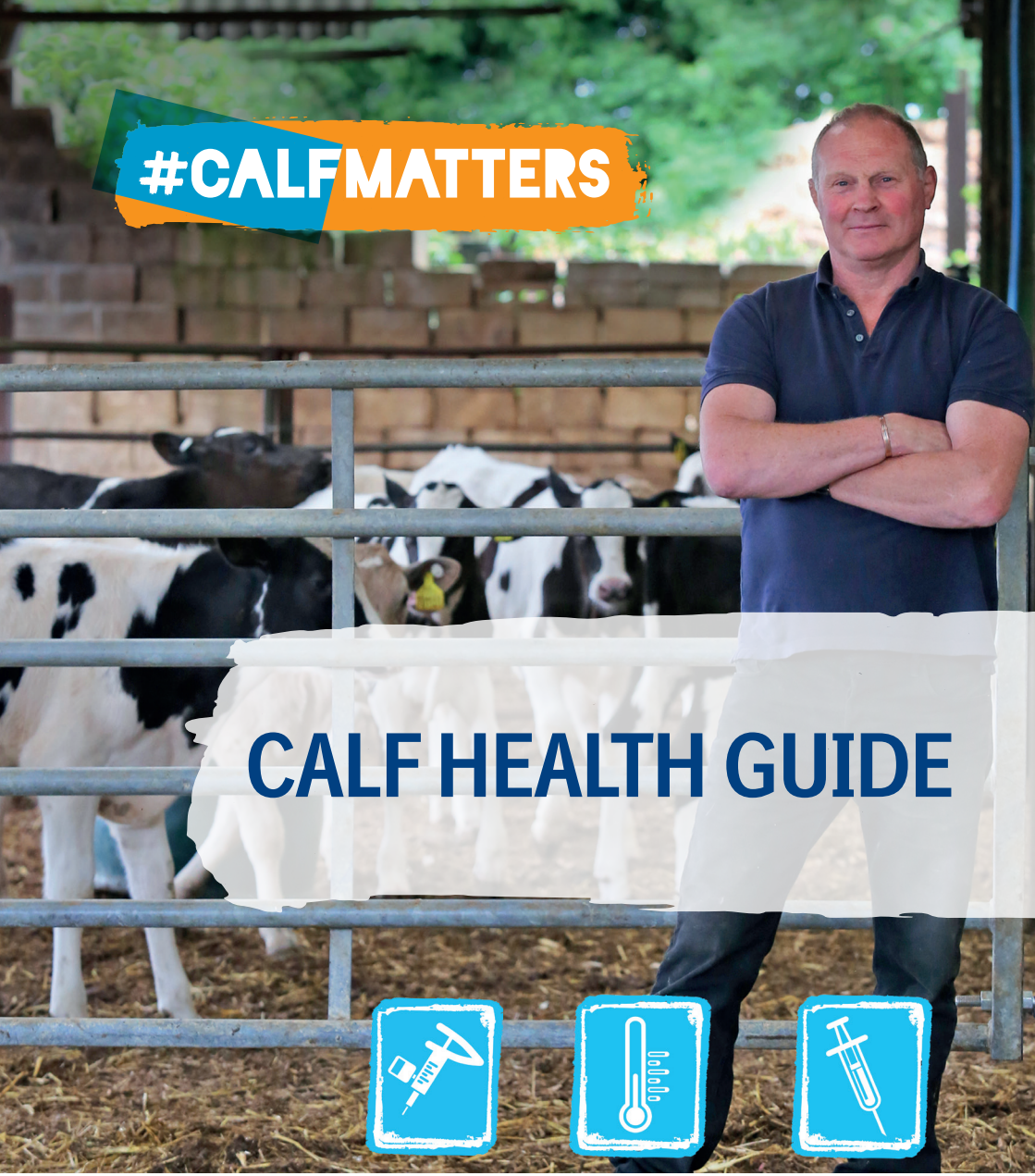
#CALFMATTERS



CALF HEALTH GUIDE

Protect **Monitor** **Treat**

For more information visit
www.calfmatters.co.uk

Boehringer Ingelheim

Contents

Introduction

Effective calf rearing is a key part of ensuring the economic success of many livestock units; in order to get it right it is important to have a structured, goal orientated approach, which ensures consistency across all areas. In both the beef and the dairy sectors, research has shown that the way an animal is managed and how it performs during its first few months of life will affect how well it performs later on.

This guide provides practical tips on how to best approach calf health and management, starting with colostrum feeding, which is an essential step in the management of any calf, then going through other important aspects of calf husbandry. In the final sections we look at the key diseases, which affect calves: pneumonia and scours.

Colostrum

It has been suggested that up to 50% of calves born in the UK do not receive a sufficient quantity of good quality colostrum. Achieving early and adequate intake of high quality colostrum is widely recognised as the single most important management factor in determining health and survival of the neonatal calf as well as reducing the risk for pre-weaning morbidity and mortality.

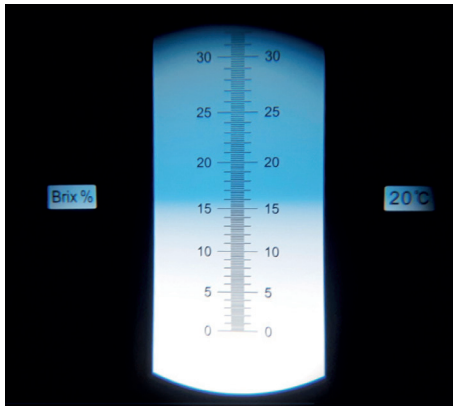
The newborn calf is reliant upon colostrum not only for the transfer of immunoglobulins (Ig) but also as a source of immune cells, cytokines and other non-specific immunologic substances which stimulate immune activity, as well as nutritional elements and growth factors. Immunoglobulins, or antibodies, are proteins that facilitate the identification and destruction of invading pathogens, providing the calf with passive immunity until its own immune system is established.

The effectiveness of passive immunity depends on the quality, volume and timing of colostrum intake. Following birth the ability of the calf's gut to absorb the immunoglobulins rapidly decreases and around 24 h it is unable to absorb them at all (mean closure tim at approx 24 hours)[1]. It is therefore important to ensure colostrum is fed as soon as possible after birth. A critical mass of 100 to 200 g of immunoglobulin must be ingested by a newborn calf to acquire passive immunity[4].

Decreased colostral Ig absorption in the first 12 hours has been reported in calves that experience prolonged calvings. This is thought to be associated with a delay in these animals getting up to suck. Calves from difficult calvings should be identified as being at increased risk of failure of passive transfer and steps should be taken to ensure that they are given supplementary colostrum.

A refractometer

The quality of colostrum will vary from cow to cow. Whilst ensuring proper feeding and dry cow management is important to ensure good quality colostrum, a number of other factors will also influence colostrum quality. For instance, sick animals, such as those suffering from mastitis or milk fever, will produce poorer colostrum. Comparative studies have reported breed effects on colostrum quality. In one study[2], immunoglobulin concentration was greater in colostrum from beef cows (113.4 g/L) than in colostrum from dairy cows (42.7 g/L), such differences could be attributed to genetic differences and/or dilutional effects. Studies report a tendency for older cows to produce higher quality colostrum especially when compared to heifers and this should be factored in when formulating colostrum-feeding plans.[3] For some causes of calf scour (e.g. rotavirus, coronavirus and *E.coli*) vaccination of the cow prior to calving will stimulate increased levels of colostral antibodies against these pathogens, providing additional protection to the neonatal calf.



When collecting colostrum for feeding and for storage it is important to maintain a high standard of hygiene as colostrum provides a perfect medium for bacterial growth. Only store good quality colostrum. This can be tested on farm using a colostrometer or a refractometer (see text box). If colostrum is not going to be used within one hour of collection, it should be refrigerated or frozen. When freezing colostrum do so in dose-sized quantities so that it can be easily defrosted when required. Only colostrum from animals of known health status should be stored with care being taken to minimise the potential spread of infectious diseases, such as, Johne's.

Monitoring

It is a good idea to have a program in place to routinely monitor colostrum management, and to ensure the effectiveness of colostrum feeding. When assessing colostrum feeding it is important to ensure that whatever system is in place is providing a sufficient **QUANTITY** of good **QUALITY** colostrum as **QUICKLY** as possible.

Quantity

Calves need a first feed of three to four litres of colostrum (10% of bodyweight) within two hours of birth, followed up by another similar sized feed within 12 hours of birth.

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Quality

Good quality colostrum contains at least 50 g/L of antibody IgG. To measure the quality, use a colostrometer or refractometer.

Quickly

Aim for all calves to receive their first dose of colostrum within two hours of birth to optimise immunity.

There are a number of different laboratory-based test methods for directly measuring the effectiveness of colostrum feeding, and monitoring for failure of passive transfer (FPT), using blood samples collected from calves in the first week of life. Measurement of serum total solids (STS) using a hand-held refractometer offers a convenient, simple, rapid, and inexpensive tool for monitoring colostrum-feeding programmes at a herd-level. It is generally accepted that total solids of greater than 55 g/L indicate sufficient immunoglobulin absorption. It is recommended that serum samples be collected from a minimum of 12 clinically normal (not scouring) calves between 24 hours and seven days of age, with the overall result used to assess FPT status (Table 1).

Number of Calves <55 g/l total serum protein (%)	Interpretation
0/12 (0%)	FPT is not a herd problem
1/12 (8%)	FPT is not a herd problem
2/12 (17%)	Borderline concern for FPT
3/12 (25%)	Borderline concern for FPT
4/12 (33%)	FPT is a problem
5/12 (42%)	FPT is a problem
6/12 (50%)	FPT is a problem

TABLE 1: Interpretation criteria for serum total protein measurements for assessment of failure of passive transfer (FPT) in a group of 12 one-week-old calves.[4]

Good colostrum management is the cornerstone of successful calf-rearing. Through use of routine monitoring and proactive health planning veterinary surgeons can work with their clients to ensure their calves receive sufficient, good quality colostrum, and hopefully, reduce the incidence of calf disease.

Calf Husbandry

Feeding the Young Calf

In a newborn calf some of the stomach's compartments are relatively small and non-functioning (see diagram on rumen development). In neonatal calves, suckling stimulates the oesophageal groove, a muscular tube that contracts as a reflex during normal milk feeding. This directs milk into the abomasum, bypassing the rumen, reticulum and omasum. The abomasum has an acidic environment, which clots the milk so it can be digested in the small intestine. If feeding is rushed, or the calf is stressed, the reflex can fail and the milk will enter the rumen where it ferments, causing digestive upset and scouring. In adult animals food passes through the rumen, reticulum and omasum before entering the abomasum.

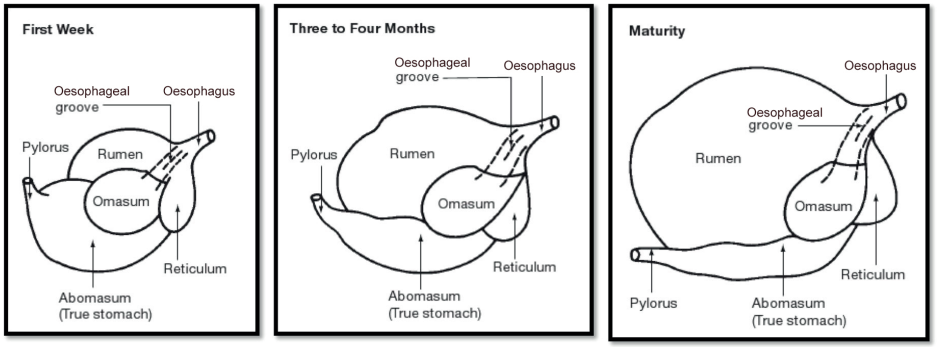
A calf needs a consistent feeding routine to maintain a healthy stomach:

- Consistent type of feed - not a mix between powder and whole milk.
- Consistent time and feeding intervals.
- Consistent temperature.
- Consistent experience - a calm, quiet stockperson.

Milk Feeding:

There are many different systems for milk feeding and it is important that producers choose a system that works for them and provides sufficient nutrients to achieve specific goals for calf growth, health and weaning age. When choosing a system it is important to consider the advantages and disadvantages of each feed type

Rumen development



	% of Total stomach capacity			
Age	Rumen	Reticulum	Omasum	Abomasum
Newborn	25	5	10	60
3 to 4 mo.	65	5	10	20
Mature	80	5	7 to 8	7 to 8

and feeding method.

- Availability – Is sufficient feed always going to be available for the number of calves?
- Consistency – Can the consistency of the feed composition be maintained?
- Nutrients – Does the feed provide sufficient energy for the calf's needs?
- Storage and Handling – Are there facilities to store the feed in a hygienic manner?
- Disease risk – What is the potential for exposure to disease-causing bacteria?
- Economics – What is the cost of the feed and how much will the equipment cost?

Milk replacer is convenient, easily stored, readily available, and carries a very low disease risk. It is important that when it is prepared, the milk powder is accurately weighed and then mixed in a consistent manner; this will avoid variation in the composition of the feed, which can lead to digestive upsets and poor growth rates. Always follow the manufacturer's guidelines for preparation. For most powders the required amount of milk powder should be added to half the volume of clean, warm water and mixed well. Cool water is then added to make the milk up to the required volume after which the milk is mixed again. Check the temperature prior to feeding to ensure the milk is around 38°C.

Current advice for typical rearing systems is to feed a calf five to six litres of milk daily (13-15% of calf birth weight) at a concentration of 125 g/L (625-750 g/day). This should be split into at least two feeds. Specific recommendations will vary between farms depending on the system and performance expectations.

Whole milk (milk which could otherwise be sold) and waste milk (milk from cows with mastitis or those receiving veterinary medicines for other reasons) are frequently used for feeding calves.

Avoid letting milk stand for long periods at room temperature as bacterial growth will occur which can cause disease in calves.

Whole milk is typically a consistent product, however feeding milk that could otherwise be sold for processing typically has no economic advantage over feeding milk replacer. In addition to this, there is a risk of whole milk may contain pathogens. On-farm pasteurisation can be used to reduce bacterial load and the risk of disease transmission, but will not eliminate all microbes. If whole milk is used, avoid letting milk stand as this can cause disease in calves. Feeding waste milk that cannot be sold due to mastitis and/or antibiotic residues has a number of disadvantages and should be avoided:

- Variable consistency and poor quality
- Waste milk, particularly from cows with mastitis, is unpalatable, and is frequently rejected by calves.
- Feeding milk containing antibiotic residues to calves can cause gut disturbances and scouring, and may also promote the emergence of antibiotic resistant bacteria.

Whichever method of feeding you choose hygiene is paramount. Milk should only be prepared and stored in clean containers and it's important to clean feeding equipment between groups of calves and disinfect it after every feeding. This is especially important when faced with outbreaks of disease that can be rapidly spread between calves on feeding equipment.
Whilst on milk it is essential that calves have access to clean water, and that solid starter feed is available from around three days of age.

Cold Weather Milk Replacer Feeding

Cold weather is stressful for calves and those that are exposed to the cold are predisposed to pneumonia. When calves are not fed adequately in cold temperatures they don't grow as quickly since they are using their energy to keep warm instead. If calves are shivering after feeding it is a sign that they are cold and not being fed adequately. A good rule of thumb is to increase the amount of milk replacer by 2% for every degree the temperature falls below 10 °C.

Weaning

Good management around the time of weaning is key to maintaining good growth rates and ensuring that calf rearing is as economical as possible. Weaning is the stage of calf rearing when rumen development is sufficient to support the calf's nutritional requirements through fermentation and digestion of dry feed. Failure to manage weaning well can result in a stall in growth rates and potentially contribute to outbreaks of disease.

When to wean will depend on the individual system - most producers wean at around 8 weeks of age. The exact timing of weaning should not be decided based solely on age, it is important to ensure that the calf is ready. A calf is typically considered ready to wean when it is consuming more than 1.5 kg of high quality dry starter feed per day. Avoid weaning animals at times of stress or if they are showing signs of disease, such as scours or pneumonia.

There are two basic approaches to weaning: abrupt and graduated. Abrupt weaning involves less management input, but there is an increased risk of checks in growth rate if the rumen is insufficiently developed. Graduated weaning involves the gradual reduction of the daily milk allowance over a period of 7-14 days. Although graduated weaning involves a higher level of management input, it is preferred as it reduces the chances of growth checks.

The intake of a dry starter ration is essential for weaning. A calf's consumption of dry food will be influenced by the availability, quality and palatability. To ensure that calves are consuming sufficient dry food by the time they reach weaning they must be introduced to it from a young age. The starter ration should be introduced on an ad-lib basis from three days of age and must be kept fresh and provided in clean containers. Calves should always have access to fresh, clean water, even when they are on milk.

Weaning represents a stressful period in the life of a young calf and good management is essential to prevent checks in growth rates and reduce the incidence of disease.

Disbudding/Dehorning

Disbudding/dehorning should take place as soon as the horn buds can be easily identified, within the first two months of life. At this stage the horn buds are not yet attached to the skull, consequently the procedure involves less tissue trauma and is less stressful. Leaving

the procedure until later in life means that the animals are larger and harder to work with and there is increased risk of infection and other complications.

The most common way of disbudding calves is using the cauterisation method (i.e. a heated disbudding iron), which is performed under local anaesthetic. Alongside the use of local anaesthetic at the site of disbudding, injecting the calves with a non-steroidal anti-inflammatory drug (NSAID) at the time of procedure can provide further pain relief and minimise the negative impact of the procedure on the calf's performance.

Arrow demonstrates the site of administration for local anaesthetic.

BRD and Pneumonia

Bovine respiratory disease (BRD) remains an important disease of calves that leads to reduced weight gain and productivity, as well as incurring significant costs in terms of management, treatment and prevention. The disease is multi-factorial with numerous viruses (bovine herpesvirus 1, Bovine respiratory syncytial virus, BRSV; parainfluenza 3 virus, PI-3, and bovine viral diarrhoea virus, BVDV) BoHV-1 and bacteria (*Mannheimia haemolytica, Mycoplasma bovis, Pasteurella multocida, Histophilus somni*) being implicated. There is also increasing evidence that bovine coronavirus may play a role in BRD in both young calf rearing systems and in feedlot operations where infection has been associated with times of stress, e.g. animal movements.[5]

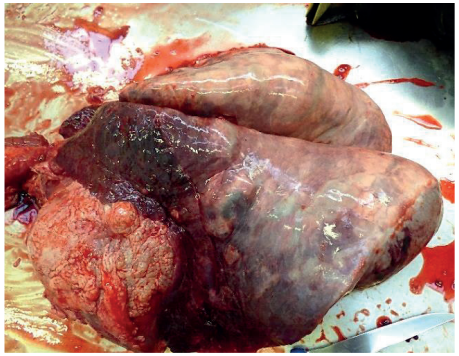
Risk Factors for Calf Pneumonia

The risk factors for calf pneumonia are well documented. In young calves disease outbreaks are frequently associated with poor immunity from failure of passive transfer from colostrum. Other factors that can predispose to outbreaks of pneumonia include poor environment, management stress (e.g. weaning or transport), mixing animals from different sources and age groups, as well as deficiencies in nutrition.

Identification and Investigation of Disease

Effective treatment and control of respiratory disease is determined by rapid and accurate identification of disease. All too frequently there are delays in identifying animals requiring treatment or an acceptance of a low level of chronic disease within a group. Cattle are highly adept at concealing signs of sickness, thus subjective assessment of sick cattle is highly

variable and the diagnosis of BRD based on clinical signs is often inaccurate. Studies in abattoirs have shown high incidence of lung lesions in animals with no history of being identified as having had, or being treated for, respiratory disease. In one study, 37% of animals with no recorded history of respiratory disease showed lung lesions at slaughter.[6] Such levels of disease would have undoubtedly had an impact on performance.It is important to understand that effective treatment must begin with a commitment to accurate and early identification of sick animals.



Technology is beginning to be implemented as an aid in disease detection on farm, with pedometers, feed consumption detection systems and temperature monitoring devices all becoming more readily available and cost effective.

When considering diagnostic testing it is important to decide on the exact question and how the information it generates will be used before submitting any samples. The information gained from diagnostic investigations may have limited impact on the management of the outbreak at hand as the time-delay will frequently mean the required information is not available at the time the therapeutic decision is made, but if steps are to be taken to reduce the likelihood of future outbreaks in a particular system (e.g. through the use of vaccination) the results can be extremely useful.

To this end diagnostic test selection needs to be appropriate both to the disease being looked for and the animal being examined. Always sample animals that are both representative of the group affected and have exhibited representative clinical signs. The animals chosen for sampling should be in the early stages of disease; sampling the chronically affected calf with a history of repeated treatments will yield very little useful diagnostic information.

Treatment and Management

Given the large number of pathogens that have been implicated in calf pneumonia, treatment tends to be symptomatic with a broad-spectrum effect.

Antimicrobials are the main component of most treatment regimes and there is a wide selection of products available. The exact choice of antimicrobial is dependent upon a number of factors, including the vet's previous experience on the farm and elsewhere, and reported susceptibility patterns. There are also a number of practical considerations, such as cost, ease and frequency of administration, potential carcass damage, and for some products, the issue of human safety that can impact on antimicrobial choice. The most important determinant of antimicrobial efficacy in treating pneumonia is rapidly attaining and maintaining an effective antimicrobial concentration at the site of infection, i.e. in the lower respiratory tract. NSAIDs are often employed alongside antimicrobials in the management of BRD to decrease the severity of clinical symptoms, increase appetite and decrease the lung damage associated with inflammation. The use of NSAIDs as an ancillary treatment for BRD results in a more rapid decrease in rectal temperature, and there is data to suggest that NSAIDs may decrease lung lesions at slaughter.[7]

Prevention and Vaccination

It is important that once an outbreak is under control that changes are made to reduce the likelihood of future outbreaks. Make use of the available data on farm management practices and the disease processes to identify the farm specific risk factors. In combination with improvements in management practices, vaccination programmes can make up a key component of pneumonia control programmes on farm.

Vaccines are available against many of the most common bacterial and viral causes of calf pneumonia, and should be used prior to high-risk periods to minimise the risk of disease. Vaccination works by increasing the calves' immunity so they are less likely to succumb to disease. It also reduces the amount of virus shed by calves, thereby reducing the disease challenge in the shed.

Vaccination programmes should be designed to take into account the circumstances on individual farms and should be based around knowledge of the risk factors and the circulating pathogens. It should be implemented at a group level, and it is important that all animals within the same airspace are vaccinated.

A device which sits in the ear for monitoring fever in calves

When looking at vaccine choices for young calves it is important to consider the potential impact of maternally derived antibodies on vaccine uptake, and time vaccination to take this into account.

Summary

Control of BRD requires a concerted effort on a number of fronts: an appropriate environment, good colostrum management, a strategic vaccination programme, and good nutrition and management. These are all components of a holistic management plan aimed at both preventing disease and reducing the severity of any BRD cases that do occur.

Scours

Scours

Neonatal calf diarrhoea caused by infectious agents remains one of the biggest issues in youngstock health, accounting for around 50% of all calf deaths and significant financial losses on both beef and dairy enterprises. Diarrhoea can result from a number of different infectious and non-infectious causes, and in the absence of diagnostic testing it is not possible to predict the specific cause based on clinical presentation alone. Testing faecal samples to identify the causative agent is, therefore important for long-term management strategies.

Rotavirus

Rotavirus was one of the first identified viral causes of diarrhoea, and has since been found throughout the world with species specific rotaviruses being identified as significant pathogens of children and most other mammals. Calves become infected after ingesting the virus from faecal contamination of the environment. After ingestion of the virus, the incubation period is approximately 24 hours, with resolution of diarrhoea in uncomplicated cases in two days. Clinical disease is typically seen in calves less than three weeks old, with a peak incidence at six days of age.

Coronavirus

There is a lot of overlap in the epidemiology and pathophysiology of coronavirus diarrhoea in calves with that caused by rotavirus. Following environmental contamination by other calves or older cattle the virus enters the calf by ingestion. Clinical signs begin approximately two days after infection, with diarrhoea being mainly caused by intestinal cell loss and malabsorption. Coronavirus typically affects calves with the first three weeks of life, with peak incidence occurring between seven and ten days of age.

Enterotoxigenic *Escherichia coli* (ETEC)

Epidemiologic studies of both beef and dairy calves have implicated Enterotoxigenic *Escherichia coli* (ETEC) as the major cause of neonatal diarrhoea occurring in the first four days of life. However, it rarely leads to diarrhoea in older calves or adult cattle. Immediately after birth, oral exposure to faecal coliforms leads to colonisation of the gut with the normal commensal flora, and these organisms continue to move caudally through the gastrointestinal tract with ingesta. If environmental contamination is high, ETEC organisms are ingested at this same time and are able to produce severe disease.

Salmonella

There are a number of Salmonella serotypes that can cause diarrhoea in calves. In the UK the most commonly serotype is *S. dublin*. The disease usually occurs between two and six weeks after birth, and can vary widely in clinical presentations; ranging from septicaemia and high mortality, to mild disease that can almost go unnoticed.

Cryptosporidiosis

Crypotosporidium parvum is a small parasite and one of the most common gastrointestinal pathogens isolated from dairy calves. It is frequently identified alongside rotavirus in outbreaks of diarrhoea. Infection, as with all the other pathogens discussed so far, is by the faecal-oral route. Once in the host, the organism goes through a complex life cycle that involves multiple stages. Following infection, clinical signs typically peak at three to five days, and last from between 4 and 17 days. If *Cryptosporidum* is suspected faecal samples should be examined to confirm its presence and allow appropriate anti-parasitic medication to be administered.

Coccidiosis

The disease is caused by a small protozoan parasite which has a 21 day life cycle. The disease can occur in housed stock or those out at pasture. Calves pick up eggs, called oocysts, by licking other calves, from dirty bedding, or by drinking and eating food contaminated with faeces. Eggs pass through the stomach into the small intestine where they mature, enter the large intestine and invade the lining of the gut wall, destroying healthy cells. More eggs are produced by the protozoa, which are then passed out in the dung. Oocysts are resistant to heat, cold and many disinfectants, so they can survive for months or years in the environment until they get ingested, ready to start the life cycle again.

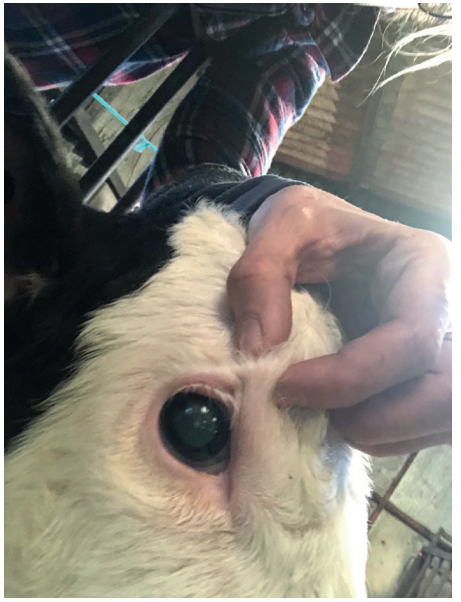
It has been suggested that all cattle kept under conventional conditions experience infection with *Coccidia* at some point in their lives. Estimations suggest that only 5% of infected animals show clinical signs of coccidiosis (anorexia, loss of weight, bloody diarrhoea), whilst the remaining 95% of infections are subclinical.[8] The economic impact of the clinical disease is widely acknowledged[9] but the negative effect of subclinical coccidiosis on feed conversion and growth is often overlooked even though it occurs more frequently.[10] Control of coccidiosis is achieved from good hygiene and environmental management, along with the strategic use of anti-coccidial drugs.

Treatment

The leading cause of mortality in calves with scour is dehydration (see Table 2 next page) and electrolyte disturbance. It follows that the backbone of routine therapeutics should be fluid and electrolyte replacement appropriate to the specific clinical signs exhibited by an affected animal. Antimicrobials should be used only when there is a specific clinical indication.

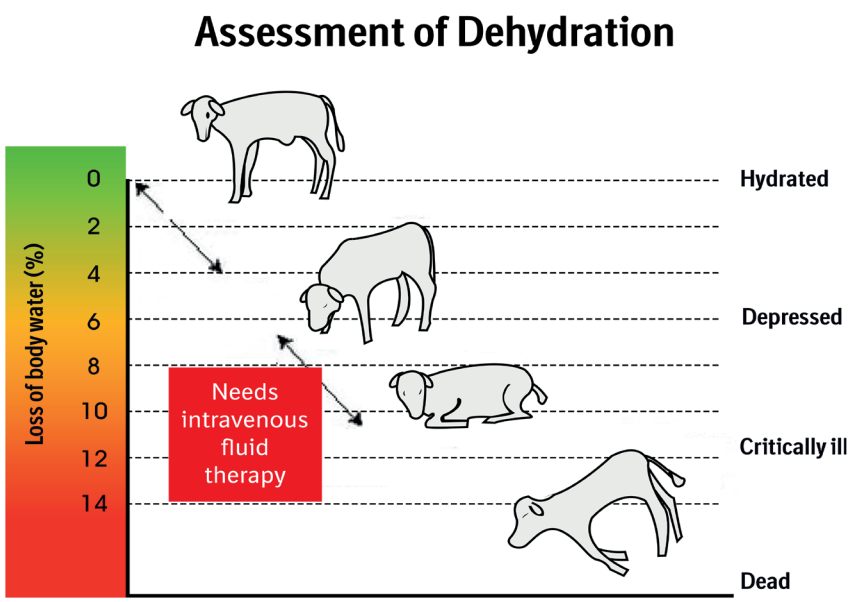
Fluid therapy

Diarrhoea results in excessive faecal loss of electrolytes and fluid. Some pathogens will cause secretory diarrhoea, in which the small intestinal



enterocytes “switch” from a net absorption of fluid to a net secretion of sodium, chloride and water into the intestinal lumen. In other cases, the pathogens cause damage to the intestinal villi reducing the ability to absorb electrolytes and water; this is termed malabsorptive diarrhoea. The average faecal fluid losses are about two litres per day but can be as high as six litres per day. This should be remembered when providing electrolyte therapy to scouring calves, as the total volume required is frequently underestimated.

Oral fluid therapy is one of the mainstays of any treatment protocol for neonatal calf diarrhoea and is widely adopted because it is cheap, and easy to administer on farm. The primary objective of oral electrolyte therapy is to replenish fluid and electrolyte losses and then to maintain the calf in a positive balance, this is accomplished by



Dehydration (%)	Demeanour	Eyeball Recession (mm)	Skin Tent Duration (s)
<5	Normal	None	<1
6-8 (mild)	Slightly Depressed	2-4	1-2
8-10 (moderate)	Depressed	4-6	2-5
10-12 (severe)	Comatose	6-8	5-10
>12	Comatose/Dead	8-12	>10

Figure: Visual representation of percent deyhdration as related clinical sympthoms and health of calves. Adapted from M. A. Wattiaux (2005). Table: Dehydration score as demonstrated by clinical signs.

three mechanisms:

1. Providing a source of additional water and electrolytes
2. Improving absorption of electrolytes by providing agents such as glucose and amino acids to facilitate sodium absorption through co-transport mechanisms
3. Providing nutritional support.

Less important objectives of oral electrolyte therapy include:

1. The support of immune and enteric function
2. The reduction of the potential negative impact on growth rates
3. A reduction in the severity of the diarrhoea.

Oral electrolyte therapy can be administered either by a bottle fitted with a teat or by orogastric intubation. Absorption is slightly more rapid following suckling; however, orogastric intubation is frequently used because it is less time consuming. There are large number of oral electrolyte products currently available, and there is considerable variability in their constituent ingredients. Farmers should consult with their vet on which product is best to use on their farm and how much to give.

There have been suggestions that continued milk feeding worsens diarrhoea and that treatment protocols should involve a period of "resting the gut" during which milk is withheld. However, research has shown that milk feeding does not worsen or prolong diarrhoea, nor does it slow down healing of the intestine[11,12]. The studies also showed that continuing to feed milk alongside electrolytes maintained growth and avoided the weight loss observed in calves limited to only electrolyte solutions.

In cases of severe dehydration (greater than 8% dehydration) where the calf is exhibiting signs of severe depression, weakness, inability to stand and the suck reflex is absent, it may be necessary for a vet to administer fluids intravenously.

Antimicrobials

The use of antimicrobials in the treatment of calf diarrhoea is controversial. There are concerns that their use promotes antimicrobial resistance in both pathogenic and commensal bacteria. In a time where the use of antimicrobials by veterinarians is under scrutiny we should ensure that we use and prescribe them prudently. All calves with diarrhoea will exhibit some level of intestinal overgrowth of *E. coli* bacteria regardless of the inciting cause, and around 20-30% of scouring calves will develop a bacteraemia[13,14]. In light of this it is prudent to limit the use of antimicrobials to only systemically ill animals and select products with activity against *E.coli* and potentially *Salmonella spp*.

Use of NSAIDs

As diarrhoea can be accompanied by intestinal cramping and abdominal pain, the use of analgesics is indicated. NSAIDs decrease inflammation in the gastrointestinal tract and reduce the effects of the endotoxaemia and septicaemia.

Treatment of viral infections

There are no specific therapies for the treatment of viral infections and so treatment in cases of rotavirus and coronavirus should be based around supportive fluid therapy, as well as management of any secondary bacterial infections.

Prevention

As for any disease, prevention is better than cure and so to minimise the impact of scours on any calf rearing unit it is important to take steps to prevent the disease.

Farm management practices

Irrespective of the identity of the causal agent, the route of infection is the same – ingestion or inhalation of the organism from an environment that is heavily contaminated by faeces. Thus hygiene and cleanliness are paramount, and along with good colostrum management, form

cornerstones of prevention and control of neonatal diarrhoea. Good hygiene must start from the moment the calf is born as many infections are picked up from the calving area. Hygiene and cleanliness must then be maintained throughout the calf-rearing period, with specific care being taken to clean and disinfect feeding equipment between feeds, and to thoroughly clean the environment on regular occasions, and between batches of calves.

Use of vaccination

Vaccination can also be a key tool to help prevent calf scours with vaccines available for some of the most common diarrhoea pathogens (rotavirus, coronavirus and *E.coli*). Given to the dam prior to calving, the vaccines will increase the circulating antibodies in cows and heifers. Shortly before calving these antibodies will accumulate in the colostrum allowing them to be passed onto the newborn calf. The protection offered by these antibodies is twofold:

1. In the first 24 hours of life the antibodies are absorbed by the calf (passive immunity)
2. After 24 hours the antibodies in the colostrum will coat the surface of the intestine and have a local protective effect

Oral antibody supplements can also boost passive immunity against specific scour pathogens when administered soon after birth.

Summary

Calf diarrhoea is a multi-factorial disease and the rapid implementation of appropriate therapy is essential for a rapid recovery. The economic impact of this disease can be reduced through the rapid management of outbreaks, and the implementation of good husbandry practices and appropriate control measures.

Products

Bovalto® Respi 3 & 4

A CONVENIENT AND RELIABLE BRD VACCINATION PROGRAM

For active immunisation of cattle in the absence of maternally derived antibodies against parainfluenza 3 virus, bovine respiratory syncytial virus and *Mannheimia haemolytica* serotype A1.

- Targets the key respiratory pathogens in a single vial
- Ready-to-use for practical handling
- Small injection volume to reduce discomfort to calves
- Use from 2 weeks of age*[15]
- Rapid onset of immunity - 3 weeks post - primary course[16]
- 6 months' continuous protection[15]

Bovalto® Respi Intranasal

RELEASE THE FULL POWER OF MUCOSAL IMMUNITY

For the active immunisation of calves from the age of 10 days against bovine respiratory syncytial virus (BRSV) and bovine parainfluenza 3 virus (PI3V).

- Efficacious in the presence of maternal antibodies
- Early vaccination from 10 days of age
- Immunity during critical periods
- Antigens with proven efficacy against recent isolates[15]
- Unique vaccination experience

Bovalto® Pastobov

For active immunisation of cattle to reduce clinical signs and lesions of *Mannheimia haemolytica* A1 induced respiratory disease.

First injection: At the minimum age of 4 weeks.

Second injection: 21-28 days later.

Imocolibov®

For passive immunisation against neonatal *Escherichia coli* infections by administration of the vaccine to pregnant cows or ewes. Reduction of diarrhoea and mortality caused by enterotoxic *E. coli* strains in both lambs and calves.

Basic vaccination scheme: one injection 2 to 6 weeks before calving/lambing (if the period of 6 weeks is exceeded, give a second injection).

Re-vaccination scheme: one injection 2 to 6 weeks before each calving/lambing.

#CALFMATTERS

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Boehringer Ingelheim

*Use from 2 weeks of age in calves from non-immune dams

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Bovalto® Respi Intranasal, nasal spray, lyophilisate and solvent for suspension contains bovine parainfluenza 3 virus (PI3V), modified live virus, strain Bio 23/A $10^{5.0}$ - $10^{7.5}$TCID^{50} and bovine respiratory syncytial virus (BRSV), modified live virus, strain Bio 24/A $10^{4.0}$ - $10^{6.0}$TCID^{50}. Bovalto® Respi 3 Suspension for Injection contains inactivated bovine respiratory syncytial virus, strain BIO-24, inactivated bovine parainfluenza 3 virus, strain BIO-23 and inactivated *Mannheimia haemolytica*, serotype A1 strain DSM 5283. Bovalto® Respi 4 also contains inactivated bovine viral diarrhoea virus, strain BIO-25. Bovalto® Pastobov contains *Mannheimia haemolytica* type A1 antigen. Imocolibov® contains Antigen K99 of *E. coli*, Antigen Y of *E. coli*, Antigen 31A of *E. coli*, *E. coli* serotype 078. IE: POM-E. Further information available in the SPC or from Boehringer Ingelheim Animal Health UK Ltd, RG12 8YS, UK. Use Medicines Responsibly.