

## Calf-rearing systems on dairy farms and specialist calf rearing units: results of a New Zealand survey

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### Abstract

Calf-rearing practices were surveyed on 297 dairy farms with an average of 82 heifer and 24 bull calves reared. Only 21% of the properties fed colostrum immediately on arrival at the dairy shed, and 30% did not feed their calves for at least 8 hours after pickup. Rearing systems were highly variable although most fed twice a day on high milk volumes. Many (40%) did not know how much milk they fed to their calves and for those who did, the average was 316 litres per calf. Calves were weaned off milk at an average of 9.7 weeks. Calf-rearing practices were surveyed on 100 bull-calf-rearing properties rearing on average 259 calves annually. Larger rearers (>600 calves) tended to feed whole milk whereas smaller rearers tended to feed calf-milk replacers. Most rearers fed milk once a day and fed an average of 155 litres/calf over rearing. Calves were weaned at an average of 6.5 weeks. Bull-calf rearers feed to a weight target and a budget which resulted in a greater focus on performance and feed costs. Dairy farmers could significantly reduce both costs and time inputs by monitoring performance, feeding milk once a day and weaning earlier.

**Keywords:** calf rearing; dairy farm; specialist calf rearers; systems

### Introduction

A significant amount of beef (~65%) is produced from the dairy industry as cull cows, dairy heifers and bull beef (Schreurs et al. 2014). Typically, dairy heifers are reared within dairy farms and bull calves on-sold for rearing within the bull-beef industry. Whilst there is anecdotal evidence of differences between the two systems, this has never been quantified. Phone surveys were carried out to examine calf-rearing practices on dairy farms and specialist calf-rearing units

### Rearing on dairy farms

The survey was designed with the assistance of Ian Tarbotton (agresearch) and 297 dairy farms throughout New Zealand were selected at random from an agresearch database and surveyed by phone in October 2004. Both herd managers and calf rearers were surveyed. Herd managers were asked 18 questions about their herd size, cow breed, replacement rate, colostrum sales and the on-farm decision making process. The people who did the calf rearing were asked a different set of 41 questions about their calf rearing experience, feeding, weaning, animal health, general management and animal performance indicators. The average herd size surveyed was 332 cows (range 100-3400) with an average 82 heifer calves (five for sale) and 24 bull calves being reared. Rearers had an average of 19.6 years of rearing experience and 36% were female. Colostrum was sold by 18% of the farms surveyed. Of these, 46.3% sold colostrum to other rearers and 53.7% to dairy companies.

#### *Early calf management.*

Most properties (92%) picked up calves on a daily basis. Only 21% fed their calves colostrum immediately on arrival at the shed and 30% did not feed for more than 8 hours after arrival at the shed. A proportion of rearers (35%) said that if the calves did not drink they waited until

the next day before considering taking action.

#### *Milk feeding*

Most rearers (79%) fed twice a day, 15% fed once a day and 6% fed *ad libitum*. Fifty-two percent of rearers reared their calves totally on colostrum, 9% fed only whole milk from the vat and less than 0.5% fed calves totally on reject milk or milk powder. Thirty-nine percent of rearers fed a mixture of the above liquid feed types. Generally, high milk volumes were fed, with an average of four litres for first four weeks and five litres per day for the remainder of rearing. Forty percent of rearers did not know how much milk they used to rear their calves. For those farms that knew how much milk was being fed, calves received an average of 316 litres of milk/colostrum (Fig 1).

#### *Concentrate and roughage feeding*

Most dairy farmers (90%) fed some meal or pellets to their calves, but 43% had no idea how much meal they fed. Those that did, estimated that 60 kg (6.5 – 245 kg) of meal was fed to each calf during the rearing period. The fact that up to 245 kg of meal was fed suggests that in some cases, meal fed over the summer has also been included, so the 60 kg per head may be an overestimate. Only 66% of rearers fed hay/straw/baleage.

#### *Pasture feeding/weaning*

The average age at which calves were introduced to pasture varied from 2 to 91 days with a mean of 29 days. Limitations of shed space and onset of fine weather were the major reasons determining when calves were introduced to pasture. Rearers who felt that their calves did better outside had calves on pasture at an average age of 12 days. Dairy farmers who used calf size as the criteria for putting them out onto pasture tended to keep their calves inside for an average of 37 days. The average age for weaning off milk was 9.7 weeks but varied from 3 to 24 weeks (Fig 2). Whilst weight was cited as the major criterion for weaning,

only 28% of dairy farmers had liveweight targets and 12% had scales for weighing calves.

#### *Animal health*

Scouring was identified as the major health issue by 53% of dairy farmers while 26% felt that they did not have any health issues. Across all farms, it was estimated that 11% of calves scoured. Those that identified weather as their main problem also had the highest level of scouring. A high proportion of rearers (78%) said they had not called a vet in the 2004 rearing season. Less-experienced rearers were more likely to have called a vet, but even the more experienced rearers called a vet when serious issues (e.g., rotavirus or *E. coli*) occurred. The mean death rate was 3%, however, there were significant discrepancies between the number of calves reared and number of replacements actually needed for the herd, suggesting that this figure may not be accurate.

#### *Rearing costs*

A high percentage (20%) of those surveyed did not know what it cost to rear a calf. The average cost estimated by the remaining rearers was \$134 with a range from \$35 to \$400. Yet from the data collected in this survey it is clear that the actual costs are likely to be higher. The average dairy farmer fed 316 l/milk and 60 kg meal to each heifer calf. There was an opportunity cost of feeding colostrum/milk to heifers as it could have been sold as colostrum or vat milk or even surplus milk to a calf rearer. Little consideration seemed to be given to inputs such as tags, animal health, bedding, interest, power and labour.

### **Calf rearing on specialist calf-rearing units**

A phone survey of 100 active calf rearers selected at random from the Poukawa database was conducted in October 2005. There was an overlap of the survey questions between the dairy farming questionnaires in 2004 and the specialist calf rearers questionnaires in 2005. However, there were additional questions added which were relevant to specialist rearers. On average 259 calves were reared annually. Only 38% of rearers were female and only 8% of all rearers surveyed were under 40. One of the outcomes of this survey was the large turnover of rearers who had exited the industry – around 20% each year. These were typically small rearers (rearing an average of 115 calves) and they cited lack of time and profitability. The average time in the industry for those still actively rearing calves was 13.1 years. Most rearers (78%) sourced the majority of their calves directly from dairy farmers. The least-favoured option was purchasing at saleyards, as this was more expensive and carried an increased disease risk.

#### *Milk feeding*

Larger calf rearers (averaging more than 600 calves) fed colostrum/whole milk or a combination with milk powder. Smaller rearers tended to feed calf-milk replacer. A significant number (45%) of the rearers feeding colostrum/

whole milk were milking their own cows. The remainder purchased colostrum and milk off dairy farmers. A small number of rearers (5%) used nurse cows and tended to rear fewer calves (50 calves on average).

Specialist calf rearers were very clear about how much milk they fed: 71% fed milk once daily and an average of 155 litres per calf (Fig 1). Some 18% of rearers surveyed had used whey-based powders with young calves (i.e. from four days of age). Of those surveyed, 72% had had difficulties with whey and the most-cited problems were slow growth rates and an increased incidence of scouring. Those rearers who had fed whey milk replacers to older calves were generally happy with the result.

#### *Concentrate and roughage feeding*

Meal was introduced early (generally immediately on arrival) (Fig 3) and rearers were able to wean earlier (6.5 weeks). All rearers fed some meal and on average, 64 kg/calf was fed with a range from 12.5 to 126 kg. While 88% fed some sort of roughage it was generally fed *ad libitum* with no measure of the amount fed.

#### *Pasture feeding/weaning*

On average, calves were kept inside for 29 days and weaned at 6.5 weeks of age (Fig 2). Some (46%) followed a more traditional dairy-type system and put their calves outside at 21 days on average, weaned at 56 days and fed 183 litres of milk. These rearers generally liked to get their calves onto pasture early and the timing of this timing was affected by shed space and weather. The other 54% of the rearers put their calves outside at 36 days of age, weaned at 43 days of age and fed 131 litres of milk. The timing for these calves going onto pasture was mainly affected by weight and age of the calf.

The larger the rearer, the more likely they were to have clear production targets. Some 40% of specialist calf rearers used scales to monitor weight gain and to determine weaning age. Rearers who monitored calf weight gains weaned a week earlier than rearers who used weigh bands or “eyeball assessment” to assess weaning time.

#### *Animal health*

Overall the mean death rate was 1.7% with the majority of deaths being attributed to lack of colostrum and/or scouring. There was a wide range in what rearers classified as scouring from loose faeces to only recording when treatment was needed. There was also a wide range in treatment points from treating at the first sign to only treating if the problem didn't resolve itself. The erratic nature of these health events and the ability/experience of rearers to be able to diagnose the cause of the problems made it difficult to get an accurate health picture. Many health problems were kept under control by monitoring and management, e.g., cryptosporidia and navel infections. However, 37% of rearers reported outbreaks of rotavirus and 18% of salmonella. Although these outbreaks occurred spasmodically they tended to have major consequences when they did occur and were one of the reasons cited as to why rearers had stopped rearing calves.

An extensive range of supplements and additives had been tried by calf rearers. Generally, for every rearer that felt a particular product worked, there was a rearer who felt the same product did not work.

*Rearing costs*

While rearers generally knew how much milk and pellets they fed it was hard to get a cost of calf rearing from them as they considered this to be commercially sensitive information. Many of the larger rearers used their size to negotiate discounts.

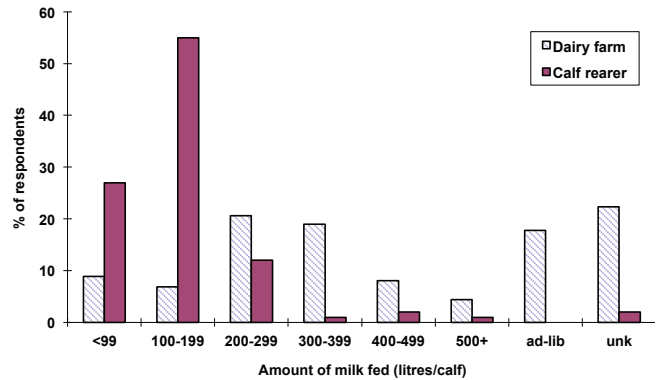
**Discussion**

Current practice within the New Zealand dairy industry is to remove calves from their dams at a fixed time each day which results in a significant proportion of calves having insufficient colostrum (Edwards et al. 1982; Vermunt et al. 1995). Calves with low colostrum intakes had significantly more animal health problems and a higher mortality rate (Nocek et al. 1984; Robison et al. 1988; Boyd 1972). Muir et al. (2006) found slower growth rates to weaning and death rates of 42% in calves that had inadequate colostrum (GGT levels below 200 iu/l; Wesselink et al. 1999). Best practice on dairy farms is to feed high-quality colostrum when calves arrive at the dairy shed. Yet when this survey was conducted, 21% of dairy farms followed best practice and 30% waited for more than eight hours to feed colostrum. Particularly concerning was the 25% who waited until the day after pick-up before dealing to a calf that wouldn't drink. The first few hours after birth are critical for absorbing the antibodies in colostrum across the membrane of the calf's gut. After six hours this ability to absorb intact antibodies reduces and by 36 hours this mechanism of transferring disease protection from the dam ceases (Edwards et al. 1982; Besser & Gay 1994; Lacy-Hulbert et al. 1996). However, in recent years there has been a greater focus on colostrum feeding and it is likely that industry practices have improved significantly since this survey was undertaken.

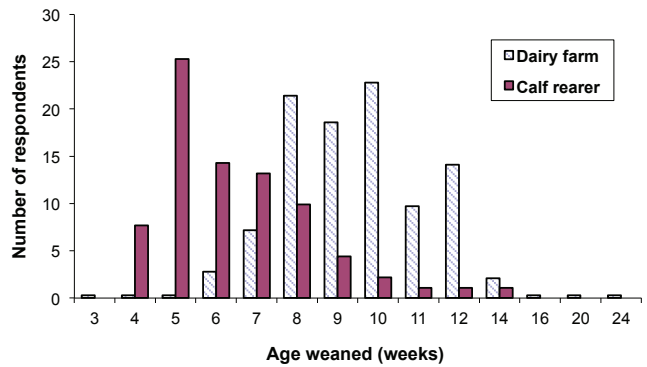
Rearing systems and milk-feeding practices were highly variable, but particularly on dairy farms (Fig. 1). Compared to specialist calf-rearing units, calves on dairy farms tend to be fed milk twice daily, are reared on a high-milk system (316 vs 155 litres of milk/calf) and fed milk for longer (9.7 vs 6.5 weeks) (Figs 1,2). Restriction of shed space on many dairy farms meant that calves tended to be put out onto pasture earlier, whereas specialist calf rearers would tend to "build another shed". Keeping calves housed has benefits in getting calves adapted to meal, which is a key strategy in earlier rumen development and enabling earlier weaning off milk. Most (92%) of specialist rearers had concentrate meal on offer in week 1 whereas only 23% of dairy farmers offered meal in the first week (Fig. 3). The combination of feeding high volumes of milk, early introduction to pasture and slower meal uptake all combined to delay weaning on dairy farms.

Labour inputs associated with calf rearing were not

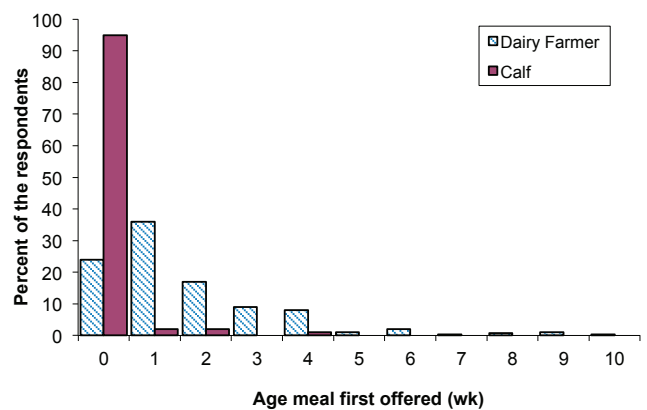
**Figure 1** Amount of milk fed to each calf by dairy farmers (2004 survey) and specialist calf rearers (2005 survey) in New Zealand.



**Figure 2** Calf age at weaning on dairy farms (2004 survey) and on specialist calf rearing units (2005 survey) in New Zealand



**Figure 3** Age (weeks) at which calves are offered concentrates by dairy farmers (2004 survey) and on specialist calf rearing units (2005 survey) in New Zealand.



quantified but it seems likely that labour inputs per calf will be significantly greater on dairy farms – calves are fed twice a day and are fed milk for an additional 3 weeks.

Only 12% of the dairy farmers surveyed weighed their calves, yet 40% of specialist calf rearers (typically larger rearers) used scales to monitor calf performance and this enabled them to wean a week earlier than rearers who didn't weigh or used weigh bands. Calf rearers are focused on cost

because their margins are typically squeezed between the purchase of four-day-old calves from the dairy farmers and the sale of 12-week-old reared calf to beef finishers so they are highly focused on cost. It could be argued that dairy farmers have less need to be concerned about cost because they are feeding surplus colostrum. However, colostrum invariably runs out and then vat milk needs to be fed, as calves are unable to be weaned as they have insufficient rumen development when they have been sustained by a high-volume milk system. As a result, milk that would normally be sold is fed to calves, thus decreasing income from milk. It would seem that many dairy farmers would benefit from monitoring their calf performance as well as adopting some of the techniques employed by specialist calf rearers.

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