# Lowering environmental impact can make financial sense

**Dairy farmers can lower the environmental impact of cow diets while maintaining or even improving margin over purchased feed, according to Mole Valley Farmers.**

Precision rationing can result in a 39.5% decrease in the carbon footprint of a diet, lower nitrogen output per litre and reduce methane emissions, calculates Mole Valley Farmers' nutritionist Dr Matt Witt. At the same time, margin over purchased feed (MOPF) can improve from £7.56 per cow per day to £8.01 per cow per day.

## *All-round attention*

"It's a combination of thinking about the environmental impact of the ration, buying feeds in at the right time, balancing the diet effectively and managing the cow well. Only by achieving all of those things can you hit that end goal," he says.

The whole industry has a responsibility to reduce the impact of farming on the environment to ensure a sustainable future. Farming is also under increasing pressure to reduce its environmental impact, with both the NFU and Arla setting net zero targets for 2040 and 2050 respectively. Inevitably, this means that farmers are going to have to reduce greenhouse gas emissions.

## *Precision nutrition*

As part of its Climate Positive Agriculture initiative, Mole Valley Farmers is working to understand how British agriculture can further monitor and mitigate emissions. Through its Precision Nutrition rationing program, Mole Valley Farmers can now calculate the carbon footprint of an individual farm's diet, along with methane output and nitrogen excretion—all of which contribute to a farm's total greenhouse gas emissions. The impact on feed margins can also be monitored.

In one example (see Table 1), thinking about feed selection, feed purchase and ration balance resulted in:

- A 39.5% decrease in the carbon footprint of the ration
- A 15.7% reduction in nitrogen output per litre
- 6.5% lower enteric (intestinal) methane emission per litre
- An increase in MOPF from £7.56 per cow per day to £8.01.

*Nutritionist Matt Witt.*

## *Contributory factors*

To achieve this, there are a number of important areas to consider:

### 1: Ration balance

Correct ration balance is essential to achieve farm specific goals. In this case, cows had the same dry matter intakes on both diets, but better ration balance meant that the cows on the lower impact diet were predicted to produce around one litre more per cow per day. This helped lower the environmental footprint and increase MOPF.

### 2: Think about the sourcing of feed ingredients

Feed ingredient choice is one of the main factors influencing a diet's carbon footprint. Mole Valley Farmers now understands the carbon footprint of all of its straights, blends and compounds delivered to farm.

Feeds with the highest environmental impact include soy and palm, originating from deforested areas. Those at the lower end of the scale include byproducts of the British food and beverage industries and British-grown feeds, such as rapeseed. In this ration example, feeds from deforested areas were removed from the blend.

### 3: Crude protein levels

The crude protein level of the diet was reduced from 18% to 15.9%. In doing so, nitrogen output from the cow was lowered. This in turn could help lower emissions of the greenhouse gas, nitrous oxide from manure and drive down a farm's total carbon footprint.

As bought-in protein tends to be high cost, lowering the crude protein level of the ration could also potentially reduce costs and influence margins.

Dr Witt adds: "We want cows to perform the same or better so we need to be very precise in what we put in the blend. It needs to be value for money and maybe include ingredients we haven't considered before, such as protected amino acids or British-grown, rumen-protected rapeseed expeller."

In addition, understanding the impact of all forages is a crucial component of managing the environmental impact of diets. Building knowledge around the carbon footprint of UK forages will be essential.

### 4: Nutrient supply

Methane produced from enteric fermentation has a big impact on a dairy farm's carbon footprint. By carefully balancing nutrient levels

**Table 1. Effects of higher and lower environmental impact rations on production, emissions and cow margins**

| | Higher environmental impact ration | Lower environmental impact ration | % change |
|---|---|---|---|
| ***Ration*** | | | |
| Grass silage (kg/d) | 30 | 20 | |
| Maize silage (kg/d) | 8.25 | 19.5 | |
| Chopped straw (kg/d) | 0.5 | 0.25 | |
| Higher impact blend (kg/d) | 12.5 | - | |
| Lower impact blend (kg/d) | - | 12.0 | |
| Performance | | | |
| Dry matter intake (kg/d) | 23.3 | 23.0 | |
| Protein of ration (% DM) | 18.0 | 15.9 | -11.6% |
| Milk yield (litres/day) | 37.6 | 38.7 | |
| Milk fat (%) | 4.00 | 4.00 | |
| Milk protein (%) | 3.30 | 3.30 | |
| ***Environmental impact*** | | | |
| Carbon footprint ($kgCO_2e$ per kg DM) | 1.17 | 0.71 | -39.5% |
| Carbon footprint ($kgCO_2e$ per litre) | 0.72 | 0.42 | -41.5% |
| Methane excretion (g/litre) | 12.3 | 11.5 | -6.5% |
| Nitrogen output (g/litre) | 12.91 | 10.89 | -15.7% |
| ***Feed margin*** | | | |
| MOPF (£/cow/day)* | 7.56 | 8.01 | +6.0% |

*Based on feed prices as of 24 May 2021. Milk price 30 pence/litre.

in the diet, methane emissions can be reduced while performance is maintained.

### *Improving margins*

Dr Witt concludes: "The British agricultural industry is well placed to lead the world in continuing to reduce farming's impact on the environment.

"Although the process will not be easy, with careful planning and attention to detail when it comes to ration balance and feed sourcing, it is possible for dairy farmers to mitigate greenhouse gas emissions further while monitoring and improving margins.

"This will form part of an overall farm approach to drive down emissions, including factors such as improved carbon sequestration and fertiliser management."

**Table 2. Example blend specifications (used in diets in Table 1)**

| | Higher environmental impact blend | Lower environmental impact blend |
|---|---|---|
| Energy (MJ/kg DM) | 12.9 | 13.0 |
| Protein (%) | 22.0 | 19.5 |
| Starch (%) | 29.5 | 33.0 |
| NDF (%) | 25.5 | 21.5 |