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Effect of Breed and Housing Type on Egg Production of White Baladi and Fayoumi Hens in the Subtropics

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THIS study included 140 White Baladi and 62 Fayoumi pullets in cages and 148 White Baladi and 69 Fayoumi pullets on the floor. Daily egg production was recorded for about 11 production months. The results indicated that Fayoumi hens reached sexual maturity earlier than White Baladis with no housing system effect. The egg weight of White Baladi was significantly heavier than that of the Fayoumi breed. However, there was no difference in egg weight between birds housed in cages or on the floor. There were no significant breed or housing system effects on the monthly egg number. No significant differences were detected in egg production between housing systems (cage and floor) and breeds. Cracked egg percentages were negligible with no breed or housing system effect. The laying house mortality for both White Baladi and Fayoumi hens in cages were higher than floor-reared hens.

The use of wire cages for housing laying birds has gained widespread popularity in recent years. Most commercial producers have very definite preferences for either cage or floor housing, but have very little experimental support for their preferences . Popescu (1971) reported that egg production was better in caged hens kept on litter. Kolodziej *et al.* (1973) found that the egg production of the White Leghorn x New Hampshire hens was 2·9 % higher for those in batteries than those on litter. The average egg weight was 3·02 % higher in batteries than on litter. Kuznesova (1977) stated that egg weight at 15 months of age was higher for caged layers than for floor layers; Chrappa and Resovsky (1974) found that egg weight for hens in cages was 5·5 % higher than those kept on the floor.

On the other hand, Bhagwat and Craig (1975) found that egg production of 3 strains of White Leghorns on the floor was higher than those in cages. Chand *et al.* (1976) reported that White Leghorn and White Cornish hens housed on the floor had significantly higher hen-day egg production than those in individual battery cages. Al-Shahwany (1976) also reported that hens kept in floor pens produced more eggs on a hen-house basis than those kept in individual cages.

Kicka *et al.* (1979) reported that the yearly egg production of Fayoumi and White Baladi hens was 165 and 174 eggs respectively. The corresponding egg weights were 49 g and 47 g respectively. Chrappa and Resovsky (1974) found that the laying house mortality for hens kept on deep litter was 16·7 % and for those in cages was 4.9%. kicka *et al.* (1979) reported that the age at sexual maturity was 229 days for Fayoumi hens and their weight at sexual maturity was 1170 g. For White Baladi the age at sexual maturity was 261 days and their weight at sexual maturity was 1130 g. Kosba *et al.* (1978) found that the age at sexual maturity of Fayoumi hens ranged from 162 to 215 days.

The purpose of this study was to evaluate the effect of the housing system (floor or cage) on the egg production (monthly egg number and egg weight) of White Baladi and Fayoumi hens. Ages and weights at sexual maturity under the two housing systems were also compared and laying house mortality was assessed.

Material and Methods

Four hundred and thirty-eight pullets at the age of sexual maturity were used in this study. One hundred and forty White Baladi (WB) and 62 Fayoumi (F) hens were housed in individual cages. Each was allowed 672 cm^2 floor space. Another 148 WB and 69 F hens were placed in floor pens with wire windows . Each was allowed 687 cm^2 from the pen area and 1357 cm^2 from the range area. There were two hatches, one in February and one in April. Data were collected for 11 months of egg production. The birds received *ad libitum* feed (containing 16 % crude protein and 2600 K cal/kg ME, Table 1) and water during all the laying period. The hens were trapnested, and eggs were collected 3 times per day. Egg production, egg weight, and mortality rate for each pullet were recorded. The following parameters were also recorded :

1. Age at sexual maturity
2. Monthly egg mass
3. Percentage of Cracked eggs for each group

Data were analyzed by the least squares method of Harvey (1960). The data were analyzed twice, once using a model without taking the interaction into consideration, and the other assuming an interaction between breed and housing system. The separation of means was carried out according to Duncan (1955).

Results and Discussion

Age at sexual maturity

The ages at sexual maturity of both the WB and F pullets housed in cages and on the floor are presented in Table 2. Fayoumi hens reached sexual maturity significantly ($P \leq .01$) earlier than did the WB hens. Differences in age at sexual maturity for both breeds between the 2 housing systems were not statistically significant. These results were obtained with the birds

exposed only to natural daylight without using any artificial light throughout their rearing and laying period. Comparable results were reported by Selim (1964).

TABLE 1. **Experimental Layer diet.**

Ingredients	Percentage
Corn	46
Decorticated cottonseed meal	7
Rice bran	14
Rice germ meal	15
Fish meal	6
Molasses yeast	7
Limestone	2.50
Bone meal	2.00
NaCl	0.50
Vit. and Mineral mixture	+
Total	100.00

Crude Protein = 16%
ME Kcal/kg diet = 2600
Additives: to each kg diet, the following additives were included: 5000 i.u. Vit. A;500 i.u. Vit. D_3; 4.5 mg riboflavin; and 220 mg manganese.

TABLE 2. **Age at sexual maturity for White Baladi and Fayoumi hens housed in cages or on the floor.**

	Housing system	Age at sexual maturity (days)
White Baladi	Cage	197[a*]
	Floor	198[a]
Fayoumi	Cage	181[b]
	Floor	177[b]

*Values followed by different superscripts differ significantly ($P \leq .01$) from each other (Duncan, 1955).

TABLE 3. Monthly egg number of Whit Baladi (WB) and Fayoumi (F) hens housed in cages and on the floor ($\bar{\times} \pm$ SE).

Breed	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	Juu
WB:											
Cage	4.2*	6.2	7.7	8.0±0.3^{a}**	10.9±0.3^{a}	11.3±0.3^{a}	11.8±0.3^{a}	12.3±0.3^{a}	11.6±0.3^{a}	11.3	11.7
Floor	4.1	6.2	6.9	8.1±0.3^{a}	10.0±0.3^{ab}	11.1±0.3^{a}	11.0±0.3^{a}	11.9±0.3^{a}	11.7±0.3^{a}	10.2	10.9
F											
Cage		1.8	3.9	5.5±0.4^{b}	9.2±.4^{b}	12.4±.5^{a}	11.3±.5^{a}	12.4±.5^{a}	12.1±.5^{a}	12.3	11.7
Floor			3.3	6.3±0.4^{b}	9.8±.4^{ab}	12.6±.5^{a}	12.2±.5^{a}	12.2±.5^{a}	11.9±.5^{a}	11.9	11.1

*Values not followed by the standard error were not included in the analysis.
**Values within month of production followed by different letters differ significantly ($P \leq .01$) from each other (Duncan, 1955).

TABLE 4. Monthly egg weights (g) of White Baladi (WB) and Fayoumi (F) hens housed in cages and on the floor ($\times \pm$ SE).

Breed	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	$\times$
WB:												
Cage	34.3*	36.9	39.7	40.1**±.3	43.2±0.3^{a}	45.3±0.3^{a}	46.3±0.3^{a}	46.2±0.3^{a}	46.6±0.3^{a}	47.1	46.9	42.9
Floor	35.9	39.4	39.8	40.5±0.3^{ab}	42.9±0.3^{a}	45.4±0.3^{a}	46.5±0.3^{a}	46.7±0.2^{a}	46.7±0.3^{a}	44.8	44.9	43.1
F:												
Cage		34.9	36.8	38.2±0.4^{c}	41.4±0.4^{b}	43.3±0.4^{b}	44.6±0.4^{b}	44.5±0.4^{b}	44.3±0.5^{b}	44.2	44.3	41.6
Floor			36.5	39.0±0.5^{b}	42.3±0.4^{b}	43.9±0.5^{b}	44.4±0.4^{b}	44.9±0.4^{b}	44.7±0.5^{b}	42.9	43.6	42.5

*Values not followed by the standard error were not included in the analysis.
**Values within months of production followed by different litters differ significantly ($P \leq .01$) from each other (Duncan, 1955).

Egg number

Daily egg production for each hen was recorded until 530 days of age for the WB and 450 days of age for the F hens. Monthly egg production for both breeds is presented in Table 3. The WB reached their peak production 6 months from the onset of egg production. However, the F reached their peak only 5 months from the onset of egg production (Table 3). There was no significant difference in monthly laying intensity between the 2 breeds. Daily egg production for each hen during the laying period for each breed and housing system is presented in Table 3. There was no significant difference in egg number between the 2 housing systems Similar results were reported by Stappers (1969) ; Yeldan and Gurocak (1976) ; and Kuznetsova (1977). They reported that the type of housing. did not significantly affect egg production.

Egg weight

The average egg weight of both breeds and housing systems are presented in Table 4. Egg weight of both breeds reached the maximum at about the 6th month of egg production. The egg weight of the WB (about 46 g) was significantly ($P \leq .01$) heavier than those of the F (about 44 g). There were no significant differences between the weight of eggs laid on the floor and in cages (Table 4) for both breeds. This agrees with Yeldan and Gurocak (1976) who reported no differences in egg weight between the 2housing systems.

Incidence of cracked eggs

Results of the incidence of cracked eggs are summarized in Table 5. Due to the nature of the data obtained, no statistical analyses were conducted. However the results obtained revealed that there were no consistent differences between breeds or housing systems. The percentages of cracked eggs collected from the different treatments ranged from 0·67 to 0·75%. These figures are within the normal level of cracked eggs expected. Al-Shahwany (1976) found that the cracked egg percentage for White Leghorns in cages was 0·67 % and for those on the floor was 0·71 % .

TABLE 5. **Total eggs produced by the different groups and the numbers and percentages of cracked eggs.**

	White Baladi		Fayoumi	
	Cage	Floor	Cage	Floor
Total eggs produced	11,963	12,464	5501	4769
Total eggs cracked.	85	83	41	34
Cracked eggs%	0·71	0 67	0.75	0.71

Laying house mortality

Results obtained on laying house mortality are summarized in Table 6. These results indicated that, for both breeds, caged birds had higher mortality than floor-housed birds. It is also apparent that the WB hens had lower mortality than the F hens. These results agree with those obtained by Chrappa *et al.* (1978) and Yeldan and Gurocak (1976), who reported that laying house mortality for caged hens was higher than for floor raised hens.

TABLE 6. **Laying house mortality of Fayoumi and White Baladi hens housed in individual cages or on the floor.**

Breed		No. of Birds at Sexual Maturity	Mortality Percentage	No. of Laying Hens at End of Experiment
White Baladi .	Cage	140	8	129
	Floor	148	6	139
Fayoumi . . .	Cage	62	11	55
	Floor	69	9	63

References

Al-Shahwany, F.F. (1976) Effect of confinement stress on blood and egg yolk cholesterol and laying performance of White Leghorn laying hens. *M. Sc. Thesis*, Fac. Agric., Baghdad Univ.

Bhagwat, A.L. and Craig, J.V. (1975) Reproductive performance of three strains of chickens in colony-cage and floor-pen environments. *Poultry Sci.* 54, 228-233.

Chand, D., Georgie, G.C. and Razdan, M.N. (1976) Effect of housing and season on egg production and egg quality indices in three breeds of poultry. *Haryana Agric. Univ. J. Research* (4) 314.

Chrappa, V., and Resovsky, S. (1974) Housing breeding flocks of egg. Production types of domestic fowls in cages. *A.B.A.* 37, 1953.

Chrappa, V., Resovsky, S. Peter, V. and Gram, A. (1978) Comparison of different systems of rearing pullets. *A.B.A.* 42, 1921.

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

Harvey, W.R. (1960) Least squares analysis of data with unequal subclass number. USDA ARS 20-28.

Kicka, M.A.M., Osman, M.A. Riad, S.A., and Kamar, G.A.R. (1979) Relation between yolk cholesterol and some economic characters in chickens. *Egypt. J. Anim. Prod.* 19, 115.

Kosba, M.A., Shawer, M.F. and El-Ibiary, H.M. (1978) Selection for age at sexual maturity in chickens under different mating systems. *Alexandria J. Agric. Research* 6, 154-161.

Kolodziej, H., Kolodziej, H. and Kemp, M. (1973) Egg production in battery cages and on litter. *A.B.A.* 41, 3667.

Kuznetsova, L.A. (1977) Effect of light impulses on the production of caged layers. *A.B.A.* 45, 7306.

Popescu, D. (1971) Comparative research into poultry-keeping on permanent litter and in battery-cages. *A.B.A*, 39, 5209.

Selim, A.D. (1964) A comparative study in meat and egg production in the fowl. *M.Sc Thesis*, Fac. Agric., Cairo Univ.

Stappers, H.P. (1969) The housing of hens in batteries and on litter during the rearing and laying period. *A.B.A.* 37, 4108.

Yeldan, M. and Gurocak, A.B. (1976) Laying performance of hens housed on the floor or in cages. *A.B.A.* 44, 1403.

تأثير النوع ونظام السكن على انتاج البيض من الدجاج الأبيض والفيومى فى المناطق شبه حارة ٠

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تضمنت هذه الدراسة ١٤٠ دجاجة بلدى أبيض ٦٢ دجاجة فيومى مرباه فى اقفاص وكذلك ١٤٨ دجاجة بلدى ابيض ٦٩ دجاجة فيومى مرباه فى مساكن ارضية ٠ وقد تم تسجيل الانتاج اليومى للبيض لنحو ١١ شهرا انتاجى واثبتت النتائج ان الدجاج الفيومى يصل الى النضج الجنسى مبكرا عن الدجاج البلدى الابيض ٠ مع عدم وجود تأثير لنوع المسكن على عمر النضج الجنسى كذلك كان متوسط وزن بيض الدجاج البلدى الابيض اعلى معنويا عن متوسط وزن بيض الدجاج الفيومى ٠

هذا ولم يكن هناك فرق بين وزن البيض المنتج فى اقفاص وبين المنتج من المساكن الأرضية كذلك لم يكن هناك تأثير للنوع او طريقة المسكن على الانتاج الشهرى من البيض أو الانتاج الكلى من البيض ٠

ولقد كان من نسبة البيض المشروخ ضئيله فى جميع الحالات مع عدم وجود تأثير للنوع أو نظام الاسكان على نسبة البيض المشروخ ٠ كما كانت نسبة النفوق لكلا الدجاج البلدى الابيض والدجاج الفيومى اعلى فى الاقفاص عنها فى المساكن الارضية ٠