

Section 3

Milk Feeding Systems



Introduction

Pre-weaning nutrition affects calves' growth rates, health and the ability to cope with cold stress. Young animals have the ability to convert feed into growth most efficiently during the first two months of life. Whole milk and milk replacer can be offered to calves once a day, twice a day, through an automated computerised system or *ad lib*. The system chosen depends on the type of calf housing, the labour available and the number of calves to be reared.

- ① What are the different milk feeding systems for artificially rearing calves?
- ② Once-a-day v twice-a-day feeding.
- ③ What are the advantages of once-a-day milk feeding calves?
- ④ Can whole milk be fed *ad lib*?
- ⑤ Checklist for *ad lib* feeding.
- ⑥ What are the benefits of acidifying whole milk?
- ⑦ Should milk be fed warm to calves?

Milk Feeding Systems

① What are the different milk feeding systems for artificially rearing calves?

Milk feeding system*	Brief description
Once-a-day feeding	Calves are fed once daily which reduces labour. Calves must be at least 10 days of age before starting to feed milk once-a-day.
Twice-a-day feeding	Calves fed twice during a 24 hour period. More labour intensive but allows for good calf supervision.
Computerised/ automated feeding	Calves fed little and often over a 24 hour period. Fed according to pre-programmed feeding curve. Good calf housing is essential.
<i>Ad lib</i> feeding	Calves fed <i>ad lib</i> (warm/cold), with access to milk 24 hours a day. Maximises early growth but reduces starter intake.

*MR concentration for each feeding system should be as directed by the manufacturer.

② Once-a-day v twice-a-day feeding.

Under EU law, calves must be fed twice-a-day. The abomasum of a newborn calf is not large enough to deal with the recommended volume of milk if it is given in one feed. Therefore milk should be fed twice-a-day at the start. When a calf is consuming concentrates and its rumen is sufficiently developed, one of these daily feeds can be a dry feed in the form of calf starter.

From 10 days of age, studies show that cold whole milk or milk replacer can be fed once-a-day with no difference in weight gain or scour incidence. However, calves must remain being checked thoroughly twice daily and fed concentrate at an alternative time to milk feeding e.g. feed milk in the morning and concentrate in the evening.



After 10 days of age, once-a-day feeding can be implemented with no detriment to calf liveweight gain.

③ What are the advantages of once-a-day milk feeding calves?

- Labour saving (can reduce labour requirement by up to 25%).
- Higher dry feed intakes at an earlier age.
- Early rumen development.
- Up to two weeks earlier weaning.
- Less water used; drier beds, lower humidity and less pneumonia.

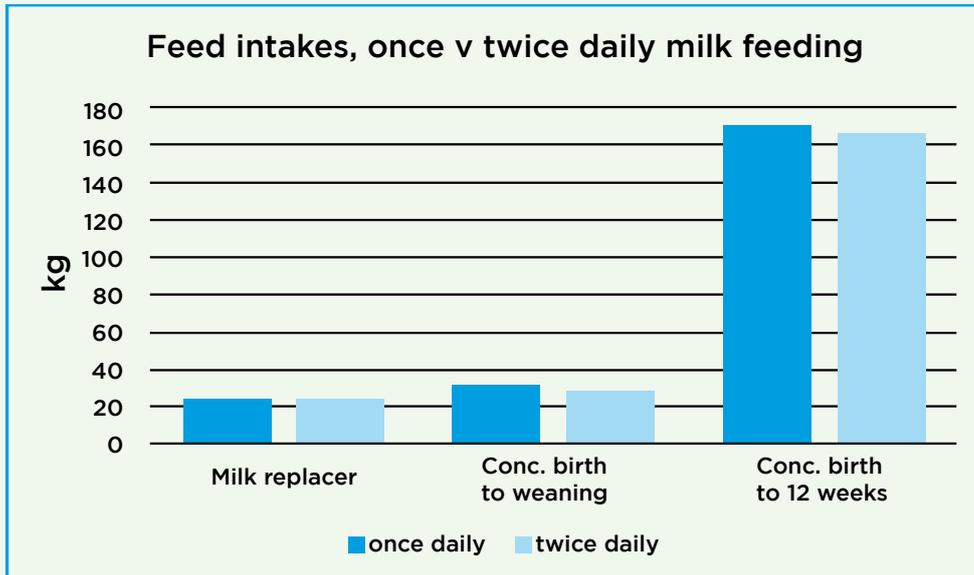


Figure 1. Effect of once versus twice daily milk feeding on calf milk replacer and concentrate intake.

4 Can whole milk be fed *ad lib*?

Whole milk can be offered warm and *ad lib* from specially designed automatic feeders, similar to those which dispense milk replacer. Whole milk can also be *ad lib* fed cold (ambient temperature) to calves. This involves filling a plastic container (e.g. dustbin) and allowing the calves to drink from a teat via a plastic tube.

Ad lib feeding from teats allows calves to determine their own intake patterns while also improving performance compared to conventional twice-a-day bucket feeding. However, *ad lib* feeding can increase the amount of calf care time required compared to once or twice daily feeding (Table 1). *Ad lib* feeding must be restricted prior to weaning to encourage calf starter intake.

Table 1. The effect of feeding system on calf weight at 77 days and total calf care time.

	Automatic Feeder	Once daily with teats	Twice daily with teats	Twice daily with trough
Total calf care time, incl. vet time (seconds/calf/day)	38	23	36	27
Calf weight at 77 days (kg)	95.0	94.8	93.2	90.5

Milk Feeding Systems

5 Checklist for *ad lib* feeding.

- Calves must be trained to drink from a teat using a teated bucket.
- Attention must be given to how milk is transported from the bulk tank.
- Equipment used to store, transport and feed milk must be cleaned daily.
- Fresh milk must never be added to old/stale milk.

The advantages of acidification are greatest when whole milk is offered *ad lib*. Studies show significantly reduced incidences of diarrhoea and mortality and increased live weight gain.

When an acidifier is used in *ad lib* feeding, milk should be taken cold from the bulk tank. The acidifier should first be dissolved in water before being added to the milk to prevent the milk from curdling.

KEY POINT:

<p>Once/twice-a-day milk feeding</p>	<ul style="list-style-type: none"> • Once- or twice-daily feedings produce the same weight gain, nutritional status and metabolic stress. • Some farmers start feeding twice-a-day then drop to once-daily feeding of older calves. This allows for close observation of newborn calves.
<p><i>Ad lib</i> automated feeding</p>	<ul style="list-style-type: none"> • Provides set amounts of milk at a rate dictated by the calf which mimics the natural feeding behaviour of a calf suckling a cow. • Properly managed systems help reduce scours. • Reduces the need for additional labour.

7 Should milk be fed warm to calves?

Debate regarding the best temperature to feed milk or milk replacer stems from concerns about the impact that temperature has on the energy expenditure of the calf. Some manufacturers recommend that the 'best' milk temperature is between 35° and 38°C, but it may be fed as cold as 6°C.

Very cool milk has the potential to lower the body temperature which means that the calf would need to use energy to increase its body temperature. This diverts energy away from growth and development. In cold climates, the effect of cool milk can be significant, however there is likely to be little impact of this in warmer climates.

KEY FACTS:

The bottom line is that liquid feed is best provided at a constant temperature, i.e. avoid feeding warm milk one day, cool milk the next.

6 What are the benefits of acidifying whole milk?

The addition of organic acid (and salt) combinations to whole milk to make the milk more acidic (pH 5.9 instead of 6.5) can be beneficial in calf rearing. The practice enhances the acid conditions in the calf's stomach and is effective in:

1. Slowing down the multiplication of *E.coli* scour causing bacteria.
2. Favouring digestive enzyme activity.
3. Encouraging more rapid clotting of milk, which in turn improves nutrient utilisation.