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The Effect of Molasses/Mineral Feed Blocks along with the Use of Medicated Blocks on Haematological and Biochemical Blood Parameters in Boer Goats

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ABSTRACT

Inadequate nutrition and the gastro-intestinal nematode are amongst the commonest problems associated with grazing goats. The aim of this study was to assess the effects on blood metabolites by introducing molasses/mineral feed blocks in addition to the use of medicated blocks, to the diet of grazing goats in Malaysia. Twenty-four male Boer goats with an average age of age average of 7-8 months were used. Goats were divided into four groups: (1) a control group; (2) an experimental group fed with a ratio of molasses/mineral feed blocks (UMB); (3) an experimental group fed with a ratio of medicated blocks (MUMB) and (4) an experimental group fed with a ratio of UMB+MUMB. At the end of the experiment, the blood was taken and analyzed to measure pathological and biochemical parameters. All the blood analysis was conducted at the Veterinary Research Institute (VRI), Ipoh, Malaysia. However, results shows that a combination of molasses/mineral feed blocks and medicated blocks has significant effects ($p<0.05$) on blood factors includes calcium, creatinine, urea nitrogen and Packed Cell Volume (PCV) and has no negative effects on body function. The results for PCV (%) shows that goats fed with the ratio contain UMB+MUMB have highest percentages which are 94.90±14.70 and 27.25±2.50, respectively. The goats fed with MUMB have highest amount of calcium in their blood which is 3.70±0.37. The highest amount of urea nitrogen is $5.48±2.15^{a}$ which belongs to the goats fed with UMB. According to the results, it can be concluded that the molasses were uses in the ratios of the goats had positive effects on body function. Thus, the use of urea molasses mineral blocks and medicated urea molasses mineral blocks is recommended.

Key words: Molasses, urea, gastro-intestinal nematode, boer goats

INTRODUCTION

Small ruminants are very important livestock to smallholder farmers in developing countries (Kioumarsi *et al*., 2008a, b, 2009; Khorshidi *et al*., 2008, 2010; Abdelrahman, 2009). However, inadequate nutrition is one of the most problematic constraints to the ruminant livestock industry in developing tropical countries. In particular, meat goats need attention since they do not fatten in ways similar to other livestock and their growth rate is slower (Morand-Fehr, 2005; Gasmi-Boubaker *et al*., 2007). Additionally, nematode parasites in domestic ruminants pose serious negative effects, (Waller and Thamsborg, 2004; Behnke *et al*., 2006; Torres-Acosta and Hoste, 2008; Ceylan *et al*., 2010).

Urea, a nitrogen-based product secreted from the kidneys, is created by the breakdown of proteins and may be utilized by rumen microbial populations to synthesize protein. Molasses has long been used as a carrier for urea and mineral supplements and as a supplementary feed for ruminants, providing the slow, continuous intake of nutrients needed to optimize fermentative digestion in the rumen (Bach *et al*., 2005). Molasses/urea feeds (blocks, pastes, or licks) are a suitable way of supplying degradable protein and fermentable energy to ruminant animals, aiding an increase of protein supply to ruminant animals (Trater *et al*., 2003; Paviz *et al*., 2011). Medicated feed-supplement blocks have been used in an effort to deliver anthelmintic medication, but with varying success (Knox, 1995). Forsberg *et al*. (2002) assessed the effect of molasses urea blocks (UMB) for goat and sheep production and concluded that UMB have utility for providing trace elements in ruminant diets. Arsenos *et al*. (2009) conducted the similar research and stated that the increase of protein and energy content in the diet will help the animals to combat nematode infections. However, this research was carried out to examine the effects of introduce molasses/mineral feed blocks beside the use of medicated blocks on blood metabolites of Boer goats in Malaysia.

MATERIALS AND METHODS

Goats and the experimental conditions: Twenty four male Boer goats with an age average of 7-8 months were selected for this study. The animals were allowed 15 days to adjust to the new feeding and housing conditions prior to the start of the experiment. The goats were fed for a period of 90 days during which time their water was available *ad libitum*. Housing and management conditions were the same for all animals.

Experimental diets: Animals were divided into four groups: (1) a control group; (2) an experimental group fed with a ratio of molasses/mineral feed blocks (UMB); (3) an experimental group fed with a ratio of medicated blocks (MUMB) and (4) an experimental group fed with a ratio of UMB+MUMB. During the day, the goats were grazed in natural pastures. At night they were enclosed overnight in sheltered pens where grass, hay and mineral licks were available.

Blood parameters: At the end of this study, blood samples were collected from the jugular veins of all the goats. All blood samples were stored in a sterile vacutainer on ice with and without EDTA as an anti-coagulant. Subsequently, all samples were used for haematology and biochemistry analyses, conducted at the Veterinary Research Institute (VRI), 2009 Department of Veterinary Services, Ministry of Agriculture Malaysia.

Data analysis: The data was statically analyzed with SPSS 16.0 software using parametric tests. One-way ANOVA was used to compare the means of different factors in the goats in four different treatments. When differences were found, the Duncan multiple comparison test was used. All analysis was carried out in triplicates and the differences were considered significant at ($p<0.05$).

RESULTS AND DISCUSSION

The blood parameters are provided in Table 1. The results revealed that the treatments had significant effects in calcium, creatinine, urea nitrogen and PCV, while it appeared insignificant on others results. The results for PCV (%) shows that goats fed with the ratio containing UMB+MUMB have highest percentage while the goats with MUMB, UMB and the control group

Table 1: Effects of treatments on selected pathological and biochemical parameters in blood of the goats

	Group			
Ratios	1	2	3	4
Total bilirubin (umol L^{-1})	8.60±0.12	8.80±0.63	8.55±2.23	9.96±0.10
Calcium (mmol L^{-1})	3.38±0.23^{ab}	3.25±0.35^{b}	3.70±0.37^{a}	3.61±0.34^{ab}
Cholesterol (mmol L^{-1})	0.79±0.49	1.08±1.01	1.75±0.94	1.81±0.62
Creatinine (umol L^{-1})	75.83±11.89^{b}	92.33±13.84^{a}	82.41±7.93^{ab}	94.90±14.70^{a}
Glucose (mmol L^{-1})	9.10±0.35	9.26±0.39	9.22±0.30	9.55±0.34
Phosphorus (mmol L^{-1})	2.46±0.78	3.23±0.79	2.91±0.56	3.04±0.41
Total protein (g L−1)	82.66±7.71	85.26±6.64	88.50±13.19	94.20±9.99
Urea nitrogen (mmol L^{-1})	2.46±0.71^{b}	5.48±2.15^{a}	3.88±2.11^{ab}	5.46±0.73^{a}
PCV	21.36±2.08^{b}	23.30±2.13^{b}	26.66±2.40^{a}	27.25±2.50^{a}
Neutrophil (%)	57.20±7.13	50.66±10.11	50.00±3.99	49.50±6.07
Lymphocyte (%)	33.53±7.36	43.03±12.35	41.83±6.45	43.75±3.78
Monocyte (%)	2.30±1.05	2.03±1.27	2.43±0.74	1.46±0.83
Eosinophil (%)	6.96±2.04	4.26±3.41	5.90±5.77	3.33±3.10
Basophil (%)	0	0	0	0

Data with different letters (a-c) in the same row are significantly different ($p<0.05$). Group 1: control group, Group 2: molasses/mineral feed blocks. (UMB), Group 3: medicated blocks (MUMB), Group 4: UMB+ MUMB

ranked second, third and forth, respectively. The results also revealed for neutrophil (%), lymphocyte (%), monocyte (%), eosinophil (%) and basophil (%) there is no significant different between the goats fed with different ratios. Results also show that there is no significant different in blood total bilirubin between the goats fed with different ratios. Results related to the calcium and phosphorous shows that is no significant different between the blood phosphorous while for the calcium there was a significant different and results revealed that the goats fed with MUMB have highest amount of calcium in their blood. Moreover, there is no significant different between blood cholesterol in the goats fed with different ratios. For the creatinine, the goats fed with UMB+MUNB and the goats fed UMB have highest amount of creatinine in their blood. There is no significant different between the blood glucose of the goats fed with different ratios. Effects of treatments on the blood total protein also are provided in Table 1 and there is no significant different between the goats fed with different ratios.

Tanritanir *et al.* (2009) stated that blood constituents are affected by endoparasitic and ectoparasitic activity. A deficiency of macro elements concomitant with parasitic diseases causes clinical disorder, loss of yield and death. Because of inflammation in gut wall in gastro-intestinal parasitosis, absorption of some vitamins and minerals can change (Soulsby, 1986; Tanritanir *et al.*, 2009). As a result of pathological disturbance engendered by gastro-intestinal parasites, disorders in feed consumption, protein metabolism and liquid balance can occur (Soulsby, 1986). The liver plays a very important role in the body and can affect varying metabolic function in the body and has a role in almost every enzymatic pathway that controls the bodily function. Depending on the ratio of energy and protein, the liver can negatively affect the amount of total bilirubin in the blood (Clemmesen *et al.*, 2000; Farrell and George, 2005). In the present study, the molasses blocks did not affect the total bilirubin and it may be concluded that the treatment could significantly improve the growth performance in the goats without having any negative effects on body function. There were slight and uneven changes manifested by increases or decreases in serum protein concentrations. The total protein in the blood can be affected by

various different factors. However, the prediction and control of all these potential factors during an experimental period is difficult and sometimes impossible (Daramola *et al.*, 2005; Aikhuomobhogbe and Orheruata, 2006).

The effect of the treatments on phosphorus and calcium were insignificant. Regarding phosphorus, research has revealed that its values range widely in repeated testing, depending on varying factors and with unpredictable results (Dinev *et al.*, 2007). Denek *et al.* (2006) also mentioned that the serum calcium can be affected by different factors like weather, stress and the animal body's response to the environment as well as its nutritional condition. Creatinine value is primarily connected with kidney function (Dinev *et al.*, 2007). The results revealed that the treatments had significant results in Creatinine. The source of protein in ruminants can be either degradable or no degradable (NRC, 2000, 2001; Broderick and Reynal, 2009) will affect renal function (Boldizarova *et al.*, 1999). Thus, the UMMB, MUMMB and UMMB+MUMMB, because of having nitrogen, had a high potential to alter renal function.

Results for glucose and cholesterol appeared insignificant. The relationship between protein and glucose kinetics is not well understood in ruminants (Zhang *et al.*, 2009) but it was thought that the effects of the NPN (Non-protein nitrogen) and energy on the fermentation in the rumen may improve the production of the fatty acids in the rumen and would subsequently influence blood glucose metabolism but these results were not observed. However, glucose and cholesterol might not be accurate indicators of energy statues in goats. The results revealed that the treatments had significant effects on urea nitrogen. Blood urea concentrations are positively related to the crude protein intake when diets containing sufficient energy are provide (Pambu-Gollah *et al.*, 2000).

The packed cell volume may be used as a measure of the parasite infection that with high infection the packed cell volume will decrease (Van den Bossche and Rowlands, 2001; Lange *et al.*, 2005).

The neutrophil, lymphocyte, monocyte and eosinophil levels showed slight and uneven changes in their parameters. Bearing in mind that during the research conducted in the field there were many different factors which can effect and alter the animal welfare indexes, such as hormonal, haematological or biochemical parameters (Broom, 2000; Vengust *et al.*, 2002; Prunier *et al.*, 2005; Bergamasco *et al.*, 2005; Kannan *et al.*, 2007).

CONCLUSION

In the current study, the molasses were uses in the ratios of the goats without having any negative effects on body function. With regard to the observed results in blood tests and also the observations made to measure commercial productivity published separately, the use of urea molasses mineral blocks and medicated urea molasses mineral blocks is recommended.

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