CALFCARE ON-FARM EVENTS

SUPPORTED BY

volac

CALF REARING for tomorrow's herd

- CALF HOUSING
- COLOSTRUM QUALITY
- BLOAT IN CALVES
- PAIN MANAGEMENT

Good calf health is the basis of long term profitability on your farm. These annual calf events serve to assist you in protecting and enhancing the profitability of your farm business.

www.AnimalHealthIreland.ie

CalfCare AnimalHealthIreland.ie

teagasc

volac

This series of CalfCare events is being run with the help and support of the local Co-op in each region.

Arrabawn

glanbia ireland

Aurivo

KERRY

CARBERY

Lakeland DAIRIES

Centenary Thurles Co-operative Society Ltd

North Cork Creameries

dairygold

TIPPERARY COOPERATIVE

Coronavirus COVID-19

Coronavirus **COVID-19** Public Health Advice

Stay safe. Protect each other.

Know the symptoms. If you have them, self-isolate and contact a GP.

Continue to:

Wash
your hands well and often to avoid contamination.

Cover
your mouth and nose with a tissue or sleeve when coughing or sneezing and discard used tissue safely.

Limit
contact with others when out and about. Distance yourself at least 2 metres (6 feet) away.

Distance
yourself at least 2 metres (6 feet) away from other people, especially those who might be unwell.

Symptoms of COVID-19

> a fever (high temperature – 38 degrees Celsius or above)
> a cough – this can be any kind of cough, not just dry
> shortness of breath or breathing difficulties

#holdfirm

Visit **HSE.ie** for updated factual information and advice

Ireland's public health advice is guided by **WHO** and **ECDC** advice

Rialtas na hÉireann
Government of Ireland

In the interest of public health and protecting each other, the wearing of masks at these events is compulsory.

IMPORTANCE OF COLOSTRUM QUALITY

Colostrum feeding is the only way to transfer antibodies to a calf as transfer of antibodies does not occur in utero as it does in humans. Calves that do not get enough antibodies after birth will have failed passive transfer (FPT) of antibodies. Calves that suffer FPT are at a significantly higher risk of illness and death and those that survive illness have reduced growth rates subsequently.

COLOSTRUM 1→2→3

1. Use colostrum from the **FIRST** milking for the **FIRST** feed
2. Give colostrum within **TWO** hours from the calf's birth
3. Give at least **THREE** litres

This practice has seen a significant improvement in calf health on Irish dairy farms in recent years however, there is still room for further improvement both in terms of delivering colostrum to the new-born calf in the correct timeframe and the quality of the colostrum offered.

Factors Influencing Colostrum Quality

Colostrum contains high levels of energy compared to normal milk which is important as new-born calves have limited amounts of fat reserves which can be quickly used up to maintain body temperature in the absence of colostrum feeding. High quality colostrum is defined as colostrum that has immunoglobulins and specifically IgG or antibodies in concentrations of >50g/L. At farm level colostrum quality can be measured with a colostrometer or a brix refractometer with values > 22% indicating suitability to be fed as a first feed for new-born calves. Values less than this are not suitable for a first feed and should not be used. Colostrum quality can be influenced by several factors namely:

- Nutrition of the cow.
- Colostrum collection.
- Colostrum storage.

Nutrition of the cow

Cows that are within target BCS at calving (3-3.5 – Target 3.25) and on a good plane of nutrition will have a plentiful supply of high quality colostrum. Provision of a high quality dry cow mineral is also important in producing high quality colostrum. Where silage quality is poor, supplemental feeding will help to improve colostrum quality.

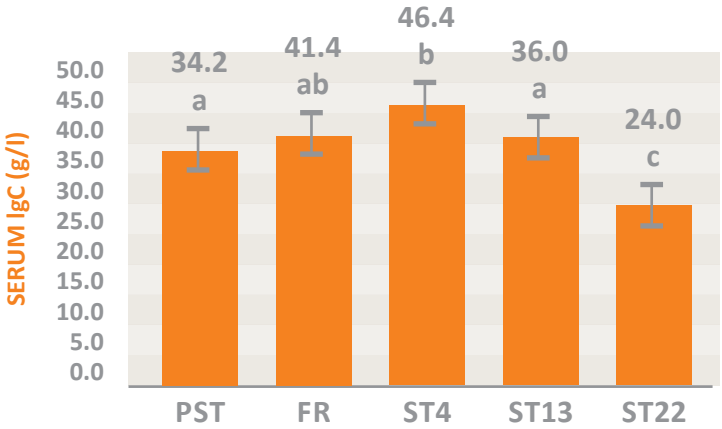
Colostrum Collection

Timing of collection of colostrum is very important as it significantly influences the IgG levels of colostrum. IgG or antibody levels are highest when collected immediately post calving. These levels drop dramatically as the IgG levels get diluted within the udder. Colostrum collected within eight hours of calving will have the highest antibody levels. Furthermore, a calf's ability to absorb antibodies is highest in the first 2 hours after birth. The longer the interval between birth and feeding of colostrum to the new-born calf, the lower the IgG or antibody absorption with absorption capacity reduced to 50% within 6 hours of birth.

Colostrum Storage

Collection of colostrum needs to take place in as clean a manner as possible from the cleaning of cow's teats prior to first milking through to the cleanliness of the bucket into which the colostrum will be harvested. A recent study at Moorepark where all precautions were taken to minimise the bacterial contamination at colostrum collection found that fresh colostrum was almost 400,000 total bacteria count (TBC) which exceeds the suggested max level of 100,000 TBC. When this colostrum was fed immediately or stored at 4°C (fridge) for a maximum of 48 hours it did not impact on passive transfer of immunity to calves. When the colostrum was not stored in a fridge, i.e. at higher temperatures, bacterial growth increased and consequently reduced absorption of antibodies. Furthermore IgG levels of fresh colostrum on this trial were almost double the target of 50 g/L which may have contributed to the results. It is important to note that colostrum quality measured on a Brix refractometer reflects the amount of IgG or good antibodies present, it does not tell us about bacterial contamination. If the colostrum is not harvested cleanly or not stored correctly allowing bacteria to multiply then even if there are plenty of antibodies, they will not be absorbed properly hence you may still see failure of passive transfer in these calves.

This study highlights the importance of clean collection of colostrum which can be challenging in commercial farm scenarios as high bacterial loads will impair antibody absorption thus compromising the immunity of calves, increasing subsequent risk to infection and associated mortality related with disease in new-born calves.



Serum IgG concentration of calves fed colostrum stored in varying conditions to induce different bacteria levels. Error bars represent 1 standard error each side of the least squares means. Means differ significantly between treatments with different letters ($P < 0.05$). PST = pasteurized colostrum (n = 15); FR = colostrum fed when freshly collected (n = 15); ST4 = colostrum stored at 4°C for 2 d (n = 15); ST13 = colostrum stored at 13°C for 2 d (n = 15); ST22 = colostrum stored at 22°C for 2 d (n = 15).

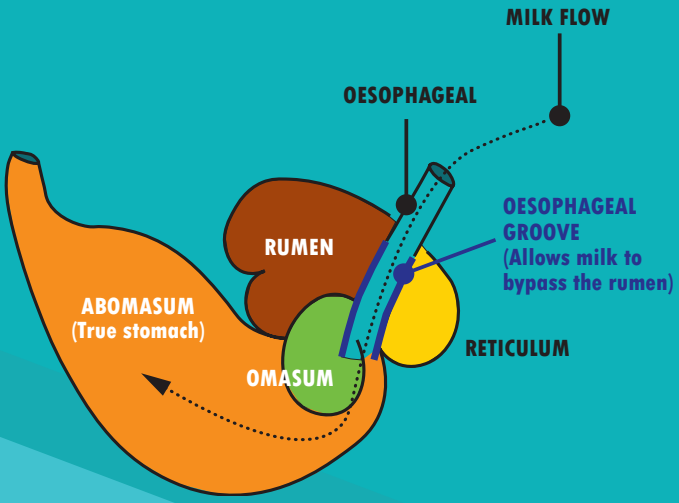
How to improve calf health

- Appropriate dry cow nutrition to ensure high quality colostrum will be produced post calving.
- Collect colostrum as soon as possible post calving, as hygienically as is feasible in a farm environment.
- Feed 3 litres of high quality colostrum to new-born calves within 2 hours of birth.
- Store surplus colostrum in clean sterilised containers at ≤4°C for no more than 2 days to ensure minimal bacterial load when being fed.
- Heat stored colostrum with a gentle heat of no greater than 50°C to avoid destroying the antibodies within.

UNDERSTANDING AND REDUCING THE RISK OF BLOAT IN CALVES

Rumen Devlopment

At birth, the abomasum is the dominant structure, accounting for about 70% of the total stomach volume while the rumen is basically non-functional. The first three stomachs (reticulum, rumen, and omasum) are not sufficiently developed. The abomasum has an acidic environment which helps in the formation of the milk clot before its passage to the small intestines for absorption of nutrients. During the first weeks of life, the calf is essentially monogastric or single stomached with the abomasum digesting milk components, and intake of starter will be low. Since the oesophagus joins the stomach in the rumen and reticulum, ingested feed first enters this section of the stomach. However, prior to weaning, milk and milk replacer take a different route.



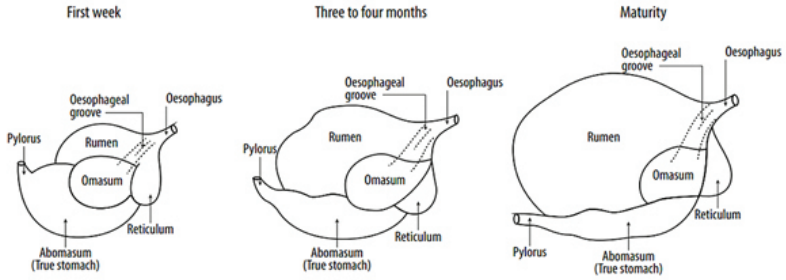
Prior to weaning

The oesophageal groove allows milk and milk replacer to bypass the rumen and reticulum so that it enters the abomasum, which is where it needs to go. Dry starter feed does not stimulate oesophageal groove closure and so unlike milk/milk replacer; it enters the rumen instead. The oesophageal groove is active until approximately 12 weeks of age. As the calf consumes dry feed and water, its rumen gradually develops and increases in size and digestive function.

The oesophageal groove or reticular groove is a specialised part of the ruminant stomach that with a combination of factors such as suckling, the presence of milk proteins and learned feeding behaviour causes muscular folds in the reticulorumen to form a groove that extends from the oesophagus to the abomasum. It is this 'tube' created by the muscular folds that directs milk or milk replacer past the reticulum and rumen and into the abomasum. Over time, this response fades, so that by a few weeks after weaning, the groove is no longer functional. In addition, liquids (such as electrolytes or other fluids etc.) administered by an oesophageal feeder/stomach tube will be directed into the rumen because the oesophageal groove does not close when a calf is tubed. In addition, free water will not cause closure of the oesophageal groove and will enter the rumen.

After weaning

Ingested feed enters the rumen and reticulum. A healthy, functional rumen contains bacteria to digest and break down feed.



Development stage of a rumen.

Bloat

Bloat is a sporadic disorder of young calves and can affect either the abomasum or the rumen. More frequently in younger calves, bloat of the abomasum occurs. Bloat is caused by the production of excessive gas by organisms (not necessarily pathogenic) in the abomasum or rumen that builds up and cannot escape. Animals can bloat whether being fed with a bottle and teat, bucket or on an automatic or computerised feeder.

Abomasal bloat or Acute Bloat Syndrome (ABS) occurs most commonly in calves from 4 to 21 days of age. Calves in this early stage of life are essentially monogastric, with all milk or milk replacer being digested in the abomasum, with little to no rumen function at that age. This makes abomasal function critical in young calves.

The causes of ABS are not well understood; however, experimental induction of ABS in calves led researchers to believe that there are three speculative sources. As a result of the following three factors, high levels of gases are produced in the abomasum, causing distention.

- Gas-producing bacteria in the abomasum (most likely Clostridium perfringens or Sarcinia ventriculi).
- An excess of readily fermentable carbohydrates, lactose (milk carbohydrate) along with fermentative enzymes, in the abomasum.
- Anything that delays the abomasal emptying rate.

A range of bacteria have been identified in cases of abomasal bloat in calves. Many of these bacteria are present in the calf's stomach all the time, so other factors must also be involved.

The primary cause is excess fermentation of whole milk, milk replacer or high energy oral electrolyte solution that can cause overgrowth of the bacteria such as Clostridium perfringens type A. These bacteria are part of the normal gut flora, but its proliferation can produce a build-up of gas and β-toxins, resulting in distension of the abdomen and bloating which slows down abomasal emptying.

Other factors that can contribute to ABS are related to nutrition and include high volumes of milk replacer, cold milk, high osmolality of milk, high protein and fat contents in milk, high-energy oral electrolyte solutions, and inconsistent feeding times. All of these can cause a slower emptying rate of the abomasum. Feeding practices that significantly prolong abomasal emptying can increase rates of gastrointestinal diseases in calves as the bacteria have more time to ferment the feedstuff, thus producing more gas in the abdomen.

Understanding the symptoms of ABS is critical because calves that develop the syndrome often die within 6 to 48 hours. Case fatality rate is a very steep at 75-100%. The likelihood of saving the calf is low as it is only possible if symptoms are recognised early.

Clinical signs of abomasal bloat

- Rapid (within 1 hour after feeding) onset of abdominal distension on primarily the right side (sometimes both sides).
- Severe distension compresses the abdominal and thoracic organs (heart, lungs) and the blood vessels that lead to them resulting in asphyxiation and heart failure.
- Occasional signs of colic (strain or kicking at their abdomen), bloat often recurrent.
- Reduced intake or refusal to drink milk or stop eating, dullness.
- Affected animals may grind their teeth, salivate, shifting one foot to the other.
- At necropsy, the abomasum is grossly distended with gas, fluid and milk, or milk replacer.
- Dehydration, cold, collapse, and sudden death ('perfectly healthy, found dead').
- Diarrhoea and high temperatures may or may not accompany these signs.

Key risk factors for abomasal bloat syndrome – and how to reduce their impact

Abomasal emptying

Abomasal emptying refers to the time span the chymus, (semi-fluid mass of partly digested food), remains in the abomasum before passing into the intestinal tract. It is influenced by volume, osmolality, the calorific content as well as the pH of the abomasal and duodenal pH.

Poor colostrum management

Always feed a minimum of three litres of quality colostrum within two hours of birth and a further three litres within 12 hours. Incorrect use of a stomach tube can damage the vagal nerve, which is responsible for abomasal motility. Consequently, always use a tube that is soft, clean and in good condition or switch to bottle feeding colostrum via a bottle and teat. It may be appropriate to enhance colostrum quality by improving the antibody levels against certain disease organisms such as Clostridium through dry cow vaccinations. Low colostrum intake reduces lactase activity which is essential to break down lactose.

Feeding irregular milk volumes

A large milk volume takes longer to empty from the abomasum giving bacteria more time to ferment the milk and this may cause an excess of gas. Milk feeds should be limited to 3 litres per feed (reduce to 2 litres per feed during a bloat outbreak).

Mix properly

Follow the same protocol for every batch of milk or milk replacer when mixing. Total solids should be considered before every batch is fed. A Brix refractometer can be used to check solid levels. Some milk powders require mixing temperatures of 55°C to generate sufficient heat to get the palm or coconut oil present in the product go into solution.

Deliver feedings consistently

Ensure the same feed from first to last calf from one feeding to the next and consistency between calf rearers at feeding. Replace worn nipples to prevent excessive drinking speeds and risk of pathogen build up in cracks and crevices.

Inconsistent milk mixing rate

Osmolarity of whole milk or milk replacer i.e., how concentrated it is influences how long the milk sits in the stomach. Always mix milk replacer according to manufacturer guidelines and mix at the chosen concentration consistently. The mixing rate is key in determining the osmolality, so it is important to weigh accurately.

The osmolality of good quality milk replacers mixed at up to 15% (150g of powder per litre of mixed milk) will be fine for the calf, however, other on-farm factors can subsequently increase the osmolality of the mixed milk (e.g., poor calf health, such as scouring; use of soft water or water softener in a calf house and low water intakes).

If adding milk replacer to whole milk to increase the total solid content 'fortified milk feeding'greater than 15% rising to 20% again be careful of osmolarity and the need for calves to have access to fresh clean drinking water given the increase in solid levels. Feeding once-a-day is convenient, but can put digestive stress on animals, especially if you are feeding a large volume of milk or milk replacer. More frequent feeding reduces hunger and provides smaller meals that are less likely to slow the rate of abomasal emptying which reduces the amount of time bacteria can feed, grow, and produce gas. We need to pay close attention when mixing milk replacers, to ensure they contain the proper amounts of water, cows' milk normally has an osmolality between 280 and 290 mOsm/L.

Include additives carefully

Avoid multiple additives, as this may alter the osmolality of a finished formula to unacceptable levels. Recent research has shown that calves fed an oral electrolyte solution with high osmolality have a much slower abomasal emptying rate as compared to calves fed a solution with lower osmolality. This high osmolality can delay gastric emptying, leading to increased gas and bloat. The regular use of a brix refractometer can help to ensure proper osmolality of feedings.

Group sizes

Bigger groups are associated with more competition, more stress, more disease, and poor health. Calves in larger groups tend to drink their milk feed faster and in fewer visits than calves housed in smaller groups. The ideal group size for young calves is 12 to 15 calves per group (maximum of 20 calves per group). Many computerised feeders are set up to feed 30 to 35 calves per feed station. Therefore, if calves are housed in larger groups of up to 30 to 35, minimise the age range between the calves within the group (ideally, seven days, maximum 21 days range), ensure calves have enough access to resources (i.e., feed calves more milk to reduce the competition at the feeder), and ensure there are enough water points (as a guide, allow two-water points per 20 calves).

Data from computerised feeders shows that calves can drink anywhere from 300ml /minute to 1.2 litres/minute within the same pen. Granted feed cannot be robbed regardless of drink speed but it does highlight the issue of feeding calves with 5 or 10 teat feeders and the need for compartmentalisation to ensure more even intake of milk feeds.

Insufficient water intake

Water intake is key. A low water intake will increase the osmolality of the milk being fed and slow the abomasal emptying rate (in combination with any scours and incorrect mixing rate). If there are more than 20 calves in a group, provide two water points. Ensure adequate water pressure 2 bar to deliver fresh water quickly in large volumes. Rumen development and function will be slowed if insufficient water is present affecting the microbial population of the rumen. Have clean water available. Water from a private bore hole may contain a high microbial content, therefore, you should periodically check your well's bacterial count.

Feeding milk at different temperatures

Variations in milk temperature will alter the rate of abomasal emptying and stop the closure of the oesophageal groove. Milk should always be fed at a consistent temperature of 38-39°C. Monitor feeding temperature. Extremely cold weather may require extra measures to ensure the temperature remains the same from the first to the last calf being fed.

Consistency avoids abrupt diet changes

Calves do well when the feeding schedule is consistent so feed near enough to the same time each day and be consistent with the whole milk or milk replacer used in terms of mixing rate, make of product and volume been fed daily. An abrupt diet change can slow the abomasal emptying rate and lead to excessive gas production so be consistent and make any dietary changes gradually.

Feed the correct calf starter

Introducing a starter feed containing too much readily fermentable energy can easily produce too much gas. Calf starter feed should be made available from day 3. Pellet or coarse mix are suitable, with a crude protein level of at least 18% and make sure it is always dry and fresh to encourage rumen development.

Poor hygiene and dirty feeding equipment

Poor hygiene can result in excessive growth of gas producing bacteria. Always ensure feeding equipment and teats are in good condition and are kept clean. Follow routine protocols for cleaning and sanitising all equipment used to mix and feed the liquid ration. Computerised calf feeders' teats should be alternated two to three times a week and soaked in peracetic acid, checked for wear and tear and replaced if necessary.

Tubing treatment and prevention

Attempting to pass a stomach tube to remove the gas from the stomach is not effective in calves as the gas is trapped in the abomasum. Passing a tube into the rumen will not release the gas as it is impossible to pass a tube through the mouth into the abomasum.

Similarly sticking a needle in the stomach will not fully evacuate the gas in the abomasum. This could cause stomach fluids to leak into the abdomen which can have serious implications. Therefore, it is important to work with your veterinary practitioner to develop protocols on how to treat cases of bloat when they happen on your farm.

The most important control factors are a consistent feeding programme with whole milk or milk replacer that has been mixed according to the label directions.

HOW MUCH WATER SHOULD DAIRY CALVES DRINK?

Why do Calves Need Water?

Providing calves with 'free-choice water' from their first few days of age is one of the easiest and cheapest strategies to employ for improved rumen development, average daily gain, and preparation of calves for a smooth weaning transition.

'Free-choice water' is pure water that is consumed by the calf. Water increases the growth of bacteria in the rumen. Calf starter provides propionic acid to bacteria, and as the population of bacteria increases, butyric acid production by bacteria also increases. This butyric acid helps develop the rumen by developing and thickening the papillae allowing for greater absorption of nutrients by the young calf.

Baby calves less than 4 to 5 weeks of age are on a liquid diet, so it may seem to many that offering water is not necessary, but that is not the case. Offering water separate from milk will increase weight gains by increasing dry feed intake. The water that is in whole milk or milk replacer does not contribute to this 'free-choice water' requirements as milk, fed from bucket or teat by-passes the rumen via oesophageal groove, and is deposited into the abomasum. A 2018 study reported that new-born calves drank about 0.75 litres/day of water during the first 16 days of life increasing to 0.82 litres/day after day 17. Once calves were weaned fully they consumed about 5.3 L of water daily.

Research has shown that when fresh water was offered for the first 4 weeks, calves eat 31% to 60% more dry feed and gain 38% more weight from birth to 4 weeks of age. Each extra litre of water consumed increased weight gain by 56g per day. Calves achieved a 31% higher ADG from birth to 10 weeks of age.

Offering fresh water is particularly important in situations where milk total solids are high (15% to 20%). High total solids in milk or milk replacer can create a situation where the osmotic balance in the calf is out of equilibrium and water is pulled out of cells which may result in diarrhoea and dehydration. Providing fresh water will allow the calf to self-adjust to some degree, lessening the severity of dehydration by maintaining osmotic balance. Water provision is especially important for calves fed an accelerated milk replacer programme to ensure proper hydration and water should be available ad-lib.

Keep water buckets, troughs and bowls free from environmental contamination dirt, feed, manure, algae, slime, biofilms.

Water is essential to raising healthy calves. Ensure that it is clean, fresh, and always available beginning at an early age to get the best growth and health of your future herd. Calves drink 1 litre/day of water during their first week of life, increasing to nearly 3 litres/day by 3–4 weeks of age.

Water infrastructure

Drinking bowls, and troughs (tanks) should be kept relatively clean. A raised base around tanks helps to keep manure contamination problems to a minimum. Cleaning tanks and water bowls to prevent build-up of old feed and other debris is important and should be done regularly.

Drinking troughs should be mounted at the front of the pens and not the back to encourage water intake and avoid water leakages going under the bedding but also for daily observation for faecal and meal contamination. Young calves will take time to learn to operate a drinking bowl therefore installing troughs with a ball valve or micron or dumpy bowls with light touch fill valves are preferable to nose fill ones. In order for calves to access water the edge of the bowl must be lower than the smallest calf's dewlap within the group approx 40 cm or 16 inches from floor level.

Flow rates at drinkers have a recommended minimum flow rate of 10 to 20 litres per minute where demand is high and can be achieved with 2 bar pressure. Water pressure can be affected by factors such as: header tank height, pipe diameter, drinker settings, cleanliness of filters, deposits within the pipeline, e.g., biofilm (slime), and sediment

Drinkers should be cleaned regularly drained or tipped and sterilised. Faulty or leaky drinking bowls should be replaced as drinkers that continually leak are adding extra moisture into the calf house making it colder and the calves will need to burn more energy to remove.

Auto feeders

Where automatic feeders are being used water should be at a minimum 2 bar pressure entering the machine to ensure correct mixing concentration at all times. If this cannot be achieved, holding tanks and primer pumps will be required to keep water at constant pressure. At the start of the calf rearing season check all holding tanks are cleaned and sterilised to remove stagnant water and biofilms. Over-head tanks should be covered or sealed to avoid the risk of contamination from birds, vermin and air borne particles. It should be noted that hard water reduces the efficiency of detergents for cleaning equipment in the calf shed.

Checking water quality

The water supply for all livestock including calf houses should be checked regularly especially if there are health, poor thrive or performance issues with the calves. Many commercial laboratories around the country offer water testing services and samples should be taken using a sterile bottle to avoid contamination.

▸ Expected levels for common water quality tests are given in table below

ITEM	AVERAGE	EXPECTED (2)	POSSIBLE CATTLE PROBLEMS
pH	7.0 (PPM)	6.8 – 7.5 (PPM)	Under 5.5; Over 8.5
Dissolved solids	368	500 or less	Over 3,000
Total alkalinity	141	0 – 400	Over 5,000
Sulphate	35.5	0 – 250	Over 2,000
Fluoride	0.23	0 – 1.2	Over 2.4 (Mottling of teeth)
Calcium	60.4	0 – 43	Over 500
Magnesium	13.9	0 – 29	Over 125
Iron	0.8	0 – 0.3	Over .3 (taste
Manganese	0.3	0 – 0.05	Over .05 (taste)
Copper	0.1	0 – .6	Over .6 to 1.0
Arsenic		0.05	Over .20
Cadmium		0 – .01	Over .05
Mercury		0 – .005	Over .01
Lead		0 – .05	Over .10
Nitrate as NO3	33.8	0 – 10	Over 100
Nitrite as NO2	.28	0 – 0.1	Over 4.0 – 10.0
Hydrogen sulphide		0 – 2	Over .1 (taste)
Barium		0 – 1	Over 10 (health)
Zinc		0 – 5	Over 25
Total bacteria/100 ml	336,300	under 200	Over 1 million
Total coliform/100 ml	933	less than 1	Over 1 for calves
			Over 15 to 50 for cows
Faecal coliform/100 ml		less than 1	Over 1 for calves
			Over 10 for cows
Faecal strep/100 ml		less than 1	Over 3 for calves
			Over 30 for cows

Adams, R.S. 1986. Water Quality for Dairy Cattle. Pennsylvania State University.

PAIN MANAGEMENT IN CALF REARING WITH A FOCUS ON DISBUDDING

The International Association for the Study of Pain defines pain as *"An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage"*. The basis for most animal welfare frameworks is that animals are sentient and can suffer, and are thus worthy of human respect and care, and moral consideration. This duty of care concept also underlies most animal welfare legislation.

The use of both local anaesthetic and pain relief (via a non-steroidal anti-inflammatory drug (NSAID) is considered the gold standard when disbudding calves to minimise the effects of this painful procedure.

What is Disbudding?

Disbudding involves the destruction of the cells of the horn bud and is defined as the removal of horns in calves up to 2 months of age. Dehorning refers to the removal of the horn after attachment of the horn bud to the skull, which occurs at approximately 2 months of age. Disbudding and dehorning are painful procedures and, therefore, are regulated by animal welfare laws. Due to the nature of the procedure local anaesthesia is advised by means of using local anaesthetic injected into the area where the nerve supplying sensation to the horns runs through, in fact local anaesthesia is mandatory for this procedure in calves over 2 weeks old, however local anaesthesia should be provided regardless of the age of animal to minimise pain. In addition, pain relief using a non-steroidal anti-inflammatory drug is also advised.

Cautery is recommended by the European Food Safety Authority (EFSA) and other authority organisations, and is the only method of disbudding allowed in Ireland under current legislation (S.I. 127 of 2014), which permits disbudding of calves up to 28 days old by thermal cauterisation. Local anaesthetic (LA) is required for disbudding on calves after two weeks of age. Administration of a local anaesthetic as a prescription only medicine (POM) by a non-veterinarian stockperson is permitted under Irish legislation for the disbudding of calves from 2 weeks to 4 weeks of age. For calves older than 4 weeks, administration of a local anaesthetic prior to disbudding under veterinary supervision, is mandatory**.**

Note: Caustic dehorning chemicals must not be used.

▸ Animal handling

Animals need to be handled calmly and with care to prevent distress and injury to the animals and the handlers. A custom-built calf dehorning crate should be used to minimise stress to a calf and for optimum safety to the operator. A person disbudding calves must have the relevant knowledge, experience and skills, or be under the direct supervision of a person who has the relevant knowledge, experience and skills.

▸ What is the best age to disbud calves at?

Where practical, calves should be disbudded while horn development is still at the horn bud stage (less than 2 months old), or at the first available handling opportunity beyond this age. This is because the procedure involves less tissue trauma when horn development is still at the horn bud stage, and there is no attachment of the horn to the skull of the animal.

What are the main methods used for disbudding of calves?

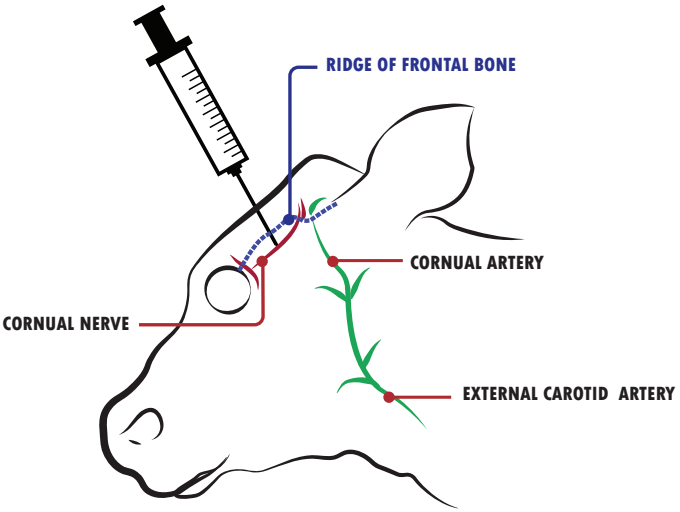
A cauterisation method (i.e. using a heated disbudding iron) is used to remove the horn buds.

The best location to anaesthetise or de-sensitise the area is halfway between the base of the ear and the corner of the eye. Feel for a bony ridge in this area; the cornual nerve runs under that ridge. Insert a 5/8" needle up to its hub under the ridge and inject 2ml of the local anaesthetic such as adrenacaine or other suitable product provided by your vet. Pull back while still injecting so that the last bit of local is injected just below the skin. Then repeat on the other side.

Successful disbudding

Because the horn grows from the skin around its base, you must remove or destroy a **complete ring** of hair (1cm wide) around the horn base. Check that the excised ring is wide enough because some horn will grow if the ring is not complete.

A 1cm wide ring of hair is enough – any more will make a larger wound, cause avoidable pain, and delay healing.



Injection site overlying the cornual nerve

Checklist for hot-iron disbudding

- No matter if the cauterizing iron is heated by fire, propane, battery or AC current, the barrel must be larger than the horn bud so that a complete ring of tissue around the horn bud base is cauterized.
- If the calf is not sedated, then its head must be completely restrained by a halter or other device in head locks. Inadequate restraint results in excessive tissue damage and increased processing time. The calf's ear should be held out of the way.
- Preheat the cauterizing iron to a dull red colour. The iron should be hot enough to produce an even and complete circle when applied to a piece of wood for 2-3 seconds.
- Place the hot iron over the horn, hold it with firm pressure. After the hair starts burning, rotate the iron around the bud to evenly distribute the heat.
- Continue the application until a copper-coloured ring of cauterized tissue encircles the bud, but no longer than about 10-20 seconds. Excessively long application of the hot iron may allow too much heat to be transferred through to the skull that will damage the brain.
- Inspect the calves after 30 minutes and cauterize any arteries that are still bleeding. Left alone the horn bud should fall off within 4 to 6 weeks.
- Failure to disbud properly at a young age often requires a greater intervention later, with potential for greater complications and increased suffering.

The degree of tissue damage associated with disbudding is influenced by the stage of development of the horn bud e.g. in younger calves the burning of the vessels surrounding the horn bud is sufficient, whereas the whole bud needs to be removed (by levering it out from the side) when the horn is further developed. Therefore, depending on the procedure, calves with greater horn bud diameter at time of disbudding may have more tissue damage which could lead to prolonged healing time and prolonged stress.

Aftercare of the disbudded calf

Inspect the calves regularly, preferably daily, for about 10 days after disbudding for early detection of infection or fly strike. The symptoms usually seen are constant tossing of the head and/or a discharge from the wound. Consult with your vet if wounds get infected. The younger the calf when disbudded the lower the risk of problems post disbudding. Avoid managing calves in areas with high fly numbers (for example, near manure heaps or wooded areas).

Brain damage can occur if the disbudding iron is applied for too long in one spot, or by using an iron which is too hot. Affected calves will become dull and depressed, usually within 24-48 hours after disbudding. Talk to your vet if disbudded calves show such signs.

Polled cattle

Breeding high genetic merit polled cattle (cattle that do not develop horns) may be considered as an alternative to dehorning or disbudding, while carefully avoiding relatedness and inbreeding in the population.

Veterinary directed sedation of calves for ease of management

For ease of management many farms are adopting this approach to disbudding, where the calves are sedated by a vet in order to facilitate batch disbudding of very restrained calves. Research has shown that sedated calves recover quicker and display less behavioural and physiological signs of pain after disbudding. The disbudding procedure is the same as described above with the exception that the calves are usually immobilised and sit down facilitating ease of management. This usually involves a multimodal protocol consisting of xylazine (a vet administered sedative), local anaesthesia, and an NSAID. Due to the involvement of a sedative drug this procedure is carried out under veterinary supervision.

Some relevant definitions:

What is anaesthesia?

Anaesthesia can be defined as the loss of sensation in the entire body (general anaesthesia) or in part of the body (local anaesthesia) by the drug-induced depression of the central or local nervous tissue. An example would be a block of the nerve that supplies the horn area. Anaesthesia is normally done **before** the procedure to make it easier on both the animal and the operator.

What is analgesia/pain relief?

Analgesia is the relief or control of pain. An example would be the use of an anti-inflammatory drug to treat an animal. Analgesics are normally used **after** the procedure.

What is a non-steroidal anti-inflammatory drug?

A non-steroidal anti-inflammatory drug (NSAID) is a veterinary medicine that is used to relieve pain, reduce inflammation, and lower a high core body temperature.

Pain management post dystocia

Dystocia, i.e. calving difficulty resulting from prolonged spontaneous calving or prolonged or severe assisted extraction, decreases calf viability, milk production, and fertility and increases the risk of culling.

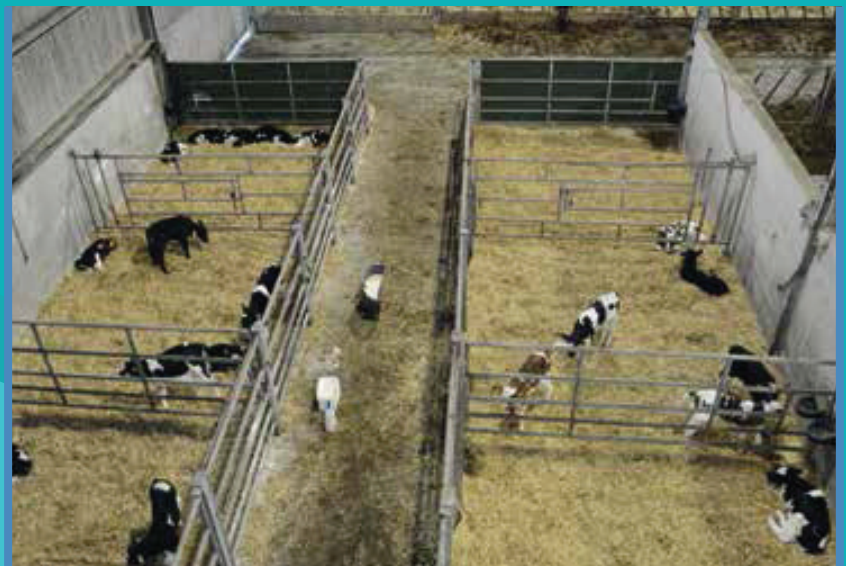
A recent study reported that a single dose of an NSAID in the immediate postpartum period may improve calf welfare regardless of assistance status and has the potential to contribute to significant welfare gains in dairy calves. At the very least, the use of an NSAID should be considered in calves that have been born after a difficult calving. In addition, cows that have had a difficult calving should receive pain relief via an NSAID unless directed otherwise by a veterinarian.

IMPACT OF HOUSING DESIGN AND USE ON CALF HEALTH

The impact of housing design and use on calf health cannot be underestimated. Below, three important aspects of calf housing are discussed, namely: stocking density, cold stress and drainage.

Stocking Density

Stocking density, specifically floorspace allowance, refers to the average area of floorspace available to an individual calf in a shed. It is calculated by measuring the total area of floor available to the calves and dividing this by the number of calves occupying the space. For example, a shed with an area of 10m^2 and five calves have 2m^2 each.



The **legal minimum** area of floorspace that calves weighing 150kg or less must have available is 1.5m^2. However, it is important to remember that this is an absolute minimum. **Recommended minimum** floorspace allowance appears in the table below. Note that calves will require more space as they grow.

CALF WEIGHT (KG)	APPROXIMATE AGE (MONTHS)	SPACE ALLOWANCE FOR GROUP HOUSING (M^2/ CALF)	RECOMMENDED AREA (M^2/ CALF)
45	0	1.5	2
46-99	0-2	1.5	3
100-149	3-5	1.5	4
150-220	6-8	1.7	5

Again, these are minimum recommendations and not a target. The number of calves in a shed is the single most important determinant of air quality in the shed. In turn, air quality is an important factor in diseases such as pneumonia. Increasing numbers of calves in a shed also means increased moisture, which affects bedding quality.

In sheds with automatic feeders, the number of calves in each pen should be determined by the area of floorspace available, not the number of calves the feeder can accommodate.

Nesting Scores

Use of calf hutches or canopies within the calf shed itself are beneficial for providing extra warmth and shelter for younger calves provided ventilation is not compromised. Concrete is one of the coldest surfaces a calf can lie on therefore it is imperative that calves have a good thick bed of clean dry straw under them and at least 3 inches above the floor. Bedding provides an effective mechanism for calves to reduce heat loss. If bedding is sufficiently deep the calf can 'nest' and trap a boundary layer of warm air around itself which reduces its lower critical temperature. Use the nesting score to judge the adequacy of the bedding.

- **Nesting score 1:** Calf resting on top with legs exposed.
- **Nesting score 2:** Calf is nestled into bedding with part of the legs exposed.
- **Nesting score 3:** Ideal - calf is nestled deeply in bedding with legs not visible.

Cold Stress

Cold stress refers to the negative effects experienced by calves at low ambient temperatures. The lower critical temperature (LCT) refers to the ambient temperature below which a calf does not need to use energy to maintain its body temperature. The LCT changes with the age of the calf.

CALF AGE	LOWER CRITICAL TEMPERATURE
Newborn	15°C
Three weeks old	5.5°C

Clearly, in Ireland, the temperature in a calf shed will routinely be below the LCT for both newborn and three-week-old calves in winter and spring. When this happens, the calf diverts energy away from the immune system in order to maintain its body temperature. The calf must then use feed energy to keep warm. This may leave it more susceptible to infectious disease.

Monitoring the ambient temperature in the calf shed will allow us to identify when this might happen. A maximum/minimum thermometer is ideal, as it allows assessment of the full temperature range in the shed.

Once we are aware that the shed temperature is falling below the LCT, we can take measures to ensure calves have enough energy to maintain their immune function. One option is to reduce the calves' heat loss, so that they do not need to use energy to maintain body temperature:

- **Avoid draughts in the calf shed.** Do make sure there is adequate ventilation, however. If you have a positive pressure ventilation tube in the shed, do not turn it off. Instead, ensure it has a working variable speed control to adjust for temperature changes.
- **Increase the amount of straw bedding available**, ensuring nesting scores of three. This means that calves' legs are completely covered by straw when lying down.
- **Use calf jackets.** These must be washed at 60°C between calves.

Another option is to **increase calves' energy intake** to account for that used to maintain body temperature. This can be used in combination with the above strategies. As a rule of thumb, consider feeding an extra 50g of milk replacer or 0.33l of whole milk per day for each 5°C drop below 15°C (AHDB).

Drainage

Good drainage is essential in calf housing. This ensures that bedding is kept dry and that humidity and build-up of harmful gases such as ammonia are minimised. It also reduces infectious pressure and spread of disease by removing waste from the shed. The floor of a calf pen should have a gradient of at least 1 in 20, sloping towards a drainage channel at the front of the pen. The gradient is defined as the fall divided by the distance. If a calf pen has a fall of 25cm from the back to the front of the pen, and the distance from the back to the front of the pen is 5m, then the gradient is 1 in 20.

Drainage channels should have a gradient of 1 in 60. Both excessively steep and flat gradients can lead to lack of drainage and blockage of channels.

If inappropriate gradients are impeding drainage, short term measures such as regular scraping of floors and flushing of drains can be used. Long term, building work may be necessary to create a gradient which allows effective drainage.

CalfCare leaflets

Further resources regarding calf housing are available on the CalfCare website. These include leaflets on design of new calf housing and assessment of existing calf sheds.

www.calfcare.ie

www.calfcare.ie

WHAT IS ANTIMICROBIAL RESISTANCE (AMR)

What is antimicrobial resistance (AMR)

AMR is the ability of a microorganism (like bacteria and viruses) to stop an antimicrobial or antiviral drug from working against it.

What are Antimicrobials used for?

- Medicines that target pathogenic organisms that cause disease (i.e. antimicrobial)
- To kill or stop the growth or spread of a pathogen

What is AMR?

- Microbes develop resistance to antimicrobials and they become ineffective
- Risk to health developing worldwide
- Future risk to current everyday medical procedures

Remember! If disease is present...

Other sources of information
https://multimedia.efsa.europa.eu/amr/index.htm
https://www.agriculture.gov.ie/amr/

The World Health Organization (WHO) has classified antimicrobials with respect to importance for human medicine (WHO Advisory Group on Integrated Surveillance of Antimicrobial Resistance, 2012). Under this system, an antimicrobial that meets both of the following criteria is considered critically important to human health (CIA), or highly important if only one criterion is met:

- An antimicrobial agent which is the sole, or one of limited available therapy, to treat serious human disease.
- Antimicrobial agent is used to treat diseases caused by either: (a) organisms that may be transmitted to humans from non-human sources or, (b) human diseases caused by organisms that may acquire resistance genes from non-human sources.

Antibiotics are classified into different categories depending on their active substance and how important that active substance is in human health. The 'Highest Priority Critically Important Antibiotics' **(HP-CIAs)** are reserved for use in humans. The Department of Agriculture, Food and the Marine (DAFM) published guidelines on the different categories of antibiotics for use in animals. The **HP-CIA's** are antibiotics vital to be preserved for use in human health and should not be administered as first-line treatments in animals when other antibiotic categories are more appropriate.

New regulations on veterinary medicines (Regulation (EU) 2019/6) and medicated feed (Regulation (EU) 2019/4) will enter into force within the European Union (EU) from 28th January 2022.

HIGHEST PRIORITY CRITICALLY IMPORTANT ANTIMICROBIALS LICENCED IN IRELAND FOR USE INANIMALS

Antimicrobial Class	Hp-Cia Category	Active Substance	Examples Of Products
3rd & 4th generation Cephalosporins	**RESTRICT**	cefovecin	Convenia
		ceftiofur	Alfacef, Cefavex, Cefenil, Cefokel, Ceftiocyl, Cemay, Cevaxel, Curacef, Eficur, Excenel, Naxcel
		cefquinome	Ceffect, Cefimam, Cefquinome, Cephaguard, Cobactan, Plenix, Qivitan
Fluoroquinolones	**RESTRICT**	enrofloxacin	Baytril, Doraflox,Enrobactin, Enrocare, Enrodexil, Enrotril,Enrotron, Enro-K, Enroxil , Fenoflox, Floxibac, Quinoflox, Roxacin, Unisol, Valemas
		marbofloxacin	Aurizon, Boflox, Efex, Forcyl,Kelacyl, Marbim, Marbocare,Marbocyl, Marbonor, Marbosyva , Marbox. Marfloxin.
		pradofloxacin	Veraflox
Polymyxin	**RESTRICT**	colistin	Colfive, Coliscour, Colistin APSA, Hydrocol, Sogecoli
Macrolides	**CAUTION**	erythromycin	Erythrocin
		gamithromycin	Zactran
		tildipirosin	Zuprevo
		tilmicosin	Hymatil, Keytil, Micotil, Milbotyl, Pulmotil, Pulmovet,Tilmodil, Tilmovet
		tulathromycin	Draxxin, Tulloxxin, Tulaxa,
		tylosin	Bilosin, Bilovet, Pharmasin, Tylan, Tylo, Tylosin, Tylovet,Tylucyl
		tylvalosin	Aivlosin

Product names sourced from Health Products Regulatory Authority and European MedicinesAgency websites. Correct as of August 2020.

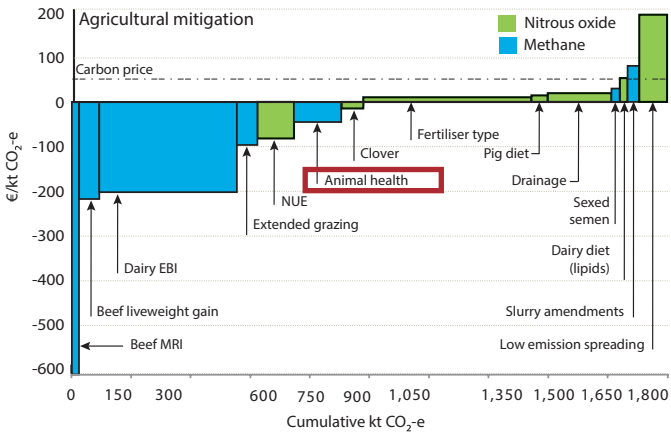
Take home message

- Only give antibiotics to animals under veterinary supervision.
- Do not use antibiotics for growth promotion or to prevent diseases in healthy animals.
- Vaccinate animals to reduce the need for antibiotics and use alternatives to antibiotics when available.
- Promote and apply good practices at all steps of production and processing of foods from animal and plant sources.
- Improve biosecurity on farms and prevent infections through improved hygiene and animal welfare.

ANIMAL HEALTH AND GREENHOUSE GAS EMISSIONS

Animal Health and Greenhouse Gas Emissions

The livestock sector in Ireland has a plan to reduce emissions from agriculture and the Marginal Abatement Cost Curve (MACC) is the basis of this plan. The MACC sets out 26 actions that farmers can take across agricultural production, carbon abatement from land use such as forestry and soil management, and providing renewable alternatives to fossil fuels. Included as one of the agricultural production mitigation measures is 'improved animal health'.



The Teagasc Marginal Abatement Cost Curve (Agricultural Mitigation)

As is evident from the graph above, improved animal health has the potential contribute to reducing GHG gas emissions (width of the bar) while at the same time reducing costs (depth of the bar below the line). The agricultural MACC sets out the actions required to deliver a reduction in GHG emissions of 1.85 mt CO^2 eq per annum between 2021 and 2030. The contribution of animal health to this reduction is 0.1 mt CO^2 eq. or 5%. The two agricultural measures giving the largest reduction in emissions are improvements in EBI (0.43 mt) and a change in fertiliser type to protected urea (0.52 mt). As is evident from the MACC, there is no silver bullet to reducing emissions. It is a combination of the implementation of all measures on farm, including improving animal health that will bring about a reduction in emissions.

Animal Health Climate Actions

The Signpost demonstration farmers embark on the implementation of an environmental sustainability plan. Animal health will be an important component of this plan. The key actions included in the Sustainability Plan for Animal Health include:

- The preparation and implementation of a Herd Health Plan in conjunction with the farmer's vet.
- The use of the EBI sub-indexes for health and fertility in sire selection.
- The implementation of an effective vaccination programme for the herd.
- A limitation of the importation of animals and the employment of best practice when importing animals.

CALFCARE ON-FARM EVENTS

SUPPORTED BY VOLAC

volac

www.AnimalHealthIreland.ie

CalfCare AnimalHealthIreland.ie

teagasc

volac

This series of CalfCare events is being run with the help and support of the local Co-op in each region.

Arrabawn

Aurivo

CARBERY

Centenary Thurles Co-operative Society Ltd

dairygold

glanbia ireland

KERRY

Lakeland DAIRIES

North Cork Creameries

TIPPERARY COOPERATIVE