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Production performance of laying Japanese quail that given citric acid as acidifier

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Production performance of laying Japanese quail that given citric acid as acidifier

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Abstract. This research aimed to study the effect of citric acid on production performance of laying Japanese quail. One hundred of 12 weeks laying Japanese quails were divided into 4 treatments and 5 replication based on completely randomized design. The treatments were citric acid addition level, they were 0, 0,3, 0,6, and 0,9% of citric acid. This research used a self-mixing feed that contained 2800 kcal/kg metabolizable energy and 17,5% crude protein. The parameters measured were feed consumption, egg weight, egg production, and feed conversion ratio. The obtained data during 4 weeks measurement were analyzed using variance analysis and continued with Duncan's Multiple Range Test. The result showed that addition of citric acid on Japanese quail feed did not give any significant effect ($P>0,05$) on feed consumption and egg weight, but the addition of citric acid gave a significant effect ($P<0,05$) on egg production and feed conversion ratio. During 4 weeks, addition 0,6% citrit acid showed egg production above 75%. It can be concluded that addition of 0,6% citric acid showed a better egg production and feed conversion ratio performance.

Keywords – laying Japanese quail, citric acid, acidifier.

1. Introduction

The Japanese quail is one of poultry which have been farmed in Indonesia. Many Japanese quail are farmed because it has a high productivity and does not require extensive land for maintenance. In addition, quail meat and eggs also contain good nutrition [1] [2].

In an effort to optimize the productivity of poultry, in recent years many experiments has carried out. The addition of the feed additive have been much done. One of the ingredients of the feed additive that has the potential to promote poultry productivity are organic acids.

Organic acids, are known as acidifier, has a growth enhancing effect [3]. In poultry, organic acids could improved body weight gain, feed conversion ratio, and also increasing the villus height of small intestine [4]. Application the organic acids can also boost poultry immunity [5] and gut health [6]. In addition, giving of organic acids could increase production [7] and quality of eggs in laying hens [8].

One of the organic acids that can be used in the poultry feed is citric acid. Citric acid can improve growth, feed conversion [9] and health of poultry [10]. Citric acid also could increase phosphorus utilization in poultry diet [11]. Based on the description before, then this research was conducted to study the effect of citric acid on the production performance of laying Japanese quails.

2. Methods

2.1. Materials

One hundred of 12 weeks laying Japanese quails were housed and handling during 5 weeks of experiment. A self-mixing feed that contained 2800 kcal/kg metabolizable energy and 17,5% crude



protein was used. The feed was composed of corn, rice bran and commercial RK24 concentrates. During experiment, feed and water were given ad libitum.

2.2. Experimental design

Laying Japanese quails were divided into 4 groups of treatment and each treatment was replicated 5 times. The treatments used in this experiment were 4 addition level of citric acid:

P0 = 0% citric acid/kg feed

P1 = 0,3% citric acid/kg feed

P2 = 0,6% citric acid/kg feed

P3 = 0,9% citric acid/kg feed

Before the data retrieval was performed, the feed adaptation was carried out for one week. After that, the data retrieval than performed during 4 weeks.

2.3. Measured parameters

The measured parameter in this experiment were feed consumption, egg weight, egg production, and feed conversion ratio. Feed consumption was measured every day by calculating the difference between given and leftover feed. Quail eggs were collected on the morning and afternoon. Every afternoon, eggs weight were weighed using analytical scale. Egg production was expressed as a percentage (%) and calculated by comparing the number of eggs produced by the number of quails reared [12]. Meanwhile the feed conversion ratio was calculated by comparing the amount of consumed feed with weights of eggs produced in a certain time.

2.4. Data analysis

The data obtained were analyzed using analysis of variance based on completely randomized design. If a significant effect found, the analysis would be continued using Duncan's Multiple Range Test.

3. Results and discussion

Feed consumption, egg weight, egg production and feed conversion ratio of laying Japanese quail given citric acid were shown in Table 1.

Table 1. Feed consumption, egg weight, egg production and feed conversion ratio of laying Japanese quail given citric acid.

Parameters	Treatments			
	P0	P1	P2	P3
Feed consumption (g/quail/day)	21,87	21,90	21,95	21,89
Egg weight (g)	10,06	10,09	10,06	10,05
Egg production (%)	68,71 ^a	70,00 ^a	77,00 ^b	71,43 ^a
Feed conversion ratio	3,16 ^a	3,10 ^a	2,83 ^b	3,03 ^a

Means within a line with no common superscript differ significantly ($P < 0,05$).

Feed consumption and egg weight were not affected ($P > 0,05$) by citric acid addition on feed. Similar things have also been reported. Giving of organic acids, butyric, fumarate, and lactate acid, did not affect feed consumption of broiler [4]. Addition of organic acids mixture (formic acid and salt of butyric, propionic and lactic acids) had no effect on feed intake and egg weight of laying hens [7].

Quail feed consumption ranged from 21,87 to 21,95 g/quail/day. Feed consumption obtained in this study are in accordance with [13] explanation. According to [13], laying quail consumption during production ranged from 19,8 to 22 g/quail/day.

Quail egg weight obtained in this study ranged from 10,05 to 10,09 g. These values did not differ greatly with some previous researches. Quail egg weights ranged from 10,73 to 10,92 g with an

average 10,86 g [14], Japanese quail egg weight is 10,34 g [15]. This result showed that addition citric acid up to 0,9% in feed doesn't give any negative effect on quail eggs weight. It means that citric acid could maintain the process of egg formation lasts well. Citric acid did not contain harmful compounds that can reduce the weight of quail eggs.

In the other hand, giving citric acid in quail feed showed a significant effect ($P < 0,05$) on egg production and feed conversion ratio. Feed conversion ratio was found lower in addition 0,6% citric acid (P2). Similar thing also found in egg production. It became higher in addition 0,6% citric acid. That addition 0,5% citric acid could improve broiler feed conversion ratio [9]. That organic acid supplementation could improve the laying hens production [7].

Egg production and feed conversion ratio obtained in this study were in accordance with [13] explanation. Laying Japanese quail given a diet that contain 18% crude protein would have egg production about 71,9% and feed conversion ratio about 3,3 [13]. In this study, egg production and feed conversion of laying Japanese quail given 0,6% citric acid were 77,00% and 2,83 respectively. These values are more optimal.

Citric acid as an organic acid have a capability of maintaining the balance of microorganism in feed and digestive tract. Dietary organic acid could inhibit the microorganism growth in feed and consequently could maintain the balance of digestive tract microorganisms [8]. Further, it also could modify the pH of intestines.

Citric acid's ability in maintaining the pH balance and microorganisms in digestive tract might be one of the causes of the feed digestion process become more optimal. Feed conversion could be improved. Further, egg production was also becoming more optimal.

4. Conclusion

Giving citric acid up to 0,9% in quail feed did not affect the feed consumption and egg weight, but in the other hand, giving 0,6% citric acid could improve production of laying quail and its feed conversion ratio. It can be concluded that addition of 0,6% citric acid showed a better egg production and feed conversion ratio performance.

5. References

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