

# TechNote 29

## Determine nutrient requirements

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In this resource, “dry period” covers the period from when the cow is dried off (non-lactating) until the transition period starts (approximately 3 weeks prior to calving).

### 29.1 Determine energy requirements of a non-lactating cow

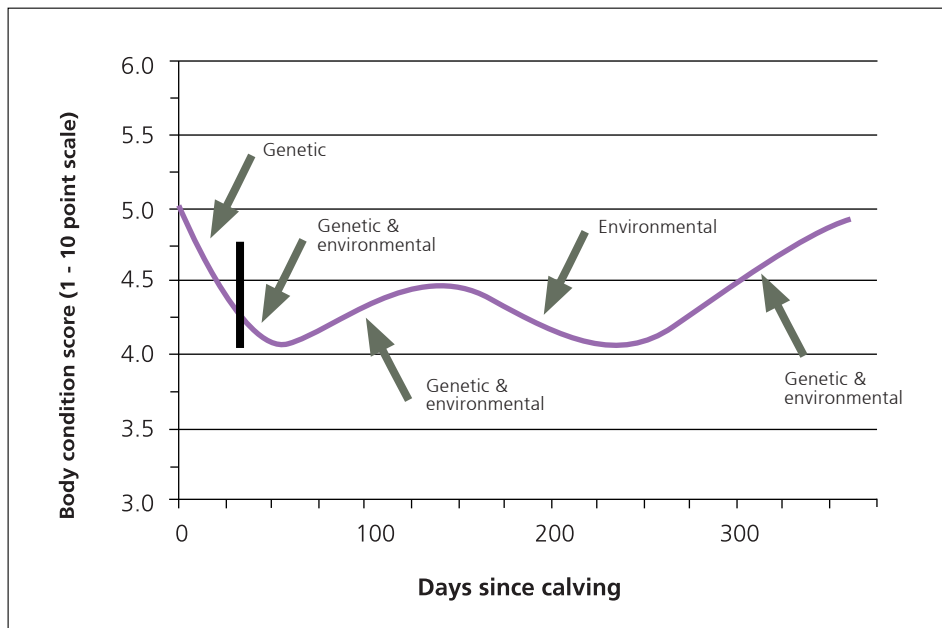
During the dry period, a non-lactating cow requires energy to support:

- maintenance,
- activity (walking and grazing),
- body condition score (BCS) gain,
- pregnancy.

Energy required for maintenance, activity, BCS gain and pregnancy can be calculated from Tables 1 to 8 in TechNote 2 or from the DairyNZ FeedChecker or Facts and Figures.

During the dry period, the non-lactating cow primarily partitions energy towards pregnancy and BCS gain (Figure 1). The amount of BCS gain during this period depends on BCS at dry off, amount, type, and management of feed allocated, in addition to genetic and environmental factors.

Figure 1. Average body condition score change through the season.



## 29.2 Determine energy requirements of pregnancy

Energy requirements for pregnancy are assumed to be zero until 12 weeks pre-calving. After this point, the demand for energy from the developing foetus and surrounding tissues increases as the pregnancy progresses and the calf grows.

The use of energy for the growing calf is very inefficient. This is often expressed at  $K_p$  (efficiency of pregnancy) and is estimated to be 0.14. In comparison, the efficiency of use of energy for maintenance ( $K_m$ ) is 0.62 and for milk production ( $K_l$ ) is 0.64.

Table 1. Estimated dietary metabolisable energy required for pregnancy (MJ ME/day).

Weeks prior to calving	Liveweight (kg)		
	400	500	600
12	11	12	13
8	18	21	23
4	32	37	41
2	42	48	54
Annual total	2,840	3,240	3,610

## 29.3 Determine energy requirements for cold stress

The importance of maintaining cows in good BCS is greater in colder climates. In these situations, subcutaneous body fat (just beneath the skin) acts as an insulating layer between the animal's core and the environment. Therefore, cows in good BCS are better able to withstand cold.

Cows are more tolerant to cold conditions compared with hot, humid weather (see TechNote 21 for more details on heat stress). However, even with adequate body condition reserves, there is a temperature below which the animal must increase its metabolic rate to create more body heat and maintain a constant core body temperature. This is known as the lower critical temperature. Therefore, when a cow reaches this lower critical temperature, she requires energy to generate heat (e.g. she may begin to shiver), and thus energy requirements for maintenance will increase. Key factors that increase the risk of cold stress are:

- low temperatures,
- wind, rain, and mud,
- low condition scores,
- low feeding levels.

In NZ, if a cow is clean and dry and there is little rain or wind, cold stress is rare until ambient temperatures fall below -10°C. However, rain, wind and mud will result in cold stress at much higher temperatures and if conditions are wet and windy, a cow with BCS 4.0 will require an additional 2 - 3 kg DM at 0°C.

Thus, depending on the BCS of the herd, and the weather situation, a wet cow may require an additional 0.5 – 3 kg DM/cow/day. Figures 2a and 2b provide a guide for how much extra feed is required in certain weather situations. Note that the information in these tables is extra feed intake, not extra feed offered so feed utilisation needs to be taken into account.

In poor weather allow for decreased utilisation and increased demand. A combination of strong wind and rain is the trigger to provide shelter and/or increase feed allowance.

**Figure 2.** Conditions, temperatures and increased requirements for a 450 kg non-lactating cow at a) BCS 4.0 and b) BCS 5.0.

**a) Cows at BCS 4**

	0-3 degrees C	4-7 degrees C	8-10 degrees C
	1 kg DM	0 kg DM	0 kg DM
	2 kg DM	1 kg DM	0 kg DM
	3 kg DM	2 kg DM	1 kg DM

**b) Cows at BCS 5**

	0-3 degrees C	4-7 degrees C	8-10 degrees C
	1 kg DM	0 kg DM	0 kg DM
	1-2 kg DM	1 kg DM	0 kg DM
	2-3 kg DM	1-2 kg DM	1 kg DM

## 29.4 Further reading

DairyNZ Facts and Figures. [dairynz.co.nz/publications/dairy-industry/facts-and-figures/](http://dairynz.co.nz/publications/dairy-industry/facts-and-figures/)

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