Hannah Dairy Research Foundation

Research Paper Summary

Effects of live yeast on milk yield, feed efficiency, methane emissions and fertility of high-yielding dairy cows

Short title: **live yeast supplementation**

Key words: **dairy cattle; digestibility; milk production; reproduction; yeast supplement**

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Practical point

Feeding live yeast is an effective way to increase feed efficiency of high-yielding cows whilst reducing their environmental impact without impacting reproduction and health indicators.

Background

Products containing yeast are often added to dairy cow diets as they have been shown to improve rumen fermentation and milk yield. Commercially available yeast products can include either dead yeast cells and fermentation by-products that may affect growth of various rumen bacteria, or active yeast products which contain live yeast cells and are thought to stabilise rumen pH and increase specific rumen bacteria.

Feeding live yeast has inconsistent effects on methane production in the rumen. This might be expected because live yeast can lead to growth of bacteria that digest cellulose as their main energy source, leading to the production of hydrogen, crucial for methane production. However, yeasts can also stimulate the growth of microorganisms that use this hydrogen, decreasing its availability for organisms that would use it in methane production.

Feeding a live yeast product to dairy cows has been shown to increase milk yield. Increased milk yield reduces methane emissions per litre of milk produced. However, increased yield can be associated with poorer fertility in dairy cows. Poorer fertility increases herd replacement rate, and greater

numbers of replacement heifers increase methane emissions at the herd level, partially offsetting the positive increased yield effect on methane emissions per litre of milk produced. However, because live yeast improves rumen fermentation, a better balance of nutrients might improve fertility.

The objectives of this study were to assess the effect of feeding an active yeast supplement to high yielding dairy cows on (1) milk yield and feed efficiency; (2) methane emissions; and (3) reproduction indicators.

Work undertaken

Two treatments were applied to 25 cows per treatment from 7 days in milk (DIM) until 128DIM. Cows had an annual average milk yield of 12500L/cow/year, calved all year round, were group housed in a free stall cubicle barn and robotically milked.

Cows due to calve each month were paired according to parity and predicted milk yield. Predicted yield was based on milk yield in the first 12 weeks of the previous lactation for multiparous cows, or genetic merit for primiparous cows. Cows were randomly allocated to a treatment from within the pairs, ensuring groups were balanced for parity, calving date and predicted performance.

Experimental set-up

Treatments were Control and Yeast. Both diets were based on the standard diet fed and consisted of ad-lib partial-mixed rations (PMR) and concentrates fed in the robot (based on yield). The PMR contained grass silage, maize silage, whole-crop silage, a soya:rape blend, molasses, protected fat, and a mineral and vitamin supplement. Control treatment had a placebo (Limestone flour) added to the PMR; Yeast treatment had a live yeast and limestone flour premix added to the PMR.

Electronic feed bins were used to monitor individual animal feed intake. Milk yield and live weight were recorded at each milking and methane emissions were recorded during each milking using a gas analyser fitted to the robot feed bin. Total digestibility of dry matter (DM), neutral detergent fibre (NDF) and gross energy (GE) were determined for each cow.

Results

This study found that milk yield, energy corrected milk, fat-corrected milk and milk fat were higher in animals fed a yeast product, but that total DMI

and intake of PMR and concentrate in the robot were not affected. Energy corrected milk yield increased by 2.8kg/day, milk fat by 122g/day, milk protein by 72g/day and lactose by 106g/day. DM, NDF and GE digestibility were higher for cows fed yeast than those fed the control. Feed conversion efficiency was also higher for those animals fed yeast.

Methane production (g/day) and methane yield (g/kg DMI) were not affected by treatment. Fertility parameters, rumination, health events and blood parameters were unaffected by treatment with yeast.

Conclusions

This study aimed to assess the effect of feeding a live yeast supplement on milk yield, feed efficiency, methane emissions, and reproduction in high yielding dairy cows. Live yeast increased milk yield and this was achieved with no difference in DMI and body tissue mobilisation. Methane emissions were not affected and there was no effect on reproductive indicators.

Reference

P.C. Garnsworthy, N. Saunders, J.R. Goodman, I.H. Algherair, J.D. Ambrose 2024. Effects of live yeast on milk yield, feed efficiency, methane emissions and fertility of high-yielding dairy cows. Animal, 19: 101379