EXTRACTED PEARL GRASS EFFECT ON BROILER CARCASS KEPT ON
Escherichia coli – SPRAYED LITTER

Nurhayati¹, M. Latief² and A. Insulistyowati¹
¹Faculty of Animal Science, University of Jambi,
Kampus Pinang Masak KM 15 Mendalo Jambi 36361 - Indonesia
²Faculty of Agriculture, University of Jambi,
Kampus Pinang Masak KM 15 Mendalo Jambi 36361- Indonesia
Corresponding E-mail: nuragus2003@yahoo.de

Received March 02, 2010; Accepted May 07, 2010

ABSTRACT

An experiment was conducted to determine the effect of hexane and acetic ethyl extracted pearl grass as feed additive in the ration on carcass of broiler chickens where the litter was sprayed by Escherichia coli. The experiment was assigned to Completely Randomized Design with 5 treatments and 4 replications. The treatments were level of pearl grass extract added into the ration; 0 (R0, control), 0.8 (R1), 1.6 (R2), 2.4 (R3) dan 3.2 (R4) gram per kilogram ration. After 3 weeks of age, litters were sprayed by Escherichia coli as much as 10⁶ CFU/100 ml liquid agar. Then, chickens were kept until 6 weeks of age. Result showed that there was no significant different among treatments groups on chicken carcass and there was no any adverse effect on liver and intestines. It is concluded that extracted pearl grass could be utilized as natural feed additive source to produce carcass of broiler chicken where their litter was sprayed by E. coli bacteria.

Keywords: broiler carcass, Escherichia coli, Hedyotis corymbosa, pearl grass

INTRODUCTION

Utilization synthetical antibiotics, medicine or feed additive to prevent and treat animal diseases cause microbes resistance in digestive tract (Van den Bogaard et al., 2001), produce metabolite products of the antibiotics, medicine or feed additive in form of residue in animal products such as milk, meat, egg and animal tissues (Jetacar, 1999) those might be transferred to human who consumed it. Ladefoged (1996) reported that antibiotic residues in digestive tract could prevent microflora growth and digestion disorder. Muntaz et al. (2000) reported that drug residue was detected in poultry meat in few days after drug ingestion and contaminated meat could disturb human health. Naeem et al. (2006) detected more Quinolones residue in liver and kidney than in chicken meat and egg. The residue might be accumulated into human body who consumed the animal products contained antibiotic residue and could cause allergy, resistance (Sundlof and Cooper, 1996), hypersensitive to stimulant, carcinogenic, mutagenic and toxicity (Voogd, 1981).

These circumstances and people realization to have healthy life and people need to back to nature persuade people to reduce and stop using synthetic antibiotics and drugs in their life and also in animal husbandry. They use alternative herbs such as pearl grass (Hedyotis corymbosa or Oldenlandia corymbosa L) that is classified into genus Hedyotis, family Rubiaceae.

Pearl grass until the present time is usually used by community to treat digestion disorder, cancer, caecum sore, microbial infection (bacteria, protozoa and fungi) and (Dalimarth, 2002). Nurhayati et. al (2006) reported that pearl grass could inhibit bacterial growth including E.coli but it could not inhibit Candida albicans growth. The highest activity of extracted pearl grass was found in acid and base ethyl acetate fraction and followed by methanol and n-hexane fraction. Nurhayati and Latief (2009) found that keton group (tersier butil isopropil keton) in extracted pearl grass could inhibit E.coli growth. Pearl grass contained 90.28% dry matter, 14.93% crude protein, and 556.81 kcal/kg gross energi. However, due to the lack of publication of pearl grass effect on animal especially on poultry causes this medicinal weed are not used either as antimicrobes or feed additive in livestock including poultry. Based on
this reason the current study was conducted to determine the effect of hexane and acetic ethyl extracted pearl grass as feed additive in the ration on carcass of broiler chickens where the litter was sprayed by *Escherichia coli*.

**MATERIALS AND METHODS**

Pearl Grass Extract, Birds, Diets and Housing

Pearl grass used in this study was collected from Jambi Regency. Then it was sorted, cleaned, chopped and extracted by maseration using organic solvent namely acetic ethyl for 2 x 3 x 3 days until all active compounds were dissolved. Thereafter, all solvent were evaporated by vacuum rotary evaporator to get pearl grass extract. The extract was dried under room temperature before it was added into the basal diet based on the treatment level.

A hundred two days-old male broiler chicks with 47.69 ± 3.79 gram of average weight were purchased from a commercial hatchery in Palembang were used in this study. Chicks were randomly divided equally to 5 experimental treatments. The design of experiment was assigned into Completely Randomized Design. The treatments were:

- R0 : Basal diet + 0 g pearl grass extract per kg diet
- R1 : Basal diet + 0.8 g pearl grass extract per kg diet
- R2 : Basal diet + 1.6 g pearl grass extract per kg diet
- R3 : Basal diet + 2.4 g pearl grass extract per kg diet
- R4 : Basal diet + 3.2 g pearl grass extract per kg diet

Each treatment had 4 replicates of 5 chicks. Chicks of each replicate were housed in colony floor pens with deep litter and were fed the experimental diet for a period of 42 days.

Basal diet was differed into starter diet (until 3 weeks of age) and finisher diet (after 3 weeks of age) as shown in Table 1. Chemical composition of treatment diets are shown in Table 2 and Table 3. The diet was offered into the chicken *ad libitum*.

At 4 days of age, chicks were vaccinated by ND vaccine strain Lasota B1 through eye drops. Other vaccines were not injected. After 3 weeks of age, litter was sprayed with *Escherichia coli* as much as 10⁶ CFU/100 ml of liquid agar. Then, chickens were kept until 6 weeks of age. At 42 days of age, 2 chickens with the nearest average live body weight was randomly selected from each treatment and were deprived of feed for 8 h prior to slaughtering. The chickens were weighed and were exsanguinated. Chickens were bled, scalded and feathered. Feet were removed manually by severing the intra tarsal joint. Carcass was manually eviscerated and abdominal fat, liver, gizzard, heart and giblets were removed and were weighed to calculate organ weight and carcass weight.

**Statistical Analysis**

Parameters determined in this study were feed consumption, live weight, carcass percentage, liver percentage, gizzard percentage and intestinal percentage. The effect of diet on chicken carcass characteristics and organ weights were analyzed by one-way ANOVA using General Linear Model procedure of SAS (version 6.04) (SAS Institute, 1994). Significant differences among treatment means were separated using Duncan’s Multiple Range Test. The statistical model used for analyzing data obtained was:

\[
Y_{ij} = M + T_i + E_{ij}
\]

where :
- \(Y_{ij}\) = the individual observation
- \(M\) = the overall mean
- \(T_i\) = The effect of pearl grass extract addition
- \(E_{ij}\) = the experimental error

**Table 1. Basal Diet Composition (%)**

| Ingredients        | Starter Diet (0-3 week) | Finisher Diet (3-6 week) |
|--------------------|-------------------------|--------------------------|
| Yellow corn        | 40.3                    | 45.3                     |
| Polish             | 10                      | 15                       |
| Soybean meal       | 30                      | 25                       |
| Fish meal          | 15                      | 10                       |
| Dicalcium phoshat  | 1.2                     | 1.2                      |
| Vegetable oil      | 2                       | 2                        |
| Premix             | 1                       | 1                        |
| Methionin          | 0.5                     | 0.5                      |
| **Total**          | **100**                 | **100**                  |

| Ingredient (％)    | Starter Diet (0-3 week) | Finisher Diet (3-6 week) |
|--------------------|-------------------------|--------------------------|
| Dry matter (%)     | 85.64                   | 86.06                    |
| Crude protein (%)  | 24.12                   | 23.26                    |
| Crude fibre (%)    | 3.76                    | 3.7                      |
| Ether extract (%)  | 7.15                    | 5.71                     |
| Ash (%)            | 6.04                    | 5.22                     |
| NFE (%)            | 44.57                   | 48.16                    |
| GE(kcal/kg)        | 4281.74                 | 4269.89                  |
| ME (kcal/kg)¹      | 3104.26                 | 3095.67                  |
**RESULTS AND DISCUSSION**

Effect of dietary treatment diets on feed consumption, carcass characteristics and organ weight of broiler chicken is shown in Table 4.

**Feed Consumption**

Analysis of variance showed that there was no difference (P>0.05) effect of addition pearl grass extract into the ration of broiler chickens where their litter was sprayed with *E. coli* bacteria was found in feed consumption during the overall period. It means that pearl grass extract did not influence diet palatability and chicken appetite. It is due to that the experimental diet among treatment groups had similar quality (Table 2 and 3). Besides it might be due to the flavonoid, steroid and aromatic compound in pearl grass did not disturb chicken appetite. The similar effect also reported by other authors who offered herbs or medicinal plants as feed additive on broiler’ feed consumption. Nurhayati *et al.* (2006); Nurhayati and Latief (2009) found that pearl grass could inhibit *E.coli* growth in vitro. Inhibited microbes growth in the gut would cause the nutrient could be utilised by animal itself and he would not need more nutrient for maintenance, growth and production.

Table 4 showed that feed consumption of broiler chicken during the experiment was 556.41 g/bird/week or 79 g/bird/day in average. This result was not significantly different by previous report by Nurhayati *et al.* (2009) who offered ration containing different medicinal weed namely bandotan (*Ageratum conyzoides* L), patikan kebo (*Euphorbia hirta* L) and sidaguri (*Sida cordifolia*) to the broiler chicken. Daily feed consumption of chicken fed 5% of bandotan, patikan kebo and sidaguri in the ration were 76.48, 78.40 and 74.29%, respectively.

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**Table 2. Chemical Composition of Starter Diets (0 – 3 weeks)**

| Parameters       | R0      | R1      | R2      | R3      | R4      |
|------------------|---------|---------|---------|---------|---------|
| Dry matter (%)   | 85.64   | 85.71   | 85.78   | 85.86   | 85.93   |
| Crude protein (%)| 24.12   | 24.13   | 24.14   | 24.15   | 24.17   |
| Crude fibre (%)  | 3.76    | 3.79    | 3.81    | 3.84    | 3.86    |
| Ether extract (%)| 7.15    | 7.15    | 7.15    | 7.15    | 7.16    |
| Ash (%)          | 6.04    | 6.05    | 6.06    | 6.07    | 6.08    |
| NFE (%)          | 44.57   | 44.6    | 44.62   | 44.64   | 44.67   |
| GE (kcal/kg)     | 4281.74 | 4282.18 | 4282.63 | 4283.08 | 4283.52 |
| EM (kcal/kg)     | 3104.26 | 3104.58 | 3104.91 | 3105.23 | 3105.55 |

**Table 3. Chemical Composition of Finisher Diets (3 – 6 weeks)**

| Parameters       | R0      | R1      | R2      | R3      | R4      |
|------------------|---------|---------|---------|---------|---------|
| Dry matter (%)   | 86.06   | 86.13   | 86.2    | 86.27   | 86.35   |
| Crude protein (%)| 23.26   | 23.27   | 23.28   | 23.3    | 23.31   |
| Crude fibre (%)  | 3.7     | 3.72    | 3.75    | 3.77    | 3.8     |
| Ether extract (%)| 5.71    | 5.71    | 5.72    | 5.72    | 5.72    |
| Ash (%)          | 5.22    | 5.23    | 5.24    | 5.25    | 5.26    |
| NFE (%)          | 48.16   | 48.19   | 48.21   | 48.23   | 48.26   |
| GE (kcal/kg)     | 4269.89 | 4270.33 | 4270.78 | 4271.22 | 4271.67 |
| EM (kcal/kg)     | 3095.67 | 3095.99 | 3096.31 | 3096.64 | 3096.96 |
Liveweight and Carcass

Analysis of variance showed that hexane and acetic ethyl extracted pearl grass addition into the ration up to 3.2 g/kg did not significantly (P>0.05) influence live weight and carcass percentage. This result was parallel to feed consumption and daily weight gain those were also not significantly different among the treatment groups. No difference on these parameters even though the litter was sprayed with E. coli bacteria might be due to that the nutrients and active compounds in the pearl grass have banded in nutrient digestive process and have synergetic effect to increase birds resistance on E-coli bacteria. As reported by Nurhayati et al. (2006); Nurhayati and Latief (2009) that pearl grass contained active ingredients those could inhibit bacterial growth including E.coli. Buchanan et al. (2009) reported that medicinal plants contained phytogenic compounds, essential oils and organic acid those could reduce pathogenic bacteria in the chicken. It was similar results were reported by previous authors (Dickens et al., 2000; Dorman et al., 2000; Abd El-Latif, 2002; Al-Harthi, 2002; Hassan, et al., 2004; Buchanan et al., 2008; Javed et al., 2009; Onibi et al., 2009) who fed briler chicken with the diet consists of herbs or medicinal plants. They reported that there was a positive effect of feeding herbal feed additive on broiler performance due to that herbal supplementation or medicinal plant supplementation could improve nutrient digestive process, thus, in could chicken body weight gain and at the end increase slaughter weight of chicken. Hernandez et al. (2004) stated that essential oils in the medicinal plants might increase broiler chicken digestion. Uuneganbayar et al. (2006) concluded that green tea mixed into the broiler chicken had no adverse effect on broiler performance. Onibi et al (2009) found that quality and aroma of meat increased by supplemented garlic into the ration. The best level was 5 g/kg diet resulted 2.1 kg body weights at 56 days of age. Javed et al. (2009) reported that feeding some medicinal plants extract as much as 10 ml/L drinking water produced 1.4 kg body weight at 35 days old and carcass was 62% in average.

Organs Weight

Analysis of variance showed that hexane and acetic ethyl extracted pearl grass addition into the ration was not significantly (P>0.05) effect on organs (liver, gizzard, and intestine) weight. There was no adverse effect also on colour of liver. There was no blood spot on the intestine, no thickening on gizzard and intestine wall. These results mean that pearl grass extract had not toxic effect, thus, it would not cause gizzard, liver and intestine work harder than usual in digestion and absorbance of nutrients. The current result was similar to previous study on mice that ingested single dose pearl grass extract orally. There was no toxicity on mice those received. The current study also showed that E. coli could not grow and develop in the digestive tract. It is due to that E. coli might be inhibited by active compounds in the pearl grass extract those were fed by chickens. Nurhayati and Latief (2009) detected 3 active compounds in the pearl grass extract namely 4-metil-2-en-heksanol, tersier butil isopropil keton, and stigmasta-5,22-dien-3-ol. The highest E. coli antibacterial activity in vitro was detected on tersier butil isopropil keton. Further, Buchanan et al. (2009) reported that essential oils, organic acid and phytopgenic compounds in plants reduced number of bacteria in the animal body significantly.
CONCLUSION

It is concluded that extracted pearl grass could be utilized as natural feed additive source to produce carcass of broiler chicken where their litter was sprayed by *E. coli* bacteria.

ACKNOWLEDGMENT

Authors would like to express their gratitude to DP2M Directorate General Higher Education for grant of Fundamental research financial 2009. Head of Research Centre University of Jambi and Dean of Faculty of Animal Science University of Jambi for permission and support, the assistance of staffs and students of Dept. Animal Nutrition and Feed Science, Faculty of Animal Science, University of Jambi for the care and management of birds is acknowledged.

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