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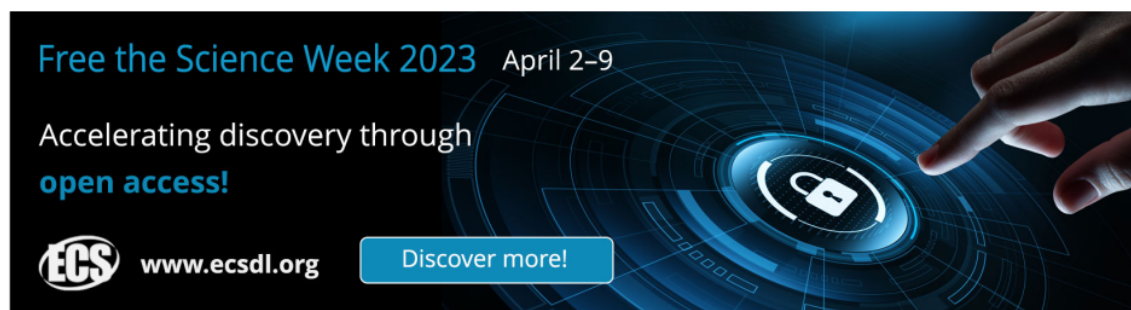
## The effectiveness of herbal fermentation into drinking water on the performance of kampung chickens

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## The effectiveness of herbal fermentation into drinking water on the performance of kampung chickens

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**Abstract.** Herbs are one of the natural ingredients that can be used in replacing the role of antibiotics as feed additives that can improve the performance of native chickens. This study aims to determine how long the fermented herbs remain effective in improving the performance of native chickens. The variables observed were feed consumption, body weight gain, and FCR. The research design used was a completely randomized design (CRD) with 5 treatments and 4 replications. The treatments in this study consisted of A0 = control (without herbal supplementation), A1 = herbal supplementation used for 1 week, A2 = herbal supplementation used for 2 weeks, A3 = herbal supplementation used for 3 weeks, A4 = herbal supplementation used for 2 weeks. used for 4 weeks. The quantitative data were analyzed with variance and if they were significantly different, it would be followed by multiple distance tests with a level of 5%. The results showed that the effectiveness of fermented herbs used in different timescales showed no significant difference ( $P > 0.05$ ) on feed consumption, body weight gain, and native chicken Feed Conversion Ratio (FCR). The conclusion of this study is the use of fermented herbs in drinking water with different time ranges still shows the results of feed consumption and high body weight gain and can reduce FCR. This is due to the fermentation process in herbs which causes the active content of herbs to be well preserved and their quality does not decrease even though they are used for different periods.

### 1. Introduction

The meat derived from originating gens chicken from Indonesia which is known as kampung chicken has become an important part as a source of animal protein. The population of native chickens in 2019 reached 311,912,413 tails, higher than in 2018 which only had a population of 300,977,882 tails [1]. Increasing the productivity of native chickens can be done by preventing stress and disease in the maintenance process. Stress in chickens can be caused by the environment, both from temperature, bacteria, and viruses.

Chickens that are exposed to stress result in reduced feed consumption and body resistance so that their productivity is very low. his condition encourages farmers to use antibiotics as an anti-stress to increase feed consumption, spur growth rates, and in turn cause the maximum value of Feed Conversion Ratio (FCR). However, in recent years there has been a ban on the use of antibiotics in raising chickens because they can be dangerous for those who consume them. After all, antibiotic residues can be left in chicken meat which, if consumed continuously, can cause disease disorders. The use of antibiotics must be avoided to produce quality chicken meat products that are safe and healthy for consumer health [2].

The use of herbs such as ginger, turmeric, garlic, and ginger has been shown to increase consumption, gain body weight and feed efficiency. Herbs in livestock function to increase endurance, prevent and cure the disease [3]. Herbs also have pharmacological activity as natural antibiotics that can reduce stress levels, are antibacterial, increase appetite, and increase digestibility. The



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fermentation process in herbs can minimize the effect of antinutrients and increase the digestibility of feed ingredients because there are microorganisms produced from this process [4].

The fermentation process will also extend the shelf-life of herbal products, making it easier and more efficient in the process of feeding to livestock. The use of fermented herbs has the potential to replace the role of antibiotics in improving the growth and efficiency of native chicken feed so that productivity increases. Research on how long-fermented herbs can still be used and can produce an optimal effect on the performance of native chickens has not been widely carried out. Based on this, research on the effectiveness of herbs such as ginger, turmeric, ginger, and garlic was carried out with a composition of 25 grams / herbal / liter which is fermented and mixed into drinking water on the performance of native chickens to determine how long the fermented herbs can be used and remain effective for increasing the productivity of Kampung chickens.

## 2. Materials and Method

### 2.1. Animals and experimental design

The material in this study was 100 native chickens placed in 20 battery cages. Each cage has 5 native chickens, the materials used in this study include well water and coconut water each 50% of the total solution of herbs, ginger, turmeric, garlic, ginger (each 2.5% herbal / liter), brown sugar 2.5% / liter. E-Bro X feed for 3erad starter and finisher period.

The research method used in this study was a completely randomized design (CRD) consisting of 5 treatments and 4 replications. The treatment in this study consisted of without herbal supplementation as control (A0); herbal supplementation used for 1 week (A1); herbal supplement used for 2 weeks (A2); herbal supplement used for 3 weeks (A3); and herbal supplement used for 4 weeks (A4).

### 2.2. Observed variables

The variables observed in this study include feed consumption, body weight gain, and FCR (Feed Conversion Rate).

### 2.3. Data analysis

The data obtained in this study will be analyzed using variance (ANOVA) with the help of the SPSS version 20 program tool. If the treatment is significantly different, it will be followed by Duncan's multiple area tests to see the differences in each treatment.

## 3. Result and Discussion

### 3.1. Feed consumption and body weight gain

The effectiveness of herbal fermentation in drinking water used with different time spans on the consumption of native chicken feed can be seen in figure 1.

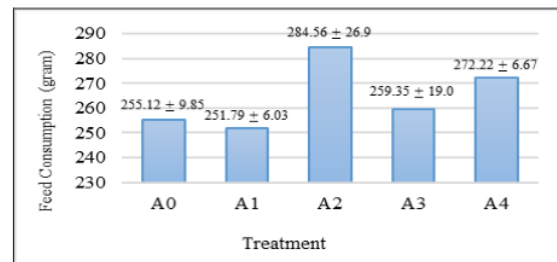


Figure 1. Average chicken feed consumption (g/head/week)

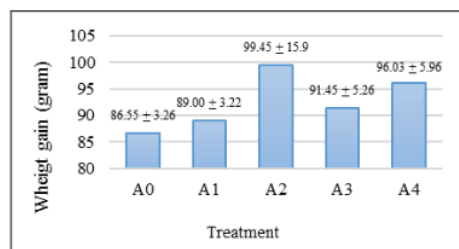
The results showed that herbal fermentation supplementation with different time ranges resulted in the consumption of chicken feed not significantly different ( $P > 0.05$ ). Where the consumption of treated chickens with control showed no significant difference. The range of free-range chicken feed consumption is 251.79 - 284.56 g/head/week. This shows that the results obtained for A0, A1, A2, A3, and A4 do not differ in the average feed consumption. The effect of active substances that each component of the chemical compounds of herbs can support one another (synergistically) to achieve its effectiveness, however, the use of herbal plants has a drawback, namely the effect of herbal active substances that are slow in performance [5]. This shows that the fermented herbs still have the same effect on feed consumption even though they are used for 4 weeks and there is no decrease in the quality of these herbs, so there is no significant difference between treatments. Herbal active substances still have the same effect due to the fermentation process carried out in herbs. The fermentation process will maintain the quality of the herbs because it will produce bacteriocin compounds from LAB (Lactic acid bacteria), which can maintain the quality of the herbs. LAB is a type of bacteria that is capable of producing metabolite compounds such as lactic acid and bacteriocin as antibacterial agents [6]. Bacteriocin itself is an antimicrobial compound produced by lactic acid bacteria which can be used as a natural preservative in inhibiting and suppressing the growth of putrefactive bacteria [6]. So that there is no decrease in the quality and content of the active substances of these herbs even though they are used in different time frames. Bacteriocin produced from LAB will be antagonistic to spoilage bacteria.

Lactic acid bacteria in fermentation products are also able to compete competitively to grow to become the dominant bacteria even though under conditions of mineral stress, such as NaCl salt, which is higher than other bacteria [7]. Some LABs have also been shown to be able to withstand low and moderate heating processes, this is due to the presence of heat-resistant proteins in these bacterial cells that can protect LAB from heat damage [8]. The ability of LAB is what causes the active ingredient content of herbs to be maintained even though they are used in environmental stresses and for a long time of use.

The supplementation of fermented herbs into drinking water still showed the same effect on feed consumption between treatments. Thus, feed consumption is still good even with the duration of using different herbs. The content of herbal active substances found in ginger can help respond to the appetite of livestock. The active ingredients of curcumin and essential oils in ginger can accelerate the work of the small intestine so that it can speed up gastric emptying, thereby arising hunger and appetite [9].

### 3.2. Body weight gain

The results of the search on the effectiveness of herbal fermentation in drinking water used in different timescales on the body weight gain of native chickens can be seen in figure 2.



**Figure 2.** Average body weight gain of native chickens (gr/head/week)

The results of variance showed that the effectiveness of fermented herbs used in different time frames showed no significant difference ( $P > 0.05$ ) on the weight gain of native chickens. The range of



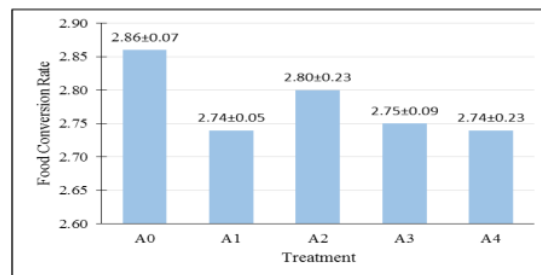
body weight gain of native chickens is between 86.55-99.45 grams/head/week. The results of analysis of variance showed that the results were not significantly different ( $P > 0.05$ ) between the treatment of fermented herbal supplementation and the control (without fermented herbal supplementation), this indicated that the weight gain of the control chickens was not significantly different from the weight gain of the treated chickens. This is because the effect of the active herbal substances has not been able to optimally increase the absorption of nutrients in the intestine so that the weight gain of the treated and control chickens is not significantly different.

This study also showed that the administration of fermented herbs at different times of use did not show a significant difference ( $P > 0.05$ ) in the weight gain of chickens between treatments given fermented herbal supplementation. This is because there is no damage to the content of these herbs so that the fermented herbs still have the same effect on the body weight gain of native chickens even though they are used for a long time. The quality that is maintained is due to the fermentation process in herbs. The fermentation process will produce lactic acid in fermented herbal products, to protect the herbs from bacteria that can degrade their quality.

The content of active substances in herbs can increase metabolic processes and help digestive enzymes in the chicken body. Active substances such as curcumin in ginger have colagoga activity which plays a role in increasing the production and secretion of bile in the liver in stimulating the release of pancreatic juice which can increase the metabolism of carbohydrate, protein, and fat feed ingredients so that the digestion process can take place quickly and optimally [10]. The increased metabolic process will result in optimal body weight gain. In addition, body weight gain in native chickens is also influenced by the amount of feed consumed by livestock. Ration consumption will affect the growth rate and final weight because the formation of weight, shape, and body composition is essentially the accumulation of feed consumed into the body of livestock [11]. Bodyweight gain is closely related to feeding consumption, if feed consumption is disturbed it will interfere with growth [12].

### 3.3. FCR (Feed Conversion Rate)

The results of the research on the effectiveness of herbal fermentation in drinking water used in different timescales against the FCR of native chickens can be seen in figure 3.



**Figure 3.** Average FCR of native chickens during the study

The results of variance showed that the effectiveness of fermented herbs used in different time frames showed no significant difference ( $P > 0.05$ ) on the FCR of native chickens. FCR is a comparison between feed consumption and body weight gain obtained within a certain period [13]. The range of native chicken FCR figures obtained in this study was between 2.74-2.86. FCR which is not significantly different is in line with the results of feed consumption and body weight gain which are also not significantly different. The ration conversion value is influenced by the amount of ration consumed and body weight gain in a certain period. The lower the feed conversion value, the better, this shows that the use of feed is more efficient. The low feed conversion value indicates that the

efficiency of feed use is good because the more efficient the chickens consume the feed to produce meat [14].

FCR which is not significantly different shows that giving fermented herbs with different usage times does not show a decrease in the quality of these herbs. This is because the active substances in herbs can optimize the use of rations in producing meat. According to [8], beneficial herbs can improve consumption and increase body weight gain which in turn can reduce the FCR number. The addition of garlic flour to chicken rations can accelerate growth, improve the work system of the digestive organs so that food absorption is more optimal [15]. Optimal absorption of food substances, high growth, and reduced-fat formation will optimize the formation of meat in the chicken body. Thus, the FCR figure obtained will be even smaller.

#### 4. Conclusion

This study concludes that the provision of fermented herbs such as ginger, turmeric, ginger, and garlic with a composition of 2.5% / liter mixed into drinking water and used for different periods showed no significant difference ( $P > 0.05$ ) in feed consumption, body weight gain and FCR of treated and control chickens. The best results obtained in this study were A2 treatment (fermented herbal supplementation used for 2 weeks).

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