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

Tuti WIDJASTUTI, Iwan SETIAWAN, ABUN

Faculty of Animal Husbandry, Padjadjaran University, Indonesia
Phone: +620227798241, Fax: +620227798212

Corresponding author email: tuti_widjastuti@yahoo.com

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 thought the 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 the quality 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 color score, but it was not significant (P>0.05) on yolk index, Haugh unit value and shell thickness. All and the use of turmeric meal in the ration of Sentul chicken up to 0.2 percent support the high quality egg formation, and the addition 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 be purposed 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 than that of local chicken eggs is often rejected by the cake manufacturing industry. Meanwhile, there is a growing assumption about the 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 infections is often causing diseases in chickens, so it makes the 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 prohibited since 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 curcuminoid such as Curcuma xanthorrhiza 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 phytophobic 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 which increase 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’respond 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.

**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, CaCO3 and bone meal, resulted 15 percent protein and 2750 Kcal/Kg of metabolism energy. The formula rations were:

- **R0** Based ration without turmeric meal
- **R1** Based ration + 0.1% turmeric meal
- **R2** Based ration + 0.2% turmeric meal
- **R3** 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.

<table>
<thead>
<tr>
<th>No</th>
<th>Ingredients</th>
<th>Based Ration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yellow corn</td>
<td>58.00</td>
</tr>
<tr>
<td>2</td>
<td>Soy-bean meal</td>
<td>4.75</td>
</tr>
<tr>
<td>3</td>
<td>Rice bran meal</td>
<td>28.00</td>
</tr>
<tr>
<td>4</td>
<td>Fish meal</td>
<td>8.00</td>
</tr>
<tr>
<td>5</td>
<td>CaCo3</td>
<td>0.50</td>
</tr>
<tr>
<td>6</td>
<td>Bone meal</td>
<td>0.75</td>
</tr>
</tbody>
</table>

**Table 2. The nutrients and metabolism energy content in rations**

<table>
<thead>
<tr>
<th>No</th>
<th>Nutrition Component</th>
<th>Based Ration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Crude Protein (%)</td>
<td>15.00</td>
</tr>
<tr>
<td>2</td>
<td>Crude Fat (%)</td>
<td>6.66</td>
</tr>
<tr>
<td>3</td>
<td>Crude Fiber</td>
<td>4.89</td>
</tr>
<tr>
<td>4</td>
<td>Calcium (%)</td>
<td>1.05</td>
</tr>
<tr>
<td>5</td>
<td>Phosphorus (%)</td>
<td>0.58</td>
</tr>
<tr>
<td>6</td>
<td>Lysine (%)</td>
<td>0.97</td>
</tr>
<tr>
<td>7</td>
<td>Methionine (%)</td>
<td>0.35</td>
</tr>
<tr>
<td>8</td>
<td>Metabolic Energy (kcal/kg)</td>
<td>2755</td>
</tr>
</tbody>
</table>
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 the egg 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

<table>
<thead>
<tr>
<th>Variable</th>
<th>R0</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hen Day (%)</td>
<td>44.80(b)</td>
<td>46.56(b)</td>
<td>47.19(a)</td>
<td>45.20(b)</td>
</tr>
<tr>
<td>Egg Weight (g)</td>
<td>41.35(b)</td>
<td>43.76(a)</td>
<td>44.38(a)</td>
<td>40.87(b)</td>
</tr>
<tr>
<td>Yolk Index</td>
<td>0.36(a)</td>
<td>0.38(a)</td>
<td>0.40(a)</td>
<td>0.36(a)</td>
</tr>
<tr>
<td>Haugh Unit</td>
<td>95.85(a)</td>
<td>96.56(a)</td>
<td>97.19(a)</td>
<td>95.36(a)</td>
</tr>
<tr>
<td>Shell Thickness</td>
<td>0.33(a)</td>
<td>0.33(a)</td>
<td>0.34(a)</td>
<td>0.33(a)</td>
</tr>
<tr>
<td>Color Yolk score</td>
<td>8.01(a)</td>
<td>8.67(b)</td>
<td>8.93(b)</td>
<td>9.01(b)</td>
</tr>
</tbody>
</table>

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 added by 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 on based ration without turmeric meal. The decreasing of hen-day and egg weight in based ration containing 0.3% turmeric meal (R3) was reducing the 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 decreased resulting 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 had a 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 of turmeric 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 laying hen 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 was affected by genetics, the age of chicken, season and storage conditions. According to Sherif (2016), the variations in the addition of turmeric powder into laying hen diets among the different studies might be attributed to the differences in the concentration levels 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 calcium and 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 analysis showed that the addition 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 the egg 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.

**REFERENCES**
REPRODUCTION, PHYSIOLOGY, ANATOMY
IMPROVING MILK AND SOYBEAN FERMENTED WITH PROBIOTIC BACTERIA ON HDL AND LDL BROILER BLOOD
Lovita Adriani, Yulia Fransiska, Diding Latipudin, Heri Supratman
University of Padjadjaran, Faculty of Animal Husbandry, Bandung, Indonesia
Corresponding author e-mail: lovita_yoghurt@yahoo.co.id

Abstract
Probiotics can play an important role in immunological, digestive and respiratory functions and could have a significant effect in alleviating lipid. Therefore, a study was conducted to evaluate the effect of Milk and Soybean Fermented with Probiotic on cholesterol status i.e. High Density Lipoprotein (HDL) and Low Density Lipoprotein (LDL) indices of broilers. Materials and Methods: A total of 120, 5 weeks old broilers were used in this study in a Complete Randomized Design (CRD). The birds were randomly assigned into six treatment groups of P0, P1, P2, P3, P4 and P5 with 24 birds treatment G1 replicated 4 times of 5 birds each. The broiler in first group (P0) basal feed, (P1) basal feed with cow’s milk, (P2) basal feed with milk fermented, (P3) basal feed with soy milk fermented, (P4) basal feed with combination milk fermented and soy milk fermented, (P5) basal feed with combination milk fermented and soy milk fermented with different bacteria. Results: There were non-significant (p>0.05) increasing High Density Lipoprotein (HDL) level of broiler due to probiotic supplementation. Increasing blood HDL levels is (69.73 mg/dL) in group fed P4 (combination milk fermented and soy milk fermented) compared to control (45.16 mg/dL). A statistically significant (p<0.05) decrease in total number of Low Density Lipoprotein (LDL) level. Lowest LDL level (33.36 mg/dL) was found in group fed (P4) combination milk fermented and soy milk fermented. In conclusion, addition of probiotic milk fermented with soy milk fermented had beneficial effect increasing HDL levels and decreasing LDL levels broiler blood.

Key words: probiotic, fermented milk, fermented soy milk, broiler, HDL, LDL.

INTRODUCTION
Cholesterol in the blood circulation in lipoprotein particles. In lipoprotein, the most influence on cholesterol is High Density Lipoprotein (HDL) and Low Density Lipoprotein (LDL). The level of HDL and LDL cholesterol is needed to determine which is the total amount of LDL, HDL and 1/5 triglycerides in each deciliter of blood. Usually, the total and HDL cholesterol levels can describe the general conditions of cholesterol levels. The goal of this study is expected to add science and knowledge, especially regarding meat quality of broilers. In addition, fermented milk, soy milk and the combinations with probiotics bacteria can increase levels of high density lipoprotein (HDL) and decrease levels of low density lipoprotein (LDL) blood broiler. HDL removes cholesterol from tissues and transports it to the liver. HDL is created mostly from components from other degraded lipoproteins. HDL converts cholesterol to cholesteryl esters by LCAT, an enzyme activated by apoA-I in HDL. HDL appears to get cholesterol to the liver 1) by transfer the cholesteryl ester to VLDL which after degradation IDL and LDL is taken to the liver and 2) by direct interactions between HDL and the liver via a specific HDL receptor. The liver disposes of cholesterol as bile acids. HDL is also called “good cholesterol” because it is associated with lowering cholesterol levels. VLDLs are synthesized by the liver, like chylomicrons, are degraded by lipoprotein lipase. VLDL, IDL, and LDL are interrelated. IDL and LDL appear in the circulation as VLDL remnants. VLDL is converted to LDL by removal of all proteins except apo B-100 and esterification of most of the cholesterol by lecithin-cholesterol acyl transferase (LCAT) associated with HDLs. The esterification occurs by transfer of a fatty acid from lecithin to cholesterol (forming lysolecithin). HDL can be classified into larger, less dense HDL2 or smaller, denser HDL3 which falls within the density ranges 1.063 – 1.125 and 1.125 – 1.210 g/mL, respectively. Although the major proportion of HDL is normally present in HDL3, individual variability in HDL levels in human populations usually reflects different amounts of HDL2.