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Ethnoveterinary technology for parasite dewormer to support goat-oil palm integration in Bengkulu Indonesia

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The effects of ethnoveterinary (medicinal dewormer) *Melastoma malabatricum* on clinical observations, liveweight change following infestation mix-gastro-intestinal worm was investigated experimentally in local goats. 25 female local goat were experimentally infected naturally via grazing in infected area from 08.00-16.00, for 15 days and followed infected by orally with1000 infective larvae. 15 goats were chosen and allocated to 3 treatments consist of 5 goats per treatments, natural dewormer used is *Melastoma malabatricum*. T1: Aqueous extract *Melastoma malabatricum* 250mg/kg LW/3 week, T2: Aqueous extract *Melastoma malabatricum* 250mg/kg LW/2 week and T3: single dose of Ivermectine (control). Parameter measured were clinical assesment, liveweight, rectal temperature, respiratory rate, hear trate. Clinical assesment showed anorexia, emaciated, rough hair coat, anaemia,watery faeces bottle jaws, and decreasing liveweight up to 13%, and following by death started in week 3 post infection. There were normal rectal temperature, normal respiratory rate, and normal heart rate. In general, anthelmintic effect of aqueous extract *Melastoma malabatricum* 250mg/kg LW/2 week is better that that of given every 3 week.

Keywords: *Melastoma malabatricum*, goat, mix-gastrointestinal parasite

Introduction

Small ruminants particularly goats have been considered the most important aspect of livestock throughout the world. Goat production is an attractive enterprise for small holder farmer in Indonesia, due to low cost in initial investment, small body size, short generation interval, high reproductive performance (Devendra, 2007). Goats are important in development because of their ability to convert forages and crops and household residues into meat, fibre, skins and milk.

The goat is commonly keep in traditional method and relies mainly on grazing native grass and forages which often have low nutritive value. Fast growing of housing and plantation is the major problem decreasing land availability for grazing. Integration between ruminant in plantation especially oil palm plantation is one of the applicative system in Bengkulu. According

Dwatmadji and Suteky (2013) the importance of Integrated Small Ruminant – Oil Palm System can be used for poverty alleviation especially under oil palm (rural) plantations where small scale farm are exist.

The constraint of developing integration of ruminant in oil palm plantation is infestation of gastro intestinal parasite. Infestation of gastro intestinal parasite or helminthiasis is one of the most important animal diseases worldwide ingrazinganimals, this disease cause dramatic economic loss due to decreasing production, cost of prevention and treatment and death of infected animals (Waller and Chandrawathani, 2005). Bachaya *et al*. (2006) reported that this disease cause biochemical alterations, loss of appetite, loss of body weight, decrease in protein, impaired digestive efficiency and poor reproductive performance which can lead to loss of meat (27%) and wool (40%) among sheep/goats. The prevalence of the disease around 70-80% in Pakistan (Tasawar *et al.,* 2010) in Indonesia is about 80%. The prevalence depend on age, sex, management, grazing habit, anthelmintic used, level of education, economic capacity of farmer (Beriajaya and Copeman, 2006; Gulland and Fox, 1992; Liu *et al.,* 2008; Raza *et al*., 2009; Suteky and Dwatmadji, 2011a). This disease more severe in malnutrition goat (Suteky and Dwatmadji, 2011a)

The common method to eliminated infestation of gastrointestinal nematodes based on repeated use of chemical anthelmintic such as albendazole, thiabendazole, mebendazole, levamisol, morantel, dormactin , and ivermectin. This method was not applicable for small holder farmer due to accessibility and price. The other problem is the increasing development of resistance to chemical anthelmintic (Waller, 2005), as well as anthelmintic residues in meat or milk.

Ethnoveterinary medicine based on medicinal plant are considered as an alternative source of compounds as dewormer and sustainable methods readily adaptable to small holder farmer. Several indigenous plants have also been investigated as anthelmintic, both *in vitro* and *in vivo,* with varying success (Mint and Hart, 2003; Acharya *et al*., 2014; Akther *et al*., 2015; Alemu *et al*., 2014; Islam *et al*., 2015). Our research showed that plant grew under mature oil plant had anthelmintic activity against *Haemonchus contortus* eggs and larvae (Suteky and Dwatmadji, 2011ab and 2015).

Materials and methods

This research was conducted in Animal Science Laboratory and in oil palm plantation area (5 ha, approximately 10-year old oil palm) located in Central Bengkulu District. The natural pasture under oil palm plantation was a complex mixture of grasses pre dominantly *Axonopus compressus*, broad

leaves, legume and fern. Kacang goats were purchased from local seller and was dewormed before starting the experiment to removed gastro intestinal parasites infestation previously. Before the treatment was started, the area under oil palm was infected with mix-gastro intestinal parasite using pool faeces from 3 artificially infected goat, and was left for 21 days waiting the egg to develop to be as an infective larvae.

Twenty five (25) local Kacang goats then grazed in infected area from 08.00-16.00 every day for 15 days and housed at night for security reason. All experimental goats were then re-infected orally with 1000 mix-gastro intestinal larvae. Three week after the initial infestation a baseline faecal analysis was conducted to entire goats to determine which goat were infected with high amount of this parasite. Fifty (15) goats was selected and allocated in 3 treatments and kept in individual cage (100 x 45 x 90 cm) for the rest of experiment.

Extract Preparation

The leaf of *Melastoma malabatricum* was collected from natural habitat in Bengkulu region. The plant material was dried at room temperature (25-35^{0}C) and powdered using commercial electric blender. The crude aqueous of *Melastoma malabatricum* were prepare based on technique describe by Suteky and Dwatmadji (2011b). Fifty goats were randomly al located into 3 groups (n=5), the groups received the following treatments:

T1: Aqueous extract *Melastoma malabatricum* 250mg/kg LW/3 week

T2: Aqueous extract *Melastoma malabatricum* 250mg/kg LW/2 week

T3: Single dose iIvermectin super (positive control).

Aqueous extract *Melastoma malabatricum* and Ivermectin was applied in the 3rd week after the first pastoral infestation and repeated based on treatments.

Parameters evaluated were clinical signs, mortality rate, feed intake, live weight, average daily gain (ADG), all parameters measured in the morning before feeding. Data were collected weekly for 6 weeks. Data were tabulated and expressed as mean and standard deviation. SPSS program for Window version 16 was used for the statistical analyses.

Results and Discussions

Anorexia, emaciated, rough hair coat, anaemia, watery faeces were the clinical sign of infected goat. Clinical assessment also found infected goats showing bottle jaws, decreased live weight, and followed by death started in

week 3 postinfection. Our previous research on the effect of crude aqueous extract of *Melastoma malabatricum* (250 mg/kg BW every week) on goat infected medium level of *Haemonchus contortus* showed promising result with no mortality on infected goat (Suteky and Dwatmadji, 2011a). This different could be due to the level of infection (medium vs. heavy), the frequency of treatment (1 week vs. every 2 or 3 week), and the time of treatment. According Houtert and Sykes (1996) infection causes protein deficiency coincident with increasing the demand for amino acids bythe gastro intestinal tissue in the alimentary tract while reducing supply through depression of appetite.

Figure 1. Mortality rate (%) of Kacang goats for all treatments

Our findings also found that the mortality rate of infected goat either treated with aquaous extract *Melastoma malabatricum* or single dose ivermectin are high (20-80%) until week 5. The reason is ivermectine and extract *Melastoma malabatricum* was given to the experimental animals is on high level of infection. It seems that ivermectine could not always decrease the mortality rate due to helminthiosis. Symoens *et al*. (1993) found a mortality rate of 74 % for animals up to one year old. In our previous research feed supplement contain rice brand, palm kernel cake and cassava leaf was given to all experimental animals, while in this experiment all experimental goats refused to supplement given. It was found that protein supplements before and during infection can prevent or reduce clinical signs of infection by *H. contortus* (Sykes and Coop, 2001). Intake of high level of protein enhances the ability of the infected host to repair mucosal damage (Coop and Holmes, 1996). Feed supplementation in order to improve the host resistance to parasite

infections seems to represent one of the most promising options (Hoste *et al*., 2005).

Table 1. Live weight (kg) and average daily gain (g/day) for all treatments

Variable measured	Treatments		
	T1	T2	T3
Initial weight (kg)	8.06	8.26	8.01
Final weight (kg) week 5	7.05	7.50	8.80
ADG (g/day)	-28.86	-21.71	22.57

T1: Aqueous extract *Melastoma malabatricum*250 mg/kg LW/3 week, T2: Aqueous extract *Melastoma malabatricum*250 mg/kg LW/2 week, and T3: Single dose Ivermectin super

Table 1 showed that liveweight gains of infected goats treated with extract *Melastoma malabatricum* every 2 or 3 week were reduced by on average 0.7-1.0 kg (11-13%). Moore *et al*. (2008) found decreasing liveweight due to *Haemonchus contortus* could reach up to 20%. Albers *et al*. (1989) also found that liveweight of infected lambs were reduced by on average of 1.29 kg (range 0.83-1.71 kg) or up to 38% (12-64%) of liveweight gain in uninfected controls.

Table 2. Clinical parameters of goats following experimental infection with mix-gastro intestinal parasite

Treatments	Mean rectal temperature (^{o}C)			Mean respiration rate (per minute)			Mean heart rate (per minute)		
	Week 1	Week 3	Week 5	Week 1	Week 3	Week 5	Week 1	Week 3	Week 5
T1	36.58^{a}	37.93^{a}	37.65^{a}	29.00^{a}	23.33^{a}	22.00^{a}	76.60^{a}	93.00^{a}	73.00^{a}
T2	37.98^{a}	37.63^{a}	37.60^{a}	27.80^{a}	22.00^{a}	25.00^{a}	77.60^{a}	73.67^{a}	77.00^{a}
T3	38.12^{a}	37.65^{a}	37.43^{a}	29.40^{a}	30.00^{a}	25.33^{a}	71.60^{a}	80.50^{a}	93.00^{a}

T1: Aqueous extract *Melastoma malabatricum* 250 mg/kg LW/3 week, T2: Aqueous extract *Melastoma malabatricum*250 mg/kg LW/2 week, and T3: Single dose Ivermectin super

No significant differences (P>0.05) were observed in the mean rectal temperature, respiration rate an heart rate in experimental animals. Williamson and Payne (1993) said that normal temperature of goat in tropical region is 37-39 ^{o}C or 36.5 –39.5 ^{o}C (Otoikhian, 2009). Ameen *et al*. (2010) reported that clinical parameter of kid and goat infected with *Haemonchus contortus* were about 38 ^{o}C (rectal temperature) , about 15 (respiration rate/minute) and 77-93 (heart rate/minute). Ameen *et al*. (2010) said that *Haemonchus* did not cause pyrexia and interfere of the respiration rate and heart rate. According to Jean

(1992) factor afecting temperature are animal activities, environment, healthyness, the size of animal, nutrition and water consumtion.

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