



# Heifer Rearing Tool

## What is this tool?

This is a **gap calculator** tool. It assesses the growth of a given group of heifers versus liveweight-for-age targets and its impact on reproductive performance and milksolids production.

## Why use this tool?

Heifer liveweight at first mating and calving influences reproductive performance and milksolids production. Establishing and achieving liveweight-for-age targets will ensure heifers are cycling at 15 months, calve earlier and get back in calf more easily, as compared with poorly grown heifers.

For more information, see *The InCalf Book*, Chapter 9: “Calf and heifer management” and your *InCalf Fertility Focus report*.

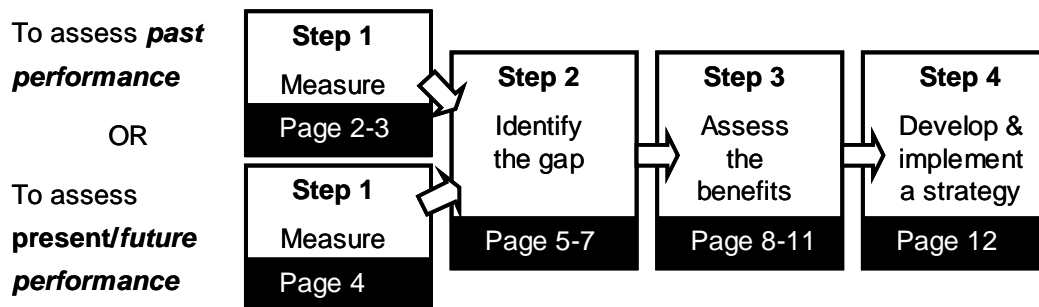



See pages 45-60

## How to use this tool

First, choose whether you want to assess **past performance** (the likely impact of heifer rearing on your herd’s previous reproductive performance) or **present/future performance** (the likely impact of a heifer group’s current liveweight gap if maintained to first calving).

Then work through this tool’s four basic steps:



When you see this symbol  you need to fill in some information or do some calculations before continuing.

Proceed to page 2 or page 4 

## Assess *past performance*

### Step 1) Measure

Do you have past heifer liveweight records to help you assess the likely impact of heifer rearing on your herd's previous reproductive performance?

**OPTION 1** (preferred): If you have past heifer liveweight records



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- Apply these records as per Step 2 of this tool to assess the likely impact of heifer rearing on your herd's previous reproductive performance.

Go to page 5. 

**OPTION 2** If you do not have past heifer liveweight records

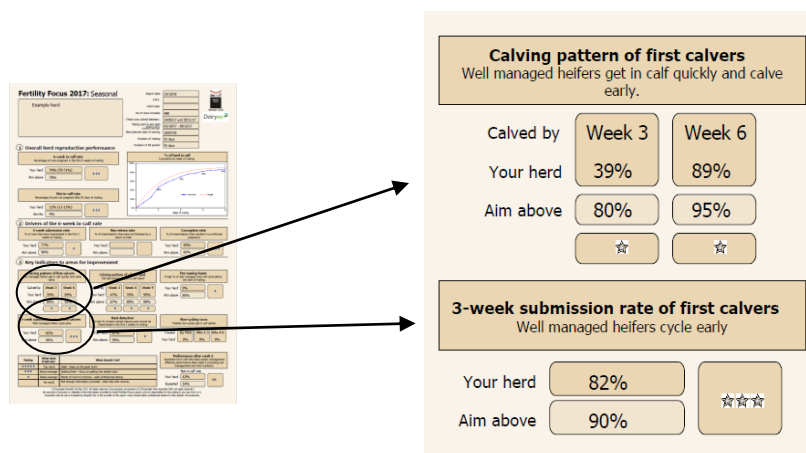


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- In the absence of past heifer liveweight records, the best indicators of likely past heifer liveweights are on an *InCalf Fertility Focus report*.

- Obtain an *InCalf Fertility Focus report* for your herd for the past 12-month period.
- Assess your Star ratings for:
  - calving pattern of first calvers; and
  - 3-week submission rate of first calvers.

Here's the place to look on your *InCalf Fertility Focus report*:



Go to page 3 to interpret these star ratings. 

### Calving pattern of first calvers:

Star rating	Risk assessment	What you should do
☆☆☆☆☆	<b>Low:</b> This indicates a low chance that heifer rearing affected herd reproductive performance last year.	Check and weigh heifers to confirm that this is the case. If so, no changes are necessary.
☆☆☆	<b>Moderate:</b> This indicates a moderate chance that heifer rearing affected herd reproductive performance last year.	Check and weigh heifers to confirm that this is the case. If so, review heifer rearing practices.
☆	<b>High:</b> This indicates a strong chance that heifer rearing affected herd reproductive performance last year.	Check and weigh heifers to confirm that this is the case. If so, <u>urgently</u> review heifer rearing practices as a high priority. You may also choose to consult an adviser to further examine the problem.

Risk level: Low / Moderate / High (circle identified level)  

### 3-week submission rate of first calvers:

Star rating	Risk assessment	What you should do
☆☆☆☆☆	<b>Low:</b> This indicates a low chance that heifer rearing affected herd reproductive performance last year.	Check and weigh heifers to confirm that this is the case. If so, no changes are necessary.
☆☆☆	<b>Moderate:</b> This indicates a moderate chance that heifer rearing affected herd reproductive performance last year.	Check and weigh heifers to confirm that this is the case. If so, review heifer rearing practices.
☆	<b>High:</b> This indicates a strong chance that heifer rearing affected herd reproductive performance last year.	Check and weigh heifers to confirm that this is the case. If so, <u>urgently</u> review heifer rearing practices as a high priority. You may also choose to consult an adviser to further examine the problem.

Risk level: Low / Moderate / High (circle identified level) 

**(!)** In the absence of actual liveweight records, calving pattern and 3-week submission rate are useful indicators of heifer rearing performance. However, each of these measures is also influenced by several other factors in addition to heifer rearing. For example, calving pattern of first calvers will also be influenced by bull management or an AB programme in yearling-heifers; and, their 3-week submission rate after first calving will also be influenced by calving management, heat detection efficiency and non-cycler treatment policies.

## Assess *present/future performance*

### Step 1) Measure




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Regular weighing (at least every three months) is necessary to check if you are on track to reach your liveweight-for-age targets. Check that facilities are suitable to confine heifers for weighing. Prepare a system for accurately recording dates, individual animal identification and liveweights.

**(The InCalf Heifer Rearing Liveweight Recording Sheet may be useful. See Appendix 1, page 13)**

Heifers should be clearly and individually identified (e.g. ear tag or freeze brand) and accurately weighed, preferably with electronic scales. Do not use a weigh bands for heifers more than 200 kg. Try to weigh heifers at a similar time of day, preferably in the morning.

Go to page 5 with your recorded heifer liveweights. 

#### **(!) With a well set-up system, weighing heifers should not be a big chore**

With Electronic Identification (EID) eartags inserted in your heifers' ears and a scanner connected to an electronic weighing unit which has data collection capability, you can simply run your heifers down the race and each heifer's ID and liveweight are collected automatically.

The three main benefits of using a well set-up weighing system are:

- no time is lost writing down eartag numbers and weights of individual heifers;
- heifers can be passed over the scales quickly and quietly; and
- there are no more sheets of recorded weights to work through later.

The heifer liveweights can then be transferred after weighing of the group is completed into MINDA Weights and this InCalf Heifer Rearing tool to assess actual results vs. targets to make management decisions. This can be achieved either by manual data entry from a paper print-out or more easily by automatic download of the data in electronic form directly from the weigh scales unit or other device.

You don't necessarily need to buy your own weighing system to get started. You may be able to get access to a system you can use with the InCalf Heifer Rearing tool on a fee-for-service basis from a local adviser such as your vet or nutrition consultant, from your feed company or herd improvement service provider, or through a contract heifer rearer.

## Step 2) Identify the gap

### Part 1: Determine the liveweight-for-age targets



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- Establishing your liveweight-for-age targets requires that you know the expected liveweight of your heifers when they grow to become mature cows. There are two ways of estimating this:
  1. Weigh the 6-8 year olds cows in your herd when they're in body condition score of 4.0 to 5.0, and before the unborn calf begins to have a large impact on liveweight. The best times are usually the December-January or April-May periods for spring calving herds. So long as your heifers are of similar genetics, assume these liveweights to be the expected mature cow liveweights of your heifers; or,
  2. Obtain a 'breeding value trait report' from your herd improvement organisation. From this report\*, calculate the average Liveweight breeding value (Lwt BV) for the heifers being reared, and use the following calculation –

Expected mature liveweight = \*500 kg + Lwt BV      (\*For reports dated July 2008 onwards)


*(eg. If the average Lwt BV for the heifers is +20 then their expected mature liveweight is 520 kg (= 500 + 20). If average Lwt BV is –20 then expected mature liveweight is 480 kg (=500 – 20)).*

#### **(!) What if I have different breed types and frame sizes among my replacement heifers?**

If your replacement heifers are a mix of distinctly different breeds (eg. some purebred Holstein-Friesians and some purebred Jerseys), you should calculate average mature liveweight and liveweight-for-age targets separately for each type. If your heifers are first-cross animals, set target liveweight-for-age targets about **three-quarters** of the way from smallest (eg. Jersey) to largest (eg. Holstein–Friesian) targets.

- Use Table 1 (over page) to calculate the liveweight-for-age targets based on your estimate of expected mature cow liveweight for a particular group of replacement heifers.
- Plot these liveweight-for-age targets on the graph over page. Title the graph with 'year born' and the heifer group (if more than one group). This will avoid confusion when referring to these records in the future. Reprint and use a separate page for each heifer group (if necessary). Refer to the example if you're unclear of what is required.

**Table 1: Calculate liveweight-for-age targets.**

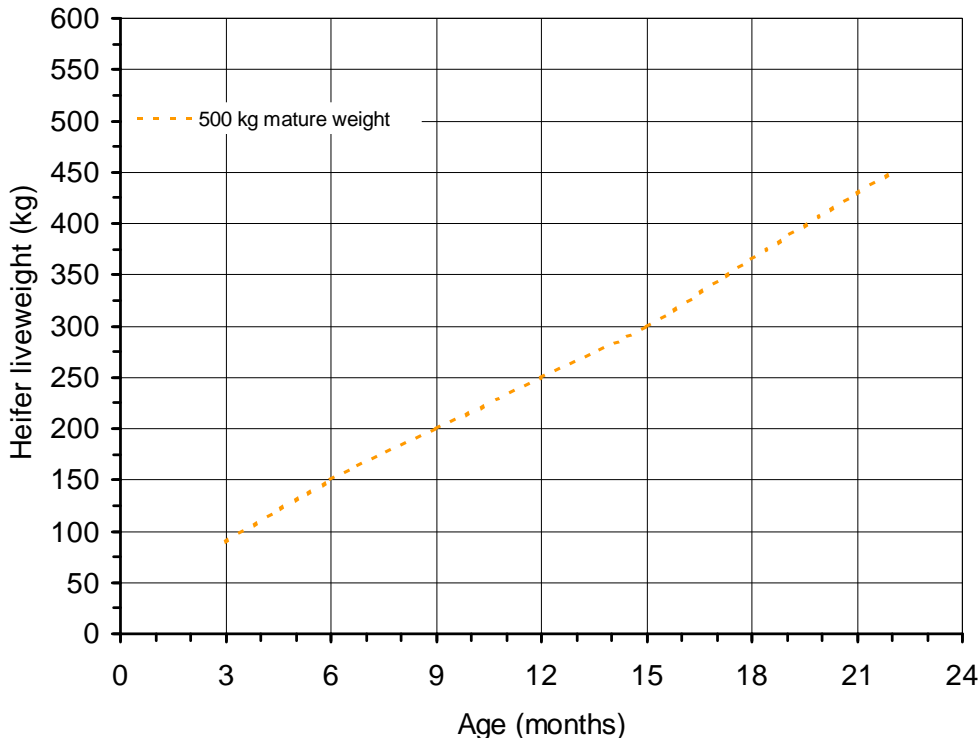
- These heifers were born in the .....year. 
- Their average expected mature liveweight is **(A)** .....kg.
- For each age (months) in Table 1, multiply (A) by the multiplier (B).
- Write the answer in the 'liveweight-for-age targets' column.

Age (months)	Multiplier <b>(B)</b>	Liveweight-for-age targets (kg)
3	0.20	
6	0.30	
9	0.40	
12	0.50	
15	0.60	
18	0.73	
22	0.90	

**Graph 1: Compare liveweight-for-age targets to actual liveweights**

- Plot the liveweight-for-age targets from Table 1 on the graph below and draw a line through these points. An example growth target line is shown for heifers expected to be 500 kg as mature cows.
- Plot the actual average liveweights on the graph after heifers are weighed each time, and compare to your target growth line. Assume 'age (months)' to be that of the oldest heifers born because the Planned Start of Mating (PSM) and Calving (PSC) are calendar dates that apply to all the heifers regardless of age.

Year born..... Heifer group.....(if monitoring distinct groups)   



## Part 2: Calculate the gap between target and actual liveweight for age

Use the InCalf Heifer Liveweight Recording Sheet (page 13) or electronic scales print-out to calculate the average actual liveweight for the group of heifers. Enter this figure as B in Table 1 below and calculate the % average liveweight gap (C).

**Table 1: What is the gap between actual and target liveweights-for-age?**



Age	Target Liveweight (A)	Measured Average Liveweight (B)	Target Liveweight (A)	% Average Liveweight Gap (C)
At ..... months	= ..... kg/heifer	- ..... kg/heifer	= ..... kg/heifer	..... X 100 ÷ ..... = ..... %

*For example: Tom's group of 60 crossbred heifers have an average Liveweight BV of +5, from which he predicted mature cow weight of 505 kg (500 + Lwt BV = expected mature liveweight).*

Age	Target Liveweight (A)	Measured Average Liveweight (B)	Target Liveweight (A)	% Average Liveweight Gap (C)
At ...15... months	= ...303... kg/heifer	- ...285... kg/heifer	= ...18... kg/heifer	...18... X 100 ÷ ...303... = ...6... %

### (!) Heifer liveweight gains will fluctuate throughout the season

If heifers experience periods of limited feed intake eg. during winter and / or summer when pasture quantity and/or quality can be low, average daily liveweight gains may be substantially lower than assumed in this tool, resulting in their average weight falling below target for that age. The question then is whether the gap, measured during the period of feed restriction, will reflect the gap at first calving. The tool will over-estimate the gap at first calving if very high growth rates are subsequently achieved. However, be careful in assuming that heifer liveweights in this situation will 'catch up' before calving without any changes from usual management. If subsequent rearing conditions are not favourable and / or time remaining to first calving is limited, heifers may not have time to 'catch up' before they calve.

## Part 3: Assess the risk

Assess the risk of losses in reproductive performance and milk production:

Liveweight Gap (C)	Risk assessment	What you should do
Less than 5%	<b>Low:</b> Average heifer liveweight of the group is very close to or above target.	Proceed to Step 3 to assess the benefits. In addition, assess the % of the heifer group at risk due to being too light (see Appendix 2, page 14).
5–15%	<b>Moderate:</b> Average heifer liveweight of the group is moderately below target and approaching critical levels.	Action is recommended to increase the group's average daily growth rate. Consider the feeding strategy for the group. Proceed to Step 3 to assess the benefits.
More than 15%	<b>High:</b> Average heifer liveweight of the group is substantially below target.	Action is needed to improve the group's average daily growth rate to prevent substantial losses in milk production and reproductive performance. Urgently consider the feeding strategy for the group. You may also choose to consult an adviser to further examine the problem. Proceed to Step 3 to assess the benefits.

Risk level: Low / Moderate / High (circle identified level)



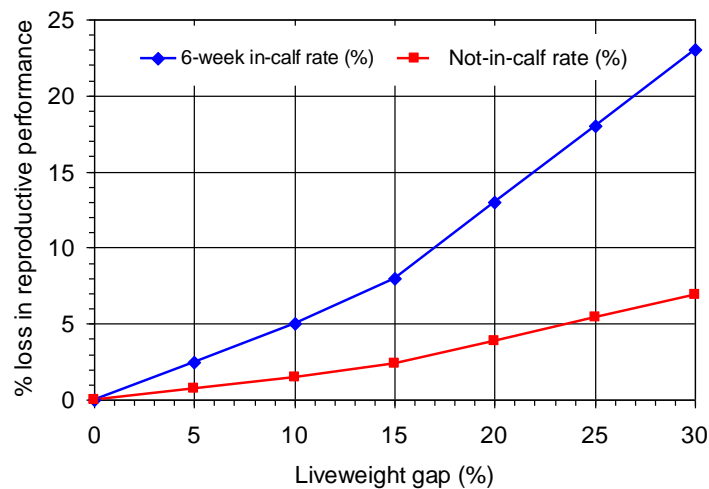
## Step 3) Assess the benefits

### a) Assess the benefits of closing the liveweight gap for this group of heifers

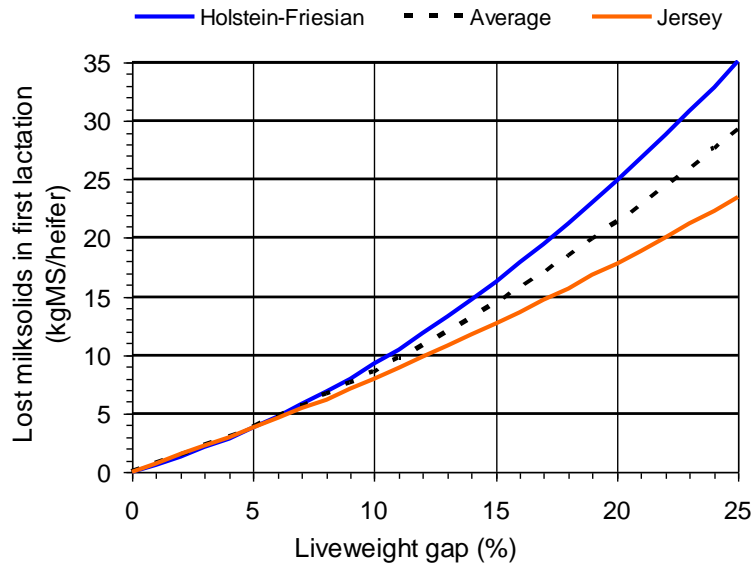
#### **Part 1: Estimate the likely effects of closing the gap on reproductive performance and milk production**

Improved heifer rearing management will result in first calvers with improved reproductive performance as first calvers and higher milksolids in their first lactation. Use the % Average Liveweight Gap (C from Table 1 on page 7), assuming that this % gap is maintained from current age to first calving. Apply this gap to the 'look-up' Graphs 2 & 3 below to estimate the likely effects of improved heifer management and **enter these values in Table 2** on page 9.

**Graph 2: Effects of liveweight gap at first calving on first calvers' reproductive performance (based on Australian and New Zealand data).**




**Graph 3: Effects of liveweight gap at first calving on lost milksolids in first lactation (based on New Zealand research; Macdonald et al., 2005).**






**Table 2: What are the likely effects for this group of heifers?**

Your heifer liveweight gap: .....% (C, from Table 1, page 7) 

Effects of this gap on performance for this group of heifers:

- First calver 6-week in-calf rate .....% (D)  
(from Look up Graph 2, page 8)
- First calver not-in-calf rate .....% (E)  
(from Look up Graph 2, page 8)
- First lactation milk production .....kg MS per heifer (F)  
(from Look up Graph 3, page 8)

***Part 2: Determine the likely economic benefits of these effects on reproductive performance and milk production for this group of heifers***

 Go to Table 3 below to estimate the likely economic benefits of improved heifer management, based on your heifer liveweight gap (C) and the effects as per Table 2, above, (D, E and F).

**Table 3: What are the likely economic benefits for this group of heifers?**

		Benefit of closing this gap (\$/heifer)
(D) .....	% increased first calver 6-week in-calf rate X \$4	= \$..... (G)
(E) .....	% decreased not-in-calf rate x \$10	= \$..... (H)
(F) .....	Kg MS x \$.....per kg MS	= \$..... (I)
<b>Total benefit/heifer = (G) + (H) + (I)</b>		<b>= \$..... (J)</b>

Total benefit for this group of heifers =

..... (J) X ..... no. of heifers in this group = \$ ..... (K)

**b) Assess the annual benefits for the whole herd if you regularly close the heifer liveweight gap each year**

Having assessed the benefits for the group of heifers, it is important to now estimate the annual benefits for the whole herd if you regularly close the heifer liveweight gap each year.

**Part 1: Estimate the likely annual effects for the whole herd of regularly closing the gap each year on reproductive performance and milk production**

**Table 4: What are the likely annual effects?**

Your heifer liveweight gap: .....% (C, from Table 1, page 7)



Effects of this gap on performance for heifers:      Likely effects of this gap /100 cows each year  
 \* assuming a 25% herd replacement rate  
 (use a different herd replacement rate if you wish)

- First calver 6-week in-calf rate  
 (from D on page 9):  
 .....%                      X 0.25\*                      = .....% (L)  
 Herd 6-week in-calf rate:
  
- First calver not-in-calf rate:  
 (from E on page 9):  
 .....%                      X 0.25\*                      = .....% (M)  
 Herd not-in-calf rate:
  
- First lactation extra milksolids (MS) production  
 (from F on page 9) :  
 .....kg MS X 100 X 0.25\*                      = .....kg MS (N)

**Part 2: Determine the likely annual economic benefits of these effects on reproductive performance and milk production for the whole herd**

Use Table 5 below to estimate the likely economic benefits of improved heifer management, based on your heifer liveweight gap (C) and the effects as per Table 4 on the previous page (L, M and N).

**Table 5: What are the likely annual economic benefits for the whole herd?**

**1. What is closing your 6-week *in-calf* rate ‘gap’ worth?**

$$\text{Gap (L)} \dots\dots\dots \times \$4 \times \dots\dots\dots \text{ cows in herd} = \$ \dots\dots\dots \text{ (O)}$$

\*This economic multiplier was estimated through modeling assuming a \$5.50 per Kg MS payout. The financial consequences of empty cows were excluded from this estimate.

**2. What is closing your *not-in-calf* rate ‘gap’ worth?**

$$\text{Gap (M)} \dots\dots\dots \times \$10 \times \dots\dots\dots \text{ cows in herd} = \$ \dots\dots\dots \text{ (P)}$$

\*\*This economic multiplier assumes a \$1000 value differential between an empty and in-calf cow.

**3. What is closing your *milk solids* ‘gap’ worth?**

$$\text{Gap (N)} \dots\dots\dots \times \$ \dots\dots\dots / \text{kg MS} \times \dots\dots\dots \text{ cows in herd} \div 100 = \$ \dots\dots\dots \text{ (Q)}$$

**4. What is closing the heifer liveweight gap worth overall?**

$$\text{Total operating profit} \quad (\text{O}) + (\text{P}) + (\text{Q}) \quad = \$ \dots\dots\dots \text{ per year}$$

## Step 4) Develop & implement a strategy

Work closely with your adviser to develop your own personal farm strategy to achieve these benefits.

### Key issues to consider:



See pages 53-59

- Number of days remaining until first calving to close liveweight gap.
- Seasonal conditions and likely quantity and quality of grazed pasture available over this period.
- Choice of suitable supplementary feeds available.
- Nutritional specifications and cost of these feeds.
- Additional inputs of selected feeds required/day to close liveweight gap at first calving.
- Feasibility of drafting light heifers from main group and feeding them increased inputs separately.
- Higher maintenance energy requirements of heavier cows.
- Additional nutritional inputs needed to realise extra milk production from first calver's.

*No warranty of accuracy or reliability of the information provided by this InCalf Herd Assessment Pack tool is given, and no responsibility for loss arising in any way from or in connection with its use is accepted by DairyNZ or Dairy Australia. Users should obtain specific professional advice for their specific circumstances.*

*Regularly check the InCalf web site ([www.dairynz.co.nz/incalf](http://www.dairynz.co.nz/incalf)) for updated versions of any of the InCalf Herd Assessment Pack tools.*

# Heifer Liveweight Recording Sheet



Name: \_\_\_\_\_ Heifer group: \_\_\_\_\_ Date of weighing: \_\_ / \_\_ / \_\_

Age of: \_\_\_\_\_ months      Breed: \_\_\_\_\_      Desired mature cow: \_\_\_\_\_ kg  
 oldest heifers      pre-calving liveweight

	Heifer ID	Liveweight
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

	Heifer ID	Liveweight
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		

Sum of heifer liveweights

 kg

÷

Number of heifers measured

=

Average heifer liveweight

 kg

(B)

## Appendix 2

### Calculate the % of the heifer group at risk due to being too light

Even if the average liveweight of the heifer group is on target, it is important to also assess whether there are excessive numbers of significantly underweight heifers in the group which are at risk of poor reproductive performance and milk production. If so, these may warrant separating and managing separately.

#### **Part 1: Calculate the liveweight-for-age threshold for 'Heifers too light'**

Calculate the weight-for-age threshold for 'heifers too light' by multiplying the target liveweight-for-age (A from Table 1) by 0.9. (This threshold weight is defined as 90% of the target liveweight-for-age). Enter this figure as D in Table 6 below.

#### **Part 2: Calculate the % of the heifer group that are 'too light'**

Count the total number of heifers in the group and the number of heifers in the group with liveweights below this 'heifers too light' threshold liveweight D. Calculate the proportion of 'heifers too light' as a % of the group. Enter this figure as E in Table 6 below.

#### **Table 6: What % of the heifer group is too light?**

Age	Target Liveweight (A)	= Threshold for heifers too light (D)	No. heifers in group weighing less than D	Total no. heifers in group	% heifers in group too light (E)
At..... months	= .....x 0.9 =	..... kg/heifer	..... ÷	..... X 100=	.....%
	kg/heifer	kg/heifer			

For example: Anne's group of 64 Jersey heifers (440 kg mature pre-calving liveweight):

At ..16.. months	= ..275..x 0.9 =	...248.. kg/heifer	....8.... ÷	.....64... X 100=	...12.5..%
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#### **Part 3: Assess the risks of losses in reproductive performance and milk production**

% heifers in group too light (E)	Risk assessment	What you should do
Less than 5% of heifers	<b>Low:</b> There are few heifers too light in the group.	No action is needed at this stage.
5–15% of heifers	<b>Moderate:</b> A moderate number of heifers in the group are underweight and at risk of poor reproductive performance and milksolids production.	Action is recommended to improve light heifers' growth rate. See an adviser regarding the potential benefits of drafting these animals off from the main group for preferential feeding.
More than 15% of heifers	<b>High:</b> A substantial number of heifers in the group are underweight and at risk of poor reproductive performance and milksolids production. Action is needed to improve the light heifers' growth rates.	See an adviser <u>urgently</u> regarding the of heifers potential benefits of drafting these animals off from the main group for preferential feeding. If drafting is not feasible, consider increasing feed inputs for the whole group.

Risk level: Low / Moderate / High (circle identified level)

