International Journal of Poultry Science 7 (3): 240-242, 2008
ISSN 1682-8356

Effect of Pause Size and its Number on Egg Mass for a Stock of White Leghorn in Iraq

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Abstract: This study included 336 Leghorn hens and was conducted at poultry farm, Department of Animal Resources /Agriculture College / University of Baghdad / Iraq, from 15/6/2005 to 30/9/2005. The aim of the present study was to investigate the effects of pause size and pause number on egg mass in White Leghorn during the first 100 day before onset of laying the first egg. General Linear Model (GLM) within SAS program was used to study the effect of some fixed effects which included (hatch and age at sexual maturity) on pause size and pause number beside studying the effect of hatch, weight at sexual maturity, pause size and pause number on egg mass. The overall means for pause size, pause number, egg mass were 2.27 days, 15.48 pauses and 3495.02 gm respectively. The effect of hatch was significant ($P < 0.05$) on pause size and pause number, whereas the effect of weight at sexual maturity on the same traits was not. Egg mass was affected significantly ($P < 0.01$) by pause size and pause number, but the effect of hatch and weight at sexual maturity was not significant.

Key words: Chicken, pause size, pause number and egg mass

Introduction

Poultry industry is currently receiving great attention in many countries and recently gap is daily increase between Iraq and these countries, so it is imperative to research in order to continue to develop the poultry industry in Iraq (Al-Soudi and Al-Jebouri, 1979).

The production of eggs has been the factor of the greatest importance in poultry production (Morley, 1985). Egg production in laying hens is a process of pronounced cycle nature and eggs are laid at intervals of around 24 to 27 h. This process results in the formation of clutches (Akbas *et al*., 2002). To describe the cyclic laying process, some clutch traits are defined as clutch number, average clutch size, pause size and pause number (Sturkie, 1976; Akbas *et al*., 2002).The clutch traits have been investigated only by a few researches in different domestic avian species in recent years (Luc *et al*., 1996).

New selection traits are searched in poultry breeding to improve egg production, so poultry breeders must consider so many traits that are economically important that it becomes difficult to apply sufficient selection on key traits in egg laying stock (Egg production rate, sexual maturity, egg size, feed efficiency, fertility and hatchability) (Schmidt and Figueiredo, 2005). Thus, with such a large number of traits, it is important to choose a compound trait such as egg mass which can reflect two traits (egg production and egg weight) to improve stock performance. Results of Sabri *et al*. (1999), Al-Nedawi (2006) obtained that there was a significant positive genetic and phenotypic correlation between egg mass and each of egg number and egg weight. Hence the aim of the present research is to investigate the effects of some factors (Hatch and age at sexual maturity) on pause size and pause number and the effects of all factors (dependent and independent) on egg mass.

Materials and Methods

This experiment was conducted at poultry farm, Department of Animal Resources /Agriculture College / University of Baghdad / Iraq, from 15/6/2005 to 30 / 2005. Three hundred and thirty six Leghorn hens at 24 weeks of age which represent a random-bred population were kept individually in cages with dimensions 40× 40×50 cm and where fed *ad libitum* on compound feed containing 16% crude protein and 2708 kcal/kg ME. Body weight at onset of laying was recorded .Number and weight of eggs were recorded to estimate egg mass from 24th to 38th week of age defined as early part of whole egg production record. For each individual, egg number, egg weight, pause size and pause number were recorded to the 38th week of age.

Statistical analysis: General Linear Model (GLM) within SAS program was used using two models the first one was used to investigate the effect of hatch and weight at sexual maturity on pause size and pause number:

$$Y_{ijk} = \mu + H_i + \beta_j + e_{ijk}$$

Where Yijk is any trait considered in this study, μ is the over all mean, Hi the fixed effect of I th hatch (I= 1 - 3),β is the regression coefficient on weight j at sexual maturity, e_{ijk} is the residual effect.

Table 1: Least square means for pause size and pause number in Leghorn hens.

Factors	No. of observation	Pause size ± S.E	Pauses No.± S.E
Over all mean Hatch	336	2.27 ± 0.04	15.48 ± 0.28
1	129	2.17 ± 0.07^{b}	16.39 ± 0.46^{a}
2	83	2.22 ± 0.08^{ab}	15.12 ± 0.56^{ab}
3	124	2.41 ± 0.07^{a}	14.84 ± 0.45^{ab}
Weight at sexual maturity	336	0.0003 day/gm	0.002 pause/gm

Means in the same column with no common superscripts differ significantly ($p < 0.05$).

Table 2: Analysis of variance for some affected factors on pause size and Pause number in Leghorn hens.

Sources of variation	D.F	Mean square Pause size	Mean square Pause No.
Hatch	2	2.02*	82.13*
Weight at sexual maturity	1	0.69	28.16
Residual	332	0.64	26.15

* ($P < 0.05$)

Table 3: Least square means ±S.E for egg mass in Leghorn hens.

Factors	No. of observation	Egg mass±S.E
Over all mean	336	3495.02±33
Hatch		
First	129	3376.38 ± 27^{a}
Second	83	3310.13 ± 33^{a}
Third	124	3304.04 ± 27^{a}
Pause size		
Lower than 3 days	114	4102.60 ± 34^{a}
3 - 5	148	3360.60 ± 29^{b}
More than 5 days	74	2418.13 ± 47^{c}
Pause number		
Lower than 9 pauses	42	4313.15 ± 65^{a}
9 - 12	74	3999.05 ± 35^{b}
13 - 16	83	3728.09 ± 33^{c}
17 - 20	70	3295.20 ± 32^{d}
More than 20 pauses	67	2640.28 ± 37^{e}
Regression on weight at sexual maturity gm/gm	336	29

Means in the same column with no common superscripts differ significantly($P < 0.01$)

Second model used all factors in the first model (dependent and independent) to investigate their effects on egg mass.

$$Y_{ijklm} = \mu + H_i + \beta_j + L_k + N_l + e_{ijklm}$$

Where Y_{ijklm} is egg mass,μ, H_i, β_j, e_{ijklm} are the same factors in the first model, L_k is the effect of k^{th} pause size (k=1-3) ,where 1= lower than 3 days, 2=3-5, 3=more than 5 days, N_l is the effect of l^{th} pause number (l=1-5), where 1=lower than 9 pauses, 2=9-12, 3=13-16, 4=17-20, 5=more than 20 pauses. Comparisons among means were made by Duncan's multiple range test.

Results and Discussion

The pause size through 100 days before the onset of laying is 2.27 days (Table 1), the present estimation was slightly lower than the estimate 2.51 days by Ahmed (1988) and much higher than estimate (1.13 days) by Akbas *et al.* (2002).The laying period consisted of 15.48 pauses and this estimate was also lower than estimate (16.80 pauses) by Ahmed (1988).The non- productive days in the present study was 35.13 days (2.27× 15.48= 35.13) which was slightly lower than 38.38 days reported by Singh and Singh (1982).

Table 4: Analysis of variance for some affected factors on egg mass in Leghorn hens.

Sources of variation	D.F	Mean square egg mass
Hatch	2	264615.75
Pause size	2	9235212.31**
Pause number	4	13123135.42**
Weight at sexual maturity	1	98186.85
Residual	326	93725.34

**($p < 0.01$)

The effect of hatch on the two traits was significant ($P < 0.05$) and the birds of the first hatch exhibited the lowest pause size (2.17 days) compared with highest estimate (2.41 days) in the birds of third hatch (Table 2), but weight at sexual maturity had no effect on the previous traits.

The mean egg mass during first 100 days was 3495.02 gm (Table 3) and this estimate was higher than the estimates 3138.75, 2495.90, 3325 reported by Ahmed (1988), Al-Rawi (2001), Yeasmin *et al.* (2003) respectively, but lower than the estimate (4040 gm) by Sabri *et al.* (1999).

Results showed that differences in egg mass belonged to pause size were significant ($P < 0.01$) (Table 4) and the estimates decreased as the pause size increased. This finding was supported by Halaj (1983) and Madkour *et al.* (1985). The effect of pause number on egg mass was significant ($P < 0.01$) and results revealed that egg mass decreased by the increase of pause number, which mean that there is a contrast relationship between egg mass and the two traits. Hence, egg mass can be increased by decreasing pause number and pause size or one of them. On the other hand egg mass was not affected by hatch and weight at sexual maturity.

References

Al-Soudi, K.A. and M.A.J. Al-Jebouri, 1979. Productive potential in subtropics climate of native Iraqi chicken compared to White Leghorn, New Hampshire and their crosses. World Poult. Sci. J., 32: 227-235.

Ahmed, A.H., 1988. Comparison of egg cycles and some other production characteristics of indigenous chickens with standard breeds in Iraq. (Thesis). Agriculture College/University of Baghdad. (In Arabic).

Al-Nedawi, A.M., 2006. Genetic evaluation of White Leghorn chicken according to some of egg production traits. (Thesis). Agriculture College / University of Baghdad. (In Arabic).

Al-Rawi, A.A., 2001. Estimate of genetic parameters for some economic traits in local hens. (Thesis). Agriculture College / University of Baghdad. (In Arabic).

Akbas, Y., Y. Unver, I. Oguz and O. Altan., 2002. Comparison of different variance component estimation methods for genetic parameters of clutch pattern in laying hens. European Poult. Sci., 66: 232-236.

Halaj, M., 1983. The egg production sequence and its effect on some egg charactors. 1. The production sequence in hens. Anim. Breed. Abstr., 51: 6747.

Luc, K.M., S. Miyoshi, M. Suzuki and T. Mitsumoto., 1996. Heritability estimates of some clutch traits in the laying hen. Jap. Poult. Sci., 33: 23-28.

Madkour, G.H., T.H. Mohmoud and N.Z. Mohonna., 1985. A comparative study on egg cycle in relation to egg production of the Fayuomi and R.I.R. Fowl., Anim. Breed. Abstr., 53: 995.

Morley, A.J.U., 1985. Poultry husbandry, 3rd Edn. Tata McGraw-Hill, Publishers, New Delhi, India. pp: 526.

Sabri, H.M., H.R. Wilson, R.H. Harms and C.J. Wilcox., 1999. Genetic parameters for egg and related characteristics of White Leghorn hens in a subtropical environment. Gen. Mol. Biol., 2: 1415-1422.

SAS, 2001. SAS / STAT Users Guide for Personal Computer. Release 6.18. SAS Institute, Inc., Cary, N.C., USA.

Singh, D.K. and C.S. Singh, 1982. Hatch effect on different production parameters of a white Leghorn strain crosses. Indian J. Poult. Sci., 17: 304-305.

Schmidt, G.S. and E.A.P. Figueiredo., 2005. Selection for reproductive traits in white egg stock using independent culling levels. Braz. J. Poult. Sci., 7: 23-235.

Sturkie, P.D., 1976. Avian physiology, 3rd. Edn. New York Heidelberg Berlin: Springer-Verlap., pp: 307-305.

Yeasmin, T., M.A.R. Howlider and M.V. Ahammad, 2003. Effect of introgression dwarf gene from Bangladeshi indigenous to exotic breeds on egg production. Int. J. Poult. Sci., 2: 264-266.