CalfCare leaflet series

ANIMAL HEALTH IRELAND

Contributing to a profitable and sustainable farming and agri-food sector through improved animal health

Colostrum Management

CalfCare Leaflet Series Vol.5, Ver. 2, Jan 2021

CALF HEALTH PROGRAMME

Animal Health Ireland, 2-5 The Archways, Carrick-on-Shannon, Co. Leitrim, N41 WN27

AHI gratefully acknowledges the financial and other contributions of our stakeholders.

Contributing to a profitable and sustainable farming and agri-food sector through improved animal health

Animal Health Ireland, 2-5 The Archways, Carrick-on-Shannon, Co. Leitrim, N41 WN27

Phone 071 9671928 Email ahi@animalhealthireland.ie

www.AnimalHealthIreland.ie

What is colostrum

Colostrum or 'biestings' is the first milk that the cow produces after calving. It is higher in energy, nutritional elements and growth factors compared to normal milk, but colostrum has a particularly high content of immunoglobulins (antibodies; Ig's). Antibodies are proteins produced by the immune system in response to infectious diseases.

The quality of colostrum is measured by the concentration of antibodies. This is because calves must consume a high level of these in the first hours of life. Good-quality colostrum has an IgG concentration of greater than 50 g/l. A Brix refractometer (with a scale of 0 – 30 %) can be used to indirectly test the quality of colostrum – a reading of 22% or more indicates high quality colostrum (i.e. > 50 g/l).

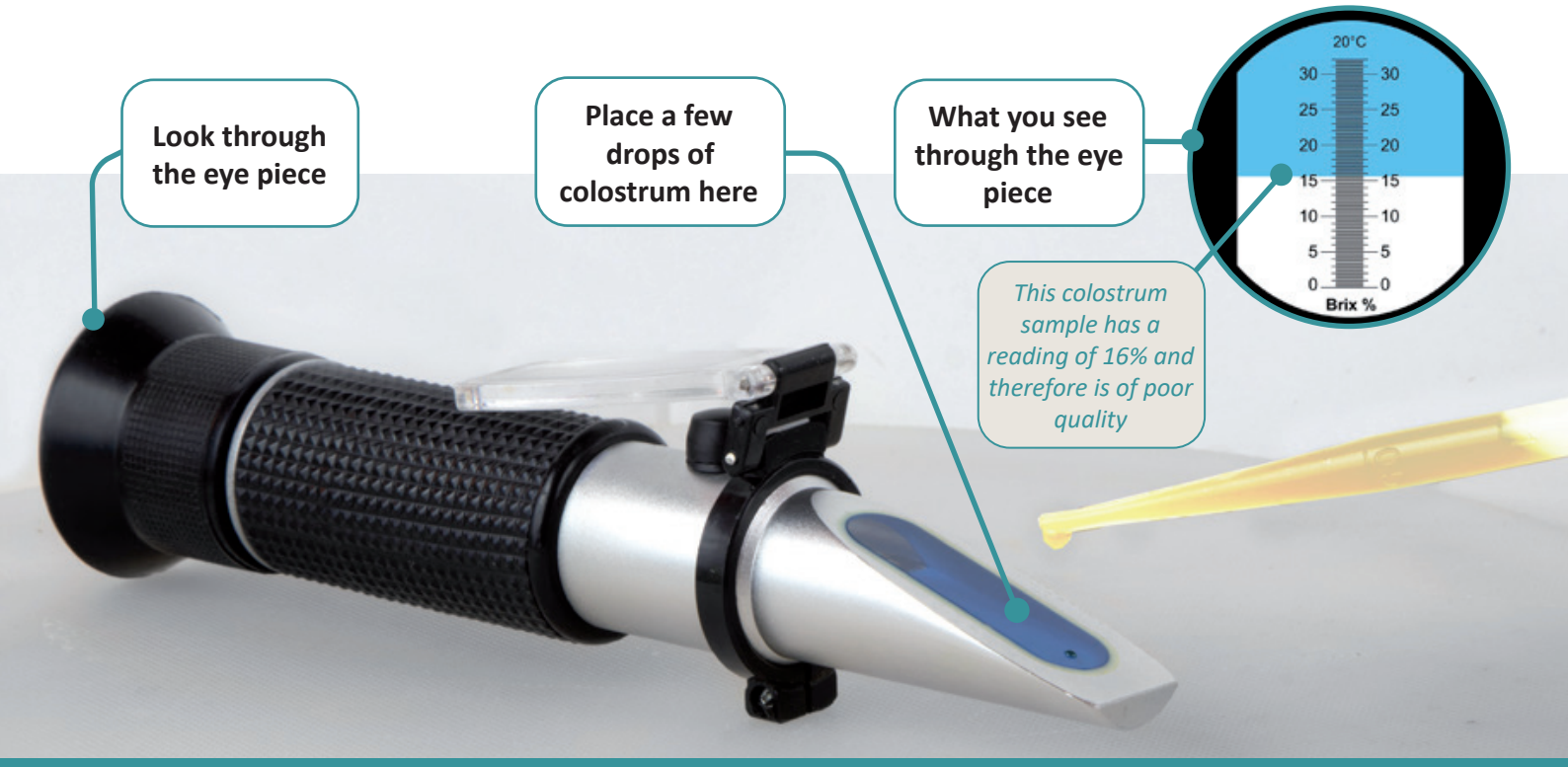
Only the first milk produced by the cow (colostrum) is suitable to feed to the calf for its first feed. Milking two to eight are referred to as transition milk; this is not saleable milk. The antibody level in transition milk is far lower than colostrum, antibody levels in the second milking are only half that of the first milking but are still higher than levels found in regular milk.

Colostrum should not be mixed with transition milk for feeding to new-born calves.

Ensuring high quality colostrum

In healthy beef cows, colostrum quality is usually good. Colostrum quality is higher in beef X dairy cross cows than beef X beef cows.

In dairy cows, colostrum quality can vary greatly between cows within the herd. Colostrum should be tested with a Brix refractometer (see below) to ensure only high quality colostrum is being fed to calves as their first feed.



Values greater than 22% represent high quality colostrum suitable for a calf's FIRST feed

Why is colostrum important for the calf?

When the calf is in-utero the maternal and foetal blood supplies are separate; a calf is born without any antibodies and depends on their absorption from colostrum to gain adequate immunity and protection from pathogenic organisms until development of its own immunity begins at 3 to 4 weeks of age.

If calves do not get enough antibodies through colostrum soon after birth, they will have failure of passive transfer (FPT) of antibodies. Calves with FPT have a high chance of becoming ill and dying. Calves that survive have poorer growth rates, reduced milk production and survivability than calves that received adequate colostrum.

Factors which affect FPT are:

- Quality of colostrum (addressed by feeding first milking only and test with Brix refractometer)
  - » Hygienic collection and correct storage of colostrum also help ensure low bacterial contamination. High bacterial content in colostrum reduces the calf's ability to absorb antibodies from colostrum and may contribute to FPT.
- Timing of first feed (addressed by feeding within the first two hours of birth).
- Volume of colostrum fed (addressed by feeding 3 litres).

Factors which affect colostrum quality in dairy cows include:

- Time from calving - after calving, dairy cows immediately start to produce large amounts of milk, which means that the colostrum is of poorer quality with every hour that passes between calving and first milking.
- Age of dam - older cows tend to produce higher quality colostrum as they have had a longer exposure period to farm specific pathogens, **but** first calving heifers often have high quality colostrum. Testing is required for all cow's colostrum.
- Dry period length - if the dry period is shorter than three weeks then colostrum quality tends to be poor.
- Month of calving - late calving spring cows (April/May) tend to have lower quality colostrum. Colostrum quality of autumn calving cows, calved from grass, is high.
- Higher yielding cows have lower quality colostrum.
- When colostrum from cows that have been vaccinated, (against Rotavirus for example), is fed to newborn calves, greater passive transfer of antibodies (against rotavirus) occurs ensuring better immunity and protection against calf scour caused by rotavirus.
- If the cow has mastitis or is treated with antibiotics the colostrum should not be used. This does not apply in the case of dry cow treatment unless the dry period was unusually short.
- If the cow leaks milk or the colostrum looks watery the quality will be poor.
- Bacterial contamination reduces the availability of the antibodies (see 'What is the best way to collect and store colostrum?').

However, it is key to remember that the only way to know if colostrum has sufficient antibodies for the calf is to test it.

Pooling colostrum

Pooling of colostrum is not recommended:

- Due to the risk of disease transmission e.g. Johne's Disease. For more information about Johne's Disease **click here**.
- Because cows with poorer quality colostrum usually give higher volumes, thereby reducing the overall quality of pooled colostrum.

How soon should colostrum be fed?

The calf is susceptible to infectious agents (bacteria and viruses) as soon as it has entered the birth canal just prior to calving, so feeding colostrum as soon as possible after birth is essential. Antibodies in colostrum are large proteins that can only enter the blood from the intestines of the calf in the first hours after the calf is born. This ability to absorb antibodies decreases from birth and stops by the time the calf is 24 hours old.

How much colostrum should be fed?

The simple rule is three litres or 8.5% of birth bodyweight. Typically, Irish Holstein-Friesian dairy calves are approximately 35 kg at birth: 8.5 % of 35 kg = 3 litres. For smaller calves calculate the volume required based on their weight (e.g. Jersey; 25 kg at birth x 8.5% = 2 litres).

When do you have to worry about colostrum in the suckler calf?

In the following situations, suckler calves should be hand fed 2 to 3 litres of colostrum by stomach tube (oesophageal feeder), nipple bucket or bottle and teat if:

- The calf is too weak to suckle.
- The cow does not allow the calf to suckle.
- The calf had a difficult birth and is unlikely to suckle soon.
- There are other circumstances making it unlikely that the calf will suckle soon (bad weather, cow and calf disturbed while bonding, pendulous udders).

As colostrum quality in beef cows is generally higher than dairy cows, suckler calves need 5% of birth weight as soon as possible after birth, with subsequent suckling of the dam (or a second feed) 6 to 8 hours later.

How should colostrum be fed?

Suckler calves should suckle on their own, or with assistance, within two hours. If not, they should be fed with a bottle and teat or stomach tube.

For dairy calves, the current advice is to remove calves from their dam immediately after birth and feed three litres of colostrum. This is for biosecurity reasons as the cow is the main source of potential infection for the new-born calf, early separation helps to prevent disease. However, disease prevention is only effective if the calf is subsequently housed in a clean pen.

By leaving the calf with the cow to drink colostrum the calf is more likely to suffer from failure of passive transfer (FPT) as it is unknown if the colostrum is of high enough quality or if the calf will drink three litres of colostrum within two hours of birth.

Colostrum can be hand-fed using a nipple bottle, bucket and teat or a stomach tube:

- Feeding by nipple or teat is more natural and the absorption of antibodies is slightly better, but it can be difficult to get the calf to drink the volume necessary.
- Stomach tubing is faster, and three litres can be easily fed. The efficiency of absorption is slightly decreased. The liquid given by stomach tube will flow into the rumen and not the abomasum as it would if the calf had suckled. However, since the new-born calf's rumen is very small, it will flow into the abomasum quickly.

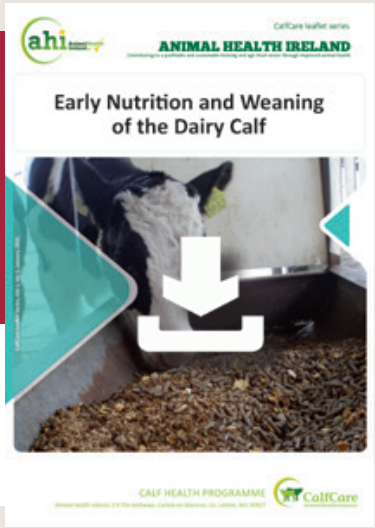
Ensure all feeding equipment used to feed colostrum is thoroughly cleaned after use as bacterial contamination can reduce the absorption of antibodies.

WARNING

If milk is repeatedly given by stomach tube it will lead to the build-up of acids in the rumen and damage the ruminal wall. It is not recommended as a method of feeding milk to calves that are not drinking due to ill health. It can, however, be used quite safely as a means of feeding electrolyte fluids

SEE AHI LEAFLET

'Early Nutrition and Weaning of the Dairy Calf' for more information on feeding calves.



Veterinary Technical Note

A number of different tests may be used to estimate serum immunoglobulin (lg) levels. Serum (clotted samples) is used rather than plasma as distorted results may be obtained if the plasma fibrinogen is elevated. The RVL routinely uses the zinc sulphate turbidity test (ZST) on serum to detect FPT.

Although this test is considered crude, examining several samples will give a good indicator of the effectiveness of colostrum management in the herd. This test cannot be carried out on haemolysed samples as haemolysis (samples where the red blood cells are disintegrated, and haemoglobin is released) gives distorted (falsely elevated) results.

Another suggested test for FPT, serum total protein (TP), is also offered. This test is considered useful for monitoring colostrum management in healthy calves but is not suitable for sick, dehydrated or dying calves. Veterinary Pracititioners may choose to test samples in-practice rather than sending them to a laboratory. Serum total protein can be measured using in-house biochemistry or a refractometer. Kits for directly measuring serum lg levels using enzyme linked immunosorbent assay (ELISA) or single radial immunodiffusion (sRID) are also available.

Table 1. Optimal cut-off points for calves when using a range of test to identify adequate passive transfer of immunity.

	Cut Off for Beef Calves	Cut off for dairy calves
ELISA, mg/ml	8	10
TP – CA, g/l	56	57
Globulin, g/l	32	29
ZST, units	14	19
TS – BRIX, %	8.4	7.8
TP – DR, g/dl	5.3	5.7

Serum samples analysed using the following: commercial ELISA assay, total protein concentration by clinical analyser (TP – CA), globulin concentration by clinical analyser, zinc sulphate turbidity (ZST) test, total solids percentage by Brix refractometer (TS – BRIX), and total protein concentration by digital refractometer (TP – DR).

Source: Todd et al., 2018

Can I check if my calves are getting enough colostrum?

In general, suckler beef calves have lower passive immunity compared to dairy calves. Calves with lower passive immunity are at greater risk of a negative health event or poor growth.

AHI advises farmers who suspect that their calves (home bred or purchased) are suffering from failure of passive transfer (FPT) of colostral immunity to contact their veterinary practitioner, who can take blood samples and arrange to have them tested for FPT. These tests can be carried out at the Department of Agriculture's Regional Veterinary Laboratories (RVLs) or at a number of private laboratories. It is suggested that at least 5 blood samples be taken from calves less than 14 days old to ensure a representative sample.

What is the best way to collect and store colostrum?

Bacterial contamination of colostrum is dangerous since it can transfer diseases to the calf. While an increased level of bacteria does not alter the antibody content of colostrum it does decrease the amount of antibodies that the calf can absorb. Hygienic collection practices and clean equipment while collecting, feeding, and storing colostrum is very important.

If colostrum is being stored it needs to be put into a fridge within three hours of collection to minimise bacterial growth. It will last in the fridge for up to 48 hours, after this, bacteria multiplies very quickly, binds to the antibodies reducing the calf's ability to absorb the antibodies from colostrum. Colostrum refrigerated for over 48 hours needs to be discarded. Frozen colostrum can be stored at -18°C to -25°C for up to a year without changing its quality.

Slow thawing in a water bath at temperatures below 50°C is recommended. If colostrum is heated above this point (e.g. thawing in boiling water) the antibodies are destroyed. Using a microwave for thawing or heating colostrum can be risky, as it can lead to overheating, some of colostrum (hotspots) and destruction of antibodies.

If using stored colostrum, it needs to be heated to body temperature before feeding to increase absorption of antibodies by the calf.

Pasteurisation of colostrum can reduce bacteria levels and the level of viable ***Mycoplasma bovis***, ***Listeria monocytogenes***, ***Escherichia coli*** O157:H7 and ***Salmonella enteritidis.*** However, if pasteurising colostrum it must not be heated above 60°C; heating above this temperature reduces the number of antibodies present in colostrum.

Can I use colostrum replacement products?

At peak calving, when there is surplus colostrum, a supply should be stored to have available when required. This colostrum should be hygienically collected, frozen (lasts for up to a year) and its quality tested using a Brix refractometer before deciding to store it. The best source of replacement colostrum is that which comes from cows on your own farm as it has antibodies specific to the infectious agents (bacteria and viruses) that are on your farm. Sourcing colostrum from farms other than your own should be avoided.

Colostrum replacement products are available for use if maternal colostrum is not available. However, the efficacy and quality of these products is variable. If, for any reason, you do not want to use your own cows' colostrum, you should ask your veterinary practitioner for advice.

Colostrum supplements are intended to supplement not replace colostrum, there is no benefit to feeding colostrum supplements if already feeding 3 litres of high quality colostrum.

For more information consult the Animal Welfare Guidelines issued by the Farm Animal Welfare Advisory Council
http://www.fawac.ie/media/fawac/content/publications/animalwelfare/Calf%20Welfare%20Guidelines%20%20FAWAC.pdf

TECHNICAL WORKING GROUP

Catherine McAloon- (Chair) University College Dublin, **Charles Chavasse** - Zoetis, **Muireann Conneely** - Teagasc, **Christine Cummins** - Bonanza Calf Nutrition, **Grainne Dwyer** - Animal Health Ireland, **Bernadette Earley** - Teagasc, **Liam Gannon** - Volac, **John Gilmore**- Veterinary Practitioner, **Ciara Hayes** - DAFM, **Ian Hogan** - DAFM, **Emer Kennedy**- Teagasc, **Mark Little**- Trouw Nutrition, **John Mee**- Teagasc.

TECHNICAL WORKING GROUP RAPPORTEUR

Michelle McGrath - Animal Health Ireland.

CalfCare Leaflet Series Vol.5, Ver. 2, Jan 2021

2–5 The Archways, Carrick-on-Shannon, Co Leitrim N41 WN27.
Phone 071 9671928
Email ahi@animalhealthireland.ie
Web www.animalhealthireland.ie