PRODUCTIVE PERFORMANCE OF HUBBARD CLASSIC BROILER BREEDER CHICKENS UNDER DIFFERENT HOUSING SYSTEMS

A.I. El-Faham; S.A. Ibrahim; S.A. El-Safty; Nematallah G.M. Ali; M.S. Hassanien and G.N. Rayan


SUMMARY

This investigation aimed to evaluate the effect of two housing types (closed and semi-closed), broiler breeder age and their interaction on breeder performance during egg production (25-45 wks of age), at a private local breeder farm in Alexandria desert road. The results indicated that: Housing system significantly affected on body weight which was heavier in semi-closed compared to closed housing system. No significant difference in egg production, egg weight and feed consumption during egg production period of breeder under two housing system. Housing system significantly affected on mortality rate percentage of breeder during egg production period which was higher under closed housing type. Body weight, egg production, egg weight, feed consumption and mortality rate of female broiler breeders were significantly affected by breeder age. Generally, in most cases, the interaction between type of house and age of breeder hens for studied criteria were insignificant.

Keywords: Housing type, Age, Breeders and egg production period

INTRODUCTION

The consumption of poultry meat has increased worldwide over the past 50 years, primarily because it has become more competitively priced and more available than other meat sources. Moreover, in Egypt there has been a rapid increase in the number of companies owning breeder parent and grandparent stocks leading to an increase in the population of meat type chicken Kosba et al. (2015). In addition, for improving and maximizing the potentiality of production and reproduction of breeder flocks, manipulating the nutritional, physiological and environmental factors are necessary (Hassanien, 2015).

Gomes De Oliveira and Jásé Camargos Lara (2016) showed that, the environment during production plays a fundamental role in modern poultry farming. Temperature, humidity, air velocity and radiation are the factors that mainly affect poultry and can compromise homeothermy.

Bell and Weaver (2001) reported that housing and management of poultry parent stock is mainly aimed at providing the conditions that ensure optimum performance of the birds. Recently, the closed housing system provides the optimum circumstances (temperature, ventilation, artificial lighting, cleaning and disinfection facilities) for the birds, it is managed more scientifically than the open one. Moreover, the economic study showed the superiority of closed systems economic efficiency characters than the semi-closed (Ashoraet al., 2016). On the other hand, Rayan et al. (2015) reported that the productive performance of the broiler breeders during growth and egg production stages was better in semi-closed houses compared with traditional open houses.

However, there were not enough information about the relationship between different housing types and broiler breeder performance. Therefore, the present study was conducted to evaluate the effect of housing type semi-closed and closed system, breeder breeder age and their interaction in productive performance of Hubbard classic broiler breeder hens.

MATERIALS AND METHODS

This study was carried out on Hubbard classic broiler breeder’s strain during egg production period (25-45 wks) of age at a private local broiler breeder farm in Alexandria desert road under the two housing types (closed and semi-closed). Numbers of females housed in closed type were 32927 and 3054 males and semi-closed type were 26744 females and 3670 males.
Birds in both housing types were reared in litter floored houses under the same environmental and hygienic conditions, lighting schedule of breeder farm according to the age of chickens was followed. The birds were fed basal laying breeder diet and water was available all the time, vaccination under specific climatic conditions was followed. Collection of data related to broiler breeder flocks, farm details and housing type was used. Measurements recorded were body weight (g), feed consumption per day (g). Mortality rate (%) was recorded in each flock. Also, egg production percentage were calculated using the equation given by North (1984).

**Statistical analysis:**

Data were analyzed using two-way analysis of variance with housing type (closed vs. semi-closed), age and their interaction using the General Linear Model (GLM) procedure of **SAS (2002)** as following model:

\[ Y_{ijk} = M + A_i + H_j + (AH)_{ij} + e_{ijk} \]

- \( Y_{ijk} \) = Trait measurement
- \( M \) = Overall mean
- \( A_i \) = Age effect
- \( H_j \) = Housing type effect (i=1, 2).
- (AH)_{ij} = interaction between housing type and age.
- \( e_{ijk} \) = Experimental error

When significant differences among means were found, means were separated using Duncan’s multiple range tests (Duncan, 1955).

**RESULTS AND DISCUSSION**

The effects of housing type and age on productive performance of breeder hens can be shown as follows:

**Live body weight:**

The results in (Table 1) indicated that body weight (g) was significantly affected by type of house and age. It is worth to note that body weight for breeder layer hens was significantly heavier under semi-closed housing type compared with those in closed housing type during experimental period (20 wks) and the corresponding values were 3647.31 and 3506.93 g, respectively. Body weight of females increased gradually with advancing of broiler breeder age (3339.8, 3658.9, 3840.3 and 3934 g). Body weight didn't significantly affected by interaction between type of house and age.

Similar results were reported by Sundaram et al. (1979) and Goher et al. (1983) Robinson et al. (1991) and Zaghari et al. (2011) they reported that body weight and body weight uniformity in males and females were recorded in all flocks from 0 to 65 weeks of age which differences between predicted performances based on breeder management guides and actual broiler breeder performance in the field depend on many environmental factors that influenced commercial broiler breeder performance.

In the same order, Rayan et al. (2015) showed that, body weight of males and females was significantly affected by interaction between housing type and age.

**Egg production and egg weight**

Productive performance of breeder broiler chickens as affected by type of house and age are illustrated in Fig. (1) and Table (2). The obtained data showed that three were no significant difference in egg production percentage of breeder under the two housing types (closed and semi-closed). On the other hand, egg production (%) was significantly affected by breeder age, the highest percentage of production was recorded during 31-35 weeks of age (81.2 %), while the lowest percentage was recorded during 25-30 weeks of age (33.25 %) at the beginning of egg production period.

These results were disagreed with Rayan et al. (2015) and Hameed et al. (2012), they reported that egg production percentage was higher under semi-closed housing type as compared to open housing type, but this difference was not statistically significant. However, egg production percentage (%) was significant affected by breeder broiler chickens age. Furthermore, they stated that environmentally controlled housing system is suggested to breeder farmers as well as broiler farmers in order to get good production results, apart from its higher initial expenditures. It is more profitable to the farmers, easier in management, reduced labor cost, lower risks of diseases, lower mortality, good production percentages and improved quality of egg shells. Egg production per hen housed is comparatively better as compared
to the open housing system. Also they stated that Co- relation in controlled housing is higher than the open indicates the controlled housing shown better productive performance than open housing system.

Egg weight was affected by age; it could be observed that the highest value of egg weight (64.59 g) recorded during production period 41-45wks. of age. The egg weight increased gradually as the breeder age progressed. Similar trend was noticed by Rizzi and Chiericato (2005), who found that the egg weight increased with the hens age.

No significant difference in egg weight of breeder under either the housing types (closed and semi-closed) was realized, also the same trend was observed to interaction effect (Table 2).

These findings agreed with results of some authors investigated that, egg weight increased with layer age in all housing type following the physiological development as reported by Hill and Hall (1980); O’Sullivan et al. (1991); Peebles et al. (2000); Silversides and Scott (2001); Van den Brand et al. (2004) and Rizziani Chiericato (2005).

Nys et al. (2008) suggested that a major impact was the bird aged which effect on the egg weight. The egg weight increased with hen aged varying between 50 and 70 g, however most modern commercial strains are now capable of achieving egg weights of 60 g by 26 weeks of age and 65.5 g by 50 weeks, and sustaining this until the end of production.

**Feed consumption and mortality rate:**

Data in Table (3) indicated that daily feed consumption per breeder broiler chicken (g/d) was significantly affected by breeder age. The highest value of consuming feed was recorded during the period of 31-45 weeks of breeder age, when the egg production was at the peak, while the lowest value was recorded during the period of 25-30 weeks of age during the beginning of egg production period. Concerning type of house, no significant difference in consuming feed of breeder under the two housing types (closed and semi-closed) was observed. Also, the interaction between type of house and breeder age was insignificant.

Regardless the housing type, Leeson and Summers (1997) found that egg production was influenced more by metabolisable energy intake than by other nutrients. Neuman et al. (1998) stated that reducing the total daily feed allowance may cause a decline in egg production and performance. Also, they showed that many factors influence broiler breeder performance and reducing the total daily feed allowance may cause a decline in egg production and performance. Therefore, Attia et al. (1995) and Leeson and Summers (1997) stated that low chick production in broiler breeder flocks seems to be due to insufficient feeding and environmental conditions.

The mortality percentage of breeder during egg production period was significantly higher under closed housing type as compared to those housed in semi-closed housing type. There were significant differences for mortality percentage of breeder with age. The highest value of mortality percentage was recorded during period 36-40 weeks of age, while the lower value was recorded during period 25-30 weeks of age. Mortality (%) was significantly affected by interaction between housing type and breeder age. That means the expression of this trait was differed according to housing type and age (Table 3).

These results in agreement with Daghir (2001); Le-Bihan et al. (2001); Barnett et al. (2001) and Hameed et al. (2012) reported that the mortality percentage of females and males during different rearing periods was markedly higher under open housing type as compared to those housed in semi-closed housing type. Whereas, Le-Bihan et al. (2001); Barnett et al. (2001) and Hameed et al. (2012) indicated that a higher mortality under traditional housing and lower mortality under controlled housing condition. Also, Zaghari et al. (2011) stated that mortality and culling rate in males and females were recorded in all flocks from 0 to 65 weeks of age which differences between predicted performance based on breeder management guides and actual broiler breeder performance in the field depend on many environmental factors such as heat, light and ventilation.

**REFERENCES**


El-Faham et al.


أحمد إبراهيم الفحام، سيد عبد الرحمن إبراهيم، صلاح الدين عبد الرحمن الصفتي، محمد سامي حسين، نعمة الله جمال الدين وجمال ناجي ريان
قسم إنتاج الدواجن- كلية الزراعة- جامعة عين شمس- مصر.

الهدف من التجربة التعرف على تأثير نوعين من المزارع (مغلقة ونصف مغلقة) وعمر أمهرات التسمين "هرد كلاسيك" والداخل.

بينهما على الأداء الإنتاجي عند عمر (25 - 45 أسبوع) إنتاج بيض.

أجريت التجربة في إحدى مزارع أمهرات التسمين الخاصة على طريق أسكندرية الصحراوي.

أهم النتائج:

1. وزن الجسم تأثر معنويًا بنوع الزيادة حيث كان أقل وزناً في المزارع نصف المغلقة بالمقارنة بالمغلقة.
2. إنتاج البيض ووزن البيض واستهلاك الطف لينتقل بنوع المزرعة (مغلق ونصف مغلق).
3. الدافع تأثر معنويًا بنوع المزارع حيث كان أعلى لألامي التسمين في المزرعة المغلقة بالمقارنة بنصف المغلقة.
4. وزن الجسم وإنتاج البيض ووزن البيض واستهلاك الطف لألامي التسمين تأثر معنويًا بآخر الطور (25 - 45 أسبوع).

عممًا المداخل بين نوع المزارعة ومهر أمهرات التسمين ليس له تأثير معنوي على معظم قياسات الأداء الإنتاجي.

الخلاصة: الأداء الإنتاجي لأمهرات التسمين (هرد كلاسيك) تأثر معنويًا بآخر الطور ولم يتأثر بنوع المزرعة (مغلق ونصف مغلق) أثناء مراحل إنتاج البيض المختلفة (25 - 45 أسبوع).
### Table (1): Effect of type of house at different ages on body weight (g) of Hubbard classic broiler breeders females during egg production period

<table>
<thead>
<tr>
<th>Trait</th>
<th>Age, of wk (A)</th>
<th>Type of house (T)</th>
<th>Overall Probability</th>
<th>T</th>
<th>A</th>
<th>T *A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight, g</td>
<td></td>
<td>Closed</td>
<td>Semi-closed</td>
<td>0.05</td>
<td>0.0001</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>25-30</td>
<td>3241.00 ±88.72</td>
<td>3438.67 ±91.59</td>
<td>3339.80&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>31-35</td>
<td>3637.40 ±30.95</td>
<td>3694.67 ±10.73</td>
<td>3666.04&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>36-40</td>
<td>3779.00 ±27.00</td>
<td>3901.50 ±93.50</td>
<td>3840.30&lt;sup&gt;bc&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>41-45</td>
<td>3906.00 ±25.00</td>
<td>3948.00 ±27.00</td>
<td>3927.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td>3506.93&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3647.31&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3507.80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Means within the same main effects with different letters are significantly differed, NS= Non-significant.

### Table (2): Effect of type of house at different ages on egg weight (g) of Hubbard classic broiler breeders females during egg production

<table>
<thead>
<tr>
<th>Trait</th>
<th>Age, of wk (A)</th>
<th>Type of house (T)</th>
<th>Overall Probability</th>
<th>T</th>
<th>A</th>
<th>T *A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg weight, g</td>
<td></td>
<td>Closed</td>
<td>Semi-closed</td>
<td>NS</td>
<td>0.0001</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>25-30</td>
<td>54.28 ±1.44</td>
<td>55.50 ±0.76</td>
<td>55.01&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>31-35</td>
<td>60.58 ±0.46</td>
<td>60.92 ±0.66</td>
<td>60.75&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>36-40</td>
<td>63.10 ±0.30</td>
<td>64.52 ±1.07</td>
<td>63.81&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>41-45</td>
<td>63.88 ±0.20</td>
<td>65.30 ±0.17</td>
<td>64.59&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
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<tr>
<td>Overall</td>
<td></td>
<td>60.78</td>
<td>61.27</td>
<td>60.78</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Means within the same main effects with different letters are significantly differed, NS= Non-significant.
Table (3): Effect of type of house at different ages on consuming feed and mortality percentage of Hubbard classic broiler breeders females during egg production period

<table>
<thead>
<tr>
<th>Trait</th>
<th>Age, of wk (A)</th>
<th>Type of house (T)</th>
<th>Overall</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed consumption, g/day</td>
<td></td>
<td>Closed</td>
<td>Semi-closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25-30</td>
<td>146.70</td>
<td>148.83</td>
<td>147.45&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>±9.40</td>
<td>±7.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>31-35</td>
<td>175.00</td>
<td>172.60</td>
<td>173.80&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>±0.36</td>
<td>±1.50</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>36-40</td>
<td>173.60</td>
<td>167.80</td>
<td>170.70&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td></td>
<td>±0.40</td>
<td>±0.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>41-45</td>
<td>173.00</td>
<td>167.00</td>
<td>170.00&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>±0.01</td>
<td>±0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>165.92</td>
<td>163.33</td>
<td></td>
</tr>
<tr>
<td>Mortality percentage(%)</td>
<td></td>
<td></td>
<td></td>
<td>0.0004</td>
</tr>
<tr>
<td></td>
<td>25-30</td>
<td>0.49</td>
<td>0.13</td>
<td>0.31&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>±0.01</td>
<td>±0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>31-35</td>
<td>0.31</td>
<td>0.18</td>
<td>0.24&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>±0.03</td>
<td>±0.03</td>
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<td></td>
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<tr>
<td></td>
<td>36-40</td>
<td>0.35</td>
<td>0.27</td>
<td>0.31&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>±0.10</td>
<td>±0.01</td>
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<tr>
<td></td>
<td>41-45</td>
<td>0.29</td>
<td>0.30</td>
<td>0.29&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>±0.02</td>
<td>±0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>0.33&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.22&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a,b</sup> Means within the same main effects with different letters are significantly differed.

NS= Non-significant

Fig. (1): Effect of type of house on egg production(%) of Hubbard classic broiler breeders females.