Egg Production and Quality of Kampung Chicken Fed Commercial Diet Mixed with and Supplemented with Forages

(Produksi dan Kualitas Telur ayam Kampung yang Mendapat Ransum Komersial Dicampur Dedak Padi dan Diberikan Suplemen Berupa Hijauan Pakan ternak)

A. G. Nataamijaya

Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian
(Indonesian Agricutural Technology Assesment and Development Institute)
Jl. Tentara Pelajar No. 10 Bogor 16114

Abstrak

Telah dilakukan suatu penelitian mengenai produktifitas dan kualitas telur ayam Kampung yang mendapat ransum komersial dicampur dedak padi.dan diberikan suplemen berupa hijauan pakan ternak. Perlakuan yang diberikan adalah ransum komersial murni (RC); R_I (ransum komersial dicampur dengan dedak padi dengan rasio 1:2), R_{II} (R_I + King grass); R_{III} (R_I + daun kriminil) dan R_{IV} (R_I + rumput lapangan). Rancangan yang dipergunakan adalah Rancangan Acak Lengkap dengan 6 kelompok ulangan yang terdiri dari 4 ekor ayam betina dewasa. Data yang diperoleh dianalisis dengan Analisis Sidik Ragam (Analysis of Variance) disertai Duncan's New York Multiple Range Test. Hasil analisis statistik menunjukkan bahwa hen-day production dari RC (36,10 ± 4,20%) sangat nyata (P<0,01)lebih tinggi daripada R_I (24,11 ± 3,20%), R_{II} (22,33 ± 4,50%), R_{III} (24,22 ± 3, 71%) dan R_{IV} (23,41 ± 0,82%), namun tidak terlihat pengaruh nyata terhadap bobot telur, bobot yolk, bobot kerabang, haugh unit dan grade. Bobot albumen R_{III} (21,22 ± 3,34 g) nyata (P<0,05) lebih ringan daripada RI (25, 49 ± 2,31g). Nilai warna yolk RC (11,71 ± 0,97) sangat nyata (P<0,01) lebih tinggi daripada R_I (6,70 ± 0,56), R_{II} (9,51 ± 0,99), R_{II} (8,91 ± 1,24) dan R_{IV} (8,68 ± 0,96), sedangkan R_I sangat nyata (P<0,01) lebih pucat daripada RC, R_{II}, R_{III}, dan R_{IV}. Pencampuran dedak padi kepada ransum komersial sangat nyata menurunkan produktivitas telur sedangkan penambahan hijauan pakan ternak memperbaiki warna yolk ayam Kampung yang diberi ransum campuran komersial dan dedak.

Kata Kunci : Produksi, kualitas telur, ayam kampung, hijauan

Introduction

The eggs of Kampung (native) chicken is considered as a delicacy for most Indonesian consumers. The yolk is also used as part of traditional herbal medicines ("jamu"). As the demand for Kampung eggs increasing from year to year, the farmers try to increase egg production through intensive management system therefore the chickens should be fed balanced diet. The balanced diet available in the market is for the hybrid chicken which is too good, too expensive and not economical if it is given to the Kampung chicken due to its low productivity. Previous research results by Creswell and Gunawan (1982), Nataamijaya (1988, 1992) showed that when Kampung chicken were fed commercial diet its productivity increased very substantially, however it was not profitable. In order to reduce the feed cost usually the farmers give the Kampung hens a mixture of commercial diet and rice bran (1 part commercial diet + 2 parts rice bran). This mixture decrease the feed cost and also the egg productivity, yet it is more practical and profitable for the farmers, but it still give deleterious effects to egg quality especially the yolk colour. The yolk become pale which is not attractive to the consumers who prefer yellow orange colour of the yolk, besides the hatchability of the eggs was decreased substantially. The yellow colour of the yolk mainly come from xanthophylls in corn called zeaxanthin and crytoxanthin. When the

commercial diet being diluted and given to the hens, percentage of xanthophylls and other carotenes (precursors of vitamin A) in the diet was decreased sharply resulted in pale yolk and low hatchability, because vitamin A is required for normal hatchability. (Nataamijaya, 1985; North, 1975).

Mineral requirements, especially Ca, can be met by giving grit (oystershell) or minerals mixture while xanthophylls and precusors of vitamin A (carotenes) can be supplied by giving forages to the birds.

Research Methods

As many as 120 heads of 14 months old Kampung chicken hens were assigned into 5 treatment groups with 6 replicates of 4 hens each. The treatments were,

RC : Commercial layer diet
R_I : RC + rice bran, ratio 1 to 2
R_{II} : R_I + 20g fresh king grass (*Penniseium purpuroides*)
R_{III} : R_I + 20 kriminil grass (*Portulaca majora sativa*)
R_{IV} : R_I + 20 field grass (*Paspallum conjugatum*)

Mineral mixtures (2%) was added to R_I, R_{II}, R_{III}, and R_{IV} diet while 20% fresh forage were given to R_{II}, R_{III}, and R_{IV}. Each bird was given 90g diet daily and drinking water was given ad libitum. Eggs were collected daily for 90 days, quality test was done every three days. Parameters measured were egg weight, albumen height, yolk weight, shell weight, haugh unit/grade and yolk colour by using Roche Yolk Colour Fan.

A Completely Randomized Design was used followed by analysis of variance and Duncan's New Multiple Range Test (Steel and Torrie, 1993).

Result and Discussion

Hen-day Production

The hen-day production of RC (36.10 ± 4.20%) was higher ($P<0.01$) than those of R_I (24.11 ± 3.70%); R_{II} (22.33 ± 4.50%); R_{III} (24.22 ± 3.71%); R_{IV} (23.41 ± 0.82%). The difference was caused by the difference in calculated crude protein (16.11% Vs 14.00%), metabolizable energy (2900 Kcal /kg vs 2400 Kcal/kg) and other nutrients content which were essential for high egg productivity (Scott *et al.*, 1976 and North, 1978) such as essential amino acids and vitamins. However, it was higher than previous report from Gultom *et al.* (1989) that the hen-day production of Kampung hen was 20.99%, when it was fed diet containing 14% crude protein and 2400 Kcal metabolizable energy.

Egg Weight

The averages egg weight were 44.01 ± 3.46g (RC); 46.40 ± 2.81g (R_I); 46.69 ± 2.81g (R_{II}); 42.68 ± 3.91g (R_{III}) and 42.61 ± 3.85g (R_{IV}), no significant difference was found (Table 1). However, there was tendency that the addition of rice bran slightly inreased the average egg weight as showed in R_I and R_{II}, but the supplementation of Kriminil grass (R_{III}) or field grass slightly decreased the average egg weight. The average eggs weight obtained in this study was similar to some previous reports. Creswell and Gunawan (1982) reported that the average egg weight of Kampung hen was 43.60g while Nataamijaya (1992) reported that it was 42.89 ± 1.82g. Sukardi and Mufti (1989) found that the average weight of Kampung hen was 41.90 ± 4.04g.

Yolk Weight

The average yolk weight of RC, R_I, R_{II}, R_{III},

and RIV were 16.52 ± 3.17g; 15.09 ± 0.81g; 16.05 ± 0.67g; 15.43 ± 1.19g and 15.09 ± 1.10g consecutively, no significant difference was found (Table 1). Yet the rice bran dilution seems to give negative effect to the yolk weight eventhough statistically not significant. This result indicated that the decrease in feeds quality may affect the egg fertility and hatchability since the yolk is a main of nutrients for the embryo. According to Gilbert, 1981 (in King and Mc Lelland, 1981), yolk is composed of just 50% solids, 94% which are protein, as much as 30% of the yolk being formed of lippo and phosphoproteins. Composition of the yolk plays dominant role in embryogenesis and forms the main nutrient source of the developing embryo. Since embryonic yolk sac grows over the surface of the yolk, the nutritional future of embryo is determined mainly before fertilization. North (1978) also stated that the yolk is a source of nutrients from which the blastoderm and the resultant embryo partially sustain their growth.

Albumen Weight

There were significant differences (P<0.05) between the albumen weight of R_I (25.49g ± 2.31g) and RC (21.95 ± 4.95g) and R_{III} (21.72 ± 3.34g) as shown in Table 1.

In hybrid hens' egg the albumen weight comprise 65% of the egg weight and it is mainly composed of water and protein which functions as chick aqueous environtment necessary for embryo development. It also contains lysozimes and ovotransferrin to protect the embryo from bacterial infections, besides it provides some additional nutritional material for the embryo (Board, 1968; Sibley, 1960 as cited by King and Mc Lelland, 1981)

This study showed that the addition of rice bran to the commercial diet significantly increased the albumen weight however the forages supplementation reduced substantially this effect, it is beneficial because most consumers don't like the eggs with too much albumen. The mechanism in which the forage supplementation bring the albumen weight back to normal is unknown.

Shell Weight

The averages shell weight of RC, R_I, R_{II}, R_{III}, and R_{IV} were 5.76 ± 0.27g ; 5 82 ± 1.049 ; 5.23 ± 0.74g and 5.51 ± 0.41g respectively, no significant difference was found which was reasonable because all groups were given enough mineral supplement needed to form egg shell.

Yolk Height

The hens of RI group showed significantly (P<0.01) lower yolk height (15.05 ± 0.23) than those of RC (17.67 ± 0.39); R_{II} (16.85 + 0.37); R_{III} (16.62 ± 0.21) and R_{IV} (16.77 ± 0.93) as can be seen in Table 1.

The yolk height indicates its quality; the higher the height, the richer its nutrients contents. The result of this study has shown that the supplementation of forages to the Kampung hens fed rice bran diluted commercial diet significantly improved the yolk quality. In this case the forages may functions as source of some vitamins and minerals needed to partially support the formation of good quality yolk.

Yolk Colour

The eggs produced by groups RC showed better yolk (P<0.01) colour score (11.71 ± 0.97) than those of R_I (6.70 ± 0.56) ; R_{II} (9.51 ± 0.99) ; R_{III} (891 ± 124) and R_{IV} (8.68 ± 0.96), as shown in Table 1.

Group R_{II}, R_{III}, and R_{IV} were also better than (P<0.01) group I, indicated that the hens of group I received very small quantity of carotenoid, including xanthophyll, which is needed to give strong yellow colour to the yolk. Hens of group R_{II}, R_{III}, and R_{IV} received forages as source of

carotenoid so that the eggs showed better yolk colour than that of R_I eventhough not as good as RC. The natural source of carotenoid in feed stuffs normally are corn (zeaxanthin and crytoxanthin), but when the diet was diluted with rice bran which has no carotenoid content, the carotenoid concentrations in the diet, became very low resulted in pale yolk colour. The supplementation of forages as carotenoid sources, gave positive effect on the yolk colour, because green leafy vegetables and forages are good sources of carotenoid (Maynard *et al.*, 1979).

Albumen Height

The albumen height of RC, RI, RII, RIII, and RIV were 4.71±0.92; 4.91±1.26; 5.35±1.18; 4.81±1.18 and 5.08±0.50 respectively, no significant difference was found, the height of albumen has a positive correlation with viscousity. Together with the egg weight, the albumen height are used to determine the haugh units score.

Haugh units and grade

There was no significant difference on the haugh units values of RC (73.10 ± 7.42) ; R_I (73.50 ± 9.29) ; R_{II} (77.20 ± 8.48) ; R_{III} (76.70 ± 9.42) and R_{IV} (74.00 ± 3.36). According to North (1978) the eggs to be grade AA should have haugh units index above 72, but since the albumen height will be decreased during hot weather and during the later part of laying period, it is better to have haugh unit score at least 78. The score of haugh units was determined by relation between egg weight and albumen height. In this study, no significant differences were found on the egg weight and albumen height of all treatment groups, therefore the haugh units and grade were also not significantly different.

Conclusion

Rice bran dilution to the commercial diet decreased the hen-day production and the yolk quality, but supplementation of forages reduced substantially the negative effect on the yolk. It was concluded that if the native hens raised in confinement and fed low quality diet it must be supplemented with fresh forages and mineral sources in order to improve egg quality.

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Table 1. The averages weight of egg, yolk, albumen and shell ; height of yolk and albumen ; score of yolk colour, haugh units and grade

Treatment group	Weight (g)				Height (g)		Score		Grade
	Whole Egg	Yolk	Albumen	Shell	Yolk	Albumen	Yolk Colour	Haugh Unit	
RC Averages	44.04	16.52	27.76a	5.76	17.07a	4.71	11.71a	73.10	A4
s-d	3.46	3.17	4.95	0.27	0.39	0.92	0.97	7.42	
RI Averages	46.60	15.09	25.49a	5.82	[illegible]	4.81	6.70b	73.30	A4
s-d	1.86	0.81	2.31	1.04	0.23	1.26	0.56	[illegible]9	
RII Averages	46.09	16.05	23.23ab	3.81	16.85a	5.35	9.51c	77.21	A4
s-d	2.81	0.67	2.38	0.31	0.37	1.10	0.99	8.40	
RIII Averages	42.36	15.43	21.72b	5.23	16.62ab	4.21	8.91c	76.70	A4
s-d	3.91	1.19	3.34	0.24	0.21	1.13	1.54	9.42	
RIII Averages	42.61	15.06	22.04ab	5.51	16.77ab	5.08	8.68c	74.00	A4
s-d	3.85	1.10	3.13	0.41	0.93	0.50	0.96	3.30	

Means within a column with different superscripts are significantly different either at P<0.05 or P<0.01

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