Researcher Hazel Costigan during a recent feed additive trial.

Food for thought on reducing dairy cows' methane emissions

Teagasc research has shown that the Bovaer feed additive can reduce dairy cows' methane emissions depending on the season and feeding system utilised, writes **Hazel Costigan and Ben Lahart**

Enteric methane, i.e. methane produced within the cow's digestive system, is currently responsible for the majority of Irish agricultural Greenhouse Gas emissions,

Reducing it will be key to meeting the agriculture sector's target of cutting Greenhouse Gas emissions by 25% by 2030, compared to 2018 levels.

The methane reducing feed additive, Bovaer (active ingredient 3-nitrooxypropanol; 3-NOP) is, at present, the most promising feed additive to reduce enteric methane. It is proven to consistently reduce enteric methane by ~30% internationally when fed in a Total Mixed Ration (TMR).

The additive works by stopping the last step of methanogenesis (methane production). However, the essence of Bovaer is that, in order to be effective, it must be present in the rumen throughout the day.

TMR feeding systems

This is why it is best suited to TMR feeding systems where it is mixed throughout the feed and therefore present in every mouthful consumed by the animal.

In pasture-based dairy systems, such as Ireland's, the main opportunities for additive supplementation are at morning and evening milking time, during the grazing season.

Research at Teagasc Moorepark showed that grazing dairy cows supplemented with Bovaer twice daily during morning and evening milking produced 28.5% less methane for two and

a half hours after consumption of the additive. After this, methane production reverts back to similar levels to the control animals.

The results showed that feeding Bovaer to grazing lactating dairy cows after milking twice daily reduced enteric methane by 6%, when averaged over the full 24 hrs.

Slightly greater reductions (circa 11%) were noted indoors in non-lactating dairy cows top-dressed onto grass silage twice daily.

Further research is required to extend the efficacy of Bovaer in grazing systems, i.e. using slow-release technology.

Winter housing period

In the meantime, feeding additives during the winter housing period may offer the solution to reducing enteric methane for a portion of the year.

Over the winter of 2022/2023, two studies were undertaken in Teagasc Moorepark and Teagasc Johnstown Castle to evaluate the effect of feeding Bovaer to non-lactating and winter milk cows in early lactation respectively, during the housing period.

Bovaer was mixed throughout the feed offered using a diet feeder and daily methane was measured using GreenFeed machines.

Results showed that reductions in enteric methane of 22% and 26% are achievable for the eight-week feeding period in non-lactating and winter milk cows in early lactation, respectively, and there was no significant effect on animal performance.

On-Farm Pilot Project

A pilot study was undertaken during winter 2023/2024 in which Bovaer was fed to non-lactating cows on some of the Signpost dairy farms. Eighteen Signpost dairy farms who fed their over-winter diet using a diet feeder were enlisted to feed Bovaer to their cows (3,500) during the eight-week dry period.

The feed additive was fed through the diet feeder alongside the dry cow minerals. Although methane emissions were not measured on the signpost farms, a reduction in enteric methane of 22% was assumed based on the results of the study undertaken in Moorepark, this equates to a 3.3% reduction in emissions when expressed across the entire year.

Close contact was kept with the participating farmers to get feedback from them on the practicalities of feeding the additive.

This is the first time that the additive has been fed at farm level and it's an exciting development to be able to observe its effect on commercial farms. The pilot study demonstrates that the dairy industry is willing to embrace new technologies to reduce enteric methane emissions.

It will also help to crystallise the business model requirements for some technologies in order for farmers to be in a financial position to embrace them.

Ultimately, this research can be used to guide policy on the mitigation potential of Bovaer across different scenarios in the Irish dairy industry.

Hazel Costigan and Ben Lahart are researchers in enteric methane emissions in Teagasc Moorepark, and their research is carried out in collaboration with VistaMilk and the FarmZeroC project

Farmer experience: John Sheridan, Borrisoleigh, Co Tipperary

The biggest concern for me is who is going to pay for the additive?

John Sheridan farms in Killoskehane near Borrisoleigh, Thurles, and is a Centenary Thurles Co-op Supplier.

"I fed the Bovaer additive to my dry cows for eight weeks during the winter of 2023/2024," he says. "It was fed through the diet feeder with the silage. I found it easy to use and there was not extra work associated with it.

"The additive had no impact on intake or anything else that I could see. It would be hard to see an effect anyway as it was dry cows not milking cows but my understanding is that the research is saying it doesn't affect intake or output.

Flexibility

"I would prefer to feed the additive separate to the dry cow minerals as all my minerals are fed through the water. And it would give me more flexibility to perhaps feed the additive to the milking cows when they still have some silage in the diet.

"I suppose the biggest concern for me is: Who is going to pay for the additive? There is a significant cost associated with it but there is no improvement in performance. I would be happy to use it as it will significantly help to reduce my farms emissions but the cost issue needs to be figured out."

John Sheridan fed the Bovaer additive to his dry cows last winter.

From Centenary Thurles Co-op: "Centenary Thurles Co-op was happy to support John Sheridan our signpost farmer with the financial cost of the additive for this pilot study last winter. Trials have shown that Bovaer does reduce farm emissions with output unchanged. The biggest challenge is to find a way of increasing its usage at farm level.