

The Effect of Addition of Turmeric Flour and Ginger Flour on the Performance of Laying Hens

K. Huda, H. N. Siswara, and M. A. Atho'illah

¹Department of Animal Husbandry Politeknik Pertanian dan Peternakan Mapena, Tuban

Corresponding Author: khoirulhuda@mapena.ac.id

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ABSTRACT

This study aims to see the production performance of laying hens fed with turmeric flour and ginger flour. The laying hens used were 80 with Isa Brown strain aged 32 weeks. The maintenance of laying hens in this study was carried out intensively (caged). During the study, chickens were fed twice daily at 08.00 WIB and 15.00 WIB. Feed is given in a measured manner, namely 120 g/head/day. Drinking water is given in ad libitum measured. The parameters observed in this study are feed intake, hen day production, egg weight and feed conversion ratio. This study used a complete randomized design (CRD) with four treatments and four replications. They were given treatment through feed ration with the following details: P0 (feed), P1 (feed + 0.75% turmeric flour + 0.25% Ginger flour), P2 (feed + 0.25% turmeric flour + 0.75% Ginger flour) and P3 (feed + 0.50% turmeric flour + 0.50% Ginger flour). Giving turmeric flour and ginger flour into the feed had a significant effect on hen day production and egg weight ($P < 0.05$) and no significant effect on feed intake and feed conversion ratio. From the results of this study, it can be concluded that adding turmeric flour and ginger flour can produce hen day production and high egg weight.

Keywords: feed intake, hen day production, egg weight, feed conversion ratio

INTRODUCTION

Market demand for animal protein, both chicken and egg, continues to increase. Many factors influence this, including the higher income that affects the community's purchasing power and public awareness of the importance of consuming products of animal origin, especially the need for animal protein. Statistical data on the last five years of layer chicken egg production in East Java has relatively increased each year, reaching as much as 293,532.00 tons in 2013, 291,399.00 tons in 2014, 390,055.43 tons in 2015, 445,792.69 tons in 2016, and 455,600.13 tons in 2017 (BPS, 2018). Along with the increasing need for protein in the community, the livestock sector must continue to increase production to meet the animal protein requirement.

The use of antibiotics in the poultry industry is intended to improve growth, feed efficiency, and reduce disease. Based on Law No. 18 of 2009, juncto No. 41 of 2014 on animal husbandry and health, Article 22 paragraph 4C prohibits using feed mixed with certain hormones and antibiotic feed additives. Using antibiotics that do not comply with the recommended doses can harm the health of livestock and humans who consume them because bacteria resistant to certain antibiotics can pass on to humans (Afakye et al., 2020).

Efforts to reduce the use of antibiotics with herbal feed additives Turmeric flour and ginger flour are herbal ingredients that can be added to the ration of laying hens. The results showed maximum production by adding turmeric and ginger flour to broiler chickens and quails. As a phytochemical, turmeric can increase broiler chickens' productivity and optimize the product (Dono, 2013). The main chemicals of turmeric rhizome are dimethoxy curcumin, fat, phosphorus, curcumin, essential oil, protein, resin, oleoresin, bidesmetoxy curcumin resin, gum, calcium, and iron. The content is good for the growth of chickens (Sahay and Sharma, 2015).

Feeding livestock with herbal plants such as ginger extract (*Zingiber officinale*) and turmeric (*Curcuma domestica*) can improve the performance of the digestive organs, which can help in the process of absorption of ginger and turmeric and make livestock healthier so that livestock can produce maximum egg quality. Administration of 0.5% ginger can be an antioxidant by increasing oxidative stability but lowering cholesterol levels in broiler blood serum (Natsir et al., 2016). Emprit ginger contains 1.5–3.3% essential oil (Haryuni et al., 2017). Essential oils contain several active substances, including zingerone, shogaol, gingerol, and natural antioxidants that serve to prevent and treat diseases, for example, dizziness, colds,

rheumatism, impotence, cough, cancer, aches, flatulence, motion sickness, Alzheimer's, and liver disease which can help the process of absorption of nutrients so that production can be maximized (Iskender et al., 2017).

This study aims to determine the addition of turmeric flour and ginger flour to feed intake, hen day production, feed conversion ratio, and egg weight in laying hens.

MATERIALS AND METHODS

Time and Place

Field research was conducted in Margomulyo Village, Balen District, Bojonegoro Regency. Implementation time: July 27–September 14, 2023

Research Methods

The research method is an experiment with a complete randomized design (CRD). The treatment consisted of four treatments, with each treatment repeated four times. In each test, five laying hens were used. Variables include feed intake, hen day production, egg weight, and feed conversion ratio.

Research Materials

This study used layer-phase laying hens with Isa-Brown strains aged 32 weeks with as many as 80 heads, turmeric flour, ginger flour, complete feed laying hens, and battery cages with as many as 80 cages with a length, width, Width x height of 20 x 60 x 40 cm/unit. Each cage unit is filled with one chicken. Each cage unit has a place to feed and drink. The equipment used includes stationery, lamps as lighting, digital scales with a capacity of 500 g, cage cleaning tools and calculators.

Research Implementation:

1. Feeding and drinking

Chickens are fed twice a day at 08.00 WIB and 15.00 WIB. Feed is given in a measured manner, namely 120 g/head per day. Drinking water is given a measured libitum. Feed is used in the

form of complete feed production of PT. Cheil Jedang with feed code GL3-K1 with the following nutritional composition:

Table 1. Research Treatment

Nutritional Content	Percentage
Crude protein	17%
Crude Fat	3%
Crude fiber	7%
Calcium	3.25-4.25%
Phosfor	0.45%
Lisin	0.80%
Methionine	0.40%
Methionine+Sistin	0.67%
Treonin	0.55%
Tryptophan	0.18%

2. Concentration of turmeric flour and ginger flour

Chickens were randomly given four treatments. Each treat contains 20 chickens. Providing treatment through feed rations with the following treatment:

P0: Complete feed (Control)

P1: Complete feed + 0.75% Turmeric Flour + 0.25% Ginger Flour

P2: Complete feed + 0.25% Turmeric Flour + 0.75% Ginger Flour

P3: Complete feed + 0.50% Turmeric Flour + 0.50% Ginger Flour

Data Analysis

The data were analyzed using a variety of fingerprint analyses (Anova) under the design used, a complete randomized design (CRD). When will the real influence be continued with Duncan's double distance test?

RESULTS AND DISCUSSION

Feed Intake

The administration of turmeric flour and ginger flour had no effect ($P > 0.05$) on feed intake, with average values in Table 2:

Table 2. The average value of feed intake, hen day production, egg weight and feed conversion ratio

Treatment	P0	P1	P2	P3
Feed Intake (g)	116.25	118.25	118.25	118.25
Hen Day Production (%)	89.75	90.25	93	93.75
Egg Weight (g)	59.25	60	60.25	62.75
Feed Conversion Ratio	1.96	1.97	1.96	1.89

Information: P0: Complete feed (Control)

P1: Complete feed + 0.75% Turmeric Flour + 0.25% Ginger Flour

P2: Complete feed + 0.25% Turmeric Flour + 0.75% Ginger Flour

P3: Complete feed + 0.50% Turmeric Flour + 0.50% Ginger Flour

Feed intake is obtained from data on the amount of feed given minus the amount not consumed by laying hens. Based on Table 2, the average feed intake is 116.25–118.25. It is under the opinion of Kurtini (2008) states that the standard layer phase laying hen feed intake is 115–120 g/head per day. It is also supported by the statement (Huda et al., 2019) that the standard feed intake of Isa brown strains of laying hens aged 25–32 weeks amounted to 114 grams per head per day. Treatment in the study did not affect feed intake due to temperature factors in the farm. High temperatures can cause heat stress and decreased appetite. According to Huda et al. (2019), chicken feed intake is influenced by large body size, liveliness, temperature, quality, and quantity of feed.

Hen Day Production (HDP)

Giving turmeric flour and ginger flour has a genuine effect ($P < 0.01$) on hen-day production, with average values in Table 2. The calculation of HDP at the time of the study was calculated per treatment: egg production divided by the chicken population multiplied by 100%. It is under Yurlahmen (2008) states that daily egg production, or hen day production, is egg production in laying hens based on the percentage of egg production with the number of laying hens after recording. The highest treatment is found in P3, which is 93.75%. It is due to the highest dose of turmeric and ginger flour contained in P3. It is supported by Yulianti et al. (2015) statement that feeding with turmeric flour can increase fat metabolism through the work of curcuminoids and essential oils. The activity of curcuminoids and essential oils is cholagogue activity, which can increase the production and secretion of bile and pancreas that perform cholekinetic and choloretic work. Mario et al. (2013) state that curcumin can stimulate the secretion of digestive enzymes and lipase from the pancreas. Ration supplementation of curcumin at 0.2 g/kg can improve the size and weight of the small intestine to improve nutrient absorption (Rajput et al., 2013).

Factors affecting hen day production during the study were the quality of feed given turmeric flour and ginger flour. According to Park et al. (2012), adding 0.5% turmeric flour can significantly increase egg production in Lohman Brown laying hens aged 60–67 weeks. Rahardja et al. (2015) stated that adding 4% turmeric flour to the feed of hisex brown laying hens aged 80–92 weeks increased egg production. Differences

in the effect of turmeric flour supplementation in the feed of laying hens in various studies may be due to differences in the administration of turmeric flour, age, and strain of chickens used.

Egg Weight

The administration of turmeric and ginger flour had a significant effect ($P < 0.05$) on egg weight, with average values in Table 2. Turmeric flour and ginger flour have higher egg weights than the control. It shows that adding turmeric flour and ginger flour to the feed can increase the weight of eggs. The highest egg weight found in the treatment of P3 was 62.75 g. According to Hartono and Kurtini (2017), the egg's weight is influenced by the protein content in the feed; the amino acid content also plays a role in the egg's weight. The excellent protein, amino acids, and linoleic acid content in the feed will affect the weight of the eggs. In this study, turmeric flour and ginger flour can help absorb nutrients in digestion to produce maximum production. In addition, feed intake can also affect egg weight (Mario et al., 2013). According to Hassan (2016), who gave ginger flour and turmeric flour at a dose of 3%–7%, the higher the level of turmeric flour mixed into the feed, the greater the size and weight of the eggs. This study can be due to the low level of ginger and turmeric flour, equal to 1%.

The increase in egg weight occurs because turmeric supplementation in feed can affect the absorption of nutrients in the digestive tract of livestock. It is supported by the opinion of Natsir et al. (2016), which states that the function of turmeric herbs in improving the work of the digestive organs of poultry is to stimulate the gallbladder wall to secrete bile and stimulate the release of pancreatic juice containing amylase, lipase, and protease enzymes that are useful for improving the digestion of feed ingredients such as carbohydrates, fats, and proteins. Turmeric contains phytoestrogens that have the same function as estrogen in the body (Saraswati et al., 2013). Estrogen is a hormone that stimulates the biosynthesis of vitellogenin in the liver. Vitellogenin is a protein that forms the yolk. Vitellogenin that has been synthesized in the liver subsequently enters the blood circulation and is absorbed by the cytoplasm of oocytes (Iskender et al., 2017).

Feed Conversion Ratio

The administration of turmeric and ginger flour had no effect ($P > 0.05$) on the feed conversion ratio, with the following average

values in Table 2. Feed conversion during the study was calculated by dividing the feed consumed by the weight of the eggs produced. Yurumen's (2008) opinion states that feed conversion is the ratio between the amount of feed consumed and the weight of eggs produced. The lowest feed conversion in the P3 treatment was 1.89. Factors that affected the high and low FCR at the time of research were the drum environment and stress levels. An environment with high temperatures can affect feed consumption in chickens because chickens will drink more. It is under the statement of Huda et al. (2019) that the factors that affect feed conversion are the feed's physical form, the chicken's weight, and the maintenance environment.

The FCR value decreased with the addition of turmeric flour and ginger flour. Hartono and Kurtini (2017) state that feed conversion can be used to suspect profit. The lower the feed conversion, the more profitable the results obtained. Low FCR is caused by increased feed digestibility with the addition of turmeric flour and ginger flour, resulting in lower ration conversion rates. The digestibility of the feed increases because there are bioactive flavonoids, antioxidants, and anthocyanins in turmeric flour and ginger flour. Because the bioactive activity has antibacterial, antioxidant, and antifungal properties, it can improve the function of the gastrointestinal tract (Park et al., 2012). Rajput et al. (2013) explained that probiotics can be antibacterial antioxidants and suppress stress in poultry, so adding probiotics to poultry feed can increase FCR, digestive tract function, feed digestibility, and immune system.

CONCLUSION

This study shows that adding turmeric flour and ginger flour has no effect on feed intake or feed conversion ratio but has an effect on hen day production and egg weight. Hen Day Production was highest at P3 with a value of 93.75%, and egg weight was highest at P3 with a value of 62.75.

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REFERENCES

- Afakye, K., Kiambi S, Koka E, Kabali E, Dorado-Garcia A, Amoah A, Kimani T, Adjei B, Caudell MA. 2020. The impacts of animal health service providers on antimicrobial use attitudes and practices: An examination of poultry layer farmers in Ghana and Kenya. *Antibiotics* 9(9): 554.
- Badan Pusat Statistik (BPS). 2018. Produksi Telur Ayam Petelur di Indonesia Menurut Provinsi (Ton). www.bps.go.id diakses 4 Oktober 2023
- Dono, N. D. 2013. Turmeric (*Curcuma longa* Linn.) supplementation as an alternative to antibiotics in poultry diets. *Wartazoa*. 23:41- 49.
- Hartono, M., & Kurtini, T. (2017). Pengaruh pemberian probiotik terhadap performa ayam petelur. *Jurnal Penelitian Pertanian Terapan*, 15(3), 214-219.
- Haryuni, Widodo, E., & Sudjarwo, E., (2017). Efek penambahan jus & daun sirih (*Piper bettle* linn) sebagai aditif pakan terhadap performa ayam petelur. *Jurnal Riset & Konseptual*, 2(4), 429-433
- Hassan, S. M. 2016. Effect of Adding Different Dietary Levels of Turmeric (*Curcuma longa* Linn) Powder on Productive Performance and Egg Quality of Laying Hens. *Int. J. Poult. Sci.* 15(4): 156-160.
- Huda, K., W. P. Lokapirnasari., Soeharsono., S. Hidanah., N. Harijani dan R. Kurnijasanti. 2019. Pengaruh Pemberian Probiotik *Lactobacillus acidophilus* dan *Bifidobacterium* Terhadap Produksi Ayam Petelur yang Diinfeksi *Eshericia Coli*. *Jurnal Sain Peternakan Indonesia*. 14(2):154-160.
- Iskender, H., Yenice, G., Dokumacioglu, E., Kaynar, O., Hayirli, A., & Kaya, A. (2017). Comparison of the effects of dietary supplementation of flavonoids on laying hen performance, egg quality & egg nutrient profile. *British Poultry Science*, 58(5), 550–556. <https://doi.org/10.1080/00071668.2017.1349297>.
- Mario, W. L. M. S., E. Widodo dan O. Sjoftan. 2013. Pengaruh penambahan kombinasi tepung jahe merah, kunyit dan meniran dalam pakan terhadap pencernaan zat makanan dan energi metabolis ayam pedaging. *JIP*. 24(1):1-8.
- Natsir, M. H., E. Widodo dan Muharliien. 2016. Penggunaan Kombinasi Tepung Kunyit (*Curcuma domestica*) dan Jahe (*Zingiber*

- officinale*) Bentuk Enkapsulasi dan Tanpa Enkapsulasi terhadap Karakteristik Usus dan Mikroflora Usus Ayam Pedaging. Universitas Brawijaya Malang. 40(1): 1-10.
- Park, S. S., J. M. Kim, E. J. Kim, H. S. Kim, B. K. An and C. W. Kang. 2012. Effect of Dietary Turmeric Powder on Laying Performance and Egg Qualities in Laying Hens. *Koren J. Poult. Sci.* 39: 27-32.
- Rahardja, D. P., M. R. Hakim and V. S. Lestari. 2015. Egg Production Performance of Old Laying Hen Fed Dietary Turmeric Powder. *Int. J. Biol. Biomol., Agric., Food Biotechnol. Eng.* 9: 717-721.
- Rajput, N., Muhammad, N., Yan, R., Zhong, X., and Wang, T. 2013. Effect of dietary supplementation of curcumin on growth performance, intestinal morphology and nutrients utilization of broiler chicks. *Journal of Poultry Science*, 50(1): 44–52.
- Sahay, M., & Sharma, R., (2015). Antioxidant activity of *tectona grandis* linn stem bark extract. *International Journal of Innovative Science, Engineering & Technology*, 2(11), 906-908
- Saraswati, T. R., Manalu, W., Ekastuti, D. R., and Kusumorini, N. 2013. The role of turmeric powder in lipid metabolism and its effect on the quality of the first quail's egg. *Journal of the Indonesian Tropical Animal Agriculture*, 38(2): 123–130.
- Yulianti, D. L., Pratiwi Trisunuwati, O. Sjoftan and E. Widodo. 2015. Effect of *Andrographis paniculata* a Phytobiotic on Consumption, Feed Conversion and Mojosari Duck Egg Production. *International Journal of Poultry Science* 14 (9): 529-532.
- Yurlahmen, R. 2008. Performa Ayam Petelur Umur 21-27 Minggu yang Diberi Air Rebusan Daun Sirih Pada Air Minum. Program Studi Ilmu Nutri dan Makanan Ternak Fakultas Peternakan IPB. Bogor.