Influence of Dietary Supplementation of Fermented Coffee Husk on Intake and Performance of Gastrointestinal Nematodes Infected Goat

Irma Badarina, Heri Dwi Putranto, and Endang Sulistyowati

Departement of Animal Science, Agricultural Faculty, Bengkulu University
Email: ibadarina@yahoo.com

ABSTRACT

The aim of this research was to explore potency of solid substrate of *P. ostreatus* from coffee husk on the performance of GINs infected Goat. Eighteen local goats, Kacang Goat, infected gastrointestinal nematodes were allocated in three different groups i.e. T0 (No chemical anthelmintic treatment and no supplementation of fermented coffee husk), T1 (No chemical anthelmintic treatment, animals supplied with fermented coffee husk), T2 (Chemical anthelmintic treatment). All goats were offered a basal diet in the ratio of 60% natural grasses along with 40% concentrate mixture for a period of 45 days. No statistically significant differences were observed in dry matter consumption and weight gain ($P>0.05$). Dry matter intake on T0 is the lowest. The weight gain of T2 is the highest followed by T1. The lowest weight gain is in T0. The haemoglobin (Hb) is significantly different ($P<0.05$). Hb in T1 and T2 were bettter than T0. The Hb in T0 were under the normal range. The general performance of infected GINs goat supplied fermented coffee husk was satisfactory. The supplementation of fermented coffee husk could improve the performance of goat.

Keywords: Fermented coffee husk, intake, performance, goat, GINs

INTRODUCTION

Gastrointestinal nematodes (GIN) are one of the most pathogenic and widely distributed blood sucking abomasal of sheep and goats. GIN infections occasionally depress feed intake, utilization and production (mortality and weight loss), and impair tissue deposition and sceletal growth (Rowe *et al*., 1988; Parkins and Holmes, 1989). Therefore, nematodes infection can cause the economic losses (Batubara, 2004).

The interaction between animals and environment caused nematodes infection cannot be avoided. The customary mode of control of the GINs has been based on the repeated use of chemical anthelmintics. However, drug resistance has become an important issue in small ruminant husbandry, especially when anthelmintics are applied at high levels and increasing frequency and inappropriate doses (Pandey *et al.* 2001; Sissouma *et al*. 2011). The price of chemical anthelmintics are quite expensive and the fear of residual effect in the animal tissues restricts use of chemical in feeds. Thus, alternative environment friendly sustainable novel strategies are required, which could reduce the exclusive reliance on anthelmintic treatment.

A potential alternative to chemical anthelmintics is the solid substrate of *P.ostreatus* especially from coffee husk. Badarina *et al.* (2014) reported that the level of lymphocyte increased and the level of eosinophil decreased in the group of goat supplemented with coffee husk fermented with *P.ostreatus*. This result indicated that solid substrate of *P.ostreatus* based from coffee husk could enhance the immunity and decreased the parasite infection on animals. *Pleurotus ostreatus* has been known for it active compound that can modulate the immune system (Zhang *et al*., 2007). Solid substrate from coffee husk contained the secondary metabolic compounds such as saponin, tannin, alcaloid, flavonoid, glicosides and triterpenoid (Badarina *et al.*, 2013[b]). These compounds have the ability to control the GINs. These bioactives compund were also invented in chemical anthelmintics (Zafar *et al*., 2004).

The aim of this research work was to explore potentiality of solid substrate of *P.ostreatus* from coffee husk on the performance of GINs infected Goat.

MATERIALS AND METHODS

Animals and Treatments

This research was done at Outdoor Laboratorium Departement of Animal Science Agricultural Faculty, Bengkulu University. Eighteen local goats called Kacang Goat of male sex, similar age (± 10 month) and body weight (9.23 ± 1.71 kg) were used. All the goats were selected from the tradisional farmer and infected gastro intestinal nematodes (GINs).

All the goats were allocated in three different groups i.e. T0 (No chemical anthelmintic treatment and no supplementation of fermented coffee husk), T1 (No chemical anthelmintic treatment, animals supplied with fermented coffee husk), T2 (Chemical anthelmintic treatment). The gastrointestinal nematodes infection are ensured by Faecal egg counts (FECs). FECs were made using the modified McMaster technique (Anonymous, 1984). All goats were housed individually with facilities for individual feeding. They were offered a basal diet in the ratio of 60% natural grasses along with 40% concentrate mixture for a period of 45 days to meet their nutrient requirements. Goats were fed twice daily in amounts adequate to ensure 3.5% dry matter of body weight at the day. The diet was arranged to fulfill the nutrient for goat with crude protein 11-12% and TDN 60% (Kearl, 1982).

Fermented coffee husk was incorporated in the diet of treatment (T1) as much as 15% of concentrate mixture (Badarina *et al*., 2013a). The concentrate diet composed mainly of cassava waste, coconut meal, soybean wastes meal, rice bran and crude palm oil. The formulation and chemical analysis of concentrate shown in the Table 1.

Table 1. Ingredients of concentrate and chemical composition of concentrate.

Ingredient	(% of DM)
Soybean wastes meal	34.88
Rice bran	23.26
Coconut wastes meal	23.26
Cassava wastes	11.63
Crude Palm Oil	6.97
Total	100.00
Dry Matter(%)	85.05
Ash (%)	10.38
Crude Protein (%)	15.33
Crude Fiber (%)	30.94
Ether extract (%)	5.66
Total Digestible Nutrient (%)	71.96

The weight gain evaluated before and after treatment. The dry matter intake were measured daily. The profile of Haemoglobin (Hb) was measured at the end day of research.

Coffee Husk Cultivation with *Pleurotus ostreatus*

Coffee husks were solar dried until its moisture content 10-15%. The cultivation method and the composition of solid substrate was done according to Herliyana *et al*. (2008) with slight modification. The substrate consisted of 82,5% of coffee husk, 15% rice bran, 1,5% gips and 1,0% $CaCO_3$. The clean water was added into the substrate as much as 65-70% (v/w). All the component was composted for 24 hours and then placed into poly propilene bags as much as 400 gram per bag. The baglogs were sterilized on 121^{o}C for 30 minutes. After cooling, each bags was inoculated aseptically with *P. ostreatus* grain spawn and incubated in a dark room at 23-24^{o}C and approximately 80% relative humidity. Each spawned bag was closed with a small sterile cotton plug inserted in the middle of its opening. All bags were placed in incubating room, after 60 days the substrate was fully colonized and primordia started to appear. The fully colonized substrate were solar dried and ready to use as feed supplement. The nutrient content of coffee husk substrate is presented in Table 2.

Table 2. Nutrient contents of coffee husk substrate fermented by *Pleurotus ostreatus*

Nutrient Component	Percentage (%)
Dry Matter	86.71
Ash	13.40
Crude Protein	12.14
Crude fiber	46.83
Ether extract	1.67
NDF	79.08
ADF	74.08
Hemicelluloses	5.32
Celluloses	24.79
Lignin	45.04
Tannin	0.18
Kafein	0.20
B-glucan (%w/w)	4.25
Ca (%)	1.28
P (%)	0.08
Fe (%)	0.11
Zn (ppm)	12.00

Badarina *et al.* (2013)

Data Analysis

All statistical analyses of the data obtained were performed to analyses variances (Steel and Torrie, 2003). Means among treatment were compared by Duncan Multiple Range Test (DMRT). Statistical differences are expressed at $P<0.05$.

RESULTS AND DISCUSSION

The effect of each treatment on performance of goats are presented in Table 3. The dry matter intake, weight gain and haemoglobin (Hb) by goat during the trial are given in the Table 3. No statistically significant differences were observed in dry matter consumption between treatment ($P>0.05$).

Table 3. Dry matter consumption, weight gain and haemoglobin (Hb) of Goats

Items	Treatments		
	T0	T1	T2
The dry matter consumption (g/day)	691.31±128.23	792.01±128.79	801.34±159.28
Weight gain (kg)	1.18±0.87	1.55±0.69	2.20±1.72
Haemoglobin (g/dl)	5.55 ± 1.90^{a}	8.62 ± 1.52^{b}	9.2 ± 2.46^{b}

Dry matter intake on T0 is the lowest. There was no statistically significant difference of weight gain among the treament. In spite of such this, the weight gain of T2 is the highest followed by T1. The lowest weight gain is T0. The haemoglobin (Hb) is significantly difference ($P<0.05$). Hb in T1 and T2 are bettter than T0. The Hb in T0 were under the normal range.

The result of this research showed that the daily intake of dry matter (DM) affected by treatment. The result indicated that T1 (No chemical anthelmintic, supplied by fermented coffee husk) and T2 (Chemical anthelmintic treatment) improved feed consumption. It was possibly related to the improved the health of the animal on T1 and T2. The intake of DM by goats were within the normal range and the amounts more than 3.5% dry matter of body weight at the day (Kearl, 1982). This indicates that all the experimental diets were palatable and the animal got sufficient supply of nutrients.

The improving the health of animal in T1 and T2 possibly related to the effect of fermented coffee husk and chemical anthelmintic as control of GINs. Feeding fermented coffee husk (T1) in GI nematode infected goat improved Hb value as the same as T2 (chemical anthelmintic treatment). The reduced Hb values in T0 possibly related to nematode infection. The reduced Hb in infected animal

may be attributed to the bleeding of abomasum and intestines due to injuries caused by the parasites (Rowe *et al.,* 1988). Fermented coffee husk supplementation to infected goat prevented a marked decreased in Hb. The haematological counts (Hb) are reflection of the health status of the animal (Kelly, 1974). Changes in haematological characteristics could be used as a measure of the nutritional or physiological status of the animal (Ekenyem and Madubuike, 2007). Pathak *et al.* (2013) said that GIN infection caused extensive abomasal tissue damage, haemorraghe and protein losses and redirected protein synthesis away from growth.

The growth of goat at T1 and T2 were slightly better than T0. The result of this research suggested general health of infected goat given fermented coffee husk was satisfactory throughout the experiment. The supplementation of fermented coffee husk could improved the resiliency of goat body.

CONCLUSION

The general performance of infected GINs goat supplied fermented coffee husk was satisfactory. The supplementation of fermented coffee husk could improved the performance of goat.

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