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Microbial protein synthesis, digestion and lactation responses
of cows to grass or grass-red clover silage diet supplemented
with barley or oats

Keywords dairy cows, grass silage, red clover, barley, oats, rumen
fermentation, microbial protein, milk fat composition,

Abstract

The study was conducted to evaluate effects of silage type (grass-red clover vs. pure grass) and grain supplement (oats vs. barley) on rumen fermentation, post-ruminal nutrient flows, diet digestion and milk production. Four primiparous Finnish Ayrshire cows fitted with cannulae in the rumen and duodenum were used in a 4 × 4 Latin square experiment with four 28-d experimental periods and 2 × 2 factorial arrangements of treatments. Using red clover-containing (40%) silage rather than pure grass silage had minor effects on rumen fermentation or diet digestion but increased non-ammonia nitrogen (N) flow in terms of increased flows of microbial and dietary N entering to the small intestine. This was reflected as a reduced ruminal N degradability on grass-red clover diets. Furthermore, grass-red clover diets in comparison to grass silage diets increased milk lactose concentration and yields of milk, protein and lactose. Feeding oats in replacement for barley had minor effects on rumen fermentation or post-ruminal non-ammonia N flows but reduced digestibility of organic matter and neutral detergent fibre in the diet. Using oats rather than barley increased yields of milk and lactose but reduced milk protein concentration. Oats also increased proportions of C18:0 and C18:1 in milk fat and reduced those of C10:0 to C16:0. It is concluded that inclusion of red clover and replacement of barley with oats in grass silage based diets have beneficial effects in dairy cow production.

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