

## The Effect of Source of Coconut Oil on Methane Output, Intake and Performance of Continental Cross Beef Heifers

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### Introduction

Under the Kyoto agreement Ireland is legally bound to limit net growth in greenhouse gas (GHG) emissions to 0.13 above 1990 levels for the period 2008-2012. Methane (CH<sub>4</sub>) accounts for 0.18 of Ireland's total GHG with enteric fermentation accounting for 0.78 of this total (Ireland National Inventory Report 2003, 2003). Reductions required under Kyoto are equivalent to a 0.10 decline in the national herd. Reducing emissions per head via dietary manipulation is one alternative to reducing numbers. The use of coconut oil (CO) to reduce enteric CH<sub>4</sub> has been identified (Sutton *et al.*, 1983; Lovett *et al.*, 2003). This experiment sought to establish the effect of source of CO on intake, CH<sub>4</sub> output and average daily live-weight gain (ADG), in finishing beef heifers fed a 0.50:0.50 forage: concentrate (F:C) diet.

### Materials and methods

Thirty-six continental cross beef heifers, blocked on weight (497 kg ±38, 23 months ±3) were assigned randomly to 1 of 3 experimental rations; 0g CO day<sup>-1</sup> (T1), 250g CO day<sup>-1</sup> from oil (T2), 250g CO day<sup>-1</sup> from copra meal (CM) (T3), in a 0.50:0.50 F:C diet. All concentrates were formulated to be iso-nitrogenous. Grass silage was the forage source and CO given via a barley\soya bean meal based concentrate. The experiment had a randomised block design (n=12/treatment) and lasted for 93 days with daily CH<sub>4</sub> measurements from days 14 to 18 and 70 to 74. Dry matter intake (DMI) was recorded daily and live-weight gain was calculated from the difference between initial and final weight, both measured on two consecutive days. The data were analysed as a randomised block design using a one-way ANOVA within the GenStat (6th edition) statistical package.

### Results

The addition of CO to the diet had no significant effect on DMI while CH<sub>4</sub> output (l/day) was significantly

reduced (P<0.001) regardless of CO source. Average daily live-weight gain (ADG) was significantly higher for the group fed refined CO than the non-supplemented group, while the ADG of the CM group did not differ significantly from either. As no significant reductions in DMI and ADG were identified, significant reductions (P<0.001) in CH<sub>4</sub> output per kg of DMI and per kg of ADG were observed.

### Discussion

This trial confirms the reductions in CH<sub>4</sub> output (0.20) identified in previous work, using 250g CO day<sup>-1</sup> from oil (Jordan *et al.*, 2004). Copra meal provides reductions in CH<sub>4</sub> output similar to that of refined CO in litres CH<sub>4</sub>/day, and is a less expensive source of CO than refined oil. The effect of diet on animal performance is key, as any reductions in CH<sub>4</sub> must be seen in the context of animal performance. Average daily gain was increased on the CO ration and the higher energy density of the ration due to the added oil may explain this.

### Conclusion

Copra meal could be a more commercially attractive method of CH<sub>4</sub> reduction than supplementation with refined oil. However, increases in ADG on the CO ration could offset the cost of including CO in the ration. Copra meal did not significantly affect ADG but the effect on carcass weight and quality needs to be assessed.

### References

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**Table 1** Effect of source of coconut oil supplementation on intake, growth and methane production.

	T1	T2	T3	s.e.d.	P-value
DMI (kg DM)	8.67	8.81	8.66	0.428	NS
CH <sub>4</sub> (l/day)	334.4 <sup>a</sup>	271.6 <sup>b</sup>	284.6 <sup>b</sup>	16.96	***
ADG (kg)	1.08 <sup>a</sup>	1.25 <sup>b</sup>	1.20 <sup>ab</sup>	0.069	NS
CH <sub>4</sub> /kg DMI	38.82 <sup>a</sup>	31.05 <sup>b</sup>	33.22 <sup>b</sup>	1.392	***
CH <sub>4</sub> /kg ADG	243.7 <sup>a</sup>	168.2 <sup>b</sup>	192.7 <sup>b</sup>	14.62	***

T1=0g oil/day; T2=250g oil as CO/day; T3=250g oil as CM/day; NS= not significant.

DMI= dry matter intake; CH<sub>4</sub>= methane; ADG= average daily gain

<sup>ab</sup>, values within rows without common superscripts are significantly different (P<0.01); \*\*\* P<0.001.