

Take time to challenge protein feed rates

It's not how much protein is in dairy rations but the balance of amino acids within it that's key to driving productivity and efficiency. And trial work has highlighted the significant gains to be had.

TEXT PHIL EADES

Using dietary protein more efficiently has become an increasing priority on many dairy units from an economic and environmental perspective, and it's an area where improvements can be made that deliver both production and financial benefits.

"Traditionally, most UK dairy rations have been formulated with higher crude protein levels compared to rations in other major milk-producing countries," says molasses blends specialists ED&F Man's Phil Holder. "Typically the level aimed for is between 17% and 18%, in the belief that this would drive milk production. But crude protein tells us little about what the cow can actually use."

Dr Holder explains that cows don't actually need protein per se, but have requirements for amino acids – the building blocks that make up protein. These amino acids are used by the animal to produce different types of proteins, including milk proteins.

All proteins are made up of a combination of 20 amino acids. Ten of these amino acids are classified as 'essential',

which means that they must be supplied in dairy diets. When protein is fed to the cow, a significant proportion is broken down into urea, ammonia and amino acids. These are reconstituted in the rumen into microbial protein. This microbial protein then passes into the small intestine to supply amino acids for the cow to use.

Microbial protein

"To be effective, a diet must supply the amino acids the cow requires to supplement microbial protein, which is not directly linked to the amount of crude protein fed," says Dr Holder. "As soon as an amino acid becomes limiting or, in other words, there is not enough to meet the cow's requirements, her performance is affected. In most UK dairy diets methionine is the first limiting amino acid, with an estimated 90% of diets being deficient."

"The usual approach when formulating dairy rations has been to overfeed metabolisable protein to try and ensure that the cow receives the correct level of amino acids," adds Dr Holder. "This is an imprecise approach, pushing up protein use and costs. If we can be more precise by supplementing diets with specific amino acids, we could reduce the total amount of protein fed and reduce costs."

Research carried out by University of Reading in 2025 clearly demonstrates that feeding specifically formulated molasses-based liquid products can help improve overall protein utilisation. By using liquid feeds as a carrier

Phil Holder:
**"Liquid feeds can easily
 be integrated into
 existing systems"**



for rumen-protected methionine, it is possible to lower overall protein levels in the ration while improving the cow's ability to utilise what she is fed.

In the trial, three groups of Holstein cows were fed different diets during a nine-week period. The first was a conventional control diet comprising around 17.5% crude protein while the other diets were formulated to reduced protein levels of 15.5%. One was a lower-protein diet using Regumix, a 27% protein, highly palatable molasses-based liquid, while the third diet included Regusmart, a molasses liquid based on Regumix but with added rumen-protected methionine (MetaSmart from Adisseo).

Amino-acid balance

The diets were designed to test how cows perform when crude protein is reduced but amino-acid balance, particularly methionine, is optimised. In the lower-protein diets, 1.1kg of a protein blend was replaced with 1.4kg of either Regumix or Regusmart.

The trial showed that milk yields did not decline when crude protein levels were reduced (see Table 1). Cows on the Regumix and Regusmart diets produced as much milk as those on the control diet, challenging the long-standing assumption that high protein is always necessary to support high yields.

"However, the real difference came in how efficiently that protein was used," says Dr Holder. "Total protein efficiency, which measures how much milk protein is produced per unit of dietary protein, improved significantly in both liquid-feed groups."

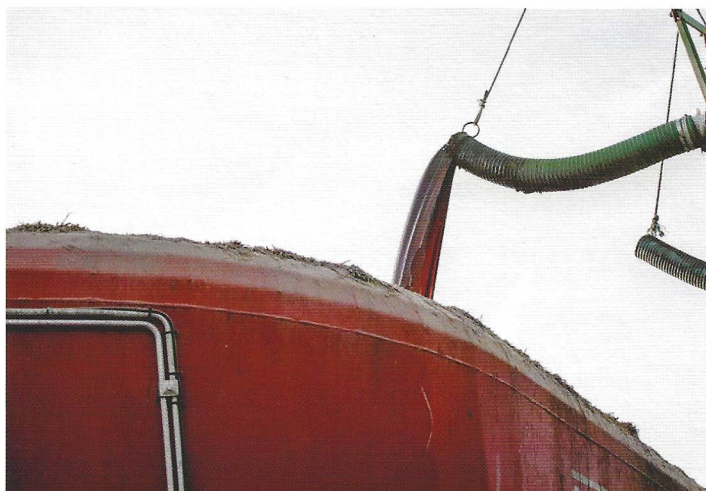
The Regusmart group, which received protected methionine, achieved a total protein efficiency (TPE) of 0.34 – a 17% improvement in protein efficiency compared to the control, and without compromising performance.

"This has significant implications on farm. Higher TPE means more of the protein you buy is converted into saleable milk protein and less is excreted as waste. This not only reduces nitrogen in slurry, helping meet environmental goals, but also reduces the metabolic burden on the cow."

"Lower milk urea levels were seen in both of the liquid-feed groups, particularly in the Regusmart-fed cows, indicating improved nitrogen metabolism and lower rumen ammonia."

To further explore the formulation potential of the trial diets, a ration-modelling exercise was conducted using AMTS, one of the industry's most advanced dynamic nutritional evaluation platforms. The objective was to assess where protein savings could be made using Regusmart, without compromising energy (ME), metabolisable protein (MP), or amino acid supply – particularly methionine.

The results showed that 300g of HP soya could be removed per cow per day while still meeting all nutritional requirements. Across the UK dairy herd



Liquid feed: molasses-based products supply protected amino acids

this equates to a saving of 510 tonnes of potentially imported vegetable protein per day, or more than 186,000 tonnes annually.

Dr Holder adds that methionine's influence goes further than protein efficiency. It is also a key player in liver function and antioxidant status – both critical elements in supporting health, immunity, and fertility.

"In the final weeks of the Reading trial, cows on the Regusmart diet showed higher body condition scores, suggesting better energy balance and potentially greater resilience, which are particularly important in later lactation."

Highly palatable

"From an economic perspective, when the immediate production benefits of feeding reduced protein levels and a balanced amino acid approach are considered, a typical herd producing 9,000 litres will see a return on investment of around 2.1:1 based on feeding costs," says Dr Holder. "And what makes this approach particularly attractive is its practicality. Using molasses-based liquid feeds to supply protected amino acids is low-labour, highly palatable, and easily integrated into existing feeding systems. There's no need for additional premix carriers or complex blending on-farm. Liquid feeds also help reduce sorting in mixed rations, improving diet consistency across the herd."

The findings from the Reading study and the subsequent diet formulation exercise are part of a growing body of evidence supporting a more precise, amino acid-focused approach to protein feeding. "For UK dairy herds, the message is clear: it is not just how much protein we feed that matters, but how well we feed it," adds Dr Holder. "Feeding protected methionine through liquid feeds is an efficient, hassle-free delivery strategy that improves cow performance while reducing nitrogen wastage. Herds that focus on protein efficiency, not just protein quantity, will be the ones that stay ahead." |

diet	formulated CP%	DMI (kg/d)	milk yield (kg)	ECM (kg)	milk protein %	total protein efficiency (TPE)
control	17.5	23.6	38.5	42.5	3.14	0.29
Regumix	15.5	23.5	37.3	40.5	3.12	0.32
Regusmart	15.5	23.6	38.1	41.6	3.21	0.34

Table 1: Effect of reducing protein content and balancing amino acids on milk yield