1-2-3 of Colostrum Management

Getting the right amount of colostrum into calves as early as possible is the secret to good calf management. Calves that get enough colostrum are less likely to get sick and will thrive better.

**Use milk from the**

- 1<sup>st</sup> milking to feed calves within
- 2 hours of birth
- 3 litres of clean safe milk.

**Why is it important?**

Colostrum (“biestings”) is the first milk that the cow produces. It is richer than normal milk in many respects, but especially in its content of immunoglobulins (antibodies). These antibodies are proteins that are built by the immune system to prevent infectious diseases.

The quality of colostrum is defined by the concentration of antibodies which varies between cows. Beef cows and lower yielding mature dairy cows generally have richer quality colostrum.

The second and subsequent milkings of a dairy cow contain less antibodies and should not be considered colostrum but as transition milk. Transition milk is milk that is not saleable from the first eight milkings.
Management of the scouring calf

Summary
- Calf scour results in mortality on Irish dairy farms annually
- Use an appropriate product to treat scouring calves and ensure it conforms to new EU legislation
- Continue milk feeding throughout the scouring episode
- Prevent scour by, implementing optimal colostrum and milk feeding, practicing good hygiene, and ensuring calves are bedded on deep clean dry bedding.

Introduction
Calf scour results in calf mortalities on a high proportion of Irish dairy farms each year. Once scouring, a calf becomes rapidly dehydrated, acidotic, and low in essential electrolytes such as sodium (Na), Potassium (K), and Chloride (Cl). Treatment, therefore, should involve rehydration, correction of acidosis, and replacement of electrolytes. Some electrolyte products on the market, while assisting with rehydration and replacement of electrolytes, often fail to effectively correct acidosis which is essential to recovery of the calf. This has led to the introduction of new legislation across the EU (EU regulation No. 1123/2014) which dictates a number of minimum requirements that all scour treatments must conform to. These requirements include a Strong Ion Difference (SID) of at least 60mmol/litre which will assist in correcting acidosis. Products meeting the SID requirement will state that they are fit for the “stabilisation of water and electrolyte balance to support the physiological digestion”. Products with an SID of less than 60mmol/litre will only state that they are “complementary feeds”. It is important therefore for dairy farmers when purchasing a product to ensure that it is suitable for their requirements i.e. it will treat a calf with scour.

Causes and prevention of scour
Optimal daily feed requirements post-colostrum and transition milk feeding are approximately 15% of calf body weight i.e. 6 litres/day for a 40kg calf, below this will lead to reduced growth rates. Scour in calves can result from inconsistent feeding regimes or it can be due to an infectious cause. Infectious causes of scour are most common and Table 1 outlines common causes and when clinical signs are most likely to occur. The most important means of preventing scour outbreaks are;

a) ensuring an adequate volume (3 litres) of good quality colostrum is fed within 2 hours of birth. Aim for approximately 8.5% of birth body weight i.e. 3
litres for a 35kg calf. Use only the first milk from the freshly calved cow – subsequent milkings (transition milk) do not contain enough antibodies to develop the calf’s immune system adequately and consequently the calf cannot fight off infection. It should be noted that 60–70 % of neonatal calves undergoing post-mortem at regional veterinary laboratories have inadequate absorption of protective antibodies.

b) practicing excellent hygiene of calf pens and feeding utensils. Keep calf pens clean and freshly top up with dry bedding. A damp, cold calf will be more susceptible to infectious pathogens in the environment. Feed buckets must be kept clean in order to prevent build-up of bacteria.

<table>
<thead>
<tr>
<th>Cause of calf scour</th>
<th>Age clinical signs most commonly appear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryptosporidium parvum</td>
<td>First week of life</td>
</tr>
<tr>
<td>Rotavirus</td>
<td>1-3 weeks of age</td>
</tr>
<tr>
<td>Coronavirus</td>
<td>1-3 weeks of life</td>
</tr>
<tr>
<td>E.coli</td>
<td>First week of life</td>
</tr>
<tr>
<td>Salmonella</td>
<td>2-6 weeks of age</td>
</tr>
<tr>
<td>Coccidia</td>
<td>3-6 weeks of age</td>
</tr>
</tbody>
</table>

Table 1: Common causes of calf scour on Irish dairy farms with approximate times of occurrence.

Treatment
Treatment of calf scour involves rehydration of the calf, replacement of lost electrolytes and correction of acidosis. Teagasc, Moorepark undertook an experiment in spring 2015 evaluating the effectiveness of a scour treatment that conforms to the new EU legislative requirements. Treatment was also administered and monitored on a number of commercial farms experiencing scour outbreaks as part of their routine calf management and disease control. In all, 99 dairy calves, aged between 0 and 5 weeks approximately, were studied. Calves were scored using the health chart outlined in Figure 1 and all calves were tested using rapid blood gas analysis. The more severe the acidosis recorded by blood gas analysis, the worse the clinical calf score. Calves with poorer health scores have lower feed intakes which invariably continue the cycle of dehydration and acidosis. Blood pH and base excess was measured before and after scour treatment, the results of which are outlined in Figure 2. The product was administered by stomach tube to ensure that calves received the full dose required. Extra fluids over and above the normal two milk feeds will assist with rehydration. Additionally, as the majority of sick calves

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in this study were incapable of independent milk feeding, mixing the product with milk served no additional advantage. The results indicate that treatment with this product restored blood pH and base excess within a 12-18 hour period and facilitated a quick and full recovery of the calves from scour.

**Figure 1: Blood pH (a) and base excess (b) comparison across normal and scouring calves pre- and post- electrolyte treatment.**
<table>
<thead>
<tr>
<th>Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demeanor</strong></td>
<td>Bright, alert, responsive</td>
<td>Dull, possibly depressed, less responsive</td>
<td>Dull, depressed, less responsive</td>
<td>Dull, markedly depressed, markedly unresponsive</td>
<td>Unresponsive to any stimulation</td>
</tr>
<tr>
<td><strong>Ears</strong></td>
<td>Alert and mobile</td>
<td>Slightly drooped</td>
<td>Drooped</td>
<td>Drooped and limp</td>
<td>Drooped and limp</td>
</tr>
<tr>
<td><strong>Mobility</strong></td>
<td>Actively mobile and able to stand without assistance or intensive encouragement</td>
<td>Capable of standing and walking independently with a little encouragement</td>
<td>Capable of standing and walking independently but encouragement required</td>
<td>Capable of standing with assistance but unable to walk</td>
<td>Recumbent</td>
</tr>
<tr>
<td><strong>Interest in surroundings</strong></td>
<td>Interactive when approached</td>
<td>Interactive when approached</td>
<td>Uninterested when approached</td>
<td>Uninterested when approached</td>
<td>Uninterested when approached</td>
</tr>
<tr>
<td><strong>Suck reflex</strong></td>
<td>Good suck reflex</td>
<td>Diminished suck reflex</td>
<td>Markedly diminished suck reflex</td>
<td>No suck reflex</td>
<td>No suck reflex</td>
</tr>
<tr>
<td><strong>Feed intake</strong></td>
<td>Feeding well</td>
<td>Slow to drink and may not finish what is offered</td>
<td>Reduction in feed intake (not finishing what is offered)</td>
<td>No feed intake (not taking any of what is offered)</td>
<td>No feed intake (not taking any of what is offered)</td>
</tr>
<tr>
<td><strong>Dehydration</strong></td>
<td>Clear bright eyes</td>
<td>Eyes slightly sunken</td>
<td>Eyes sunken</td>
<td>Eyes markedly sunken</td>
<td>Eyes markedly sunken</td>
</tr>
</tbody>
</table>
Milk Feeding

Good nutrition is fundamental to animal health, welfare and productivity. Traditional milk feeding systems for dairy calves have been based on daily feeding rates of 8 to 10% of body weight (~4 litres/day). These ‘restricted’ feeding systems were intended to encourage the calf to eat a greater quantity of concentrate feed from an earlier age however they seriously limit growth potential as they only allow 20-30% of biologically normal growth and are detrimental to calf health and welfare. A higher plane of nutrition facilitates physiologically appropriate growth rates, better immune function, and lower incidences of disease and mortality. In a recent Teagasc Moorepark experiment calves were fed 4 litres (~10% of birth bodyweight) or 6 litres (~15% of birth bodyweight) of milk. Calves fed 4 litres of milk were lighter at five weeks of age than those fed 6 litres. At five weeks of age the reticulorumen is still underdeveloped and calves fed a restricted quantity of milk are not capable of increasing intake of starter concentrate and forage to a degree that they can fully compensate for the lower supply of energy from milk. Feeding calves a greater volume of milk tends to reduce the number of days taken to reach a target weaning weight. Furthermore, there was no difference in incidences of diarrhoea between calves fed 4 litres or 6 litres of milk. Weaning calves earlier is desirable from the farmer’s point of view as this saves labour, time and feed costs.

Milk replacer vs whole milk

A number of experiments have been undertaken at Teagasc Moorepark comparing whole milk and milk replacer. There were no differences in calf growth rates between the two, however it should be noted that no waste milk was fed to calves and a high quality milk replacer (26% crude protein) was used.

Milk replacers which have high levels of vegetable protein should be avoided as they are generally not very digestible for the young calf. In general the higher the crude protein content of a milk replacer the more expensive it is. An experiment was undertaken in spring 2015 which compared a 20% crude protein milk replacer to a 26% crude protein milk replacer. The protein of both milk replacers was mainly from milk derived sources. It took the calves offered the 20% crude protein milk replacer almost a week longer to achieve their target weaning weight than the calves offered a 26% crude protein milk replacer. This was because the average daily weight gain of calves on the 20% crude protein milk replacer was 0.6 kg/day less than the calves consuming the 26% crude protein milk replacer (0.67 kg/day) from the birth to weaning stage. All calves were given the same concentrate and grass post weaning; interestingly, when calves were 140
days old (4 ½ months) the calves fed the 26% crude protein milk replacer during the milk feeding period were still 5% heavier than the calves fed the 20% crude protein milk replacer. This suggests that calves should be well fed and high quality products used during the pre-weaning period.

**How soon can milk replacer be fed?**

Diseases, such as Johnes disease, can inadvertently be transmitted through colostrum and transition milk feeding. One of the main control strategies to minimise the spread of Johnes disease is to implement a controlled calf management programme. This involves feeding individual cows colostrum (preferably the colostrum and transition milk from each calf’s own dam) to individual calves. Substantial labour input is however required, particularly in seasonal calving systems of production where a large number of cows are calving simultaneously and separating colostrum and transition milk is laborious and can be prone to error. One strategy to overcome this difficulty is to commence milk replacer feeding immediately after the first feed of colostrum. An experiment carried out in Teagasc Moorepark in spring 2015 showed that once calves received 8.5% of their birth bodyweight in colostrum within 2 hours of birth there was no difference in their weight gain pre or post weaning compared to calves which were fed colostrum and four feeds of transition milk before moving to milk replacer (Figure 1). This suggests that in well managed systems where the transfer of disease may be an issue milk replacer can be offered immediately after colostrum.

![Figure 3: Effect of timing of milk replacer feeding on body weight at weaning, 140 days and 240 days of age](image)
**Coccidiosis**

Coccidia are single-celled parasites which are common in the farm environment. These parasites damage the gut wall and if calves are infected with large numbers, severe damage results and scours, straining and bloody diarrhoea can occur. Calves exposed to small numbers of the parasites will develop immunity without developing the disease or experiencing major production losses.

Coccidiosis generally affects 3 week to 9 month old calves. Calves are infected by ingesting coccidial oocysts (similar to eggs) and this can occur while housed or at grass. In the calf, the parasites multiply and damage the gut wall. This results in thousands of new parasites which are passed in the dung, contaminate the environment and infect other calves. Coccidia are hardy, so houses and fields can remain contaminated for a year or more. Stressors such as turnout, weaning and poor weather conditions may also trigger a disease outbreak.

Coccidia are host specific i.e. coccidia from one animal cannot affect another animal species. This applies even to animals as closely related as sheep and goats. Therefore birds do not transmit coccidiosis to cattle.

A diagnosis of coccidiosis should be made by observing clinical signs and providing dung samples to your local vet or laboratory. It must be remembered that coccidial oocysts can be seen in the dung of clinically normal animals.

Diarrhoea usually develops at the end of the parasitic life cycle which means that severe damage to the intestines has already occurred and treatment at this stage is often unrewarding. Drugs may be used prophylactically (preventatively), in the at risk period, to prevent severe disease on farms with a known problem.

- Maintain calf housing in a hygienic manner
- Use effective disinfectants
- Provide clean dry bedding
- Raise troughs off the ground and clean regularly
- Turn calves out onto pasture not grazed by calves in over a year
<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Trade Name</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amine based</td>
<td>KenoTM Cox</td>
<td>CIDLines N.V., Belgium</td>
</tr>
<tr>
<td>Ammonium Hydroxide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorocresol</td>
<td>Interkokask</td>
<td>Hysolv Ltd</td>
</tr>
<tr>
<td>p-chloro-m-cresol</td>
<td>Neopredisan</td>
<td>Vertriab GMBH, Germany</td>
</tr>
</tbody>
</table>

Table 2: Disinfectants effective against coccidial oocysts

See the AHI leaflet: Bovine coccidiosis – the facts for more information.
Cryptosporidiosis

*Cryptosporidium parvum* is a small single cell parasite which causes damage to the gut wall. It is a highly infectious, robust parasite which is resistant to many of the disinfectants used on farms. Cryptosporidiosis generally affects calves aged 1-4 weeks.

Clinical signs include:
- Lethargy/weakness
- Profuse watery diarrhoea with strands of mucus
- Dehydration

Scouring can last for a week or more and deaths can occur in severe cases. Where mixed infections (e.g. with rotavirus) occur, mortalities can be high.

The parasite is transmitted via the faecal-oral route, with calves becoming infected from calf pens, utensils or farm workers clothing which has been contaminated with dung containing the parasite.

**Diagnosis**

It is difficult to distinguish cryptosporidiosis from other types of scour because the clinical signs are non-specific.

- Submit faecal samples (in sterile containers) from untreated, scouring calves to the local vet or laboratory, in the early stages of a disease outbreak
- Take dead calves to the Regional Veterinary Laboratory for post-mortem

**Treatment**

- Isolate sick calves in a clean, warm and dry pen
- Give one or two extra feeds (2 litres each) of a good quality oral rehydration solution per day (see AHI leaflet: Management of the scouring calf)
- Continue to offer normal amounts of milk or milk replacer
- Treat with halofuginone lactate

Halofuginone lactate can be administered to in-contact calves to limit the impact of infection.

**Disease control measures**

- Ensure all calves receive 3L of colostrum within two hours of birth
- House calves individually or in small groups with adequate bedding and replace bedding regularly
• Never mix new born calves with calves older than 3-4 days
• Ensure strict hygiene with feeding equipment
• Raise feeding and water troughs off the floor by 0.75m
• Wash hands, change clothes and footwear after handling sick calves
• Thoroughly clean and disinfect calving and calf pens with a disinfectant effective against cryptosporidiosis and leave free of animals for 3-4 months before the new calving season.

**Spread to humans**

*Cryptosporidium parvum* can infect humans. Farm workers should wash their hands, change their clothes and footwear after handling sick calves. Children and immunocompromised adults should not care for sick calves. Farm owners should comply with all the regulations on slurry and run-off water from animal buildings to ensure a clean water supply for their families and the general public.

See the AHI leaflet Cryptosporidiosis in neonatal calves for more information.
Labour

Calf rearing is labour intensive and occurs at the busiest time of the year. Over 60 discussion groups have analysed labour input on their farms and 93% have moved from individual pens to group pens. However, only 27% are practicing once a day (OAD) feeding of calves and average turnout date of calves is April 10th. There is potential to reduce the labour associated with calf rearing by adopting OAD feeding and earlier turnout to grass.

Calf feeding system and labour requirement: A study was undertaken on 57 commercial herds to quantify the overall labour requirement for calf care and how it is influenced by enterprise scale and facilities, together with an evaluation of specific calf-feeding systems with respect to labour requirement. The total average time consumed by calf care (includes colostrum stage) per farm increased with herd size and the average time consumed per calf was highest in the small herd (<50 cows) group (2.1 min/day) and lowest in large herds (1.70 min/day). Total calf care time (up to 8 weeks) was 23 seconds (sec) per calf for herds that fed calves milk once daily compared to herds that fed calves twice daily (36 sec). The labour input per calf for the cleaning of calf pens was greater with automatic feeding systems compared to the other feeding systems. Farms not using automatic feeding tended to put calves on once a day milk feeding earlier and put calves outdoors earlier and this may account for the lower calf bedding times with these systems. Overall 36% savings in total calf care time could be achieved if calves were fed milk once daily.

Once a day milk feeding and early turnout- what effect on calf performance:

Calf feeding methods can influence labour input and calf performance. At Moorepark, female calves were assigned to 3 cold milk (5-100C) feeding treatments. Whole milk was fed to calves once daily (OD) or twice daily (TD) and calves remained indoors for the first 80 days, and a third group were fed milk once daily and were put outdoors at day 38 (ODO). There were no differences in liveweight (LW) or average daily gain between calves fed milk twice a day or once day at day 80 or 410. Calf LW at day 80 was 86, 89 and 85 kg and at day 410 was 304, 309 and 316 kg for OD, TD and ODO, respectively. Similar calf performances in subsequent trials were observed when calves were fed milk replacer as opposed to whole milk. To comply with EU regulations with regard to feeding calves twice daily, calves need to be consuming an alternative feed before introducing once daily milk feeding, ideally at 3 weeks of age.
**Organisation:** Preparation in advance of calving will ease workload during calf rearing. Cleaning calf sheds, bedding in place and nearby, calf health supplies purchased in advance and having a system to record and register births can all be prepared in advance. Excessive calf and milk movement will result in inefficiency during this busy period. Efficient farms have a maximum of two calf movements within yards, from calving area to nursery area, and from nursery to calf rearing shed. The next move is to grass. Redesigning calf sheds may be required to minimise excessive calf movement. In discussion group analysis, 61% of farmers were manually moving milk from the dairy to the calf house. There are labour saving options, which include pumping milk, motorised trolleys and trolley/quad.

**Looking after yourself and others working on the farm:** The next three months will be an extremely busy time on dairy farms. Make sure to look after yourself and those working on your farm during this busy time. Eat well – plenty of fruit and vegetables – and drink plenty of water. Try to ensure that you get a good night’s sleep as rest is important to ‘recharge the batteries’. Make time to keep in touch with other farmers and friends. Taking time to do something different, even for a short time, can help to re-energise you. Focus on the things which you can control and do something about and try to accept that there are certain things that you cannot change. Where possible, share the workload. Other family members may be able to help. Have you considered getting some additional outside help during the busiest period? Caring for yourself is the most important thing that you can do, but can often be overlooked. Above all, if you find yourself becoming overwhelmed, talk to somebody else about your troubles. They will help you to find a solution to your troubles. There are plenty of individuals who can help. Finally, the risk of farm accidents increases at this time. Plan ahead to try to reduce the chances of accidents occurring.