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2216281 Effect of substituting palm oil by sunflower oil in fattening dairy beef bulls fed high-concentrate diets on performance and enteric methane emissions

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INTRODUCTION

Enteric CH_4 produced by ruminants represent 17% of total global CH_4 output; for this reason, evaluate feeding strategies to reduce methane emissions is critical for ruminant production sustainability.

Fat supplementation may reduce CH_4 emissions by lowering ruminal fermentability, enhance propionic acid production and protozoal inhibition. In addition, when fat is rich in polyunsaturated fatty acids (PUFA) it may reduce CH_4 emissions by biohydrogenation. Moreover, palm oil is extensively used as a dietary fat source in dairy beef production; however, its use is questioned due to its impact on deforestation that negatively impacts on climate change.

Therefore, replacing palm oil by other ingredients with high content of polyunsaturated fatty acids (PUFA) locally produced as sunflower oil may be a good strategy to reduce enteric CH_4 emissions and environmental impact of dairy beef production.

1. Spanish dairy beef system

OBJECTIVE

Effect of substituting concentrate palm oil by sunflower oil in dairy beef cattle on animal performance and enteric methane emissions measured with a “sniffer” methane measurement system under commercial conditions.

MATERIAL AND METHODS

94 bulls (399 ± 9.3 kg of BW, 271 ± 4.0 days of age) were group-housed in 6 pens with straw as bedding material cleaned fortnightly.

TREATMENTS. Concentrate offered to bulls differed on the fat source:

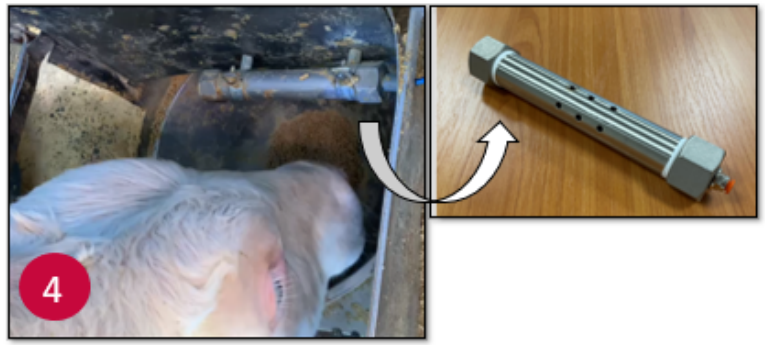
1. **CT** (n = 46): 3.5 % palm oil
2. **SU** (n = 48): 3.5 % sunflower oil

The study lasted 42 days divided in 3 periods of 14 days.

Individual feed intake was recorded daily. Bulls were weighed every 14 days. Enteric emissions were recorded daily based on a "sniffer" methane measurement system. Methane, CO_2, and O_2 were detected with an infrared gas analyser installed in each concentrate feeder after being collected by an inlet collector, a holed metal piece placed in the feeder. Total daily CH_4 (g/d) was estimated based on Madsen et al. (2010).

Data were analyzed using a mixed effects model with treatment, period and their interaction as main effect and treatment by pen interaction as random effect.

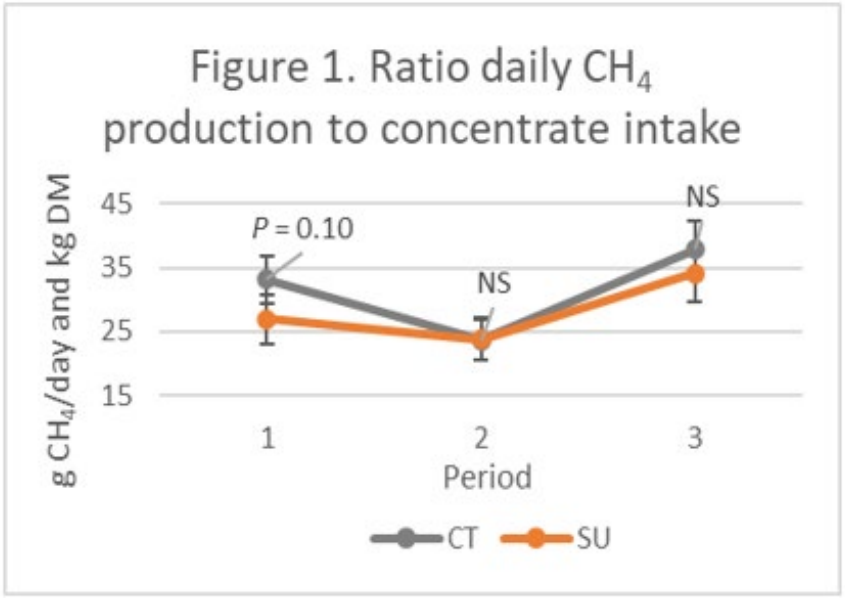
2. Palm oil; 3. Sunflower oil.



4. Bull eating in the concentrate feeder with the inlet collector, a holed metal piece connected to sniffer.

RESULTS

1. No differences were observed in average daily gain (1.83 vs. 1.85 ± 0.141 kg/day, $P = 0.87$; CT vs. SU) and concentrate intake (7.48 vs. 7.48 ± 0.420 kg DM/day, $P = 1.00$; CT vs. SU).
2. A significant time by treatment interaction was observed in mostly enteric gasses emissions data with no clear pattern. Overall, mean CH_4 concentration per visit (73.0 vs. 91.6 ± 19.73 ppm, CT vs. SU; $P = 0.40$); mean CO_2 concentration per visit (1442 vs. 1990 ± 576 ppm, CT vs. SU; $P = 0.39$); ratio CH_4 to CO_2 (0.050 vs. 0.052 ± 0.0104 ppm, CT vs. SU; $P = 0.80$); and daily CH_4 production (213 vs. 213 ± 22.5 g CH_4/day, CT vs. SU; $P = 0.72$) did not differ among treatments.
3. A significant time by treatment interaction ($P < 0.01$) was observed in the ratio daily CH_4 production to concentrate intake, where SU tended ($P = 0.10$) to be lower than CT in period 1 (33.1 vs. 26.7 ± 68.5 g CH_4/day and kg DM; Figure 1).



CONCLUSIONS

Palm oil substitution by sunflower oil in fattening dairy beef bulls fed high-concentrate diets did not impair performance, and only enteric methane emissions during the first supplementation period tended to decrease when enteric CH_4 emission was expressed by concentrate intake.

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