



(RESEARCH ARTICLE)



Provision of natural antibiotics in drinking water on the performance and number of microbes in broiler cecum

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GSC Advanced Research and Reviews, 2022, 13(03), 054–058

Publication history: Received on 16 October 2022; revised on 28 November 2022; accepted on 01 December 2022

Article DOI: <https://doi.org/10.30574/gscarr.2022.13.3.0329>

Abstract

This study aimed to determine the effect of natural antibiotics in drinking water on the total microbial population and performance in the cecum of broiler chickens. The material used was 96 broiler chickens of strain CP 707 from PT Charoen Pokphand Jaya. The experimental design used was a completely randomized design (CRD) consisting of 4 treatments and 6 replications. Statistical analysis using analysis of variance (ANOVA) and Duncan's Multiple Range Test. The treatments tested were: T0: without natural antibiotics; T1: 5 mL of natural antibiotics per liter of drinking water; T2: 10 mL of natural antibiotics per liter of drinking water; and T3: 15 mL of natural antibiotics per liter of drinking water. The parameters studied were performance (consumption, body weight, and conversion) and total microbes in broiler cecum. The results showed that the treatment had no significant effect ($P > 0.05$) on performance but had an effect on the total amount of bacteria present in the cecum. It was concluded that the administration of natural antibiotics in drinking water caused the total bacteria present in the cecum to decrease so that it could improve the performance of broiler chickens, although there were no significant differences in consumption, final body weight, or conversion.

Keywords: Natural antibiotics; Performance; Total microbes; Broiler chicken

1. Introduction

Broiler chickens are still the main prime source in meeting the animal protein needs of the community, considering its several advantages, namely fast growth and efficiency in converting feed into meat. In supporting its productivity, broiler chickens are not enough to be given feed and drinking water, but feed additives are still needed to maintain their health such as vitamins, antibiotics and others.

The administration of synthetic antibiotics is unavoidable in the maintenance of broiler chickens, and excessive use of antibiotics can trigger bacterial resistance in livestock and residues in livestock products that can harm consumers. Therefore, it is necessary to look for herbal ingredients that contain natural antibiotics such as garlic, ginger, kencur, temulawak, betel leaf, and "mahkota dewa" leaves. The use of herbal additive feeds can improve the immune system of livestock because herbal additive feeds contain compounds that are antibacterial [1]. Herbal ingredients contain natural antibiotics, are antiviral, antimicrobial, anti-inflammatory, anti-cholesterol, anti-cancer, increase appetite, and increase the digestibility of chickens [2]. Meanwhile, Komara reports in Gea et al. [3] that the essential oils in herbal ingredients contain betiethenol oil (flying oil), starch, sugar, sesquiterpenes, diastase, and zamak kavikol, which are very useful for

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killing bacteria and are antioxidants, fungicidal, and anti-fungal. Essential oils in herbal ingredients, according to Agusta [4], are also anti-bacterial and anti-inflammatory.

The use of natural plants in the feed and drinking water of broiler chickens, such as garlic, ginger, galangal, "kencur," "temulawak," turmeric, cinnamon, betel leaf, and "mahkota dewa," was found to be more effective in the use of alternative herbs for antibiotics and is widely used outside the country. country for animal feed supplements. For example, oregano has been used to treat necrotizing enteritis in poultry [5].

According to Apritar [6], the ingredients for making herbal ingredients such as garlic, galangal, ginger, kencur, temulawak, turmeric, cinnamon, betel leaf, and "mahkota dewa" are very effective in reducing abdominal fat levels, increasing liver function, emulsifying toxic substances in the bodies of chickens, and effectively increasing the percentage of carcass; besides, these materials are also cheap and easy to obtain. Furthermore, Laily [7] reported that the use of herbal ingredients made from kencur, temulawak, kunci, galangal, ginger, turmeric, onion, garlic, yam, betel leaf, lemongrass, starfruit, basil, black ginger, molasses, and EM-4 in as much as 2.5 mL of drinking water can increase body weight gain but has not been able to affect feed intake, feed conversion ratio, or the efficiency of protein utilization in broiler chickens. Other studies reported that the use of herbal ingredients made from garlic, kencur, ginger, temu ireng, temu lawak, lempuyang, galangal, turmeric, cinnamon, papaya leaves, aloe vera, simbiloto, noni, betel leaf, molasses, and EM-4 in as much as 50% of drinking water has a significant effect and can improve the performance of super native chickens [8].

The results of the Tahalele et al. [9] study show that a mixture of herbal ingredients in juice as much as 2.5 mL and 5 mL added to drinking water has not been able to affect the carcass and liver percentages but shows a significant effect on the decrease in the abdominal fat content of super free-range chickens.

The results of the Tahalele et al. [9] study show that a mixture of herbal ingredients in juice as much as 2.5 mL and 5 mL added to drinking water has not been able to affect the carcass and liver percentages but shows a significant effect on the decrease in the abdominal fat content of super free-range chickens. Based on the description above, a study has been conducted to determine the extent of the effect of herbal ingredients as an alternative to antibiotics added to drinking water in increasing the performance and total microbes in the cecum of broiler chickens.

2. Material and methods

The 96-day-old DOC broiler CP 707 with an average body weight of 38.89 ± 0.89 g was used in this study. The cage used was 6.6 m by 5.9 m, consisting of 24 plots with a size of 80 x 70 x 80 cm. PT. Charoen Pokphan's CP 11 and 12 commercial feeds were used. The provision of feed and drinking water was done ad libitum.

The rations tested consisted of: T0 = provision of drinking water without natural antibiotics (control); T1 = 5 mL of natural antibiotics per 1 liter of drinking water; T2 = 10 mL of natural antibiotics per 1 liter of drinking water; and T3 = 15 mL of natural antibiotics per 1 liter of drinking water.

The following was the procedure for a natural antibiotic process, according to Desmayati [10]:

- All the ingredients were washed and peeled, apart from the betel leaf and the leaves of "mahkota dewa." Prepare the following ingredients: 250 g of garlic, 250 g of kencur, 150 g of ginger, 150 g of galangal, 150 g of turmeric, 150 g of temulawak, 62.5 g of cinnamon, 62.5 g of betel leaf, and 62.5 g of "mahkota dewa."
- The ingredients were then mixed and ground. The juice is extracted, and then 10 liters of clean water are added and fermented for 7 days with a mixture of Mollases and EM4 (effective microorganisms).
- Performance (feed intake, final body weight, feed conversion ratio), and total microbes in the broiler cecum were measured.

2.1. Data Analysis

The experimental design used was a completely randomized design pattern. An analysis of variance was used to see the effect of treatment on the measured variables. Duncan's multiple distance test was applied to determine the effect of differences between treatments [11].

3. Results and discussion

Based on the results of the study, the effect of giving natural antibiotics in drinking water on the performance, total microbes in the cecum, and final body weight of broiler chickens can be seen in table 1.

Table 1 Average Performance and Total Microbes in the Cecum of Broiler Chickens

Variables	Treatments				P-Value
	T0	T1	T2	T3	
Feed intake (g/e/h)	2679,77±38,27 ^a	2681,85±44,99 ^a	2640,78±53,62 ^a	2643,98±40,33 ^a	0,249
Body weight(g/e)	1922,33±82,91 ^a	2000,17±81,57 ^a	1936,50±93,66 ^a	1941,33±72,39 ^a	0,401
Feed conversion ratio	1,40±0,05 ^a	1,34±0,07 ^a	1,37±0,09 ^a	1,36±0,05 ^a	0,595
Total microbes (CFU/g)	1,20×10 ⁸ ^b	2,02×10 ⁷ ^a	2,23×10 ⁷ ^a	2,05×10 ⁷ ^a	0,026

Note: The same superscript in the same column showed no difference (P > 0.05)

3.1. Feed intake

There was no effect of treatment on feed intake (P > 0.05), presumably because the feed given to livestock was the same, namely commercial feed CP-11 for starter phase chickens and CP-12 feed for finisher phase chickens with the same protein and energy content for all treatments. This statement is in accordance with the opinion (12) that feed intake is influenced by the balance of nutritional content contained in the ration and the palatability of the feed given, which is also influenced by the smell, taste, texture, and color of the feed. Judging from the results of the study, it was found that the level of feed intake was relatively the same; however, the use of herbal ingredients in this study still worked.

The purpose of giving herbal ingredients in feed and drinking water to broiler chickens is to increase palatability and increase stamina and endurance [13]. The presumed factor is possibly caused by the active substance content of herbal ingredients such as essential oils and curcumin, which contain methylcinnamate, camphor, alpinene, galangol, and galangin, which are thought to play an active role in the working system of organs and the digestive tract so that they are able to stimulate (trigger) instincts (voluntary intake) in broiler chickens to consume feed [7].

3.2. Final Body Weight

as shown in Table 1. The higher body weight in the T1 treatment was thought to be because the total microbe at T1 (2.02×10⁷ CFU/g) was lower than other treatments and could suppress pathogenic bacteria so that they could digest the feed and drinking water given better than in other treatments. This situation can be assumed because the existing bioactive substances from the ingredients and between the mixed ingredients of herbal ingredients are thought to have a complementary effect [7], which is thought to be able to provide a comfortable atmosphere in the digestive tract of livestock, causing feed intake, digestibility, and nutrient absorption to also increase, thus affecting increased body weight gain [8]. Dharmawati et al. [14] stated that curcumin and essential oils, allicin, and quercetin, which are bioactive substances in herbal ingredients, play an important role in inhibiting bacteria (anti-bacterial) in the digestive tract, increasing livestock endurance, and increasing appetite, so that it has the potential to improve the performance of chickens. This is also in line with the opinion of [15], who reported that ginger, kencur, turmeric, galangal, betel leaf, and garlic, which are traditional herbal ingredients containing various active substances, can increase the palatability and metabolism.

The results of the analysis of variance (ANOVA) confirmed that the addition of herbal ingredients to drinking water did not have a significant effect (P > 0.05) on the final body weight of broiler chickens, which is similar to feed intake. This is in accordance with the statement in [16], which states that feed intake is very influential on the increase in broiler chickens; if feed consumption decreases, growth becomes slower.

3.3. Feed Conversion Ratio

The average feed conversion value ranges from 1.40 to 1.34. The feed conversion ratio produced in this study is classified as very good because, based on the recommendation of PT Charon Phokphan Indonesia, the standard conversion value of broiler rations is 1.85.

Statistical analysis showed that the addition of ingredients had no significant effect ($P > 0.05$) on feed conversion ratio. This means that treatments gave the same response to the efficiency of feed use by broiler chickens during the study period. The pattern of feed conversion values produced in this study is thought to be caused by the presence of bioactive substances in herbal ingredients that are thought to have good benefits for improving intake, digestibility, and absorption of nutrients for growth, all of which are proven to have good conversion values in this study [17]. Empirically, the lowest feed conversion was obtained by chickens that received T1 treatment (1.34), this is likely due to the presence of bioactive substances such as curcumin and essential oils in herbal ingredients, which are thought to play a role in increasing the efficiency of feed use by chickens [11]. It is clear that the pattern of ration conversion value is positively proportional to the pattern of feed intake and body weight gain. This is because the level of feed intake and body weight gain is a determining factor for the conversion value of the ration [18].

3.4. Total Microbial

The results of the analysis of variance (ANOVA) confirmed that the addition of herbal components to drinking water had a significant effect ($P < 0.05$) on the overall microbes in the digestive tract of broiler chickens. The addition of natural components to the total microbes had no significant effect. This could be because the chickens are in good health and their immunity is strong. This is in accordance with the opinion of Widodo [19], which states that the microbial explosion in the digestive tract of broiler chickens is influenced by various factors, including age, immune response, feed, and antibiotics.

Seen from laboratory analysis data, it shows the absence of *Salmonella* bacteria. This proves that the current management of antibiotics with natural ingredients does not affect the transmission of *Salmonella* microorganisms in chickens with and without antibiotics (P0). Vertical transmission can occur due to natural pollution [20]. Several elements that can affect the presence of *Salmonella pullorum* and *Mycoplasma gallisepticum* infections include:

- Maintenance consists of the number of chickens kept in one cage and the presence of flies and mice in the cage and feed cage.
- Health control includes treatment during the incident and the intensity of feeding. Nutrition,
- Feed control is made up of feed and feed garage.
- Livestock biosecurity includes the intensity of cage disinfection, site visitors, and feed or egg vehicles.

Salmonella sp infection causes diseases in chickens aged 7-21 days; chickens older than three weeks often do not show medical symptoms due to higher immunity, but there may be companies that can transmit the disease to humans [21]. This did not occur in this observation because there were no symptoms of *Salmonella* bacteria in the cecum of broiler chickens given natural substances in drinking water.

4. Conclusion

It was concluded that the administration of natural antibiotics in drinking water decreased the total number of bacteria present in the cecum and subsequently could improve the performance of broiler chickens, although there were no significant differences in feed intake, final body weight, or feed conversion ratio.

Compliance with ethical standards

Acknowledgments

Thank you to the faculty administration for their assistance in granting permission to use the stables and laboratory facilities for this research.

Disclosure of conflict of interest

The authors declare no conflict of interest.

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