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A New Strategy that Can Improve Commercial Productivity of Raising Boer Goats in Malaysia

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ABSTRACT

This research was conducted in order to investigate the effects of mineral feed blocks along with the use of medicated blocks on growth, control of gastro-intestinal nematode infection and subsequently commercial productivity of Boer goats. In Malaysia, the gastro-intestinal nematode is a common problem in grazing animals, particularly in sheep and goats. This parasitic infection can damage the intestinal epithelium and cause leakage into the gastrointestinal tract of ruminants. These parasites can also cause a high mortality rate and production loss. Molasses, urea and other components are used for producing molasses/urea feeds (blocks, pastes or licks). These preparations are a suitable way of preparing degradable proteins and fermentable energy to ruminant animals as they help to increase the protein supply to the ruminant animals. Furthermore, medicated feed-supplement blocks have been used in an effort to deliver anthelmintic medication. There has been a vast amount of research by scientists to control gastrointestinal nematode infections and to improve the nutrition in goats; however, to date, the data has been inconclusive. This research was carried out to examine a new strategy that can improve performance and productivity of raising Boer goats in Malaysia. The results revealed that using the block has been quite successful and commercially recommendable in this area.

Key words: Boer goats, commercial productivity, gastro-intestinal nematode, molasses, urea

INTRODUCTION

Many different strategies can be used to improve the agriculture and livestock industry in order to reach our ultimate goal, which is of course, to improve its commercial productivity (Shahrbabak *et al*., 2006; Khorshidi *et al*., 2008; Du and Zhang, 2008; Restuccia *et al*., 2008; Khorshidi *et al*., 2010). Small ruminants are very important livestock to smallholder farmers in developing countries of the world. Adding to that, goats are considered to be very important for their contribution to the development of rural zones (Dubeuf *et al*., 2004). The most significant problems in the goat meat industry are nutrition and parasitic control. Parasitic infection can damage the intestinal epithelium and cause leakage into the gastrointestinal tract of ruminants. These particular parasites can also cause high mortality rate and production loss (Papadopoulos *et al*., 2003; Waller and Thamsborg, 2004; Torres-Acosta and Hoste, 2008). Molasses has been used both as a carrier for urea and mineral supplements and as a supplementary feed for ruminants to allow a slow, continuous intake of nutrients needed to optimize fermentative digestion

in the rumen (Bach *et al.*, 2005). Scientific research has shown that this methodology can control gastrointestinal nematode infection and improve nutrition in goats; however, to date, the data is inconclusive. This research was carried out in order to examine the effects of introducing mineral feed blocks along with the use of medicated blocks on the performance and efficiency of raising Boer goats in Malaysia.

MATERIALS AND METHODS

Goats and the experimental conditions: This study was conducted in 2009 as a portion of the university postgraduate research grant scheme in USM, Malaysia. Twenty-four bore goats, age ranging of 7-8 months, were separated and allowed a 15 day adjustment period to the new feeding and housing conditions prior to the start of the experiment. The goats 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: This study was carried out to assess the effects of introducing mineral feed blocks to improve the performance and productivity of raising goats in Malaysia. Animals were divided into four groups: (1) a control group, (2) an experimental group with a ratio of molasses feed blocks (UMB) included, (3) an experimental group with a ratio of medicated blocks (MUMB) included and (4) an experimental group with a ratio of UMB + MUMB included. During the day, the Goats grazed in natural pastures and were enclosed overnight in sheltered pens where grass, hay and mineral licks were available *ad libitum*. Animals were watered daily and closely monitored for any illnesses and would be promptly treated if needed.

Commercial productivity of the project: A key measure of livestock industry performance is its productivity. Although the concept of productivity is a widely discussed subject, it is often vaguely defined and poorly understood. In practise, this lack of knowledge results in productivity (Tangen, 2002) particular in agriculture and the livestock industry. However, hereby, the researchers measured the commercial productivity using UMB along with MUMB in Malaysia. The researchers measured the commercial productivity of the project by measuring the variable and invariable profit using the methods offered by Shahrbabak *et al.* (2006) and Khorshidi *et al.* (2008).

Gastrointestinal tracts: At the end of the test, feed was withheld for 16 h and the goats were slaughtered. The weight of the empty stomach, empty small intestine and empty large intestine were determined separately. Consequently, the small intestines of the goats were used for the histological study. Removal of the organs was accomplished as fast as possible to avoid putrefaction (by bacteria) and autolysis (self digestion by own enzymes). The organs were cut into small cubes (not exceeding 5 mm in thickness) and placed into a coplin jar containing suitable amounts of fixative which was then followed by a preparation process to be completed in several steps: Fixation, Dehydration, Clearing, Impregnation, Embedding, Microtomy and Staining.

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

Performance and productivity: The growth rate, block cost, variable profit/goat (Malaysian Ringgit) and invariable profit/goat (Malaysian Ringgit) means are provided in Table 1. The price of the UMB block used in this project is 15 RM (Malaysian Ringgit) per block (4 kg) and the price of MUMB is 18 RM (Malaysian Ringgit) per block (4 kg). After the experiment concluded, goats were sold for 15 RM per kg (live weight). The results revealed that the goats fed with the UMB+MUMB had the highest invariable profit, while goats fed with MUMB and the control group had the weakest results. The results also show that the goats fed with UMB+MUMB had the highest variable profit, while the control group had the lowest. The results of the current study demonstrate the positive effects of treatments on commercial productivity of raising goats. These results are in line with the results observed in previous research (Shahrbabak *et al*., 2006; Khorshidi *et al*., 2008).

Gastrointestinal tracts: The weights of the gastrointestinal tracts are provided in Table 2; a significant difference was shown in the results of the goats not fed with medicated blocks where they had revealed bigger gastrointestinal tracts. Later, the samples from the intestines of the goats were used for histological study. The histological results also revealed the damages in intestinal epithelium of the goats affected with gastrointestinal nematodes in the control group. Normally, vilh are 3-5 times longer than the crypts are tall. However, intestinal injury can result in blunting, shortening (partial villous atrophy) or complete loss of the villi and flattening (villous atrophy) of the intestinal surface. There was also a noticeable change in the weight of the gastrointestinal organs.

Table 1: Effects of treatments on goat performance and efficiency

	Treatments			
Treatments	1	2	3	4
Growth rate	14.78±0.88^{d}	17.40±0.94^{b}	16.16±0.68^{c}	19.50±0.86^{a}
The block cost	221.25	211.65	226.18	265.65
Unvariable profit/ goat (Malaysian Ringgit)	2.21±13.26^{b}	2.16±14.20^{b}	1.87±10.29^{c}	2.43±12.90^{a}
Variable profit/ goat (Malaysian Ringgit)	2.21±13.26^{d}	2.61±14.20^{b}	2.42±10.29^{c}	2.92±12.90^{a}
Calculated yield grade	5.63±0.029^{d}	5.94±0.012^{c}	6.64±0.023^{b}	7.26±0.020^{a}

Data with different letters in the same row are significantly different ($p<0.05$). Group 1: Control group, group 2: UMB, group 3: MUMB, group 4: UMB+ MUMB

Table 2: The gastrointestinal tracts of the goats

Empty stomach	Empty small intestine	Empty large intestine	Villus height (μm)	Crypt depth (μm)
0.91±0.02^{b}	0.61±0.02	0.56±0.03^{a}	469.85±10.4^{b}	239.57±27.31^{a}
0.97±0.01^{a}	0.62±0.05	0.61±0.09^{a}	522.40±25.54^{a}	199.68±41.13^{b}
0.92±0.07^{b}	0.60±0.03	0.56±0.02^{b}	521.69±23.50^{a}	168.96±14.65^{b}
0.90±0.03^{b}	0.62±0.01	0.58±0.01^{a}	561.49±58.38^{a}	214.36±20.81^{ab}

Data with different letters in the same row are significantly different ($p<0.05$)

DISCUSSION

Performance and productivity: The results revealed that using UMB+MUMB was associated with the highest variable profit while the control group had the lowest productivity this is evaluated from the output of the production procedure. Productivity visualizes the metrics of the technical efficiency of production. Overall, productivity emphasises the quantitative metrics of input and output (Saari, 2006) and in Agricultural science, productivity is measured as the ratio of agricultural outputs to agricultural inputs. The results of the current study revealed that the treatments would affect the economical productivity. A number of factors affect productivity in livestock marketing, of which the nutrition is probably the most important (Muwalla *et al*., 1998; Bellof and Pallauf, 2004; Kioumarsi *et al*., 2008). Shahrbabak *et al*. (2006) and Khorshidi *et al*. (2008) also mentioned improving animals nutrition will surly tap the commercial productivity through better growth where animals facing nutrient deficiency. The molasses with the increasing of the energy level allows the production of more fermentable ME for paunch microorganisms resulting in a rise in the synthesis of microbial protein and in the amount of protein available to the animal (Early *et al*., 2001; Kioumarsi *et al*., 2008).

Gastrointestinal tracts: Parasitic gastroenteritis is one of the major causes of productivity loss in goats. These parasites will target the abomasums and the small intestine of the goats (Torina *et al*., 2004). The small intestines of the goats were used for this study. The nematode infection could directly affect the tissue of the internal organs of the animals (Douch *et al*., 1996; Madden *et al*., 2004; Suzuki *et al*., 2008). The gastrointestinal nematode infection could effect the mucin staining area, crypt area and crypt height (Thomsen *et al*., 2006; Jacobson *et al*., 2009). The results of the current study revealed the damages in intestinal epithelium of the goats affected with gastrointestinal nematodes in the control group. Normally, villi are 3-5 times longer than the crypts are tall (Hoste and Chartier, 1998). However, intestinal injury can result in blunting, shortening (partial villous atrophy) or complete loss of the villi and flattening (villous atrophy) of the intestinal surface. About the weight of gastrointestinal tracts, previously, it have been proved that gastrointestinal nematode infections would increase the size of gastrointestinal tracts in guinea pigs (Symons and Jones, 1983), in pigs (Thomsen *et al*., 2006) and in sheep (Jacobson *et al*., 2009). The results of current study have been in line with the results observed in other species.

CONCLUSION

The results of commercial productivity stated that the positive effect of using molasses/mineral feed blocks along with the use of medicated blocks in Malaysia under the previously explained strategy is highly recommended.

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