Layer Male Chicken Farming: Characteristics and Net Income in west Lombok, Indonesia

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by Djoko Kisworo

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Mould Bread in The Feeding of Local Ducks under Small Holder Management in Lombok Indonesia

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ABSTRACT

An experiment was conducted with 75 twenty four weeks old local ducks feeding on three diets formulated by using the mould bread (MB) to assess its effect on laying performance. Three experimental diets were used in the study and proposed in a completely randomized design (CRD). Each treatment group was replicated five times with 5 birds per replicate. Diet 1 (T0) as a control feed was a conventional standard commercial layer duck feed. Diet 2 (T1) was a practical feed applied by small holders with 262 g/kg of dry matter inclusion of mould bread. Diet 3 (T2) was a practical feed applied by small holder with 297 g/kg inclusion of mould bread. Egg production increased ($p<0.05$) by 32.4 per cent and 3.2 per cent of the control when T1 and T2 diets respectively were included in conventional feeding system in small holder managements. Yolk color was lower ($p<0.05$) in group T1 and T2 (9.8) compared to T0 (12.7). Fresh egg yolks were not improved by the dietary tests. Layer ducks fed MB T1 and T2 had somewhat heavier egg weight (62.67g and 61.80g respectively) ($p=0.8233$) compared with layer ducks fed the standard commercial diet (61.44g). Feed costs of the MB ingredients were only 58.3 and 56.3per cent (0.28 USD and 0.27 USD) respectively compared with the standard diet (0.48 USD).

Keywords: *egg production, egg weight, feed cost*

INTRODUCTION

The duck industry in Indonesia was dominated by small holders which accounts for 2.3 per cent of poultry population and contributes 1.5 per cent of the duck meat and 15.15 per cent of the duck eggs (DGLAHS, 2016). In other words, layer ducks are more popular than meat ducks. Under an intensive management system applied by the small farmers, the ducks are fed various local feed stuffs although commercial feeds are also available. Rice bran (RB) and yellow corn (YC) are the two energy sources that have long been known as feed ingredients in conventional poultry ration. However, recently the price of these feed stuffs has increased significantly which make the feed cost higher when confinement management system continuous to be implemented. An alternative energy source is necessary to sustain the existence of the small scale farmers. Mould bread is a waste of the retail bread of home industry when the expired date was over.

Feeding with mould bread now is becoming accepted as a replacer of rice bran and yellow corn diets for both meat and layer ducks at any growing periods in small scale duck farmers in Lombok, Indonesia. The main reason is because of little cost for the mould bread that could reduce the feed cost which accounts for 60-70 per cent of the production cost. However, this may cause problems when excessive inclusion is applied because little information on this field for laying ducks is available. Therefore, this study was undertaken to evaluate the inclusion levels of mould bread which offer the maximum laying performance without any problems both to the birds and the consumers.

MATERIALS AND METHODS

Experimental design

The experiment was carried out at a duck farm of small group farmers in Mataram, Lombok Indonesia between October 2016 and February 2017, in the rainy season. A total of seventy five twenty four –wk old laying local ducks (Mojosari ducks) were purchased from the local breeder and wing banded, then weighted on an individual basis. They were then allocated randomly to three dietary treatments with five replicates of five birds. They were again weighted at the end of the study to evaluate the body weight changes that may occur.

Animals, housing and management

In a shedding house, the ducks were divided into pens floors which were covered by rice husk with average density of 4 birds/m^2. The pens were equipped with two round plastic basins with 20 cm in diameters for a feeder trough and for a drinking water. Lightings were natural during the day and provided by electric bulbs at night. There were no routine management practices such as health and disease control programs were applied. Also, no commercial vitamin and minerals were added into the diets.

Diets and Treatments

The birds were assigned to a completely randomized design. Seventy five of laying ducks were divided into 3 groups of dietary treatments with five replicates (25 birds/dietary treatment) and fed on a commercial layer concentrate and mixed with yellow corn and fine rice bran in the modified ratio of 2:4:4 respectively according to a

commercial standard feed acting as the control group. The two other dietary treatments were formulated diets containing 262 and 297 g/kg of dry matter (DM) of mould breads to produce isoenergetic diets of 3,200 kcal /kg (Table 1). The rice bran used in this study was slightly coarse because our preliminary study found that the duck ate more in the coarse rice bran when mixed with the loaves bread than in the fine rice bran. This is more related to the characteristics of wheat flour which are sticky and viscous making birds difficult to eat or to take up the feed. Restricted feeding methods were applied due to the duck eating behavior to avoid over spillage. Birds had free access to drinking water during the experimental period. The diets were offered in a wet form. Spillage of the feed was calculated by weighing and drying the remaining feed on the feeder and drinking water to correct the feed intake.

To ascertain the nutrient content of the ingredient, proximate analysis was applied. Prior to the study, all feed ingredients were evaluated for the proximate composition according to the methods of the Association of Official Analytical Chemists (AOAC, 1995). The results of proximate analysis of the mould bread are shown in Table 2.

Table 1: Ingredient and calculated nutrient composition of experimental diets.

Ingredient (g/kg)	Dietary treatment		
	T0	T1	T2
Yellow corn (YC)	330	279	206
Rice bran (RB)	470	157	154
Commercial layer concentrate (CLC)	200	0	0
Ground fresh water fish (GFWF)	0	302	325
Mould bread (MB)	0	262	297
Total	1,000	1,000	1,000
Calculated nutrient composition			
Metabolizable Energy (kcal/kg)	3,100	3,100	3,100
Crude Protein	170	195	185
Crude Fiber	80	83	80

*% of DM ; No vitamin and mineral added

Table 2. Proximate analysis of expired bread of bakery home industry used in this experiment (%)*

Variety	Moisture	Ash	Ether extract	Crude Fibre	Crude Protein	Carbohydrate
Chocolate bread	23.7	0.81	12.6	0.02	5.4	57.3
Cheese bread	34.3	0.51	7.9	0.14	7.0	49.8
Plain bread	30.6	1.21	9.2	0.08	6.9	51.7

*Analyzed values – 2017

Measurements

The data on feed consumption, egg production and egg weight were recorded daily from 24 to 34 weeks (for the 10- wk of the experimental period). FCR was calculated from the daily feed intake and the egg mass. Egg mass was also calculated from egg weight multiplied by daily egg production. Egg quality characteristics viz. egg weight, fresh yolk weight and yolk pigmentation were measured during the experimental production period. A total number of 150 eggs (5 eggs from each dietary treatment) per week collection were taken and broken out on a clean Petri dish and then yolk color was determined against the Roche Yolk Color Fan scale (RYCF) as a tool for a standard color.

Data Analysis

The data collected for 10 wk of the experimental study were subjected to the General Linear Model (GLM) procedure of SAS version 8 (SAS, 1999). To compare means, Duncan's multiple range test was applied at the level of $p < 0.05$.

RESULTS AND DISCUSSIONS

Body weight changes and laying performance

To the best our knowledge, this is the first study examining the potential expired bread (mould bread) in laying ducks. The author's belief that the ducks are capable of using the mould bread into the desirable production performance. As seen in Table 3 that the initial and final body weights as well as weight gain of the laying ducks fed mould loaves of bread were not significantly different ($p>0.05$) from the control diet although the T1 showed the heaviest birds (1569 g). The result therefore suggests that

feeding to laying ducks with mould loaves of bread did not show any detrimental effects on bird's health and their palatability associated with the fungal contamination. This tendency has also been shown on the laying performance.

Feed intake and egg production were affected by dietary treatments ($p<0.05$) but there is no effect on feed conversion ratio attributable to the treatments. Reduced feed intake by 14.9 per cent and 18.6 per cent of the control respectively were observed when 262 and 297 g/kg mould bread were included in a conventional feeding system in small holder managements. Conversely, egg production of T1 and T2 diet fed birds increased by 32.4 per cent and 3.2 per cent of the control group respectively. Although the egg production curves (Figure 1) fluctuated in a similar manner for all groups, it is interesting to note that the highest egg production was recorded in birds fed with T1 diet (40.9 per cent) and the lowest egg production birds fed with the control diet (30.9 per cent) and tended to increase after 10 wk of the experimental period. The improvement in egg production by birds fed with the mould bread diet could be attributed to enhancement of feed efficiency as a result of the effect of fermentation by gut microflora. There are two possible explanations for these improvements. The first is that fungus growing in the loaves of bread is favorable to the ducks and could work as a probiotic. As reported by previous studies that probiotics have several benefits if supplemented in poultry diets. Significant effects of probiotic were observed by Denev *et al*. (2006) and Boostani *et al*. (2013) on higher body weight in broilers, egg quality in chukar partridge by Hashemipour *et al*. (2011) and laying hens by Shalaei *et al*. (2014). In general, beneficial changes in gut microflora environment that improve host's performance are the main concern of applying probiotics. Another possibility is that mould bread could also take action as prebiotics. The proximate analysis of the loaves of chocolate bread showed that this bread contains 57.3 per cent carbohydrate and 0.02 per cent crude fiber (Table 2) and wheat itself as the major ingredient of bread making had a higher proportion of insoluble (87 g/kg) than soluble (28 g/kg) non-starch polysaccharides (NSP) (Amerah, 2015) as an energy source. Like other poultry, ducks as a monogastric animal cannot digest complex carbohydrate such as NSP (Nikam *et al*., 2016) and high insoluble NSP is considered to modify the intestinal flora and reduce turnover rate of the intestinal mucosa and to change the immune system (Shalaei *et al*., 2014). In addition, the use of coarse rice bran in present study may help to

increase gut development and nutrient digestibility (Choct, 2015), thus improving feed efficiency. It has been claimed that the benefits of crude fiber affect the intestinal mucosa carbohydrase and binding effect (Hsu *et al.*, 2000). In this case, ducks were apparently tolerant to the mould bread which was evident by no mortality was found during the experimental period and as mentioned earlier that body weight of the mould bread fed birds were also higher than the control diet although this is not significantly different. Slightly different from chickens, however, that body weight gain and hen day production were reduced when laying hens fed with mould-contaminated diet (Akande *et al.*, 2015). Sangsoponjit and Suphalucksana (2016) in their work with broilers fed the commercial ration and mixed with selected microorganisms (such as *Actinomysetes*, *Aspergillus niger*, *Rhizopus stolonifer sp, and Trichoderma sp*) reported that increased the nutritive value of the diet in terms of crude fibre, crude protein, and ether extract as a result of the ability of this microbes to produce enzyme cellulase, hemicellulase and lignin. Thus, the improved performance of the T1 and T2 birds in the present study may be explained by the actions of both probiotics and prebiotics simultaneously. Mirana *et al.* (2016) found that *Aspergillus sp* were the dominant fungi in the expired breads. At this moment, we did not asses the microbiology aspect of which could clarify the microorganisms present in the loaves of bread with respect to types and their characteristics.

The relatively low egg production of all groups in this study was not expected and this could be due to an extreme weather recently. Heavy rain and strong wind blew in the time of the experiment, make birds experiencing environmental stress. Under normal condition, it is predicted that the production performance is better than this current condition.

Table 3. Performance of laying ducks fed different dietary levels of mould loaves of bread during 10 wk of the experiment

Parameters	Dietary treatments			SEM	p-value
	T0	T1	T2		
Initial body weight (g)	1400	1368	1426	33	0.3449
Final body weight (g)	1486	1569	1550	35	0.3638
Gain (g)	86	201	123	51	0.3024
Egg production (%)	30.9[b]	40.9[a]	31.9[b]	3.0	0.0390
Feed consumption (g)	156.9[a]	133.5[b]	127.7[b]	12.2	<.0001
FCR (g/g)	6.036	5.701	5.538	0.320	0.5370
Egg mass (g/bird/wk)	56.34	83.40	54.59	10.42	0.0967

[a-b] means in the same row with no common superscript differ significantly ($p<0.05$)

T0: commercial concentrate based diet; T1:262 g/kg mould loaves of bread diet;

T2:297 g/kg mould loaves of bread diet. SEM –standard error of means

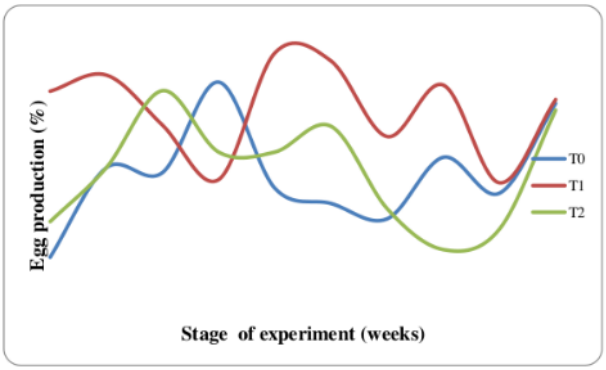

Figure 1. Egg production of different mould loaves of bread fed in laying ducks

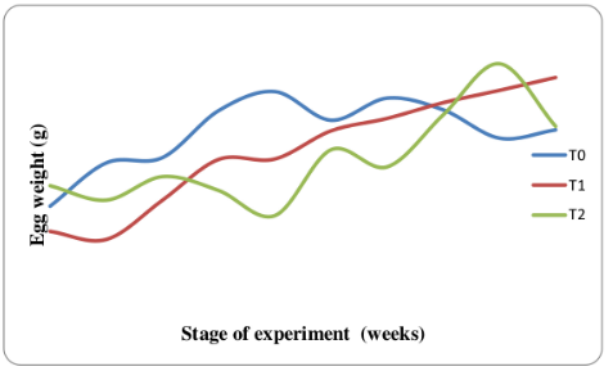

Figure 2. Egg weight of different mould loaves of bread fed in laying ducks

Egg quality characteristics

The results on selected characteristics of egg qualities are shown in Table 4. It appears that inclusion of mould loaves of bread in layer diet for ducks at 262 and 297 g/kg dietary levels had a substantial improvement of yolk color in the control diet. This is quite probable to be related to the higher level of yellow corn as a single source of *xantophyll* included than in the tested diets (400 g/kg versus 279 and 206 g/kg corns – Table 1). Corn has been long as the most common feed stuff used in poultry nutrition for egg yolk pigmentation (Blessinz *et al.*, 1963). Although there is no statistically significant difference in egg weight and fresh egg yolk weight when layer ducks were fed diets with different levels of mould bread (Table 4), there was a marked tendency for heavier egg weight (Figure 2) and egg yolk with the dietary mould bread level was lower.

Table 4. Selected characteristics of egg qualities of laying ducks fed different dietary levels of mould loaves of bread.

Parameters	Dietary treatments			SEM	p-value
	T0	T1	T2		
Egg weight (g)	61.44	62.67	61.80	1.42	0.8233
Fresh yolk weight (g)	22.17	23.98	22.73	0.9634	0.4711
Yolk color (RYC)	12.7[a]	9.8[b]	9.8[b]	0.3284	0.0001

[a-b] means in the same row with no common superscript differ significantly ($p<0.01$)

T0: commercial concentrate based diet; T1:262 g/kg mould loaves of bread diet; T2:297 g/kg mould loaves of bread diet; SEM –standard error of means

Health records

As mentioned that there was no mortality found during the study. It means that the mould bread did not affect on the bird's health.

Economic analysis

Calculated feed cost per kg (Table 5) showed that the lowest feed cost per kg feed was for the T2 diet (0.27 USD or 58 per cent of T0), in which 297 g/kg mould bread was included. However, the ducks fed with this diet had both low egg production and egg weight. Conversely, the T1 diet (0.28 USD or 56% of T0), in which 262 g/kg mould bread was fed, had the highest egg production compared to either the control or the T2 diets. The control diet which a commercial concentrate diet used had the most expensive feed cost (0.48 USD). It means that mould contaminated bread was not only cheap but also gave heavier eggs than the control diet.

Table 5. Estimates of feed costs based on the retail market price when the study conducted

Ingredient	Price /kg	T0	T1	T2
		IDR		
Yellow corn	6.000	2.400	2.736	2.742
Rice bran	2.000	800	506	380
GFWF	2.500	-	278	278
Mould bread	1.000	-	180	242
Commercial concentrate	8.000	3.200	0	0
Feed cost per kg		6.400	3.700	3.642
		(0.48 USD)	(0.28 USD)	(0.27 USD)

T0: commercial concentrate based diet; T1:262 g/kg mould loaves of bread diet; T2:297 g/kg mould loaves of bread diet

*1 USD = IDR 13,300

CONCLUSIONS

- Mould loaves of bread are potential to replace in part of energy source in duck feeding at level of 262 g/kg in course rice bran and corn based diets.
- Egg production increased by 32.4 per cent by feeding with mould loaves of bread with lower feed cost than the standard diet.
- Ducks are tolerant to the fungus contaminated diet which was shown by the increase in body weight and no mortality or health disorder due to this feeding trial.

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