Effect of The Combination Phytobiotic and Probiotic on The External Quality of Mojosari Egg-Laying Ducks

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Abstract. This study aims to evaluate the use of a combination between phytobiotics and probiotics on the external egg quality of laying ducks. One hundred Mojosari laying ducks were divided into 4 treatments and 5 replications, each replication with 5 ducks. The treatments were T1: control, T1: 0.25% combination, T2: 0.5% combination and T3: 0.75% combination. The variables observed were egg weight, egg length, egg width, and egg shape index. Observations on variables were carried out once a week for four weeks, each replicate using 2 eggs. The data was statistically analyzed using analysis of variance (ANOVA) from a Completely Randomized Design (CRD), and then the significant difference continued with Duncan's Multiple Range Test. Based on the results, it shows that the different levels of the combination of phytobiotics and probiotics showed significantly different results (p<0.05) on egg weight, however did not significantly different (p>0.05) on the egg length, egg width, and egg shape index. It can be concluded that the use of a 0.5 to 0.75 combination of phytobiotics and probiotics can improve the external quality of duck eggs.

1 Introduction

People in the world need an adequate daily source of protein, which can be obtained from livestock products. Not only do meat and milk have good nutrition for the body, but there is also a source of animal protein that has the most complete and cheap amino acid composition, namely duck eggs. Feed is very influential in the laying duck farming business [1]. The addition of feed additives is one of the efforts that have been made to overcome the inefficiency of feeding laying ducks in tropical countries. The use of antibiotics as feed additives has proven to optimize feed efficiency in poultry. The aim of using antibiotics is to stimulate growth, increase immunity, and increase production [2]. According to Minister of Agriculture Regulation No. 14 of 2017 concerning the classification of veterinary drugs, which states that the use of antibiotics as feed additives has been prohibited except for treatment and using a veterinarian's prescription. To prevent the use of antibiotics, use feed additives made from herbs or natural ingredients, for example, probiotics and phytobiotics.
Probiotics can decrease the total of harmful microorganisms that can generate toxins and alleviate the adverse effects caused by feed barriers, such as anti-nutrients. This is because probiotics can enhance the availability of feed substances, stimulate the production of digestive enzymes, and generate antimicrobial substances and also vitamins. Consequently, the digestive health status is improved [3]. The use of herbal plants as phytobiotics has the purpose of optimizing the bioactive substances from herbal contents that influence the balance between pathogenic and non-pathogenic bacteria [4] so that they can improve the condition of the poultry digestive tract, which can improve the immune system and have an impact on high productivity. Meanwhile, phytobiotics are herbal plants that have active ingredients that can be used as antibacterials to improve the condition of the digestive tract (pH balance and microflora) and feed conversion, as well as increase the digestibility of food substances [5]. Probiotics and phytobiotics derived from herbal plants combined because of their synergistic properties as feed additives are expected to provide better effectiveness in the production of laying ducks. Based on the description above, research was conducted on using a combination of probiotics and phytobiotics as feed additives to replace antibiotics in laying ducks, especially for external egg quality.

2 Material and Method

This research employed an in vivo experimental approach, utilizing a completely randomized design (CRD). The study comprised four treatments and five replications, with each experimental set involving five ducks. One hundred Mojosari laying ducks were aged 40–44 weeks. The treatments were divided by two types of combination phytobiotic and probiotic called yellow and green type, where the administration is carried out alternately, one week using the green type and the next week using the yellow type, respectively. The "yellow" blend incorporates a potent mix of turmeric varieties, including both Curcuma xanthorrhiza roxb and Curcuma domestica val, and ginger (Zingiber officinale). This combination is strengthened by a diverse assembly of microbes such as Actinomycetes, lactic acid bacteria, and photosynthetic bacteria. The collaborative action of these microbes, along with the assistance of tempeh yeast and Aspergillus, further enhances the blend's properties. In contrast, the "green" blend was a mixture of Andrographis paniculata and Moringa oleifera leaves, complemented by papaya along with several combinations of microbes as contained in the "yellow" one.

The treatment given is as follows: T0: Basal feed; T1: basal feed + combination of probiotics and phytobiotics 0.25%; T2: Basal feed + combination of probiotics and phytobiotics 0.50%; and P3: Basal feed + combination of probiotics and phytobiotics 0.75%. Eggs were measured for external quality once per week for four weeks. The variables of the external quality of eggs consist of:

1. Egg Weight
   Egg weight was obtained from directly weighing the eggs using a digital scale every day.

2. Egg length and width
   Egg length was measured from the sharpest part to the blunt, furthermore egg width was obtained by measuring the width of the egg in the largest circle using a digital calliper.

3. Egg Shape Index
   Egg shape index is the ratio between the width diameter and the length diameter of the egg. The index can be calculated using the formula:

   \[ \text{Egg Index} = \frac{\text{egg width}}{\text{egg length}} \times 100\% \]
Data of the research was collected every week. Data was tabulated using the SPSS program version 25. The data obtained was statistically analyzed using analysis of variance (ANOVA) from a Completely Randomized Design (CRD). The significantly different (P<0.05) then continued with Duncan's Multiple Range Test.

3 Results and Discussion

The impact of incorporating a combination of phytobiotics and probiotics as feed additives on the egg weight, egg length, egg width, and egg shape index of egg-laying ducks is presented in the table below (Table 1).

Table 1. Effect of the combination phytobiotic and probiotic on the egg weight, egg length, egg width and egg shape index of laying duck.

<table>
<thead>
<tr>
<th>Variabel</th>
<th>Egg weight (g)</th>
<th>Egg Length (mm)</th>
<th>Egg Width (mm)</th>
<th>Egg Shape Index (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>71.05±0.65</td>
<td>59.05±1.01</td>
<td>47.09±0.57</td>
<td>79.82±1.66</td>
</tr>
<tr>
<td>T1</td>
<td>71.48±0.58</td>
<td>58.91±1.10</td>
<td>46.65±0.46</td>
<td>79.26±0.95</td>
</tr>
<tr>
<td>T2</td>
<td>72.36±0.60</td>
<td>59.09±0.41</td>
<td>47.29±0.87</td>
<td>80.00±1.04</td>
</tr>
<tr>
<td>T3</td>
<td>73.34±0.83</td>
<td>58.02±0.96</td>
<td>47.25±0.31</td>
<td>81.48±0.96</td>
</tr>
</tbody>
</table>

Notes: Asterisk symbol (*) showed the significantly different between the treatment

The statistical data showed that the different combinations of phytobiotic and probiotic significantly increased the egg weight (p<0.05). Increasing levels of probiotic and phytobiotic showed a positive interaction on the duck egg weight. According to [6] phytobiotics should be analyzed in more depth because some of the plant-derived substances may contain anti-nutrition. This also depends on the addition of a feed additive. During the 4 weeks of the addition combination phytobiotic and probiotic increased the egg weight. The action of phytobiotic as feed additives is caused by secondary compounds [7]. According to [8] plants have the bioactive compound that can improve the digestive tract of chicken, then in the laying hens can be a booster of egg production, especially egg weight. According to an earlier study [9], the egg weight of Mojosari ducks was 71.37 g. However, a study [10] reported the egg weight of Mojosari ducks was 60.3 g. So this research showed that the used 0.25 % feed additive has the same weight as the research of Putra, then increasing the level of feed additive to 0.75 % improved the egg weight. Interaction between probiotics and herbs has a positive impact. Probiotics stimulate intestinal structure due to increased nutrition digestion leading to improved availability of nutrients like protein and fat to increase egg quality[11]. Bioactive compounds of turmeric contain 2.5 % - 6.0 % turmerone and 3 % - 5 % curcuminoids [12].

The use of a combination of phytobiotic and probiotic as feed additive did not have significant effects (p>0.05) on the length egg, width egg, and egg shape index. The varied impacts of supplemental herbs on egg quality could be attributed to differences in both the quantity and the origin of bioactive compounds present in these herbal plants. The findings indicate that there is no significant effect in the egg index during the fourth week among various levels of combined probiotic and phytobiotic supplementation. The egg index is derived from measurements of egg length and width, with the typical range for the egg index being between 72 % - 76 % [13]. The shape of an egg is governed primarily by its width, specifically the diameter of the isthmus. There is a positive correlation between the width of the isthmus and the roundness of the resulting egg form. Conversely, a narrower diameter of the isthmus is associated with an oval shape of the created egg. A positive correlation exists between the egg index value and the roundness of the egg shape. According to [14] bioactive
compounds and probiotics improved the health status of the poultry. This research is in line with the statement of Salari et al. who stated that feed additive lavender essence which has the bioactive compound did not affect external egg quality [15]. The outcomes of the current study do not align with the previous finding [16], who documented that the supplementation of peppermint leaves at 5-10 g/kg demonstrated improvements in egg weight and shape index. This discrepancy can be attributed to the influence of the oviposition process, which plays a crucial role in the conversion of digested feed into eggs, thereby impacting the observed effects of the herbal supplement.

4 Conclusion

The addition of a 0.5 % to 0,75 % combination of phytobiotics and probiotics can improve the external quality of duck eggs.

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References

