Neonatal calf diarrhoea: how can it be managed effectively?

The first weeks of a calf's life are decisive to positively influence the development and future performance of the herd. The neonatal period is a delicate phase in the development of calves that needs extra care. During their first weeks of life, newborn calves are particularly fragile.

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Amongst the most common, and sometimes serious, diseases is neonatal calf diarrhoea (NCD). NCD is one of the major problems in ruminant breeding. Respiratory diseases and infections of the umbilical cord are other common diseases in calves. All of these disorders have an influence on the profitability of the farm and on animal welfare.

Different pathogens are involved in neonatal diarrhoea, which makes the effectiveness of a prevention strategy difficult.

Although modern cattle farming has made great improvements with herd management, animal facilities and hygiene, calf diarrhoea is still problematic due to the multi-factorial nature of the disease and the newborn's vulnerability.

On the one hand, there are determining factors. These are the infectious agents responsible for gastrointestinal infections.

On the other hand, there are contributing factors which favour the emergence of these pathologies.

Amongst the contributing factors, we can include poor breeding conditions (such as overcrowding, and poor hygiene), climatic factors and factors related to the perinatal period (such as a difficult calving, or colostrum in insufficient quantities or not rich enough).

The prevalence of each of pathogen and disease incidence can vary by geographical location of the farms, farm management practices and herd size but four major enteric pathogens are involved in calf diarrhoea worldwide: rotavirus, coronavirus, E. coli and Cryptosporidium parvum.

Prevention

On a farm, preventive measures are essential so as not to jeopardise the economic balance of the farm. Bovine veterinary practitioners and cattle producers are aware that, in addition to dam vaccination and environmental hygiene, calf immunity is important to prevent the onset of diarrhoea.

Due to the structure of the bovine placenta, the calf is born agamma-globulinaemic and therefore depends on the successful passive transfer of maternal antibodies (Ig) from colostrum to get immunity.

The success of passive immunisation depends on the timing, quantity and quality of colostrum absorbed by the calf.

The absorption of maternal Ig across the small intestine during the first 24 hours after birth helps to protect the calf against common disease organisms until its own immature immune system becomes functional. Calves absorbing high amounts of maternal antibodies are at a significantly lower risk of neonatal diarrhoea than those receiving inadequate amounts.

A generally accepted rule for feeding colostrum to the newborn calf is to feed 10% of body weight within the first six hours of life. High quality colostrum has an IgG concentration greater than 50g/L.

Some factors, like a cow's first calving for example, can affect colostrum quality and specific support can be provided after colostrum ingestion in order to increase the calf's immunity. Passive immunisation by oral administration of specific antibodies from different sources (such as immune colostrum or chicken egg yolk (IgY)) could represent effective and economic strategies to prevent gastrointestinal infections.

Treatment

When diarrhoea occurs, early diagnosis and treatment avoids fatal cases. There is a huge loss of fluids and electrolytes from the body of a diarrhoeic calf. The consequent dehydration and the appearance of metabolic acidosis are the main causes of calf mortality. Faecal fluid loss in calves with severe watery diarrhoea can reach 20% of body weight per day.

The highest priority in treating scours is to replace the water and electrolyte loss with fluid therapy. This oral rehydration therapy is the single most important therapeutic measure to be carried out by the farmer and is usually successful if instigated immediately after the onset of diarrhoea.

To be efficient, an oral rehydration

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solution (ORS) must satisfy the following requirements:

- To supply sufficient sodium and to provide agents that facilitate the absorption of sodium and water from the intestine.
- To provide an alkalinising agent that corrects the metabolic acidosis.
- To provide energy.

The electrolyte solutions only partially cover the calf's energy requirements and oral rehydration should be considered as a supplement to normal milk or milk replacer intake, initiated at the onset of symptoms with the main objectives of restoring ionic balance and countering acidosis. To limit the negative energy balance, the ORS should be given for a short period of time.

The knowledge and diagnosis of causal pathogen(s) is important to accurately assess the current status of the affected farm and to develop further interventions.

Aetiological diagnosis is now possible on farm thanks to rapid tests and the recognition of enteropathogens should guide the fast adoption of effective measures i.e. the choice of an antibiotic in the presence of E. coli or an antiprotozoal in the presence of cryptosporidium.

E. coli F5 is the most frequently detected causative agent of NCD in the first five days of life, causing profuse watery diarrhoea and may require antibiotic treatment.

For an antibiotic to be effective, its concentration vis-à-vis the bacterium at the infectious site (blood or intestine) must be higher than its MIC (minimal inhibitory concentration). There is little data on the distribution of antibiotics in the intestine following parenteral administration.

Only fluoroquinolones and ceftiofur would provide sufficient serum and intestinal concentrations. However, following international recommendations (WHO, OIE), third and fourth generation cephalosporins and fluoroquinolones are considered as critically important antimicrobials and should be avoided in veterinary medicine.

If an antibiotic is injected during septicaemia, it seems thus reasonable to add oral treatment to obtain effective blood and digestive concentration. Given the current legislation and sensitivity profiles of E. coli isolated from digestive pathologies in calves, aminoglycosides should be given priority for oral use.

Cryptosporidium parvum is also globally cited as one of the main agents of neonatal diarrhoea in calves. In addition to important preventive measures, effective treatment should be strongly recommended due to the zoonotic potential of this pathogen.

Paromomycin is now the only antimicrobial registered in veterinary medicine to treat cryptosporidiosis.

Whilst it is generally accepted that antibiotics should be used as little as possible, it is important to retain antibiotic use if necessary. In cases of clinical disease, antibiotics cannot be avoided and should be used according to the guidelines in place for responsible use. Their administration is justified when considering animal welfare and the economic impact on cattle operations when scour outbreaks occur. ■

References are available from the author on request