

The Effect of Breed and Housing System on White Baladi and Fayoumi Pullets' Body Weights

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A GROUP of 175 White Baladi and 74 Fayoumi female chicks were brooded in batteries from hatch to 8 weeks of age. Each bird was allowed 148 cm² at hatch. By 8 weeks of age each bird was allowed 361 cm². The birds were then kept in individual cages from 8 weeks to sexual maturity allowing 672 cm²/pullet. A second group, consisting of 175 White Baladi and 78 Fayoumi female chicks, was brooded on the floor from hatch to sexual maturity. Each bird was allowed from 148 cm² at hatch to 361 cm² at 8 weeks of age. From 8 weeks of age to sexual maturity each pullet was allowed 700 cm².

The birds were weighed individually at 30-day intervals until sexual maturity. The results indicated that there was no significant difference in body weights between pullets raised in cages or on the floor. Also the White Baladi pullets were significantly heavier than Fayoumi pullets. During the second and third months of age, the average pullet body weights of those reared on the floor were higher than those reared in batteries. However, during the fourth and fifth months for both breeds and at sexual maturity, the body weights of cage-reared pullets were heavier than floor-reared pullets. The mortality for the caged pullets was significantly higher than for the floor-reared pullets. The mortality of White Baladi was higher than Fayoumi, and the mortality was higher for both breeds during the early growing period than later on.

Layer performance is affected greatly by body weight at sexual maturity. However, little has been published on the effect of the housing system (floor or cage) on pullet growth and body weight at sexual maturity. It has been found that Fayoumi and Lohman pullets reared in cages weigh more than those reared on the floor (Helmy and Afifi, 1974). Andrews (1978) found that broilers reared on litter were significantly heavier than broilers reared in cages. He also stated that broilers reared on plastic mats weighed significantly more ($P \leq .05$) than broilers reared on litter or on rubber mats.

Stino (1974) reported that the average body weights of the Fayoumi pullets reared on the floor at 0, 4, 8, and 12 weeks of age were 30, 210, 445, and 835 respectively. The average body weights for the White Baladi pullets were 29 g at hatch, 160 g at 4 weeks, 370 g at 8 weeks and 730 g at 12 weeks of age. Ragab *et al.* (1967) stated that the mortality in Fayoumi chicks at ages from 0-8 weeks in batteries was 3% while on the floor it was 6%.

The purpose of this study was to evaluate the effect of housing system (cage or floor) on the body weight of two native Egyptian breeds (White Baladi and Fayoumi). This evaluation included monthly body weights until sexual maturity. It also included mortality rate during the rearing period.

Material and Methods

This study was carried out at the Poultry Experiment Station, Faculty of Agriculture, Cairo University, during the 1978-1979 season. One -day-old White Baladi (WB) and Fayoumi (F) pullets were used. There were 2 hatches, 1 in February and the other in April, 1978. Each chick was wingbanded at hatch. The birds received *ad libitum* feed and water throughout the experimental period (28 weeks of age). Their diet contained 20% crude protein and 2840 K Cal/kg ME (Table 1). They were exposed only to natural light (Table 2) during the growing period. On hatching, all the birds were vaccinated against Newcastle Disease with the F strain vaccine using the eye drop method. They were revaccinated against Newcastle using the K strain by injection at 45 days of age and at 6 months of age. The birds were also vaccinated at 12 weeks of age against Fowl Pox. At 4 months of age, they were inoculated with Fowl Cholera bacterine.

TABLE 1. Composition of the starter ration.

Ingredients	Percentage
Yellow corn	45
Rice germ meal	25
Decorticated cottonseed meal	16
Fish meal (45% protein)	6
Molasses yeast	5
Limestone	1.50
Bone meal	1
Sodium chloride	0.50
Vitamin mixture	+
Mineral mixture	+
TOTAL	100.00

Crude protein = 20%
ME K cal/kg diet = 2840

TABLE 2. Ambient and brooding temperature (°) and day length during the growing period.

Months (1978)	Average Ambient Temperature		Average brooding temperature		Average day length /hr
	Max°	Min°	Max°	Min°	
February	24.2	11.2	28.0	24.0	11: 06
March	25.5	12.0	27.5	23.0	12: 01
April	30.1	14.3	30.9	21.4	12: 40
May	34.4	18.4	31.9	28.9	13: 30
June	34.3	21.1	34.7	31.0	14: 00
July	34.7	22.9	32.9	31.2	13: 10
August	32.6	21.9	31.8	30.2	11: 58
September	31.3	20.3	30.5	26.9	12: 00
October	31.2	19.6	29.3	24.3	11: 10
November	22.4	12.2	22.2	19.2	10: 39
December	20.5	11.0	19.5	14.8	10: 13

At hatch all the birds of both breeds were randomly divided into 2 groups. One group, consisting of 175 WB and 74 F, was brooded in battery brooders ; the other group, consisting of 175 WB and 78 F, was brooded on the floor. The 2 breeds were raised intermingled. From hatch to 8 weeks of age, each bird in batteries was allowed from 148 cm² to 316 cm². From 8 weeks of age to sexual maturity, the birds were reared in individual cages, allowing 672 cm² per bird. The cages were equipped with trough feeders and waterers. The floor-grown pullets were brooded intermingled in 425 x 367 cm houses with open yards. Water was supplied in plastic fountains while feed was supplied in feed troughs from 1 day to 8 weeks of age. Each bird was allowed 148 to 316 cm² floor space. From 8 weeks until sexual maturity the floor space allotted for each bird was 700 cm². All the birds were weighed individually to the nearest gram at hatch. Thereafter the birds were weighed individually to the nearest 5 grams at monthly intervals (30 days) until 6 months of age. Weight at sexual maturity was obtained. Mortality until sexual maturity was also recorded.

The analysis of the body weight data was carried out by the least square method of Harvey (1960). The data were analyzed, taking the breed, housing type, and the interaction into consideration. Separation of means was carried out according to Duncan (1955).

Results and Discussion

Body weight up to sexual maturity

The average body weights of White Baladi and Fayoumi pullets raised in batteries and on the floor during this period are presented in Table 3.

There was no significant difference in 1-month body weight between the 2 breeds or the 2 housing systems. However, the floor-reared birds were slightly (about 3%) heavier than those raised in batteries. At 2 months of age, the White Baladi chicks started to be heavier than the Fayoumi chicks, specially those raised in cages. At that age, the chicks reared on the floor were about 6% heavier than those reared in batteries. These differences, however, were not statistically significant.

TABLE 3. Body weight (g) of White Baladi and Fayoumi pullets raised in cages and on the floor ($\bar{x} \pm SE$).

Age	White Baladi		Fayoumi	
	Cage	Floor	Cage	Floor
Hatch	28.9 ± 0.3 ^a *	29.2 ± 0.3 ^a	28.9 ± 0.5 ^a	28.4 ± 0.5 ^a
One month	114 ± 2 ^a	117 ± 2 ^a	109 ± 3 ^a	113 ± 3 ^a
Two months	253 ± 5 ^{ab}	269 ± 5 ^a	266 ± 8 ^c	240 ± 8 ^{bc}
Three months	424 ± 7 ^a	433 ± 7 ^a	387 ± 11 ^b	410 ± 11 ^{ab}
Four months	613 ± 10 ^a	600 ± 10 ^{ab}	582 ± 15 ^{ab}	563 ± 16 ^b
Five months	868 ± 11 ^a	819 ± 10 ^a	768 ± 16 ^c	757 ± 16 ^c
Sexual maturity	1054 ± 10 ^a	1033 ± 9 ^a	981 ± 14 ^b	947 ± 14 ^b

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

At 3 months of age, the White Baladi pullets were still heavier than the Fayoumis reared in cages. The higher body weights of the floor-grown pullets also started to subside. By 4 months of age, this trend started to reverse. The body weights of the cage-grown pullets started to be higher (although not significantly so) than the floor-grown birds. At this age also the White Baladis were still heavier than the Fayoumis. At the age of 5 months, both White Baladi pullets reared on the floor and in cages were significantly ($P \leq .01$) heavier than the Fayoumi pullets. Also the White Baladi pullets reared in cages were significantly heavier than those raised on the floor. However, the differences in body weights between the Fayoumis reared in cages or on the floor

were not statistically significant. By sexual maturity, there were no significant differences for both breeds between the 2 housing systems. However the White Baladi hens were about 8% heavier than the Fayoumi hens. This difference was statistically significant ($P \leq .01$).

The monthly body weight gain of both breeds reared on both housing systems are presented in Table 4. It is noticeable that from 2 months of age the caged birds gained more weight than the floor-reared birds. These results indicate that these pullets, especially at the early ages, were smaller in weight than previously published data (Stino, 1974; Sabri, 1979; El-Samra, 1970; Abdel-Kadr, 1973 and Kicka *et al.*, 1977). The lower body weights of the birds in this study may be due to an inferior diet and to a low brooding temperature (Table 2). As in this study, previous data (Shupe and Wuisenberry, 1961; Manfredin *et al.*, 1967; Irgashev, 1976; Hole *et al.*, 1963; and Stappers, 1969) have indicated that cage-reared pullets were heavier than floor-reared pullets.

TABLE 4. Monthly body weight gain (g) of White Baladi and Fayoumi pullets raised in cages and on the floor.

Period	White Baladi		Fayoumi	
	Cage	Floor	Cage	Floor
Hatch-1 month	85	88	80	84
1-2 months	140	152	116	127
2-3 months	171	164	161	170
3-4 months	189	167	195	153
4-5 months	255	219	186	194
5 months-sexual maturity	186	215	213	190

Mortality rate during the growing period

Results obtained on growing mortality are summarized in Table 5. In general mortality was higher for the White Baladi pullets than for the Fayoumi pullets. Also pullets of both breeds had a higher mortality rate when they were raised in cages rather than on the floor (Table 5). Helal (1966) reported a higher mortality for Fayoumis reared in cages than White Baladi reared in cages. However, when he reared both on them on the floor there were no differences in mortality rates between the two breeds. Results obtained by Stappers (1969); Abdou (1965); Ragab *et al.* (1967); and Irgashev (1976), indicated that cage-reared birds had lower mortality percentages than floor-reared birds during the brooding and growing periods.

TABLE 5. Mortality of Fayoumi and White Baladi pullets raised in cages and on the floor.

	White Baladi		Fayoumi	
	Cage	Floor	Cage	Floor
No. of birds at hatch . . .	175	175	74	78
No. of birds at sexual maturity	140	148	62	69
Age	% Mortality	% Mortality	% Mortality	% Mortality
1 month . . .	6.3	4.5	4.1	3.8
2 months . . .	5.1	3.4	4.1	2.6
3 months . . .	3.4	2.3	2.7	1.2
4 months . . .	2.3	2.3	2.7	1.2
5 months . . .	1.1	1.1	1.3	1.2
6 months . . .	1.1	1.1	1.3	1.2
7 months . . .	1.6	—	—	—
TOTAL. . . .	20.9%	14.7%	16.2%	11.2%

Vit. mixture supplied the following (in units or milligrams per kg diet) : 10,000 i.u. Vit. A ; 2000 i.u. Vit. D₃ ; 3 mg Vit. K ; 7 mg Vit. E ; 6 mg Vit. B₂ ; 6 mg Vit. B₆ ; 16 mcg Vit. B₁₂ ; 600 mg Vit. C.

Trace mineral mixture supplied the following (mg/kg of feed); 40 mg iron 120 mg manganese ; 6 mg copper ; 6 mg iodine ; and 6 mg zinc.

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تأثير أنواع ونظام الاسكان على وزن اناث الكتاكيت البلدى والفيومى *

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تم استخدام مجموعتين من الكتاكيت الاناث البلدى الابيض والفيومى * الاولى عددها ١٧٥ كتوكوت بلدى ابيض و ٧٤ فيومى وتم تربيتها فى بطاريات تم اقصاء معلقة والثانية وعددها ١٧٥ كتوكوت بلدى ابيض و ٧٨ كتوكوت فيومى تم تربيتها بمساكن ارضية * وتم وزن الكتاكيت شهريا من عمر النضج

الجنسى *

ولقد اظهرت النتائج عدم وجود تأثير معنى لنوع المسكن على نمو الكتاكيت * اما الكتاكيت الاناث البلدى الابيض فلقد كانت اقل معنى من الكتاكيت الفيومى هذا ولقد تبادلت المجموعتين (المرباه فى بطاريات وعلى الارض) زيادة وزن احدها عن الاخرى فى فترات التجربة المختلفة كما كانت نسبة التفوق اعلى معنى فى الكتاكيت المرباه فى بطاريات عنها بالنسبة للكتاكيت المرباه على الارض كما كانت نسبة التفوق فى الكتاكيت البلدى الابيض اعلى من نسبة التفوق فى الكتاكيت الفيومى وكذلك كان التفوق اعلى ما يمكن فى الاعمار الاولى وتناقص بعد ذلك *