Results

Only cystine and methionine were significantly influenced by dietary methionine level but not with phytase level. This confirms the interrelationship between the cystine and methionine in the metabolism of the two amino acids. Also, threonine was significantly affected by only dietary methionine levels. There was no significant interaction between methoinine and phytase level. Though not significant, phytase addition led to numerical improvement in most of the amino acid digestibility.

Conclusion

These results show that when methionine is marginally deficient in the diet of laying hens, addition of phytase could bring about numerical improvement in the AA digestibility which is not significant. This suggests that the inclusion level of methionine must be met even when phytase is to be used.

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Nutrients supply in wethers fed a tropical grass based-diet supplemented with levels of canola meal

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Introduction

Continual growth of the biodiesel industry in Brazil has increased the availability of byproducts, such as canola meal (CM), for use in livestock feeding. However, the nutritional effects of CM supplementation for ruminants fed tropical grass based-diets need to be evaluated. This study evaluated the effect of offering canola meal as a supplementary feed on digestible organic matter intake, microbial protein synthesis, duodenal flux of amino acids and N retention in wethers fed a tropical grass based-diet.

Materials and methods

Eight Polwarth $\times$ Texel crossbreed wethers (31.1 $\pm$ 3.8 kg live weight) housed in metabolism cages were used in a replicated 4 $\times$ 4 Latin Square experiment. Four of them were implanted with duodenal cannulae. Each experimental period was conducted over 15 d, with a 10 d adaptation and a 5 d measurement period. Wethers were fed a basal diet consisting of Sudangrass (*Sorghum sudanense*) ad libitum (100 to 200 g/kg of orts) and treatments were not supplementation (control) or supplementation with CM at a rate of 5, 10 or 15 g/Kg live weight. Forage and supplements were offered separately, in two daily meals, at 0800 and 1700 h. Cracked corn grain was added to CM (1:9) to improve palatability. Feed, refusals, urine and fecal output were recorded and sampled daily on days 10 to 15 of each experimental period. Duodenal sub-samples (100 mL) were taken on day 15 of each collection period in three hour intervals during a 24-h period. All samples were composited by animal and period. Feed, refusals, duodenal and feces samples were analysed for dry matter (DM), organic matter (OM), N and acid detergent lignin (ADL). Duodenal samples were also analysed for purines and α-amino N. Urine samples were analysed for N concentration. Duodenal flux of DM was estimated based on ADL concentration in duodenal digesta and feces as follows: Duodenal DM (g/day) = [fecal DM (g/day) $\times$ fecal ADL (g/kg of DM)]/duodenal ADL (g/kg of DM) (Porter & Singleton 1971). The amount of microbial N supplied to the small intestine (g/d) was calculated considering a ratio of purine N/microbial N of 0.116 (Chen and Gomes, 1992). Duodenal flux (g/d) of microbial N and α-amino N were calculated as: [duodenal microbial N or α-amino N (g/kg DM) $\times$ duodenal DM (g/d)]. Data were analyzed using the PROC MIXED option of SAS (2002). When treatment effect was significant means were compared by orthogonal contrast (control vs. supplementation), and the effect of supplementation levels were analysed by regression.

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Results

Treatment effects are shown in Table 1. As compared to control treatment, supplementation with CM increased digestible OM intake, duodenal flux of α-amino N and N retention in wethers fed a tropical grass based-diet. Among supplemented animals both digestible OM intake and N retention increased linearly whereas duodenal flux of α-amino N tended to increase ($P = 0.07$) with increased levels of CM supplementation. Microbial N entering the small intestine was similar for all treatments.

Table 1 *Effects of canola meal supplementation on digestible organic matter intake (DOMI), duodenal flux of microbial N and α-amino N, and N retention in wethers fed a Sudangrass based-diet*

	(g/kg BW canola meal)					*P*-value*	
Item	0 (Control)	5	10	15	s.e.m	C vs. S	S
		(g/d)					
DOMI†	344	389	502	565	35.4†	<0.001	0.002
Microbial N¥	3.03	4.08	4.20	4.80	1,99¥	n.s.	n.s.
α-amino N¥	3.67	6.54	8.07	9.75	0.81¥	<0.001	n.s.
N retention¥	3.48	7.49	11.09	16.75	1.36†	<0.001	<0.001

†$n = 8$ per treatment; ¥ $n = 4$ per treatment; * = Probability of type I Error: C vs. S = contrast between control and supplementation and S = linear effect of supplementation levels.

Conclusions

Supplementation with canola meal improves energy and amino acids supply in wethers fed tropical forage based diets.

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Intake and digestibility of fresh grass fed to sheep indoors or at pasture, at various stages of regrowth and levels of feeding

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Introduction

Under tropical condition, fresh forage, used *in situ* at pasture or cut and distributed indoors, is the most common feed resource for ruminants. Intake and digestibility are the two main parameters known to control ruminant production from such resource. Due to the lack of accuracy of the measurement methods for such parameters at pasture, the fundamentals of animal feeding are often based on the extrapolation of results obtained indoors. However, although most of the factors known to affect intake and digestibility of animals fed indoors may also affect grazing animals, some factors like the selective behaviour implemented by grazing animals, appear to be specific to the grazed forage (Minson, 1990). To our knowledge (Fanchone *et al.*, 2010), studies that have attempted to compare nutrition indoors and at pasture are

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