

Early Nutrition and Weaning of the Dairy Calf

For Irish Farmers, Advisors, Vets



CALF HEALTH PROGRAMME

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



CALF HEALTH PROGRAMME



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Why do we feed calves the way we do?

The traditional recommendation for feeding dairy calves is to offer them 8 to 10% of body weight in whole milk or milk replacer per day. Since calves are usually not weighed at birth and the average weight of a newborn Holstein calf is about 40 kg, this is generally further simplified into the feeding of 2 litres of liquid feed twice daily.

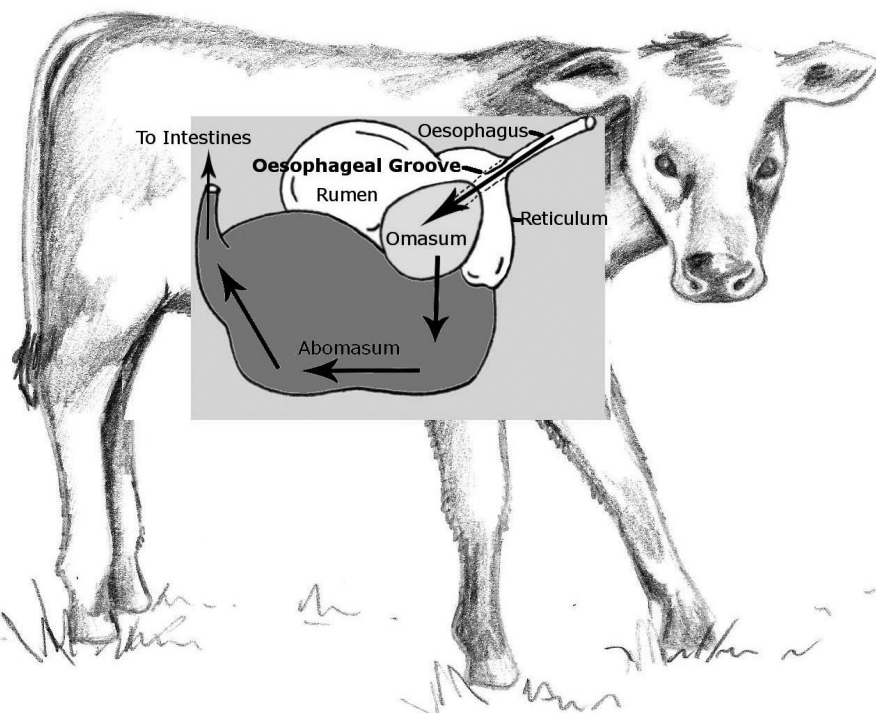
This amount of liquid feed basically covers the maintenance requirements for a calf of average weight until they start to eat concentrates. Under perfect conditions (little or no stress or disease, low infectious pressure and housing that is neither too cold nor too hot) a 40 kg calf could gain about 200g weight per day with that volume of milk (4L/day).

Under this regime, calves will be hungry and will start to eat concentrates early, allowing them to be weaned from liquid feed as soon as possible.

What are the limitations of this system?

There are several reasons why feeding 2 litres twice daily is no longer considered adequate:

- not all calves are average weight. If all calves are fed the same amount of milk, then heavier calves will not get enough to even maintain their weight
- there are many situations in which calves need more energy, e.g. temperatures below 15°C, heat stress, disease, or after vaccination. Under these circumstances calves may be severely underfed
- it has been shown in studies that calves that get more than 4L/day of milk grow faster, and are healthier
- heifers that grow faster before weaning calve earlier and have higher milk producing potential.



Newborn calves are totally dependent on milk as a source of nutrition. The abomasum (the fourth stomach) is the only stomach working at this stage. For the milk to enter the abomasum, the oesophageal groove has to close by reflex, so that milk does not spill into the rumen. This works best if calves suckle from a teat or nipple. It works also in many, but not all, calves that are trained to drink from a bucket. If the reflex doesn't work, the calves will get sick and will not thrive.

How much liquid feed should calves be offered?

Calves that are suckling the dam or are on ad-lib feeding regimes can drink about 20% of their body weight (for a 40 kg calf this is 8L/day) and will gain about 1kg per day. These calves are effectively fed 'little and often' by getting numerous feeds through the day. However, these high volumes may neither be practical (unless computerised feeders are used) nor economical on many dairy farms.

Feed at least 13 - 15% of calf birthweight in whole milk or high quality milk replacer

There is no single system of calf rearing suitable for all dairy farms and many systems can be successful. However, there are basic nutritional requirements that should be met regardless of the feeding regime.

To ensure that calves grow well and are not marginally malnourished, they should get a daily amount of at least 13 to 15% of their birth weight in whole milk or high quality milk replacer, mixed at 125 g/L water (see table below for feeding rate guidelines).

This should enable calves to gain about 500 - 600g per day throughout the first three weeks of life from milk alone. After this they can keep growing at or above this rate or more with the help of additional starter concentrates.

TABLE 1: EXAMPLES OF FEEDING RATES FOR DIFFERENT BREEDS

Breed of calf	Holstein, Friesian, HF X Norwegian Red Cross	HF X Jersey cross	Jersey
Average birth weight (kg)	37-40	32	28
Volume fed L/day up to day 5	Minimum 5	Minimum 4.5	Minimum 4
Volume fed L/day after day 5	Minimum 6	Minimum 5	Minimum 4.5

Should I feed calves once or twice a day with milk (or milk replacer)?

The abomasum of a newborn calf is not large enough to deal with the suggested volume of milk (13-15% of body weight; up to 6L/calf/day) if it is given in one feed. Calves should be fed with liquid feed twice a day until they are at least 3 weeks of age.

Which is better: nipple or bucket?

Feeding calves from a nipple is more natural. Drinking from the nipple takes longer and helps the calves satisfy their urge to suckle. It is preferable from a behavioural point of view. Most calves can be fed successfully from a bucket, once trained. The feeding method does not have a major impact on weight gain.



Calf being trained to drink from a nipple bucket

Can I feed waste milk to my calves?

Waste milk is milk that is not saleable. It usually refers to transition milk, or milk from cows which have been treated with antibiotics and whose milk is within the recommended withdrawal period. It can also include milk from cows with high somatic cell count. It may seem like a good idea to feed this milk to calves, as it would have to be thrown away otherwise.

However - there are a number of reasons why you should not feed raw waste milk to your calves.

1 Antibiotic residues

Milk from cows that have been treated with antibiotics and which is within the withdrawal period will contain residues from those drugs. This can affect the taste of the milk resulting in the calves not drinking as much as they should. Even worse, it can lead to the development of bacteria that are resistant to these antibiotics. This means that if you try to treat animals with these antibiotics they may not work as effectively as might otherwise be the case.

■ **Conclusion: Milk from cows that are under antibiotic treatment should not be fed to calves.**

2 High bacterial contamination

By its nature, waste milk is usually high in bacteria, especially if it contains high cell count milk. It will deteriorate even further if left at room temperature until it is fed. Apparently healthy cows may, in fact, be transmitting disease to the calves. A typical example is Johne's Disease, which can be transmitted through the milk from apparently healthy cows to calves at their most vulnerable stage. Other examples include Salmonella and E. coli.

One strategy to decrease pathogen load and still utilise waste milk is to pasteurise the milk. Pasteurisation is a method of exposing milk to elevated temperatures for a period of time as a means of reducing the bacterial contamination. This process kills bacteria that can cause diseases in humans and animals.

If the milk is not pasteurised within a few hours of collection, it should be chilled to prevent fermentation and bacterial growth. This is very important, since a heavy bacterial load in waste milk will not be eliminated completely by pasteurisation.

■ **Conclusion: Milk with a high bacterial contamination should only be fed to calves after pasteurisation.**



3 Transition Milk

Milk from the first eight milkings is known as transition milk. Depending on the disease status of your farm, feeding raw transition milk from healthy cows and excess saleable milk should have a lower risk than feeding raw milk contaminated by antibiotics or high in SCC. However, best practice is to pasteurise this milk, and chill for storage.

■ **Conclusion: Transition milk and saleable milk should ideally be pasteurised and chilled before feeding to calves.**

What is good quality milk replacer?

With milk replacer you generally get what you pay for. While there are many possible reasons for poor weight gains in young calves, the quality of the milk replacer should be included in any investigation.

Milk replacer powder should be easily dissolved, leaving no sediment at the bottom of the feeders. It should be a cream colour and have a pleasant odour.

A milk replacer which contains only milk-derived proteins is preferable, especially for young calves. You should always check the label of the bag to see what ingredients and product specifications are given. The content of crude protein in many traditional milk replacers is around 20% (on a dry matter basis). If these milk replacers are fed at the recommended feeding levels, there will not be enough protein for muscle growth. To promote muscle growth, milk replacers should have a high crude protein content (preferably at least 25% on a dry matter basis). Milk replacer should always be mixed according to the manufacturer's guidelines.

What should I know about calf starter concentrates?

The intake of calf starter concentrates is the single most important factor for the development of the rumen. For this reason, it is important that calves have access to clean and palatable starter concentrates from early on, even though they will only eat small amounts in the first 3 weeks. If you provide only small amounts fresh every day, you can reduce wastage, and you will see when the calves need more.

Calves fed coarse starter mix eat more and have higher weight gains than calves fed pelleted starters. The coarseness is also of benefit for the growth of the muscle layers in the rumen wall.



Why are starter concentrates important for calves?

When a calf is born, the rumen is very small and undeveloped. It does not contribute to digestion at all at this stage. To encourage early development of the rumen, the calf needs to start eating calf starter concentrates and drink water. The development of the rumen is important to ensure a smooth transition from milk feeding to an adult diet at weaning without setbacks in growth rates. Calves are only beginning to eat considerable amounts of starter concentrates from 3 weeks of life onwards. From then on, however, the higher the amount of milk fed, the lower the amount of starter concentrates they will consume. **Thus, the time of weaning is dependent on the feeding regime.**

Why is water important for calves?

The development of the rumen depends on the chemical end-products of bacterial fermentation of the starter concentrates. For the fermentation to take place the bacteria need water. The water that is in the milk does not contribute, because the milk bypasses the rumen and goes directly into the abomasum. Calves that have free access to water eat more starter concentrates and have enhanced ruminal development. **Thus, it is recommended that clean water is provided at all times.**

Should calves get hay or straw early on?

This depends on the type of starter concentrates that you are feeding. Calves need small amounts of hay or straw. In particular, if fine ground pelleted rations are fed, additional roughage will be necessary for the development of the rumen. However, a high intake of hay in young calves will decrease the intake of the all-important starter concentrates and the calves will develop 'hay bellies'. In this situation, the rumen is stuffed with hay which cannot be properly digested and ruminal development is delayed.

When can I wean calves?

The recommendation is only to wean calves after they eat **at least 1 kg of starter concentrates** per day to avoid a growth check after weaning. This is difficult to assess when calves are housed in groups. The amount of concentrates a calf eats depends on the availability of concentrates and the volume of milk being fed.

Assuming that calves have access to clean and palatable starter concentrates from the second week of life and are fed only the minimal required volumes of milk as described above they will usually eat 1 kg of starter concentrates from about 8 weeks of age. If starter concentrates are limited or larger volumes of liquid feed are given this point can be delayed.

TIP: If calves are fed milk ad-lib or close to the amounts of milk they would normally drink (for example to make use of over-quota milk or to achieve higher weight gains in an automated feeding system), gradual weaning should not be initiated before the 12th week of life.

How should I wean them?

Weaning should be done by gradually reducing the volume fed over a period of 7 to 10 days. In calves that are still fed twice a day at this point, this can be achieved by cutting down to once a day feeding. This will lead to an increased starter concentrate intake and avoid a slump in growth rate after weaning.

Points to Remember

Feed at least 13 - 15% of calf birthweight in whole milk or high quality milk replacer

Calves should be weaned when they are eating at least 1 kg starter concentrate

For proper ruminal development clean water and proper starter concentrate must be provided at all times

Milk from cows treated with antibiotics should not be fed to calves

Waste milk should be pasteurised before it is fed to calves



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The contents of this leaflet are based on the following peer-reviewed review article compiled by the AHI TWG on Calf Health:

Ingrid Lorenz, John F. Mee, Bernadette Earley, Simon J. More (2011): Calf health from birth to weaning. I. General aspects of disease prevention. Irish Veterinary Journal. 64:10. <http://www.irishvetjournal.org/content/64/1/10>

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