

# Rearing replacement heifers, a cost, or an investment?

## Key points:

- Rearing heifer calves as fast as possible up to weaning has a massive impact on the lifetime productivity of that cow.
- International research shows that a 22% variation in the first lactation milk yield can be attributed to how fast calves grow before weaning.
- A review of heifer weights in the national database found: 73% of heifers were more than 5% behind their liveweight for age targets at 22 months.

## Well grown heifers:

- Have improved milk production
- Have greater lifetime productivity
- Have reduced replacement costs
- Need to grow at 700gms (Friesians) 500gms (Jerseys) a day every day of its life until it's fully grown.
- Heifer diets need enough energy (10.5 MJ ME/kg DM or higher) and protein to achieve target growth rates.
- Heifers require adequate mineral levels and available water.

## Cost or investment?

Raising replacement heifers is often looked upon as a cost to a farming operation but is this the right way of looking at them?

Undoubtedly rearing calves into heifers is a major investment in terms of money and labour but they represent the future of your dairy herd so they should be looked upon as an investment, but how well they are grown and their body condition at first calving has a big impact on the return on that investment.

Your dual aims are to turn your heifer into a strong, productive dairy cow and to use labour, housing and feed efficiently. If you achieve these aims, you will cut the costs of rearing per kilogram of milk.

## Well grown heifers

- **Have improved milk production**  
Heifers reaching target liveweight will produce 8.5kgMS more in their first lactation than if they are 10% below target liveweight.
- **Have greater lifetime productivity**  
Heifers reaching target liveweight will have 5% better 6wk in-calf rates and 1.5% lower empty rates. This equates to \$35 economic benefit per heifer compared to heifers 10% below target liveweight.
- **Have reduced replacement costs**

Using InCalf data for a mob of 50 heifers, the potential gain to move them from 10% under target liveweight to achieving targets is \$3875 at a \$5/kgMS milk price.

The key to reaching target liveweights at first lactation is growth rate pre-puberty.

Nutrition pre-puberty (before 50% mature liveweight) is where skeletal growth is influenced, if R2 heifers are significantly shorter than mature cows pre-calving it will be due to feed management pre-puberty.

**Pre-weaning:** The objective of calf rearing is to deliver an in-calf Heifer ready to express her genetic potential, not to just reach 100kg quickly and cheaply.

Calf rearing is an important part of the farm business and feeding them enough, so they develop to their full potential is essential.

Research shows that rearing heifer calves as fast as possible up to weaning has a massive impact on the lifetime productivity of that cow.

Vet and sharemilker Nicola Neal, a presenter at the recent South Island Dairy Event (SIDE), quotes international research showing that a 22% variation in the first lactation milk yield can be attributed to how fast calves grow before weaning.

Many New Zealand dairy cows don't achieve their high-producing genetic potential because they aren't fed enough as calves and therefore don't grow quickly enough

"So, when we look at how much time and effort we spend choosing a bull or selecting a cow and all that sort of thing, it is actually vastly more important how fast we grow our calves regardless of what their genetics might look like," she says.

McNaughton and Lopdell (2012) reviewed heifer weights in the national database and found: 73% of heifers were more than 5% behind their liveweight for age targets at 22 months. These results indicate that despite interest in heifers the interest is not translating to well grown stock.

A 35kg calf needs to grow at **700gms (Friesians) 500gms (Jerseys) a day every day of its life until it's fully grown** to get to 90% of its adult weight at two years old

If calves aren't getting as much nutrition as they need, it could just be they're not being offered enough milk because of the way New Zealand pastoral dairy is.

Sometimes, because we're quite time-sensitive, it's a job you're not allowing enough time for, so the calf has five minutes to drink and if it doesn't drink what it needs to drink in that time, well that's the end of that. But the reality is that's not how a ruminant's stomach works,

With once-a-day (OAD) feeding, it's difficult to get enough nutrition once-a-day in calves up to about four weeks, where all of their nutrition is coming from milk.

Some farmers don't feed enough milk because of outdated beliefs about the dangers of feeding too much. In the past there's been a lot of literature around too much milk giving calves the scours, but that's been pretty well debunked and we're feeding calves to survive, not thrive, not necessarily feeding them enough to really get that 600g a day growth that we should be looking for.

That growth rate has to be maintained in the next stage of the calf's life too, as it develops its rumen and over time transitions on to pasture.

The keys to developing a rumen suited to transitioning to pasture are;

- having a nice tasting hard feed ready for them early so they can snuffle around and play with that
- offering them a good, quality protein calf meal and fibre,

The importance of fibre in calves' diet can't be underestimated and actually improves digestion. If you feed calves the right sort of fibre, they eat more meals which seems counterintuitive that if you feed more dry, rough feed that would make them eat more high-energy feed but it is actually a thing.

And if calves have access to fresh, clean water, they'll eat 30% more meals and grow 40% faster, because you can't start the rumen's development without water.

"It's like trying to make a loaf of bread without water. When we think about growing a rumen in a young animal, we're actually encouraging the bugs that are going to be the powerhouse of the cow when she grows and those bugs need water," Neal says.

Having the right type of fibre is important too, with international research showing that a "chaff chop", with 2.5-5cm pieces, is much better than long, stringy hay or straw which tends to "ball-up" inside the rumen.

The dividends, if you get it right and your calves consistently grow at 600g/day, are too good to ignore.

## Impact of age on nutritional requirements.

As heifers grow, their requirements change, and the feeding levels and make-up of their diet should change as well. Matching the type of feed, and its composition, to a heifer's nutritional requirements is key to meeting growth targets. There are three post-weaning nutritional stages:

### Nutritional stages

- **Weaning to nine months of age.** This is a critical stage. Studies have identified that pre-puberty (before heifers reach 50% of their mature liveweight) is when nutrition most affects skeletal growth (1). Focus should be on lean growth (muscle and skeletal) and not overly fat heifers, achieving 30% mature liveweight at six months. Lean growth results in increased frame size while maintaining a consistent body condition score. Improved skeletal development results in taller heifers that experience fewer calving difficulties. Rumen capacity can limit at this age so high energy and high protein diets are critical. Try to capitalise on energy efficiency when heifers are young. For dairy animals typical to New Zealand (2), growth rates from weaning of 0.7 kg/day in Holsteins and 0.5 kg/day in Jerseys are required to achieve target weights. A diet high in energy and protein should be provided, particularly as heifers' rumen capacity may be limited during this stage (see Table 1).

**Table 1.** Energy and protein required by heifers of different liveweights, to meet their maintenance needs and target growth rate.<sup>4</sup>

Liveweight	Energy		Protein
	Maintenance	Growth rate per 1 kg	
Kg	MJ ME/day	MJ ME/day	%
100	19	17	17
150	26	24	17
200	32	28	17
250	37	29	15
300	42	31	15
350	47	39	14
400	51	40	14
450	55	40	14
500	62	40	14
550	69	40	14

NB. Pregnancy energy requirements are not included.

- From nine months to mating at 15 months of age.** Focus on heifers achieving puberty (43-47% mature liveweight) one to two months pre-mating and continued growth to mating (60% mature liveweight at 15 months) to improve conception rates. During this period, heifers do not require a diet as high in energy and protein as younger heifers; however, they require more feed to meet their maintenance and growth requirements. Heifers should have a progressively increasing feed allocation, particularly when they are due to be mated.
- 15 months of age to 24 months.** Liveweight should be gained over this year targeting 90% of mature liveweight at 22 months and 5.5 body condition score pre-calving. Cow condition reflects how well an animal has been fed for the last 6-8 weeks where body weight relative to liveweight targets is how well the heifer has been fed over her life. At this stage, a feed with a lower energy density can be used to maintain growth rates. Care should be taken in the period coming up to calving. Attempting to make up for lost growth just before calving can result in overly fat heifers (higher body condition) and/or overly large calves. New Zealand farm data (3) indicates that heifers do not typically put on the necessary weight during the autumn before their first calving; the cause of this is unknown.

The below table shows the required daily feed intake

Start weight	DM intake for different rates of Lwt gain (kg/hd/day)			
	0.4	0.6	0.8	1.0
100 kg	2.4	2.8	3.2	3.6
150 kg	3.0	3.4	3.9	4.4
200 kg	3.7	4.2	4.7	5.2
250 kg	4.3	4.8	5.4	5.9
300 kg	4.9	5.5	6.1	6.8
350 kg	5.5	6.2	6.9	7.6
400 kg	6.0	6.8	7.5	8.3
450 kg	7.0	7.5	8.3	9.2
500 kg	7.1	8.0	8.9	9.7

**This table is for feed eaten, feed offered needs to account for wastage.**

**This table does not include walking/ hard hill/ unfavourable weather and is based on feed quality of**

**11MJME/kg.** Add/subtract 10% per MJME for diets below/above. Add additional 5% for rolling to steep land.

**Targets.** The current New Zealand targets can be found in the DairyNZ website heifer liveweight targets. See below for weight for age target guidelines.

Mature weight	Age	Liveweight (kg)				
		420	465	500	550	600
100%	6 - 8 yrs	420	465	500	550	600
20%	3 months	84	93	100	110	120
30%	6 months	126	140	150	165	180
40%	9 months	168	186	200	220	240
50%	12 months	210	232	250	275	300
60%	15 months	252	279	300	330	360
80%	19 months	336	372	400	440	480
90%	22 months	378	419	450	495	540

### Why meet targets?

All targets are important, but the two crucial targets are 60% of mature liveweight at first mating and 90% of mature liveweight at first calving.

Puberty onset is determined by liveweight. Friesians reach puberty around 45-55% of mature liveweight. Reaching puberty at least 2 cycles before mating starts leads to improved conception rates (Bryerley et al. 1987). Heifers that reach the 60% of mature liveweight target prior to mating should have had at least 2 cycles prior to the start of mating and be ready to quickly conceive. In a 2009 study of 1100 heifers in the Waikato, 40% of heifers were found to be prepubertal 2-weeks prior to the start of mating (Scott McDougall, pers. comm). Failure to reach liveweight targets may partially explain the poor 'Calving Pattern of First Calvers' commonly seen in Fertility Focus Reports from across New Zealand herds.

## Compensatory growth

It is dangerous to rely on compensatory growth as it varies for each animal. Compensatory growth rarely makes up the difference for mobs to meet target weights and fails to close liveweight gaps. Using supplements and crops when pasture is limited increases the chances of heifers reaching target weight.

## Balancing diets to meet target growth rates

Grazed pasture is the cheapest feed source for growing cattle on most farms.

If pasture quality is good enough i.e. 10.5 MJ ME/kg DM or higher, heifer growth rate targets can be met by using pasture alone, even with Kikuyu if it is leafy.

If pasture quality (due to excessive stem or dead material) or quantity (due to poor plant growing conditions) are lacking, supplementation may be required to maintain heifer growth. Supplements should contain at least 11 MJ ME/ kg DM, and crude protein levels which are suitable for the animal's nutritional stage.

### Pasture characteristics required

To sustain high heifer growth rates, pasture should:

- be between 9 and 20 clicks on the plate meter, or
- 2500 on a sward stick, and
- contain at least 15% clover, and
- be predominantly made up of green and leafy material (low in stem and dead plant material)

## Mineral requirements

Heifer mineral requirements should not be overlooked. These will vary due to various factors, including: forage mineral levels, which will be affected by the soil type and fertiliser applications; supplementary feed utilisation; and the interactions between minerals. For example, selenium deficiency can be an issue particularly on peat soils; sodium may need to be supplemented when lucerne is fed; and as copper is bound by zinc, copper deficiency can become an issue during the facial eczema season as zinc is used for control

*1 Dairy heifer nutrition. Macdonald, KA, JW Penno, AM Bryant, and JR Roche. 2005. Effect of feeding level pre- and post-puberty and body weight at first calving on growth, milk production, and fertility in grazing dairy cows. Journal of Dairy Science. 88:3363-3375.*

*2 DairyNZ 2016. Breed category averages. New Zealand Dairy Statistics. Page 32*

*3 Handcock, RC, TJ Lopdell, LR McNaughton. 2016. More dairy heifers are achieving liveweight targets. Proceedings of the New Zealand Society of Animal Production. 76:3-7*

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*Raising healthy calves. Dairy Farmers August 2021*  
*Dairy heifer nutrition. DairyNZ fact sheet 21*