

Reproductive Performance of Female Local Chicken Breeds under Vitamin E Supplementation

(Kinerja Ayam Betina Lokal yang Mendapat Suplementasi Vitamin E)

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Abstrak

Penelitian pendahuluan mengenai kinerja reproduksi ayam betina lokal yang mendapat suplementasi vitamin E per oral telah dilaksanakan di Balai Penelitian Ternak Bogor. 16 ekor ayam dari tiap jenis ayam lokal berumur 13 bulan ditempatkan dalam kandang individu. Rancangan yang dipergunakan adalah Rancangan Acak Lengkap pola factorial 3x4 dengan 4 ulangan. Faktor pertama adalah jenis ayam (Kampung, Arab dan Sentul). 4 pejantan dari tiap jenis ayam ditempatkan dalam kandang individu sebagai sumber semen untuk diinseminasikan secara artifisial. Faktor ke dua adalah level suplementasi vitamin E (0 I.U., 2 I.U., 4 I.U. dan 8 I.U.). Parameter yang diukur adalah produksi telur (hen-day), bobot telur, fertilitas telur dan bobot d.o.c. Data yang diperoleh dianalisis dengan Analisis ragam dan Duncan's New Multiple Range Test. Hasil analisis statistik menunjukkan bahwa jenis ayam mempengaruhi bobot telur secara nyata ($P < 0,05$), bobot telur ayam Arab ($43,07 \pm 1,06$ g) lebih tinggi daripada telur ayam Kampung ($40,09 \pm 0,53$ g) dan Sentul ($40,77 \pm 1,33$ g). Fertilitas telur ayam Kampung ($75,57 \pm 2,01\%$) lebih baik ($P < 0,01$) dari pada telur ayam Arab ($58,01 \pm 10,50\%$) dan Sentul ($37,26 \pm 12,84\%$). Suplementasi vitamin E tidak berpengaruh nyata terhadap produksi telur (*hen day production*), bobot telur, fertilitas, daya tetas dan bobot badan anak ayam (d.o.c).

Kata Kunci : Ayam lokal, reproduksi, vitamin E, telur

Introduction

Local chicken in Indonesia plays important role in rural people welfare especially as source of quick cash income whenever it is needed by the owner. So far as much as 31 distinct groups and breeds of local chicken were identified (Nataamijaya, 2000), each group showing specific characteristics, some of them have very high economic value among the farmers. Pelung, origin of Cianjur West Java, Bekisar origin of Madura East Java, Cemani origin of Kedu Middle Java are among the most well known local chicken of Java island. Unfortunately most of local chicken are raised in traditional manner, free to scavenge around the farmer's houses make it very susceptible to diseases, because no vaccination and good quality feeds were given. When farmers try to keep the chickens in

confinement, the performance were not good. There are also some variations in reproductive performance among local breeds which is presumably due to genetics factor. One of the problems is its' very low fertility and hatchability of the hatching eggs possibly due to mainly deficiency of vitamin E. This is happened because most of farmers cannot afford to buy good quality feeds, besides the productivity of native chicken is very low if compared with hybrid chicken, make it not profitable, it is also known that vitamin E in the feedstuffs is readily oxidised. In this study the reproductive performance of three local breeds under four levels of vitamin E supplementation was observed. The local chicken breeds used in this experiment were Kampung, Arab and Sentul. The Kampung is a common indigenous chicken which can be easily found throughout Indonesian islands,

it's physical appearance is very highly varied. The Arab actually is descendant of European breed namely Silver brekel kriel crossed with Kampung, which is already adapted very well to Indonesian environment (Nataamijaya *et al.*, 2003). The Sentul is origin of Ciamis West Java, it's population is very low and should be considered as an endangered native chicken breed.

Research Methods

Sixteen hens of each breed (Kampung, Arab and Sentul) were kept in individual cages, they were 13 months old. Four males of each breed at the same age were also used as sources of semen to be artificially inseminated to the hens, they were placed in individual cages.

The experimental design used was 3x4 factorial Completely Randomized Design with 4 replicates. The first factor was breed (3) while second factor was vitamin E level (4). Vitamin E was given per oral at the levels of 0 IU (t_0 -Control), 2 IU (t_1), 4 IU (t_2) and 8 IU (t_3) each hen daily. The semen was obtained by applying the massage technique (Burrows and Quinn, 1937) on the back area of the males, then it was diluted using NaCl 0,9 with pH of 7-8, to be inseminated into oviducts.

The diet given to the birds was composed of yellow corn (60%), rice bran (18%), soybean meal

(10%), fish meal (10%) and dicalcium phosphate (2%). The calculated nutrient contents (NAS-NRC, 1984) were as follows, crude protein (17.38%), metabolizable energy (3070.9 kcal/kg), fat (4.81%), crude fiber (3.72%), calcium (0.63%), phosphorus (0.65%), lysine (0.97%) methionine (0.21%). Eggs were collected, marked, weighed and stored on the egg trays before being incubated at the hatchery unit. The candling of the hatching eggs were done at day 5 to determine fertile eggs and day 12 to discard the eggs containing dead embryos. At day 18 the fertile eggs were removed into the hatcher, eggs were hatched at day 21. The observation was continued for 120 days, data were analysed using the Analysis of Variance and Duncan's New Multiple Range Test (Steel and Torrie, 1980).

Results and Discussion

Egg Production

The average hen-day production is shown in Table 1, the egg production percentage of Kampung, Sentul and Arab was $14.06 \pm 2.58\%$, $14.25 \pm 3.40\%$ and $18.06 \pm 3.30\%$ consecutively no significant different was found. The egg production of hens supplemented with vitamin E levels of 0 IU (Control), 2 IU (t_1), 4 IU (t_2) and 8 IU (t_3) were $14.00 \pm 1.73\%$, $14.16 \pm 2.84\%$, $15.58 \pm 4.12\%$ and $18.00 \pm 4.58\%$ respectively.

Table 1. Egg production (%) of three local chicken breeds supplemented with vitamin E

Breeds	Vitamin E Supplementation (I.U)				Total	Average S.D
	0	2	4	8		
Kampung	16.00	16.50	16.75	23.00	72.25	14.06 ± 2.58
Sentul	13.00	11.00	19.00	14.00	57.00	14.25 ± 3.40
Arab	13.00	15.00	11.00	17.00	56.00	18.06 ± 3.30
Total	42.00	42.50	46.75	54.00	185.25	
Average	14.00	14.16	15.58	18.00		
S.D.	1.73	2.84	4.12	4.58		

Eventhough the vitamin E supplementation statistically did not significantly affect the average egg production there was tendency that the higher level of vitamin E supplemented, the higher was the egg production. The difference between control group (0 IU) and t_3 (8 IU) was 4% which is economically could be substantial if it is applied to a big number of hens.

The vitamin E content in the diet given to the hens, should be very little due to oxidation, yet the hen's body especially the liver still has the storage of vitamin E which could be used when it's intake is not sufficient. That was the reason why the control group egg production was not too low if compared with t_1 (14.16%), t_2 (15.58%) and t_3 (18.00%).

Egg and Day Old Chick Weight

Table 2 showed that there was significant difference ($P<0.05$) in egg weight among

Kampung (40.09 ± 0.53 g), Sentul (40.77 ± 1.33 g) and Arab (43.07 ± 1.06 g).

It was clear that the average egg weight of Arab chicken (43.07 ± 1.06 g) was higher ($P<0.05$) than those of Kampung (40.09 ± 0.53 g) and Sentul (40.77 ± 1.33 g) which may caused by genetic factor. The vitamin E supplementation did not affect the egg weight significantly, however the average egg weight of t_1 (42.31 ± 1.53 g) was slightly higher than those of control (40.96 ± 1.60 g), t_2 (40.48 ± 0.98 g) and t_3 (41.31 ± 2.52 g).

Although the egg weight of Arab was significantly ($P<0.05$) higher than those of Sentul and Kampung, its' day old chick weight was not significantly higher than the others (Table 3).

Egg Fertility and Hatchability

The average fertility of eggs produced by Kampung ($75.57 \pm 2.01\%$) were higher ($P<0.01$)

Table 2. Egg weight (g) of three local chicken breeds supplemented with vitamin E

Breeds	Vitamin E Supplementation (IU)				Total	Average S.D.
	0	2	4	8		
Kampung	42.78	43.58	41.73	44.20	172.29	$43.07^b \pm 1.06$
Sentul	40.34	42.75	39.78	40.24	163.11	$40.77^a \pm 1.33$
Arab	39.76	40.61	40.48	39.52	160.37	$40.09^a \pm 0.53$
Total	122.88	126.94	121.99	123.96		
Average	40.96	42.31	40.48	41.31		
S.D.	1.60	1.53	0.98	2.52		

Means within a column with different superscripts are significantly different at $P<0.05$

Table 3. Day old chick weight of three local chicken breeds supplemented with vitamin E

Breeds	Vitamin E Supplementation (IU)				Total	Average S.D.
	0	2	4	8		
Kampung	26.24	26.30	27.42	26.37	106.33	26.58 ± 0.56
Sentul	25.50	26.75	25.42	25.56	103.23	25.81 ± 0.63
Arab	26.27	30.14	26.25	27.53	110.09	27.55 ± 1.82
Total	78.01	83.19	79.09	79.46		
Average	26.04	27.73	26.36	26.49		
S.D.	0.43	2.09	1.01	0.99		

Table 4. Egg fertility of three local chicken breeds supplemented with vitamin E

Breeds	Vitamin E Supplementation (IU)				Total	Average S.D.
	0	2	4	8		
Kampung	74.45	77.38	73.33	77.14	302.30	75.57 ^b ± 2.01
Sentul	20.83	36.67	52.08	39.46	149.04	37.26 ^a ± 12.84
Arab	61.90	47.17	70.83	52.15	232.05	58.01 ^b ± 10.50
Total	157.18	161.23	196.24	168.75		
Average	40.96	42.31	40.48	41.31		
S.D.	1.60	1.53	0.98	2.52		

Means within a column with different superscripts are significantly different at $P < 0.05$

Table 5. Egg hatchability (%) of three local chicken breeds supplemented with vitamin E

Breeds	Vitamin E Supplementation (IU)				Total	Average S.D.
	0	2	4	8		
Kampung	91.67	100.00	100.00	100.00	391.67	97.92 ± 4.16
Sentul	100.00	75.00	58.33	79.67	313.00	78.25 ± 17.15
Arab	62.22	86.66	58.33	72.92	280.13	70.04 ± 12.68
Total	253.89	261.66	216.66	257.59		
Average	84.63	87.22	72.22	84.20		
S.D.	19.84	12.50	24.05	14.09		

than that of Sentul ($37.26 \pm 12.84\%$) and Arab ($58.01 \pm 10.50\%$) while Arab was higher ($P < 0.05$) than Sentul, as shown in Table 4. However it is not surprising because there is considerable variation in fertility of different breeds and strains of chicken (Sturkie, 1976) for example, the fertility of White Plymouth Rocks was higher than in Cornish (Soller *et al.*, 1965).

The vitamin E supplementation did not give significant effect on fertility, yet there was tendency that the supplementation improved the fertility of these three breeds. This result is in accordance with Scott *et al.* (1976) who stated that vitamin E is required for normal fertility in the rooster and for normal reproductive performance in the hen. The hatchability of eggs was not significantly affected by vitamin E supplementation nor by breeds, however the Kampung showed considerably higher egg hatchability than the others (Table 5).

Some previous reports revealed that Kampung chicken performs very high fertility and hatchability, Kingston (1979) found that the Kampung chicken fertility or hatchability was 82.00% while Subiharta *et al.* (1985) reported as high as 77.37% and Tri Yuwanto *et al.* (1982) as cited by Muryanto (1989) found it was around $66.67 \pm 21.39\%$.

Effect of Interaction

No significant interaction effect was found on egg production, egg and day old chick weight, egg fertility and hatchability.

Conclusions

The Kampung and Arab chicken showed better egg fertility than Sentul while the Arab chicken produced heavier egg weight, indicated that there were some effects of breed on the

reproductive performance in this study. Vitamin E supplementation gave no significant effect, so it is concluded that the vitamin E content of the diet was sufficient to maintain normal reproductive performance during the experiment presumably due to the good quality of feedstuffs which was mixed and fed to the birds not too long after procurement.

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