THE EFFECT OF CITRATE ACID ON THE PRODUCTION PERFORMANCE OF THE QUAIL (Coturnix coturnix japonica)

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ABSTRACT

This study was aimed to determine the effect of citric acid on layer quail (Coturnix coturnix japonica) of production performance. The material used in this study was 80 quail of layer period (12 weeks) observed kept for five weeks. This study was used to complete randomized design with four treatments and five replications. Levels of citric acid administration were 0%, 0.3%, 0.6% and 0.9%, respectively. Parameters observed were feed consumption, egg production, egg weight, and feed conversion. The results showed that citric acid did not have a significant effect (P> 0.05) on feed consumption and quail egg weight, but gave real effect (P<0.05) to quail egg production and gave very significant effect (P<0.01) to feed conversion of quail. The addition of citric acid with a level of 0.6% (P2) gives better egg production and feed conversion than other treatments.

Keywords: Quail, Citric Acid, Production Performance

INTRODUCTION

Quail is egg-producing poultry, and quail production is relatively fast compared to other laying bird because it can reach adult sex at the age of 40-50 days, and egg production reaches 250-300 eggs per year (Randell and Gery, 2008).

Increasing the amount of egg production can be achieved by fulfilling the quality and quantity of feed as well as the digestive efficiency of feed nutrition, especially protein. To increase the digestive efficiency of feed nutrition can be done by adding organic acids to the feed or drinking water. One type of organic acid (acidifier) that can be used is citric acid. Citric acid added to feed is used as an acidifier that aims to improve the digestion of nutrients in feed, especially protein. Acidifier works by improving feed digestibility by increasing enzyme activity and decreasing gastric pH so that the digestive process and nutrient absorption of feed are more optimal. It is hoped that the addition of citric acid in feed improves the efficiency of nutrient absorption in quails.

Based on this description, it is necessary to research the effect of citric acid administration on the production performance of the layer quail phase (Coturnix coturnix japonica).

MATERIALS AND METHODS

This research was conducted from October to December 2017. The study was located at Permata people's farm, Jl. Khairil Anwar RT. IV/RW.III Wua-Wua Village Wua-Wua District Kendari City.

The material used in this study was 80 quail birds of the layer period at 12 weeks of age. The feed material consisted of bran, corn and RK24 concentrates and synthetic citrate acid.

The equipment that will be used in this study is cages and enclosures, in the form of scales, room thermometers, lamps for lighting, stationery, and cameras. The pen used is a cage with a battery model that is equipped with a feed and drinking water container.

The ration to be used in this study was arranged to meet the needs of the layer phase quail containing PK = 17.73%, and EM = 2820.80 kcal. Citric acid to be used is synthetic citric acid. Citric acid is mixed in the feed according to treatment. The gift consists of 4
levels, namely 0%, 0.3%, 0.6% and 0.9% of 1 kg of feed.

Quail maintenance time is 5 weeks with the adaptation period of treatment feed for one week. Feeding is done two times a day and drinking water ad libitum. After quail lay eggs, eggs are collected every day, and then the egg production is calculated and weighed eggs every day.

This study uses a completely randomized design (CRD) with four treatments with five replications. Levels of citric acid administration ranging from 0%, 0.3%, 0.6% and 0.9% are given to feed. The treatments applied to the study consisted of:

P0 = Control without citric acid
P1 = Control + 0.3% citric acid
P2 = Control + 0.6% citric acid
P3 = Control + 0.9% citric acid

Feed consumption. Feed consumption is calculated by weighing the weight of the given feed reduced by the weight of the remaining feed and divided by the number of quails. The formula for calculating feed consumption (Rasyaf, 2002) is as follows:

\[
\text{Feed consumption (g/head/day)} = \frac{\text{bobot telur (kg)}}{\text{Feed consumption (g/head/day)}} \times 100\%
\]

Egg Weight. Egg weight is calculated from weighing the daily quail egg production. Egg weight is obtained from eggs that are considered in one plot and divided by the number of quails in one scheme.

Feed Conversion Ratio (FCR). Feed conversion is the ratio of feed consumed in a certain period compared to the weight of eggs produced at a particular time (Handarini et al., 2008). The formula for calculating feed conversion is as follows:

\[
\text{Feed Conversion} = \frac{\text{Konsentrasi pelaku (gr)}}{\text{Konsentrasi pelaku selama penelitian (gr)}}
\]

The data obtained were analyzed using analysis of variance. If the treatment had a significant effect, a further test was done with the Duncan’s Multiple Range Test (DMRT) to measure the difference between treatments (Steel and Torrie, 1991).

RESULTS AND DISCUSSION

Effect of Treatment on Feed Consumption, Egg Production, Egg Weight, and Layer Phase Quail Feed Conversion.

<table>
<thead>
<tr>
<th>Repeat</th>
<th>Treatment</th>
<th>Feed Consumption (g/head/day)</th>
<th>Egg Production (%)</th>
<th>Egg Weight (grams)</th>
<th>Feed Conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P0</td>
<td>21.87±0.10</td>
<td>60.89±0.86</td>
<td>10.09±0.09</td>
<td>3.56±0.00^c</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td>21.91±0.05</td>
<td>62.50±0.45^b</td>
<td>10.13±0.06</td>
<td>3.46±0.01^a</td>
</tr>
<tr>
<td></td>
<td>P2</td>
<td>21.96±0.10</td>
<td>71.25±1.71^d</td>
<td>10.07±0.03</td>
<td>3.06±0.06^c</td>
</tr>
<tr>
<td></td>
<td>P3</td>
<td>21.90±0.07</td>
<td>64.29±0.86^c</td>
<td>10.07±0.06</td>
<td>3.38±0.02^b</td>
</tr>
</tbody>
</table>

Note: Different superscripts on the same line show significantly different effects (P<0.05).

Feed consumption

The results of the analysis of variance showed that the addition of citric acid in quails to the level of 0.9% (P3) had no significant effect (P> 0.05) on the consumption of layer phase quail feed. These results are consistent with the results of the study of Sacakli et al. (2005), who found that the addition of organic acids did not affect the consumption of quail feed. Dahiya et al. (2016) added supplementation of organic acids in feed did not affect feed consumption.

The common use of quail feed during the study in the control treatment (without citric acid) was 21.87 g / head/day, and those treated with citric acid ranged from 21.90-21.96 g / head/day. The results were not different from Achmanu et al. (2011), which states that the
consumption of quail feed is 21.05 - 21.23 g / head/day. Faiz (2017) reports that the use of quail feed is 21-23 g / head/day. Feed consumption is influenced by feed quality, quail body size, and the environment around the cage. This is according to Suprijatna et al. (2005) that the amount of feed consumption is strongly influenced by animal body size, genetic traits, environmental temperature, production level, housing, feed per cattle, state of drinking water, quality and quantity of feed and the presence of disease.

### Egg Production

The results of the study with the addition of citric acid in the layer phase quail showed a significant difference (P <0.05) on quail egg production compared with the control treatment. This is presumably because the addition of citric acid as an organic acid can improve the digestive efficiency of feed nutrients, especially protein, which is closely related to increased egg production.

Protein is needed for the production of quail eggs, with the addition of citric acid as organic acids can improve protein digestion in the feed. According to Afscharmanesh and Pourreza (2005) states that citric acid can increase the secretion of pepsin and hormones in the proventriculus that plays a role in starting the digestion of proteins.

The average quail egg production during the study ranged from 60.89 to 71.25%. These results are the same as the results of research by Triyanto (2007), which obtained egg production of 52-72.22%. Egg production in the study was lower when compared with the results of Faiz's research (2017), which received quail egg production of 78.75-83.04%.

The addition of citric acid as an organic acid can optimize the digestion and absorption of nutrients in the feed to increase quail productivity. Deepa et al. (2011) reported efforts to improve the efficiency of absorption of nutrients, especially protein in broilers, namely the addition of organic acids (acidifier) through feed or drinking water.

### Egg Weight

The results of the analysis of variance, the addition of citric acid in quails, had no significant effect (P > 0.05) on the weight of quail eggs, meaning that there were no differences in egg weights between P0, P1, P2, and P3. This is following research Soltan (2008), organic acid supplementation does not affect the average egg weight, because egg weight is influenced by genetic factors.

Table 1 shows the average importance of quail eggs during the study, which was given citric acid with different levels ranging from 10.07 to 10.13 grams. These results are relatively similar to the results of the survey of Sahin et al. (2002), who obtained a quail egg weight of 10.5 grams.

The results of the analysis showed that the administration of citric acid had no significant effect. This was alleged because the consumption of feed during the study was also not much different. Listyowati and Roospitasari (2000) stated that the type of feed, the amount of feed, the environment of the cage, and the quality of the feed greatly influence the weight of the eggs produced.

### Feed Conversion

Variance analysis results, the addition of citric acid in quails has a very significant effect (P <0.01) on the conversion of quail feed. High egg production can reduce feed conversion rates, meaning that the efficiency of digestion and absorption of nutrients by the addition of citric acid as an acidifier is more optimal. Deepa et al. (2011) state the addition of citric acid can increase feed consumption, increase body weight, and improve feed conversion.

The average value of feed conversion during the study ranged from 3.06 to 3.56. The average cost is lower when compared to the study of Alhasbi (2005) feed conversion in quails ranging from 3.64 - 4.52. The transformation of the weakest to the highest feeds was P2 (3.06), P3 (3.38), P1 (3.46), and P0 (3.56).

The addition of citric acid can improve the value of feed conversion because of citric acid functions as an acidifier whose mechanism of action increases digestion and absorption of nutrients by lowering pH and increasing enzyme activity. Emma et al. (2013) state that the addition of citric acid from lime juice to the level of 0.8% indicates a decrease in pH and an increase in enzymatic digestive activity.

### CONCLUSION

Addition of citric acid showed a very significant effect on egg production and feed conversion, but did not significantly affect feed consumption and egg weight. The addition of
citric acid with a level of 0.6% (P2) gives better egg production and feed conversion compared to other treatments.

REFERENCES


Triyanto. 2007. Production Performance of Quail (Coturnix coturnix japonica) Production Period of 6-13 Weeks on Long Exposure.