

Herbs as A Feed Additive in the Broilers for the Sustainability of Local Products

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Abstract. The purpose was to determine the comparison of giving herbal herbs through feed and drinking water to the productivities of broilers. The research took place in the Closed House Cage and Animal Science Laboratory, Faculty of Agriculture and Animal Science, University of Muhammadiyah Malang, East Java, Indonesia. The material was Day Old Chick (DOC) broilers by number 200 and herbs in feed and drinking water. The treatment of herbs was divided into two types as follows: Herbs in feed (TA) and herbs in drinking water (TB). Then, herbs in the feed and drinking water were divided into four treatments as follows: T0: Feed without herbs or 0 % (as control), T1: Feed with herbs 1 %, T2: Feed with herbs 2 %, and T3: Feed with herbs 3 %, with five replications. The herbs used are mixed with several medicinal plants. The variables were body weight gain, final body weight, daily feed consumption, and feed conversion ratio. The research data were analyzed by quantitative descriptive analysis. The conclusion was giving herbs through feed was better in final body weight, body weight gain, and feed conversion ratio.

Keywords: Broilers final body weight, environmentally friendly technology, feed conversion, increase productivity, medicinal plant

1 Introduction

1.1 Background

The success of a chicken business can be influenced by several factors, namely the availability of DOC, feed requirements, and maintenance management. These factors are closely related to the success of the chicken farming business. So that to achieve optimal productivity, it is necessary to have good coordination with the selection of DOC, feed requirements, and appropriate maintenance management.

Broilers have a growth period of approximately 35 d, so the maintenance of broilers can be said to be faster than native chickens. These genetic factors are very influential on the growth of broilers in the right environment and management. So there was the growth of broilers can be maximized. The business carried out is the provision of feed additives in feed or drinking ingredients. There are active ingredients that can improve the condition of the body during the maintenance period.

Fulfillment of feed requirements is an important factor, so feed has a contribution of reaching 60 % to 70 % of the total production cost. There was feed efficiency can be reduced with low production costs. The optimum nutrition absorption of nutrients if digestion is in optimal conditions. The right step to improve the appearance of production in chickens is the addition of feed additives to the feed. Giving feed additives to the amount can be added according to the

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needs of the livestock. The purpose of adding the feed additive is to increase the population of good microbes in the digestive tract of chickens and stimulate growth.

Herbs as feed additives have anti-oxidants. Some of the supporting ingredients for additional feed contain active microbes that have positive values in the digestive tract of chickens [1]. Herbs can also be used as livestock immunity and anti-septic contained in some herbal ingredients. Broilers require herbs as an additional feed that can minimize the presence of disease-causing pathogenic microbes that can interfere with growth and cause disease.

It was necessary to have the information for the right dose of herbs according to the needs of broilers. This research was hoped will inform the general public about the dose of herbal medicine according to the broiler's requirements. Based on this, it was necessary to research the comparison of giving herbs through feed and drinking water to the productivities of broiler.

1.2 The problem statement

How was the comparison of giving herbs through feed and drinking water to the productivities of broilers?

1.3 The research purpose

To analyze the comparison of giving herbs through feed and drinking water to the productivities of broilers.

2 Materials and methods

This research was carried out in January 2020, located at the Closed House Cage and Animal Science Laboratory, Faculty of Agriculture and Animal Science, University of Muhammadiyah Malang, East Java, Indonesia. The material was 200 DOC MB Platinum (PT. Japfa Comfeed Indonesia Tbk.) and herbs in feed and drinking water. The herbs used are mixed with several medicinal plants (local market) *i.e.* galangal or sand ginger, (*Kaempferia galanga* L.): 5 % to 10 %, garlic (*Allium sativum* L.): 5 % to 10 %, ginger (*Zingiber officinale* Roscoe.): 2 % to 8 %, greater galangal (*Alpinia galangal* (L.) Willd.): 2 % to 8 %, turmeric (*Curcuma longa* L.): 2 % to 8 %, Javanese ginger (*Curcuma zanthorrhiza* Roxb.): 2 % to 8 %, true cinnamon tree (*Cinnamomum verum* J.Presl.): 1 % to 5 %, vitamin: 2 % to 8 %, and mixing ingredients: 45 % to 60 %.

The treatment of herbs was divided into two types as follows: Herbs in feed (TA) and herbs in drinking water (TB). The other factors were the level of giving herbs consisting of four kinds, namely: T0: Feed with 0 % herbs (as control), T1: Feed with 1 % herbs, T2: Feed with 2 % herbs, and T3: Feed with 3 % herbs. Herbs were added to the finisher feed and given ad libitum. Likewise, herbs were mixed in drinking water, then stirred and given ad libitum as well

The variables used in this study were (i) body weight gain was final body weight minus initial body weight divided by the length of the maintenance period, (ii) final body weight was from weighing the chickens at harvest, (iii) daily feed consumption was from the provided feed minus the remaining feed divided by the length of the maintenance period, and (iv) feed conversion ratio was the division of daily feed consumption by daily body weight gain.

This research used the experimental method, five replications, and the research data were analyzed by quantitative descriptive analysis

3 Results and discussion

The herbs were tested by giving them at various levels. The data taken were final body weight, body weight gain, feed consumption, and feed conversion ratio. The results obtained were as follows.

Table 1. Comparative data on the giving of herbs through feed and drinking water on the productivities of broilers

No	Variables	Giving herbs through feed (TA)	Giving herbs through drinking water (TB)
i	Final body weight (g)		
	T0	2 153.47	2 031.24
	T1	2 140.80	2 055.68
	T2	2 194.80	2 053.50
	T3	2 071.05	2 033.01
	Average	2 140.03	2 043.36
ii	Bodyweight gain (g head ⁻¹ d ⁻¹)		
	T0	60.38	56.91
	T1	60.07	57.64
	T2	61.61	57.56
	T3	58.06	56.99
	Average	60.03	57.28

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Table 1. Continued

No	Variables	Giving herbs through feed (TA)	Giving herbs through drinking water (TB)
iii	Daily consumption (g head ⁻¹ d ⁻¹)		
	T0	97.48	99.84
	T1	95.74	101.64
	T2	98.97	99.10
	T3	95.95	98.62
	Average	97.03	99.80
iv	Feed conversion ratio		
	T0	1.61	1.75
	T1	1.59	1.76
	T2	1.61	1.72
	T3	1.65	1.73
	Average	1.62	1.74

Information: T0: Without (0 %) herbs, T1: 1 % herbs, T2: 2 % herbs, TP3: 3 % herbs

3.1 The effect of herbs as feed additive on the final body weight of broilers

Based on Table 1, the final body weight of chickens on the use of herbs in feed was higher than in the drinking water. This was following the statement Oleforuh-Okoleh *et al.* [1], that the use of garlic (*A. sativum*) powder in broiler feed was proven to be able to produce a higher final body weight than the use of drinking water. This result was not consistent with the report by Goodarzi *et al.* [2], that garlic supplementation through drinking water levels of 1 % to 2 % resulted in higher final body weight than the addition of virginiamycin 300 g t⁻¹ of feed. Based on the Table, the high final body weight was due to the high achievement of final body weight gain. There was thought of the efficacy of garlic in herbs. Garlic can increase the digestibility of nutrients. There was supported by Issa *et al.* [3], that garlic supplementation in broiler feed can increase the digestibility of crude protein, dry matter, and crude fat.

Based on Table 1, the highest final body weight was the use of herbs at the level of 2 % in the feed. There was suspected that the phytobiotics in the herbs maintained their function throughout the digestive tract. Phytobiotics in herbs help the process of digestion and absorption of nutrients contained in the ration and were used for growth and tissue formation. The results of this study were supported by the statement by Alifian *et al.* [4], that supplementation of *C. xanthorrhiza* at a dose of 400 mg kg⁻¹ stimulates an increase in growth hormone levels in broiler blood plasma. The use of herbs with the same level, but through drinking water gives a lower final weight. There was suspected the levels of herbs consumed by the chickens were lower because the condition of the cage gives the chickens more preference to consume feed than drinking water.

Based on Table 1, the use of herbal medicine level 3 % through feed, the final weight decreased by 5.64 % when compared to the final weight of the use of herbal medicine by 2 % in the same way. This is due to over-dose phytobiotic levels, under the statement by Alifian *et al.* [4] and Rahayu *et al.* [5], that all chemical compounds are toxic if given in excessive doses or under inappropriate use.

The result of this study was supported by Onyimonyi *et al.* [6], that garlic contains allicin, a source of sulfur that can improve intestinal microflora so that the addition of garlic to broiler feed can increase digestibility, absorption, and energy use, which in turn improves poultry growth. The garlic with a level of 30 g kg⁻¹ of feed has caused a decrease in body weight gain and final weight in broilers. The effect of sulfur overdoses causes a decrease in palatability and feed consumption. The high final body weight on the use of herbs through feed indicates the phytobiotics in herbs were able to influence chickens to increase feed consumption to meet basic living needs and production, including body weight gain [7].

3.2 The effect of herbs as feed additive on the body weight gain of broilers

Table 1 showed the use of herbs through feed provides a higher body weight gain than the use of drinking water. The use of herbs orally, which can be given through drinking water or mixed with feed will minimize stress on the chickens, but the dose of herbs was very dependent on the activity of eating and drinking chickens. Oral giving of herbs can also be done by force-feeding, with this technique the maximum dose of herbs, but the chickens will be stressed because they have to be caught and forced individually. The use of semi-closed house system type cages in this study provides comfort for chickens to be more active in consuming feed so that the dose of the herb was more leveraged than through drinking water. A further effect was the volatile oil content in herbs can increase the secretion of digestive enzymes from the pancreas and bile. There was accelerating the digestive process, absorption in the small intestine, and emptying of the stomach, which in turn will stimulate the secretion of various hormones and nerve activity that encourages chickens to increase their appetite [8].

The results of this study were in line with the statement [8], that the digestibility of native chickens given herbs was higher than that without herbs, this resulted in increasing the intake of nutrients. So that higher body weight gain was achieved. The combination of phytobiotics in herbs provides complementary effects so that they synergize to improve

the performance of broilers, including the parameters of body weight gain. There was supported by Ullah *et al.* [9], that the phytobiotics in herbs in the form of allicin, essential oil, quercetin, and curcumin, function as antibacterial. It was further stated that phytobiotics inhibited pathogenic bacteria in the gut but increased the growth of beneficial bacteria, including *Lactobacillus* sp. [10], curcumin and essential oils promote intestinal relaxation and provide an opportunity for the intestines to work optimally in the process of digestion and absorption of nutrients [11]. The combination of various phytobiotic effects that complement each other from the use of herbs has a positive impact on increasing the body weight gain of broilers.

Based on Table 1, the use of herbal herbs at the level of 2 % in feed provided the highest body weight gain when compared to other levels orally, either through feed or drinking water. The results of this study were in line with reports Oleforuh-Okoleh *et al.* [1], that powdered garlic supplementation mixed with feed showed a higher body weight gain than the drinking water. It was suspected the phytobiotics contained in herbs were present in synergistic levels to support maximum physiological digestive function so that chickens obtain adequate nutrition for life and growth. There nutritional content in the feed.

Based on Table 1, in the use of herbs at the 1 % level, the body weight gain achieved was lower than the 2 % level. There was thought to be related to lower levels of curcumin and essential oils so that it was less than optimal in stimulating the bile wall to secrete bile and the pancreas to secrete digestive enzymes., namely amylase, lipase, and protease [13]. Based on Table 1, the use of the 3 % level, body weight gain decreased by 5.76 % when compared to the 2 % level, this was presumably the presence of tannin as an anti-nutrient was increasing in levels. Tannins were protein binding so that the protein in the feed cannot be absorbed and utilized for the growth process of broilers, which results in lower body weight gain achievement. This reason was under the statement by Artha *et al.* [14], that proteins and amino acids contained in the feed may be precipitated by the tannins contained in the extract of *singawalang* (*Petiveria alliacea* L.) leaves so that the absorption process of nutrients was disturbed.

3.3 The effect of herbs as feed additive on daily consumption of broilers

Based on Table 1, the use of herbs through drinking water in broilers showed a higher average level of feed consumption than through feed. There was a result of the intake of herbs through drinking water which was more than through feed. There was a long period of giving herbs through drinking water, starting at the age of 2 wk old, while the feed was given at the age of 3 wk old. This difference in consumption levels is thought to be due to the influence of phytobiotics contained in herbs. The curcumin in *Zingiber zerumbet* (L.) Roscoe ex Sm. The extract had the effect of increasing bile and pancreatic secretions. This resulted in increased digestibility, absorption of nutrients in the intestines, and gastric emptying, thereby revitalizing the appetite of chickens [15]. The essential oil in *Z. zerumbet* can increase digestibility because the essential oil causes relaxation and reduces peristalsis of the small intestine so that digestion and absorption of nutrients take place optimally [11].

Based on Table 1, the high consumption of rations on the use of herbs through drinking water was not accompanied by an increase in final body weight and body weight gain. There was thought to be due to excessive intake of essential oils and disruption of the ecological system of microbiota in the digestive tract. This reason was the statement that the activity of essential oils can affect the microbial population in the digestive tract and the metabolism of livestock [16]. Based on Table 1, consumption of rations, body weight gain, and final body weight on the use of herbs through drinking water respectively were (99.80 g head⁻¹ d⁻¹), (57.28 g), and (2 043.36 g), while the use through feed was (97.03 g head⁻¹ d⁻¹), (60.03 g) and (2 140.03 g).

3.4 The effect of herbs as feed additive on feed conversion ratio of broilers

Feed conversion was how efficiently the use of feed increased body weight per unit weight. The higher the feed conversion value, the more feed needed to form meat, conversely the lower the feed conversion value means the more efficient use of feed in forming meat. The results in Table 2 showed the use of herbs through feed was more efficient than the use of feed, resulting in an average feed conversion of 1.62, this figure was lower than the use of drinking water was 1.74. The use of herbs through the feed can create a better micro-biota ecological system in the intestines than drinking water. This reasoning was supported by Daneshmand *et al.* [17], that digestion was a chemical process that involves complex interactions between microbiota and nutrients in the gut. This affects the balance of microbes in the gut and has an important role in determining health, digestibility, and production efficiency.

One of the herbs used in this study was garlic, according to Fitro *et al.* [18], garlic supplementation in broiler feed did not affect the weight or length of the parts of the small intestine (duodenum, jejunum, and ileum), these data prove that the micro-biota environment in broiler intestines was in balance, resulting in increased production of polyamines and volatile fatty acids, which play an important role in absorption in the small intestine. This statement was supported by Onyimanyi *et al.* [6], that allicin in garlic acts as an inhibitor of the growth of pathogenic bacteria, to create a balance of microbes in the intestines that ensures maximum digestion and absorption of nutrients.

The results in the Table 2 indicate a low conversion value, both in the use of herbs through feed and drinking water, this figure was lower than the statement by Rahayu *et al.* [15], that the feed conversion rate of broilers slaughtered at 4 wk of age was 1.76. The lowest value of feed conversion rate was the use of herbs through feed level 1 % was 1.59,

and this was lower than that achieved by the control group (0 %) was 1.61. The higher the level of use of herbs through feed, the higher the feed conversion value, this was due to the increased levels of phytobiotics in herbs, such as alkaloids, flavonoids, saponins, tannins, terpenoids, curcumin, and essential oils, which each of these compounds can be toxic if in high concentrations.

Tannins contained in herbs were anti-nutritional. This was able to bind protein in complex bonds, difficult to degrade by enzymes. There was a disrupted utilization of protein in the feed. Protein is insoluble and difficult to digest. In the end, there was excreted through feces [19–21]. Tannins at high levels in broiler rations will interfere with the work of the digestive organs, including the small intestine, liver, and pancreas [22, 23], further inhibiting growth will increase feed conversion rates.

4 Conclusion and suggestions

The conclusion was that giving herbs through feed improved final body weight, weight gain, and feed conversion ratio. Suppose compared by giving herbs through drinking water to broilers. Then, it was better if the herbs given to broilers were given by mixing them with feed.

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