

Effect of Housing Systems for Turkey Hens on Some Performance Traits

I. Body Weight, Egg Production and Weight, Feed Consumption and Conversion.

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ONE HUNDRED twenty medium weight Studler turkey hens were experimented on. At 32 weeks of age they were divided into three equal groups. The three groups were housed in individual laying cages, floor pen and a yard respectively. The 1st and 2nd groups were fed turkey breeder ration while the 3rd one was given green clover in addition to turkey breeder ration.

Results showed that the body weight of all groups decreased. The decrease in body weight of the hens housed in the yard was the largest, the differences between the three groups were highly significant. The average egg production per hen up to 49 weeks of age was 40.96, 29.60 and 28.88, the average weights of eggs were 75.58, 74.10 and 76.33g and the total egg mass produced during the experimental period was 121.16, 91.76 and 88.76 kg for the birds housed in cages, yard and floor pen respectively. The differences in egg production, egg weight and egg mass between groups and periods were highly significant. Average feed consumption per hen during 16 weeks (experimental period) was 19.06, 19.52 and 8.57 + 34.32 "green clover" kg, the feed conversion (kg feed/kg eggs) was 6.14, 8.57 and 3.70 + 14.7 "green clover" for the hens housed in the cages, floor pen and yard respectively.

There has been an increased demand in recent years for fresh killed young tom and hen turkeys throughout the years. This demand has been further reinforced by the need to meet the continuing requirements of further processing plants. These facts have made it necessary for the breeder to produce fertile turkey eggs on a year-round basis to insure an adequate supply of turkey poults at all times. It is obvious that this can be accomplished only through the use of controlled environment housing or through a combination of controlled environment and conventional housing. There is however, very little information available on management of turkey breeders that will assure maximum reproductive performance under housing conditions.

Fuquay and Renden (1980) reported that body weight of caged hens was significantly higher than that of hens on the floor. On the other hand Gowe (1956) showed that the average body weight of hens housed in batteries was slightly lower than those in laying pens. During the laying period, body weight was slightly greater when birds were reared in confinement than those reared on ranges (Pepper *et al.*, 1959).

Gowe (1955), Lowry (1965), Christmas *et al.* (1974) and Hamid *et al.* (1981) showed that egg production was greater for hens housed on floor than those in cages. On the other hand Shupe and Quisenberry (1961), Andrews (1977), Leighton *et al.* (1978) and Renden and Pierson (1982) observed that there was significant difference in egg production when turkey hens were housed either in cages or in floor pens. The rate of egg production of pullets reared on range was significantly higher than those reared in confinement (Kinder and Yoes, 1956 and Pepper *et al.*, 1959). On the contrary Bailey *et al.* (1959) and Taylor *et al.* (1960) found no difference in egg production between hens reared on ranges or in confinement.

Peterson (1978) found that hens on deep litter produced smaller eggs than those on sloping wire floor. However, Tripathi *et al.* (1980) found that hens housed on deep litter laid eggs heavier than those in cages, while Thomas, *et al.* (1972) showed that egg weight was not significantly affected whether turkey hens were housed in cages or on conventional litter. Orr *et al.* (1957) showed that egg weight of Pullets reared on ranges were smaller than those reared in confinement. However, Winter and Schlamb (1948) found that range reared birds produced slightly larger egg sizes than those reared in confinement.

Shupe and Quisenberry (1961) showed that poults reared in colony cages consumed more feed than those in floor pens or on range. No significant differences were found in feed consumption between pen and range reared birds. Turkey hens housed in cages consumed more feed than those in floor pens (Thomas *et al.*, 1972 and 1976). Fort *et al.* (1978) found that there was no difference in feed intake if turkey hens were housed either in cages or on deep litter.

Feed conversion of turkey hens housed in cages was better than that on floor (Karavashenko and Koryavets, 1975). Slinger *et al.* (1977) found that feed conversion of turkey hens housed on litter floor was better than that for hens housed on slatted floors.

Material and Methods

This work was performed at the Poultry Experimental Center, Animal Production Department, Faculty of Agriculture, Cairo University. One hundred twenty medium-weight, White Studler turkey hens hatched together and reared under the same conditions were experimented on.

When the turkey poults were 30 weeks old, they were exposed abruptly to 17 hr of light daily, *i.e.*, 8 hours of natural light plus 9 hours of artificial light of 2 feet candles (from 5 p.m. to 2 a.m.), a timer was used for this purpose.

At 32 weeks of age the turkey hens were leg-banded and divided into three equal groups randomly of similar body weight. The birds of the 1st group were randomly placed in individual wire laying cages (45 x 45 x 37 cm). The

cages were placed under a shed. The 2nd group was placed in a floor pen (0.5 m²/hen). The pen was equipped with eight aluminum trapnests, 2 tube feeders and 2 waterers. The 3rd group was placed in an opened yard (2 m²/hen), provided with eight aluminum trapnests, four tube feeders and 2 waterers.

The turkey hens of the 1st and 2nd groups were fed a turkey breeder ration (NAS-NRC, 1977), while those of the 3rd group were given green clover from 8 a.m. till 2 p.m., thereafter the above mentioned ration was offered till the end of the day. For the three turkey hen groups the feed was given ad libitum then the actual consumption was recorded.

All the turkey hens were artificially inseminated by pooled semen collected according to the method of Burrows and Marsden (1938) and modified by Parker (1946), starting 25 days from the stimulatory light. The hens were inseminated deeply into the vagina with 0.05 ml pooled semen twice in the two successive days and at bi-weekly intervals according to the method of Ferebec and Ernst (1967).

The eggs were collected five times daily and identified by hen number, egg weight, date of laying and group.

Individual turkey hens weights were recorded at 33rd week of age and at the termination of the experiment. Egg number, egg weight and feed consumption were recorded for each group.

Steel and Torrie (1960) and Duncan (1955) were consulted for conducting the statistical analyses.

Results and Discussion

1. Body Weight

Table 1 shows that the turkey hens at the start of the experiment were of nearly similar body weight, on the termination of the trial it was noticed that the body weight of the hens housed in cages exceeded those in floor pen and yard by 1.43 and 3.38% respectively. This may be attributed to the little movement of the birds housed in the cages relative to those of floor pen and yard. In this connection Thomas *et al.* (1976) reported that caged hens were 0.5 kg heavier than their counterpart on litter floor. It was found that the loss in live body weight was 0.5 and 0.9 kg for hens housed in cages and floor pen respectively. Gowe (1956), Bailey *et al.* (1959), Francis and Roberson (1963) and Fuquay and Renden (1980) reported that hens housed in cages were heavier in body weight than those in floor pens.

2. Egg Production

Table 2 shows that egg production was high during the period from 35 to 49 weeks of age under the different housing systems. The peak of egg production was attained at the 3-4 weeks of production. The lowest egg production was noticed during the period from 45 to 49 weeks of age.

TABLE 1 Average body weight of turkey hens housed under different systems at 33 and 49 weeks of age.

Age	Housing Systems		
	Cages	Floor Pen	Yard
wks,		kg	
33	5.200	5.260	5.208
49	4.905 ^a	4.836 ^b	4.724 ^c
Differences	-0.295	-0.424	-0.484

* Values followed by different letters differ significantly ($p < 0.05$) from each other.

During the over-all experimental period, turkey hens housed in the cages laid 28.44% more eggs than those of the yard. Birds housed in the yard laid 3.65% more than those in the floor pen. Assuming that egg production "hen-housed basis" was 100 for turkey hens housed in the cages, the same criterion would be 74.33 and 71.62 for those housed in the yard and floor pen respectively. The corresponding values for egg production "hen-day basis" are 100, 73.72 and 71.31 for the turkey hens housed in the cages, yard and floor pen respectively.

The reduction in egg production of the turkey hens housed in the floor pen and the yard during the last three periods of production may be due to increased number of birds which moulted and went out of production (15 and 9% respectively).

The above mentioned results agree with the findings of Bailey *et al.* (1959) and Moore *et al.* (1977) where it was reported that chickens housed in cages produced more eggs than those in conventional floor houses. On the other hand Reddy *et al.* (1981) mentioned that type of housing had no significant effect on egg production in commercial eggtype chickens.

In addition, Karavahenko and Koryavets (1975), Andrews and Morrow (1978) and Thomas *et al.* (1972) & (1976) reported that turkey hens housed in cages laid more eggs than those in floor pens.

3. Egg Weight

Table 3 shows that egg weight of turkey hens housed in the yard was slightly heavier than that of the housed in the cages (1.86%) or in the floor pen (2.07%). Assuming that the average egg weight of the birds housed in the yard is 100, the corresponding values for the hens of the cages and floor pen would be 98.20 and 97.97 respectively. Analysis of variance "F test" showed that the differences in egg weight due to the type of housing and periods of production were highly significant ($p < 0.01$).

TABLE 2. Average egg number of turkey hens from 33 to 49 weeks of age at biweekly intervals and under different housing systems.

Periods wks.	Housing Systems					
	Cager		Floor Pen		Yard	
	H.H.	H.D.	H.H.	H.D.	H.H.	H.D.
33 — 35	4.85	4.85	4.78	4.78	5.13	5.13
35 — 37	6.70	6.70	6.33	6.33	6.83	6.83
37 — 39	6.18	6.18	5.20	5.20	4.55	4.55
39 — 41	6.85	7.03	5.13	5.13	4.70	4.70
41 — 43	5.48	5.62	2.75	2.89	3.95	4.05
43 — 45	4.95	5.21	1.75	1.84	2.53	2.59
45 — 47	3.00	3.15	1.55	1.68	1.08	1.10
Total . . .	40.59 ^a	41.45 ^a	29.07 ^c	29.56 ^c	30.17 ^b	30.39 ^b

* H.H. = Hen-housed production, H.D. = Hen-day production.

** Values followed by different letters differ significantly ($p < 0.05$) from each other.

In this connection Winter and Schlamb (1948) found that range-reared birds produced slightly heavier eggs than those in confinement. Moore *et al.* (1977), Kotaiah *et al.* (1978), Balachandran *et al.* (1980), Methew *et al.* (1980) and Prasad *et al.* (1982) reported that hens housed in laying cages had heavier egg weight than those confined in floor pens.

TABLE 3 Average egg weight of turkey hens from 33 to 49 weeks of age at biweekly intervals and under different housing systems.

Periods wks.	Housing Systems		
	Cages	Floor Pen	Yard
		Grams	
33 — 35	74.13	73.86	74.55
35 — 37	75.60	73.35	76.13
37 — 39	74.36	74.13	74.64
39 — 41	74.82	75.11	76.04
41 — 43	75.27	71.74	76.45
43 — 45	75.89	76.16	78.81
45 — 47	73.83	76.97	75.99
47 — 49	72.71	73.96	75.00
Average . . .	74.58 ^b	74.41 ^b	75.95 ^a

* Values followed by different letters differ significantly ($p < 0.05$) from each other.

weeks of age for the turkey hens housed in the cages and the yard, for the birds confined in the floor pen, it was reached during the period from 39 to 41 weeks of age.

For producing one kg or dozen eggs, less feed was required for caged turkey hens than those in the floor pen (6.14 vs., 8.55 kg ration/kg eggs or 5.50 vs., 7.84 kg ration/dozen eggs). Turkey hens housed in the yard required 3.70 kg ration plus 17.74 kg clover/kg eggs or 3.38 kg breeder ration plus 13.48 kg green clover/kg eggs.

These results coincided with those reported by Bailey *et al.* (1959), Miller and Quisenberry (1959), Christmas *et al.* (1974) who reported better feed conversion for caged hens than for floor pen birds. Also, Andrews and Morrow (1978) mentioned that caged turkey hens consumed significantly less feed per kg eggs than those in floor pens. Reddy *et al.* (1981) mentioned that type of housing had a significant effect on feed intake and feed intake/12 eggs.

TABLE 4. Average feed consumption of turkey hens from 33 to 49 weeks of age at biweekly intervals and under different housing systems.

Period wks.	Housing Systems			
	Cages	Floor Pen	Yard	
	Feed	kg Feed	Feed + Clover	
33 — 35	2.750	3.000	1.125	4.200
35 — 37	2.250	3.000	1.175	3.870
37 — 39	2.500	2.375	1.100	3.975
39 — 41	2.410	2.350	1.075	4.300
41 — 43	2.436	2.237	1.100	4.359
43 — 45	2.421	2.184	0.940	4.462
45 — 47	2.184	2.216	1.026	4.512
47 — 49	2.105	2.162	1.260	4.640
Total	19.056	19.524	8.567	34.323

4. Feed consumption and conversion

During the experimental period (from 33 to 49 weeks of age), the turkey hens housed in the cages consumed less feed than those in the floor pen (19.06 vs., 19.52 kg turkey breeder ration/hen). Turkey hens in the yard consumed 8.57 of the previous ration in addition to 34.32 kg green clover/bird (Table 4).

The amount of feed required to produce one kg of eggs is outlined in Table 5. It is obvious that feed conversion is highly related to egg production, better feed conversion can be obtained with increased egg production and vice versa. Better feed conversion was noticed during the period from 35 to 37

TABLE 5. Average feed conversion for turkey hens from 33 to 49 weeks of age at biweekly intervals and under different housing systems.

Periods wks.	Housing Systems			
	Cages	Floor Pen	Yard	
	kg feed/ kg eggs	kg feed/ kg eggs	kg feed + kg clover/ kg eggs	
33 — 35	7.652	8.517	2.947	11.003
35 — 37	4.442	6.474	2.263	7.462
37 — 39	5.445	6.160	3.235	11.689
39 — 41	5.585	6.129	3.001	12.033
41 — 43	5.760	10.096	3.505	13.543
43 — 45	6.122	15.555	4.641	21.824
45 — 47	11.186	16.865	9.398	41.353
47 — 49	9.156	17.335	12.407	56.141
Mean	6.140	8.549	3.698	14.738

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تأثير نظام المسكن للدجاج الرومى على بعض الصفات الانتاجية ١ • وزن الجسم ، انتاج ووزن البيض أستهلاك ومعدل تحويل الغذاء

محمد جمال الدين قهر ، مختار عبد الفتاح ، محمد سعيد سامى ومجيبى الدين
صالح

كلية الزراعة جامعة القاهرة والمركز القومى للبحوث ، مصر

استخدم في هذه الدراسة عدد ١٢٠ دجاجة رومى ابيض متوسط الوزن عريض الصدر (ستودلر) • قسمت هذه الدجاجات عشوائيا عند عمر ٢٢ أسبوع الى ثلاثة مجموعات متساوية « ٤٠ دجاجة فى كل مجموعة » متماثلة تقريبا فى العمر والوزن • أسكنت المجموعة الأولى فى أقفاص فردية ، والمجموعة الثانية فى حظيرة أرضية ، غديت هاتين المجموعتين على عليقة دجاج رومى تربية • وضعت المجموعة الثالثة فى حوش وقدم لها البرسيم المصرى الأخضر طوال اليوم الى جانب عليقة رومى التربية والتي كانت تقدم بعد الظهر • وقد أظهرت نتائج هذه الدراسة ما يلى :

- ١ - حدث نقص فى وزن الجسم لكل المجموع وكان النقص للطيور التى تحت نظام الاحواش أعلى من تلك التى تحت نظام الحظائر الأرضية أو الأقفاس وكان متوسط النقص فى وزن الجسم ٤٨٤ ، ٤٢٤ ، ٢٩٥ جرام للمجموع السابقة على التوالي ، وكانت الاختلافات بين المجموع معنوية بدرجة عالية •
- ٢ - سجل دجاج الاقفاص أعلى انتاج بيض ، يليه الدجاج الذى بالحوش ثم الذى بالحظيرة الأرضية ، وكان متوسط انتاج الدجاجة حتى عمر ٤٩ أسبوع للمجموع الثلاثة هو ٤٠٩٦ ، ٢٩٦٠ ، ٢٨٨٨ بيضة/دجاجة على التوالي • وكانت الاختلافات بين المجموع وفترات الانتاج معنوية بدرجة عالية •
- ٣ - كان متوسط وزن البيض ٧٤٥٨ ، ٧٤١٠ ، ٧٦٣٣ جرام للمجموعة الاقفاص والحظيرة الأرضية والحوش على الترتيب • وكانت الاختلافات بين المجموع والفترات معنوية بدرجة عالية •
- ٤ - كان متوسط العليقة المستهلكة لكل دجاجة خلال فترة التجربة « ١٦ أسبوع » ١٩٥٢ ، ١٩٠٦ ، ١٩٥٢ كيلو جرام عليقة رومى تربية فى مجموعتى الأقفاس والحظائر الأرضية على الترتيب ، بينما كان ٨٥٧ كيلو جرام من العليقة السابقة بالاضافة الى ٣٤٢٢ كيلو جرام برسيم مصرى أخضر •
- ٥ - كان معدل تحويل الغذاء « كيلو جرام غذاء / كيلو جرام بيض » ٨٥٧ ، ٦١٤ لكل من مجموعتى الاقفاص والحظائر الأرضية على التوالي • وكان معدل تحويل الغذاء لمجموعة الاحواش ٣٤٠ غذاء اضافة الى ١٤٧٤ برسيم أخضر مصرى •