Dairy heifer nutrition

This Infosheet covers

- The post-weaning nutrition of heifers.
- Feed composition: energy, protein and dry matter levels.
- Balancing heifer diets to meet growth rate targets.
- Mineral requirements.
- Water requirements.

Key points

- Heifers are most feed efficient when they are young (small); try to capitalise on early growth efficiency.
- Nutrition pre-puberty (before 50% mature liveweight) influences skeletal growth.
- Growth rates give the best indication of whether heifers’ nutritional requirements are being met.
- Heifer diets need enough energy (10.5 MJ ME/kg DM or higher) and protein to achieve target growth rates. Often pasture alone will be sufficient.
- Heifers require adequate mineral levels and available water.

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:

  - **Weaning to nine months**
    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. Improved skeletal development will result in taller heifers that suffer fewer problems at calving. It is important to stimulate lean body growth (muscle and skeleton) without encouraging the deposition of excessive fat. This will increase a heifer’s frame size, as opposed to just increasing body condition score.
    For dairy animals typical to New Zealand, 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).

FARMER VIEWPOINT

To give heifers lush new pasture we do a cut of silage at the runoff before the calves go out.

Dairy farmer, 320 cows, Rerewhakaaitu, Bay of Plenty

We've had to look at our management over the first year of life. In the past heifers came home at 22 months and they were in good condition but not very well grown.

Dairy farmer, 320 cows, Hawera, Taranaki
• **Nine months to mating at 15 months**
  
  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.

• **Older heifers**
  
  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. Body condition reflects how well an animal has been fed for the previous 6-8 weeks, whereas a longer period of good nutrition is required to convert feed into body frame. 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.

  
  **FARMER VIEWPOINT**

  We prioritize feeds by their protein content over the winter, the lighter animals get the higher protein feeds. The lightest heifers are fed on all grass, the medium weight animals get turnips and swedes, and the heaviest heifers get fodder beet.

  Contract Grazier, 2,400 heifers, Mossburn, Southland

  
  **Feed composition**

  **Energy and protein requirements**

  All animals require energy for maintenance i.e. the energy required to sustain basic functions, such as normal metabolism, and physical activities, including walking and eating. Growing animals also require energy for liveweight gain.

  In New Zealand, the energy in a feed is expressed as megajoules of metabolisable energy per kilogram of dry matter (MJ ME/kg DM).

  As animals become heavier they become less efficient at using energy for growth. For example, a heifer weighing 100 kg requires about 20 MJ ME to gain a kilogramme of liveweight, whereas a 400 kg heifer requires double that i.e. 40 MJ ME (see Figure 1\(^4\)). Therefore, it is important to try to capitalise on energy efficiency when animals are young.

  
  **FARMER VIEWPOINT**

  Use heifer weights to see if heifers have been fed enough, we don’t measure feed intakes at the runoff—we go off weight gain.

  Dairy farmers, 265 cows, Inglewood, Taranaki

  Putting weight on heifers in the autumn can be difficult. Even though our autumn grass looked like rocket fuel, I started weighing and it showed the heifers weren’t gaining any weight. Sometimes the dry matter is too low in the pasture.

  Contract grazier, 850 heifers, Stratford, Taranaki

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Figure 1. Intake requirements of dairy heifers for a) maintenance only and b) for growth at different growth rates (assuming feed energy value is 11 MJ ME/kg DM).

The example shows how much heifers’ energy requirements change as they grow.

Monitoring heifer growth rates and comparing them with their expected weight gain will give a good indication if the feeding programme is on track. Table 1 shows the energy and protein required at different liveweights for good heifer rearing.
Table 1. Energy and protein required by heifers of different liveweights, to meet their maintenance needs and target growth rate.

<table>
<thead>
<tr>
<th>Liveweight Kg</th>
<th>Maintenance MJ ME/day</th>
<th>Growth rate per 1 kg MJ ME/day</th>
<th>Protein %</th>
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</thead>
<tbody>
<tr>
<td>100</td>
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<td>17</td>
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</tr>
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</tr>
<tr>
<td>550</td>
<td>69</td>
<td>40</td>
<td>14</td>
</tr>
</tbody>
</table>

NB. Pregnancy energy requirements are not included.

Dry matter intake

Predicting the dry matter intake of dairy heifers is an important part of heifer rearing, but it can be difficult to estimate because:

- Heifer dry matter intake as a percentage of liveweight decreases as liveweight increases, but the relationship is not direct.
- Dry matter intake is influenced by dietary fibre, but the influence decreases as liveweight increases—this is one of the reasons that feeding high quality feed to young animals is so important.

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.

More information

- For more on heifer mineral requirements and treatment, see Heifer Infosheets: Trace Elements and Heifer Infosheets: Trace Element Treatment.
- Further information is available in the Heifer Infosheet covering crops and supplements.
**Water requirements**

Access to clean, fresh water is important for rumen function, metabolism and health. Inadequate levels will restrict heifer growth. The water contained in feed will meet some of a heifer’s water requirements, but additional drinking water is essential.

Heifers require 3-6 litres water/kg DM eaten; the amount will vary depending on the air temperature, the diet’s water content, and mineral salt intake. During hot weather more water will be required to help regulate body temperature. Table 2 shows the expected water intakes of heifers of different liveweights at two different ambient temperatures.

**Table 2.** Estimated water intake (litres/day) required by heifers, at two different ambient temperatures.

<table>
<thead>
<tr>
<th>Liveweight (kg)</th>
<th>Air temperature (° C)</th>
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**More information**

- For more about feeding heifers see Heifer information: Dairy Heifer Nutrition.

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