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THE EFFECT OF EARLY FASTING INTERVALS ON THE PERFORMANCE OF GIMMIZAH AND BAHEIJ PULLETS

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ABSTRACT

The effect of short periods of fast early in production on subsequent performance of Gimmizah (G) and Baheij (B) laying hens was studied. When hens reached 10% production, fasting program was used. Hens were assigned randomly to four groups (3 replicates, 10-13 hens each) in floor rearing houses. Those groups were: the full fed group (control) and the three treated groups which food was fast for 5, 7, and 9 days. The G pullets were significantly (P<0.001) heavier than B ones at the different ages studied. The G showed more reduction in body weight (BW) than B while the later grew faster than G -after refeeding- up to the end of experimental period (at about 56 weeks of age). Control pullets were significantly heavier than any of the treated ones at all ages studied. The G pullets produced significantly more eggs than B during the first six weeks post fasting, and during (1-28 wks). No significant effect of fast periods on either EN or RL during all periods studied. Early eggs produced by G pullets were significantly heavier than that set by B ones during all periods studied except that during the 3rd week. During the 6th week post fasting, the 9-day fast pullets produced eggs significantly lighter than those produced by the other groups. The G hens produced significantly higher percentage of large and extra large of eggs during the early interval of laying (1-6 wk) than B ones but G pullets produced twice percentage of extra large eggs during 1-28 wk interval. The 9-day fast hens produced significantly more small eggs than the other ones. Both 7-day and 9-day fast produced larger percentages (but not significant) of extra large eggs than the other two groups. The G pullets had higher viability value than B ones and either of the 5- and 7-day fast pullets had higher viability than both the control or -9 day fast pullets.

The G strain significantly (P<0.001 to P<0.05) surpassed B one during the early periods while no significant effect of strain on feed conversion (FC) during the long interval. The 5-day and -9- day fast pullets had the best FC (P<0.05) during the 2nd and 6th week post fasting. There was a significant reduction of fertility and hatchability of fertile eggs in B eggs, also chick body weight at hatch (CBW) for G was significantly (P<0.001) heavier than that of B one. Fasting period affected (P<0.01) HFE, piped embryos and CBW. Eggs which produced by 7- and 9-day fast pullets showed highest HFE than those of eggs produced by control or 5-day fast pullets. Moreover, while no piped embryos (PE) were found in the eggs produced by 7- and 9-day fast pullets, eggs set by control or 5- fast pullets had (3.70 and 2.22%) PE. In general, the results showed that there were improving in FC, viability and some of hatch traits while no significant effects of fast program used were found on the egg production traits studied of Baheij and Gimmizah pullets.

Keywords: chicken, fast, body weight, egg production, egg weight classification, feed conversion, viability, hatch traits.

INTRODUCTION

In the developed local strains Gimmizah (G) and Bahiej (B), pullets just beginning to lay give small eggs, these small eggs problem reduces the

eggs net income during the early period of production due to its low price from eggs. Also, eggs produced during the early period became not suitable to be hatching eggs. That is why there is a need to develop management system to increase early egg weight and develop the performance of pullets. However, developed local strains significantly differed in body weight (Abou-El-Ella, 1982; Nofal *et al.*, 2000; Afify *et al.* 2002). In addition, it has been shown that feeding programs which restrict the feed intake of pullets during rearing or during the laying period were found to be effective in decreasing body weight (Muir and Gerry, 1978), increasing initial egg weight (Leeson and Summers, 1983; Katanbaf *et al.*, 1989; Strong, 1992), developed egg production (Muir and Gerry, 1978), increasing viability (Muir and Gerry, 1978; Katanbaf *et al.*, 1989), increasing economic efficiency (Muir and Gerry, 1978; Nofal *et al*, 2000) and developed egg production at part or full record as pointed by (Strong, 1992; Nofal *et al.*, 2000). Compared with full feeding, feed restriction improved feed efficiency (Lee and Leeson 2001, Nofal *et al.*, 2000), and increased fertility and hatchability (Blair *et al.*, 1976; McDaniel *et al.* 1981, Bartov, 1998; Bilgili and Renden, 1985).

Ross *et al.* (1989) showed that imposing an early restriction period of the beginning of production was effective in improving egg size in some strains of laying hens. More recently, Strong (1992) reported that using a 5-day feed withdrawal period near the beginning of production resulted in improved early egg size in Hy-Line w-36 laying hens.

Results obtained by Koelkebeck *et al.* (1993), indicated that there is little or no benefit to long – term production performance by using an early short- term feed withdrawal period.

On the other hand, Dunnington and Siegel (1984) reported that to be profitable a young hen must probably attain a minimum body weight in combination with a particular body composition in order to initiate egg production.

The objectives of the present experiment were to study the effect of early periods of fast (at 10% production) on subsequent early and long term egg weight and production performance in Gimmizah and Baheij pullets.

MATERIALS AND METHODS

This experiment was carried out at El-Sabhiah Poultry Research Station, Animal Production Research Institute. Total number of 280 of Gimmizah (G) and Baheij (B) pullets were kept on floor pens. Feed and water were provided *ad-libitum* prior to the experiment. The pullets were subjected to natural lightning, which was received about 14 hr light per day during the experimental period (June, 2001– February, 2002). When birds reached 10% egg production at 27 weeks of age (the age of sexual maturity as reported by (Gous and Stielau, 1976) to study the effect of early periods of fast on subsequent early and long term egg weight and production performance in Gimmizah and Baheij pullets fasting program was used where pullets in both the strains were assigned randomly to four groups (three replicates, 10-13 hens each), the full fed group (control) and the three treated groups which were fasted for 5 or 7 or 9 days. Water was provided all time. A ration of

15.45% crude protein and 2730 Kcal ME/kg of diet was used. Body weights (BW) at the beginning of study and at different times up to the end of experiment were recorded. Eggs were recorded daily for 28 weeks following the end of fasting, egg number/hen (EN) and rate of laying,% (RL), egg weight, g (EW), and feed conversion (FC) (kg feed/kg eggs) were estimated weekly from the 1st to 6th week, from 1-6 weeks and from 1-28 weeks post fasting, also viability (V%) during the experimental period was studied. Egg weight classifications were measured weekly for 28 weeks on all eggs produced 2 consecutive days per week. Eggs for each pen were incubated at 7 days intervals for 3 hatches. Fertility (F), hatchability was expressed as a percent hatched of all eggs (HAE) and of fertile eggs (HFE), the early (EDE) and late (LDE) dead embryos, and piped embryos (PE) were recorded and calculated as a percentage of fertile eggs at the end of incubation. Also BW of chicks at hatch (BWH) was recorded.

Data of all traits studied were analyzed using factorial design according to Snedecor and Cochran (1982) as the following model:

$Y_{ijk} = \mu + S_i + T_j + ST_{ij} + e_{ijk}$.

where, Y_{ijk} = an observation, μ: overall mean, S_i: effect of strain (S), T_j: effect of feed treatment (T), ST_{ij} = interaction between SxT and eijk = the residual effect.

All data presented on a percent basis (viability and hatch traits) was subjected to Arcsine transformation prior to statistical analysis using (SAS, 1989). Significant differences among means were tested using Duncan's Multiple Range Test (Duncan, 1955).

Table (1): Composition and calculated analysis of the experimental diets

Ingredients	Grower	Layer
Yellow corn	675.0	660
Soybean meal (44% P)	231.0	213
Wheat bran	55.0	22.4
Dicalcium phosphate	22.0	15.0
Limestone,ground	10.2	80.0
Sodium chloride	3.1	6.0
Vitamins-Minirals premix*	3.0	3.0
Methionin	0.7	0.6
Total	1000.0	1000.0
Calculated chemical analysis:**		
Crude protein %	16.86	15.45
ME (Kcal/Kg of diet)	2864	2730
Calorie/protein ratio	170	176
Ca%	0.95	3.12
Avail. Phosphorus	0.51	0.41
Lysine % of C.P	4.94	4.86
Methionine % of C.P	2.08	2.08
Cystine % of C.P	1.71	1.72

***Vitamin-mineral premix supplied per 1Kg. of diet: Vit.A, 12000 IU; Vit. D3, 2200 ICU; Vit. E,10 mg;Vit. K3, 2mg; Vit. B1,1 mg; Vit. B2,4mg; Vit. B6, 1.5 mg; Vit. B12, 10 Ug; Nicotinic acid, 20 mg; Folic acid, 1mg; Pantothenic acid,10 mg; Biotin 50 Ug; Choline chloride, 500 mg; Copper, 10 mg; Iron 30 mg; Manganese, 55mg; Zink, 50 mg; Iodine, 1mg; Selenium, 0.1 mg. **Calculated according to Scott *et al.* (1976).**

RESULTS AND DISCUSSION

Tables 2 and 3 showed the effect of early fasting on BW of G and B strains at the beginning of treatment, and at different ages post fasting. It was

clear that G pullets were significantly (P<0.001) heavier than B ones at the different ages studied. As a result of fast treatments, G showed more reduction in BW as a percentage of initial weight than GM (-5.01 vs -0.86) while B pullets grew faster than G, after refeeding, up to the end of experimental period. Similar results were reported by (Abou-El-Ella, 1982; Nofal *et al.*, 2000) who found that developed local strains significantly differed in body weight. As for feed treatments, significant (P<0.001 or P<0.01) differences in pullets BW were found at all ages studied where control pullets were significantly heavier than any of the treated ones. The fast periods did not show any significant differences between the three groups at all ages studied, pullets that were fasted for 5, 7 or 9 days lost 5.41, 4.04 and 6.03% of the initial BW, respectively. It was obvious that the treated groups failed to regain BW at the end of experiment. The interactions between SxT were significant at all times studied except that after 4 weeks post fasting. Similar results were reached by Fattori *et al.* (1991), Strong (1992) and Nofal *et al.* (2000) who reported that proportional decreases in feed allocation resulted in corresponding decreases in BW while no significant difference in BW was found by Koelkebeck *et al.* (1992) and Sandoval and Gernat (1996). However, results cited by Koelkebeck *et al.* (1993) showed that hens that did not eat for 7 days had significantly reduced BW at week 2 compared with control and 4-day hens, and hens that did not eat for 4 days did not loss significant BW compared with control hens during any measurement period, in addition, feed withdrawal had a more pronounced effect on BW recovery (in Experiment 2) after the withdrawal period than in Experiment 1.

The effect of S, T and the interaction between them with respect to EN during different periods, are presented in Tables 4 to 7. Highly significant differences were found between the two strains with respect to both EN or RL which G pullets produced more eggs than B during the first six weeks post fasting, and during (1-28 wks). Similar results were reported by Abou-El-Ella (1982), Nofal *et al.* (2000) who found that developed local strains significantly differed in rate of laying. Although analysis of variance showed no significant effect of fast periods on either EN or RL during all periods studied, Duncan Test appeared that 5-day fast pullets produced EN more than control ones (2.25 vs 1.59) during the 2nd week post fasting and the RL had the same trend. On the other hand, no significant differences were found in both traits among the three treated groups. The interactions of SxT of the same traits were not significant during all post fasting periods studied. Koelkebeck *et al.* (1992) reported that early hen/day egg production was depressed by 4- or 7-day withdrawal, but long term production was not different between control and 4-day hens in both experiments studied. In addition, reports of (Koelkebeck *et al.*, 1993) have indicated that hen-housed production was significantly lower in 4-day hens versus controls in both Experiments and depriving hens of feed for 7 days reduced long-term hen-housed egg production in both experiments.

Moreover, Ross *et al.* (1989) and Strong (1992) showed that hen-housed egg production from 5 to 44 wk after feed withdrawal was not different between control hens or hens that did not eat for 4 days.

Table (2):Body weight (g) (I±s.d) and the variation percentage[1] in body weight according to fast program used

Week	Strain		Sig.	Treatment				Sig.
	Baheij	Gimmizah		Control	5-day fast	7-day fast	9-day fast	
Initial weight	962.9±125.5^{b}	1454.4±212.2^{a}	***	1194.3±282.6	1172.5±270.6	1134.6±290.1	1169.9±334.2	-
0[2]	954.6±129.1^{b} (-0.86)	1380.5±217.1^{a} (-5.01)	***	1240.9±283.9^{A} (3.91)	1109.0±218.0^{B} (-5.41)	1088.8±251.0^{B} (-4.04)	1099.3±303.8^{B} (-6.03)	***
2	1036.8±144.8^{b} (7.68)	1493.3±212.0^{a} (2.67)	***	1301.6±277.8^{A} (8.99)	1218.8±243.9^{B} (3.69)	1214.3±264.5^{B} (7.03)	1190.4±347.9^{B} (1.76)	***
4	1106.4±137.4^{b} (14.90)	1528.0±208.0^{a} (5.06)	***	1354.5±288.4^{A} (13.42)	1260.3±248.6^{B} (7.49)	1259.2±247.6^{B} (10.98)	1280.4±290.6^{B} (9.45)	**
16	1143.0±139.5^{b} (18.71)	1542.0±220.9^{a} (6.02)	***	1386.8±304.0^{A} (16.12)	1275.4±228.4^{B} (8.78)	1279.9±242.7^{B} (12.81)	1319.4±279.2^{B} (12.83)	***
28	1480.4±170.5^{b} (53.74)	2020.4±289.4^{a} (38.92)	***	1818.9±407.20^{A} (52.30)	1667.0±301.6^{B} (42.17)	1670.5±323.0 (47.24)	1728.4±365.7 (47.74)	***

** Significant at P<0.01, *** Significant at P<0.001, NS: non-significant.
- Means with the same letter for each row (for every factor) are not significantly different.
[1] As a percentage of initial weight.
[2] Body weights are for the end of each treatment (0 wk).

Table (3): Body weight (I±s.d) of Gimmizaha and Baheij strains according to fast program used

Strain / Treat.	Baheij				Gimmizah				Sig. SxT
	Cont.	5 day	7 day	9 day	Cont.	5 day	7 day	9 day	
Initial wt.	1001.67±123.39	975.48±119.78	952.56±135.08	921.22±112.37	1473.10±202.93	1439.35±167.75	1404.48±244.20	1498.71±226.54	NS
After fasting o1	1042.50±119.33	965.71±113.25	939.77±126.22	872.93±100.13	1514.48±205.18	1303.23±169.79	1309.66±226.16	1398.71±205.97	***
2 wks	1112.50±121.80	1059.64±117.48	1047.44±149.21	916.76±118.74	1562.41±212.50	1434.52±200.83	1461.72±194.35	1517.10±225.32	***
4 wks	1146.92±132.97	1094.29±126.28	1118.37±153.05	1061.00±124.38	1633.62±185.43	1485.16±188.82	1467.93±211.53	1528.06±214.33	NS
16 wks	1164.10±127.87	1129.88±135.89	1157.21±149.94	1118.61±143.19	1686.21±192.51	1472.58±173.68	1461.72±241.38	1552.58±207.32	***
28 wks	1504.68±157.20	1458.63±153.93	1493.40±183.04	1465.38±187.58	2208.93±252.19	1929.08±227.53	1914.86±316.21	2033.88±271.58	***

[1] Body weights are for the end of each treatment (0 wk),
*** Significant at P<0.001, NS: non-significant.

Table (4): Egg number/hen (ī±s.d) during different periods according to fast program used

Week	Strain		Sig.	Treatment				Sig.
	Baheij	Gimmizah		Control	5- day fast	7- day fast	9- day fast	
1	0.87±0.34^{B}	1.69±0.41^{A}	***	1.23±0.68	1.33±0.61	1.21±0.44	1.34±0.62	NS
2	1.21±0.45^{B}	2.63±0.52^{A}	***	1.59±0.77^{b}	2.25±0.04^{a}	1.88±0.93^{ab}	1.95±0.93^{ab}	NS
3	1.46±0.29^{B}	2.80±0.65^{A}	***	2.27±0.75	2.23±1.09	2.29±1.01	1.73±0.54	NS
4	1.99±0.62^{B}	3.34±0.43^{A}	***	2.91±1.06	3.02±1.01	2.61±0.96	2.61±0.40	NS
5	2.54±0.71^{B}	3.35±0.61^{A}	**	2.62±0.80	3.03±1.09	2.95±0.58	3.18±0.59	NS
6	2.67±0.55^{B}	3.55±0.61^{A}	***	3.18±0.43	3.00±0.99	2.89±0.65	3.38±0.81	NS
1-6	10.72±1.58^{B}	17.36±2.04^{A}	***	13.30±4.16	14.86±5.17	13.81±3.68	14.18±2.90	NS
1-28	47.58±3.24^{B}	52.26±6.76^{A}	*	49.44±3.15	51.45±7.77	47.95±1.65	50.83±7.10	NS

*** Significant at P<0.01, ** Significant at P<0.01, *** Significant at P<0.001, NS: non-significant.**
- Means with the same letter for each row (for every factor) are not significantly different.

Table (5): Egg number/hen (ī±s.d) of Gimmizah and Baheij strains according to fast program used

Strain / Treat.	Baheij				Gimmizah				Sig. SxT
	Cont.	5 day	7 day	9 day	Cont.	5 day	7 day	9 day	
1 wks.	0.62±0.00	0.92±0.07	0.85±0.08	1.08±0.67	1.85±1.33	1.73±0.65	1.57±0.29	1.60±0.56	NS
2 wk	0.90±0.19	1.44±0.32	1.13±0.38	1.36±0.76	2.28±0.12	3.07±0.35	2.63±0.55	2.53±0.73	NS
3 wks.	1.69±0.40	1.26±0.25	1.54±0.08	1.33±0.27	2.85±0.48	3.20±0.26	3.03±0.92	2.13±0.42	NS
4 wks	1.54±0.54	2.28±0.84	1.85±0.74	2.28±0.09	3.78±0.47	3.77±0.40	3.37±0.21	2.93±0.25	NS
5 wks.	2.10±0.77	2.33±1.02	2.92±0.48	2.79±0.47	3.13±0.47	3.73±0.67	2.97±0.78	3.57±0.45	NS
6 wks	2.95±0.54	2.13±0.19	2.44±0.56	3.15±0.08	3.41±0.04	3.87±0.40	3.33±0.38	3.60±1.21	NS
1-6 wk.	9.79±2.20	10.36±1.51	10.72±0.73	12.00±1.47	16.79±1.31	19.37±1.89	16.90±2.15	16.37±2.14	NS
1-28 wk	49.95±4.47	45.00±0.93	45.69±1.44	49.67±2.11	48.92±2.00	57.90±5.02	50.20±5.82	52.00±10.84	NS

NS: non-significant

Table (6): Rate of laying, % (I+s.d) during different periods according to fast program used

Week	Strain			Treatment				
	Baheij	Gimmizah	Sig.	Control	5- day fast	7- day fast	9- day fast	Sig.
1	12.36±4.83^{B}	24.09±5.81^{A}	***	17.58±9.71	18.98±8.67	17.23±6.25	19.12±8.88	NS
2	17.22±6.47^{B}	37.56±7.37^{A}	***	22.71±11.03^{b}	32.16±13.46^{a}	26.87±13.24^{ab}	27.80±13.26^{ab}	NS
3	20.79±4.20^{B}	40.05±9.28^{A}	***	32.42±10.65	31.83±15.56	32.66±14.39	24.76±7.70	NS
4	28.39±8.91^{B}	47.67±6.15^{A}	***	34.43±15.09	43.21±14.37	37.23±13.75	37.25±5.64	NS
5	36.26±10.09^{B}	47.84±8.73^{A}	**	37.36±11.44	43.33±15.26	42.07±8.26	45.44±8.43	NS
6	38.10±7.79^{B}	50.75±8.68^{A}	**	45.42±6.06	42.82±14.19	41.21±9.29	48.24±11.52	NS
1-6	25.52±3.76^{B}	41.33±4.85^{A}	***	31.66±9.91	35.39±12.30	32.88±8.76	33.77±6.91	NS
1-28	24.27±1.65^{B}	26.66±3.45^{A}	*	25.22±1.61	26.25±3.96	24.46±3.31	25.94±3.62	NS

*** Significant at P<0.01, ** Significant at P<0.01, *** Significant at P<0.001, NS: non-significant.**
- Means with the same letter for row are not significantly different.

Table (7): Rate of laying (I+s.d) Baheij and Gimmizah strains according to fast program used

Strain / Treat.	Baheij				Gimmizah				Sig. SxT
	Cont.	5 day	7 day	9 day	Cont.	5 day	7 day	9 day	
1 wks.	8.79±0.00	13.19±1.10	12.09±1.10	15.38±9.58	26.37±1.90	24.76±9.29	22.38±4.12	22.86±7.95	NS
2 wk	12.82±2.77	20.51±4.58	16.12±5.42	19.41±10.84	32.60±1.68	43.81±5.01	37.62±7.87	36.19±10.53	NS
3 wks.	24.18±5.71	17.95±3.53	21.98±1.10	19.05±3.86	40.66±6.86	45.71±3.78	43.33±13.20	30.48±3.95	NS
4 wks	21.98±7.69	32.61±12.05	26.37±10.48	32.60±1.27	46.89±6.71	53.81±5.77	48.10±2.97	41.90±3.59	NS
5 wks.	30.04±11.01	33.33±14.51	41.76±6.86	39.93±6.71	44.69±6.71	53.33±9.51	42.38±11.10	50.95±6.44	NS
6 wks	42.12±7.71	30.40±2.77	34.80±7.95	45.05±1.10	48.72±0.63	55.24±5.77	47.62±15.41	51.43±17.32	NS
1-6 wk.	23.32±5.23	24.66±3.60	25.52±1.74	28.57±3.51	39.99±3.12	46.11±4.50	40.24±5.12	38.97±5.09	NS
1-28 wk	25.48±2.28	22.96±0.48	23.31±0.74	25.34±1.08	24.69±1.02	29.54±2.56	25.61±2.97	26.53±5.53	NS

NS: non-significant.

Early eggs produced by G pullets were significantly (P<0.05 to P<0.001) heavier, than that set by B ones during all periods studied except that during the 3rd week are presented in Tables 8 and 9. Differences between averages of EW in different strains were recorded by Nofal *et al.* (2000). It was obvious that no significant effect of fasting periods was found during all periods except that during the 6th week post fasting where the 9-day fast pullets produced eggs significantly lighter than those produced by the other groups. Moreover, the interactions between SxT were not significant during all periods studied. However, Ross *et al.* (1989) reported that using an early fasting period at the beginning of production improved egg size in some strains of laying hens but not others. Moreover, Strong (1992) found that using a 5-day feed withdrawal period near the beginning of production improved egg size in Hy-Line® W-36 laying hens from 26 to 29 wk in two trials, while early EW of Shaver® 288 hens was not affected in 5-day withdrawal hens at 19 wk of age in a third trial. Koelkbeck *et al.* (1993) found that average early EW (Weeks 1-6) was not different among treatments in both experiments. They showed that EW for 7-day fast hens was greater than for controls in experiment 2.

As for classification of the EW during early or late production, while G hens produced significantly (P<0.001) higher percentage of large (45-50 g) during the early interval of lay (0-6 wk) than B ones (30.35 vs 11.85%), both the two strains produced approximately the same percentages of medium or large eggs during (1-28 wks) (Table 10). However, the eggs in both classes which had high price and suitable to be hatching eggs which were produced by G pullets were (74.32% and 70.55%) and those produced by B pullets were (58.12 and 73.46%) during the early and long intervals, respectively. No significant effect of fasting were found on egg classification during the early period except that for the large eggs (45-50 g) where the control hens produced significantly larger amount of eggs (34.05%) more than those of -5, -7 and -9 day fast. In addition, long term egg weight was not affected by feed treatment except that for the small eggs (< 40.0 g) which control pullets produced fewer percentage (8.48%) than the -9 day fast (15.44 g). The differences between control group and -5 d and -7 d withdrawal ones were not significant. Pullets on quantitative restriction produced the greatest returns that was due to increased numbers of large eggs (Mbugua and Cunningham, 1983).

Highly significant difference were found of viability percentage between the two strains where G pullets had higher value than B ones (Tables 13 and 14). The 5- and 7-day fast pullets had higher viability than both control or -9 day fast. Significant SxT interaction were found. In contrast, Blair *et al.* (1976) found that viability was not significantly affected by the reduction in feed intake during laying period. In addition, Koelkbeck *et al.* (1993) reported that mortality was not significantly different (P>0.05) among withdrawal treatments in either experiment which they studied.

Tables 11 and 12 indicates FC during different posting fast periods. The G strain significantly (P<0.001 to P<0.05) surpassed B one during the early post fasting periods while no significant effect of S on FC during the long interval (1-28 weeks).

Table (8): Egg weight, g. (I+s.d) during different periods according to fast program used

Week	Strain			Treatments				
	Baheij	Gimmizah	Sig.	Control	5-day fast	7- day fast	9- day fast	Sig.
1	37.41±2.50^{B}	40.78±2.62^{A}	**	40.85±4.69	38.22±2.29	39.30±1.36	38.00±2.68	NS
2	38.16±2.61^{B}	44.55±2.27^{A}	***	41.65±4.24	41.37±5.15	41.13±3.97	41.27±3.26	NS
3	40.27±3.94	42.90±1.82	NS	41.65±3.81	40.68±3.56	41.28±2.75	42.72±3.51	NS
4	39.78±2.54^{B}	43.34±1.92^{A}	**	43.08±1.99	41.40±3.86	40.70±2.68	41.07±2.73	NS
5	40.38±3.35^{B}	45.60±2.45^{A}	***	42.08±3.75	41.82±4.51	44.28±2.50	43.78±4.95	NS
6	40.47±1.79^{B}	41.92±1.36^{A}	*	42.22±1.52^{A}	41.47±1.73^{AB}	41.28±0.58^{AB}	39.80±2.08^{B}	*
1-6	39.41±1.60^{B}	43.18±1.18^{A}	***	41.92±2.93	40.83±3.31	41.33±1.53	41.11±2.87	NS
1-28	44.13±1.76^{B}	45.88±1.76^{A}	*	44.90±1.36	45.20±2.44	45.00±1.51	44.92±2.67	NS

*** Significant at P<0.05, ** Significant at P<0.01, *** Significant at P<0.001, NS: non-significant.**
- Means with the same letter for each row (for every factor) are not significantly different.

Table (9): Egg weight, g. (I+s.d) of Gimmizah and Baheij strains according to fast program used

Strain Te-ret.	Bahij				Gimmizaha				Sig. SxT
	Cont.	5 day	7 day	9 day	Cont.	5 day	7 day	9 day	
1 wks.	37.70±4.45	36.40±0.52	38.87±0.40	36.67±2.91	44.00±2.34	40.03±1.72	39.73±1.97	39.33±2.05	NS
2 wk	37.93±1.86	36.80±1.92	38.00±1.47	39.90±4.56	45.37±0.38	45.93±0.23	44.27±2.80	42.63±0.32	NS
3 wks.	39.20±4.16	38.37±3.05	40.77±4.10	42.73±5.02	44.10±1.00	43.00±2.51	41.80±1.14	42.70±2.36	NS
4 wks	41.63±1.46	38.70±3.64	39.13±1.01	39.67±3.40	44.53±1.19	44.10±1.45	42.27±3.09	42.47±1.12	NS
5 wks.	38.90±2.18	39.53±5.31	43.17±1.27	39.93±3.30	45.27±0.35	44.10±2.65	45.40±3.21	47.63±2.42	NS
6 wks	41.77±0.61	40.33±1.40	41.43±0.59	38.33±2.02	42.67±2.18	42.60±1.30	41.13±0.57	41.27±0.51	NS
1-6 wk.	39.52±1.70	38.36±2.31	40.23±1.11	39.54±1.38	44.32±1.14	43.29±1.44	42.43±0.96	42.67±0.41	NS
1-28 wk	44.70±0.46	43.10±0.98	43.77±0.83	44.97±3.45	45.10±2.08	47.30±0.80	46.23±0.65	44.87±2.44	NS

NS: non-significant.

Table (10): Egg weight classification (⇓↑±s.d) during early and late periods of laying according to fast program used

Egg weight class.	Strain			Treatments				
	Baheij	Gimmizah	Sig.	Control	5-day fast	7-day fast	9-day fast	Sig.
1-6 weeks:								
< 40	41.88^{A}	19.56^{B}	**	18.24^{B}	30.01^{AB}	26.81^{AB}	37.82^{A}	***
40-45	46.27	43.97	NS	45.10	49.24	51.53	44.61	NS
45-50	11.85^{B}	30.35^{A}	***	34.05^{A}	18.56^{B}	18.53^{B}	13.27^{B}	***
> 50	0.00^{B}	6.02^{A}	**	2.52	2.20	3.15	4.19	NS
1-28 weeks:								
< 40	16.12^{A}	8.14^{B}	***	8.48^{B}	13.06^{AB}	11.54^{B}	15.44^{A}	*
40-45	33.23^{A}	32.30^{B}	NS	٣٢,٨٥	37.19	37.08	37.96	NS
45-50	40.23	38.26	NS	٣٨,٨٩	34.51	36.20	33.37	NS
> 50	10.42	21.30	**	19.78	15.24	١٥,١٨	١٢,٢٤	NS

* Significant at P<0.01, ** Significant at P<0.01, *** Significant at P<0.001, NS: non-significant.
- Means with the same letter for each row (for every factor) are not significantly different.

Table (11): Feed conversion (⇓↑±s.d) during different periods according to fast program used

Week	Strain			Treatments				
	Baheij	Gimmizah	Sig.	Control	5-day withdrawal	7-day withdrawal	9-day withdrawal	Sig.
1	9.76±2.45	6.40±1.31	***	9.15±4.12	7.25±1.87	8.31±1.41	7.62±2.44	NS
2	7.72±2.41^{B}	3.77±0.97	***	7.13±3.39^{a}	4.48±2.21^{b}	5.79±2.41^{ab}	5.40±2.50^{ab}	NS
3	6.28±1.39	4.48±1.67	**	4.57±1.49	5.08±2.42	5.24±1.38	6.29±1.54	NS
4	5.09±2.04^{B}	3.18±0.68^{A}	**	4.70±2.47	3.69±1.74	4.30±2.08	3.84±0.65	NS
5	4.57±2.21^{B}	3.28±0.69^{A}	*	4.90±2.33	4.14±2.29	3.61±0.70	3.05±0.59	NS
6	3.93±0.49	3.12±0.68	*	3.35±0.76^{ab}	3.74±1.23^{ab}	4.02±0.86^{a}	2.98±0.62^{b}	NS
1-6	5.18±1.03^{B}	3.71±0.61^{A}	***	4.88±1.63	4.25±1.44	4.57±0.71	4.09±0.26	NS
1-28	10.31±0.91	9.86±1.29	NS	10.20±0.85	9.86±1.67	10.39±0.97	9.88±1.09	NS

* Significant at P<0.05, ** Significant at P<0.01, *** Significant at P<0.001, NS: non-significant.
- Means with the same letter for each row (for every factor) are not significantly different.

Table (12): Feed conversion (I+s.d) of Gimmizah and Baheij strains according to fast program used

Strain	Baheij				Gimmizah				Sig. SxT
Treat. / Weak	Cont.	5 day	7 day	9 day	Cont.	5 day	7 day	9 day	
1 wk.	12.68±1.02	8.91±0.64	8.70±1.54	8.58±3.31	5.44±0.34	5.59±0.28	7.92±1.46	6.66±1.06	***
2 wk	10.05±2.47	6.12±1.99	7.69±1.25	7.03±2.74	4.57±0.51	2.85±0.52	3.89±1.48	3.77±0.39	NS
3 wk.	5.62±1.58	7.05±1.52	5.93±1.02	6.17±1.75	3.85±0.79	3.10±0.75	4.55±1.51	6.41±1.69	NS
4 wk	6.34±2.63	4.81±1.91	5.27±2.70	3.93±0.73	3.05±0.42	2.58±0.36	3.33±0.80	3.75±0.71	NS
5 wk.	6.36±2.49	5.34±2.89	3.55±0.85	3.04±0.83	3.44±0.98	2.94±0.67	3.67±0.72	3..06±0.42	NS
6 wk	3.67±1.05	4.77±0.41	4.43±0.86	2.83±0.27	3.03±0.17	2.71±0.68	3.61±0.77	3.13±0.90	NS
1-6 wk.	6.06±1.52	5.45±0.75	5.05±0.09	4.17±0.35	3.70±0.44	3.05±0.53	4.09±0.75	4.01±0.16	*
1-28 wk	9.30±0.83	11.20±0.84	10.70±0.34	9.63±0.88	10.69±0.63	8.52±0.90	10.08±1.40	10.13±1.41	*

* Significant at P<0.05,
*** Significant at P<0.001, NS: non-significant.

Table (13): Hatch traits and viability (I+s.d) according to fast program used

Age, wk		Strain		Sig.	Treatment				Sig.
		Baheij	Gimmizah		Control	5-day fast	7- day fast	9- day fast	
Fertility	adj[1].	68.31±13.89^{b}	74.78±10.61^{a}	*	73.39±9.12^{AB}	71.83±11.72^{AB}	65.93±15.80^{B}	75.02±12.36^{A}	NS
	%	(82.35)	(90.27)		(89.79)	(87.05)	(78.82)	(89.58)	
Hatchability[2]	adj.	58.00±15.12^{b}	66.33±14.80^{a}	*	61.16±11.76^{AB}	57.76±15.09^{B}	61.27±16.86^{AB}	68.46±16.73^{A}	NS
	%	(68.44)	(79.40)		(74.40)	(68.00)	(72.74)	(80.52)	
Hatchability[3]	adj.	70.89±16.53	74.21±14.43	NS	68.69±13.74^{B}	66.18±16.92^{B}	78.61±14.12^{A}	76.72±14.57^{A}	**
	%	(83.23)	(87.62)		(82.75)	(77.93)	(91.44)	(89.59)	
Early dead embryos	adj.	6.75±11.46	5.80±9.37	NS	5.53±8.32	9.88±13.84	6.36±11.14	3.31±6.61	NS
	%	(4.74)	(3.45)		(2.88)	(7.57)	(4.44)	(1.55)	
Late dead embryos	adj.	8.00±12.23	7.05±9.01	NS	6.95±9.78^{AB}	9.57±11.21^{AB}	3.40±6.66^{B}	10.18±13.42^{A}	NS
	%	(5.84)	(3.76)		(4.00)	(6.08)	(1.58)	(7.54)	
Piped embryos	adj.	2.87±7.33	2.33±6.05	NS	6.33±9.60^{A}	4.07±7.91^{AB}	0.00±0.00^{B}	0.00±0.00^{B}	**
	%	(1.75)	(1.22)		(3.70)	(2.22)	(0.00)	(0.00)	
Chick weight (g)		32.53±1.19^{b}	34.32±1.38^{a}	***	34.09±1.24^{A}	33.34±1.60^{AB}	32.97±1.56^{B}	33.28±1.72^{AB}	*
Viability	adj.	82.90±8.89	85.93±7.18	***	78.49±8.98^{B}	90.00±0.00^{A}	90.00±0.00^{A}	81.17±9.88^{B}	**
	%	(96.38)	(98.33)		(94.10)	(100.00)	(100.00)	(9800)	

* Significant at P<0.01, ** Significant at P<0.01, *** Significant at P<0.001, NS: non-significant.

- Means with the same letter for each column or row are not significantly different.

[1] The percentage values which adjusted to Arcsine values prior to statistical analysis,

[2] Estimated as a percent hatched of all eggs,

[3] Estimated as a percent hatched of fertile eggs,

Table (14): Hatch traits (I+sd) of Gimmizah and Baheij strains according to fast program used

Strain / Treat / Trait		Baheij				Gimmizah				Sig. SxT
		Cont.	5 day	7 day	9 day	Cont.	5 day	7 day	9 day	
Fertility	adj [1]	73.19±9.77	67.86±13.32	57.95±14.24	73.52±13.47	72.87±8.99	75.80±8.89	73.91±13.58	76.51±11.76	NS
	%	(90.04)	(82.04)	(69.49)	(87.82)	(89.54)	(92.07)	(88.14)	(91.34)	
Hatchability[2]	adj	59.28±8.96	52.26±15.28	54.18±14.77	66.27±18.32	63.05±14.34	63.26±13.50	68.36±16.52	70.66±15.76	NS
	%	(72.90)	(59.45)	(64.14)	(77.25)	(75.89)	(76.56)	(81.35)	(83.78)	
Hatchability[3]	adj	66.44±12.52	61.65±16.92	79.41±15.30	76.06±16.97	70.94±15.27	70.70±16.16	77.81±13.72	77.37±12.74	NS
	%	(81.13)	(72.36)	(91.63)	(87.79)	(84.36)	(83.50)	(91.25)	(91.38)	
Early dead embryos	adj.	7.41±8.85	11.63±15.79	7.95±12.92	0.00±0.00	3.66±7.81	8.14±12.28	4.78±9.55	6.62±8.26	NS
	%	(3.68)	(9.41)	(5.86)	0.00	(1.97)	(5.72)	(3.01)	(3.10)	
Late dead embryo	adj	6.49±10.79	11.56±11.01	0.00±0.00	13.94±16.97	7.40±9.29	7.58±11.70	6.79±8.28	6.42±7.92	NS
	%	(4.14)	(7.03)	0.00	(12.21)	3.86	(5.13	(3.17)	(2.88)	
Piped embryos	adj	9.00±10.91	2.47±7.40	0.00±0.00	0.00±0.00	3.66±7.81	5.66±8.51	0.00±0.00	0.00±0.00	NS
	%	(5.43)	(1.59)	0.00	0.00	1.97	(2.85	0.00	0.00	
Chick weight (g)		34.79±0.77	33.74±1.95	33.93±1.52	34.80±0.69	33.93±1.25	32.94±1.13	32.01±0.89	31.75±0.78	*
Viability	adg	79.27±9.30	90.00±0.00	90.00±0.00	72.35±3.25	77.71±10.64	90.00±0.00	90.00±0.00	90.00±0.00	* *
	%	(94.87)	(100.0)	(100.0)	(90.63)	(93.33)	(100.0)	(100.0)	(100.0)	

*** Significant at P<0.05, NS: non-significant.**

[1] The percentage values which adjusted to Arcsine values prior to statistical analysis.

[2] Hatchability was expressed as a percent hatched of all eggs, 3Hatchability was expressed as a percent hatched of fertile eggs.

Although analysis of variance showed that no significant effect of fasting periods on FC during all periods except that during the 4th weeks (P<0.001) where FC of 5-day and 9-day fast pullets were the best values, 5-day fast and -9- day fast pullets had the best FC during the 2nd and 6thweek post fast, respectively. The interactions between SxT were significant (P<0.01) during 1st week and during both 1-6 and 1-28 weeks post fast. However, no significant difference in FC were found by Lefebvre *et al* (1989) when restricted feeding used while Muir and Gerry (1978) and Nofal *et al.* (2000) reported that feed restriction improved FC during laying periods. In contrast, Koelkbeck *et al* (1993) found that FC during weeks 1 to 6 were significantly poorer for both withdrawal groups compared with control hens in Experiment 1, while depriving hens of feed for 7 days in Experiment 2, resulted in poorer FC than that of control or 4-day hens, similar to the result reported herein, cumulative FC (weeks 1 to 32) was not affected by early feed withdrawal in both experiments.

Tables 13 and 14 showed that there was a significant reduction of F and THE in B eggs than G ones. Also CBW was significantly (P<0.001) heavier than that of B one. In contrast, Afify *et al.* (2002) found that strain had no significant effect on both fertility and hatchability. No significant effect of S on the other hatch traits. In addition, fasting period affected significantly HFE, PE and CBW. Eggs which produced by 7- and 9-day fast pullets showed highest HFE than those of eggs produced by control or 5-day fast pullets. Moreover, while no piped embrios were found in the eggs produced by 7- and 9- day fasting pullets, eggs set by control or 5- fast pullets had (3.70 and 2.22%) piped embryos. However, no significant interaction between SxT were found with respect all hatch traits studied. Significant interaction between SxT was found in CBW. McDaniel *et al.* (1981) who found that feed restriction resulted in increased fertility and hatchability, also, Yu *et al.* (1992) indicated that full-fed hens had lower percentages of fertility and hatchability. Moreover, Triyuwanta *et al.* (1992) reported that body weight of the progeny at hatch was enhanced by increasing feed allowanced. In contrast, Katanbaf *et al.* (1989) reported that differences in fertility and hatchability of fertile eggs for feeding regimens were not significant. Also, Fattori *et al.* (1991) concluded that both fertility and hatchability were not significant affected by the reduction in feed intake. In general, the results showed that there were improving in some of hatch traits while no significant effects of fast program used were found on the other traits studied of Gimmizah and Baheij pullets.

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تأثير الصيام لفترات مبكرا على أداء بدارى جميزة وبهيج

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تم دراسة تأثير الصيام لفترات قصيرة عند البدء فى إنتاج البيض على أداء دجاجات جميزة وبهيج. عندما بلغت الدجاجات ١٠% إنتاج تم اتباع برنامج صيام ، حيث تم توزيع الدجاجات عشوائيا على أربع مجاميع (٣ مكررات كل منها ١٠-١٣ دجاجة) فى بيوت رعاية أرضية وكانت المجاميع كما يلى : مجموعة كنترول وثلاث مجاميع تجريبية تم تصويمها لفترة ٥ أو ٧ أو ٩ أيام وقد أوضحت النتائج ما يلى :

- كانت دجاجات الجميزة الأثقل فى الوزن بدرجة معنوية عن دجاجات بهيج عند جميع الأعمار و كانت الأخيرة أسرع نموا بعد إعادة التغذية حتى نهاية التجربة ، كما تفوقت أوزان مجموعة الكنترول معنويا على مجاميع الصيام فى جميع الأعمار التى تم دراستها.
- تفوقت دجاجات الجميزة على البهيج فى صفات انتاج البيض ومعدل الوضع بدرجة معنوية بينما لم يكن هناك تأثيرا معنويا للصيام .
- كان البيض الناتج عن دجاجات الجميزة أثقل وزنا عن بيض البهيج فى جميع فترات الإنتاج ما عدا البيض الناتج خلال الاسبوع الثالث. و نتج عن المجموعة التى تم تصويمها لمدة ٩ أيام بيض أقل فى الوزن عن البيض الناتج عن دجاجات المجموعات الأخرى وذلك خلال الاسبوع السادس بعد الصيام.
- كان نسبة البيض الناتج عن دجاجات الجميزة من فئة كبير الحجم والكبير جدا أعلى معنويا خلال المرحلة المبكرة من الإنتاج عن البيض الناتج عن دجاجات بهيج . والدجاجات التى تم تصويمها ٧ أو ٩ أيام نتج عنها نسبة من البيض الكبير جدا فى الحجم (ولكن بدرجة غير معنوية) أعلى من منها فى مجموعة الكنترول ومجموعة الصيام ٥ أيام.
- كانت حيوية دجاجات الجميزة أفضل معنويا عن دجاجات بهيج كما وجد أن حيوية الدجاجات التى تم تصويمها ٥ ، ٧ أيام عن مجموعتى الكنترول والمجموعة التى تم تصويمها لفترة ٩ أيام.
- كانت الكفاءة الغذائية لدجاجات الجميزة أفضل منها للدجاجات بهيج خلال المرحلة المبكرة من الإنتاج بينما لم يكن للسلالة تأثيرا معنويا على هذه الصفة خلال فترة ١-٢٨ أسبوع من الإنتاج. وكانت كفاءة الغذاء لمجموعتى الصيام ٥ ، ٩ أيام هى الأفضل خلال الأسبوع الثانى والسادس من الإنتاج.
- انخفضت خصوبة ونسبة الفقس للبيض المخصب فى بيض بهيج معنويا عن بيض الجميزة وكانت كتاكيت الجميزة أثقل وزنا بدرجة معنوية عن كتاكيت بهيج. أدى الصيام لفترة ٧ ، ٩ أيام إلى تحسين نسبة الفقس وبينما لم تشاهد أجنة نافقة فى بيض الدجاجات التى تم تصويمها ٧ و ٩ فقد بلغت قيمتها ٣,٧٠ ، ٢,٢٢% فى مجموعتى الكنترول وصيام ٥ أيام. وجد تفاعل معنوى بين السلالة والمعاملة بالنسبة لوزن الكتكوت عند الفقس. بصفة عامة فإن نظام الصيام المستخدم قد أدى إلى تحسين بعض الصفات الإنتاجية مثل الكفاءة الغذائية والحيوية و بعض صفات الفقس بينما لم يؤثر على صفات إنتاج البيض فى دجاجات الجميزة وبهيج.