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THE USE OF TURMERIC (*Curcuma domestica* Val) MEAL IN THE RATIONAS FEED ADDITIVE ON HEN-DAY PRODUCTION AND EGG QUALITY OF SENTUL CHICKEN

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Abstract

Sentul chicken is recognized as a dual purpose local chicken breed and it is very potential because it growth rapidly and it has high eggs productivity. They are able to adapt to the environment and it remains productive even thoughthe diets given are low of quality, and they resist to diseases and the husbandry of the does not require a special skill. One of the alternative to improve eggs quality is by giving the ration added with a Turmeric (Curcuma domestica Val) meal. Turmeric is one of the medicinal plants used as an herbal medicine containing atsiri oil (volatile oil) and curcuminoid. The aim of this research was to evaluate the hen-day production and thequality of Sentul's egg added turmeric meal in the ration. Sixty Sentul Chickens at 42 weeks of age were used. The data were analyzed using a Completely Randomized Design consisted of four treatments, which were 0, 0.1, 0.2, and 0.3 percent of turmeric meal, and each treatment was repeated five times. The statistical analysis indicated that the effect of the addition of turmeric meal (Curcuma domestica, Val) in ration was significant (P<0.05) on hen-day production, egg weight, and egg yolk colorscore, but it was not significant (P>0.05) on yolk index, Haugh unit value and shell thickness. All and all the use of turmeric meal in the ration of Sentul chicken up to 0.2 percent support the high quality egg formation, and theaddition of 0.3 percent turmeric into Sentul chicken's ration have positive effect on egg yolk color.

Key words*: Sentul chicken, turmeric (Curcuma domestica Val) meal, hen-day production,egg quality.*

INTRODUCTION

Sentul Chicken is a local chicken from Ciamis region, West Java, Indonesia, and it is a dual purpose type which can bepurposed for eggs and meat production.

They are able to adapt with the environment and it remains productive even though their diets are low of quality.

This chicken resiston diseases and their breeding does not require a special technique (Widjastuti, 1996).

The egg of Sentul chicken has high nutritional value which can be accepted by all consumers. The yolk color of it has its own charm, thus from the observations,the yolk color which is paler thanthat of local chicken eggs is often rejected by the cake manufacturing industry. Meanwhile, there is a growing assumption aboutthe egg yolk color which is often defined as the quality of nutrient that the more yellow of yolk is the higher content of nutrition. So in order to face this market assumption, some treatments have to be conducted.

Recently, the demand of the eggs has to be free from the residue of any drugs. The presence of pathogenic bacterial which is causing infectionis often causing diseases in chickens, so it makesthe livestock productivity are decreasing. In order to avoid the bacterial infection, usually, it is given the antibiotics (Agustina, 2006; Khusman et al., 2008). However, the utilization of antibiotics as feed additives is prohibitedsince it endangers the health of both humans and livestock, because, the residue is left behind as well as the resistance of the bacteria. Therefore, in order to face that problem, the alternative which has a same purpose but not harmful to the health of livestock is needed, and the answer is phytobiotic.

The solution, the alternative food ingredients which has good quality,is expected to be able to reduce the production cost. Moreover, several studies have been conducted by using natural ingredients in rations containing curcumoid such as *Curcuma xanthorriza* Roxb, garlic or *Curcuma zedoaria* Rosc meal, which was frequently used as the ingredients of

traditional medicine or herbs (Maheswari, 2002).

Turmeric (*Curcuma domestica* Val) is one of phytobiotic use as herbal medicine component production.

Turmeric are very nutritious for healing the stomachache, reinforcing the digestion and appetite, stimulating intestine movements and eliminating the indigestion (Mangisah, 2005; Widjastuti, 2010).

Turmeric is one of the herbs which can be used as feed additives and it has good enough quality when it is added to ration for poultry (Pratikno, 2010). Turmeric can be used as growth promoters and immunomodulatory or antibacterial in poultry.

Turmeric contains 6.3% crude protein, 5.1% crude fat, 69.4% carbohydrates, 13.1% moisture (Chattopadhyay et al., 2004), 2.4 to 4% essential fatty acids and 4.7 to 8.2% crude ash (Kermanshahi and Riasi, 2006).

The curcuminoid content in turmeric is 3-5% curcumine and its derivatives, called demethoxycurcumine and bisdemethoxy-curcumine and it is also containing atsiri oil (volatile oil) approximately 2.5 to 6%.

Curcumine can improve the performance of the digestive tract, the immune system of poultry, thus it can produce the good quality carcass. In addition to prevent diseases, turmeric can also provide color on the carcass and egg yolk (Somaatmadja, 1981).

Atsiri oil can help the digestion by stimulating the nervous system secretion, produced digestive enzymes that contain pepsin, trypsin, lipase, amylase and secreted into stomach and intestines whichincreas nutrients metabolism (Widjastuti, 2010).

Furthermore, turmeric contains many flavonoid compounds acting as phytoestrogen which have estrogen-like activity, enhancing vitellogenin (an egg yolk protein precursor) synthesis during the egg laying period via it'srespond to estrogen (Saraswati et al., 2013; Rahardja et al., 2015).

Based on those problems, this study was conducted to evaluate the effects of the addition of four different dietary levels (0, 0.1, 0.2, and 0.3%) of turmeric *(Curcuma domestica Val*) meal on Hen-day production and to evaluate egg quality of Sentul chicken hens from 42 to 50 weeks of age.

Figure 1. The Sentul Hen

MATERIALS AND METHODS

The research used sixty Sentul Chickens at 42 weeks of age with 1.36% coefficient variation. The hens kept in litter system, as much as 20 flock, and each unit was consisted of 3 chickens.

The ration which was consisted of yellow corn meal, fish meal, rice bran meal, soy-bean meal, turmeric meal, $CaCO_3$ and bone meal, resulted 15 percent protein and 2750 Kcal/Kg of metabolism energy.

The formula rations were:

R_0 Based ration without turmeric meal
R_1 Based ration + 0.1% turmeric meal
R_2 Based ration + 0.2% turmeric meal
R_3 Based ration + 0.3% turmeric meal

The composition of based ration is in Table 1, while the nutrient and metabolism energy content are in Table 2.

Table1. Composition of based ration (%)

No	Ingredients	Based Ration
1	Yellow corn	58.00
2	Soy-bean meal	4.75
3	Rice bran meal	28.00
4	Fish meal	8.00
5	CaCo3	0.50
6	Bone meal	0.75

Table 2. The nutrients and metabolism energy content in rations

No	Nutrition Component	Based Ration
1	Crude Protein (%)	15.00
2	Crude Fat (%)	6.66
3	Crude Fiber	4.89
4	Calcium (%)	1.05
5	Phosphorus (%)	0.58
6	Lysine (%)	0.97
7	Methionine (%)	0.35
8	Metabolic Energy (kcal/kg)	2755

The Completely Randomized Design (CRD) was used by 4 treatments, and each treatment was replicated 5 times. The data was analyzed by using analysis of variance and the difference among treatments which were tested by using Duncan'S Multiple Range Test. Variable analyses were egg weight, yolk index, Haugh unit value, shell thickness and yolk color score.

RESULTS AND DISCUSSIONS

The effect of turmeric treatment on theegg weight, yolk index, Haugh unit value, shell thickness and yolk color score of Sentul chicken egg is shown in Table 3.

Table 3. The average of the egg weight, yolk index, Haugh unit value, shell thickness and color yolk score

Variable	R0	R1	R2	R3
Hen Day (%)	44.80$^{(b)}$	46.56$^{(a)}$	47.19$^{(a)}$	45.20$^{(b)}$
Egg Weight (g)	41.35$^{(b)}$	43.76$^{(a)}$	44.38$^{(a)}$	40.87$^{(b)}$
Yolk Index	0.36$^{(a)}$	0,38$^{(a)}$	0.40$^{(a)}$	0.36$^{(a)}$
Haugh Unit	95.85$^{(a)}$	96.56$^{(a)}$	97.19 (a)	95.36$^{(a)}$
Shell Thickness	0.33$^{(a)}$	0.33$^{(a)}$	0.34$^{(a)}$)	0.33$^{(a)}$
Color Yolk score	8.01$^{(a)}$	8.67$^{(b)}$	8.93$^{(b)}$	9.01$^{(b)}$

Hen-day Production and Egg Weigh

The average hen-day production and egg weight were various. The R3, the giving of 0.3 percent turmeric meal in the ration, is the lowest while the giving of 0.2 percent turmeric meal was the highest (Table 3). The analysis of variance showed that treatment addedby turmeric meal had significant effect on the Hen-day production and egg weight. The treatment of R1 and R2 on hen-day produce and egg weight were significantly higher than R0 and R3. The difference was due to the consumption of ration containing turmeric meal which was better than that onbased ration without turmeric meal. The decreasing of hen-day and egg weight in based ration containing 0.3% turmeric meal (R3) was reducingthe feed consumption. High turmeric content in the ration will reduce feed consumption, because turmeric can affect the aroma and appetite. This is due to the bitter taste and pungent smell, so the palatability of the ration was decreasedresulting the decreased of feed intake. It means that the turmeric meal from 0.1-0.2% in the ration did not affect the aroma, the palatability of the diets and appetite, but it hada limit on hen-day production achievement. The addition until 0.2% turmeric meal in the ration Sentul chickens had advantages, because the bioactive substance such as curcumin and atsiri oil can help digestion by stimulating the nervous system secretion, producing digestive enzymes which contains pepsin, trypsin, lipase, amylase and secreted into stomach and intestines that increased nutrients metabolism. The high dose ofturmeric used in the ration can be poisonous, so the right utilization of turmeric meal can improve the hen-day and Sentul chicken egg weight.

In addition, the results were similar to those found by Lagana et al. (2011), who found that the addition of 0.2% turmeric into layinghen diets did not affect the egg production, feed consumption and egg specific gravity. Moreover, Riasi et al (2012) suggested that the addition of 0.2% turmeric powder into laying (Hy-Line W-36) hen diets from 100-104 weeks of age significantly increased the egg mass and it improved the feed conversion ratio.

Yolk Index and Haugh Unit

Table 3 shows that yolk index and Haugh unit tends to increase proportional because of level of turmeric meal increased in the ration. Analysis of variance showed that by addition of turmeric meal as feed additive in ration Sentul chicken has no significant effect on yolk index and Haugh unit. It is meaning that the turmeric meal from 0.1-0.3% in the ration gave the best results on yolk index and Haugh unit. The eggs were tested had relatively similar levels of freshness, because the retrieval of eggs and egg yolk index measurement carried out in the same time. Mountney (1976) states that a fresh egg has a variety of egg yolk index values are relatively small. As the average value of yellow index normal egg range 0.30 to 0.50.

The Haugh unit value of Sentul chicken egg was still included in grade AA, because it has

the value above 75. The quantity of Haugh unit value wasaffected by genetics, the age of chicken, season and storage conditions. According to Sherif (2016), the variations in the effects of the addition of turmeric powderinto laying hen diets among the different studies might be attributed to the differences in the concentrationlevels and periods of turmeric supplemented, age and strain of laying hens, turmeric sources, stability of active compounds, drying method, turmeric products, experimental methods used.

Shell Thickness

The average range shell thickness is 0.33 – 0.34. The range is in the range chicken egg shell thickness in general (Nataamijaya et al., 2003). The analysis of variance showed that by giving turmeric meal as feed additive until 0.3% in the ration did not significantly influence ($P>0.05$) the shell thickness. It means that the bioactive turmeric which was curcumin could improve the performance of the digestive tract, so the absorption calciumand phosphorus were increasing consequently resulting thick eggshell thickness.

Egg Yolk Color Score

Table 3 shows that egg yolk color score tends to increase proportional, because of the increasing of turmeric mea in the ration. The results of variance analysisshowed that theaddition of turmeric until 0.3% in ration provided significant effect ($P<0.05$) on egg yolk color score. Turmeric contains xanthophyll compounds, thus the addition of high doses of turmeric in the ration can produce more natural xanthophyll, so the egg yolk color score is going to increase. According to Gilbert (1971), there was a linear relationship between the level of pigment with the egg yolk color. The molecular structure xanthophyll in turmeric meal decisive to theegg yolk color, because most of xanthophyll from the food is used first for pigment egg yolk color production and only a few are used for the pigment of skin tissue. In accordance with the opinion of Edjeng et al. (2002) which states, if the egg-laying chickens quickly largely xanthophyll of ration, it can be used to production of egg yolk color pigment and just a little to the skin tissue, hence the chickens after the long period of the egg, the network becomes pale or bluish white.

CONCLUSIONS

It can be concluded that the utilization of the Turmeric (*Curcuma domestica* Val) until 0.2% level in ration was still able to support a good result on hen-day production and egg weight, furthermore the addition of 0.3% turmeric into Sentul chicken ration have positive effect on egg yolk color.

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REPRODUCTION, PHYSIOLOGY, ANATOMY