

Supplementary fats as a heat stress mitigation strategy

Feeding Cool Cows – Fact Sheet 5

KEY POINTS

Dietary fat supplements are energy dense and can increase total energy intake, but total dietary fat levels should not exceed 6 per cent of dry matter intake.

Diets high in unsaturated fatty acids should be avoided in areas where heat events are prolonged and intense.

Diets high in saturated fatty acids can reduce the drop in dry matter intake and milk yield during hot weather, but **ONLY** when cows are consuming high fibre forage.

Introduction

Use of supplementary fats in the diet of lactating dairy cows has been shown to have a beneficial effect on production and performance of cows during periods of heat stress. It is well established that the breakdown of fat in the rumen produces a lower heat load than other dietary components, particularly Neutral Detergent Fibre (NDF).

Fats have a greater energy density than other dietary components such as protein and carbohydrates. This means the Metabolisable Energy (ME) of a fat supplement will be greater than other supplements, providing an opportunity to increase the daily ME intake of cows without requiring an increase in total dry matter intake (DMI). But increasing total energy intake through fat supplementation does come with limitations.

If the total crude fat concentration of the diet exceeds 6 per cent, it can negatively affect rumen function (particularly fibre digestion) and DMI. Milk solids yield can also be reduced through a decline in milk fat concentration. Most forages used on Australian dairy farms contain an average of 3 per cent crude fat, so some opportunity exists to supplement with dietary fat additives without exceeding the threshold of 6 per cent of total DMI.

The type of fat is also an important factor. Not all supplementary fats are the same, and in dairy cow nutrition an important factor is the level of saturation of the fatty acids. For example, canola oil is often used in dairy cow diets and is high in unsaturated fatty acids.

Fat supplements high in saturated fatty acids have similar energy densities to unsaturated fats. However saturated fats have less impact on the rumen and are often termed bypass or rumen-protected fats. There are several examples of commercially available protected fat supplements on the market that are high in saturated fatty acids.

A risk of using supplementary fat is a drop in DMI and milk production. Supplementary fat should be used with the aim of maintaining or increasing energy intake while improving performance. Some fat supplements are expensive, so it is important to know the extra milk production required to justify the investment and whether that extra production can be achieved.

Unsaturated fat

As part of the **DairyFeedbase Feeding Cool Cows** project, at the Ellinbank SmartFarm, cows in late lactation (216 days in milk) were offered either a control Total Mixed Ration (TMR) diet (3 per cent total fat) or the control diet plus 700 g of canola oil (6 per cent total fat).

The experiment consisted of a 3-day pre-heat period; a 4-day heat-challenge period generated in controlled climate chambers, and a 7-day recovery period.

Cows offered canola oil had greater milk yield than cows on the control diet across the entire experiment (Figure 1), despite eating less during the heat-challenge period (Figure 2).

Body temperature of the cows offered canola oil was greater than the control cows during the heat challenge. Also, analysis of blood metabolite data indicated the cows offered canola oil were using body reserves during the short-term heat challenge to maintain milk production. This is undesirable on a longer-term basis where negative impacts on health and fertility would be expected.

Therefore, despite having a positive impact on milk solids yield in this short term study, canola oil is not recommended for use during periods of prolonged heat stress.

Figure 1 Effect of canola oil supplementation on daily milk yield

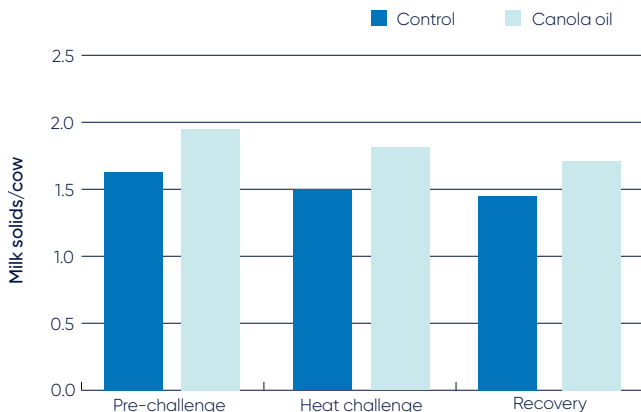
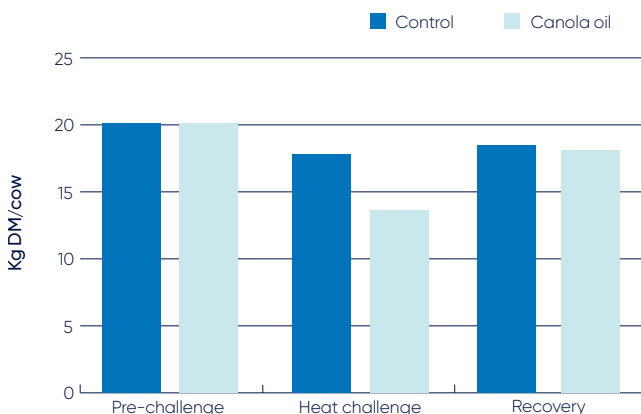


Figure 2 Effect of canola oil supplementation on daily feed intake



Saturated fat and forage quality

As part of the DairyFeedbase Feeding Cool Cows project, cows in mid lactation (155 days in milk) at the Ellinbank SmartFarm were fed one of four diets for 40 days. The diets were – high fibre (53 per cent NDF) or low fibre (34 per cent NDF) vetch hay, with or without a saturated fat supplement (Bergafat™, 300 g per cow per day). All cows received 7 kg DM of grain per day. The temperature humidity index (THI) was greater than 75 for seven of the 40 days. Dairy cows begin to feel heat stressed a THI of 68.

Cows offered the low fibre diets ate more and produced more milk than cows on the high fibre diets (Figure 3). However extra feed intake comes at a cost to the cow.

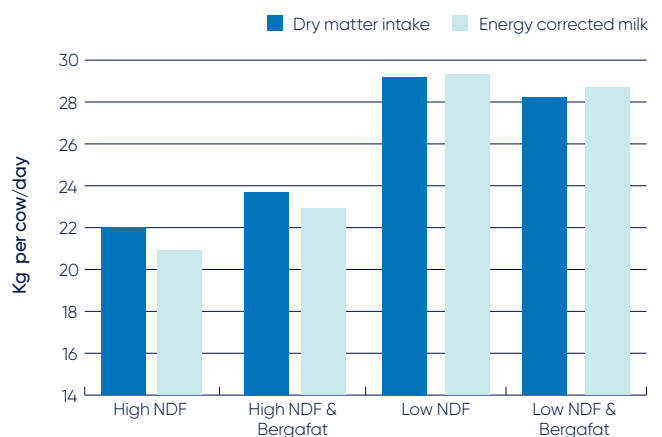
On the hottest day, average body temperature of cows with high intake (low NDF hay) was 0.4°C greater than the cows with low intake (high NDF hay).

The low heat produced from fermentation of the low NDF hay was overridden by the extra heat generated through processing a greater amount of feed. It should be noted that the effects on milk yield, intake and body temperature were only shown using vetch hay and may not necessarily be replicated if a different forage source was used.

While this difference in body temperature may appear small, the hotter cows had greater respiration rates in an effort to shed the extra heat. This effort to shed heat consumes energy which is then no longer available to support milk production.

Adding saturated fat was beneficial to both DMI and milk yield when forage NDF was high, but detrimental if forage NDF was low (Figure 3). There was no difference in body temperature between those cows fed saturated fat and those not fed saturated fat.

Figure 3 Effect on intake and milk yield during summer of adding saturated fat to high and low fibre diets



Conclusions

- Including supplementary fat in the diet can be a useful strategy to help mitigate against heat stress but fat type and the duration of hot weather need to be considered.
- Canola oil can increase body temperature, so this strategy is not recommended in regions where longer, more intense periods of heat are frequent. Canola oil may be beneficial in regions where heat events are short, provided it does not cause an excessive decline in DMI. It is highly recommended to consult a nutritionist before adding it to the diet.
- Saturated fats are only likely to be beneficial when the forage offered is high in NDF, but it should be noted that this effect has only been shown using vetch hay and may differ if a different forage type was offered.

MORE INFORMATION

Read more about managing heat stress in cows here [Cool Cows | Dairy Australia](#).