

Growth and eye muscle area of cross-bred Boer goats fed *Desmanthus cultivar JCU 1* hay

A. Aoetpah^A, C. Gardiner^A, B. Gummow^A and G. Walker^{A,B}

^ACollege of Public Health, Medical and Veterinary Sciences James Cook University, Townsville, Qld, Australia.

^BEmail: glen.walker@jcu.edu.au

Rhodes grass (*Chloris gayana*) hay (RGH) is an improved tropical pasture species used for livestock production in the Australian tropics and sub-tropics, however, RGH contains low crude protein, low metabolisable energy and high neutral detergent fibre relative to improved temperate pasture species and tropical legumes leading to low productivity of goats unless supplemented with a source of crude protein. Supplementation tropical grasses with urea (Uza *et al.* 2005), cottonseed meal (CSM) (Solomon *et al.* 2008) or the tropical legume species *Desmanthus* (Ngo 2012) is reported to increase dry matter intake and liveweight gain of goats and sheep. The objective of the present study was to compare rate of liveweight gain and accretion of eye muscle determined at the 12th rib of twenty female Boer goats (19.84±2.21 kg) fed RGH supplemented with either urea, urea + CSM, CSM or only fed *Desmanthus* (cultivar JCU 1) hay over 138 days. Total crude protein concentration in the diets was 185 to 195 g/kg DM. Each diet (Urea, Urea + CSM, CSM and *Desmanthus*) provided 144, 130, 139 and 112 g/kg DM of rumen degradable protein (RDP) and 42, 56, 59 and 83 g/kg DM of undegraded dietary protein (UDP), respectively. The urea and CSM in the Urea + CSM diet supplied equivalent amounts of crude protein. All animals received a complete mineral supplement (Rumevite[®] Fermafos). The diets were offered in equal amounts twice a day at 08:00 h and 16:00 h. Eye muscle area was estimated by counting the number of 1 × 1 mm squares marked on a clear plastic grid that covered a transverse section of the longissimus dorsi muscle (including fascia) on the caudal side of the 12th rib.

All diets supplied sufficient crude protein, RDP and minerals to maintain normal rumen function at high levels of DMI (NRC 2007). The *Desmanthus* diet resulted in the highest total dry matter intake (DMI), crude protein intake (CPI) and metabolisable energy intake (MEI) while the diet supplemented with urea produced the lowest total DMI, CPI and MEI (Table 1). The diets supplemented with urea + CSM or CSM showed intermediate values for total DMI, CPI and MEI. The rates of liveweight gain across all diets were consistent with those predicted by NRC (2007) based on metabolisable energy intake for a 20-kg Boer goat.

This intake pattern can be explained by both palatability and the amount of UDP supplied by the diets. In particular, the high palatability and UDP supplied by the legume likely promoted intake and liveweight gain while the low palatability (Tadele and Amha, 2015) and lower UDP supplied by the diets containing urea likely limited intake and liveweight gain. Importantly, once requirements of the rumen for RDP (and minerals) are met, diets with the most UDP in dry matter (CSM and *Desmanthus*) supported the highest dry matter intakes, rates of liveweight gain and eye muscle area. Supplementation strategies for diets based on tropical grasses must provide sufficient UDP to support high levels of intake and growth.

Table 1. Intake of dry matter, crude protein, and metabolisable energy as well as live weight gain and eye muscle area of supplemented growing Boer goats

Item	Dietary treatments				sem
	Urea	Urea CSM	CSM	<i>Desmanthus</i>	
DMI total (g/d)	443 ^a	573 ^b	636 ^b	1027 ^c	43.10
CPI (g/d)	98 ^a	125 ^b	151 ^c	206 ^d	8.46
MEI (MJ/d)	3.8 ^a	4.5 ^a	5.9 ^b	10.1 ^c	0.46
Average LW gain (kg)	0.7 ^a	5.6 ^b	6.7 ^b	9.6 ^c	0.64
Eye muscle area (cm ²)	2.4 ^a	3.5 ^{ab}	3.9 ^b	5.5 ^c	0.25
Hot carcass weight (kg)	6.5 ^a	8.2 ^b	10.1 ^c	12.6 ^d	0.50

Different letters in the same row differ significantly; $P < 0.05$.

References

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