J. Agric. Sci. Mansoura Univ., 27 (7): 4419 - 4435, 2002

EFFECT OF CERTAIN FEED ALLOWANCES DURING REARING PERIOD ON THE PERFORMANCE OF GIMMIZAH AND GOLDEN MONTAZAH PULLETS

Afify, Yousria K.; Nazla Y. Abou-El-Ella; Mervat A. Breikaa and Magda M. Balat
Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Cairo, Egypt.

ABSTRACT

Two hundred and twelve Gimmizah (G) and Golden Montazah (GM) female chicks at 4 weeks of age were used. Four groups of about (26-27) chicks from each strain were kept on floor pens and fed a growing diet from 4 to 20 weeks of age. The chicks were assigned randomly to one of the following treatments: the control group which was fed ad libitum, the +8% group, which was fed 8% diet above that of the control consumption during a week before, and the -8% and -16% groups, which were fed 8% and 16%, respectively, less feed than that of the control consumption during a week before. These treatments were applied up to 20 weeks of age, then, laying diet was provided instead of the growing one and the same amount of food was allocated to birds of all treatments till the end of the experimental interval. Water was available for ad libitum intake throughout the study. The G strain was significantly ($P<0.001$) heavier than GM at all studied ages, and food allocation treatment affected BW ($P<0.05$) at 8 weeks and ($P<0.001$) at the other ages studied. However, the hens which received the increased food allocation surpassed the control, -8% and -16% groups in a descending order up to 20 wks of age. While GM birds grew significantly ($P<0.05$) faster than G from 8-12 and from 12-16 weeks, the control group or hens which received the increased food allocation surpassed the -8% and -16% groups. The G birds had significantly better values of feed conversion (FCR) at 4-8 and 16-20 weeks of age. On the averages, the hens of -16%, -8% food allowancing showed significantly the best values of FCR at 12-16 weeks, followed by those with increased food allowancing +8% and then the control hens. The interaction between the strain and feed treatment (SxT) was significant in the later two periods studied. No significant differences were observed in age at sexual maturity between the two strains or among the feeding treatments. In addition, GM pullets produced significantly higher egg number (EN) during all periods studied than G. The same trend was found in rate of laying (RL). However, strain had no effect on either EN or RL at 120 days of production. With respect to the feed conversion during laying interval (FCL), GM pullets showed significantly ($P<0.05$) better FCL than G during the 1st, 2nd, and 3rd month of laying while no significant effect of food allocated treatment were found. The G pullets produced significantly ($P<0.001$) heavier eggs which had significantly ($P<0.001$) heavier shell than GM, while the opposite was true with respect to albumen percentage. While control pullets produced lighter eggs than the other treated groups, pullets which were received +8% feed allowance had the lowest yolk index (YI) values. There were highly significant interactions between SxT of egg weight (EW), shell weight and albumen weight percentages and Haugh units. Also, significant interaction between SxT was found with respect to YI. Neither the strain nor feeding treatment had significant effects on both fertility and hatchability. However, the percentage of early dead embryos of G eggs was significantly ($P<0.001$) higher than that of GM chicks. These results indicated that increasing the food allowance by 8% resulted in an increase in growth traits, while a decrease of 16% in Gimmizah birds and 8% in Golden Montazah birds of feed allowance improved the egg production

traits of Gimmizah and Golden Montazah pullets.
Keywords: chicken, feed allowances, growth, feed conversion, egg traits, viability, hatch traits.

INTRODUCTION

Feed allowances for different ages were suggested for developed local strains (APRI, 1968), and for laying period for Silver Montazah pullets as 120 g/pullet/day (Mahmoud *et al.*, 1975). Since this time, no attempts were made to determine feed allowances for other strains of local chickens. However, these allowances were recommended for heavy and light local breeds of chickens. Thus, determining feed allowances for other local strains of chickens has become a rnust. With the same token, determining feed allowances for local strains of chickens at rearing is essential. The effect of increasing amount of feed on the performance Fattori *et al.* (1991), Robinson *et al.* (1993) and Bartove and Wax (1998) who found that increasing the amount of feed allocated beyond recommendation resulted in increased body weight, stimulated early maturity. Also, Bartove and Wax (1998) found that effects of a moderate increase in food allowance on laying performance are not straightforward. However, Triyuwanta *et al.* (1992b) found that the shell quality was not affected by food allowance. On the other hand, it has been shown that feeding programs which restrict the feed intake of pullets during rearing or near the beginning of egg production were found to be effective in delaying sexual maturity (Sandoval and Gernat, 1996; Nofal *et al.*, 2000). Compared with ad libitum controls, restricted feeding was found to be effective on feed efficiency (Moultrie, 1983; Lee and Leeson, 2001), egg production traits, either at part or full record (Strong, 1992; Nofal *et al.*, 2000) or egg weight and egg quality (Triyuwanta *et al.*, 1992a; Renema *et al.*, 1995), viability (Muir and Gerry, 1978; Katanbaf *et al.*, 1989), and for hatching traits (McDaniel *et al.* 1981; Wilson *et al.*, 1983). On the other hand, results of Fattori *et al.* (1991) indicated that feed restriction levels below recommendations can be used with broiler breeder females without affecting significantly mortality, average egg weight, fertility, or hatchability.

The present work aimed to study the effect of feed allowances during rearing interval on the performance of Gimmizah and Golden Montazah pullets.

MATERIALS AND METHODS

This study was carried out at El-Sabhiah Poultry Research Station, Animal Production Research Institute (APRI). Two hundred and twelve, Gimmizah (G) and Golden Montazah (GM) female chicks at 4-week old were kept on floor pens and fed a growing diet from 4 to 20 weeks of age. In each strain, four groups of about 26-27 chicks were randomly assigned to rearing houses (three replicates). The control group which was fed ad libitum. The first treated group. was fed 8% diet (+8%) above that of the control consumption the week before. The second and the third treated groups were fed 8% and 16% less than the control consumption the week before, respectively. At 20 weeks of age a laying diet replaced the growing one (Table 1) and the same amount of food was allocated to birds of all treatments after the age of 20 weeks. Water was available for ad libitum intake throughout the study.

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

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 %	16.67	15.45
ME (Kcal/Kg of diet)	2847	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).**

Body weight (BW) and feed intake were recorded biweekly up to 20 weeks of age. Growth rate (GR), feed conversion during rearing periods (FCR) (kg diet/kg body weight gain), age at sexual maturity (ASM) at 50% egg production for each pen were estimated. Eggs were collected daily throughout 120 days from the beginning of lay. Egg number (EN), and rate of laying percentage (RL), feed conversion during the laying periods (FCL) (kg. feed/kg eggs) were studied. At 32 and 42 weeks of age, two consecutive days of eggs were collected [280 egg (G) and 224 egg (GM)] and the following traits were studied: egg weight (EW), shell weight (SHW), and percentages of shell weight (SHW%), yolk weight (Y%), albumin weight (A%). Also. Haugn units (Hu), and yolk index (YI), Stadelman and Cotterill (1986). Total eggs for each strain and each replicate within every treatment (1546 G and 1092 GM) were incubated at 7-day intervals for 7 hatches. Fertility percentage (F), and hatchability on the bases of all eggs set (HAE) or of fertile eggs (HFE) were determined. The dead embryos (EDE), late dead embryos (LDE), piped embryos (PE) were recorded and calculated as percentages of fertile eggs at the end of incubation. Also body weight 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:

$$Yijk = \mu + Si + Tj + STij + eijk.$$

where, Yijk = an observation, μ: overall mean, Si: effect of strain (S), Tj: effect of feed treatment (T), STij = interaction between SxT and eijk = the residual effect.

All data presented on a percent basis (viability and hatch traits) were 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).

RESULTS AND DISCUSSION

The superiority of G birds in live body weight than those of GM ones represented to 16.8, 17.2, 14.4, 12.3 and 12.6% at 4, 8, 12, 16 and 20 weeks of age, respectively, (Table 2).

Although the birds of all feeding groups had nearly equal live weights at the beginning of the study at 4 weeks of age, the +8% group ranked the first in this respect followed by those of control, -8% and -16% in a descending order up to 20 weeks of age (Table 2). The +8% group had significantly ($P<0.05$ or $P<0.01$) heavier body weights than the other three groups which were approximately equal.

The feeding treatment had significant ($P<0.01$) effects on growth rate at 4-8 and 16-20 weeks of age (Table 3). At the period from 8 up to 16 weeks all groups had nearly similar value of growth rate. When the data of growth rate were pooled at period 4-20 weeks, the +8% group had the best value and the -16% group had the lowest growth rate value, however, the two groups control and -8% were intermediate in this concern. The interaction SxT was significant at all periods except at 8-12 weeks where the two breeds had variable values at all ages according to the feeding treatment without any consistent breed. Similar results were reached by Mosaad *et al.* (1995) and Nofal *et al.* (2000) who reported that strain significantly affected growth performance. With respect to the effect of feed treatment effect, Fattori *et al.* (1991), Robinson *et al.* (1993) and Bartove and Wax (1998) found that increasing the amount of feed allocated beyond recommendation resulted in increased body weight. In addition, Strong (1992), Abd El-Ghani *et al.* (1995) and Nofal *et al.* (2000) reported that feed restriction significantly decreased body weight while no significant difference in BW were found by Lefebvre et al (1989), Koelkebeck *et al.* (1992) and Sandoval and Gernat (1996).

Table (2): Live body weight (g) ($\bar{X}\pm$s.d) at different ages of Gimmizah (G) and Golden Montazah (GM) birds as affected by food allocation

Treatments \ Strain	Age (weeks) 4			8			12			16			20		
	G	GM	Av.	G	GM	Av.	G	GM	Av.	G	GM	Av.	G	GM	Av.
Control	581.2	493.7	540.0	977. 8	833.5	911.4^{b}	1293.3	1135.7	1222.6^{b}	1411.5	1313.3	1369.7^{b}	1606.3	1480.0	1557.8^{b}
	±90.3	±96.0	±102.1	±129.6	±109.0	±139.7	±136.4	±125.3	±152.4	±163.0	±146.2	±162.1	±165.0	±116.8	±158.9
+8%	622.7	492.6	555.4	1053.1	881.6	964.2^{a}	1413.3	1219.2	1318.3^{a}	1549.5	1387.6	1473.9^{a}	1799.8	1529.9	1700.3^{a}
	±122.2	±100.0	±127.0	±159.1	±134.3	±169.2	±183.5	±163.2	±198.0	±190.1	±148.9	±188.8	±150.4	±152.5	±199.1
-8%	599.2	512.6	555.9	963.0	827.8	895.4^{b}	1289.3	1127.1	1212.9^{b}	1461.5	1258.3	1365.9^{b}	1589.3	1424.3	1517.1^{b}
	±77.9	±88.8	±93.6	±31.99	±120.2	±130.6	±132.1	±108.9	±145.7	±171.5	±107.0	±176.2	±194.8	±129.7	±187.0
-16%	597.6	555.6	577.0	958.9	822.4	893.3^{b}	1275.2	1117.7	1201.5^{b}	1430.4	1253.3	1349.6^{b}	1577.8	1419.5	1505.8^{b}
	±91.9	±111.8	±103.3	±134.0	±125.4	±146.0	±158.0	±142.4	±164.2	±199.2	±148.1	±197.1	±200.0	±156.9	±196.6
Av.	600.0^{A}	513.7^{B}		987.6^{A}	842.4^{B}		1315.8^{A}	1150.2^{B}		1461.3^{A}	1301.4^{B}		1640.6^{A}	1457.0^{B}	
	±96.4	±100.5		±136.4	±123.8		±160.1	±140.0		±185.7	±145.6		±197.5	±143.0	
Sig. of strain, S	***			***			***			***			***		
Sig. of treat., T	-			*			***			***			***		
Sig. of SxT	-			NS			NS			NS			NS		

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

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

Table (3): Growth rate (%) ($\bar{X} \pm$s.d) at different ages of Gimmizah (G) and Golden Montazah (GM) birds as affected by food allocation

Treatments \ Strain	4-8 wks.			8-12 wks			12-16 wks			16-20 wks			4-20 wks		
	G	GM	Avg.	G	GM	Avg.	G	GM	Avg.	G	GM	Avg.	G	GM	Avg.
Control	51.10	50.18	50.68^{ab}	28.04	30.93	29.34	8.63	13.12	10.54	13.02	9.63	11.66^{ab}	93.94	96.94	95.14^{ab}
	±9.86	±11.95	±10.77	±6.28	±7.28	±6.98	±3.00	±5.15	±4.59	±4.71	±3.48	±4.54	±10.28	±13.64	±11.69
+8%	51.87	56.97	54.51^{ab}	28.36	32.06	30.17	9.29	12.20	10.65	15.33	10.13	13.41^{a}	97.19	102.49	99.14^{a}
	±9.43	±14.11	±12.28	±6.97	±6.94	±7.13	±3.29	±4.72	±4.24	±4.95	±2.97	±4.98	±10.59	±11.78	±11.19
-8%	46.73	47.26	46.99^{bc}	29.00	30.99	29.94	12.35	11.13	11.78	8.32	11.64	9.77^{b}	90.27	95.61	92.61^{bc}
	±8.97	±11.86	±10.42	±6.14	±8.28	±7.22	±5.15	±5.30	±5.20	±2.78	±4.18	±3.81	±10.42	±12.02	±11.35
-16%	46.48	38.80	42.79^{c}	29.04	29.58	29.29	11.27	11.17	11.22	9.59	11.37	10.40^{b}	91.10	86.51	89.02^{c}
	±9.77	±12.34	±11.63	±4.95	±8.68	±6.88	±3.80	±4.00	±3.85	±3.70	±6.27	±5.05	±8.78	±12.11	±10.56
Overall mean ±	49.02	48.50		28.61^{B}	30.90^{A}		10.40^{B}	11.86^{A}		11.51	10.78		93.07	94.77	
SD.	±9.70	±14.12		±6.13	±7.75		±4.15	±4.82		±4.91	±4.52		±10.27	±13.40	
Sig. of strain, S	NS			*			*			NS			NS		
Sig. of treat., T	***			NS			NS			***			***		
Sig. of SxT	*			NS			**			***			*		

*Significant at P<0.05, ** Significant at P<0.01, *** Significant at P<0.001, NS: non-significant.

- Means with the same latter for each column or row (for every trait) are not significantly different.

The G birds had better values of feed conversion at all intervals of the rearing period, except at 12-16 weeks Table (4) where it needed less amount of feed to gain one unit of body weight than GM ones by about 0.39, 0.13, 0.87 and 0.33 kg at 4-8, 8-12, 16-20 and 4-20 weeks, respectively.

Despite the effect of feeding treatment on FCR differed at various rearing intervals studied without any constant trend but these difference were significant (P<0.01) at 12-16 weeks, only. It is clear that the group of +8% showed the best value of FCR at 4-20 weeks, followed by those of -16%, -8% and the control in a descending order.. Similar to the results reported herein, Mosaad *et al.* (1995) and Nofal *et al.* (2000) found that strain affected significantly feed conversion during growth period. On the other hand, no significant difference in feed conversion were found by Lefebvre et al (1989) when restricted feeding used while Lee and Leeson reported that physical feed restriction improved feed efficiency, also, Nofal *et al.* (2000) found that feed restriction improved feed conversion during rearing and laying periods.

Although analysis of variance showed no significant effects of strain or treatment on ASM, G pullets reached sexual maturity three days later than GM and pullets those fed +8% reached sexual maturity earlier by about 2, 5, 4 days than control, -8%, -16% ones, respectively (Table 5). Similar results with respect to the effect of strain on ASM, was found by Nofal *et al.* (2000) while they found significant differences between treatments. Fattori *et al.* (1991), Robinson *et al.* (1993), and Bartove and Wax (1998) reported that increasing the amount of feed allocated beyond the recommendation resulted in stimulated early maturity. The same trend was found with respect to rate of production. Concerning laying viability percentage, Table (5) showed no significant differences due to S, T and the interaction of SxT was not significant. Similar results were reported by Muir and Gerry (1978) and Fattori *et al.* (1991) where viability was not significantly affected by the reduction in feed intake.

The results in Tables (6 and 7) revealed a significant (P<0.05) effects of strain on both EN and RL during all intervals except that during the 3rd period of production. GM pullets produced eggs more than those of G ones (17.62 vs 13.83 egg, 17.81 vs 14.15 egg, 18.29 vs 14.28 egg and 19.77 vs 15.21egg) during the 1st, 2nd, 3rd, and 4th intervals, respectively. In general, GM pullets surpassed the G ones by about 28% during 120 days of production.

As for the feed treatment effect, pullets fed amount of ration -16% less than control ones during the rearing period produced the highest number of eggs and the -8% group had the lowest value while both the control and +8% groups had the intermediate values. With respect to feed treatment, In addition, results have indicated that brief periods of feed restriction near the beginning of egg production have been effective in delaying sexual maturity by 3 to 5 d (Strong, 1992; Sandoval and Gernat, 1996), In addition, Fattori *et al.* (1991) reported that a delay in sexual maturity caused a significant decrease in laying rate but not in total settable eggs due to feed treatments -16% and -24% to 64 wk of age.

Table (4): Feed conversion (x± s.d) during the rearing period (kg diet/kg body weight gain) of Gimmizah (G) and Golden Montazah (GM) birds as affected by food allocation

Main factors \ Age (wk)	4-8	8-12	12-16	16-20	4-20
Strain:					
Gimmizah	3.34±0.37^{A}	4.82±0.51	6.65±1.91	6.03±0.94^{A}	4.74±0.44
Golden Montazah	3.73±0.45^{B}	4.95±0.59	6.26±1.10	6.90±1.56^{B}	5.07±0.62
Treatment:					
control	3.51±0.41	5.26±0.18	7.60±1.94^{B}	7.33±1.73	5.26±0.73
+8%	3.56±0.46	5.07±0.34	7.09±1.09^{B}	5.95±1.51	4.64±0.29
-8%	3.51±0.29	4.63±0.68	5.75±0.98^{A}	6.49±0.90	4.91±0.39
-16%	3.57±0.67	4.58±0.58	5.39±0.99^{A}	6.09±0.85	4.83±0.62
Sig. of strain, S	*	NS	NS	*	NS
Sig. of treatment,	NS	NS	**	NS	NS
Sig. of interaction SxT	NS	NS	**	**	NS

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

Table(5): Age at sexual maturity and viability percentage (x+s.d) of Gimmizah (G) and Golden Montazah (GM) strains as affected by food allocation

Treatment \ Trait	Age at sexual maturity, day			Viability percentage		
	G	GM	Av.	G	GM	Av.
Cont.	171.33±4.04	169.00±0.01	169.60±3.29	100.00	91.67	95.84
+ 8%	169.67±1.16	169.50±6.36	172.60±3.21	100.00	84.45	92.23
- 8%	174.67±2.08	169.52±0.71	171.40±3.36	85.19	100.00	92.60
- 16%	173.00±3.61	169.00±0.00	171.00± 2.50	100.00	100.00	100
Av.	172.17±3.19	169.25±2.44		96.30	94.03	
Sig. of strain, S	NS			NS		
Sig. of treatment, T	NS			NS		
Sig. of interaction SxT	NS			NS		

- NS: non-significant.

Table (6): Egg number (x+s.d) of Gimmizah (G) and Golden Montazah (GM) strains as affected by food allocation

Treatment \ Age	First month			Second month			Third month			Fourth month			120 days		
	G	GM	Av..	G	GM	Av.	G	GM	Av.	G	GM	Av.	G	GM	Av.
Cont.	15.01 ±4.22	17.37 ±0.05	15.95 ±3.25	15.28 ±9.02	17.37 ±0.05	16.12 ±3.07	15.31 ±3.73	17.28 ±0.02	16.31 2.97	15.43 ±3.52	20.10 ±2.12	17.30 ±3.72	61.03 ±15.48	72.65 ±2.06	65.68 ±12.71
+ 8%	15.04 ±3.48	14.41 ±1.00	14.78 ±2.53	15.26 ±3.92	14.71 ±0.72	15.04 ±2.81	15.48 ±4.18	15.14 ±0.91	15.35 ±2.99	15.26 ±4.23	18.32 ±0.26	16.48 ±3.43	61.04 ±15.79	62.57 ±2.36	61.65 ±11.26
- 8%	9.96 ±3.02	20.63 ±4.19	14.23 ±6.57	10.20 ±3.00	20.99 ±0.05	14.52 ±6.60	10.46 ±3.07	21.29 ±4.41	17.79 ±6.69	14.09 ±9.62	21.40 ±4.81	17.01 ±8.25	44.71 ±18.71	84.30 ±17.40	60.55 ±26.85
- 16%	15.32 ±1.29	18.08 ±2.48	16.42 ±2.16	15.64 ±1.71	18.17 ±2.60	16.65 ±2.25	15.88 ±1.53	18.92 ±2.48	17.09 ±2.34	16.06 ±1.69	19.25 ±3.42	17.33 ±2.72	62.88 ±6.14	74.42 ±11.0	67.50 ±9.74
Average	13.83 ±3.59^B	17.62 ±3.03^A		14.15 ±3.67^B	17.81 ±3.00^A		14.28 ±3.63^B	18.29 ±3.06^A		15.21 ±4.84	19.77 ±2.67		57.42 ±14.79^B	73.49 ±11.39^A	
Sig. of strain, S	*			*			*			NS			*		
Sig. of strain, T	NS			NS			NS			NS			NS		
Sig. of SxT	NS			NS			NS			NS			NS		

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

- Means with the same letter for each interval are not significantly different.
- FF.: Full feeding , RF: restricted feeding.

Table (7): Rate of laying, % ($\bar{X}$±s.d) of Gimmizah (G) and Golden Montazah (GM) strains as affected by food allocation

Trait / Treatment	First month			Second month			Third month			Fourth month			120 days		
	G	GM	Avg.	G	GM	Avg.	G	GM	Avg.	G	GM	Avg.	G	GM	Avg.
Cont.	50.04 ±14.06	57.89 ±0.16	53.18 ±10.83	50.94 ±13.41	57.89 ±0.16	59.36 ±10.01	51.01 ±12.43	59.39 ±0.08	54.36 ±9.91	51.43 ±11.73	67.00 ±0.00	57.66 ±12.41	50.85 ±12.91	60.54 ±1.71	54.73 ±10.59
+ 8%	50.12 ±11.59	48.02 ±3.32	49.28 ±8.44	50.86 ±13.06	49.04 ±2.41	46.99 ±12.22	51.61 ±13.91	50.46 ±3.01	51.15 ±10.0	50.87 ±14.10	61.05 ±0.88	54.94 ±11.43	50.87 ±13.16	52.14 ±1.97	51.38 ±9.38
- 8%	33.21 ±10.07	68.78 ±13.99	47.44 ±21.89	34.01 ±10.00	69.95 ±13.27	48.39 ±21.94	34.85 ±10.23	70.95 ±14.69	49.29 ±22.30	46.96 ±12.08	71.34 ±16.03	56.71 ±27.51	37.26 ±15.59	70.25 ±14.50	50.46 ±22.37
- 16%	51.05 ±4.29	60.28 ±8.25	54.74 ±7.19	52.12 ±5.69	60.56 ±8.65	55.50 ±7.50	52.92 ±5.12	63.06 ±8.25	56.97 ±7.81	53.51 ±5.64	64.17 ±11.39	57.77 ±9.08	52.40 ±5.13	62.02 ±9.13	56.25 ±7.85
Average	46.11 ±11.95	58.74 ±10.09		46.99 ±12.22	59.36 ±10.01		47.60 ±12.11	60.96 ±10.19		50.69 ±16.13	65.89 ±8.88		47.85 ±12.33	61.24 ±9.49	
Sig. of strain, S	*			*			*			NS			*		
Sig. of treatment, T	NS			NS			NS			NS			NS		
Sig. of SxT	NS			NS			NS			NS			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 interval are not significantly different.

On the other hand, egg production was not affected by such an increase food allocated in some studied (Blair *et al.*, 1976; Fattori *et al.*, 1991), but decreased in other reports (Katanbaf *et al.*, 1989; Robinson *et al.*, 1993) while Bartove and Wax (1998) found that effects of a moderate increase in food allowance on laying performance are not straightforward. On the other hand, while early feed restriction showed no effect on egg production rate, in most cases, Abd El-Ghani *et al.* (1995), egg production (Koelkebeck *et al.*, 1992; Sandoval and Gernat, 1996) results of Robbins *et al.* (1986) and Nofal *et al.* (2000) showed that feed restriction improved egg production traits. In contrast, reduction in egg production was reported by Strong and Dale (1989), and Strong (1992). Yu *et al.* (1992) found that full-fed hens produced fewer settable eggs.

The GM pullets were more efficient in converting feed to egg than those of G ones by about 24.8, 23.4, 23.0 and 24.1 % at the 1st, 2nd, 3rd, and 4th months, respectively, with overall mean 26.3% (Table 8). Difference in FCL due to strain differences were significant ($P<0.05$) at all periods except at the 4th month of laying. The feeding treatment had no significant effects on FCL in all intervals studied. The -8% group had the poorest value at all studied periods, and the -16% group was the best at most intervals. In comparison to the control group, the groups of +8%, -8% and -16% needed -11.9, + 10.1, -16.8% feed to produce one unit of eggs at 4-20 weeks, respectively. Similar results were reported by Nofal *et al.* (2000) who reported that strains differed significantly in feed conversion during the 90 day of laying while the same authors found significant differences in feed conversion with feeding program which used in all periods. In contrast to the results reported herein, Moultrie (1983) found significant and proportional decreases in feed per dozen eggs during the production period as feed was restricted from 10% to 15% below standard. Moreover, Bartove and Wax (1998) evaluated the relationship between BW of breeder pullets at different ages and the amount of food allocated on laying performance, generally, their results showed that number of eggs per laying hen was not affected by the weight group and or food allocated.

Results presented in Table (9) showed that G pullets produced significantly ($P<0.001$) heavier eggs which had significantly ($P<0.001$) heavier shell than GM ones while the opposite was true with respect to AI%. While control pullets produced lighter eggs than the other treated groups, pullets which were received +8% feed allowance had the lowest value of YI. There were highly significant interactions of EW, SH%, AI%, and Hu. With respect to YI, significant interaction was found. These results agreed with those reported by Balat (1984) who found that egg weight differed in the developed strains. Compared with the results reported herein opposite reports were found by Fattori *et al.* (1991), Koelkebeck *et al.* (1992) and Sandoval and Gernat (1996) who reported that egg weight was not significantly affected by reduction in feed intake, in addition, Triyuwanta *et al.* (1992b) found that egg weight was decreased by limiting the food intake of the breeder, while the shell quality was not affected by food allowance.

Table (8): Feed conversion ($\bar{X}\pm$s.d) (kg. feed/kg eggs) of Gimmizah and Golden Montazah pullets birds as affected by food allocation

Treatment \ Laying period	First month	Second month	Third month	Fourth month	Avg.
Strain:					
Gimmizah	4.88 ± 1.3^{B}	4.57 ± 1.21^{B}	4.44 ± 1.19^{B}	4.10 ± 1.35	4.56 ± 1.25^{B}
Golden Montazah	3.67 ± 0.57^{A}	3.50 ± 0.48^{A}	3.42 ± 0.50^{A}	3.11 ± 0.44	3.36 ± 0.41^{A}
Treatment:					
control	4.32 ± 0.70	4.26 ± 0.72	3.95 ± 0.72	3.79 ± 0.71	4.28 ± 0.88
+8%	4.20 ± 1.10	3.88 ± 0.84	3.97 ± 0.73	3.32 ± 0.80	3.77 ± 0.86
-8%	5.03 ± 2.00	4.80 ± 1.85	4.73 ± 1.83	4.36 ± 2.11	4.71 ± 1.92
-16%	4.04 ± 0.82	3.63 ± 0.48	3.47 ± 0.46	3.36 ± 0.30	3.56 ± 0.40
Sig. of strain, S	*	*	*	NS	*
Sig. of treatment, T	NS	NS	NS	NS	NS
Sig. of interaction SxT	NS	NS	NS	NS	NS

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

- Means with the same letter for each column (for every trait) are not significantly different.

Table (9): Egg quality traits (x±s.d) of Gimmizah (G) and Golden Montazah (GM) birds as affected by food allocation

Main factors	Trait	Egg weight	Shell weight	Shell %	Yolk %	Albumin %	Haugh units	Yolk Index
Strain:	G.	49.7±4.7[a]	6.5±0.8[a]	13.1±1.4	31.1±3.5	55.8±3.9[b]	80.2±11.4	48.1±4.6
	GM	47.8±4.0[b]	6.1±0.6[b]	12.8±1.4	30.6±2.6	56.6±3.2[a]	80.8±12.3	48.5±4.5
Treatment:	control	47.9±4.7[B]	6.3±0.7	13.1±1.4	30.8±3.0	56.1±3.3	79.4±11.2	49.0±4.4[A]
	+8%	49.4±4.3[A]	6.3±0.8	12.8±1.5	31.1±3.0	56.4±3.8	79.9±11.2	47.1±5.0[B]
	-8%	49.2±4.8[A]	6.3±0.8	12.9±1.4	30.7±3.4	56.4±3.8	81.8±11.9	48.4±4.5[A]
	-16%	49.1±3.8[A]	6.4±0.7	13.0±1.3	30.9±3.3	56.2±4.0	80.7±13.1	48.8±3.8[A]
Sig. of strain, S		***	***	NS	NS	**	NS	NS
Sig. of treat., T		*	NS	NS	NS	NS	NS	**
Sig. of SxT		***	NS	**	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 column (of each main factor) are not significantly different.

Table (10): Hatch traits and body weight of chick (g) at hatch (x+s.d) of Gimmizah (G) and Golden Montazah (GM) strains as affected by food allocation

Main factors / Trait	Fertility	Hatchability of TE[1]	Hatchability of FE[2]	Early dead embryo	Late dead embryo	Piped embryo	Chick weight at hatch (g)
Strain:							
Gimmizah							
%	95.19	75.74	79.36	9.53	6.86	4.36	
adj.[3]	80.6±8.8	62.1±12.4	65.0±12.6	13.8±12.6[A]	11.1±10.9	8.7±8.6	38.8±1.6[A]
Golden Montazah							
%	94.60	79.55	83.97	5.21	7.30	3.15	36.8±1.3[B]
adj.	70.6±8.9	64.6±10.2	68.2±10.1	9.4±9.7[B]	12.2±10.3	6.0±8.6	
Treatment:							
Control %	94.40	75.82	80.13	7.31	7.49	5.33	
adj.	80.1±9.9	61.7± 9.9	64.7± 9.1	12.3±10.3	12.3±10.6	9.9±9.3	37.6±1.4
+8% %	95.00	77.18	80.94	8.67	7.06	3.10	
adj.	80.2±8.7	62.8±11.5	65.7±11.5	12.5±13.4	11.5±10.3	6.3±8.2	37.3±1.2
-8% %	94.64	75.82	80.01	8.09	7.73	3.82	
adj.	79.7±8.9	62.7±13.4	66.3±14.0	11.9±12.3	12.0±11.5	7.4±8.8	37.0±2.0
-16% %	95.81	80.37	83.87	7.06	5.83	3.22	
adj.	80.9±7.8	65.4±11.5	68.5±11.8	11.3±11.1	10.3± 9.9	6.7±8.2	37.6±1.4
Sig. of strains, S	NS	NS	NS	*	NS	NS	***
Sig. of traits, T	NS	NS	NS	NS	NS	NS	NS
Sig. of SxT	NS	NS	NS	NS	NS	*	NS

- *Significant at P<0.05, ** Significant at P<0.01, *** Significant at P<0.001, NS: non-significant.
[1,2] TE: Total eggs set, FE: Fertile eggs.
[3] adj: Adjusted to Arcsine values prior to statistical analysis.
- Means with the same letter for each column are not significantly different.

Triyuwanta *et al.* (1992a) found that shell quality and albumin quality were affected by the level of feed intake. In addition, Renema *et al.* (1995) indicated that restricted feeding during rearing could potentially improve laying characteristics by altering ovarian morphology without limiting shell quality or yolk size, quantitative feed restriction was most effective for improving egg quality.

Results in Table 10 showed that neither the strain nor feeding treatment had significant effects on both fertility and hatchability. However, the percentage of early dead embryos of G eggs was significantly ($P<0.001$) higher than that of GM chicks (9.53% vs 5.21) and the G chicks at hatch were significantly heavier than those of GM (38.8 vs 36.8 g). Feed treatment showed no significant effect, also the interactions between SxT was not significant in all hatch traits which studied. In contrast, McDaniel *et al.* (1981) and Wilson *et al.* (1983) found that feed restriction increased fertility and hatchability. Also Yu *et al.* (1992) cited that full-fed had lower percentages of fertility and hatchability and embryonic viability. In addition, Triyuwanta *et al.* (1992a) reported that body weight of the progeny at hatch was enhanced by increasing feed allowanced, also, Triyuwanta *et al.* (1992b) found that one-day-old chick weight was decreased by limiting the food intake of the breeders.

These results indicated that increasing the food allowance by 8%, resulted in an increase in growth traits, while a decrease of 16% in Gimmizah birds and 8% in Golden Montazah birds of feed allowance improved the performance of Gimmizah and Golden Montazah pullets.

REFERENCES

Abd-El-Ghani, I.A.; E.H.El-Ganzoury and Salwa B. Abd-El-Hady (1995). Effect of feed restriction for replacement poults on their subsequent production performance. The Second Sci. Conf. on Poultry. Sept. 1994, Kafr El-Sheikh, Egypt.

A.P.R.I. (1968). Animal Production Research Institute, Animal and Production Nutrition. Technical bulletin., 3: 249.

Balat, Magda M. (1984). Production traits for the local strains of chickens under Egyption villages conditions and its extension implications. Ph. D. thesis. Fac. Of Agric. Alex. Univ. Alexandria, Egypt.

Bartove, I. and E. Wax (1998). Lack of effect of body weight of breeder pullets at various ages and the amount of food allocated on their subsequent laying performance. Br. Poult. Sci., 39: 418-422.

Blair, R., M.M. MacCowan and W. Bolton (1976). Effects of food regulation during the growing and laying stages on the productivity of broiler breeders. Br. Poult. Sci., 17: 215-223.

Brody,T.B.; P.B. Siegel and J.S. Chery (1984). Age. Body weight and body composition requirements for the onset of sexual maturity of dwarf and normal chickens. Br. Poultry Sci., 25: 245-252.

Duncan, D.B. (1955). Multiple range and multiple F tests. Biometrics. 11: 1-42.

Fattori, T.R.; H.R. Wilson; R.H. Harms and R.D. Miles (1991). Response of broiler breeder females to feed restriction below recommended levels. 1. Growth and reproductive performance. Poultry Sci., 70: 26-36.

Katanbaf, M.N.; E.A. Dunnington and P.B. Siegel (1989). Resricted feeding in early and late-feathering chickens. 2- Reproductive responses. Poultry Sci., 68: 352-358.

Koelkebeck. K.W.; C.M. Parsons and R.W. Leeper (1992). Influence of early fasting period on laying hen perforance. Poultry Sci., 71 (Suppl.1): 1.

Lee, K.H. and S. Leeson (2001). Performance of broilers fed limited quantities of feed or nutrients during seven to fourteen days of age. Poultry Sci., 80:446-454.

Lefebvre, F.L.; S.P. Touchburn and C.W. Chan (1989). Intermittent feeding responses in genetically fat and lean chickens. Anim. Breed. Abstr., 057-03718; 7A.

Mahmoud, T.H.; N. Abdel Salam and M.M. Balat (1975). Effect of certain feed allowances on the performance of Silver Montazah pullets. Agric. Res. Rev., 53:118-139.

McDaniel, G.R.; J.Brake and M.K. Eckman (1981). Factors affecting broiler breeder performance. 4. The interrelationship of some reproductive traits. Poultry Sci., 60: 1792-1797.

Mosaad, Nema A.; Magda M. Balat; Hanaa M.Ismail; A. El-Ahwal and Nadia A. El-Sayed (1995). Comparative study of certain productive traits, meat quality and chemical composition of different local strains of chickens. First Egypt. Hangarian.Poultry Conf., 17-19 September, Alex. Egypt.

Moultrie, F. (1983). Feeding and lighting trials with broiler breeders-a progress reports. Pages 48-54 in: Proc. Arkansas Nutr. Conf., Dept. of Animal Sciences, Univ. of Arkansas, Fayetteville. AR. (cited by Fattori *et al.* ,1991)

Muir, F.V. and R.W. Gerry (1978). Effect of restricted feeding and watering in laying house performance of Red x Rock sex-linked females. Poultry Sci., 57:1508-1513.

Nofal, M.E.; K.A. Yamani; GH.A.El-Sayiad and Y.M.Abd El-Kader (2000). Effect of restricted feeding on performance of Gimmizah and Mamourah laying hens. Proc. Conf. Anim. Prod. In The 21th Century, Sakha, 18-20 April 2000:375-384.

Renema, R.A.; F.E. Robinson; V.L. Melnychuk; R.T. Hardin; G. Bogley; D.A. Emmerson and J.R. Blackman (1995). The use of feed restriction for improving reproductive traits in male-line large white turkey hens. 2- Ovary morphology and laying traits. Poultry Sci., 74: 102-120.

Robbins, Kelly; George C. McGhee; Peter Osei and Roy E. Beauchene. (1986). Effect of restriction on growth, body composition, and egg production of broiler females through 68 weeks of age. Poultry Sci., 65:2226-2231.

Robinson, F.E.; J.L Wilson; M.W., Yu, G.M. Fasenko and R.T. Hardin (1993). The relationship between body weight and reproductive efficiency in meat-type chickens. Poultry Sci., 72:912-922.

Sandoval, D.M. and A.G. Gernat (1996). Evaluation of early feed restriction on egg size and hen performance. Poultry Sci., 75:311-314.

SAS Institute, (1989). SAS User's Guide, Statistics. Version 5. SAS Institute Inc., Cary, NC.

Scott, M.L. M.C.Nesheim and R.J. Young (1976). NUTRITION OF THE CHICKEN. M.I. Scott & Associates, Ithaca, New York, U.S.A.

Snedecor. G.W. and W.G. Cochran (1967). Statistical Method. Ames, Iowa, U.S.A.

Stadelman, W.J. and Owen J. Catterill (1986). EGG SCIENCE AND TECHNOLOGY, Third Edition. PSS,58. AVI Publishing Company. INC. Westport, Connecticut.

Strong, C.F. Jr. (1992). The pre-lay pause: A live-day fast near the beginning of production for improving early egg size of beginning of production for improving early egg size of commercial laying hens. J. Appl. Poult. Res.,1:56-60.

Strong, C.F. Jr. and N.M. Dale (1989). Evaluation of a 5 day fast for commercial pullet of the beginning of production. Poultry Sci., 68 (Suppl.1):143.

Triyuwanta, C. Leterrier and Y. Nys (1992a). Dietary phosphorus and food allowance of dwarf breeders affect reproductive performance of hens and bone development of their progeny. Br. Poultry Sci., 33:363-379.

Triyuwanta, C. Leterrier; J.O. Brillard and Y. Nys (1992b). Maternal body weight and feed allowance of breeders affect performance of dwarf broiler breeders and tibial ossification of their progeny. Poultry Sci., 71:244-254.

Wilson, H.R.; D.R. Ingram and R.H. Harms (1983). Restricted feeding of broiler breeders. Poultry Sci., 62:1133-1141.

Yu, M.W.; F.E. Robinson; R.G. Charles and R. Weingardt (1992). Effect of feed allowance during rearing and breeding on female broiler breeders. 2. Ovarian morphology and production. Poultry Sci., 71:1750-1761.

J. Agric. Sci. Mansoura Univ., 27 (7), July, 2002

تأثير استخدام نظام تغذية خلال فترة الرعاية على أداء دجاجات الجميزة والمنتزه الفضى

يسرية محمد كمال عفيفى - نظلة يوسف أبو العلا - مرفت على بريقع - ماجدة مصطفى بلاط

معهد بحوث الإنتاج الحيوانى والدواجن –مركز البحوث الزراعية –وزارة الزراعة

استخدم فى هذه الدراسة عدد ٢١٢ كتكوت الجميزة والمنتزه الذهبى عمر ٤ أسابيع (إناث) . تم تقسيم الكتاكيت عشوائيا إلى أربعة مجاميع بكل منها ٢٦ 27 –كتكوت من كل سلالة فى بيوت رعاية أرضية. مجموعة المقارنة تم تغذيتها على عليقة حرة ، وتم تغذية المجموعة الأولى التجريبية على كمية من العليقة تزيد عن المستهلك لمجموعة المقارنة فى الأسبوع السابق بنسبة ٨% (+٨%) ، بينما تم تقديم كمية من العليقة لطيور المجموعتين الثانية والثالثة التجريبيتين على كميات تقل عن كمية العلف التى تستهلكه مجموعة المقارنة بنسب ٨% و ١٦% ، على التوالى، حيث استمرت تلك المعاملات حتى ٢٠ أسبوع من عمر الطيور، ثم تم تقديم عليقة بياض لجميع الطيور حتى نهاية المعاملة. وقد أوضحت النتائج ما يلى:

- كان لبرنامج التغذية أثرا معنويا على وزن الجسم عند ٨ أسابيع لطيور المجاميع التجريبية الثلاث بينما تأثرت بدرجة عالية المعنوية عند الأعمار الأخرى. وبينما تفوقت المجموعة الأولى فى وزن الجسم على باقى المجموعات فى جميع الأعمار كانت طيور الجميزة الأثقل وزنا بدرجة عالية المعنوية عند جميع الأعمار أيضا. من ناحية أخرى فإن السلالة لم تؤثر معنويا فى معدل النمو خلال ٤-٨ و ١٦-٢٠ أسبوع من العمر وكانت طيور المنتزه الذهبى أسرع نموا عن طيور الجميزة عند ٨-١٢ و ١٢-١٦ أسبوع.
- تحسن معامل تحويل الغذاء لطيور الجميزة بدرجة عالية المعنوية خلال ٤-٨ و ١٦-٢٠ أسبوع من العمر على طيور المنتزه الذهبى ، تحسن معامل تحويل الغذاء لطيور المجموعتين التجريبيتين الثانية والثالثة بدرجة عالية المعنوية خلال ١٢- ١٦ أسبوع من العمر عن باقى المجاميع. كذلك تأثر معامل تحويل الغذاء معنويا بالتفاعل بين كل من السلالة والمعاملات الغذائية وذلك خلال المرحلتين الأخيرتين التى تم دراستها. كذلك حققت دجاجات المنتزه الذهبى معامل تحويل الغذاء لإنتاج البيض أفضل معنويا عن دجاجات الجميزة.
- لم يختلف العمر عند النضج الجنسى معنويا بين السلالتين بالرغم من تأخر نضج دجاجات الجميزة ٣ أيام عن دجاجات المنتزه الذهبى. كذلك لم تؤثر المعاملات الغذائية معنويا على نفس الصفة. وقد كان كل من إنتاج البيض ومعدل وضع البيض لدجاجات المنتزه الذهبى أعلى معنويا عنه فى دجاجات الجميزة خلال جميع الفترات التى تم دراستها إلا أن الإختلاف بين السلالاتين لم يكن معنويا خلال ١٢٠ يوما الأولى من الإنتاج.
- كان االبيض الناتج عن سلالة الجميزة أثقل وزنا وكذلك وزن القشرة بينما كان نسبة الألبيومين أكثر فى البيض الناتج عن دجاجات المنتزه الذهبى. وكان البيض الناتج عن دجاجات غذيت على المجاميع التجريبية الثلاث أثقل وزنا عن البيض الناتج عن دجاجات الكنترول بينما وجد أن قيمة معامل الصفار فى المجموعة التى قدم لها كمية من الغذاء + ٨% كانت الأعلى. ولم تؤثر كل من السلالة والمعاملات الغذائية معنويا على كل من نسبتى الخصوبة و الفقس، بينما أثرت السلالة معنويا بدرجات متفاوته على كل من الأجنة الميتة ووزن الكتكوت عند الفقس.

تشير نتائج هذه الدراسة إلى أن زيادة المقررات الغذائية المسموح بها بما يعادل ٨% نتج عنها زيادة صفات النمولطيور السلالاتين خلال مرحلة الرعاية بينما أدى خفض المقررات المسموح بها بـ ١٦% فى طيور الجميزة و ٨% فى طيور المنتزه الذهبى إلى تحسين صفات إنتاج البيض.