

Feeding colostrum, milk, milk powder

On-Farm
Research

Key Points

1. The best calves will be those reared on *ad libitum* milk. But rearing costs will be higher and rumen development will be slower – this is likely to reduce post weaning growth rates.
2. Calves fed on colostrum and whole milk will generally have less health issues than calves reared on milk powder.
3. Milk powders which do not curd are generally not suitable for very young calves (less than 2 weeks). The labelling on milk powders is not helpful and we suggest a curd test to ascertain the suitability of milk powders.



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Calf Rearing Fact Sheet 3.1

General

- The best calves will inevitably be reared on *ad libitum* milk. However, milk energy is expensive and the more milk that is fed to a calf, the slower the rate of rumen development. This means that weaning is delayed, further increasing rearing costs.
- Calves reared on *ad libitum* milk powder often grow poorly after weaning because they have poor rumen development.

Colostrum

- Colostrum is the best feed source available to newly born calves.
- Technically, colostrum comes from the first milking and subsequent milkings produce transition milk. First milking colostrum has more fat, protein and minerals than milk and contains 22% solids.
- The quality of colostrum declines rapidly after the first milking and by day 3 after calving, transition milk is very close to milk in composition.
- Although the antibodies in colostrum are only absorbed for the first 24 hours of a calf's life, continued feeding of colostrum and transition milk can still have huge benefits. Even slightly higher immunoglobulin levels appear to have beneficial effects within the gut and can offer some protection against pathogens such as rotavirus if the cow has been vaccinated.
- Colostrum has a higher feed value than milk and, depending on the size of the calf, 3-4 litres daily is usually sufficient for the young calf if it is also being fed meal. Colostrum that has blood in it should be fed fresh. Colostrum can be fermented with yoghurt and stored (chilled for up to one month or frozen).

Whole milk

- Cows' milk contains around 12.5% solids, has a high energy value and the correct balance of nutrients. Calves fed on whole milk generally have fewer health issues than calves fed on powdered milk. There is plenty of on-farm evidence that the best feed for calves is colostrum and fresh, warm whole milk.
- Whole milk and colostrum can be preserved by acidification with formalin (20 ml/10 litres) or citric acid (1.5 g powdered citric acid/10 litres) or adding yoghurt before storage. Use 1 sachet or 1 litre to 20 litres of colostrum, let it age and then use it to seed the next batch of colostrum.

Milk powders

- Calf milk replacers are generally fed when whole milk is not available (or is too expensive to feed). Milk powder is used to rear many of the 500,000 Friesian bull calves reared each year and sometimes used to finish off the rearing of heifer calves once colostrum and transition milk has finished.
- Milk powders usually contain 24% protein and On-Farm Research product surveys have shown this can range from 22 to 29%. The fat content is typically 22% but with a range from 17 to 23%. Unfortunately the labelling on NZ milk powders is poor, with many indicating minimum rather than actual specifications. It is difficult for rearers to make value judgements on milk powders as there is no information on the actual ingredients used. Phrases like 'proven blend', 'leading brand', 'premium product' are not very helpful to the discerning calf rearer. By contrast, European labelling requirements provide much more detail as shown below.

Friska Sød	
Mælkeerstatning som fuldfoder til kalve	
Indholdsgaranti	Tilsætningsstoffer:
146,00 FE pr. 100 kg	Garanti i.E. pr. gram/mg
24,00 % Råprotein	pr. kg:
19,00 % Råfedt	26,00 I.E. A-vitamin
6,80 % Råaske	3,00 I.E. D ₃ -vitamin
0,01 % Træstof	273,00 mg Alfa-tokolerol **)
1,80 % Lysin	10,00 mg B ₁ -vitamin
0,60 % Methionin	8,00 mg B ₂ -vitamin
0,25 % Cystin	6,00 mg B ₆ -vitamin
1,12 % Threonin	20,00 mg D-Pantothensyre
	300,00 mg Cholin-klorid
Råvarer	0,03 mg B ₁₂ -vitamin
60,25 % Skummetælkpulver	35,00 mg Nicotinsyre
17,55 % Vallepulver	0,28 mg Folsyre
17,50 % Vegetabilsk fedt	0,10 mg Biotin
3,00 % Hvedestivelse, prægelatineret	10,00 mg C-vitamin
1,30 % Forblandning *)	30,00 mg Mangan(II)-oxyd
	100,00 mg Fe i form af Jern(II)-sulfat, heptahydrat
	15,00 mg Cu i form af Kobber(II)-sulfat, pentahydrat
	0,30 mg Co i form af Kobolt(II)-sulfat, heptahydrat
	100,00 mg Zn i form af Zinkoxyd
	0,30 mg J i form af Calciumjodid, vandfrit
	0,40 mg Se i form af Natriumselenit Calciumformiat
	Tilsat Ethoxyquin (E 324)
Produktionsnr.: Se sækkeetik	
Fremtillet: 6 måneder før udløbsdato	Mindst holdbar til: Se sækkeetik
Nettovægt: 25 kg	Yderligere oplysninger: Se bagsiden
CE DE 46 3 57001	

Composition
 24% Protein
 19% Fat
 6.8 % Minerals
 0.01% Crude fibre
 1.8% Lysine
 0.6% Methionine
 0.25% Cystine
 1.12% Threonine
 60.25% Milk Powder

- Most New Zealand made milk powders are formulated from by-products of dairy processing (e.g. whole milk powder, skim milk powder, whey powder, butter milk powder) along with added fats, vitamins and minerals.
- Milk powders containing a reasonable percentage of skim milk powder or whole milk powder will contain casein proteins and should curd.
- In recent years, whey milk powders have been imported from Europe. These have no casein proteins and will not curd. Skim milk powders which have had excessive heat treatment have had their casein proteins denatured and will also fail to curd.
- Although these non-curding milk powders are generally cheaper, they are not really suitable for very young calves.
- Non-curding milk powders are suitable for older calves (e.g. 2-3 weeks old) and for feeding once colostrum and transition milk has finished.

Curd Test

- Because labelling on milk powders is poor, it is often difficult to determine whether milk powders are made of casein or whey proteins. For this reason we suggest a curd test - a milk powder is unlikely to curd unless it contains a significant amount of skim or whole milk (probably 60-70%).
- Make up 500 ml of the milk powder you wish to test, as per the instructions on the bag. Keep at 39°C (set the oven and use a thermometer) and add 5 ml of rennet. A good curd should have formed within 20 minutes.
- Do the same with some ordinary (blue top) milk so you can see what a really good curd should look like - though it is very unlikely that any milk replacer will curd as well as whole milk.

