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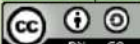
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Performance of *Gallus gallus domesticus* Induced by Turmeric (*Curcuma longa* L.) Powder before Puberty

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Article Information	ABSTRACT
Submitted: xx – xx – 202x Accepted: xx – xx – 202x Published: xx – xx – 202x	<p>The purpose of the practice was to determine the effect of turmeric powder supplement (<i>Curcuma longa</i> L.) on the weight of native chicken eggs (<i>Gallus gallus domesticus</i>) 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/tail/day (P1). Third; is a native chicken given turmeric powder supplement with a dose of 324 mg / tail / day. Each treatment is made 5 replays of treatment, so that 15 cages are treated. Each replication drum is given 3 hens. The administration of turmeric powder is carried out for 60 days, which starts from the time the village chicken is 4 months old. 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 % ($\alpha > 0.05$). The data stated that native chickens given turmeric powder supplements had higher egg weights on every two weeks of observation compared to chickens that were not given turmeric powder supplements before puberty. The highest dose of turmeric powder weight of native chicken eggs produced in each month of observation was a dose of 324 mg/tail/day. Therefore, turmeric powder has a good influence on the increase in the weight of native chicken eggs produced every two weeks of observation.</p>
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Publisher Biology Education Department IKIP Budi Utomo, Malang, Indonesia	Keywords: Puberty; <i>Curcuma longa</i> L.; Egg Weight; <i>Gallus gallus domesticus</i> . How to Cite Sukarman Hadi Jaya Putra (2022). Performance of <i>Gallus gallus domesticus</i> Induced by Turmeric (<i>Curcuma longa</i> L.) Powder before Puberty. <i>Edubiotik : Jurnal Pendidikan, Biologi Dan Terapan</i> , Vol(No), xx-xx. https://doi.org/10.33503/ebio.xxxx.xxx
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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. 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, 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%. This is in accordance with data Respati et al., 2013 explained that the value of our community calorie consumption in 2011 reached 1,952.01 kcal, and experienced a decrease in the value of calorie consumption in 2012 of 99.37 kcal. Where the value of calorie consumption obtained only reached 1,852, 64 kcal.

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 (Handarini et al., 2008).

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, while quail eggs and village chickens are 700 mg / dl (Rahmat and Wiradimadja, 2011) and 715 mg / dl (Saidin, 2000). 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 genetic, environmental, and maintenance management. Feed or ration is part of environmental factors that affect the quality of quail eggs such as egg weight (Anggraeni 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 (Luis 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), turmeric powder is given to quail (Hussein. M.A & Farghaly, 2010), Curcuma zanthorrhiza and Curcuma zedoaria are given to quail (Rondonuwu, et al., 2014). 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.

Therefore, testing by increasing the dose of turmeric powder supplement by 3-fold to 324 mg/chicken/day is expected to affect the metabolic activity of fat in the body of village chickens so that it can have an impact on increasing the weight of village chicken eggs.

RESEARCH METHODS

1. Times and Place Of Research

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.

2. Materials and Tools

The tools are laying hen coop, analytical balance, scales, buckets, drinking water tools, thermometers, hygrometers and feed places. The ingredients are 4-month-old village chicken that has not entered the genital mature, turmeric powder and eggs.

3. Research of Method

The methods in this study used a complete randomized design. Test animals in the form of village chickens (*Gallus gallus domestica*). 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 / tail / day, the second treatment is at a dose of 216 mg / tail / day and the third treatment is at a dose of 324 mg / tail / day (Putra, 2020 and 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.

4. Research procedures

a. Turmeric Powder Preparation

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.

b. Turmeric powder feeding

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.

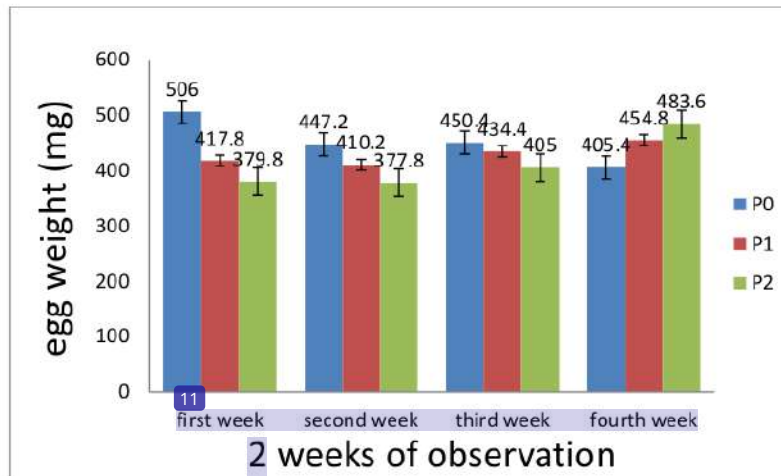
5. Parameters Of Research

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. The analysis software is SAS software, then continued with LSD (Least Significant Difference) test with 95% confidence ($\alpha < 0.05$) (Putra, 2017 and Putra, 2018).



FINDING AND DISCUSSION

Data on egg weight in the observation of the first, second, third and fourth weeks are presented in Figure 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 $P < 0.05$.



Information:

P0 : control 0 mg/ chicken /day

P1 : dose 216 mg/ chicken /day

P2: dose 324 mg/ chicken /day

Figure 1. Village Chicken Egg Weights that have been given turmeric powder supplements before puberty on every two weeks observations.

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/tail/day compared to the control not given turmeric powder showed a high material of 78.2 mg/2 weeks of observation.

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, et al., 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.

Therefore, the data in Figure 1 is clear that the village chickens given the highest dose of 324 mg /tail / day in every 2 weeks of observation showed an increase in weight. Where the difference between the dose of 324 mg / tail / 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 / tail / day has the highest weight. Luthfi et al. (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 %. Curcumin content plays a role in optimizing liver function when performing lipid metabolism (Sengupta et al. 2011). An example is the increased activity of lipoproteins in controlling cholesterol and triglycerides in body tissues (El-Sayyad at al., 2010 and Emadi, at al., 2007). Levi et al. (2009) 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.

Mouler 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 (Negi et al., 2007). In the presence of phytoestrogen activity in increasing vitolegenin synthesis, it means turmeric can aid estrogenic performance in poultry (Ravindran et al., 2007). 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 at 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 and Mansur, 2017) 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 vitelogenin. Such synthesis occurs in body tissues such as the liver and intestines. Lipids are distributed from the liver, meat, and blood. 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

Turmeric powder at a dose of 324 mg /tail / day was able to increase the weight of native chicken eggs up to 78.2 mg / 2 weeks observation.

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