

Growth of Young and Mature Cattle Fed Ryegrass Haylage or Concentrate Based Diets

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Animals utilise metabolisable energy (ME) with different levels of efficiency depending upon their stage of maturity and the quality of the diet especially between forage and concentrate based diets (CBD). CSIRO (2007) collated the equations by which energy use and live weight gain (LWG) may be predicted. The aim of this study was to compare the efficiency of use of ME for LWG for young and (Y) and mature (M) steers fed ryegrass haylage (RH) or CBD over a 75 day period and to compare it to that predicted by CSIRO (2007).

Weaner (204 ± 1.5 kg LW) and mature fattening (477 ± 7.5 kg LW) *Bos indicus* cross steers, (Swans Lagoon Research Station), were used in this experiment. The experimental design was a randomised block incorporating a response surface with two age groups (Y and M) x two feed types (RH and CBD) x four levels of feeding, with two animal replicates/level of feeding. CBD consisted of 80% grain based pellet and 20% pangola (*Digitaria eriantha*) hay (PH). The pellet comprised 85.8% barley, 3% molasses, 2% canola meal, 0.85% urea, 5% bentonite, 0.1% premix, 1.5% limestone, 1% salt, 0.5% ammonium chloride, 0.1% magnesium oxide, 0.15% myco curb, and 0.025% rumensin 100. RH or CBD were offered at 12, 16 or 15, 20 or 18, and 25 or 22 g DM/kgW/day, respectively, for Y steers; and were offered at 10, 14, 18, and 23 or 22 g DM/kg W/day, respectively, for M steers. Live weight was measured twice weekly and intake daily. During weeks 4-6, DM digestibility (DMD) was measured. The chemical composition (g/kg DM) of the RH was crude protein (CP) 184, ash-free neutral detergent fibre (NDF) 366, of the CBD was CP 150, NDF 187 and of PH was CP 65 and NDF 690. There was no effect of level of feeding on DMD and the mean DMD for young vs mature animals was $74.7 (\pm 0.67)$ vs $73.4 (\pm 0.67)$ for RH and $71.0 (\pm 0.67)$ vs $71.5 (\pm 0.67)$ for CBD respectively.

Table 1. Relationship between ME intake (X; MJ ME/kgW/d) and live weight gain (LWG) (Y; kg/d) of young and mature steers offered ryegrass haylage (RH) or concentrate based diet (CBD)

Steer Age	Feed	Equations	R ²	RSD
Mature	RH	$Y = -1.592 + 14.064^aX$	0.93	0.15
	CBD	$Y = -0.971 + 10.9159X$	0.92	0.13
Young	RH	$Y = -0.987 + 8.783^bX$	0.92	0.13
	CBD	$Y = -1.2028 + 11.45X$	0.84	0.16

^{a,b} Means in the same column with different superscripts are significantly different

Table 2. Relationship between LWG predicted from CSIRO (2007) (X; kg/d) and LWG observed (Y; kg/d) of young and mature steers offered haylage (RH) or concentrate based diet (CBD)

Steer age	Feed	Equations	R ²	RSD
Mature	RH	$Y = -0.23 + 1.336X$	0.90	0.182
	CBD	$Y = 0.163 + 1.099X$	0.89	0.160
Young	RH	$Y = 0.034 + 1.211X$	0.92	0.128
	CBD	$Y = 0.275 + 1.763X$	0.75	0.203
All animals combined		$Y = 0.188 + 1.051X$	0.62	0.276

There were highly significant relationships between LWG and MEI for all animal groups and diets (Table 1). On RH diet, the M steers had a significantly greater efficiency of use of ME compared to Y steers but there were no other differences between groups. There was a linear relationship between LWG observed and that predicted from the CSIRO (2007) across all steer ages and diets but with significant variation. There was less variation within feed and age types (Table 2). These results suggest that the equations within CSIRO (2007) are reasonable in predicting the efficiency of use of ME for LWG when intake and DMD of the diet are known but there was large variation, the reasons for which need to be resolved. We thank ACIAR for funding this work and the John Allwright Fellowship for CH Pham.

CSIRO. (2007). Nutrient Requirements of Domesticated Ruminants, CSIRO Publications. Australia.

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