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Effect of *Melastoma Malabatricum* and Feed Supplementation on Local Goat Infected with *Haemonchus Contortus* in Ruminant-Oil Palm Integrated System

Tatik Suteky and Dwatmadji

Department of Animal Science, Faculty of Agriculture, University of Bengkulu, Indonesia.

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Twenty worm-free female local goats were used to determine the effect of *Melastoma malabatricum* extracts and feed supplementation on their performance following natural infection with *Haemonchus contortus.* Paddock was built under oil palm plantation and contaminated with faecal pellets from the artificially infected goats containing *Haemonchus contortus* eggs every day for 7 consecutive days, and left for 21 days waiting for the eggs develop into infective larvae.25 female local goats of 6-8 months an average weight of 8 kg were drenched with fenbendazole within 2 weeks before entering the contaminated paddock. On day 22 post pastoral infection, those goat were subjected to contaminated pastures for grazing during the day from 08.00-16.00, for 10 consecutive days and housed at night. Twenty five (25) goats then were divided into 5 (five) treatments T0: *Melastoma malabatricum* extracts 125mg/kgLW/week without feed supplementation T1: feed supplementation with out *Melastoma malabatricum* extracts, T2: feed supplementation + *Melastoma malabatricum* extract 125 mg/kg LW/week; T3: feed supplementation + *Melastoma malabatricum* 250mg/kgLW/week and T4: ivermectin single-dose + feed supplementation. Supplementation of feed containing the Palm Kernel Cake, rice bran and cassava leaves meal with a total crude protein of 12.38% given as much as 1% of liveweight. All goats maintained in individual pens and given un-infected pasture harvested from palm oil plantation using cut and carry system, the water was available ad libitum. Performance parameters measured in*cluded liveweight gain, faecal reduction, Packed Cell Volume (%PCV) and haemoglobin. Result showed that faecal reduction, PCV, significantly higher ($P<0.05$) and haemoglobin was significantly higher ($P<0.05$) in T2, T3 and T4.While T0 had lower rate liveweight gain than the other groups.

Key word: *Haemonchus contortus, Melastoma malabatricum,* goat

Introduction

Ruminant-Oil palm integrated system could be used for optimizing land used, due to low/zero input and more ecological sound (Dwatmadji and Suteky, 2013; Smart *et al.*, 2006). The problem in that grazing system is that the animal becomes more susceptible to *Haemonchus sp* due to continous re-infection (Kerr, 2008; Wildeusand and Zajac, 2005), as the parasite live either in grazing animal or pasture (Coffey and Hale, 2012). Infestation of nematode parasitism particularly stomach worm *Haemonchus contortus*

* **Coressponding Author:** Tatik Suteky, **E-mail:** Tatiksuteky.2008@yahoo.com

has been reported as a major problem to ruminant production in Thailand (Kochapakdee *et al.,* 1991), Vietnam (Binh and Lin, 2005) and over the world mainly tropical region (Besier *et al*., 2016; Kumar *et al*., 2015; Tasawar *et al*., 2010; Waller and Chandrawathani, 2005; Liu *et al*., 2008). Haemonchosis can lead to production loss (meat 27%, wool 40%) and economic loss, protein deficiency, loss of appetite, loss of body weight, impaired digestive efficiency, anemia, bottle jaw, and death (Iqbal and Jabbar, 2005; Bachaya *et al*., 2006; Williams, 2010, Suteky and Dwatmadji, 2011a; Suteky and Dwatmadji, 2015b).

A wide variety of anthelmintics is used for the treatment of helminths in animals. However, the development of resistance in helminths against commonly used anthelmintics have always been a challenge faced by researcher (Akhtar *et al*., 2000; Bowie *et al.,* 2014; Waller, 2006) exploitation of potential anthelmintic is an area of research interest. *In vitro* and *in vivo* research of several indigenous plants have also been investigated as anthelmintic with varying success (Escobar, 2016; Acharya *et al*., 2014; Alemu *et al*., 2014; Akther *et al.,* 2015; Islam *et al*., 2015; Suteky and Dwatmadji, 2015ab; Suteky *et al*., 2014)

Adequate nutrition could reduce the severity of Haemonchosis, Mhomga *et al*. (2012) found that the supplemented goats shed significantly fewer helminth eggs in the faeces and harbored lighter burdens of the 2 worm species compared to unsupplemented goats. Palm Kernel Cake is palm oil by-product and considered source of energy with moderate content of crude protein (Rahman *et al.,* 2013). Zahari and Alimon (2005) found supplementing 30-50% PKC in traditional ration can improve beef cattle performance and live weight gain.

The use of cassava *(Manihot esculenta)* hay as source of protein supplementation has been reported by Wanapat and Khampa (2006), the crude protein (CP) content of cassava leaves is in the range of 22–29 % of dry matter (AFRIS, 2007) and between 21–24 % in the foliage (Seng *et al.,* 2007; Seng, 2009).Combination between PKC and cassava hay as a good source of amino acid cause PKC lack of lysine and cassava have adequate of lysine.

Materials and methods

Five hectares of 8 year old oil palm in Central Bengkulu Indonesia was used to conduct this experiment. Goats were purchased from local seller, weighed to determine its live weight, and assessed for body condition score (BCS), neck tag was used to identified each animal. Subsequently, all of the animals dewormed using fenbendazole within 2 weeks to removed gastro intestinal parasites infestation previously. The natural pasture under oil palm plantation was a complex mixture of grasses pre dominantly *Axonopus compressus*, broad leaves, legume and fern.

One thousand m^2 paddock was built under oil palm plantation and contaminated with 500 gram faecal pellets from the artificially infected goats containing *Haemonchus contortus* eggs every day for 7 consecutive days. This paddock was left for 21 days waiting for the eggs develop into infective larvae. Twenty five (25) female local goats of 6-8 months an average weight of 8 kg, were drenched with fenbendazole within 2 weeks before entering the contaminated paddock. On day 22 post pastoral/paddock infection, those goats were subjected to contaminated pastures for grazing during the day (08.00-16.00) for 10 consecutive days and housed at night. Based on liveweight and BCS, twenty five (25) female goats was selected and distributed into 5 treatments, and then kept in individually cages (100x45x90 cm) for the rest of study. All goats were fed twice daily (at 08.00 and 16.00 hours) with cut-and-carry forages that were harvested from oil palm plantation.

Melastoma malabatricum leaves were dried at room temperature (25-35^0C) and powdered using commercial electric blender, based on method develop Suteky and Dwatmadji (2011^b). The goats received the following treatments:

T0: *Melastoma malabatricum* extracts 125mg/kg LW/week without feed supplementation

T1: Feed supplementation with out *Melastoma malabatricum* extracts

T2: Feed supplementation + *Melastoma malabatricum* extract 125 mg/kg LW/week;

T3: Feed supplementation + *Melastoma malabatricum* extract 250mg/kg LW/week and

T4: Ivermectin single-dose + feed supplementation

Aqueous extract *Melastoma malabatricum* and ivermectin was applied in the 3^{rd} week after the first pastoral infestation and repeated based on treatments. Feed supplementation with total crude protein of 12,38% was compounded using 40% Palm Kernel Cake (CP 13,71%), 45% rice bran (CP 7,86%) and 15% cassava leaves meal (22,73%) given 100 mg or as much as 1% of liveweight. Parameters evaluated were live weight, ADG, PCV, Hb and Faecal Eggs Counts. All parameters measured in the morning before feeding. Data were collected fortnightly until day 56-70 post infection. Data were tabulated and expressed as figures. SPSS programmed for window version 16 was used for the statistical analyses.

Results and Discussions

The effect of feed supplementation and *Melastoma malabatricum* extract was presented in Tabel 1. There were significant different ($P<0.05$) between T0 and T1 with the other treatments in final weight, total weight gain and ADG. Our findings revealed that feed supplementation or *Melastoma malabatricum* extract alone could prevent the mortality rate due

to *Haemonchus contortus.* Our previous research showed that the mortality rate of untreated Haemonchosis could reach 67.7% (Suteky and Dwatmadji, 2011a; Albers *et al* (1989) found that liveweight gains of infected lambs were reduced by on average 1.29 kg (range 0.83-1.71 kg) amounting to 38% (12-64%). The mortality rate as high as 20-80% was documented in goat infected with high level of mix-gastro intestinal parasite either treated with aquaous extract *Melastoma malabatricum* or single dose ivermectin. It seem that ivermectine could not always decrease the mortality rate due to helminthiosis (Suteky and Dwatmadji, 2015b)

The result showed that combination feed supplementation and 125 mg/LW Week^{-1} extract of *Melastoma malabatrium* had a positive effect on ADG. Feed supplementation slightly mitigated the effect of *Haemonchus contortus* through the improvement of weight gain and minimizing the detrimental effects of parasitism.

Table 1. Summary of live weight and average daily gain

Treatment (T)	Initial Weight (kg)[1]	Final Weight (kg) [1]	Total gain (kg)[2]	Average Daily Gain (g)
T0	8,424	8,641 [c]	0,217 [c]	3,88[c]
T1	8,412	8,627 [c]	0,215 [c]	3,84[c]
T2	8,427	9,176 [a]	0,749 [a]	13,38[a]
T3	8,417	8,843 [b]	0,426 [b]	7,61[b]
T4	8,444	9,266 [a]	0,822	14,68[a]

[1] Average of 5 replications, [2]average of 56 days weight change, T0: *M.malabatricum* extracts 125mg no feed suppl; T1: Feed suppl with out *M. malabatricum* extracts ; T2: Feed suppl+ *M.malabatricum* extract 125 mg ; T3: Feed suppl+ *M.malabatricum* extract 250 mg; T4: Feed suppl +ivermectin single-dose .

a–c, values marked with the similar alphabets in a colum do not differ significantly at P >0.05

According to Wanapat and Khampa (2006) Coop and Holmes (1996) Hoste *et al.* (2005) feed suplementation reduce internal parasitic egg counts in ruminants, enhances the ability of the infected host to repair mucosal damage, and improving the host resistance to parasite infections.

This experiment also showed that when the dose of extract was increased to 250mg/kg LW Week^{-1}, the ADG decline significantly (P<0.05). The possible explanation for this condition is the high concentration of tannin in those extract. According to Barry and Duncan (1984); Waghorn *et al.* (1994) high concentrations of tannin depressed feed intake, digestibility, and animal production in sheep.

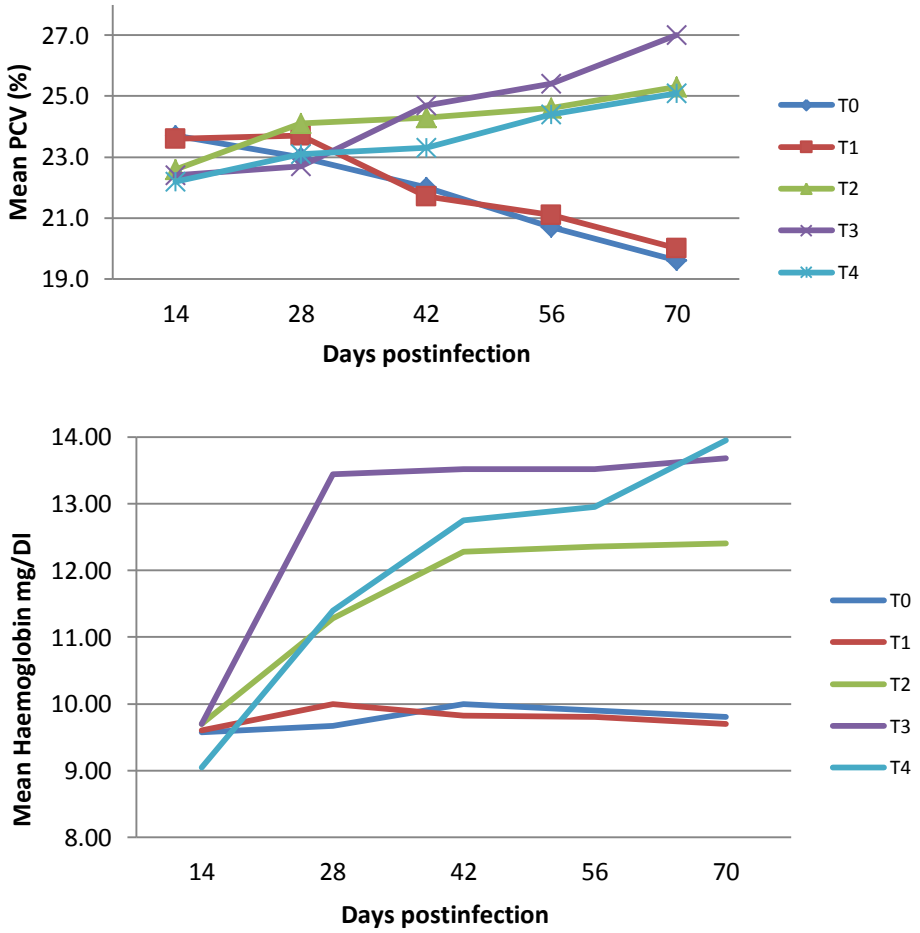

Figure 1. Mean of PCV and Haemoglobin of post infection.
T0: *M.malabatricum* extracts 125 mg no feed suppl; T1: Feed suppl with out *M. malabatricum* extracts; T2: Feed suppl+ *M. malabatricum* extract 125 mg; T3: Feed suppl+ *M. malabatricum* extract 250 mg; T4: Feed suppl + ivermectin single-dose

Packed Cell Volume is a good indicator for naturally infected nematode (Jadav *et al.*, 2006). There were gradually reduction of PCV level in group of goats infected and treat with *Melastoma malabatricum* without feed supplementation (T0) and group of goats receive feed supplementation without extract (T1). Its seem that decreasing the level of PCV in T0 and T1 relate to its blood-feeding activity (Besier *et al.*, 2016). Schoenian (2010) the normal value of *Packed Cell Volume* (PCV) of goat is 22-28% or 22-38% (Bernard *et al.*, 2009). Whittier *et al.*, (2003), said that *Haemonchus contortus* suckling 0,094 ml blood daily. Albers *et al.* (1989) haematocrits of infected sheep had in five out of six cases declined to less than 24%. Ameen *et al.*, (2006) reported PCV in infected African Dwarf Kid decrease significantly up to 17.45%.

In addition, the percentage of PCV in T2-T4 increase significantly (P<0.05) from 42 days post infection until in the end of study. As the bioactive compound of Melastoma and cassava is tannin, therefore those tannin can improve protein nutrition by binding to plant proteins in the rumen and preventing microbial degradation, thereby increasing amino acid flow to the duodenum.

The same pattern also found in Haemoglobin value, Hb value on T2-T4 were within the normal physiological range, this suggests that beneficial effects feed supplementation and *Melastoma malabatricum* extract or albendazole on infected goats. Therefore, the general health of goat's remained satisfactory throughout the experiment (Singh *et al*., 2015).

Figure 1 also showed that Hb level of To-T1 decrease significantly compare the other treatments. Howlander *et al*., (1996) there was interaction between *Haemonchus contortus* infection and duration of infection on Haemoglobin concentration. Haemoglobin value decrease up to 6 g/100ml 18 weeks post infection (Howlander *et al*., 1996).

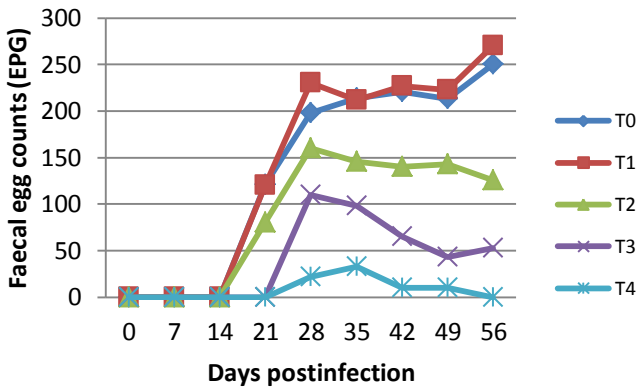

Figure 2. Mean Faecal Egg Counts (FEC) during the study.
T0: *M.malabatricum* extracts 125 mg no feed suppl; T1: Feed suppl with out *M. malabatricum* extracts; T2: Feed suppl+ *M. malabatricum* extract 125 mg; T3: Feed suppl+ *M. malabatricum* extract 250 mg; T4: Feed suppl + ivermectin single-dose

All experimental animals had positive mean FECs at two to three weeks after-infection (see Figure 2), which mean that all experimental animals were successfully infected naturally from infected pasture. The reduction of faecal egg count was evidenced that Melastoma had anthelmintic activity in vivo and in vitro (Suteky and Dwatmadji, 2011ab, 2015b; Suteky *et al*., 2014). The reduction is more pronounce in T4 (ivermectin super) followed by T3 (Melastoma extract 250mg/LW Week^{-1}). Tannin has capability to inhibit egg hatching, while faecal egg counts reduction was through improved nutrient utilization (Min and Hart, 2003). Combination of extract *Melastoma malabatricum* and feed supplementation based on PKC and cassava meal, enhance host nutrition might contribute to the improvement

of PCV, Haemoglobin, ADG and reduce parasitic egg counts. The improvement of ADG significantly higher (P<0.05) in T2 than those of T3, however PCV and Hb value is significantly higher (P<0.05) in T3 compared with T2.

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