

What is the financial benefit of growing good young stock?

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Key points

- Heifers entering the national herd are on average 11% below target for live weight.
- Under grown heifers produce less milk and achieve poorer reproductive performance than those reaching their live weight targets.
- The cost of these under grown heifers is estimated to be \$105/hd
- The cost to the dairy industry is calculated to be approximately \$120m per year.

Introduction

The importance of good heifer rearing practice has been the subject of many presentations at past SIDE conferences. Authors such as MacDonald & Clark (2009), Taylor (2008), and McNaughton & Voogt (2013) have argued that well grown heifers entering the milking herd produce more milk and have better reproductive performance than poorly grown heifers.

This paper seeks to draw on these papers and others in order to quantify the financial impact well grown heifers have on whole farm profitability and at an industry level. Firstly the paper will review the impact of poorly grown heifers entering the herd on milk production and reproductive performance. The InCalf Heifer Rearing Tool will then be used to assess the financial impact of this under performance at a herd level and extrapolate the cost to the dairy industry.

How are we performing with our young stock?

Liveweight targets for heifers based on Liveweight Breeding Values can be found in The InCalf Book p43 and are presented in Table 1.

Table 1: Target liveweights, by estimated mature cow liveweights from The InCalf Book.

Mature cow liveweight (kg)	400	450	500	550	600
Liveweight Breeding Value (lwtBV)	-103	-53	-3	+47	+97
3 months (18% of mature liveweight)	70	80	90	100	110
6 months (30% of mature liveweight)	120	135	150	165	180
9 months (40% of mature liveweight)	160	180	200	220	240
12 months (50% of mature liveweight)	200	225	250	275	300
15 months (60% of mature liveweight)	240	270	300	330	360
18 months (73% of mature liveweight)	290	330	365	400	440
22 months (90% of mature liveweight)	360	405	450	495	540

The estimated mature liveweight of a heifer is based on the genetics for liveweight she has derived from her ancestry. This is expressed as the animal's live weight breeding value which represents the number of kilograms above or below a base of 503kg an animal is expected to reach at their mature weight (Bryant, 2004).

Expected mature weight = 503 + liveweight breeding value

Weight for age targets are then calculated at various ages as a percentage of the expected mature liveweight. At 15 months of age (first mating) the target is 60% of mature liveweight.

Table 1 represents what we should be aiming to achieve with our heifers.

A comprehensive review of heifer liveweights recorded in LIC MINDA Weights (McNaughton, 2012) found that 73% of heifers entering the national herd were 5% or more below their target liveweight (at 22 months). Figure 1 shows that on average heifer calves are weaned close to target weight and gradually fall behind target and never make up the difference. On average heifers are entering the herd 11% below target liveweight.

Figure 1.

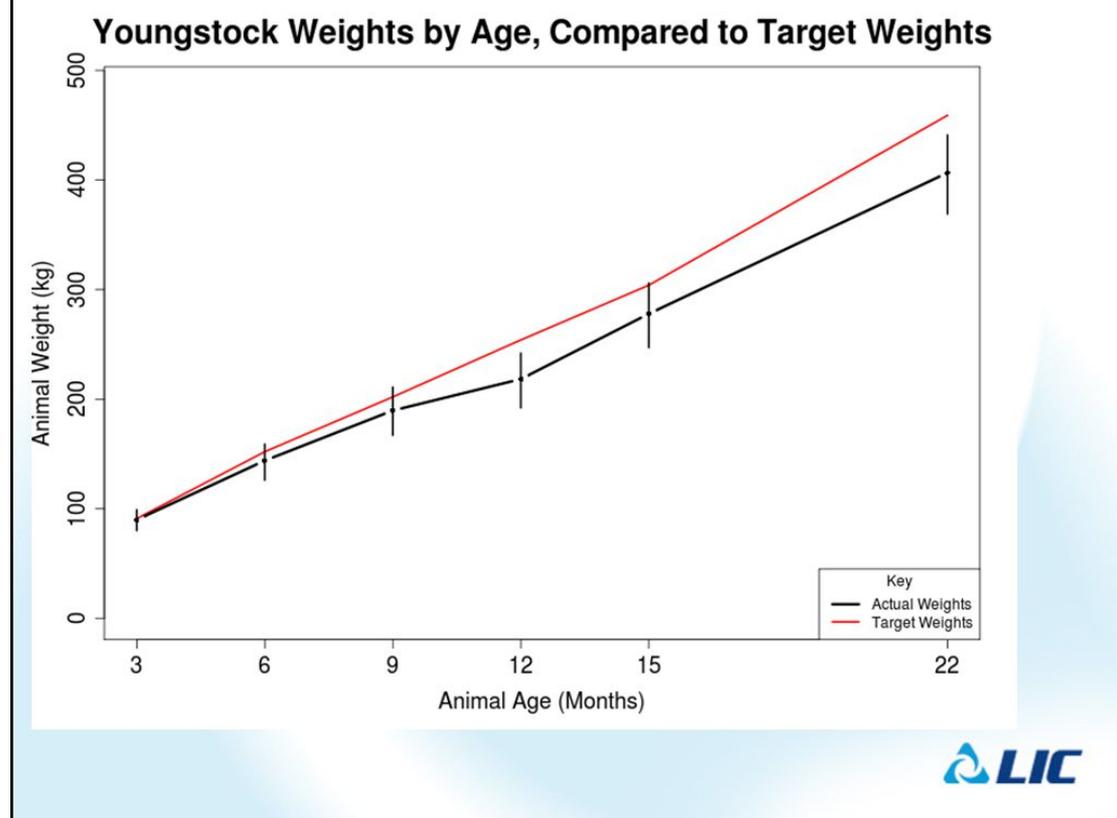
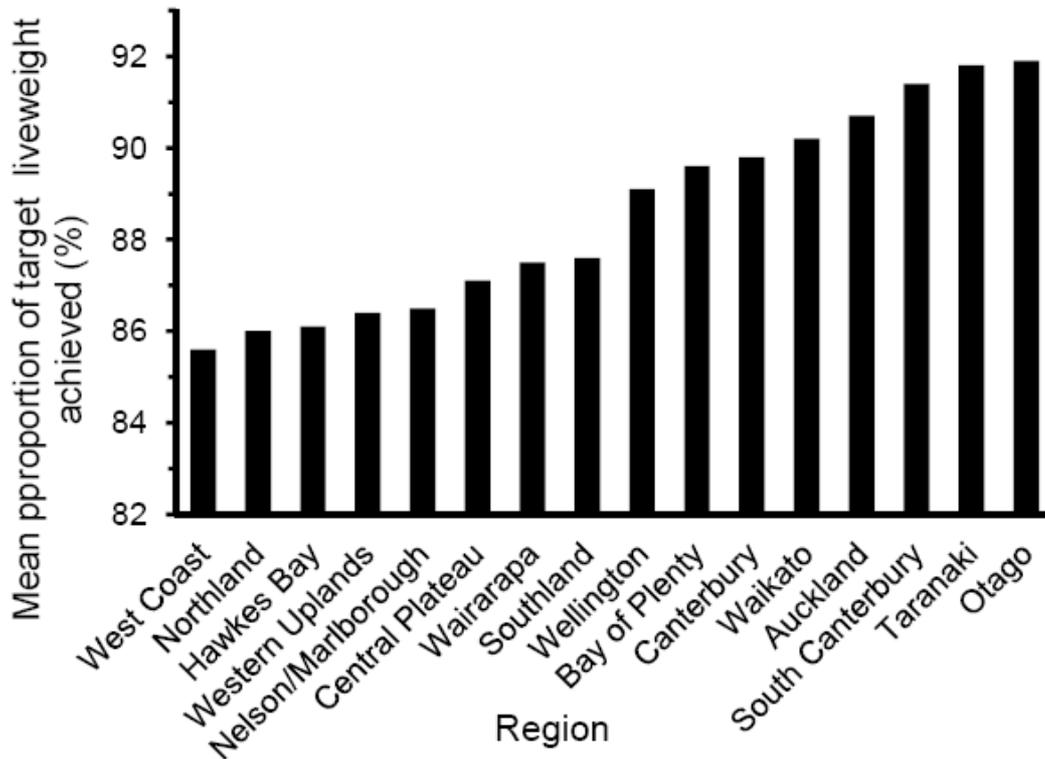


Figure 2 shows that there are regional differences and while Otago and Taranaki perform better no region is achieving the targets.



Source McNaughton 2013

These data confirm that as an industry we are not growing our heifers well enough.

To consider the financial impact of well grown heifers we need to consider the consequences of under grown heifers.

What are the consequences of our current performance?

Heifers that fail to reach target liveweights are likely to produce less milk and have lower reproductive performance than heifers that enter the milking herd at or above target liveweight.

Impact on milk production

Three different approaches are considered to assess the impact:

- Research trial data
- Database analysis
- Energy balance calculations.

Research

The most comprehensive research trial carried out in New Zealand was reported by MacDonald (2009). In this study researchers concluded that for every kilogram below target liveweight a heifer was when she entered the milking herd, 0.25kg milksolids less was produced.

If on average heifers are entering the herd 10% below target liveweight (as found by McNaughton) this equates to 45Kg LW and the consequent impact of milk production would be expected to be 11kgMS less than if they reached target liveweights.

Database Analysis

McNaughton (2012) analyses of LIC records found that heifers entering the herd 10% below target produced around 16kg milk solid less than those entering the herd at target weight. These results were consistent with a similar study completed by van der Waaj (1997).

Energy Balance Calculations

Growth of the heifers is going to occur at some stage (MacDonald, 2009)ie before the start of lactation or during lactation. Results reported from the Waikato trials found that all treatments had similar liveweights after 120 days from the start of the first lactation. This suggests that the underweight heifers made up liveweight difference in the first 120days of their first lactation. If, as found in this trial this recovery of liveweight occurs during lactation this means that energy will be used for growth rather than milk production. In the example shown below for a 50kg LW difference, milk production is expected to be 13kgMS lower.

	On target 450kgLW	Below target 400kgLW
Energy Intake 16kgDM (MJME)*	192	192
Energy for Maintenance including working	60	54
Energy required for growth at 0.4kgLW/day	-	15
Energy available for milk production	132	123
Milk production	1.65	1.54
Milk over 120 days (kgMS)	198	185

*This assumes a constant intake.

We can conclude from each of these analyses that the impact on milk production from heifers entering the national herd 10% below target liveweight is estimated to be 11-16kgMS/heifer in the first lactation.

Impact on reproductive performance

The reproductive performance of replacement heifers is directly related to their liveweight at mating and calving. Lower live weights delay the onset of puberty and these heifers are less likely to have started cycling at the Planned Start of Mating date. They take longer to get in calf and will calve later. Late-calving heifers become late calving cows and this reduces overall herd reproductive performance (Burke et al, 2007).

Onset of Puberty

Puberty onset is determined by live weight and reaching puberty 2 cycles before mating starts leads to improved conception rates (McNaughton, 2013). A Waikato

trial (Penno 1997) found that 20% of heifers grown at below target growth rates were non cycling at the start of mating.

Calving pattern as a first calving heifer

Brownlie (2013) found that heifers entering the herd below live weight targets had extended calving patterns as first calvers. This calving pattern probably occurred because some of the heifers were anoestrous at the start of mating. A poor calving pattern such as this results in decreased days in milk and problems at subsequent matings (Penno, 1997).

Reproductive Performance as first calvers during their first lactation in the herd

The industry agreed measure for reproductive performance is the 6-week in-calf rate Burke (2008a). Figure 3 below shows the reproductive performance of first calvers in their first lactation. This demonstrates a significant gap between the national average for first calvers and first calvers in the top 25% of herds.

Figure 3. The 6-week -in-calf rates of first calving heifers

Source LIC – unpublished data

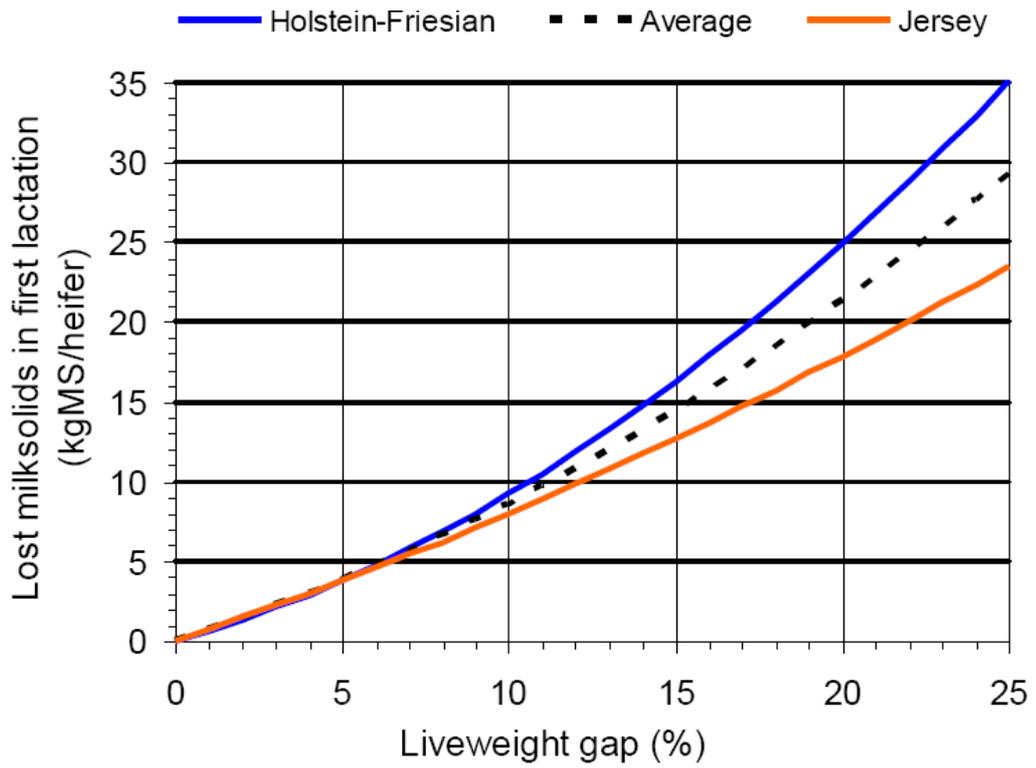
What is the financial impact of our current performance?

Poorly grown heifers have a significant impact on milk production and reproductive performance. In order to quantify this impact the InCalf program has developed the Heifer Rearing Tool, a gap calculator tool to assess the likely financial impact of under grown heifers.

InCalf tools

The relationship between the gap in performance (actual liveweight v target liveweight expressed as a percentage) and milk production is summarised in Figure 4. The impact of this gap on reproductive performance is summarised in Figure 5.

Figure 4 Effects of liveweight gap at first calving on lost milksolids in the first lactation



Source: www.DairyNZ/InCalf Tools

Figure 5 Effects of liveweight gap on first calvers' reproductive performance.

There are approximately 1.2m heifers reared in NZ per year. Based on heifer rearing under performance this represents a lost opportunity of approximately \$120m per annum

How is the industry addressing this performance gap?

Given the size of the financial impact at an industry level and the high percentage of heifers not reaching target weights it is appropriate that the industry seek to close this performance gap. Key industry partners have collaborated to agree an industry strategy. Through a series of farmer and industry focus groups four key themes of work have been identified.

1. Leadership

Gaining industry agreement on targets for heifers, metrics to measure industry changes towards these and definition of what the industry is seeking in terms of heifer rearing.

2. Knowledge

Develop underpinning resources (good practice heifer rearing manual & demo farm)

3. Pricing

Develop and deliver a new commercial grazing pricing system that supports rearing of heifers to agreed industry targets

4. Relationship Management

Develop and /deliver resources that facilitate and formalise the commercial relationships between heifer graziers and dairy herd owners.

Actions are planned for each of these themes over the next 2-3 years.

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