Benefits of well-grown heifers

Extensive research undertaken in Australia has shown that heifers that reach target weights perform much better in several key areas.

It is important that heifers enter the herd sooner rather than later and produce at a higher level so that the investment in them can be repaid sooner. Better heifers live longer, which means you need fewer replacements to maintain herd numbers.

How much does it cost to rear a heifer?

Modelling undertaken in 2021 in southern Australian systems by Phil Shannon, estimates the cost of rearing replacement heifers is between $1,190/head and $1,718/head excluding the value of the calf at the time of birth. The modelling demonstrated that those heifer rearing operations that focus on reducing the cost of feed while still achieving target growth rates have the lowest overall cost. The breakdown of the cost of rearing replacements under a range of common scenarios are shown in Table 1. This example demonstrates that as more grazed feed is used, the cost of rearing decreases by up to $500/head. Whilst agistment is technically a form of feed cost, an example of full agistment is provided for illustration purposes.

Scenario								
	Zero grazing		40% grazing		75% grazing		Full agistment	
Birth to weaning	$315		$315		$315		$315	
Weaning to 200kg	$239		$187		$142		$208	
200kg to calving	$1,164		$934		$733		$852	
Cost by input (and proportion of total rearing cost)								
Feed (incl milk)	$1,315	77%	$1,034	72%	$787	66%	$208	15%
Agistment	$0	0%	$0	0%	$0	0%	$852	62%
Labour	$140	8%	$140	10%	$140	12%	$53	4%
Vet/animal health	$263	15%	$263	18%	$263	22%	$263	19%
$/kg lwt	$3.12		$2.61		$2.16		$2.50	
Total	**$1,718**		**$1,437**		**$1,190**		**$1,375**	

Table 1 *Estimates for the cost of heifer rearing based on Dairy Farm Monitor Project figures and input from farmers (Shannon, 2021).*

The four scenarios included in the model included:

- **Zero percent grazing;** Representing a business that might keep the stock on farm and feed them on supplement only (a diet comprising concentrate and fodder).
- **40 percent grazing;** Representing a business that provides some opportunity for grazing (40 percent of the diet) and the balance as concentrate and fodder.
- **75 percent grazing;** Representing a business that provides opportunity for grazing (75 percent of the diet) and the balance as concentrate and fodder.
- **Full agistment;** Representing a business that places all stock out on agistment as soon as they are weaned. No supplement is used.

The assumptions behind feed costs are relatively simple. For each example the assumed cost of concentrate and fodder was held constant:

- Concentrate @ $350/tDM
- Fodder @ $300/tDM
- Grazed feed @$125/tDM

Whilst the purchased fodder cost may appear to be high, it is assumed that the fodder required for rearing replacements needs to be of high quality to provide a balanced diet, and to encourage reduced wastage. Additionally, the grazed feed cost used was based on the average cost of direct grazed feed from the 2019/20 Dairy Farm Monitor data. This is a major influencing input. The cost from birth to weaning remains the same in all examples.

A sensitivity analysis which looked at variation in the cost of grazed feed from $78/tDM (representing the lowest cost of direct grazed feed recorded in the 2019/20 Dairy Farm Monitor data set) to $213/tDM (representing the average cost of home-grown conserved feed recorded in the 2019-20 Dairy Farm Monitor data set) was also undertaken and as expected, demonstrated that any change in the cost of home-grown feed can have a significant impact on the overall cost of rearing replacements. The cost variation in the examples outlined in Table 1 were just over $300/heifer.

It is acknowledged that agistment costs are highly variable. In this scenario, the assumed cost of agistment per week was $7/head from birth to 12 months and $10/ head from 12 months to two-years. It is likely that it will become more difficult to secure 'cheap' agistment given.

What is a target weight?

Target weight is assumed to be the weight of a heifer at various stages of her growth to achieve a weight at calving which will maximise her productivity and longevity. Research has shown that the desirable weight at first calving is 85% of mature liveweight. Therefore for a herd with an optimal mature weight of 600 kg, the ideal heifer is 510 kg at the time of first calving.

Each dairy enterprise will have a different management system that will have different mature-cow liveweights. There is a correlation between mature-cow liveweight and average milk production target or potential (see Figure 1, page 21). A simple way to estimate mature-cow weights on an individual enterprise is to look at the dockets when you sell cull cows. Figure 1 can also be used to estimate ideal heifer weight based on annual cow production. For example, in a 6000-litre (440 kg MS) herd, mature-cow weight is likely to be 625 kg, and ideal heifers at calving should weigh approximately 535 kg.

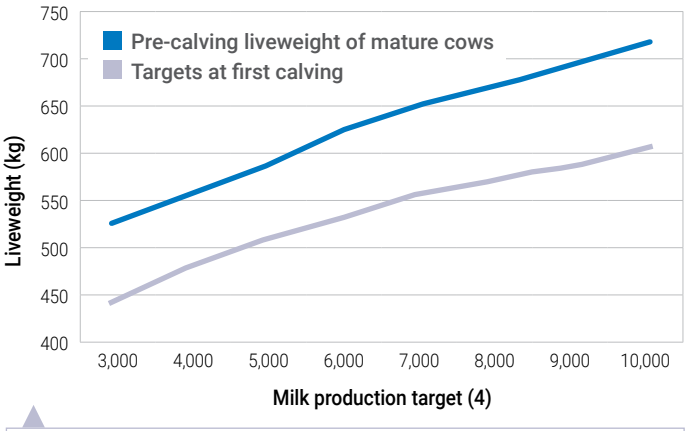

Figure 1 *Correlation between milk production, mature-cow and first-calving liveweight (from Smart 2010).*

Heifer fertility

Liveweight is a much better indicator of when heifers commence oestrous activity (cycling) than age. Heifers which are well grown commence cycling at an earlier age than their lighter herd mates.

Research undertaken in New South Wales showed that the heavier the heifers at 12 months of age, the higher the percentage of heifers that were cycling. 30% of heifers were cycling when they weighed 200 kg compared to 65% when they weighed 260 kg. In New Zealand 90% of Holstein heifers were cycling when they weighed 300 kg.

In seasonal and split-calving herds, heifers can be between 13 and 15 months of age at first joining. This means that all heifers in a group must be grown so that they achieve liveweight targets by the time of joining. In year-round calving herds there is some flexibility in deciding at what age to join maiden heifers; however, it is less profitable to join heifers so that they calve at more than 24 months of age (or 15 months of age at first joining).

Heifers that are grown well get in calf more rapidly. InCalf research (Table 2) has shown that in seasonal and split-calving herds, higher weights pre-calving result in heifers that calve sooner than heifers with a lower weight pre-calving. This means that heavier heifers have conceived at a faster rate than lighter heifers. Measures of three- and six-week in-calf rates increased as precalving liveweight increased (Table 2).

Liveweight at first calving (kg)	3 week in-calf rate %	6 week in-calf rate %
<400	36	79
400–440	49	80
441–470	55	91
471–510	65	90
511–540	53	88
>540	68	94

Table 2 *Percentage of heifers in calf by three weeks and six weeks at different pre-calving liveweights.*

Longevity

Heifers that enter the herd at their target weights will be more likely to survive longer in the herd as milkers. Better-grown heifers calve early in the calving period, get back into calf more quickly and produce more milk. There will be fewer reasons for first-calvers to be culled.

In a study undertaken in year-round herds near Camden, NSW, 33% of first calvers were culled before their second calving. In New Zealand studies, 13.4% of two-year-olds were culled for various reasons. In Northern Ireland, 22% of heifer calves identified as herd replacements never enter the milking herd, while in a United Kingdom study, 11% of replacement heifers were lost before calving and 19% were culled in their first lactation.

Worldwide, it seems that too many heifers are culled too early. This provides a potential opportunity for dairy farmers—reduced culling of heifers results in a need for fewer replacements to be reared, which results in better welfare outcomes and a reduced carbon footprint from the dairy industry. Alternatively, there is greater opportunity to cull older animals for important reasons such as poor milk quality, or for farmers to derive an income from the sale of excess animals.

A second measure of the success of rearing heifers is the ratio of second-calvers to first-calvers. In herds where successful heifer-rearing practices are occurring more than 85% of first-calvers will calve for the second time.

	Extra production from an extra 1 kg liveweight			Extra production from an extra 50 kg liveweight		
	Milk (l)	Fat (kg)	Protein (kg)	Milk (l)	Fat (kg)	Protein (kg)
1st Lactation	4.0	0.18	0.18	203	9.0	9.0
2nd Lactation	8.3	0.26	0.39	415	13.0	19.5
3rd Lactation	8.4	0.33	0.28	422	16.5	14.0
Totals	20.8	0.77	0.85	1041	38.5	42.5

Table 3 *Increase in milk and milk solids due to increased liveweight at calving (from Freeman 1993)*

Key measure	Measurement	Target	Trigger
Age at first calving		24 months	>27 months
Heifer fertility	% calved by 3 weeks	70%	<60%
	% calved by 6 weeks	95%	<85%
First calf heifer fertility	6-week in-calf rate	60%	<50%
	21-week not in-calf rate	6%	>10%
	100-day in-calf rate	53%	<45%
	200-day not in-calf rate	12%	>18%
Production	Relative to mature-cows	>85%	<80%
Longevity	% second calvers to first calvers	>85%	<80%
	% of cows 4–8 years old	>50%	<40%

Table 4 *Recommended measures of replacement heifer rearing performance*