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1. Title

Effect of starch substitution by rapeseed oil on enteric methane emission and performance in dairy cows fed grass-silage based diets⁽¹⁾

2. Authors

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3. Abstract

This work aimed to study the effect of energy source supplementation on methane emission and performance in dairy cows fed grass-silage based diets.

Eight multiparous lactating Holstein cows were used in a replicated 4 x 4 Latin square design with 4 periods of 28 days. Animals were limited fed (95% ad libitum) with 4 grass silage based diets supplemented with 4 concentrates in which starch was gradually substituted by increasing amounts of rapeseed oil (1.5, 3.0 and 4.5% on a dry matter basis). Diets were formulated to be iso-energy and iso-protein to meet individual energy and protein requirements for production. Methane emissions were measured (days 23 to 27) when animals were in open-circuit respiration chambers. Daily intake, milk production and composition were also recorded.

Intakes of gross energy and fiber were similar among diets, starch intakes decreased linearly ($P < 0.0001$) and ether extract intake increased linearly ($P < 0.001$) with increasing rapeseed oil amounts. Methane emissions (g/d), yield (g/kg dry matter intake) and intensity (g/kg milk) decreased linearly ($P < 0.01$) when starch was replaced by rapeseed oil in the diets.

Milk production and composition differ among diets ($P < 0.001$). The linear decrease in milk fat yield with increasing amounts of oil suggests a milk fat depression with changes in milk fatty acids profile. Starch substitution by rapeseed oil decreased both enteric methane emission and performance in dairy cows fed grass-silage based diets.

4. Index terms: methanogenesis, mitigation feeding strategy, energy source, milk cow