



Performance of *Gallus gallus domesticus* induced by turmeric (*Curcuma longa* L.) powder before puberty

Sukarman Hadi Jaya Putra*, Yohanes Bare, Mansur S, Oktavius Yoseph Tuta Mago, Yohanes Nong Bunga, Yohanes Boli Tematan

Biologi Education, Nusa Nipa University, Maumere, Indonesia

Email: sukarmanputra88@gmail.com*, bareyohanes@gmail.com, mansursaputra00@gmail.com, magoyotta@gmail.com, uma.Sandy910@gmail.com, yohanestematan@gmail.com

Article Information

Submitted: 2021-11-04

Accepted: 2022-07-21

Published: 2022-07-21

ABSTRACT

The lack of use of turmeric powder by farmers to increase the production of native chicken eggs such as increasing egg weight. The purpose of the research was to determine the effect of turmeric powder supplement (*Curcuma longa* L.) on the weight of native chicken eggs (*Gallus gallus domesticus*) that had been induced on standard feed before entering the pebertas period. The design of this study is to use a complete randomized design with a total of 3 treatments. Treatment consists of the first; chicken that is not given turmeric powder supplement (P0). Second; native chickens are given turmeric powder supplements at a dose of 216 mg/ chicken /day (P1). Third; is a native chicken given turmeric powder supplement with a dose of 324 mg/ chicken /day. Egg weight data is obtained from the results of measurements made every day when all chickens have laid eggs. One month's measurement data is taken from 28 days of measurement. All measurement data is analyzed with analysis of variance (ANOVA). If the data is influential, it is then tested with a Duncan test with a trust of 95 % ($\alpha > 0.05$). Supplementation of turmeric powder mixed in daily standard feed before entering puberty can have an effect on increasing the weight of free-range chicken eggs (*Gallus gallus domesticus*). There was a significant difference in free-range chickens that were given turmeric powder supplements at a dose of 324 mg/ chicken /day (483.6 mg) compared to chickens that did not receive turmeric powder supplements (405.4 mg).

Keywords: Animal protein; *Curcuma longa* L; *Gallus gallus domesticus*; puberty

Publisher

Biology Education Department
IKIP Budi Utomo, Malang, Indonesia

How to Cite

Putra, S., Bare, Y., S, M., Tuta Mago, O., Bunga, Y., & Tematan, Y. (2022). Performance of *Gallus gallus domesticus* Induced by Turmeric (*Curcuma longa* L.) Powder before Puberty. *Edubiotik : Jurnal Pendidikan, Biologi Dan Terapan*, 7(01), 79-86. <https://doi.org/10.33503/ebio.v7i01.1640>



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INTRODUCTION

Nutritional fulfillment of Indonesian people continues to increase every year. The government also provides intense counseling to achieve government targets in the fulfillment of community nutrition. One example is the free feeding of school-age children in villages (Umaroh and Vinantia, 2018). Examples of

nutrients that must be met are nutrients in the form of animal protein needs. The energy distribution of indonseia society in the three main nutritional components of the body is energy derived from protein as much as 9-14%, energy derived from fat as much as 24-36% and energy derived from carbohydrates as much as 54-63% (Hardinsyah et al., 2010). However, the government still can not reach the target because the latest data in 2011 decreased ie energy from protein should be 5-15 %, energy from fat should be 25-55% and energy from carbohydrates should be 40-60%.

The right strategy that can be done to meet the nutritional standards required by the government is to increase the production of food producing three main nutritional components in the body, one of which is the improvement of the livestock sector. Chicken (*Gallus gallus domestica*) cattle especially laying hens are examples of farm animals that can meet the basic nutritional needs of the community. The main production of chickens such as eggs and chicken meat can provide animal protein nutrients (Fransela.The et al., 2016). The nutritional content in chicken eggs is quite high which contains protein as much as 13.1% and fat as much as 11.1% in 100 mg egg samples. The content is almost the same as the content contained in other poultry eggs such as quail eggs. Cholesterol levels in village chickens are 732 mg /dl (Kusmanto et al., 2014), while quail eggs and duck are 385,78 mg / dl (Rahmat and Wiradimadja, 2011) and 715 mg / dl (Kasmirah et al., 2013). Such nutrients are related to the internal quality of eggs. However, in addition to internal there is also an external quality.

Some factors that affect the external quality of eggs such as egg weight are environmental and maintenance management. Feed or ration is part of environmental factors that affect the quality of quail eggs such as egg weight (Nugraha et al., 2018). Good quality of feed certainly has a good impact on egg production, which can also increase the weight of village chicken eggs (Estronca et al., 2014).

Feed is a mixture of several ingredients containing nutrients needed by livestock. Feeding, usually given with additional feed mixture with the aim to improve the performance of the livestock (Putra et al., 2015). Because additional feeding can help the optimal digesting and production process. Vitamins, amino acids, minerals, antibiotics, enzymes, prebiotics, probiotics, organic acids, dyes and antioxidants are commonly added to feed. One type of additional feed that can be used as a supplement for chickens is turmeric powder (Putra, 2018).

The results of research that tests the ability of herbal ingredients and increase egg production in poultry are among others; red ginger flour is given to native chickens (Siahaan et al., 2013), where there was a difference in the number of eggs produced in chickens given red ginger supplements (30 eggs/month), turmeric powder is given to quail (Liu et al., 2020), where curcumin supplementation of 150 mg/kg could increase the productive performance of laying hens, Curcuma zanthorrhiza and Curcuma zedoaria are given to quail (Rondonuwu et al., 2014), where the addition of 2% red ginger and white ginger can increase egg weight and egg yolk. Therefore, turmeric powder is a good ingredient in controlling the amount of lipids in the body. Where, lipids are factors that affect physiological conditions in improving poultry production, such as increased egg production of native chickens, so that it can have an impact on increasing the weight of eggs.

RESEARCH METHODS

The type of research is True Experimental. The methods in this study used a complete randomized design (Puteri et al., 2020). Test animals in the form of village chickens (*Gallus gallus domestica*). The chicken samples used were 150 chickens raised in cages. The number of native chickens used is 45 hens. The 45 samples were taken randomly from 100 4-month-old native chickens. The entire sample was divided into 3 treatment groups. each treatment group consists of 5 re-treatment groups. Therefore,

each treatment replay consists of 3 hens. Furthermore, at the age of six months, egg weight measurement is carried out. The weight of eggs is measured daily and in the data every month. Egg data is taken daily and data collection is done when it is 28 days. The variables analyzed are the number of eggs in each observation month, namely the observation of the 1st month and the observation of the 2nd moon.

The number of treatment doses of turmeric powder consists of 3 treatments. The first treatment is at a dose of 0 mg/ chicken /day, the second treatment is at a dose of 216 mg/ chicken /day and the third treatment is at a dose of 324 mg/ chicken /day (Putra and Tiring, 2020) dan (Putra et al., 2016). The parameter data observed in this study is the production of the number of village chicken eggs produced in each month of observation. The research was conducted in The Test Cage and Laboratory of MIPA FKIP Universitas Nusa Nipa Indonesia. The research was conducted for 12 months from January to December 2019.

The tools are laying hen coop, analytical balance, scales, buckets, drinking water tools, thermometers, higrometers and feed places. The ingredients are 4-month-old village chicken that has not entered the genital mature, turmeric powder and eggs. At the beginning, researchers prepared 16 kg of fresh turmeric rhizomes. The rhizome taken is the oldest rhizome of turmeric (*Curcuma longa L.*). The rhizome is then treated so that the bias to avoid turmeric powder with the condition is not wet / or contains water. The process is done to obtain turmeric powder, among others; turmeric is first peeled, then washed, then dried under the shade that is not exposed to the sun directly until the moisture content becomes 30 %, then ground. The manufacture of turmeric powder was conducted in the laboratory of MIPA FKIP Universitas Nusa Nipa Indonesia.-Turmeric powder that has been processed was then weighed according to the required dose treatment which is 216 mg/ chicken /day and 324 mg/ chicken /day. Each dose is mixed with standard feed for poultry, namely chicken pellet feed as much as 100 gr / cage / day. To facilitate the mixing of standard feed with turmeric powder, given a spray of water as much as 20 times spray (until turmeric powder mixes), then stirred until well blended. The next process is drying in a place that is not exposed to direct sunlight.

A standard feed mixture containing 100 g of turmeric powder is given every morning at 06.00 WIB in each cage according to the treatment. Turmeric powder is given before genital mature starts at the age of 4 months for 60 days.-The weight of the eggs is calculated starting when all samples of native chickens have laid all eggs, then recorded the number of eggs every day and accumulated when it reaches 28 days. The 28-day period is used as data to observe the weight of eggs every month. All measurement data is analyzed with analysis of variance (ANOVA). If the data is influential, it is then tested with a Duncan test with a trust of 95 % ($\alpha > 0.05$) (Putra, 2017) dan (Putra, 2018).

INDING AND DISCUSSION

Data on egg weight in the observation of the first, second, third and fourth weeks are presented in Figure 1 and Table 1. The picture explains that the village chickens given turmeric powder on standard feed before entering puberty have a positive impact on the egg weight of the village chicken. This is evidenced by the value of $P < 0.05$.

Table 1. Average Number of Free-Range Chicken Eggs at Observation Months 1 and 2 After Administration of Turmeric Powder Before Sexual Maturity

Egg weight (two-week observation)	P0	P1	P2	Anova P Value
1st two weeks	379.80 ± 8.76 ^c	417.80 ± 8.93 ^b	506.00 ± 35.04 ^a	0.000
2nd week	377.80 ± 10.16 ^c	410.20 ± 23.66 ^b	447.20 ± 13.54 ^a	0.000
3rd two weeks	405.00 ± 10.70 ^c	434.40 ± 6.73 ^b	450.40 ± 8.26 ^a	0.000

4th fortnight	405.40 ± 20.45 ^c	454.80 ± 23.09 ^b	483.60 ± 14.01 ^a	0.000
Description: A number followed by a different superscript on the line the same showed significantly different (P<0.05). P0: without turmeric powder (control), P1: giving turmeric powder at a dose of 216 mg/ chicken /day, and P2: giving turmeric powder at a dose of 324 mg/ chicken /day.				

Egg weight in every 2 weeks of observation for 4 observation data showed that turmeric powder had a significant impact (P<0.05) in increasing the weight of native chicken eggs given before puberty or genital cooking. Three initial observations showed the impact of turmeric powder was still low, but in the last observations showed that the difference between treating 324 mg/ chicken /day (483,3 mg) compared to the control not given turmeric powder (405,4 mg), found a significant difference. High that is 78.2 mg/2 weeks of observation. Therefore, the data in Figure 1 is clear that the village chickens given the highest dose of 324 mg/ chicken /day in every 2 weeks of observation showed an increase in weight. Where the difference between the dose of 324 mg/ chicken /day with control is decreasing at 2 weeks of observation 1, 2, and 3, namely 126.2 mg / 2 weeks observation., 69.8 mg / 2 weeks observation. These results explain that the impact of turmeric powder is not rapidly but slowly. This is related to the physiological activity that occurs in the body of native chickens. Optimal results will be seen after 4 months of administration of turmeric powder. Where, in the last observation the weight of the eggs of the village chickens given the highest dose is 324 mg/ chicken /day has the highest weight.

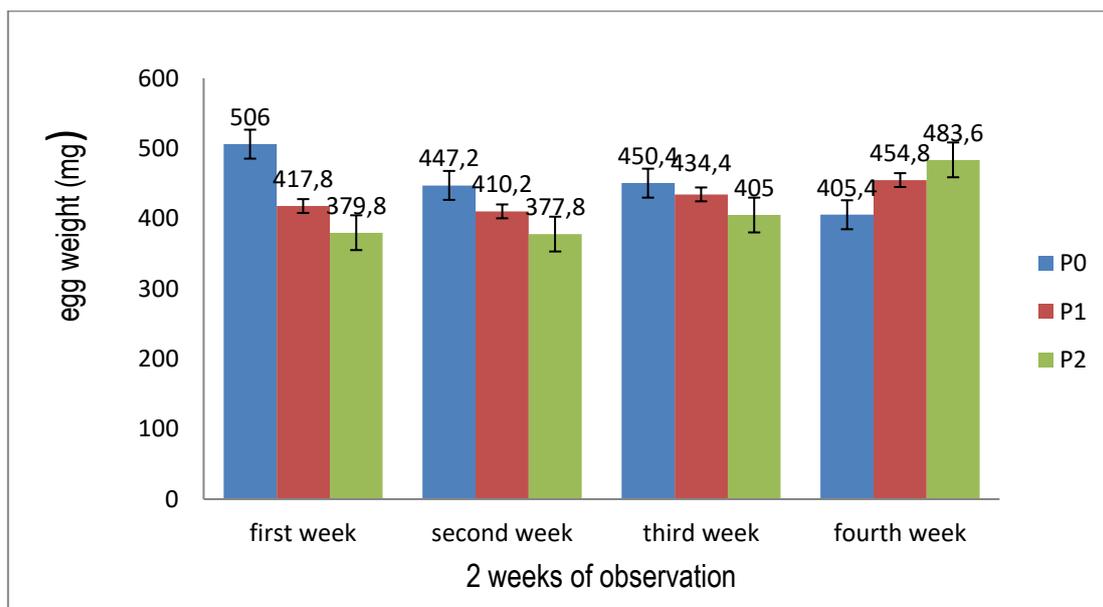


Figure 1. Village Chicken Egg Weights that Have Been Given Turmeric Powder Supplements before Puberty on Every Two Weeks Observations

The increase in the weight of the eggs of the village chickens in the last observation is due to the turmeric powder already has an impact on the physiological body of the village chicken. Different on the three initial observations. Turmeric powder has not had an impact on the physiological activity of the body of native chickens. Because turmeric supplements will have an impact after a few months of administration. Therefore, the optimal turmeric powder supplement is before puberty, which is about 14 days old until the egg-laying period. This is according to (Putra et al., 2015) report, that the effect of turmeric powder supplements has a good impact on the physiological activity of Japanese quail is if given at the age of 14 days until the egg-laying period. (Putra, 2017) added that the increase in the number of japanese quail eggs hierarchy also increased after induced turmeric powder on standard feed at the age

of 14 days until the egg-laying period. [Luthfi and Nur, \(2015\)](#) reported that quails given the highest dose of turmeric solution had the highest egg production of 70.31%, compared to control which only reached 58.03%.

The increase in the weight of chicken eggs given turmeric powder before genital cooking is due to the influence of curcumin and phytoestrogens present in turmeric. [Saraswati et al., \(2013\)](#), explained that the phytoestrogen content in turmeric reaches 6.73 %. An example is the increased activity of lipoproteins in controlling cholesterol and triglycerides in body tissues ([Ibi et al., 2021](#)) and ([Qureshi et al., 2011](#)). ([Liu et al., 2016](#)) explained that the effects of phytoestrogens on curcumin are similar to the effects of the hormone estrogen on the animal's body. Because phytoestrogens are responsible for spurring the activity of vitelogenin synthesis in the liver. Where the synthesis results are used as a precursor in the synthesis of vitelogenin.

[Rechtman et al., \(2010\)](#) explains that there is an increase in the number of chicken eggs when it is given turmeric powder before entering puberty, since it is an indication of phytoestrogen activity in increasing the synthesis of vitolegenin ([Raza et al., 2022](#)). In the presence of phytoestrogen activity in increasing vitolegenin synthesis, it means turmeric can aid estrogenic performance in poultry ([Ajaghaku et al., 2021](#)). Phytoestrogens can be bound to estrogen receptors. Estrogenic potential was once studied in fish. Where if fish is given phytoestrogens then there will be changes in the content of vitolegenin in the blood ([Saraswati et al., 2013](#)).

Metabolism of lipids such as vitelogenin produced by the liver will be distributed throughout the body's tissues. An example is the hierarchy of follicles in poultry. Egg production will increase if the content of vitelogenin in its follicle hierarchy is contained in large quantities. Therefore, more follicle hierarchy will be formed, so that a large number of eggs can be produced as well. ([Putra, 2017](#)) reported that the number of follicle hierarchies experienced a significant increase in japang quail ovaries given turmeric powder mixture on its standard feed. It also has an impact on increasing the weight of eggs.

The increase occurred because the physiological condition of the native chicken improved after being given turmeric powder supplements before puberty. This is in accordance with the results of the study [Putra et al.,\(2015\)](#), that the Japanese quail given a mixture of turmeric powder on its feed has an impact on the low content of triglycerides in the liver, serum and carcasses. In addition, the quality of eggs also increased in quails given the same treatment, where the cholesterol content in carcasses and eggs ([Putra et al., 2016](#)) and liver cholesterol ([Putra, 2018](#)) were lower than quails that did not get treatment.

The condition of lipid levels in the body of ungags can affect the physiological condition of poultry. Lipids are the basic ingredients used to synthesize vitellogenin ([Hiramatsu et al., 2015](#)). Such synthesis occurs in body tissues such as the liver and intestines. Lipids are distributed from the liver, meat, and blood ([Maiara et al., 2019](#)). This suggests that curcumin has an estrogenic effect in increasing the number of eggs in poultry. The optimal physiological condition has a good impact on the increasing number of chicken eggs after being given turmeric powder before puberty.

CONCLUSION

Supplementation of turmeric powder mixed in daily standard feed before entering puberty can have an effect on increasing the weight of free-range chicken eggs (*Gallus gallus domesticus*). There was a significant difference in free-range chickens that were given turmeric powder supplements at a dose of 324 mg/ chicken /day (483.6 mg) compared to chickens that did not receive turmeric powder supplements (405.4 mg).

ACKNOWLEDMENT

This research is a beginner lecturer grant funded by Kementerian Riset, Teknologi, dan Pendidikan Tinggi (KemenRistekdikti) and Thanks to the Universitas Nusa Nipa who has provided a place to carry out research.

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