

Feeding colostrum, milk, milk powder

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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 % Skummetråkødpulver | 35,00 mg Nicotinsyre |
| 17,55 % Vallepulver | 0,28 mg Folsyre |
| 17,50 % Vegetabilsk fedt | 0,10 mg Biotin |
| 3,00 % Hvedestivelse, prægelatiniseret | 10,00 mg C-vitamin |
| 1,30 % Forblandning *) | 30,00 mg Mangan(II)-oxyd |
| | 100,00 mg 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 Natriumseleat Calciumformiat |
| | Tilsat Ethoxyquin (E 324) |
| Produktionsnr.: Se sækkeetik | Mindst holdbar til: Se sækkeetik |
| Fremtillet: 6 måneder før udløbsdato | Yderligere oplysninger: Se bagsiden |
| Nettovægt: 25 kg | |
| CE DE 04 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.



Milk feeding systems

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Research

Key Points

1. Understand the strengths and limitations of the different systems.
2. It is the combination of the system and the people and farm resources that determine the success of a system.
3. Choices include once a day or twice a day, low or high milk volumes.
4. High milk volume systems require twice a day feeding but calves can be let outside early and fed in larger mob.
5. With high volume milk systems calves need to be older before they can be weaned.
6. Low milk systems require calves to be kept inside until weaning and the feeding of pellets or meal. But these calves can be weaned between 5 and 7 weeks depending on weight and meal intake.
7. Colostrum and whole milk are generally preferred on dairy farms.
8. Calf pellets or meal encourage early rumen development.



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Calf Rearing Fact Sheet 3.2

General

- There are many systems for rearing calves. Each system has advantages and disadvantages and principles that need to be followed to be successful. It is the combination of the feeding system and the rearer that determine the success of a system. Attention to detail and good observation skills are critical.
- Calves are born with a non-functioning rumen and it is the development of the rumen that controls the age at which calves can be weaned. Calves with a poorly developed rumen cannot digest grass. Pellet or meal intake encourages rapid rumen development and enables earlier weaning.
- Grass is a very bulky feed so even though a calf might have a well developed rumen, it is still relatively small and pellets or meal will still be required until the calf's rumen is large enough for it to digest adequate quantities of grass to provide the nutrients required for optimum growth and good health.

Options

Once a day or twice a day feeding?

- Twice a day feeding requires a higher labour input but means that each calf can be individually checked twice each day (see Fact Sheet 3.3).
- On a high volume milk system calves are usually fed twice a day to reduce the risk of nutritional scours from the large milk volumes used.
- On a restricted milk system, calves are fed twice a day for the first 7-10 days although small calves and Jersey calves are fed for longer (see Fact Sheet 3.4).
- Pellets or meal and clean drinking water must be available when calves are fed once a day.



Low or high milk volumes?

- Low milk volumes require compartmentalised feeders, housing of calves until weaning and the feeding of calf pellets/meal but calves can be weaned off milk between 5 and 7 weeks of age.

- High volume milk systems mean calves can go outside earlier and can be fed using large calf trailers. Less calf pellets or meal are fed.
- Rumen development is slower in high milk volume systems and calves cannot be weaned until they are about 9-10 weeks old. More milk is fed in these systems and reduced rumen development can result in a post weaning check.

Inside or outside?

- Calves on high volume milk systems can be placed outside from as early as one week of age as long as they have access to sheltered paddocks. However cold will increase the energy demands of the calf. A Friesian calf will begin to shiver at 5 °C when there is no breeze or rain. However shivering commences at 12 °C when it is windy and wet. Shivering calves are using energy to keep warm. This energy could be used for growth.
- Calves being fed a low milk system need to be kept inside until they are weaned off milk at 5-7 weeks of age.



Colostrum, milk or milk powder?

- Quality colostrum is best followed by milk, followed by calf milk powder.
- Generally, whole milk or colostrum are the preferred feeds on dairy farms because they are readily available and easy to feed. They are cheaper than CMR (calf milk replacer) and there is no extra work with mixing.
- If a calf milk replacer is fed it is important to feed a high quality milk powder for at least the first two weeks. High quality milk powders are those containing whole milk powder or skim milk powder (see Fact Sheet 3.1).
- The advantage of calf milk replacers is that calves can be fed away from the milking shed without having to transport milk to the calves. Calf milk replacers are often the only option for bull calf rearers without access to whole milk.

Concentrates or not?

- Concentrates include calf meals and pellets. They increase the rate of rumen development and allow calves to be weaned off milk earlier thus reducing costs.
- It can be difficult to get calves to eat concentrates when they being fed *ad libitum* milk. They aren't hungry so don't bother with the meal. It is rather like filling a child up on ice cream and then a parent suggesting they eat cereal!
- If calves are being fed restricted milk and not eating the concentrates, they may be unpalatable. Calves do not like meal/pellets containing palm kernel.

The most appropriate choice will depend on:-

- the facilities available,
- amount and skill set of labour available,
- the required performance and
- the cost.

When reviewing costs it is important to remember that the protein and metabolisable energy in concentrates generally cost only 40 and 60%, respectively, of those in whole milk. It therefore makes good economic sense to have a high proportion of calf diet made up of concentrates.

Milk feeding—high volume

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Key Points

1. Traditional system used on dairy farms.
2. Good live weight gains achieved up until weaning.
3. Calves weaned at around 9-10 weeks at 90-100 kg for Friesians and 70 kg for Jerseys.
4. Uses a lot of milk (average 400 litres/calf) and generally requires a longer period of twice a day feeding.
5. Good growth rates can be achieved.
6. High milk volumes can delay rumen development and can result in a post- weaning check if the calf cannot digest enough grass to meet its energy requirements.
7. Hard to monitor calves in large groups.



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Calf Rearing Fact Sheet 3.3

General

- Traditionally, high volume milk systems are used on dairy farms as colostrum or vat milk is readily available. Mixing not required and seen as a cheaper option.
- High live weight gains can be achieved. To rear a 37 kg calf gaining 0.80 kg/day to 90 kg at weaning at 10 weeks of age on milk requires approximately 400 litres of milk.

Typical system

- There are many variations in terms of how much milk and for how long it is fed, when calves go outside and age at weaning.
- On arrival at the calf shed feed calves 2 litres of first day colostrum and a further 2 litres later. Calves trained to drink off a feeder.
- Calves are fed an average of between three and four litres of colostrum or vat milk twice a day. Milk best fed warmed to 37-39 degrees C.
- Some people feed milk *ad libitum* - meaning that milk is always available. Large quantities of milk can be consumed using this method.
- Calves can go outside from a week old if suitable shelter is accessible and the weather is good. There are benefits in the calves having access back to the sheds as these very young calves are vulnerable to cold.
- Once outside they are generally fed in large groups on a cafeteria pulled behind a vehicle - usually a motorbike. It is important to check all calves are feeding well and this is often difficult with 50 calves to a feeder.
- Calves consume minimal amounts of concentrates, whilst milk intake is high. Rumen development is delayed as a consequence.
- On average, calves are weaned off milk at 9-10 weeks of age.

Advantages

- Can be put outside early. Only a small amount (if any) concentrates are fed.
- As calves are outside early there is reduced exposure to high levels of pathogens.

Disadvantages

- Can get post weaning growth check due to poor rumen development.
- Feed a lot more milk with less control so easier to get nutritional scours as some calves can drink more than their share. More expensive than some other options.
- Less 'hands on' so harder to closely monitor individual calves in larger groups.
- Wean later and feed twice a day for longer so higher labour inputs.

Milk feeding—low volume/restricted milk

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Key Points

1. Milk energy is expensive whereas pasture energy is cheap. However pasture is an inadequate diet for young calves.
2. Pellets or meal (20% Protein) need to be available from day one to promote early rumen development and to transition calves from milk to pasture if early weaning is desired.
3. Feeding restricted volumes of milk to housed calves (i.e. not fed grass) encourages them to eat larger volumes of pellets or meal.
4. Using this system calves can be weaned off milk if they are healthy and have put on at least 20 kg live weight since arriving in the shed and are eating at least 1 kg of pellets per day. This is generally between 5 and 7 weeks.
5. Need to use a compartment milk feeder (see below) to ensure all calves are getting sufficient.
6. Pellet feeding continues after weaning and until the calves are at least 12 weeks old.

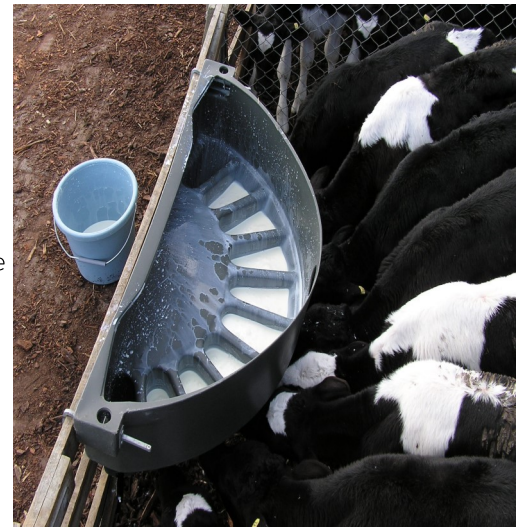
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Calf Rearing Fact Sheet 3.4

General

Milk is the most expensive component of a calf's diet whether it is removed from the vat or purchased as milk powder. Reducing the amount of milk fed and getting the calf onto pasture faster will reduce rearing costs. However, grass does not meet the nutritional requirements of a young calf because the calf's rumen is small and not well developed. Grass is bulky and can be up to 85% water, so it is hard for the calf to consume enough. Feeding calf pellets or meal encourages early rumen development and provides the nutritional bridge between milk and pasture in a low volume/restricted milk system.



| | Days | Small <35kg * | Medium 35kg – 40kg | Large >40kg / calf |
|----------------------|------|------------------|-----------------------|-----------------------|
| Day 1-2 | 2 | 2 x 1 litres | 2 x 1.25 litres | 2 x 1.25 litres |
| Day 3-5 | 3 | 2 x 1l | 1.75 l | 2.25 l |
| Day 6-9 | 4 | 2 x 1.25 l | 2 l | 2.5 l |
| Day 10-12 | 3 | 1.75 l | 2.25 l | 2.5 l |
| Day 13-16 | 4 | 2 l | 2.5 l | 2.5 l |
| Day 17-24 | 8 | 2.25 l | 2.5 l | 2.5 l |
| Day 25-35 | 11 | 2.5 l | 2.5 l | 2.5 l |
| Day 36-42 | 7 | 2.5 l | 2.5 l | Weaned |
| Day 43-49 | 7 | 2.5 l | Weaned | |
| | | Weaned | | |
| Milk replacer / calf | | 22.75 kg | 20.0 kg | 17.35 kg |

*These are typically Jersey calves.

Milk feeding

- Sort and group the calves on weight and age and feed accordingly.
- Calf milk replacer concentrated at **200g milk replacer/litre** from Day 1 (see table) or feed whole milk 2 litres morning and again late afternoon for 10 days and then switch to 3 litres of milk fed once a day for a further 5 weeks. Where restricted milk diets are fed it is **essential** that compartment feeders are used and calf feeding is supervised so that all calves get their entire ration.
- Twice a day feeding can be carried out for longer by spreading the amount over two feeds but it increases labour requirements.
- From day 1 it is essential to have fresh 20% protein calf pellets (or meal) available *ad lib* (i.e. always have some left in the feeder).
- Have fresh straw or low quality hay available.
- Always have clean drinking water available. A good test of this is whether you would drink it!

Weaning off milk

- Calves are best kept in the shed until after weaning. If they are on pasture they will eat pasture rather than the pellets and this will slow down both the rumen development and their growth rate.
- Calves can be weaned off milk if they are healthy, have gained at least 20 kg live weight since arriving at the shed and are eating at least 1kg of pellets or meal per day.
- Calves should be kept inside for a couple of days after weaning off milk so that any calves not eating enough pellets are detected. These calves can then be placed back on milk.

Post weaning

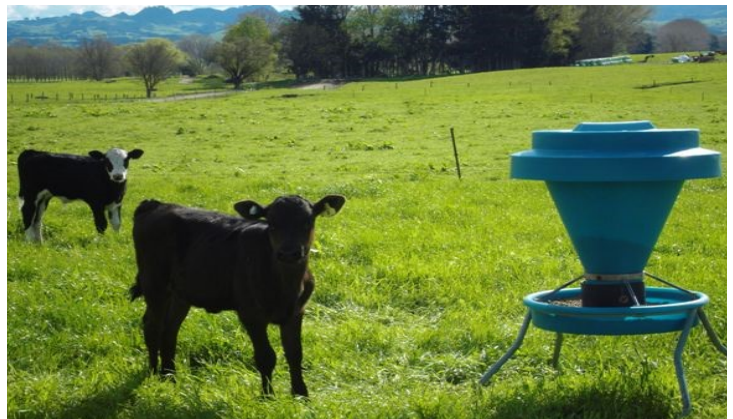
- Pellets can be changed from 20% protein to 16% (protein) if the calves have access to and are consuming reasonable amounts of high quality pasture (green, leafy, clover, growing well).
- If there is good quality pasture available the amount of pellets being fed/ head can be slowly reduced as follows:-

Up to the end of week 8 feed 1.5 kg/head day

Up to the end of week 10 feed 1.0 kg/head/day

Up to the end of week 12 feed 0.5 kg/head/day

After week 12 stop feeding pellets if calves are meeting growth targets.



- If there is not enough quality grass then pellets need to be fed for longer.
- Over summer an alternative feed source may be needed if pasture quality or quantity is limited.

Advantages

- Calves in small groups so easy to closely monitor health.
- Calves can be weaned early.
- Feed less milk in total.
- If done properly reduced likelihood of nutritional scours.

Disadvantages

- Calves need to be kept inside until weaning.
- Keeping calves inside for longer means higher risk of a disease outbreak if hygiene is poor.
- Requires the feeding of high quality calf pellets or meal to encourage early rumen development.
- Calves can look “potty” as rumen develops early.

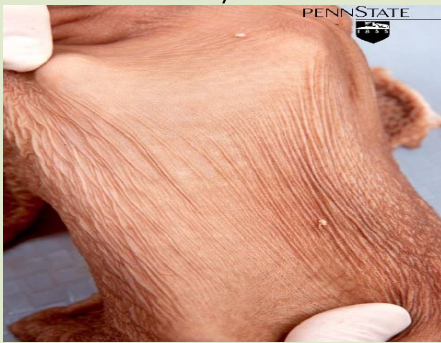
Rumen development

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Key Points

1. The newborn calf can only digest milk. It needs to move to a fully functioning ruminant which can digest a complex diet like pasture.
2. Milk does not develop the rumen. Grain causes much more rapid rumen development than pasture because it stimulates papillae development.

Calf fed milk and hay-



Calf fed milk and grain-



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Calf Rearing Fact Sheet 3.5

Digestion in the new born calf

- At birth the young calf has a simple digestive system with only one of the four stomachs (abomasum) functional. The abomasum in a 40 kg calf can hold 1.5 litres but it expands rapidly to a capacity of 2.5–3 litres within a week.
- Since the calf can only handle a highly digestible milk diet when it is born the digestive tract has to undergo major changes before it can handle a less digestible diet like pasture.

Digestion in the adult

- Diets such as pasture and silage contain fibre that cannot be absorbed directly - it needs to be broken down by microbial fermentation before it can be absorbed. To deal with this fibre, adult ruminants have a large fermentation vat (rumen) which operates at a neutral pH so micro-organisms can digest complex carbohydrates/fibre.
- The lining of a fully functioning rumen is covered in papillae which are finger like projections which greatly increase the surface area for absorbing the nutrient produced by microbial fermentation.

Developing the rumen

- The rumen is small at birth and milk causes no rumen development at all as it by-passes the rumen and goes straight to the abomasum. Soon after birth, the rumen begins to develop a population of microbes. These enter the rumen when the calf nibbles on grass, straw or bedding. The microbes that develop will be those that best digest whatever dry feed the calf is eating.
- Water is important for the growth and multiplication of these micro-organisms and if it is not provided, rumen development is restricted.
- In order for the rumen to become functional, the rumen papillae need to develop. Calves fed grain (or meal) develop a functional rumen much more quickly than calves fed on milk, grass or hay. This is because grain produces butyrate and propionate when fermented and these products develop the rumen papillae. Calves fed on milk and grass eventually develop a functional rumen but the process takes much longer. Thus milk has to be fed for longer and therefore rearing costs increase.
- To optimise rumen development, and achieve successful early weaning, calves need to have a palatable grain based ration on offer as soon as possible (Note: palm kernel is not palatable for young calves).

Weaning

Key Points

1. Base your weaning decisions on calf weights (scales are more accurate than guess work).
2. Transition calves onto clean high quality pasture once meal intake is greater than 1 kg/calf/day.
3. Calves must have access to clean water.
4. Access to shelter for young calves on pasture reduces health risks.
5. Ensure adequate meal intake prior to weaning.
6. Gradually reduce milk over a week.
7. Keep other practices the same during the process of weaning
8. Check animal health procedures—vaccination, parasites, minerals. Consult your vet if necessary.



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Calf Rearing Fact Sheet 3.6

When to Wean

- Under all systems calves need to be growing well prior to weaning. Weaning age will depend on the feeding system used.
- Calves on a typical high volume dairy farm system (see Fact Sheet 3.3) will have slower rumen development and need to be weaned at heavier weights. Dairy NZ targets are 100 kg for Friesian calves, 90 kg for crossbred calves and 80 kg for Jersey calves.
- On a low volume/restricted milk (an early rumen development system - see Fact Sheet 3.4) calves can be weaned earlier. For example, Friesian calves can be weaned at 65 kg, crossbred calves at 60 kg and Jersey calves at 55 kg. These are minimum weights, not the average of the group. All calves need to be eating 1 kg of meal before they are weaned. It is important to remember that if a mob of 20 calves are eating 20 kg of meal, some individuals will only be eating 0.5 kg and will not be ready for weaning. Watch out for these individuals - they will be hollow looking and noisy - and put them back onto milk.

Weaning

- Ensure calves are weaned onto high quality clean pasture. Often paddocks close to the rearing facility are weed infested and used for effluent.
- Plan ahead and prepare high pasture quality for calves. The aim is to encourage intake. Access to clean water is also essential.
- Access to shelter is important. A sudden change in weather or lengthy periods of adverse weather increases the susceptibility to health problems like pneumonia
- Gradually reduce milk over about a week. Do not water down the milk given. The aim is to encourage the calf to replace milk with meal and/or pasture. Increase meal feeding to 2 kg/head/day. Then after 2-3 weeks, slowly reduce the meal available to 1 kg/head/day and down to 0.5 kg/head/day after 4-6 weeks. Continued feeding of small quantities of meal or crushed maize through the summer will maintain calf growth rates.
- Reduce the stress by keeping other things the same and choose your timing regards weather conditions. It is of course best to have a few fine days post-weaning.
- Once weaned calves are settled, they can be moved around the farm ahead of cows to ensure access to high quality pasture.
- Animal health (see Fact Sheet 2.7)

Managing the summer

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Key Points

1. Achieving target growth rates is often difficult over summer because of poor summer feed quality. Calves reared on a high milk volume system fare worst because of insufficient rumen development .
2. Silage is just a substitute for pasture and is often of insufficient quality to maintain summer growth rates in young calves.
3. High energy supplements can be used but must be introduced slowly. Calves fed 1 kg of palm kernel and 1 kg of crushed grain grew at 0.9 kg/day compared to calves fed pasture alone which grew at 0.6 kg/day.
4. Calves on forage rape (Winfred) can grow at 1 kg/day provided they have 3 weeks to adapt to the crop and they are not forced to eat into the stems.



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Calf Rearing Fact Sheet 3.7

What is the problem?

- Milk feeding is only part of calf rearing. After weaning a young calf needs high quality feed well beyond weaning as the rumen is simply not big enough to cope with much roughage – and roughage is often what they have to contend with over their first summer. Feed which is drying off and going to seed is rapidly declining in energy. The end result is poorer energy intake and slower growth rates.
- Calves which have been reared on high milk volume systems with little meal often fare worse over their first summer (than those reared on low milk volume/high meal) . This is because although milk is a great energy source it does not actually stimulate rumen development. On the other hand, the grain in meals encourages the growth of the papillae which line the rumen wall and absorb the products of rumen digestion. Calves with good rumen development may not be as heavy or look as round as calves which have been fed a lot of milk but they are better placed to handle poorer quality feed.
- The same issues apply to bull calves and many bull finishers hold off their calf purchases until the autumn – so they can buy calves that someone else has battled through the summer. With bull calves there is an obvious gap between when calf rearers need to sell their calves (late spring) and when finishers want to buy (early autumn) which creates ongoing problems in the bull beef supply chain.
- Calves can potentially grow at 1.3 kg/day over their first summer – to achieve this requires an impractical ration of *ad lib.* lucerne hay and pellets containing by-pass protein. But even on good quality summer pasture, calf growth rates are typically 0.55-0.65 kg/day.
- A Friesian dairy heifer weaned at 100 kg on the 30th November should be 185 kg on the 1st April. But if it only grows at 0.5 kg/day over the summer it will be 25 kg behind its target weight.
- Live weight penalties incurred over the first summer can be recovered before mating but only with very good management and supplementation.

Brassicas

- Feeding a brassica crop is one of the most cost effective way of ensuring good calf growth rates – particularly in a summer dry area.

Brassicas (continued)

- Forage rapes provide the best fit as they can be grazed early yet are capable of carrying a bulk of feed into the summer. There are cultivar differences in growth and animal performance but Winfred has consistently given good animal performance and can be grazed 85 days after sowing.
- On all brassica crops, calves need time to adapt to what is a complete change of diet (3 weeks seems sufficient). This means that growth rates will be slow initially after calves are introduced to a crop. In two different experiments, calves on Winfred grew at 0.6 and 1.0 kg/day over the first 3 weeks and 1.1 and 1.2 kg/day over the second 3 weeks. To achieve this level of performance, calves need to be rotationally grazed and moved once they have eaten the leaf off the crop. If they are pushed to graze into the stem they won't grow as fast and brassica re-growth will be compromised.



Feeding supplements at pasture

- Calves can be fed silage but this is just a pasture substitute. Higher growth rates often require higher energy supplements. The advantage of supplements is that they can be used on an as-required basis whereas brassica crops require planning and having land that can be taken out of grass.
- In a series of experiments feeding supplements to pasture fed calves, growth rates were typically increased from 0.6 kg/day on summer pasture to 0.75 kg/day with 1 kg of supplement (25% of total ration) and to 0.9 kg/day with 2 kg of supplements (50% of total ration). Supplements used were typically a mix of 50% crushed maize and 50% palm kernel. While palm kernel has palatability issues for very young calves, this does not appear to be an issue once calves are older than 3 months.
- Calves need to be adjusted to supplements gradually to avoid dietary upsets and potential acidosis. However this is not an issue if the summer feeding supplementation is simply a continuation of the rearing and meal feeding programme.

