Calf rearing using a once-a-day milk feeding system: current best practice

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Abstract

Beef produced from bulls of dairy origin constitutes a significant component of total beef production, with up to 700,000 calves reared annually. These calves are reared on a wide range of artificial rearing systems although once-a-day milk feeding of calves has become the norm in recent years.

Successful calf rearing can be achieved by attention to detail and by essentially "following the recipe". This paper will outline the "best practice" calf rearing undertaken at Poukawa and cover the critical areas of calf rearing such as rearing facilities, calf procurement, milk and meal feeding, weaning, post weaning management and animal health.

Keywords: animal health, calf rearing, once-a-day feeding, procurement, rearing facilities

Background

Continued premiums for manufacturing beef over prime beef have led to the development of a specialised industry concerned with the rearing of calves of dairy origin. Depending on the beef schedule, between 400,000 and 700,000 such calves are reared annually. The profitability of calf rearing depends on the purchase price of 4-day-old calves and the input costs of calf milk replacer and proprietary meals. A comparison of different calf rearing systems in 1996 (Muir *et al.* 2000) found that there was a wide range of costs associated with various calf rearing regimes and this work provided the impetus to continue calf rearing research at the Poukawa Research Station. Since then approximately 2500 calves have been reared through the research facility and this has provided the opportunity to refine the once a day calf rearing regime.

Rearing facilities

In recent years some rather novel and low cost calf rearing facilities have evolved, often using low cost materials such as UV resistant plastic and shadecloth. The capital costs of erecting these facilities can be as little as \$35 per calf. Irrespective of the type of construction there are several general comments which apply. Facilities should have:

- Good drainage
- Dry weather vehicle access for calf unloading and milk feeding
- Clean and dry pens with fresh bedding (barkchips/ sawdust) added regularly

- A covered area of approximately 1.5 m² per calf
- · No draughts at the level of the calves
- Adequate ventilation at a high level. An enclosed shed without ventilation will lead to ammonia build up and can result in pneumonia.

Calf procurement

Calf procurement should be relatively straightforward—a healthy calf which is four days old and which has been fed at least 2 litres of colostrum. Rearers who are aiming to on-sell their calves to finishers need to ensure that the calves they rear are suitable for the purchasers. There is considerable prejudice in the industry against Jersey cross calves in spite of the relative profitability of these animals (Muir et al. 2001). Thus if calves are to be sold as weaners it is important to ensure that calves have the right markings. Coat colour is less of a consideration if the calves are being retained and finished by the rearer.

Our experience is also that light calves tend to grow slower and have more animal health problems. This is probably because some of these calves may be premature, or with either heifers or low mature size bulls as parents. As a general rule, we specify that a rearable Friesian calf should be over 40 kg and ideally never under 35 kg. A sample of 763 Friesian calves were weighed immediately on arrival at Poukawa and following transportation of between 6 and 8 hours. The average liveweight was 43 kg with approximately 20% of calves under 40 kg. Only 5% of Friesian calves have been under 35 kg when delivered.

Rearers in a dairy area are able to select and purchase their own calves from dairy farmers whereas rearers in non dairy areas (e.g. Hawkes Bay) have to rely on agents to purchase and supply their calves. One of the benefits of using agents in dairy areas to source calves is that rearers can obtain large numbers at once - i.e. they are able to purchase their calves in batches. This has benefits in terms of rearing calves of even age and weight, reducing labour requirements and minimising disease transmission from older to younger calves. The downside of calves sourced in this manner is not knowing quite what will be unloaded from the truck. Calves which are outside specifications (i.e. under 35 kg or with colour marking other than what was specified) generally result in problems for the rearer who is endeavouring to onsell their calves. Small calves are often associated with a higher incidence of animal health problems and may have

to be discounted at 12 weeks of age because they are not up to target weight.

Feeding regime

It must be emphasised that there are numerous calf feeding regimes, ranging from *ad libitum* to restricted milk feeding regimes and with many variations in between. The following regime is a reliable, low labour and low cost method by which to rear calves and has been adapted from the once-a-day milk feeding regimes described by Kellaway *et al.* (1973) and Muir *et al.* (2000). The principle of once-a day milk feeding involves feeding a restricted volume of concentrated milk which provides slightly more than the maintenance requirements for a young calf. This provides the incentive for calves to consume a cereal based meal or pellet which has a high potential for fermentation and which in turn brings about the most rapid development of rumen tissue (Brownlee 1956).

Upon arrival, 4-day-old calves are weighed and allocated to pens on a weight basis. Calves are all fed a constant concentration (200 g/litres) of a good quality calf milk replacer (CMR) but at different volumes and for differing periods, depending on their arrival weight (Table 1). Calves are initially fed milk on a twice-a-day basis but this is reduced to once-a-day feeding after 2 - 3

Table 1 Suggested milk regime for once a day feeding.

Day	Small <37kg	Medium 37kg-43kg	Large >43kg
1-2	2 x 1 litre	2 x 1 litre	2 x 1 litre
3-5	2 x 1 litre	1.5 litres	2.0 litres
6-9	2 x 1 litre	1.75 litres	2.25 litres
10-12	1.5 litres	2.0 litres	2.5 litres
13-16	1.75 litres	2.25 litres	2.5 litres
17-20	2.0 litres	2.5 litres	2.5 litres
21-24	2.25 litres	2.5 litres	2.5 litres
25-35	2.5 litres	2.5 litres	2.5 litres
36-42	2.5 litres	2.5 litres	Weaned
43-49	2.5 litres	Weaned	Weaned
Total milk replace per calf (kg)	er 21.8	19.1	16.8

days in the case of medium and heavier calves (>37 kg) and only after 10 days in the case of smaller, Jersey type calves (<37 kg). The maximum amount of milk replacer fed is 500 g/d (Table 1). This will provide 10.1 MJME, 67% of the energy requirements of a 50 kg calf growing at 0.5 kg/day (Moran 1993). This weight of calf will typically be consuming 0.4 kg DM of calf pellets which will provide the remaining 33% of the calf's energy requirement.

From Day one, calves are offered fresh *ad libitum* cereal based pellets (typically 12.5 MJME and 18-20% CP). Calves are kept off pasture for the first four or five

weeks to encourage pellet consumption (Table 2). During this time, calves must have access to a roughage source (barley straw or poorer quality meadow hay) and clean

Table 2 Pellet intake in calves offered ad libitum cereal based based pellets.

	Pellet intake (kg DM)	
Week 1	0.12	
Week 2	0.35	
Week 3	0.65	
Week 4	0.93	
Week 5	1.28	

fresh water. Given free and unlimited access to calf pellets and straw, calves will consume around 10% of their total dry feed intake as straw. This generally amounts to around 2 kg of barley straw by weaning. However calves will waste and trample on considerably more of their roughage than they eat so a figure of around 6 to 8 kg of roughage is generally budgeted for each calf.

Calves can be weaned off milk once pellet intakes of around 1 kg DM are being achieved. This usually occurs at around 4 or 5 weeks of age (Table 2) although it is difficult in a pen feeding situation to identify those calves not consuming sufficient quantities of the pelleted ration. Consequently it is prudent to continue feeding for a further week to ensure all calves have suitable pellet intakes and are ready for weaning.

Weaning and introduction to pasture

Weaning off milk occurs when calves are 63 kg in liveweight and consuming sufficient pelleted feed to meet their maintenance requirements (around 1 kg DM/day of pelleted feed). Once calves have achieved these targets there is no merit in gradual weaning as opposed to "cold turkey" weaning (Muir, unpublished data). Our practice is to hold calves in their pens for 2-3 days after cessation of milk to enable calves to get over the stress of weaning. This also provides the opportunity to identify the occasional calf which is not consuming sufficient pellets. During this time calves are continually fed pellets ad libitum. Calves are then introduced to clean high quality pasture - around 1800 kg DM/ha is considered optimum. The paddock must be sheltered and, ideally, adjacent to the rearing shed. Post weaning, calves are fed a lower cost calf pellet (12.5 MJME; 16% CP) on a restricted basis (1.5 kg DM/head). This level of pellet intake provides 18.8 MJME and is sufficient to meet the energy requirements of a 75 kg calf growing at 0.5 kg/day (Moran 1993). During this time of restricted pellet feeding, access to sufficient trough space is essential otherwise some calves will not receive their pellet allocation. Pellet feeding normally ceases at 10 weeks of age and at 12 weeks of age calves are considered to be

fully adapted to pasture and ready for sale.

On average, medium calves (37-42 kg) consume around 19 kg of CMR up until weaning and 22 kg of high protein calf pellets. From weaning until 10 weeks of age these calves generally consume a further 53 kg of low protein calf pellets.

Calf performance

On arrival at 4 days-of-age a typical Friesian calf weighs 43 kg. Using the rearing system described above, calves have an average growth rate of 0.61 kg/day and average 64 kg at weaning at 5 weeks of age. Between weaning and 12 weeks of age calves have average growth rates of 0.76 kg/day and typically average 102 kg at 12 weeks of age. Our experience is that calves born in autumn and reared on an identical feeding regime are up to 10 kg lighter than spring born calves. Presumably, rearing autumn born calves through winter means that a greater proportion of energy is used for maintenance relative to growth. The reduced energy of winter pasture may also play a part.

Animal health

Calf procurement may involve extended periods of transportation and good practice is to feed a proprietary electrolyte (e.g. Dexolyte, Bomac) to replace lost fluids. At their first feed (of either milk or electrolytes) calves are checked for navel infections and any problem calves are identified with spray marker and treated with antibiotics. Similarly calves which are problem/slow drinkers are grouped into a separate pen for closer attention. Any calf refusing to drink is tube fed its allotted ration of milk or electrolytes.

Failure of calves to receive sufficient colostrum is potentially a major issue facing calf rearers. Many dairy farms remove calves from their dams on a daily basis and approximately 45% to 49% of these are deficient in colostrum. (Vermunt *et al.* 1995; Wesselink *et al.* 1999). If these are not fed colostrum on arrival at the calf shed (i.e. within 24 hours) subsequent mortality can be as high as 42% (Muir, unpublished data).

Scouring is the most visible animal health problem facing calf rearers. Overfeeding causes nutritional scours which frequently predisposes bacterial problems. Scouring is also a symptom of viral and protozoa infections. Faecal cultures are frequently the only way in which the cause of scouring can be identified. It is important if you are battling a large number of scouring calves to find out what type you are encountering and what you can do about preventing this in the future. For all scours, isolate the calf, remove from milk and feed electrolytes to replenish lost fluids. Calves can dehydrate quickly so it is important to feed electrolytes until the calf has shown real signs of improvement. This means

feeding electrolytes at least 3 times a day. There are a wide range of products designed to stop scouring or treat the cause of scouring and inexperienced calf rearers should seek veterinary advice to identify the appropriate treatment.

Coccidiosis can be a problem in young calves but since most calf meals/pellets contain coccidiostats the problem is usually only seen once pellet feeding ceases at or around 10 weeks of age. Coccidiosis normally manifests itself as scouring and poor growth rates. The problem can be minimised by putting calves back on calf pellets and there are currently calf pellets on the market with increased coccidiostat levels. These pellets can be fed at a rate of 0.5 kg/head/day to ensure protection against coccidiosis. Continuing feeding of calf pellets also has a benefit in terms of improving calf growth rates in early summer when pasture quality is declining (Muir, unpublished data). Up until 6 or 9 months of age, combination oral drenches offer the most cost effective protection against gastro-intestinal parasites (particularly Cooperia). However oral combination drenches need to be used in conjunction with a suitable endectocide for lice control.

During the early calf rearing period a broad spectrum virucide (e.g. Virkon S, Antec International) is sprayed around the calf pens on a weekly basis. Care should be taken to avoid calves, water troughs and feed troughs. At the end of each season, the calf shed should be fully cleaned out and sprayed with a disinfectant (e.g. Farm Fluid S, Antec International).

In 6 years of rearing at Poukawa, around 2500 calves have been reared with death rates averaging 2.2% between arrival and 12 weeks of age.

Conclusions

Once a day milk feeding in conjunction with restricted volumes of concentrated milk have made the artificial rearing of calves a relatively simple process. Nevertheless the following points are associated with successful calf rearing and need to be addressed by the prospective calf rearer:

- Plan ahead and have facilities, milk replacer and meal ready before the calves arrive.
- · Housing needs to be clean, dry and draught free
- · Select the right calves
- · Segregate age groups
- · Use good quality milk replacer
- Observe your calves and anticipate animal health issues
- · Get on top of problems immediately

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