

Effect of Housing Systems for Turkey Hens on Some Performance Traits

2. Percentage of Settable Eggs, Fertility, Hatchability and Mortality.

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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 the turkey breeder ration.

Results showed that the percentage of settable eggs was 83.07, 87.41 and 88.90, fertility was 69.21, 70.77 and 72.39%, hatchability was 58.90, 62.59 and 60.31% for the hens housed in cages, floor pen and yard respectively. For fertility and hatchability the differences between groups were significant and highly significant between periods of production. The average mortality percentage was 5, 7.5 and 2.5 for the turkey hens housed in 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 year. 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 ensure maximum reproductive performance under housing conditions.

Thomason *et al.* (1978) showed that turkey hens housed in cages produced a lower percentage of settable eggs than those on litter floor. Andrews (1977) reported that higher incidence of cracked eggs were found in floor reared turkey hens compared with caged turkey hens. On the other hand Andrews and Marrow (1978) found that the incidence of cracked eggs, misshapen eggs and soft-shelled eggs of turkey hens housed in floor pens were 0.94, 3.26 and 3.92% respectively, while these characters were 3.38, 0.79 and 1.38% when hens were housed in individual cages.

Thomason *et al.*, (1972) and (1976) found the lowest and highest fertility when turkey hens were housed in cages and conventional floors respectively. Bhagwat and Craig (1975) reported that fertility was lower for turkey hens in colony cages than those in floor pens. Leighton *et al.* (1978) found that turkey hens in cages produced approximately 8 and 6% fewer settable and fertile eggs respectively than those in litter floors.

Olssen *et al.* (1947) indicated that systems of housing neither cage nor confinement did not affect hatchability. Karavashenko and Koryavets (1975) showed that housing one and two turkey hens in cages caused hatchability to be somewhat less than that for hens in floor pens. On the other hand, Fort *et al.* (1978) found that hatchability rate of fertilized turkey eggs was less when hens were housed in floor pens than when housed in cages. Renden and Pierson (1982) found no difference in egg hatchability of laying hens housed either in individual cages or in the floor pens. El-Halawani *et al.* (1978) found that egg production and hatchability of fertile eggs of range birds were 4.5% and 3% respectively, higher than that of confined birds. Over the 20 week production season, there were 68.6 and 61.2 poults per hen for range-reared and confinement-reared hens, respectively. It was added that there was no adverse effect of dietary regimen on either fertility and hatchability of fertile eggs.

Shupe and Quisenberry (1961) reported no significant difference in mortality rates between turkeys reared in colony cages neither with slat sides nor with wire sides. Mortality rates of turkey hens housed in colony cages were significantly higher than those housed on floor (Shupe and Quisenberry, 1961) Thomason *et al.* (1972) and (1976) reported that mortality rate of caged turkey hens was more than for those in litter pens.

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, reared and fed 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 hr of natural light plus 9 hr 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 old the turkey hens were leg-banded and divided randomly into three equal groups of similar body weight. The 1st group was randomly housed in individual laying wire cages (45 × 45 × 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 ad libitum a turkey breeder ration (NAS-NRC, 1977), while those of the 3rd group were given green clover ad libitum 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 hens 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 Marden (1938) and modified by Parker (1946). Starting 25 days from the stimulating light, the hens were inseminated deeply into the vagina with 0.05 ml pooled semen twice in two successive days and at bi-weekly intervals according to the method of Ferebee and Ernst (1967).

The eggs were collected five times daily and identified by hen number. All eggs were stored under normal room temperature. Unsuitable eggs were neglected. The eggs were set into a forced air draft incubator at weekly intervals. Eggs set were candled at the 24th day of incubation then transferred to hatching trays. Fertility and hatchability were determined for hens of the experimental groups.

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

Results and Discussion

1. Percentage of Settable Eggs.

Table 1 shows that the number of settable eggs for turkey hens in the cages was more than that of the birds in the yard and floor pen by 26.25 and 36.11% respectively. Assuming that the number of settable eggs of the caged birds is 100, it would be 75.36 and 79.54 for the turkey hens in the floor pen and yard respectively. The percentages of settable eggs for the turkey hens in the cages, the floor pen and the yard were 83.07, 87.41 and 88.90% respectively. Assuming that the percentage of settable eggs for the turkey hens housed in the cages is 100, it would be 105.22 and 107.02 for the birds housed in the floor pen and yard respectively. Turkey hens housed in the cages had a lower percentage of settable eggs than those in the other two types of housing, in the same time they laid the highest number of eggs. Since turkey hens commonly lay their eggs in the standing position, it is likely that they would attain a high incidence of egg breakage if cage bottoms do not have some degree of resiliency. This emphasizes the importance of the cage floor on the incidence of cracked eggs laid by turkeys.

Analysis of variance "F test" showed that the differences in settable eggs due to type of housing and periods of production were highly significant ($p < 0.01$).

The above mentioned results agree with those by Thomason *et al.* (1972), (1976) & (1978) and Andrews and Morrow (1978) it was found that the percentage of settable eggs for turkey hens housed in cages was lower than those housed on litter.

TABLE 1. Average settable eggs per turkey hen (number and percentage) from 33 to 49 weeks of age at biweekly intervals and under different housing systems.

Periods wks.	Housing Systems					
	Cages		Floor Pen		Yard	
	No.	%	No.	%	No.	%
33 — 35	3.05	62.89	4.35	91.00	4.40	85.77
35 — 37	5.45	81.34	5.55	78.68	5.90	86.38
37 — 39	4.93	79.77	4.25	81.73	4.03	88.57
39 — 41	5.88	85.84	4.53	88.30	4.35	92.55
41 — 43	4.90	89.42	2.50	90.91	3.58	90.63
43 — 45	4.50	90.91	1.47	84.00	2.33	92.09
45 — 47	2.28	88.37	1.33	84.18	1.28	91.43
47 — 49	2.73	91.00	1.43	92.26	0.95	87.96
Total	3.72a	83.07	25.41c	87.41	26.82b	88.90

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

2. Fertility and Hatchability

In general, the turkey hens housed in the yard recorded better fertility than those confined in the cages or the floor pen. Fertility was slightly lower for caged turkey hens' eggs than those in the floor pen (Table 2). Assuming that fertility of the yard group is 100, it would be 95.61 and 97.76 for the caged and floor pen birds respectively.

It can be noticed that fertility was high in the three types of housing, higher fertility was observed during the first four periods. The last three periods recorded the lowest fertility for the three treatments. This may be related to the high environmental temperature during those periods. This may also be due to the changes in semen quality.

Analysis of variance "F test" showed that differences in fertility due to type of housing were significant ($p < 0.05$), those due to the periods of production were highly significant ($p < 0.01$).

TABLE 2. Fertility of turkey hen,s eggs from 33 to 49 weeks of age at biweekly intervals and under different housing systems.

Periods wks.	Housing Systems					
	Cages		Pen Floor		Yard	
	No. eggs set	Fertility %	No. eggs set	Fertility %	No. eggs set	Fertility %
33 — 35	122	87.70	174	85.60	176	85.80
35 — 37	218	84.86	222	79.28	236	84.32
37 — 39	197	78.17	170	77.65	161	72.76
39 — 41	235	68.94	181	68.51	174	70.11
41 — 43	196	64.29	100	57.00	143	65.03
43 — 45	180	56.11	59	52.54	93	56.99
45 — 47	91	51.65	53	50.94	51	50.98
47 — 49	109	45.87	57	42.11	38	39.47
33 — 49	1348	69.21 ^b	1016	70.77 ^{ab}	1072	72.39 ^a

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

Hatchability of fertile eggs for the turkey hens housed in the floor pen was 2.28 and 4.5% higher than for those in the yard and cages respectively (Table 3). Also hatchability of the eggs produced by the turkey hens in the yard was 2.22% higher than that of the eggs of the caged turkey hens. Assuming that hatchability of the floor pen group is 100, it would be 92.81 and 96.36 for the groups housed in the cages and yard respectively. In spite of the caged contained the highest number of pullets, it recorded the lowest fertility and hatchability. This may be due to the large number of eggs produced by this group relative to the other ones. The hatchability tended to decrease rather rapidly as the breeding season progressed. In this connection Parker (1947) suggested that hatchability of fertile eggs increased to late February (point of highest production), followed by a decline as the breeding season progressed.

Analysis of variance "F test" showed that differences in hatchability due to type of housing were significant ($p < 0.05$), while those due to periods of production were highly significant ($p < 0.01$).

The results obtained agree with those reported by Thomason *et al.* (1972) & (1976), Karashenko and Koryvets (1975), Bhagwat and Craig (1975), Chrappa and Resovsky (1978), Rohi (1980) and Renden and Pierson (1982), it was reported that fertility of caged birds was less than those on floors. In addition, Karavashenko and Koryvets (1975) stated that hatchability was somewhat less for turkey hens housed in cages than in floor pens.

TABLE 3. Hatchability of turkey hen's eggs from 33 to 49 weeks of age at biweekly intervals and under different housing systems.

Periods wks.	Housing Systems					
	Cages		Floor Pen		Yard	
	No. fert.	Hatchability	No. fert.	Hatchability	No. fert.	Hatchability
	eggs	%	eggs	%	eggs	%
33 — 35	108	69.44	148	70.95	151	66.23
35 — 37	185	67.03	176	65.34	199	65.33
37 — 39	154	60.39	132	61.36	177	62.39
39 — 41	162	59.62	124	58.87	122	58.20
41 — 43	126	51.99	57	57.89	93	55.91
43 — 45	101	46.53	31	58.06	53	42.31
45 — 47	47	44.68	27	55.56	26	42.31
47 — 49	50	42.00	24	41.67	15	53.33
33 — 49	933	58.09 ^b	719	62.59 ^a	776	60.31 ^{ab}

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

3. Mortality Rate

Turkey hens housed in the yard reported less mortality than those of the cages or the floor pen. Mortality rates for all over the experimental period "from 33 to 49 weeks of age" were 5, 7.5 and 2.5% for the turkey hens housed in the cages, floor pen and yard respectively. Dorothy *et al.* (1956), Hill (1977) and Tripathi *et al.* (1980) found that mortality rate of hens in individual cages was significantly lower than those in floor pens. Reddy *et al.* (1981) stated that type of housing for commercial egg-type chickens had no significant effect on survival. The results obtained from this study indicate that liveability of turkey hens housed in the yard from 33 to 49 weeks of age was higher than those housed in the cages or in the floor pen.

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تأثير نظام المسكن للدجاج الرومي على بعض الصفات الانتاجية

٢ • البيض الصالح للتفريخ ، الخصب ، الفقس ، معدل

المنفوق

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صالح

كلية الزراعة جامعة القاهرة والمركز القومي للبحوث ، مصر

استخدم في هذه الدراسة عدد ١٢٠ دجاجة رومي أبيض متوسط الوزن عريض الصدر (ستودلر) • قسمت هذه الدجاجات عشوائيا عند عمر ٢٢ أسبوع الى ثلاثة مجموعات منساوية « ٤٠ دجاجة في كل مجموعة » متماثلة تقريبا في العمر والوزن • أسكنت المجموعة الأولى في أقفاص فردية ، والمجموعة الثانية في حظيرة أرضية ، غذيت هاتين المجموعتين على عليقة رومي تربية • وضعت المجموعة الثالثة في حوش وقدم لها البرسيم المصري الاخضر طوال اليوم اى جانب عليقة رومي التربية والتي كانت تقدم بعد الظهور • ولقد أجرى تلقيح صناعي لكل الدجاجات بواسطة السائل المنوي المجموع من ديوك من نفس السلالة كل أسبوعين • وقد أظهرت نتائج هذه الدراسة ما يلي :

١ - كانت النسبة المئوية للبيض الصالح للتفريخ ٨٣.٠٧ ، ٨٧.٤١ ، ٨٨.٩٠ لمجموعات الاقفاص والحظائر الارضية والاحواش على التوالي ، وكانت الفروق بين المجموع والفترات معنوية بدرجة عالية •

٢ - كانت النسبة المئوية للخصب ٦٩.٢١ ، ٧٠.٧٧ ، ٧٢.٣٩ لمجموعات الاقفاص والحظائر الارضية والاحواش على التوالي ، وكانت الفروق بين المجموع معنوية وبين فترات الانتاج معنوية بدرجة عالية •

٣ - كانت النسبة المئوية للفقس ٥٨.٠٩ ، ٦٢.٥٩ ، ٦٠.٣١ لمجموعات الاقفاص والحظائر الارضية والاحواش على التوالي ، كانت الاختلافات بين المجموع معنوية وكانت معنوية جدا بين الفترات •

٤ - كانت النسبة المئوية للمنفوق هي ٥ ، ٧.٥ ، ٢.٥ لمجموعات الاقفاص والحظائر الارضية والاحواش على الترتيب •