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Effects of lipid sources in steers performance and methane emission finished in feedlot

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Introduction One important aspect in the beef cattle industry refers to the enteric methane production, and this issue may represent losses that range between 4 and 12% of total gross energy intake (IPCC, 1996). Thus, the objective of this was to evaluate the effect of the different lipid sources in enteric methane production.

Materials and methods Twenty Nellore steers (average body weight at the experiment 471.6 ± 28.08 kg and 18 months age) were feed with 60% corn silage and 40% concentrate, with 7.0% of ether extract on total diet. The lipid sources were: soybean grain, by pass fat (Lactoplus®), linseed oil and palm oil plus a control treatment, without additional fat. The supplements were based in corn and soybean meal. The animals were housed in individual stalls, weighed for 90 days (every 30 days) and slaughtered at 497.96 kg. The animals were assigned to a completely randomized design, with five treatments and four replications.The methane emission was evaluate using the SF6 tracer gas technique (Johnson *et al.*, 1994; Westberg *et al.*, 1998, adapted by Primavesi *et al.* 2004). Permeation tubes with known release rates for SF6 were placed in the rumen, 72 hours prior to the start of gas sampling. Each tube was charged with 500-600 mg of SF6 and incubated at 39°C for calibration. Release rates of SF6 were determined by measuring the weight loss trough the tubes for 6 weeks to establish a steady pre-determined rate. Release rates of the permeation tubes used in this study ranged from 930 to 1600 ng min^{-1}. Gases exhaled from the nose and mouth were drawn into pre-evacuated collecting tubes, through a capillary tubing. The collecting system was designed to deliver half of its volume during a 24h collect, ensuring an uniform collecting rate. Four consecutive 24h gas samples were collected from each animal. The fixed effect was the treatment. The methane emission and average daily gain were analysed using the Tukey test, with 5% probability.

Results There was statistical effect ($P<0.05$) of different lipid sources on the average daily gain (ADG), methane emission expressed in kilogram of methane emitted per year (kg $CH_4.yr^{-1}$), gram of methane emitted per day (g $CH_4.day^{-1}$) and gram of methane emitted per day per kilogram of metabolic body weight (g $CH_4.day.MBW^{-1}$) in steers finished at feedlot. The ADG was higher in animals fed with the control and bypass fat when compared to other treatments. The treatments kg $CH_4.yr^{-1}$, g $CH_4.day^{-1}$, and $CH_4.day.MBW^{-1}$ where fat sources were added to the basis of unsaturated fat acids had lower methane emissions per year. However the kilogram of methane emitted per kilogram of carcass produced (kg $CH_4.kg\ CAR^{-1}$) did not differ ($P>0.05$) among the treatments in any unit expressed, although there was a tendency ($P=0.070$) for the treatments with linseed oil and soy bean showed be more efficient than others.

Table 1 Average daily gain and methane emission of steers finished in feedlot

Variables	Treatments					P[1]	CV[2] (%)
	Control	Palm oil	Linseed oil	By pass fat	Soy bean		
ADG	1.15 [a]	0.36 [c]	0.79 [b]	1.03 [a]	0.86 [b]	0.040	11.2
kg $CH_4.yr^{-1}$	53.75 [a]	24.37 [b]	22.91 [b]	40.39 [ab]	23.35 [b]	<.001	24.2
g $CH_4.day^{-1}$	147.25 [a]	66.70 [b]	62.77 [b]	110.65 [ab]	63.98 [b]	<.001	24.8
g $CH_4.day.MBW^{-1}$	1.40 [a]	0.68 [b]	0.63 [b]	1.01 [ab]	0.66 [b]	<.001	23.0
kg $CH_4.kg\ CAR^{-1}$	0.22	0.29	0.16	0.20	0.17	0.070	22.4

Means within each variable followed by different letters differ by Tukey test ($P < 0.05$).
ADG = average daily gain; BW= body weight; MBW = metabolic body weight; CAR= carcass
[1] Probability; [2] Coefficient of Variation

Conclusions Lipid sources with 7.0% of ether extract on total diet were effective in reduced the emission of methane. Results of methane emissions expressed in kilogram of dry matter and energy consumed per day are important and necessary in the interpretation and discussion of results.

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