

Energy use efficiency and enteric methane production in Boran steers fed at restricted levels of energy intake

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1. Background

- At low levels of intake, ruminants fed above maintenance energy requirements (MER) improve their dietary nutrients use efficiency.
- Limited studies have however been conducted at below maintenance intakes and the few available studies are inconclusive (Doreau *et al.*, 2003; Korir *et al.*, 2016).

3. Methods

- Boran yearling steers (n=12, LW=183.3±4.3 kg [SE], age=18 mo) were used in a completely randomized block design. The experiment ran for 5 weeks.
- Dietary treatments consisted of 120%, 100%, 80% and 60% levels of MER intake.
- The diets consisted mainly of chaffed Rhodes grass hay (CP: 57.7 g/kg ME: 8.3 MJ/kg). 20% of energy intake for the 120% MER treatment was fed as 48:52 cotton seed meal: molasses mix.
- Net Intake, faecal and urine output (Figure 1), total tract digestibility and enteric methane production were measured (Figure 2).

4. Results

- Level of intake did not affect organic matter or crude protein digestibility (P>0.54 and P>0.38, respectively).
- Methane production at the lowest energy intake was lower than maintenance intake (Table 1).

Table 1: Treatment contrasts for energy intake (MJ/100kg LW/d), faecal, urinary, and methane energy losses (% of G.E intake) and methane production (g) in Boran steers used in the current trial.

Pictures

	120%MER (n=3)	100% MER (n=3)	80% MER (n=3)	60% MER (n=3)	Pooled S.E
Energy intake (MJ/100kg LW/ d)					
Gross energy	47.6 ^a	40.5 ^b	33.5 ^c	25.7 ^d	1.62
Digestible energy	37.4 ^a	32.1 ^{a,b}	25.2 ^b	19.9 ^b	1.47
Metabolizable energy	32.7 ^a	28.1 ^{a,b}	21.4 ^c	16.6 ^d	1.46
Energy loss: (% of G.E intake)					
Faeces	42.8 ^a	42.3 ^a	46.7 ^a	44.5 ^a	1.18
Urine	1.8 ^a	2.1 ^a	2.4 ^a	2.2 ^a	0.23
Methane	7.5 ^a	7.3 ^a	8.8 ^a	9.1 ^a	0.45
Methane production:					
(g/d)	95.3 ^a	81.1 ^b	79.8 ^b	59.3 ^c	6.11
(g/ kg DMI)	24.0 ^{a,b}	19.3 ^a	22.0 ^{a,b}	24.3 ^{a,b}	1.44

2. Aim

- To study the effect of restricted level of intake-above and below maintenance on dietary apparent digestibility, energy partitioning and enteric methane emission.



Figure 1 : Steers in individual metabolic crates during total urine and faecal collection.



Figure 2 : Animal in the respiratory chamber during methane production measurements.

5. Discussion

The higher energy losses in form of methane emissions at energy intakes below MER in the present study suggest that energy utilization in cattle fed below maintenance decrease. This is against the general trend observed at above MER intake.

6. Conclusion

Findings from the present study agree with the limited data available from animal experiments. Tangible conclusion however could not be made because of the small sample size used in the present experiment.

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