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

Two hundred and twelve Gimmizah (G) and Golden Montazah (GM) female chicks at 4 weeks of age were used. Four groups of about (28-27) 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 allowances showed significantly the best values of FCR at 12-16 weeks, followed by those with increased food allowing +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.
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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 must. 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-Sabihia 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,

4420
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>
<thead>
<tr>
<th>Ingredients</th>
<th>Grover</th>
<th>Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow corn</td>
<td>675.0</td>
<td>660</td>
</tr>
<tr>
<td>Soybean meal (44% P)</td>
<td>231.0</td>
<td>213</td>
</tr>
<tr>
<td>Wheat bran</td>
<td>55.0</td>
<td>22.4</td>
</tr>
<tr>
<td>Dicalcium phosphate</td>
<td>22.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Limestone,ground</td>
<td>10.2</td>
<td>80.0</td>
</tr>
<tr>
<td>Sodium chloride</td>
<td>3.1</td>
<td>6.0</td>
</tr>
<tr>
<td>Vitamins-Minerals premix*</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Methionine</td>
<td>0.7</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1000.0</td>
<td>1000.0</td>
</tr>
</tbody>
</table>

**Calculated chemical analysis:**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude protein %</td>
<td>16.67</td>
<td>15.45</td>
</tr>
<tr>
<td>ME (Kcal/Kg of diet)</td>
<td>2847</td>
<td>2730</td>
</tr>
<tr>
<td>Calorie/protein ratio</td>
<td>170</td>
<td>176</td>
</tr>
<tr>
<td>Ca%</td>
<td>0.95</td>
<td>3.12</td>
</tr>
<tr>
<td>Avail. Phosphorus</td>
<td>0.51</td>
<td>0.41</td>
</tr>
<tr>
<td>Lysine % of C.P</td>
<td>4.94</td>
<td>4.86</td>
</tr>
<tr>
<td>Methionine % of C.P</td>
<td>2.08</td>
<td>2.08</td>
</tr>
<tr>
<td>Cystine % of C.P</td>
<td>1.71</td>
<td>1.72</td>
</tr>
</tbody>
</table>

*Vitamin-mineral premix supplied per 1 Kg. of diet: Vit.A, 12000 IU; Vit. D3, 2200 IU; Vit. E, 10 mg; Vit. K3, 2 mg; Vit. B1, 1 mg; Vit. B2, 4 mg; Vit. B6, 1.5 mg; Vit. B12, 10 ug; Nicotinic acid, 20 mg; Folic acid, 1 mg; Pantothenic acid, 10 mg; Biotin, 50 ug; Choline chloride, 500 mg; Copper, 10 mg; Iron 30 mg; Manganese, 55 mg; Zink, 50 mg; Iodine, 1 mg; 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 (FLC) (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 (ED), 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:

\[ Y_{ijk} = \mu + S_i + T_j + S \times T_{ij} + e_{ijk} \]

where, \( Y_{ijk} \) = an observation, \( \mu \): overall mean, \( S_i \): effect of strain (S), \( T_j \): effect of feed treatment (T), \( S \times T_{ij} \) = interaction between SxT and \( e_{ijk} \) = 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 Lefevre et al (1999), Koelkebeck et al. (1992) and Sandoval and Gernat (1996).
Table (2): Live body weight (g) (\(X \pm s.d\)) at different ages of Gimmizah (G) and Golden Montazah (GM) birds as affected by food allocation

<table>
<thead>
<tr>
<th>Treatments</th>
<th>4</th>
<th>8</th>
<th>12</th>
<th>16</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>581.2</td>
<td>493.7</td>
<td>540.0</td>
<td>977.8</td>
<td>833.5</td>
</tr>
<tr>
<td></td>
<td>±90.3</td>
<td>±96.0</td>
<td>±102.1</td>
<td>±129.6</td>
<td>±109.0</td>
</tr>
<tr>
<td>-8*</td>
<td>622.7</td>
<td>492.6</td>
<td>555.4</td>
<td>1053.1</td>
<td>831.6</td>
</tr>
<tr>
<td></td>
<td>±122.2</td>
<td>±100.0</td>
<td>±127.0</td>
<td>±159.1</td>
<td>±134.3</td>
</tr>
<tr>
<td>-8*</td>
<td>599.2</td>
<td>512.6</td>
<td>555.9</td>
<td>963.0</td>
<td>827.8</td>
</tr>
<tr>
<td></td>
<td>±77.9</td>
<td>±88.8</td>
<td>±93.6</td>
<td>±119.9</td>
<td>±120.2</td>
</tr>
<tr>
<td>-16*</td>
<td>599.6</td>
<td>555.6</td>
<td>577.0</td>
<td>958.9</td>
<td>822.4</td>
</tr>
<tr>
<td></td>
<td>±91.9</td>
<td>±111.8</td>
<td>±103.3</td>
<td>±134.0</td>
<td>±125.4</td>
</tr>
<tr>
<td>Av.</td>
<td>600.0*</td>
<td>513.7*</td>
<td>577.0</td>
<td>987.6*</td>
<td>842.6*</td>
</tr>
<tr>
<td></td>
<td>±96.4</td>
<td>±100.5</td>
<td>±123.8</td>
<td>±136.4</td>
<td>±120.3</td>
</tr>
</tbody>
</table>

Sig. of strain, S  
- ***  
- ***  
- ***  

Sig. of treat, T  
-  
-  
-  

Sig. of itsT  
-  
-  
-  

* Significant at P < 0.05, ** Significant at P < 0.01, NS: non-significant.
* Means with the same letter for each column or row (for every two) are not significantly different.
Table (3): Growth rate (%) (X±s.d) at different ages of Gimmizah (G) and Golden Montazah (GM) birds as affected by food allocation

<table>
<thead>
<tr>
<th>Treatments</th>
<th>4-8 wks G</th>
<th>4-8 wks GM</th>
<th>Avg.</th>
<th>8-12 wks G</th>
<th>8-12 wks GM</th>
<th>Avg.</th>
<th>12-16 wks G</th>
<th>12-16 wks GM</th>
<th>Avg.</th>
<th>16-20 wks G</th>
<th>16-20 wks GM</th>
<th>Avg.</th>
<th>20-24 wks G</th>
<th>20-24 wks GM</th>
<th>Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>51.10</td>
<td>50.18</td>
<td>50.68*</td>
<td>28.04</td>
<td>30.93</td>
<td>29.34</td>
<td>8.63</td>
<td>13.12</td>
<td>10.54</td>
<td>13.02</td>
<td>9.63</td>
<td>11.66*</td>
<td>93.94</td>
<td>96.94</td>
<td>95.14*</td>
</tr>
<tr>
<td>±0.5%</td>
<td>51.87</td>
<td>56.97</td>
<td>54.31*</td>
<td>28.36</td>
<td>32.06</td>
<td>30.17</td>
<td>9.29</td>
<td>12.20</td>
<td>10.65</td>
<td>15.33</td>
<td>10.13</td>
<td>13.41*</td>
<td>97.19</td>
<td>102.49</td>
<td>99.14*</td>
</tr>
<tr>
<td>±0.75%</td>
<td>50.43</td>
<td>54.11</td>
<td>52.28</td>
<td>28.69</td>
<td>31.84</td>
<td>30.31</td>
<td>9.32</td>
<td>12.67</td>
<td>11.45</td>
<td>16.05</td>
<td>11.29</td>
<td>13.64</td>
<td>93.05</td>
<td>88.45</td>
<td>90.75</td>
</tr>
<tr>
<td>±1.0%</td>
<td>46.73</td>
<td>47.26</td>
<td>46.99*</td>
<td>29.00</td>
<td>30.99</td>
<td>29.94</td>
<td>12.35</td>
<td>11.13</td>
<td>11.78</td>
<td>8.32</td>
<td>11.64</td>
<td>9.77</td>
<td>90.27</td>
<td>93.61</td>
<td>92.61*</td>
</tr>
<tr>
<td>±1.5%</td>
<td>46.48</td>
<td>38.80</td>
<td>42.79*</td>
<td>29.04</td>
<td>29.58</td>
<td>29.29</td>
<td>11.27</td>
<td>11.17</td>
<td>11.22</td>
<td>9.59</td>
<td>11.37</td>
<td>10.40</td>
<td>91.10</td>
<td>86.51</td>
<td>89.02*</td>
</tr>
<tr>
<td>Overall mean</td>
<td>49.02</td>
<td>48.50</td>
<td>48.75</td>
<td>28.61</td>
<td>30.90*</td>
<td>29.00</td>
<td>10.40</td>
<td>11.86*</td>
<td>11.51</td>
<td>10.78</td>
<td>11.16</td>
<td>10.78</td>
<td>93.07</td>
<td>94.77</td>
<td>94.30</td>
</tr>
<tr>
<td>SD</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
</tr>
<tr>
<td>Sig. of strain, S</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. of treat, T</td>
<td>***</td>
<td>NS</td>
<td>***</td>
<td>NS</td>
<td>***</td>
<td>***</td>
<td>NS</td>
<td>***</td>
<td>***</td>
<td>NS</td>
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</tr>
<tr>
<td>Sig. of SxT</td>
<td>*</td>
<td>NS</td>
<td>**</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>*</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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</tr>
</tbody>
</table>

*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 or row (for every unit) 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 while 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

<table>
<thead>
<tr>
<th>Main factors</th>
<th>Age (wk)</th>
<th>4-8</th>
<th>8-12</th>
<th>12-16</th>
<th>16-20</th>
<th>4-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gimmizah</td>
<td></td>
<td>3.34±0.37&lt;sup&gt;A&lt;/sup&gt;</td>
<td>4.82±0.51&lt;sup&gt;A&lt;/sup&gt;</td>
<td>6.65±1.91&lt;sup&gt;A&lt;/sup&gt;</td>
<td>6.03±0.94&lt;sup&gt;A&lt;/sup&gt;</td>
<td>4.74±0.44&lt;sup&gt;A&lt;/sup&gt;</td>
</tr>
<tr>
<td>Golden Montazah</td>
<td></td>
<td>3.73±0.45&lt;sup&gt;B&lt;/sup&gt;</td>
<td>4.95±0.59&lt;sup&gt;B&lt;/sup&gt;</td>
<td>6.26±1.10&lt;sup&gt;B&lt;/sup&gt;</td>
<td>6.90±1.56&lt;sup&gt;B&lt;/sup&gt;</td>
<td>5.07±0.62&lt;sup&gt;B&lt;/sup&gt;</td>
</tr>
<tr>
<td>Treatment:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>control</td>
<td></td>
<td>3.51±0.41&lt;sup&gt;B&lt;/sup&gt;</td>
<td>5.26±0.18&lt;sup&gt;B&lt;/sup&gt;</td>
<td>7.60±1.94&lt;sup&gt;B&lt;/sup&gt;</td>
<td>7.33±1.73&lt;sup&gt;B&lt;/sup&gt;</td>
<td>5.26±0.73&lt;sup&gt;B&lt;/sup&gt;</td>
</tr>
<tr>
<td>+8%</td>
<td></td>
<td>3.56±0.46&lt;sup&gt;B&lt;/sup&gt;</td>
<td>5.07±0.34&lt;sup&gt;B&lt;/sup&gt;</td>
<td>7.09±1.09&lt;sup&gt;B&lt;/sup&gt;</td>
<td>5.95±1.51&lt;sup&gt;B&lt;/sup&gt;</td>
<td>4.64±0.29&lt;sup&gt;B&lt;/sup&gt;</td>
</tr>
<tr>
<td>-8%</td>
<td></td>
<td>3.51±0.29&lt;sup&gt;B&lt;/sup&gt;</td>
<td>4.63±0.68&lt;sup&gt;B&lt;/sup&gt;</td>
<td>5.75±0.98&lt;sup&gt;B&lt;/sup&gt;</td>
<td>6.49±0.90&lt;sup&gt;B&lt;/sup&gt;</td>
<td>4.91±0.39&lt;sup&gt;B&lt;/sup&gt;</td>
</tr>
<tr>
<td>-16%</td>
<td></td>
<td>3.57±0.67&lt;sup&gt;B&lt;/sup&gt;</td>
<td>4.58±0.58&lt;sup&gt;B&lt;/sup&gt;</td>
<td>5.39±0.99&lt;sup&gt;B&lt;/sup&gt;</td>
<td>6.09±0.85&lt;sup&gt;B&lt;/sup&gt;</td>
<td>4.83±0.62&lt;sup&gt;B&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Sig. of strain, S: * NS NS * NS NS
Sig. of treatment: NS NS ** NS NS
Sig. of interaction SxT: NS 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

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Trait</th>
<th>Age at sexual maturity, day</th>
<th>Viability percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>G</td>
<td>GM</td>
</tr>
<tr>
<td>Cont.</td>
<td></td>
<td>171.33±4.04&lt;sup&gt;A&lt;/sup&gt;</td>
<td>169.00±0.01&lt;sup&gt;B&lt;/sup&gt;</td>
</tr>
<tr>
<td>+ 8%</td>
<td></td>
<td>169.67±1.16&lt;sup&gt;B&lt;/sup&gt;</td>
<td>169.30±6.36&lt;sup&gt;C&lt;/sup&gt;</td>
</tr>
<tr>
<td>- 8%</td>
<td></td>
<td>174.67±2.08&lt;sup&gt;C&lt;/sup&gt;</td>
<td>169.52±0.71&lt;sup&gt;C&lt;/sup&gt;</td>
</tr>
<tr>
<td>- 16%</td>
<td></td>
<td>173.00±2.61&lt;sup&gt;C&lt;/sup&gt;</td>
<td>169.00±0.00&lt;sup&gt;C&lt;/sup&gt;</td>
</tr>
<tr>
<td>Av.</td>
<td></td>
<td>172.17±3.19&lt;sup&gt;C&lt;/sup&gt;</td>
<td>169.25±2.44&lt;sup&gt;C&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Sig. of strain, S: NS
Sig. of treatment, T: NS
Sig. of interaction SxT: NS

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

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Cont.</th>
<th>8%</th>
<th>-8%</th>
<th>-16%</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First month</td>
<td>15.01</td>
<td>17.37</td>
<td>15.95</td>
<td>15.28</td>
<td>17.37</td>
</tr>
<tr>
<td></td>
<td>+4.22</td>
<td>+0.05</td>
<td>+3.25</td>
<td>+9.02</td>
<td>+0.05</td>
</tr>
<tr>
<td></td>
<td>+3.48</td>
<td>+1.00</td>
<td>+2.53</td>
<td>+3.92</td>
<td>+0.72</td>
</tr>
<tr>
<td>Third month</td>
<td>9.96</td>
<td>20.63</td>
<td>14.23</td>
<td>10.20</td>
<td>20.99</td>
</tr>
<tr>
<td>Fourth month</td>
<td>15.32</td>
<td>18.08</td>
<td>16.42</td>
<td>15.64</td>
<td>18.17</td>
</tr>
<tr>
<td></td>
<td>+1.29</td>
<td>+2.48</td>
<td>+2.16</td>
<td>+1.71</td>
<td>+2.60</td>
</tr>
<tr>
<td>120 days</td>
<td>13.83</td>
<td>17.62</td>
<td>15.62</td>
<td>14.15</td>
<td>17.81</td>
</tr>
<tr>
<td></td>
<td>+3.59</td>
<td>+3.03</td>
<td>+3.67</td>
<td>+3.67</td>
<td>+3.00</td>
</tr>
</tbody>
</table>

**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, % (x±s.d) of Gimmizah (G) and Golden Montazah (GM) strains as affected by food allocation

<table>
<thead>
<tr>
<th>Treatment</th>
<th>First month</th>
<th>Second month</th>
<th>Third month</th>
<th>Fourth month</th>
<th>120 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cont.</td>
<td>50.04</td>
<td>57.89</td>
<td>53.18</td>
<td>50.94</td>
<td>57.89</td>
</tr>
<tr>
<td>±10.06</td>
<td></td>
<td>±0.16</td>
<td>±10.83</td>
<td>±13.41</td>
<td>±0.16</td>
</tr>
<tr>
<td>+8%</td>
<td>50.12</td>
<td>48.02</td>
<td>49.28</td>
<td>50.86</td>
<td>49.04</td>
</tr>
<tr>
<td>±11.59</td>
<td></td>
<td>±3.32</td>
<td>±8.44</td>
<td>±13.06</td>
<td>±2.41</td>
</tr>
<tr>
<td>-8%</td>
<td>33.21</td>
<td>68.78</td>
<td>47.44</td>
<td>34.01</td>
<td>69.95</td>
</tr>
<tr>
<td>±10.07</td>
<td></td>
<td>±13.99</td>
<td>±21.89</td>
<td>±10.00</td>
<td>±13.27</td>
</tr>
<tr>
<td>-16%</td>
<td>51.05</td>
<td>60.28</td>
<td>54.74</td>
<td>52.12</td>
<td>60.56</td>
</tr>
<tr>
<td>±12.29</td>
<td></td>
<td>±8.35</td>
<td>±7.19</td>
<td>±5.69</td>
<td>±8.65</td>
</tr>
<tr>
<td>Average</td>
<td>46.11</td>
<td>58.94</td>
<td>51.74</td>
<td>46.99</td>
<td>59.36</td>
</tr>
</tbody>
</table>

**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 studies (Blair et al., 1976; Fattori et al., 1991), but decreased in other reports (Katanbay 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. (1988) 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, +11.1, -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 Baiat (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 ($X \pm s.d$) (kg. feed/kg eggs) of Gimmizah and Golden Montazah pullets birds as affected by food allocation

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

*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

<table>
<thead>
<tr>
<th>Trait</th>
<th>Main factors</th>
<th>Egg weight</th>
<th>Shell weight</th>
<th>Shell %</th>
<th>Yolk %</th>
<th>Albumin %</th>
<th>Haugh units</th>
<th>Yolk Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain</td>
<td>G</td>
<td>49.7±4.7(^b)</td>
<td>6.5±0.8(^b)</td>
<td>13.1±1.4</td>
<td>31.1±3.5</td>
<td>55.8±3.9(^b)</td>
<td>80.2±11.4</td>
<td>48.1±4.6</td>
</tr>
<tr>
<td>GM</td>
<td>47.8±4.0(^b)</td>
<td>6.1±0.7(^b)</td>
<td>12.8±1.4</td>
<td>30.6±2.6</td>
<td>56.6±3.2(^b)</td>
<td>80.8±12.3</td>
<td>48.5±4.5</td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>control</td>
<td>49.7±4.7(^b)</td>
<td>6.3±0.7</td>
<td>13.1±1.4</td>
<td>30.8±3.0</td>
<td>56.1±3.3</td>
<td>79.4±11.2</td>
<td>49.0±4.4(^b)</td>
</tr>
<tr>
<td></td>
<td>+8%</td>
<td>49.4±4.3(^A)</td>
<td>6.3±1.8</td>
<td>12.8±1.5</td>
<td>31.1±3.6</td>
<td>56.4±3.8</td>
<td>79.9±11.2</td>
<td>47.1±5.0(^b)</td>
</tr>
<tr>
<td></td>
<td>-8%</td>
<td>49.2±4.8(^A)</td>
<td>6.3±0.8</td>
<td>12.9±1.4</td>
<td>30.7±3.4</td>
<td>56.4±3.8</td>
<td>81.8±11.9</td>
<td>48.4±4.5(^A)</td>
</tr>
<tr>
<td></td>
<td>-10%</td>
<td>49.1±3.8(^A)</td>
<td>6.4±0.7</td>
<td>13.0±1.3</td>
<td>30.9±3.3</td>
<td>56.2±4.0</td>
<td>80.7±13.1</td>
<td>48.8±3.8(^A)</td>
</tr>
</tbody>
</table>

*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

<table>
<thead>
<tr>
<th>Trait</th>
<th>Main factors</th>
<th>Hatchability of TE(^1)</th>
<th>Hatchability of FE(^2)</th>
<th>Early dead embryo</th>
<th>Late dead embryo</th>
<th>Pipped embryo</th>
<th>Chick weight at hatch (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain</td>
<td>Gimmizah</td>
<td>95.19</td>
<td>75.74</td>
<td>79.36</td>
<td>9.13</td>
<td>6.86</td>
<td>4.36</td>
</tr>
<tr>
<td></td>
<td>adj</td>
<td>80.6±8.3</td>
<td>62.1±12.4</td>
<td>65.0±12.6</td>
<td>13.8±12.6</td>
<td>11.1±10.9</td>
<td>8.7±8.6</td>
</tr>
<tr>
<td></td>
<td>Golden Montazah</td>
<td>94.60</td>
<td>79.55</td>
<td>83.97</td>
<td>5.21</td>
<td>7.30</td>
<td>3.15</td>
</tr>
<tr>
<td></td>
<td>adj</td>
<td>70.6±8.9</td>
<td>64.6±10.2</td>
<td>68.2±10.1</td>
<td>9.4±9.7</td>
<td>12.2±10.3</td>
<td>6.0±8.6</td>
</tr>
<tr>
<td>Treatment</td>
<td>Control</td>
<td>94.40</td>
<td>75.82</td>
<td>80.13</td>
<td>7.31</td>
<td>7.49</td>
<td>5.33</td>
</tr>
<tr>
<td></td>
<td>adj</td>
<td>80.1±9.9</td>
<td>61.7±9.9</td>
<td>64.7±9.1</td>
<td>12.3±10.3</td>
<td>12.3±10.6</td>
<td>9.9±9.3</td>
</tr>
<tr>
<td></td>
<td>+8%</td>
<td>95.00</td>
<td>77.18</td>
<td>80.94</td>
<td>8.67</td>
<td>7.06</td>
<td>3.10</td>
</tr>
<tr>
<td></td>
<td>adj</td>
<td>80.2±8.7</td>
<td>62.8±11.5</td>
<td>65.7±11.5</td>
<td>12.5±13.4</td>
<td>11.5±10.3</td>
<td>6.3±8.2</td>
</tr>
<tr>
<td></td>
<td>-8%</td>
<td>94.64</td>
<td>75.82</td>
<td>80.01</td>
<td>8.09</td>
<td>7.73</td>
<td>3.82</td>
</tr>
<tr>
<td></td>
<td>adj</td>
<td>79.7±8.9</td>
<td>62.7±13.4</td>
<td>66.3±14.0</td>
<td>11.9±12.3</td>
<td>12.0±11.5</td>
<td>7.4±8.8</td>
</tr>
<tr>
<td></td>
<td>-10%</td>
<td>95.81</td>
<td>80.37</td>
<td>83.87</td>
<td>7.06</td>
<td>5.83</td>
<td>3.22</td>
</tr>
<tr>
<td></td>
<td>adj</td>
<td>80.9±7.8</td>
<td>65.4±11.5</td>
<td>68.5±11.8</td>
<td>11.3±11.1</td>
<td>10.3±9.9</td>
<td>6.7±8.2</td>
</tr>
</tbody>
</table>

*Significant at P<0.05, ** Significant at P<0.01, *** Significant at P<0.001, NS: non-significant.
\(^1\)TE: Total eggs sat. FE: Fertile eggs.
\(^2\) Adjusted to Amaze values prior to statistical analysis.
- Means with the same letter for each column (of each main factor) are not significantly different.

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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 were 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 allowance, 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


تأثر استخدام نظام تغذية خاملة فترة الرعاية على أداء دجاجات الجمليزة والمنتزه

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استخدمت في هذه الدراسة عدد 219 كوكك من الجمليزة والمنتزه الذئبي عم 4 أسابيع (ناثئ) تم تنفيذ الكتاكبين على أربع مجموعات كل منها 27 كوكك من كل سلالة في بوت رعاية أرضية. مجموعات المقارنة تم تغذيتها على عقلية حرة، وتم تغذية المجموعة الأولي التجريبية على كمية من الطيور تزيد عن مستهلة لجميلية المقارنة في الأسبوع السابق بنسبة 78% بينما تم تغذية كمية من الطيور المجمعة بين السنة والثانية والثالثة التجريبية على كمية من الطيور المندهشة الفعلي في السنة والثانية والثالثة التجريبية. استمرت هذه المجموعات حتى أسبوع 30 من عمر الطيور. تم تقدير كمية غذاء جسم الطيور وفي نهاية المعاملة. وقد أوضحت النتائج ما يلي:

1. كان برنامج التغذيية أثر علي وزن السموم عند 219 كوكك للطيور الجمليزة الثلاث بنما

2. تأثرت طية عقلية معينة عند الأشخاص الأكبر، بينما توقفت المجموعة الأولى في وزن الجسم على سلالات كبيرة في جميع الأعمار. كان طيور الجمليزة الأقل وزناً بدرجة عالية معينة عند جميع الأعمار أيضاً. من ناحية أخرى فإن السلاسل لم تؤثر معينة في معدل النمو خلال 8-11

3. أسبوع من العمر وكانت طيور المنتزه الذئبي أسرع نمواً على طيور الجمليزة عند 12-16 أسبوع.

4. تحسس معالجات تلقي الخفافيش لطيور الجمليزة بدرجة عالية المعينة خلال 8-12 أسبوع من العمر على طيور المنتزه الذئبي، تحسن معالجات لطيور المنتزه الذئبيين على الذهبي وثاني للأعمال، كذلك تأثر معالجات لطيور المنتزه الذئبيين بالتفاوت بين كل من السلاسل والمعالجات الغذائية وذلك خلال المرحلة الأولية التي تم دراستها. كذلك تحقق موقف دجاجات المنتزه الذئبي معالجات تلقي الخفافيش في جميع الأعمار./

5. تختلف المعدل عند النضج الجسم معينة بين السلالتين، بالنسبة من تأخر ضعف دجاجات الجمليزة.

6. تأثرت معالجات لطيور المنتزه الذئبي معينة على نفس الصفة. وقد كان من النتائج البيئي معالجات البطيئة الذئبي بين معينة عليه في دجاجات الجمليزة خلال جميع الفترات التي تم دراستها إلا أن الاختلاف بين السلالتين لم يكن معيناً خلال 10-12 أسابيع الأولى من الإنتاج.

7. كان البيض الناتج عن سلاسل الجمليزة أقل وزناً، وذلك ويند المنتزه بينما كان نسبة الأيونيين أكثر في البيض الناتج عن دجاجات المنتزه الذئبي.

8. وكان البيض الناتج عن دجاجات المنتزه الذئبي. وكان البيض الناتج عن دجاجات المنتزه الذئبي. وكان البيض الناتج عن دجاجات المنتزه الذئبي. كان البيض الناتج عن دجاجات المنتزه الذئبي. كان البيض الناتج عن دجاجات المنتزه الذئبي.

9. تشير هذه الدراسة إلى زيادة المغذيات الغذائية النموش بها بما يعادل 8% تحسين منها زيادة صفات التطاير للذئبي، بينما عدة مغذيات للذئبي، حيث 1% في طيور الجمليزة و8% في طيور المنتزه الذئبي إلى تصميم صفات الناتج البيض.