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Effects of restriction of silage fermentation with formic acid on milk production

Keywords grass silage, fermentation, formic acid, formic acid, dairy cows, milk production,

Abstract

The study was conducted to evaluate the effects of silage fermentation quality and type of supplementation on milk production. Thirty two Finnish Ayrshire dairy cows were used in a cyclic change-over experiment with four 21-day experimental periods and $4 \times 2 \times 2$ factorial arrangement of treatments. Silage fermentation was modified with formic acid (FA), which was applied at the rates equivalent to 0 (FA0), 2 (FA2), 4 (FA4) or 6 (FA6) litres t⁻¹ grass of pure formic acid (as 100% FA). Dietary treatments consisted of four silages, a protein supplementation (no supplement or rapeseed meal 1.8 kg d⁻¹) and a glucogenic substrate (no supplement or propylene glycol 225 g d⁻¹). Increasing the application rate of FA restricted silage fermentation curvilinearly, as evidenced by higher concentrations of ammonia N and butyric acid in FA4 than FA2 silage. Similarly the use of FA resulted in curvilinear changes in the silage dry matter intake and milk yield. The highest milk and protein yields were achieved with FA6, while the milk yield with FA2 was higher than with FA4. Interactions were observed between silage type and supplementation. Rapeseed meal increased milk yield irrespective of the extent of silage fermentation, but the magnitude of response was variable. Propylene glycol was most beneficial with restrictively fermented silages FA4 and FA6. In conclusion, restriction of silage fermentation with a high rate of formic acid is beneficial in milk production. Interactions between silage composition and concentrate types suggest that the responses to supplementary feeding depend on silage fermentation characteristics.

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