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The effect of molasses/mineral feed blocks and medicated blocks on performance, efficiency and carcass characteristics of Boer goats

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ABSTRACT

In this study, molasses/mineral feed blocks and medicated blocks were studied to identify the best way to control gastro-intestinal nematode infection and also improve growth performance of Boer goats in Malaysia. Molasses, urea and other components are used for producing molasses/urea feeds, and provide a suitable way of supplying degradable protein and fermentable energy to ruminant animals. Medicated feed-supplement blocks have been used in an effort to deliver anthelmintic medication. Results shows that molasses/mineral feed blocks and medicated blocks have significant effects ($P < 0.05$) on final weight, avarage daily gain, carcass length, hot carcass weight, weight of 9^{th}, 10^{th} and 11^{th} rib area, backfat thickness, body wall thickness, ribeye area- REA, eye muscle width, eye muscle depth, lungs, liver, spleen, kidney, heart, empty stomach, empty large intestine, kidney fat, pelvic fat, heart fat, internal fat, leg, hind, shank, chump, rack, ribs, square shoulder, fore shank and neck. According to the results, it can be concluded that a combination of molasses/mineral feed blocks and medicated blocks provided the best growth performance and carcass traits. Thus, the use of urea molasses mineral blocks and medicated urea molasses mineral blocks is recommended.

Keywords: molasses, urea, growth performance, Boer goats.

INTRODUCTION

Small ruminants are very important to farmers in developing countries [1,2]. Goat husbandry is a multifarious set of activities dependent on very different factor such as abiotic, biotic and socio-economic factors. However, many different strategies can be used to improve livestock industry in order to reach our ultimate goal, which is of course, to improve growth performance and the commercial productivity [3,4]. Urea is a nitrogen-based product secreted in the kidneys. It is created for the duration of the breakdown of protein. Nonetheless, urea is not a protein; it does contain nitrogen and can be used by the microbial population in the rumen to synthesize protein. In fact, urea is classified as non-protein nitrogen (NPN). Molasses has been used both as a carrier for urea and mineral supplements and as a supplementary feed for ruminants [5,6]. Rafiq et al. [7] stated that preparing an adequate source of energy and N under grazing condition is necessary for grazing animals. Rahman et al. [8] conducted a research to evaluate the effect medicated urea molasses block to control gastro-intestinal nematode in grazing goats. For this propose faecal sample from 30 male goats were taken and faecal egg counting were conducted. The results revealed using medicated molasses block can control gastro-intestinal nematode infection and is recommendable. Sanyal and Singh [9] conducted a research in a farm in India with strategic long-term low-level administration of fenbendazole incorporated medicated urea molasses blocks to understand its nematocidal efficacy and production response in buffaloes. The results indicated that the anthelmintic delivery system could effectively remove already established adult parasites and prevent larval establishment. However, this research was carried out to examine the effects of introduce molasses/mineral feed blocks beside the use of medicated blocks on growth performance 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.

Growth performance and carcass traits

At the end of this experiment, the entire collection of goats was sold to the mppp abattoir center in Sg. Penang where the animals were butchered and the weights of eatable and uneatable parts were measured. Growth performance and carcass traits measured included the; Initial weight, final weight, average daily gain, dressing percentage, carcass length, hot carcass weight, weight of 9^{th}, 10^{th} and 11^{th} rib area, backfat thickness, body wall thickness, ribeye area- REA, eye muscle width, eye muscle depth, calculated yield grade, head+hide, lungs, liver, spleen, kidney, pancreas, heart, empty stomach, empty small intestine, empty large intestine, kidney fat, pelvic fat, heart fat, internal fat, leg, hind shank, chump, rack, ribs, square shoulder, fore shank, and neck.

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

Results are shown in Table 1 to 3. The results revealed that the treatments had significant effects in final weight, avarage daily gain, carcass lenth, hot carcass weight, weight of 9^{th}, 10^{th} and 11^{th} rib area, backfat thickness, body wall thickness, ribeye area- REA, eye muscle width and eye muscle depth while it appeared insignificant on other results. However, the ratio containing urea-molasses block (UMB) plus medicated urea-molasses-block (MUMB) resulted in the most favorable final weight while goats fed with ratios of UMB were ranked second and goats in control group were ranked forth.

Carcass characteristic means are provided in Table 2 and Table 3. The results showed that the ratio which includes UMB plus MUMB was associated with the best outcome. The treatments had significant effects ($P < 0.05$) on leg, hind shank, chump, rack, ribs, square shoulder, fore shank, neck, yield grade, lungs, liver, spleen, kidney, heart, empty large intestine and the goats fed with UMB+MUMB have heaviest lung, liver, kidney, leg, hind shank, rack, ribs, square shoulder, fore shank, and neck. The results revealed the goats fed with UMB have heaviest kidney fat and the goats fed with UMB+MUMB, MUMB and the control group ranked second, third and fourth, respectively. The results also showed that the goats fed with UMB have heaviest pelvic fat while the goats fed with MUMB+UMB and MUMB ranked second and third, respectively. The results also revealed that the goats in the control group ranked fourth. Table 3 shows that the goats fed with UMB have heaviest heart fat while goats fed with UMB+MUMB, UMB and the control group ranked second, third and fourth, respectively. For the internal fat, Table 3 shows that the goats fed with UMB have heaviest internal fat and the goats fed with MUMB+UMB and the control group ranked second and third ranked while the goats fed with MUMB ranked fourth. The treatments were found to have a significant effect on growth ($P < 0.05$). The results revealed that goats fed with the particular ratio of UMB plus MUMB displayed the most favorable results for the final weight, average daily gain, carcass length and hot carcass weight. Goats fed with ratios of MUMB were ranked second for the mentioned results and goats fed with ratios of UMB were ranked third. Providing an adequate amount of nitrogen, energy and minerals in the diet of ruminants is essential for maximizing ruminal activity. Diets which are deficient in nitrogen not only cause depression in voluntary intake but also cause interruption in digestive physiology and metabolism in ruminants. Thus, a consistent and continuous supply of both nitrogen and energy has been necessary for maintaining optimum microbial activity in rumen [10]. The results of the current study reveal that group 4 had the best growth performance that could be justified with the inclusion of molasses as a reliable source of energy for ruminants and

urea as the source of NPN for producing proteins by microbes in the ruments as well as the addition of mineral in the blocks. The reason that goats were fed with UMB + MUMB were an advantage over the goats fed with UMB. This is because the medicated block was included and a noted effect on the control of gastrointestinal nematodes in the goats. One reason for having better results for goats fed with MUMB + UMB than goats given MUMB may be for the fact that UMB is more palatable to the goats than MUMB. This could be justified by the importance of feeding behaviour [11]. It is clear that goats are not obligatory browsers and they choose their food precisely [12,13]. The goats fed with UMB+MUMB were ranked first for the weight of 9th, 10th and 11th rib area, backfat thickness, body wall thickness, and also ribeye area – REA that could be justified by having a heaviest final weight. Garcia et al. [14] stated that results for the mentioned data usually are parallel. Table 1 shows the results related to the eye muscle width and eye muscle depth and the results revealed that in this case the goats fed with UMB+MUMB which had highest growth rate and also backfat thickness, body wall thickness, and ribeye area – REA didn't had widthest or depthest muscle. These results are consistent with the results observed by pervious researchers who reported there could be a negative relation between amount of body fat and muscle [1,15]. Dadi et al. [16] mentioned that increasing feeding days linearly increased fat proportion. However, the results obtained from the carcass also showed that in most parts the results have been the same as the results mentioned in the growth and therefore could be justified by saying; the growth of the carcass parts are in parallel with the whole body [1].

Table 1. Effects treatments on goats performance and carcass traits.

Treaits	Control group	UMMB	MUMMB	UMMB+ MUMMB
Initial weight (kg)	22.72 ± 0.143	22.60 ± 0.202	22.84 ± 0.147	23.00 ± 0.660
Final weight (kg)	37.50 ± 0.87^{d}	40.00 ± 0.96^{b}	39.00 ± 0.64^{c}	42.50 ± 0.42^{a}
Avarage daily gain (gr)	164 ± 9.82^{d}	193 ± 10.50^{b}	179 ± 7.60^{c}	216 ± 9.50^{a}
Dressing percentage (%)	45.50 ± 1.41	46.00 ± 1.50	44.50 ± 0.76	45.00 ± 0.90
Carcass length (cm)	103.0 ± 0.83 ^{c}	102.2 ± 0.64 ^{c}	104.5 ± 0.75^{b}	105.7 ± 0.72 ^{a}
Hot carcass weight (kg)	17.06 ± 0.40^{b}	18.40 ± 0.79^{a}	17.35 ± 0.52^{b}	19.12 ± 0.69^{a}
Weight of 9th, 10th and 11th rib area(gr)	370 ± 0.89 ^{c}	398 ± 1.41 ^{a}	385 ± 2.12 ^{b}	405 ± 60 ^{a}
Backfat thickness(mm)	1.34 ± 0.031^{d}	1.42 ± 0.014^{c}	1.60 ± 0.030^{b}	1.76 ± 0.014^{a}
Body wall thickness, cm	1.44 ± 0.035^{d}	1.49 ± 0.014 ^{c}	1.55 ± 0.023^{b}	1.60 ± 0.041^{a}
Ribeye area- REA (mm^{2})	50.21 ± 0.07^{b}	50.36 ± 0.06^{b}	52.00 ± 0.09^{a}	52.18 ± 0.04^{a}
Eye muscle width (A)(mm)	100 ± 1.22 ^{d}	104 ± 1.63 ^{c}	111 ± 0.63 ^{a}	109 ± 1.37 ^{b}
Eye muscle depth (B)(mm)	71 ± 1 ^{c}	75 ± 2.09 ^{b}	78 ± 0.89 ^{a}	76 ± 1.37 ^{b}

$^{a\,b\,c}$ *Means within rows for different group with different superscripts differ (P < 0.05)*

Table 2. Effects treatments on goats carcass traits

Treaits	Control group	UMMB	MUMMB	UMMB+ MUMMB
Head+hide	4.90 ± 0.16	5.10 ± 0.15	4.88 ± 0.29	5.00 ± 0.07
Leg	4.00 ± 0.38^{b}	4.14 ± 0.01 ^{b}	4.15 ± 0.08 ^{b}	4.40 ± 0.08 ^{a}
Hind shank	1.00 ± 0.11^{b}	1.23 ± 0.09^{a}	1.22 ± 0.07^{a}	1.15 ± 0.05^{a}
Chump	0.27 ± 0.59^{a}	0.23 ± 0.75 ^{c}	0.24 ± 0.36^{bc}	0.25 ± 0.43 ^{b}
Rack	2.78 ± 0.07^{d}	3.12 ± 0.01^{b}	3.03 ± 0.02^{c}	3.20 ± 0.07^{a}
Ribs	2.37 ± 0.01^{ab}	2.30 ± 0.12^{b}	2.42 ± 0.02^{a}	2.40 ± 0.02^{a}
Square shoulder	4.37 ± 0.02^{c}	4.87 ± 0.01^{b}	4.85 ± 0.02^{b}	5.10 ± 0.13^{a}
Fore shank	0.98 ± 0.01^{c}	1.10 ± 0.12^{b}	1.05 ± 0.13^{bc}	1.18 ± 0.06^{a}
Neck	0.75 ± 0.01^{b}	0.88 ± 0.01^{a}	0.72 ± 0.04^{c}	0.87 ± 0.06^{a}

$^{a\,b\,c}$ *Means within rows for different group with different superscripts differ (P < 0.05)*

Table 3. Weights and proportion of non-carcass components of the goats

Treaits	Control group	UMMB	MUMMB	UMMB+ MUMMB
Lungs	0.78 ± 0.02^{b}	0.83 ±0.02^{ab}	0.78 ± 0.08^{b}	0.85 ± 0.01^{a}
Liver	0.78 ± 0.04^{b}	0.83 ± 0.02^{a}	0.84 ± 0.01^{a}	0.85 ± 0.01^{a}
Spleen	0.08 ± 0.01^{b}	0.10 ± 0.00^{a}	0.07 ± 0.01 ^{c}	0.08 ± 0.01 ^{bc}
Kidney	0.15 ± 0.59^{c}	0.19 ± 0.75 ^{b}	0.16 ± 0.36 ^{c}	0.20 ± 0.43 ^{a}
Pancreas	0.040 ± 0.01	0.040 ± 0.01	0.030 ± 0.01	0.035 ± 0.06
Heart	0.130 ± 0.01^{b}	0.140 ± 0.01^{b}	0.150 ± 0.02^{a}	0.135 ± 0.01^{b}
Empty stomach	0.91 ± 0.02^{b}	0.97 ± 0.01^{a}	0.92 ± 0.07^{b}	0.90 ± 0.03^{b}
Empty small intestine	0.61 ± 0.02	0.62 ± 0.05	0.60 ± 0.03	0.62 ± 0.01
Empty large intestine	0.56 ± 0.03^{a}	0.61 ± 0.09^{a}	0.56 ± 0.02^{b}	0.58 ± 0.01^{a}
Kidney fat, g	69.12 ± 0.70^{b}	72 ± 1.48 ^{a}	71.20 ± 0.63 ^{a}	71.60 ± 0.29^{a}
Pelvic fat, g	86.10 ± 0.63 ^{c}	92.12 ± 0.64 ^{a}	90.60 ± 0.23 ^{b}	91.14 ± 0.63 ^{b}
Heart fat, g	53.00 ± 0.45 ^{d}	57.20 ± 1.72 ^{a}	54.15 ± 0.06 ^{c}	55.10 ± 0.36 ^{b}
Internal fat	2.30 ± 0.06^{b}	2.42 ± 0.05^{a}	2.20 ± 0.03^{c}	2.40 ± 0.12^{a}

$^{a\,b\,c}$ *Means within rows for different group with different superscripts differ (P < 0.05)*

CONCLUSION

The results revealed that the molasses/mineral feed blocks and medicated blocks had significant effects on growth performance and carcass characteristics of the goats. The results showed that the ratio which includes

molasses/mineral feed blocks plus medicated blocks were associated with the most favourable outcome. However, with regards to the observed results in growth performances, carcass traits measurements and also the observations made to measure blood parameters, facial egg counts as well as the commercial productivity of the projects published separately, the use of urea molasses mineral blocks and medicated urea molasses mineral blocks is highly recommended. The authors also suggest that future research could be done on different area and with different breed of goats.

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