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The Effect of Feeding a Mixture of Indigofera Flour In Commercial Feeding on The Production and Quality of Quail Eggs (*Cortunix-cortunix Japonica*)

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Abstract

Indigofera is a leguminous plant that has long been known to Indonesian people, especially on the island of Java. One type of Indigofera which is also used as animal feed includes Indigofera zollingerina. Livestock that have growth potential using indigofera leaf flour are quail. This research aims to determine the effect of providing a mixture of Indigofera flour in commercial feed on feed consumption and quail egg production. This research was carried out for 45 days starting in May – July 2023. The design used in this research was a Completely Randomized Design (CRD) with 4 treatments and 3 replications. The results of the study showed that the effect of giving a mixture of Indigofera flour to commercial feed showed no significant difference (P<0.05) on feed consumption, egg production and quality of quail eggs. The highest average feed consumption was in treatment P2, namely 23.09 gr/head/day and the lowest average was in treatment P3, namely 23.07 gr/head/day. The highest average quail egg production was in treatment P2, namely 77.62% and the lowest average was in treatment P3, namely 75.24%, while quail egg quality included egg weight and egg shell thickness. The highest average egg weight was in treatment P2, namely 8.24 g/item and the lowest value was in P3, namely 7.94 g/item. The highest average eggshell thickness was in P0, namely 0.14 mm, and the lowest average was in treatments P1 and P3, namely 0.12 mm each.

Keywords: Quail, Indigofera Flour, Commercial Feed, Production, Egg Quality

1. Introduction

*Indigofera zollingerina*is one of the forages that has tolerance to dry soil conditions and is able to survive and produce at severe drought stress levels (field 25% capacity), even though productivity decreases [1]. The Indigofera plant has great potential as an alternative feed ingredient for protein sources where its crude protein content is 29.16%, tannin 0.027 - 0.1%, and saponin 2.24 - 4.20%, so its use is very good as a quality animal feed without causing disruption to livestock health [2]. Indigofera zollingeriana. Indigofera zollingeriana can be used as forage and high quality supplement for livestock because of its high nutritional content [3], [4], [5], [6].

One of the livestock animals that has growth potential using Indigofera leaf flour is quail. Quail is a type of poultry that is being developed to increase its production. The most important factor in raising quail is feed, because 80% of the costs incurred by farmers are used to purchase feed. One of the commercial feeds used in this research is complete P304C granular feed obtained in the market and the additional use of Indigofera flour as an alternative feed to make it easier and provide feed efficiency. [7]. The nutritional requirements for quail (Coturnix coturnix japonica) from the starter

to grower phase are PK of 24% and ME of 2900Kcal/kg, and layer phase quail require PK of 20% and ME of 2900Kcal/kg feed [8].

Indigofera contains calcium, phosphorus, potassium, xanthophyll, and carotenoids which have a major influence on egg development [9], [10]. [11] reported that indofera fermentation was able to increase the growth of Arabian chickens (Gallus turcicus). [12]. It also states that the use of Indofera fermented feed is able to improve the sperm quality of Arabian chickens (Gallus turcicus), thus it is necessary to carry out research to determine changes in the production and quality of quail eggs (Coturnix coturnix japonica) which will be produced by giving a mixture of Indigofera flour as an alternative feed for birds. quail.

2. Materials andMethods

Time and Place of Research

This research was carried out at Pak Rusdi's farm, Cot Jabet Village, Gandapura District, Bireuen Regency for 40 days starting in May - July 2023.

Research Materials and Tools

The materials used in this research included: 120 quail (Coturnix coturnix japonica) without distinguishing between genders aged 36 days with commercial feed branded as P304C complete granulated feed with Indigofera mix. Meanwhile, the tools used in this research include: cages, feed containers, drinking water containers, egg storage areas, 75 watt incandescent lamps as heaters, disinfection spray, plastic and cardboard to collect dirt and brooms to clean up all existing rubbish, hoes, scales, strollers, digital cameras, and stationery.

Research design

This research used a Completely Randomized Design (CRD) with 4 treatments and 3 replications. Each replication consisted of 10 quail. The treatment is as follows:

P0 = 100 %commercial feed (control)
P1 = 80 %commercial feed (192 gr) + 20% indigofera flour (48 gr)
P2 = 70 %commercial feed (168 gr) + 30% indigofera flour (72 gr)
P3 = 60 %commercial feed (144 gr) + 40% indigofera flour (96 gr)

Research procedure

a) This research used Pak Rusdi's cage in Gandapura District which was made of wood and equipped with a feeder, drinker and egg shelter. Before the research took place, the research cage was first cleaned. The environment around the research site is also cleaned so that livestock health is maintained and the research process is not disturbed. This research consisted of 4 treatments with 3 repetitions, each consisting of several stages, namely:
   - The adjustment stage lasts 7 days, the aim is to adapt the experimental livestock to the environment and feed provided.
   - The preliminary stage, which lasts for 7 days, aims to eliminate the influence of residual previous feed. At this stage, experimental livestock are given experimental rations that are appropriate to each treatment for each period.
   - The treatment phase lasted 21 days. At this stage, quail are given rations according to the treatment for each replication.
   - Data collection stage. At this stage, the amount consumed by quail that have been given rations according to treatment is calculated, namely by the amount of rations given minus the remaining uneaten feed divided by the length of treatment, to obtain the amount of ration consumed by the livestock. After that, quail egg production is calculated by calculating the number of eggs produced after being given the treatment ration divided by the number of livestock multiplied by 100% to obtain the number of egg production. Furthermore,

observing the quality of the eggs, one of which is the weight of the eggs, namely eggs that have been cleaned and weighed using a digital scale by placing the eggs on the scales, the results can be seen and expressed in (grams/grain), while measuring the thickness of the egg shell is at the blunt end, the middle (equator), and the sharp end of the egg using a micrometer and then making an average.

Measured parameters

The parameters measured in this research are:

a. Feed Consumption

Feed consumption is obtained by reducing the amount of feed given with the remaining feed available the following day [13]. Weighing the remaining feed is carried out every day when feeding in the morning. The calculation is as follows.

$$\textbf{Consumption (g/head/day)} = \frac{\textbf{Amount of feeding (g) – remaining feed (g)}}{\textbf{Research duration (days)}}$$

b. Egg Production

[13] It is believed that on average quail start laying eggs at the age of over 7 weeks. Egg testing is carried out according to the observation variables carried out. Egg sampling was carried outThe whole group was kept in cages and the samples were separated for each treatment and replication. Calculation of egg production uses the following formula:

$$\textbf{Egg production (\%)} = \frac{\textbf{Number of egg production at that time (grains)}}{\textbf{Number of quail (tails)}} \textbf{ X 100\%}$$

c. Egg Quality

- Egg weight (g/piece) was calculated by adding up all egg weights divided by the number of quail and then divided by the length of the study [14] (Rotikan et al., 2018).
- $$\textbf{Egg Weight} = \frac{\textbf{Total weight of eggs (g)}}{\textbf{Number of Eggs (grains)}} \textbf{ / Length of research}$$
- Eggshell thickness was obtained by measuring the thickness of the shell and egg membrane (mm). Egg shell thickness was measured at the blunt end, middle (equator), and sharp end of the egg using a micrometer and then averaged [15].

TK = (t1+t2+t3)

Information:

Kindergarten	=	thick shell
t1, t2, t3	=	shell thickness at the blunt, middle and sharp ends.

3. Results and Discussion

The average results of the analysis of the various variables observed during the research are presented in table 1 below.

Table 1. Results of average feed consumption, egg production, egg weight, and egg shell thickness.

	Observation Variables			
Treatment	**Feed Consumption (g/head/day)**	**Egg Production (%)**	**Egg Weight (g/piece)**	**Eggshell Thickness (mm)**
P0	23.07 + 0.03	77.14 + 2.86	10.66 + 0.18	0.14 + 0.01
P1	23.08 + 0.02	76.19 + 1.65	10.04 + 0.21	0.12 + 0.01
P2	23.09 + 0.01	77.62 + 1.65	10.80 + 0.08	0.13 + 0.01
P3	23.03 + 0.02	75.24 + 2.18	10.38 + 0.51	0.12 + 0.01

Note: All treatments showed no significant effect (P<0.05)

Discussion

Feed Consumption

Feed consumption is obtained by the amount of ration given minus the remaining uneaten feed divided by the length of treatment. The results of statistical analysis show that P0 (100% commercial feed), P1 (80% commercial feed + 20% Indigofera flour), P2 (70% commercial feed + 30% Indigofera flour), and P3 (60% commercial feed + 40% flour Indigofera), there was no significant difference (P<0.05) on quail feed consumption. This is thought to be because each treatment has relatively the same energy content. In essence, poultry consume feed to meet energy needs. If energy needs are met, poultry will stop consuming feed, and vice versa [16].

The highest average feed consumption (g/head/day) was obtained at P2 (23.09) followed by successive treatments P1 (23.08), P0 (23.07) and P3 (23.03). It can be seen that there is a decrease in feed consumption along with the addition of Indigofera flour to the ration. This is thought to be because the greater the level of Indigofera flour added, the greater the crude fiber content in the feed. The increasing crude fiber content in feed causes feed consumption to decrease. Crude fiber is bulky, meaning it fills the digestive tract and tends to reduce food movement so that livestock will feel full and stop eating, causing low consumption [17]. [18] added that in raising livestock there are several factors that influence ration consumption, including the amount of ration consumed and the content of food substances in the ration such as energy, crude protein and crude fiber.

Egg Production

Egg production is obtained by the number of eggs produced after being given the treatment ration divided by the number of livestock multiplied by 100%. The calculation results using variance analysis show that P0 (100% commercial feed), P1 (80% commercial feed + 20% Indigofera flour), P2 (70% commercial feed + 30% Indigofera flour), and P3 (60% commercial feed + 40% Indigofera flour), had no significant effect (P<0.05) on quail egg production. This is because production performance is influenced by fat consumption, protein consumption, energy consumption and crude fiber in the ration, which affects the daily egg production of quails, but there is an increase with each treatment. It is suspected that each treatment can meet the protein needs of quail. In accordance with the opinion of [19] that the determining indicators of egg productivity are largely influenced by the nutritional content of feed, feed consumption and age.

The highest average egg production (%) was obtained at P2 (77.62) followed by successive treatments P0 (77.14), P1 (76.19) and the lowest egg production was at P3 (76.24). Egg production is also influenced by the digestibility of protein in feed, where the higher the protein digestibility, the more egg production increases as a result of the supply of amino acids being met for egg formation [20].

a. Quail Egg Weight

Egg weight (g/piece) was calculated by adding up all egg weights divided by the number of quail and then divided by the length of the study. The results showed that P0 (100% commercial feed), P1 (80% commercial feed + 20% Indigofera flour), P2 (70% commercial feed + 30% Indigofera flour), and P3 (60% commercial feed + 40% Indigofera flour), there was no significant difference ($P<0.05$) in the weight of quail eggs. The highest average egg weight (g/item) was obtained at P2 (10.80) followed by successive treatments P0 (10.66), P3 (10.38) and the lowest egg weight was at P1 (10.04).

The lowest average egg weight was seen in treatment P1. Low egg weight is caused by low protein feed resulting in low egg weight or a lack of protein can result in a decrease in egg size. This statement is in accordance with the opinion of [21] that protein consumption is one of the factors that influences the viscosity of egg albumen, the thicker it is, the heavier the egg will be.

The highest average egg weight was seen in P2 with an egg weight of 10.80 g/piece. The high egg weight was directly proportional to feed consumption. This is thought to be because the provision of protein rations at P2 is sufficient for the quail's maximum protein requirements to produce eggs. In accordance with the opinion of [21] protein deficiency will result in a decrease in egg size and the amount of egg albumen.

b. Quail Eggshell Thickness

Eggshell thickness was obtained by measuring the thickness of the shell and egg membrane (mm). The results showed that P0 (100% commercial feed), P1 (80% commercial feed + 20% Indigofera flour), P2 (70% commercial feed + 30% Indigofera flour), and P3 (60% commercial feed + 40% Indigofera flour), there was no significant difference ($P<0.05$) in the thickness of quail eggshells. This is caused by the value of calcium (Ca) content in the treated feed. The thickness of quail eggshells is also influenced by the calcium (Ca) content in the diet [22]. The thicker the egg shell means the higher the calcium content [23]. According to [24] most of the elements that make up egg shells are calcium, magnesium, sodium and carbon.

The highest average eggshell thickness was obtained at P0 (0.14 mm) followed by P2 (0.13 mm) and the lowest eggshell thickness was at P1 and P3, each producing (0.12 mm). The thickness of the egg shell is influenced by several factors, namely: age, type of livestock, food substances, physiological events from body organs, stress, and components of the egg shell layer [25]. In line with research [24] states that the thickness of the egg shell is influenced by strain, age of the parent, feed, stress and disease in the parent.

4. Conclusion

The results of the research can be concluded that the effect of giving a mixture of Indigofera flour in commercial feed showed no significant difference ($P<0.05$) on feed consumption, egg production and quail egg quality.

a. The highest average feed consumption was seen in the P2 treatment, namely 23.09 g/head/day and the lowest average was in the P3 treatment, namely 23.03 g/head/day.
b. The highest average quail egg production was found in treatment P2, namely 77.62% and the lowest average was found in treatment P3, namely 75.24%.
c. The quality of quail eggs includes egg weight and egg shell thickness. The highest average egg weight was in treatment P2, namely 10.80 g/item and the lowest value was in P1, namely 10.04 g/item. The highest average eggshell thickness was found in P0, namely 0.14 mm, and the lowest average was in treatments P1 and P3, namely 0.12 mm each.

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