Profitable dairy farming: Good business management reduces greenhouse gases

Managing diet and pasture to increase profit and reduce emissions

Managing diet to improve quality and better match feeds with production demands is good for dairy businesses. Farmers should first and foremost consider the productivity and profitability impacts of potential emissions reduction strategies. But with a range of practical dietary options available that minimise emissions and increase profits, incorporating these into your farming operation makes good business sense.

Key points

- Greenhouse gas emissions are highest per kilogram of milk solids when cows are fed poor quality diets.
- High quality, high digestibility feed will maximise milk production and minimise greenhouse gas emissions per kilogram of milk solids.

Key recommendations

- Monitor and supplement diets to ensure nutritional requirements are met when pasture quality is low.
- Use low protein, high-energy supplements when pastures are high in nitrogen to improve milk production efficiency, avoid excessive dietary nitrogen and minimise nitrous oxide emissions.
- Include fats and oils as feed supplements to increase milk production if dietary fat levels are below 2–3%, to reduce methane emissions and potentially generate income through the Carbon Farming Initiative.

What is Crimped Grape Marc?

Crimped Marc is steam-distilled grape marc that has been screened to remove stalks then rolled to crush the seeds, thus improving digestibility and ME availability.

Crimped marc is basically a silage material: 50% moisture and with modest but consistent values of 12–13% protein, 8–9% fat, 11ME & 30% CF (DM basis). It has the potential to be a cheaper, convenient & reliable year round supplement or replacer for some hay or silage.

Case study

Incorporating high-fat supplements into the diet

Gary, Ros and Justin Zweck, Blyth

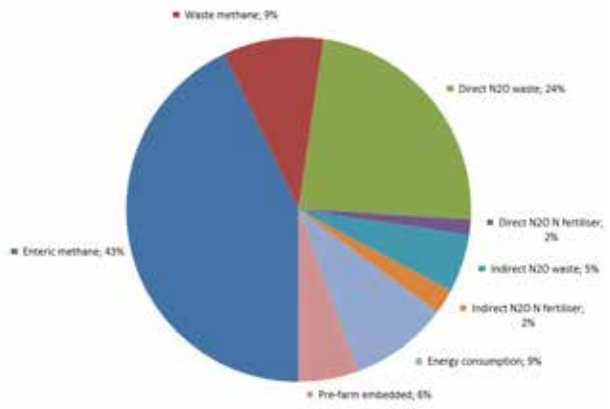
The Zwecks heard about grape marc as a feed supplement to increase production and reduce greenhouse gas emissions and were interested in its potential for their feeding strategy.

Grape Marc is a by-product of winemaking with a high concentration of both fat and tannins. Feeding it to dairy cattle has been shown to reduce methane by up to 20%.

With the 2013/14 DGAS analysis of the Zwecks' operation showing that 43% of emissions come from enteric methane (see chart below), this is a good area to focus on for reducing emissions.

However, the problem with dairy farm methane emissions isn't only their environmental impact. The loss of methane is a direct loss of energy from the farming system. The methane burped by dairy cattle is equivalent to those animals losing between 25 and 40 days of grazing per year, or up to 10 per cent of the total energy consumed by each animal.[1]

Additionally, if feeding by-products such as grape marc is adding energy to the diet, an increase in milk production will result. The profitability of this milk production increase depends on the comparative price of conventional grain feeding.



Crimped Grape Marc

Reducing enteric methane

The organisms in the fore-stomach of sheep and cattle produce methane from the hydrogen and carbon dioxide that result from microbial digestion of their feed. This is known as 'enteric methane'.

Strategies for reducing enteric methane include breeding for lower methane-producing animals, microbial interventions, and nutrition and animal management.

Dietary interventions, such as feeds containing tannins or high levels of oil, have been shown to reduce methane production from livestock.

There are a number of possible ways oil supplementation reduces methane:

- reducing fibre digestion
- lowering total feed intake (this is obviously undesirable, and only occurs when total dietary fat exceeds 6% to 7% of total intake), and
- suppressing the micro-organisms that make methane and suppressing rumen protozoa, on which those organisms depend.

Tannins, on the other hand, reduce enteric methane by directly suppressing methane-making micro-organisms.[2]

"Our farm is close to the well-know winemaking regions of the Clare and Barossa Valleys, so access to this by-product is cost-effective and relatively easy," says Gary.

In early 2015, the Zwecks participated in a trial of crimped grape marc conducted by Tarac Technologies.

During the trial the Zwecks' standard ration was used as the baseline and they then incorporated up to 5–6 kg/head/day of crimped grape marc in their mix. The trial worked on four weeks using grape marc, four weeks without, then another four weeks using it. 1800kg silage was replaced with 500–900kg crimped marc during the trial.

During both trial periods, average production increased and there was no discernible difference in fat and protein.

Gary continues to incorporate crimped marc into his feeding strategy because it is a good replacement for cereal hay or silage and at $200/t DM for cereals and $95/t DM landed for the crimped marc there is a significant cost saving to the ration.

The difference in moisture content between the crimped marc (50% moisture) and cereal silage it is replacing (65-70% moisture) means that the crimped marc provides relatively more dry matter with less water, making it more satiating for the cows.

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How high-fat feeds reduce methane: the science

One dietary strategy for reducing methane emissions is through feeding high-fat supplements.

Research has shown that for every 1% extra oil added to the diet of livestock in summer and autumn when pasture quality is low, enteric methane can be reduced by 3.5% (Moate et al., 2011).

Increased dietary fat suppresses the activity of the methane-producing microbes in the rumen. High fat supplements suitable for dairy cows include canola meal, cold-pressed canola meal, brewers' grain, crimped marc, hominy meal and dried distillers' grain. As they are by-products of other agricultural industries, little or no added emissions are produced through their use as supplementary feed in dairy systems.

In addition to reducing methane, high-fat supplements will also increase milk production if they are adding new energy to the diet. However as feed intake and milk production are both suppressed when dietary fat exceeds 6–7%, high-fat supplements should only be used when pasture quality (and therefore natural grass oils) are low. In southern dairy systems, the response to dietary oil supplementation will be highest in summer, when oil levels in grass are about 1%.

The Emissions Reduction Fund (ERF) provides a financial incentive for dairy farmers to reduce methane emissions through feeding of specific high-fat supplements.
Find out more at https://www.environment.gov.au/climate-change/emissions-reduction-fund/cfi/publications/factsheet-dairy-additives-milking-cows

"Because the crimped marc is denser, the cows seem to be able to consume the feed with less waste and they appear contented with the feed," Gary confirms.

Production volumes when feeding crimped marc are good, but he has found that they need to work hard to manage the fat content of the milk, and with their payment structure this is important.

"We work with our nutritionist to make sure that the ration keeps our fat content as high as possible," Gary says.

Another note of caution is that the crimped marc can heat up in storage and mould can be an issue if stored for long periods of time.

"We buy a load a fortnight so it's not sitting around," Gary says.

"If we start working with larger volumes we'll look at adding a preservative to reduce loss of quality," he finishes.

The Profitable Dairy Project is funded by the Australian Government and Dairy Australia and supported by DairySA.

References

1. Eckard, R. J., C. Grainger, and C. A. M. De Klein. "Options for the abatement of methane and nitrous oxide from ruminant production: A review." Livestock Science 130.1 (2010): 47–56.
2. Richard Eckard, Associate Professor & Director, Primary Industries Climate Challenges Centre at University of Melbourne, "Reducing methane from dairy cows: it's all in the oil" 22 March 2013

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