DEJUNGKIL (Bran, Corn, Meal) as Nutritional Formula for Free-Range Chicken (*Gallus Domesticus*) Egg Production Increase

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Keywords: DEJUNGKIL, free-range chicken, free-range chicken eggs.

Abstract: DEJUNGKIL is the nutritional formula used to increase the production of free-range chicken (*Gallus domesticus)* eggs with compositional ratio of 5 bran: 3 corn : 2 soya bean meal. The study of DEJUNGKIL nutritional formula proves the significant production of free-range chicken eggs compared to both commercial nutrition and combination of commercial and DEJUNGKIL in 50:50 compositions. The research method of free-range chicken (*Gallus domesticus)* provided with DEJUNGKIL (Bran, Corn, Meal) nutrition used the experimental type. Twenty-seven free-range hens of 18-20 week (4-5 month) old were used as the experimental animals. The design in use was Completely Randomized Design (CRD) with 3 treatments and 9 replications. The three treatments were P1 (commercial nutrition provision), P2 (DEJUNGKIL nutrition provision), and P3 (combination of commercial and DEJUNGKIL nutrition provision) with 50 commercial nutrition : 50 DEJUNGKIL nutrition ratio. Provision of DEJUNGKIL nutrition and combination of commercial and DEJUNGKIL nutrition were conducted for one month and data was collected on the 30th day (data includes eggs produced by the free-range chickens in one month). The collected data was then analyzed using Analysis of Variant (ANOVA) test. The results showed real difference between the production of free-range chicken eggs (P>0.01) provided with commercial nutrition (P1), DEJUNGKIL nutrition (P2), and combination of commercial and DEJUNGKIL nutrition (P3). The average number of free-range chicken egg production of P1 treatment was (8.888 ± 1.269); P2 (10.444 ± 1.509); P3 (9.444 ± 0.881) and the weight in P1 treatment is (2211 ± 124.3); P2 (2211 ± 124.3); P3 (2216 ± 71.93). From this research, it can be concluded that DEJUNGKIL nutrition can increase of egg productivity of free-range chicken compared to commercial nutrition or combination of commercial nutrition and DEJUNGKIL nutrition.

1 INTRODUCTION

Free-range chickens are local breed of chickens in Indonesia with large variable performance and genetics, and its potential should be developed to enhance community nutrition and increase family income (Zakaria, 2004[a]). The demand for free-range chicken is increasing year by year (Bakrie *et al*., 2003); there was an increase by 4.5% during 2001-2005 and free-range chicken consumption increased from 1.49 tons to 1.52 tons during 2005-2009. Meanwhile, the production of free-range chicken with traditional maintenance ranges only between 40-45 eggs/head/year (Sulandari *et al*., 2007). Given this situation, it is apparent that traditional maintenance to agribusiness transition in order to increase population, production, productivity, and efficiency of free-range livestock business needs development (Zakaria, 2004[b]).

Various attempts have been conducted in this development, and semi-intensive and intensive free-range chicken development with quality feed as well as prevention from and control of disease, especially *tetelo* (ND), worm disease, and lice were considered quite profitable (Usman, 2007). Furthermore, improvement on maintenance governance from traditional to intensive could increase hatchability to 80%, egg-laying frequency to 7 times/year, and decrease dmortality to 19% (Sartika, 2005).

On the other hand, there were some problems in free-range chicken among other micro businesses (mother hen ownership of less than 10 heads), such as low egg production ranging between 30-40 eggs/year, slow growth, high mortality from ND

Djazuli, P. and Mudji, E.
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DOI: 10.5220/0007547906040607
In *Proceedings of the 2nd International Conference Postgraduate School (ICPS 2018)*, pages 604-607
ISBN: 978-989-758-348-3

disease, high-priced feed, and individual business with traditional maintenance (Sapuri, 2006). Even so, some experts believed that free-range chicken productivity could be increased through feed improvement and genetic quality enhancement (Setioko and Iskandar, 2005).

2 MATERIALS AND METHODS

In this study, 27 free-range hens age 18-20 weeks, DEJUNGKIL (Bran, Corn, Meal) feed and commercial feeds for free-range chicken were used. The type of this research was experimental, as in conducting direct observation on the number of eggs produced by free-range chickens provided with commercial and DEJUNGKIL (bran, corn, meal) feed.

Free-range chickens were divided into three groups of treatment in *kandang postal* (chicken coop/run). In treatment I, 9 hens were fed with commercial feed. In treatment II, 9 hens were fed with DEJUNGKIL (bran, corn, meal) with the ratio of 5 : 3 : 2, and in treatment III, 9 hens were fed with a combination of DEJUNGKIL and commercial feed. The hens were raised for one month, and the count for the number of eggs started from the first day the hens laid eggs to the time they showed indications of incubation or started incubating their eggs. Meanwhile, the weight was calculated after one week of new feed adaptation process by weighing the hens every week for a month.

Analysis of comparative data of egg production and weight of free-range chicken (*Gallus domesticus*) was conducted by using ANOVA. F value $\geq$ F statistics 0.05, therefore the analysis was continued to BNT test 0.05.

3 RESULTS

Table 1: Average and standard deviation of free-range chicken egg production number one month (30 days).

Treatment	Number of Eggs Average ± SD
P1	8.888 ± 1.269^{a}
P2	10.444 ± 1.509^{b}
P3	9.444 ± 0.881^{ab}

Note: The different superscript letters in the same column show real difference (P<0.01).

Table 2: Average and standard deviation of free-range chicken weight in one month.

Treatment	Average of Weight (gram) ± SD
P1	2211 ± 124.3^{a}
P2	2238 ± 96.78^{b}
P3	2216 ± 71.93^{a}

4 DISCUSSION

Ration has a significant role in chicken reproduction and egg production processes. The lack of certain substances in rations leads to a defect and failed production and reproduction. Layer rations should contain high protein and mineral as needed. Sufficient mineral content in rations is essential in the physiological processes of poultry. One of the must-have minerals in rations is calcium. Mineral is one of the nutrients needed by poultry. It has various types, such as Ca, P, Mg, Al, and Na. Poultry animals need all of those minerals, but layer hens need calcium the most as it is the main mineral in egg production process (Underwood, 2001). Calcium, when provided as needed in every period, has a positive impact on egg production (Ahmad *et al*., 2003). Eggshell calcification starts before egg enters the uterus, namely in isthmus area. A small batch of calcium is seen on the outer side of the shell membrane before the egg leaves the isthmus. Reproduction canal does not store calcium and approximately 20% of calcium in blood is transferred to uterus (Hafez *et al*., 2000). Vitamin D increases absorption in intestinal mucosa by stimulating production of (CaBP), a calcium-binding protein (Wahyu, 1997).

The calcium content in DEJUNGKIL, comprising of bran, corn, and soyabean meal, is: 0.1% of bran (Hartadi *et al*.,1997), 21% of corn (Amrullah, 2003), and 0.32% of soya bean meal (*National Research Council*, 1994). As for the calcium content value of the mixture, all of the components mentioned above are mixed in 5 : 3 : 2 ratio in a total weight of 10 kg (Komala, 2008).

Calculation of calcium content in the artificial feed made out of bran, corn, and soya bean meal with the ratio of 5 : 3 : 2 was bran (5 : 10 x 0.1 = 0.05%), corn (3 : 10 x 21 = 6.3%), and soya bean meal (2 : 10 x 0.32 = 0.064%). Therefore, the total calcium content in the feed per 10 kg was 0.05 + 6.3 + 0.064 = 6.414%. Calculation of calcium content in the mixed feed consisting of 50% commercial feed and 50% artificial feed was (calcium value of commercial feed : 2) + (calcium value of artificial feed : 2) = total calcium content (2 : 2) + (6.414 : 2)

= 1 + 3.207 = 4.207%. The calcium content of commercial feed was 2% per 10 kg.

Provision of commercial feed, DEJUNGKIL feed, and combination of commercial and DEJUNGKIL feed made no real difference to the weight of free-range chicken. The nutritional needs of 18-20-week old free-range chickens are 2400 kcal of energy, 17% of protein, 1.00% of calcium, 0.40% of phosphor, 0.21% of methionin, and 0.45% of lysine (Nawawi and Nurrohmah, 2002). Protein is the main component of poultry's body tissue, covering a range of 18-30% of the body. Each type of poultry needs different level of protein, and even those who belong to the same species have different needs of protein. Chickens need approximately 16-18% protein out of the feed's total weight (Tillman *et al*., 1991). Protein as a builder substance works to fix tissue damage or shrinkage (*perbaternak* and tissue maintenance) and in order to build new tissues (growth and protein production), protein can be catabolized into energy source or as substrate constituent for carbohydrate and fat tissue. Protein is also needed as constituent of hormones, enzymes and other essential biological substances such as antibody and hemoglobin (Scott *et al*., 1982). Protein is acid-forming food. Hence, excessive protein intake increases the body's acidity level, particularly in blood and tissues. This condition is called acidosis, with indigestion as its early symptom (Suprapto *et al*., 2005).

The protein content in commercial feed was 14% per 10 kg. Protein content in DEJUNGKIL feed: bran 11.9% (Hartadi *et al*.,1997), corn 9.5% (Amrullah, 2003), and soyabean meal 43.8% (*National Research Council*, 1994).

Calculation of protein content in DEJUNGKIL feed consisting of bran, corn, and soya bean meal with the ratio of 5 : 3 : 2 was bran (5 : 10 x 11.9 = 5.95%), corn (3 : 10 x 9.5 = 2.85%), and soya bean meal (2 : 10 x 43.8 = 8.76%). Therefore, the total protein content in DEJUNGKIL feed per 10 kg was 5.95 + 2.85 + 8.76 = 17.56%. Calculation of protein content in the mixed feed consisting of 50% commercial feed and 50% DEJUNGKIL feed was (protein value of commercial feed : 2) + (protein value of artificial feed : 2) = total protein content (14 : 2) + (17.56 : 2) = 7 + 8.78 = 15.78%.

Provision of commercial feed, DEJUNGKIL feed, and a combination of commercial and DEJUNGKIL feed were ineffective in increasing free-range chickens' weight due to the lack of real distinction among treatments. It is because the free-range chickens were not in their growth age and their genetics had slower growth compared to that of purebred or broiler chicken, which led to unsatisfactory weight increase.

5 CONCLUSIONS

Chickens fed with DEJUNGKIL feed (bran, corn, and meal) yields higher number of eggs in production compared to chickens provided with commercial feed and a combination of 50% commercial feed and 50% DEJUNGKIL feed. DEJUNGKIL feed (bran, corn, and meal) and a combination of 50% commercial feed and 50% DEJUNGKIL feed have no impact on free-range chickens' weight due to several factors such as age and genetics.

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