Utilization of distillation waste of Lemon Grass (Cymbopogon nardus) as litter for reducing parasite diseases and its influence on broiler performance

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Abstract. The study aimed to know the effect of lemongrass (C.nardus) distillation waste as litter floor in reducing Ascridia galli growth and in broiler performance. The study use of 175 day old chicken (DOC) that were divided into 5 treatments consist of 7 chickens each with 5 replications. Ascridia galli eggs were challenged at 4 weeks old broiler with 100 eggs/bird. The data were analysed using Analysis of Variance followed by Duncan’s Multiple Range Test. The results showed that of lemongrass distillation waste as litter and anti-parasitic does not have significant effect on feed intake, body weight gain and feed conversion ratio of broiler.

1. Introduction
Rearing chicken in a litter system cage usually use materials such as husks, wood shavings, straw, corn cobs and peanut shells. A good litter material should have low water content and high water absorption. The litter material will be mixed with chicken excreta, remaining feed and chicken feathers and these will be fermented. Fermentation process can produce unidentified protein factors and vitamin B12. In addition, it also increases the humidity and temperatures. High humidity and high temperatures increase the risk of chicken to be contaminated by fungi, viruses, parasitic, bacteria through air, feed, drinking water or litter. Chicken in litter cage showed 43% pecking behaviour and it showed in several activity such as foraging (25%), eating (18%) and through these activities were assumed that chicken consumed 4% litter. It can increase the infection of bacteria, viruses, fungi and parasites which contaminated litter. One of the parasites that commonly infect chicken is Ascaridia galli (A. galli) [1]

Chicken health problems caused by parasites can reduce feed intake and also reduce meat and egg production. Infection of A. galli can reduce the surface area of the broiler small intestine in the starter phase [2]. It can affect growth of native chicken by decreasing the body weight of up to 38% and cause blood deficiency (anemia) [3]. Litter materials, should not only use as litter floor but should have other benefits such as preventing diseases, especially parasitic diseases. Natural litter materials have prevention effect to parasites infection because it contains essential oils from the plant. Waste product from essential oil refining of patchouli and clove leaves can be used as litter ingredients [4].
has been shown that these materials had good result in reducing *Eimeria tenella* infection that causes *coccidiosis* since it contains the active ingredient, *saponin*, that has as anti-protozoa effect [4].

Distillation waste of essential oils from lemongrass was assumed to still contain bioactive substances and the utilization of these materials as litter should help reduce parasite infection. Essential oils such as *citronella* oil as anti-parasites play a role as anti-parasitic through inhibition of parasite metabolism process including in *A. galli* so that the growth and development of this parasite should be depressed. This study aimed to see the effect of lemongrass distillation waste utilization as litter on the performance of broiler that were challenged with *A. galli*.

2. Material and methods

2.1. Material

The equipments were 25 units of cages, sized 1 x 1 x 1 m. The tools used for preparation of *A. galli* embryonization were 250, 500- and 1000-ml measuring cups, magnetic stirrers, centrifuges, 3 ml syringes, petri dish, light microscopes, glass preparations, glass covers, pipette drops, scalpel, tweezers, 200 ml Erlenmeyer, and aquarium air pump (Lion). The experiment used 175 one day old (DOC) male broiler. Litter materials were in the form of 62.5 kg of rice husk and 50 kg lemongrass distillation waste. Chicken feed content 22% of Crute Protein, 3050 kcal/kg of Metabolic Energy, 1% of Calcium and 0.5% of Phosfor [5].

For embryonisation, the *A. galli* eggs were collected from infected local chicken intestines using specific method [6]. The eggs and oviduct of *A. galli* were removed and stored in a petri dish. The eggs and oviduct were weighed ± 2 g and were stored in 50 ml of NaOH 0.5 N. These materials than were stirred with a magnetic stirrer for 30 minutes then let stand for 10 minutes. The supernatant was removed carefully and was added with 100 ml NaOH 0.5N then stirred again. The washing process was repeated 3 times. The precipitate was transferred into a test tube and added with distilled water up to ¾ tubes then followed by centrifugation for 5 minutes at a speed of 1500 rpm. The supernatant was removed.

2.2. Methods

Incubating process of *A. galli* eggs following Fairbain method with some modification [7]. *A. galli* eggs were transferred to a 200 ml Erlenmeyer tube containing 150 ml of distilled water. The plastic air pump hose was inserted in the Erlenmeyer tube and the mouth of the Erlenmeyer tube was covered with cotton. Aquarium air pump was turned on at low speed. The development of eggs was examined every day. If the egg has embryo, the oxygenator was turned off and the embryonic egg were used for further. Lemongrass distillation waste was aerated and cut into pieces to ± 1 cm (the size of chaff). The lemongrass distillation waste and husk were spread out on the cages in to 5 cm thick [8]. All of the chickens were weighed and 7 chickens randomly placed into 5 groups with 5 replications to each group:

- P1: The litter were made from Lemongrass distillation waste 25%
- P2: The litter were made from Lemongrass distillation waste 50%
- P3: The litter were made from Lemongrass distillation waste 75%
- P4: The litter were made from Lemongrass distillation waste 100%
- P5: The litter were made from Rice Husk 100%

As much as 100 eggs of *A. galli* were challenged to each individual per orally.

Data were analyzed by Analysis of Variance (Anova), followed by Duncan Multiple Range Test (DMRT) [9]. Th formula was shown as follows:

\[ Y_{ij} = \mu + \alpha_i + \epsilon_{ij} \]

- \( Y_{ij} \) = response to chicken performance of obtaining for treatment i and repeat j
- \( \mu \) = Middle population value
- \( \alpha_i \) = Effect of treatment of lemongrass distillation waste (*C. nardus*) as litter
- \( \epsilon_{ij} \) = Effect of trial error from the second treatment i and repeat j.
3. Result and discussion

The effect of lemongrass distillation waste to the development of *Ascaridia galli* and its effect on the broiler performance can be seen on Table 1.

Table 1. Broiler performance after using of lemongrass distillation waste litter for 8 weeks

| Treatment | Feed Intake (g/bird) | Body Weight Gain (g/bird) | Feed Conversion Ratio |
|-----------|----------------------|---------------------------|----------------------|
| P1 ns     | 3327.64±195.89       | 1275.30±143.79            | 2.62±0.17            |
| P2 ns     | 3167.34±147.15       | 1298.88±80.87             | 2.44±0.19            |
| P3 ns     | 3032.48±138.08       | 1194.66±56.48             | 2.54±0.13            |
| P4 ns     | 3059.84±52.16        | 1263.80±108.98            | 2.43±0.24            |
| P5 ns     | 3103.29±286.89       | 1241.51±170.17            | 2.50±0.14            |

ns: not significant

Feed intake. The use of distillation waste of lemongrass as a litter from 25 to 100% had no significant effect on feed intake compared to rice husk (Table 1). At 21 days old, none of chicken infected by *A. galli* and showed good health condition. After challenged by *A. galli* at day 28 to 56, there was no significant affect to all parameters. It is due to lemongrass distillation waste was not inhibit the *A. galli* worm larvae because lemongrass distillation waste contained low geraniol 0.51%[10]. Materials from lemongrass distillation waste and rice husk physically were not altering the activities of feed consumption. The result showed no difference on feed intake between groups. Another study used litter patchouli and clove leaf distillation waste showed no effect to the feed intake after challenged by oocysts [4].

Body weight gain. The use of lemongrass distillation waste as a litter and *A. galli* anti-parasitic agent in 25 to 100% had no significant effect to in body weight improvement (Table 1). In the broiler which were infected with *A. galli*, the parasites egg then hatched into larvae (L3) and entered the intestinal mucosa which resulted inflammation in the intestines and prevented it to absorb nutrients that was indicated low growth performance. It was different to other research using patchouli and clove leaf distillation waste litter which did not show any effect to body weight gain after challenged oocysts [4].

Feed conversion ratio. The usage of lemongrass distillation waste as a litter and anti-parasitic agent for *A. galli* worm had no significant effect on feed conversion ratio (FCR) of broiler. The broiler feed was not absorbed properly because the intestine had infected by *A. galli* worms so that nutrients cannot be used for gaining weight. Feed intake of broiler among the same treatment gained the same body weight so that the FCR produced was equal between treatments. The usage of several litter materials did not significantly affect feed conversion ratio. A study showed that the average conversion of rations obtained was 1.69 to1.71 in a cage that use litter ingredients derived from wood powder, paper, straw and rice husks [11]. In addition, there was no significant effect on feed conversion of broiler which was maintained at 28 days on softwood powder, hard wood powder, rice husks, wood shavings, paper, recycled litter, straw [12].

4. Conclusion

The research can be concluded that the usage of lemongrass distillation wastes up to 100% as litter and anti-parasitic did not affect the performance of broiler.

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