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EFFECT OF FASTING AT GROWER PERIOD ON PRODUCTION PERFORMANCE OF JAPANESE QUAIL *(Coturnix Coturnix Japonica)*

Nani Zurahmah[1)], Tri Yuwanta[2)], Wihandoyo[2)]

[1)] College Counselling of Agriculture, Manokwari, Indonesia,
[2)]Faculty of Animal Science, Gadjah Mada University, Yogyakarta, Indonesia.

ABSTRACT

This experiment was conducted to investigate the effect of fasting at grower period (3 to 6 wk of age) on production performance of Japanese quail *(Coturnix coturnix japonica)*. Three hundred and fourty female of Japanese quails at 3 wk of age were used in this experiment. The treatments were non fasting (control), skip-a-day fasting, nighttime fasting (18.00 until 06.00), and daytime fasting (06.00 until 18.00). The experiment was designed randomized completely block design, and every treatment was repeated five times. Data were collected since three until 12 wk of age. The treatments were significantly effect (P<0,01) delay of age at the onset of lay (sexual maturity) and egg production at two first week a period of laying eggs, but were not affected (P>0,05) on heterophil/lymphocyte ratio. The phenomena of compensatory in egg production was significant (P<0,01) during of one until two weeks after fasting discontinued. It is concluded that the skip-a-day fasting can be selected to improve efficiency produce in Japanese quails egg.

Key words: Fasting, Japanese quail, Egg production, Heterophil/Lymphocyte ratio.

INTRODUCTION

Restriction of feeding or restricting caloric and/or protein intake before sexual maturity delay the onset of egg production and increases the number of ova that are packaged into complete eggs throughout the laying cycle, as well as reduces the number of small eggs (Etches, 1996). The physiological mechanisms responsible for an increase in egg production when nutrient intake is limited are unknown. According to Etches (1996), this mechanisms may be related with plasma concentrations of LH are lower in hens given free access to feed during the rearing period. In spite of the lowered gonadotropic stimulation, unrestricted broiler breeder hens have significantly more yellow yolky follicles in their ovarian hierarchy than their restricted flockmates. By contrast, hens with high plasma concentrations of LH between hatch and sexual maturity are reputed to be more prolific layers. In part, these contradictory result may be related to body composition, since various authors have advocated a role for lean body tissue and fat content in the control of the onset of lay. Summers and Robinson (1995) reported that there is more evidence of reproductive problems in bird that are overweight than there is for birds that are underweight. Therefore, feed restriction during the pullet rearing stage is a major determinant in reproductive success during the laying period (Yu et al., 1992[b] in: Summers and Robinson, 1995).

Some researchers studies reported that restricted of feeding at bird before sexual maturity can decrease of body weight, delaying the onset of egg production, increase the number of big eggs, as well as increase of egg production (Yu et al., 1992[a]; Yu et al., 1992[b]; Robinson, 1991 in Summers and Robinson, 1995; Sandoval and Gernat, 1996, Bruggeman et

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al., 1999). However, aplication of feed restriction at poultry require to be done wisely because the treatment can be change of hematologic status (Razak et al., 1992), as well as can decrease of egg production if the treatment to apllied at laying period in poultry (Mazda, 2002). The same phenomenon of effect feed restriction also happened in duck (Olver et al., 1978 in Siregar, 1979; Matram, 1985) and turkey (Crouch et al., 2002). The research that concern of feed restriction in quails was very little published. Therefore, the effect of fasting at grower period (3 to 6 wk of age) on production performance of Japanese quail *(Coturnix coturnix japonica)* were studied.

MATERIALS AND METHODS

Three hundred and fourty female of Japanese quails (3 wk of age) with the first of body weight about 74,46 ± 0,75 g were used in this experiment. The birds were obtained from PT. Peksi Gunaraharja, Kalasan, Sleman, Special District of Yogyakarta. The Japanese quails were fed a commercial feed containing of protein was 20 – 22%, produce by PT. Central Proteinaprima, Semarang. The birds placed in the cage of high rise five. Each storey was divided to four cage unit (60 x 60 x 30 cm per unit), so that first and last counted 20 unitses. Lighting was given by as long as nighttime.

The experiment was designed with randomized completely block design. The treatments were without fasting or control (P_0), skip-a-day fasting (P_1), nighttime fasting: 18.00 until 06.00 (P_2), and daytimefasting: 06.00 until 18.00 (P_3). Each treatment was repeated five times, so that there are 20 flock, and then 17 quails (3 wk of age) are placed per flock. Data were collected since three until 12 wk of age for age of sexual maturity, egg production, and heterophil/lymphocyte ratio (H/L). Data obtained to be analysed of variance and to be continued by comparing of orthogonal contrast: P_0 versus P_1, P_2, P_3; P_1 versus P_2, P_3; and P_2 versus P_3.

RESULT AND DISCUSSION

Age at Sexual Maturity

Occurence the lay of first egg of poultry is an indicat on that poultry have reached its sexual maturity. The quails first of laying eggs at this research (Table 1) was ranging from 6 to 7 wk of age, as also found in many reports (Sugiarsih, 1979; Nugroho and Mayun, 1983; Shanaway, 1994; Rasyaf, 1995; Listiyowati and Roospitasari, 1997).

Table 1 indicating that the treatment of fasting at quails will be delay of age at sexual maturity of quail. This matter is possible as effect is lack of nutrient intake at quail fasted, as statement by Etches (1996). During treatment of fasting (3 - 6 wk of age), feed intake at quails fasted (P1, P2 and P3) was lower ($P<0,01$) than control (P0). Among of the treatments, skip-a-day fasting (P1) have consumption of ransum lower ($P<0,01$) than half day fasting (P2 and P3). The treatment of nighttime fasting (P2) have consumption of ransum lower ($P<0,05$) than daytime fasting (P3). The pattern of feed intake can be explain pattern of age at sexual maturity in this research.

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Table 1. Average of age at sexual maturity in Japanese Quail under fasting treatment

Treatment	Age at Sexual Maturity (d)
P_0	40,64
P_1	49,20
P_2	45,28
P_3	45,16

P_0: without fasting (control); P_1: skip-a-day fasting;
P_2: nighttime fasting; P_3: daytime fasting.

Table 2. Test of orthogonal contrast on age at sexual maturity of Japanese Quail under fasting treatment

Contrast	Age at sexual maturity
P_0 vs P_1, P_2, P_3	46,10**
P_1 vs P_2, P_3	18,61**
P_2 vs P_3	0,01

P_0: without fasting (control); P_1: skip-a-day fasting; P_2: nighttime fasting;
P_3: daytime fasting. Tabel $F(1;12):F_{0,05}=4,75;F_{0,01}=9,33$;**(P<0,01);*(P<0,05)

The result of ortogonal contrast (Table 2) indicated that the age of sexual maturity between quails of fasting treatments group versus control (P_0 vs P_1, P_2, P_3) was different (P<0,01). The difference (P<0,05) also happened between quails of skip-a-day fasting treatment versus half-day fasting (P_1 vs P_2, P_3). The difference do not happened at quails of daytime fasting treatment (P_2) and nighttime fasting treatment (P_3).

Egg Production

Egg production (% HDP) during research to presented at Table 3. Its seen that after laying eggs first, egg production go up till culminate production, and then the egg production of relative stabilize to the last research (12 wk of age). These results agree with statement of Nugroho and Mayun (1983) that after lay of first egg, the egg production of quail will be go up immediately mount till reach peak of egg production. Peak of egg production of quail at control (P_0) quicker (10 wk of age) and higher (89,3%) than peak of egg production of quail which during the grower period to given by fasting at skip-a-day (P_1), fasting at nighttime (P_2) and fasting at daytime (P_3), and were 87,33% at 12 wk of age, 87,61% at 10 wk of age, and 87,07% at 10 wk of age, respectively.

Pattern of egg production in group of quail fasted at grower period (P_1, P_2, and P_3) were different with in group of quail control (P_0). Increase of egg production after laying of eggs first until peak of egg production in group of quail fasted at grower do not as high as like in group of quail control (P_0). But by the end of research, group of quail fasted at grower period can be pursue on egg production presented by control quail group. Even at group of quail fasted of skip-a-day at grower period (P_1) still increase of egg production till this research end. The phenomenon above was a clue there is event of compensatory egg production that happened in group of quail fasted at grower period, so that can be make up for lost time egg production before. The results of statistical analysis was agree the existence of event of such compensation (Tables 3), where at 6 and 7 wk of age, group of quail fasted during grower period (P_1, P_2 and P_3) presenting the egg production of lower (P<0,01) than group of quail control (P_0).

Table 3. Average of egg production (%HDP) in Japanese Quail under fasting treatment and orthogonal constrast

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Age (wk)	Egg production (%HDP)					Orthogonal contrast (F value)		
	P_O	P_1	P_2	P_3	Average	P_0 vs P_1, P_2, P_3	P_1 vs P_2, P_3	P_2 vs P_3
6	11.81	0.00	0.57	0.76	3.28	21.55**	0.07	0.03
7	49.36	4.90	19.36	19.85	23.37	73.55**	11.7**	0.01
8	75.95	55.95	65.24	68.87	66.50	3.98	2.75	0.22
9	87.85	79.24	85.57	84.85	84.38	1.49	2.20	0.02
10	89.30	83.94	87.61	87.07	86.98	1.09	1.17	0.02
11	84.86	85.14	87.43	86.25	85.92	0.12	0.15	0.05
12	85.67	87.33	83.33	85.93	85.56	0.04	1.45	1.00
Average	69.26	56.64	61.30	61.94	62.28	-	-	-

P_0: without fasting (control); P_1: skip-a-day fasting; P_2: nighttime fasting; P_3: daytime fasting.
Table F(1;12): $F_{0.05} = 4.75$; $F_{0.01} = 9.33$; ** (P<0.01); * (P<0.05)

The difference of egg production was significantly (P<0,01) happened also at 7 wk of age between group of quail fasted of skip-a-day during grower period (P_1) with group of quail fasted of half day (P_2 and P_3). But, the difference of egg production do not happened again (P>0,05) among groups of quails in this research after 8 wk of age till the end this research, even egg production in group of quail fasted of skip-a-day during grower period (P_1) tend to higher at the end of research (12 wk of age). This results is same such as have been reported by Hassan et al. (2003[a]) that feed can be restricted to 85 or 70% of ad libitum feed intake from 2 to 5 wk of age without detrimentally affecting reproductive parameters between 6 to 13 wk of age. Some researchers also was found that restricted feeding at chicken before sexual maturity can be increase of egg production (Yu et al., 1992[a]; Yu et al., 1992[b]; Robinson et al., 1991 in Summers and Robinson, 1995; Sandoval and Gernat, 1996). Similar event was also happened at turkey (Crouch et al., 2002).

Heterophil/Lymphocyte Ratio

Ratio of heterophil/lymphocyte (H/L) was indicator of stress in poultry (Gross and Siegel, 1983). Ratio of H/L before fasting (3 wk of age), during fasting (4 to 6 wk of age), and after fasting (7, 9 and 12 wk of age), presented at Table 4.

Data in Table 4 showed that ratio of H/L in group of fast quail (P_1, P_2 and P_3) tend to increase at first week (4 wk of age) after given by treatment of fasting than control quail group (P_0). But next fasting till later time periods the treatment of fasting (6 wk of age), ratio of H/L group of fast quail to normal return. This pattern indicate that stress as effect fast only experienced of in the early of just treatment, while giving of next fasting do not cause stress by significant. Maxwell et al. (1990) reported that long of feed restricted in broiler (4 to 20 wk of age) was not significant change ratio of H/L. This research agree with statement of Gross and Siegel (1986) that ratio of H/L in poultry will downhill after fasting, but will return normal when poultry have adapted with form of stress.

Katanbaf et al. (1988) also report that ratio of H/L broiler breeder to increase after three period given restricted feeding (skip-a-day), but become normal after ten period. Situation of ratio of H/L which return normal indicate that chicken do not experience of stress again, or have adapted.

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Table 4. Average of heterophil/lymphocyte ratio in Japanese Quail under fasting treatment and orthogonal contrast

Age (wk)	Heterophil/Lymphocyte ratio					Orthogonal contrast (F value)		
	P_0	P_1	P_2	P_3	Average	P_0 vs P_1, P_2, P_3	P_1 vs P_2, P_3	P_2 vs P_3
3	0.43	0.39	0.43	0.38	0.41	0.40	0.03	0.61
4	0.50	0.58	0.53	0.55	0.54	1.26	0.55	0.06
6	0.48	0.50	0.51	0.51	0.50	0.11	0.02	0.00
7	0.59	0.47	0.46	0.49	0.48	0.39	0.00	0.37
9	0.49	0.50	0.49	0.50	0.50	0.01	0.00	0.06
12	0.50	0.51	0.51	0.52	0.51	0.02	0.00	0.02
Average	0.48	0.49	0.49	0.49	0.49	-	-	-

P_0: without fasting (control); P_1: skip-a-day fasting; P_2: nighttime fasting; P_3: daytime fasting.
Table F(1;12): $F_{0,05} = 4,75$; $F_{0,01} = 9,33$; ** (P<0,01); * (P<0,05)

The result of contrast ortogonal (Table 4) indicated that fluctuation of H/L ratio during of giving fasting period and after giving of fasting was not significant different among group of quail fasted (P_1, P_2 and P_3) with control (P_0), and among group of quail fasted: (P_1 vs P_2 and P_3), and (P_2 vs P_3). Azis et al. (2002) also was found that there are not significant reaction on amount of heterophil, lymphocyte, and H/L ratio at broiler which to fasted during 8, 12 and 16 hours per day from 7 to 21 day of age, not only at during fasting period, but also in after of giving fasting (35 day of age). Thus, treatment of fasting in this research do not give negative physiological effect to life of quails, not only at during of fasting period, but also pasca of fasting.

CONCLUSION

The treatment of fasting at Japanese quails during grower period (3 - 6 wk of age) can improved productivity without causing of high stress. The skip-a-day fasting can be made as choice to improve efficiency produce of Japanese quails.

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