The Use of *Melastoma malabatricum* and *Manihot esculenta* extract as natural anthelmintic on the Performance of Kacang goat

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Abstract. This study was carried out to evaluate anthelmintic activity of the combination *Melastoma malabatricum* and Cassava (*Manihot esculenta*) leaves extract on the performance of Kacang goat. The first experiment was conducted to examine the efficacy of thus extract on larva development assay and adult motility assay. In the second experiment, twenty Kacang goat were distributed into four groups according to a Completely Randomized Design namely P1= 75% *Melastoma malabatricum* extract + 25% *Manihot esculenta* extract, P2= 50% *Melastoma malabatricum* extract + 50% *Manihot esculenta* extract, P3= 25% *Melastoma malabatricum* extract + 75% *Manihot esculenta* extract, P4= Single dose Ivermectin as positive control. Extract All experimental goats were dewormed with Albendazole and treated prophylactically with a broad-spectrum antibiotic before the experiment. Goat were infected orally with 200 infective *Haemonchus contortus* larvae (L3). Result indicated that *Melastoma malabatricum* leaves extract inhibited larva development assay by 77% compared with 71.5% on Cassava (*Manihot esculenta*) leaves extract. For the mean of adult motility assay increase in the concentration of extract from 3.125 - 50 mg/mL. Our finding also found that the was significant different (P<0.05) on dry matter intake and there no significant different on live weight, no mortality was found during experimental periods.

1. Introduction

Small ruminant play a significant role as an economical source of farmer in developing countries. According to Reference [1] raising small ruminants have several advantages such as low capital investment, easy to manage, source of protein, organic fertilizer, and could be used as stable household, the contribution of goats on family income could reach 58.0%. One of the biggest challenge in goat production is the infestation of gastrointestinal parasite especially *Haemonchus contortus* [2,3].

*Haemonchus contortus* also known as barber pole is a blood sucking parasites, each worm sucks 0.05-0.094 ml [4] [5]. This disease is not only a problem faced by farmer in developing tropical countries but also in developing countries sub-tropical regions [6] [7] [3]. Infected goats showed anaemia, low packed cell volume (PCV), haemoglobin (Hb) and low average daily gain [8], bottle jaw, weight loss, and ill thrift coincide with a lot of eggs in the faeces [9]. As the life cycle is only about 3 weeks and an adult worms can produced 5,000 to 10,000 eggs per day passed through faeces to the pasture, therefore pasture contamination and re-infection could easily happen in susceptible animal [9, 10].

Scientists have been developing several methods to control *Haemonchus contortus*, the most common method is the application of chemical anthelmintic, pasture management and the used of medicinal plants. *Melastoma malabatricum* is a common weed abundantly grow in tropical region, and *Melastoma malabatricum* has been reported in folk medicine as anti diarrhea, dysentery, wound and scar.
Scientifically extract of *Melastoma malabatricum* has been documented as antimicrobial [12], wound healing [13], anthelmintic [8] [14] [15]. Other plants are believed to have anthelmintic capability are *Manihot esculenta* or cassava leaf [16] [17]. Several research have been done to determine the efficacy of *Manihot esculenta* in vitro and in vivo as anti-nematode. The aim of this research to evaluate anthelmintic activity of the Melastoma malabatricum and Cassava (*Manihot esculenta*) leaves extract and their combination on larvicidal and adult motility as well as performance of Kacang goats.

2. Materials and Methods
This experiment was conducted in Bengkulu, the maximum temperature of this area was 32.3°C at minimum temperature 26.2°C, with the relative humidity of 71.4%. *Melastoma malabatricum* and *Mahihot esculenta* were harvested under oil palm plantation surroundings Bengkulu University. Extract preparation was prepared according to Tatik Suteky (2014) - Patent (No P 2014/03374). The leaves were dried for 5-7 days and then milled to powder using home blender and stored until used. The extract were prepared crude leaf extract were prepared w

In the first experiment: in vitro assay (larva development and adult motility assay were performed based on [14] and [18]. Five (5) different concentration of each plant extract were applied and normal saline was used as negative control/non-treated control, while a positive control was done using Albendazole and Ivermectine. Petri dishes was used to exposed worms in extracts tested, three replicates was performed in each assay. Second experiment was conducted using 20 local female goats with initial weight about 8 kg. All goat were drench with Albendazole 2 weeks before infected orally with 200 *Haemonchus contortus*. Broad spectrum antibiotic and vitamin were given when needed before the experiment started. All the experimental goats were asigned into four groups according to a Completely Randomized Design (CRD), namely P1= 75% *Melastoma malabatricum* extract + 25% *Manihot esculenta* extract. P2= 50% *Melastoma malabatricum* extract + 50% *Manihot esculenta* extract P3= 25% *Melastoma malabatricum* extract + 75% *Manihot esculenta* extract P4 = : Single dose ivermectin as positive control.

Parameter measured are larva development, motility adult worm, feed consumption and body weight changes. All data were tabulated using Microsoft excel, data were analysed using one-way ANOVA, to determine the differences between means Duncan Multiple Range Test was performed. All data analysed using SPSS for Window 16.

3. Results and Discussion
Result indicated that ivermectine super showed the highest larvicidal activity. Reference [19] reported that ivermectine (IVM) at a high concentration, (10-4 M), began to kill L3s within 1-2 hours. Other researcher comparing the effectiveness of different brands of ivermectin injection, result showed that Ivermectine super has highest activity (LC50 = 1.1 ng/ml) [20]. Ivermectin, as well as the rest of AVMs, increases the activity of γ-aminobutyric acid (GABA) receptors on parasite or helminth [21]-[23], which blockades the signal between neuron and muscle. No significant difference (P<0.05) larvicidal activity between Oxendazole 40 mg/ml and *Melastoma malabatricum*. It seem that *Melastoma malabatricum* comparable to albendazole and potential as natural anthelmintic. Figure 1 showed that leaves extract *Melastoma malabatricum* inhibited larvae development assay by 77% compare 71.5% of Cassava (*Manihot esculenta*) leaves extract. The mean inhibition percentage of larva development of Melastoma malabatricum extract in the same dose was always slightly higher than those of *Manihot esculenta* extracts. Larva inhibition of *Manihot esculenta* extracts in the concentration 12.5 mg/ml was 47.87%. Almost the same result was reported by [24] 11mg/ml methanol extract of *Manihot esculenta* killed half of the larvae (50%). Further [24] reported that total tannin from the methanol leaf extract of *Manihot esculenta* 254.44 TAE/mg

It can be seen from Figure 1, larvicidal activity was depend on the extract concentration. Our previous research indicated that larvicidal activity of *Melastoma malabatricum* depend on the solvent used [14].
The effects of different extracts (Melastoma malabatricum, Monihot esculenta and their combination on adult motility assay 2-12 after exposure can be seen in Figure 2-7.

Figure 2 showed that in general Melastoma malabatricum have the highest inhibition rate (P<0.05) comparing the other two extracts. In the first 2 hour extracts of Melastoma malabatricum in high concentrations (50mg/ml) could inhibit 77% or in another word the percentage of motility worms was 33%. While their inhibition rate of Monihot esculenta and the combination were 10% and 16.7% respectively. It was also found that adultcidal activity of Melastoma malabatricum extract was decrease (55%) on the concentration of 25 mg/ml. It the same concentration there is no effect on adult worm motility rate due to Monihot esculenta and the combination extract.
After 4 hours exposure the adult motility of *Haemoncus contortus* tend to decrease. Extract of *Melastoma malabaricum* showed the highest responses than the others. The motility of adult worm in extract of *Melastoma malabaricum* 20% (50mg/ml), 42.5% (25mg/ml) and decrease coincide with decreasing the concentration 67% (3.125mg/ml).

In the concentration of 25mg/ml extract *Manihot esculenta* and their mixture showed anthelmintic activity. The inhibition of adult motility were 20% and 23.7%.

Figure 4 showed that the efficacy of extract as anthelmintic on the concentration 50mg/ml still the highest after 6 hour exposure. It also can be seen in Figure 4, in lower concentration levels (3.125-25mg/ml) adultcity of *Melastoma malabaricum* extract was 35-87.5%, *Manihot esculenta* 10-65%, combination extract 10-76.7%.
Figure 5. Adult motility 8 hours post exposure

Figure 5 showed that all the adult worms tested were dead at a concentration of *Melastoma malabatricum* extract at 50 mg/mL within 8 hours after exposure. Experiment was done by [25] to determine the effectiveness of 3 different solvent (ethyl acetate, acetone, and methanol) and five medicinal plants found that complete inhibition (100%) happen in the maximum concentration tested (50 mg/ml).

Figure 6. Adult motility 10 hours post exposure

There is no adult worm motility observed ten hour post exposure in the extracts tested on the concentration of 50mg/ml. Our result indicated that all extracts tested have anthelmintic activity and in the higher concentrations induced greater inhibition.
Figure 7. Adult motility 12 hours post exposure

Those activities could be due to the presence of tannin. Reference [26] isolated 11 hydrolysable tannins. Further [27] successfully screened a new complex tannins namely ellagitannin and casuarinin from extract of *Melastoma malabaricum* leaves. The effectiveness of different plants source tannin as ovidical have been reported by [28] and [29]. Tannins may disturb adult worms skin or in directly by improving protein utilization [30].

No mortality was found during the trial period, the experimental animal showed rough hair coat, pale conjunctiva, it happen could be due to low-moderate level of Haemonchus infection in the experiment. The effect of treatment on dry matter intake can be seen on Table 1. Goats treated with ivermectine had greater dry matter intake (P<0.05) than those treated with *M.malabaricum* and *Manihot esculenta*. As the predelection of parasite in abomasum therefore those parasites will interfere nutrient intake and feed absorption. Ivermectin causing hyperpolarization of nerve or muscle cells as a result the worm will be paralyzed to death [31].

There was significant differences (P<0.05) among treatments on ADG. The best ADG of goats receiving IVM is probably related to parasite burden. Medicinal plant could not eliminated all the parasites in abomasum. Our previous findings showed that infected goat receiving IVM or *Melastoma malabaricum* 125 mg/kg LW had ADG 14.68 and 13.38 gram respectively [8].

4. Conclusions
*Melastoma malabaricum* and *Manihot esculenta* leaves extract showed the anthelmintic activity in vitro. Adulticity was increased in the concentration of extract from 3.125-50 mg/mL. Our finding also found the was significant different (P<0.05) on dry matter intake and ADG and there is no significant different on live weight, no mortality was found during experimental periods.

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