important losses to the cattle industry.

The respiratory complex is a multifactorial disease. A number of non-infectious factors predispose animals to disease and various pathogens can be involved. Ideally, preventive measures should address all risk factors. Vaccination is the most effective intervention against the infectious agents involved in BRD.

Vaccination programs usually focus on the young calves and starting the vaccination program early is important. However, cow vaccination might be applied as an additional measure to improve the respiratory disease status in the calves. ■