

SOME STUDIES ON BEHAVIOURAL, PHYSIOLOGICAL AND PRODUCTIVE ASPECTS IN EGYPTIAN GOSLINGS KEPT UNDER TWO SYSTEMS OF MANAGEMENT

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SUMMARY

The behavioural and physiological performance of 20 young Egyptian goslings were studied under two systems of management, confined and open system. Birds were divided into 2 equal groups each of 10, six weeks old goslings. The study was conducted for 6 consecutive weeks in the department of hygiene and animal ethology.

Obtained results revealed that goslings kept in open system showed a marked increase in feed consumption (Kg), have good feathering and obtained a (2.19 / Kg) final body weight. While goslings kept in confinement showed less feed consumption, poor feathering and obtained (1.696 kg) final body weight. Goslings in open system were more active, feed searching, ground pecking, playful, contented, sleeping and sunbathing, more performing comfort movements than do goslings in confinement. The ethogram of goslings in open system was timed by nature than the ethogram of those in confinement. No significant differences in Rbc's (million / ml), Hb % MCV, MCH, PCV and MCHC ($P < 0.01$) was found between goslings of the two systems of management.

INTRODUCTION

Animal welfare is one of the most important contemporary issues in animal management. Generalized comparison among Traditional, confined and open poultry housing systems on environmental factors revealed specific advantages and disadvantages of each (Hurnik and Lehman, 1988). However, there is a need for comparative studies re-

garding the behaviour, physiology productive performance of goslings in confinement and in open semi-natural habitats. The objective of the present study was to elucidate the difference in the behavioural and physiological performances of Egyptian goslings bred under two different managemental systems.

MATERIAL AND METHODS

Animals and Housing systems:

Twenty young Egyptian goslings of 6 weeks age were used in the current study at Dept. Hygiene and Animal Ethology, Fac. Vet. Med., Cairo Univ. The birds were randomly divided into two equal groups, the confined group was allocated to a pen without yard (2 m. x 2m. x 3m.). The other group (open) allocated to an adjacent pen of the same size and permitted to gain access to a large yard (11.6 m. x 7.55 m.) as well as to a large berry Tree. Birds of the second group were kept outdoor from early morning at 8.00 hr. a. m to sunset at about 18.00 hr. p. m.

Feeding and drinking:

One plane of feeding was used in this study where a broiler starter ration (El-Salam Company for broiler production) was used ad. lib. clean water was offered ad. libitum.

Lighting program:

An electric lamp of 100 watt inside pens was used during the night hours.

Behavioural observations:

Observations of the gosling's behaviour were carried out by using scanning techniques for 6 consecutive weeks (Gillette, 1977 and Blockhuis, 1984). Where the behavioural patterns were recorded 2 days / week, at daily hours of 8.00 - 10.00 hr, 10.00 - 12.00 hr., and at 12.00 - 14.00 hr. respectively. Each group was observed for 45 minutes / day, divided into 3 sections each of which 15 minutes. Each category of the following behaviours were recorded at 5 minutes intervals. Ingestive behaviour (eating, drinking, mouth-washing, food searching and ground pecking). Feeding bouts were recorded in seconds.

Standing, laying, running-resting and sleeping behaviour were recorded at the second 5 minutes - sleeping bouts were recorded in seconds.

Comfort behaviour (preening-oiling - scratching - body splashing-wing/leg stretch-wing flap and body shake) were recorded at the third 5 minutes of the observation section (15 minutes).

Physiological parameters:

Blood samples were taken from the median metatarsal vein and collected on EDTA as anticoagulant and subjected to the following:-
Haemoglobin estimation in gm / 100 ml blood by spectrophotometric method (Schalm, 1986).

Packed cell volume (PCV %) according to Cohen method (1967).

Red blood cell count (Rbcs) in million / ml blood, Mean corpuscular volume (MCV), Mean corpuscular haemoglobin (MCH) and Mean corpuscular haemoglobin concentration (MCHC) were determined according to (Wintrobe, 1967).

Productivity performance:

Feed consumption was recorded daily for each group to determine the mean feed intake / bird. Mean body weight (Kg) / week was recorded for each group.

Statistical Analysis:

Data were analysed according to *senders*, Cochran (1967). Two ways analysis of variance were estimated using a classical Apple Macintosh computer.

RESULTS AND DISCUSSION**1- Open system:****Behavioural patterns****Ingestive behaviour:**

The ingestive behaviour was considered as composed of feeding habits, feeding bouts, drinking, mouth washing, feed searching and ground pecking. From the results in Table (1) it can be found that with the open system ingestive behaviour of goslings follow a diurnal rhythm and significant difference ($P < 0.05$) was found between periods of observation, higher activity in feed mouth washing, ground pecking was performed early morning (08.00 - 10.00 hrs). Birds in open system were more active, more searching for materials, more pecking of groups and plant leaves. Obtained results agreed with the Abd El-Gwad (1991).

Resting, standing, and sleeping behaviour:

From Table (1) and from observation it was found that goslings kept in the open system were more exploring their habitat, more alert. Standing activities increased at early morning hours (8.00 - 10.00 hrs) and this activity decreased with increasing daily hours (10.00 - 12.00, 12.00 - 14.00 hrs). At most of the birds were in rest and sleep. Significant differences ($P < 0.001$) was found in percentage of birds performing such activities along hours of observation. From observation it can be seen that birds in open system showed frequent happiness running, and were more content in the open habitat, most of them were resting under the sunbathing when sun rays were suitable for feathers and when temperature increased they were rested under the tree shed.

Comfort movement:

From table (2) it can be shown that goslings kept in open system were more preening, flapping

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Table (1): Mean percentage and standard errors of two group of young goslings induced ingestive behaviour patterns and locomotor activities.

| Group | Observation period | Mean + S. E. | | | | | | | | | |
|-------|--------------------|---------------------|-----------------|-----------------|-----------------|-----------------|----------------------|---------------|---------------|-------------------|----------------|
| | | Ingestive behaviour | | | | | Locomotes activities | | | | |
| | | Feeding % | Drinking % | Mouth wash. % | Feed Search % | Ground pecking | Feeding bout / sec | Standing % | Laying % | Ground pecking | Sleeping |
| White | 8-10 hr | a 64 ± 10.2 | ab 56 ± 18.6 | a 66.6 ± 16 | a 88 ± 12 | a 85 ± 15 | a 0.21 ± .04 | a 95 ± 3.4 | b 5 ± 5 | b 55 ± 11.4 | b 35 ± 8.4 |
| | 10-12 hr | bc 50 ± 19.5 | a 72 ± 17 | b 10 ± | ac 73 ± 14 | ab 66.6 ± 24 | a .19 ± | b 55 ± 13 | a 45 ± 12 | ac 80 ± 5.7 | ac 76 ± 5.1 |
| | 12-14 hr | ac 53 ± 3.3 | a 45 ± 8.6 | ab 30 ± | bc 40 ± 10 | ab 66 ± 0 | a .27 ± .053 | b 34 ± 7.4 | a 66 ± 8.3 | a 88 ± 6.0 | ac 83 ± 6.6 |
| Black | 8-10 hr | ac 62 ± 9.1 | ab 44 ± 10 | b 30 ± 4.08 | bc 46 ± 9.2 | b 46 ± 8.12 | a .212 ± 0.55 | b 50 ± 4.5 | a 50 ± 4.5 | ab 66.6 ± 7.6 | bc 85 ± 7.9 |
| | 10-12 hr | bc 35 ± 7.6 | a 26 ± 4 | b 12.5 ± 2.5 | b 23.3 ± 8.8 | b 48 ± 4.8 | a .272 ± .08 | b 54 ± 12 | a 46 ± 10 | ab 76.6 ± 13.3 | ac 68 ± 12 |
| | 12-14 hr | ac 56 ± 8.1 | a 42 ± 9.6 | b 27 ± 8.5 | bc 45 ± 11.9 | b 37.5 ± 8.5 | a .248 ± .08 | b 42 ± 12 | a 58 ± 12 | ab 75 ± 6.2 | ac 56 ± 8.4 |

Difference in subscript (a, b, c) mean significant at $p < 0.05$

S. E. Percentage of birds inducing the above activities, are measured within 5 min. observation.

Difference in subscript (a, b, c) indicate significant at $p < 0.01$.

Table (2): Mean percentage and standard errors of two groups of young goslings inducing body care activities

| Group | Observation period | Body care behaviour | | | | | | |
|-------|--------------------|---------------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|
| | | Mean + S. E. | | | | | | |
| | | Preening % | Oiling % | Scratching % | W/L stretch % | Wing flap % | Splash % | Body shake % |
| White | 8-10 hr | a 73.3 ± 3.3 | a 38 ± 3.7 | a 16.6 ± 3.3 | c 10 ± 0 | a 33.3 ± 5.5 | a 50 ± 19.5 | a 35 ± 11.9 |
| | 10-12 hr | a 71.6 ± 3.1 | ab 22 ± 9.5 | a 15 ± 5 | a 46.6 ± 6.6 | ab 20 ± 5.7 | | a 10 ± 0 |
| | 12-14 hr | a 70 ± 6.3 | b 10 | b 10 ± 0 | c 12.5 ± 2.5 | ab 24 ± 6 | b 10 ± 0 | a 20 ± 10 |
| Black | 8-10 hr | a 66.6 ± 7.1 | ab 21.5 ± 10 | a 20 ± 5.4 | bc 20 ± 0 | ab 22 ± 3.7 | b 22 ± 7.3 | a 40 ± 6.32 |
| | 10-12 hr | ab 58.3 ± 7.0 | ab 20 ± | a 16.6 ± 6.6 | b 23.3 ± 3.3 | ab 20 ± 5.7 | b 15 ± 5 | a 30 ± 14.4 |
| | 12-14 hr | a 48.3 ± 5.4 | b 12.5 ± 2.5 | a 10 ± 6 | c 12 ± 6 | b 18 ± 3.7 | b 20 ± 10 | a 24 ± 4 |

Difference in subscript (a, b, c) indicate significant at $P < 0.05$.

Percentage of birds inducing the above activities are measured within 5 min observation.

more splashed their bodies with water, sunbathing and were more playful. Wing / stretch increased during periods of rest. Observations indicate that goslings permitted

more freedom for movement that stimulating natural requirements, were given better opportunity for manifesting comfort behaviour patterns more freely. Black & Hughes (1974) and Tanaka &

Table (3): Mean percentage and standard errors of two groups of young goslings in some physiological blood parameters

| Group | Week | Mean ± S. E. | | | | | |
|-----------------|------|-------------------------|----------------|------------|--------------|------------|------------|
| | | Physiological parameter | | | | | |
| | | Rbcs million/ml | PCV % | Hb % | MCV | MCH | MCHC |
| Gr1 Open | 1 | 1.802 ± .051 | 30.6 ± 1.4 | 7.35 ± .44 | 169.4 ± 4.5 | 40.1 ± 2.8 | 26.9 ± 1.1 |
| | 2 | 1.627 ± .116 | 30.8 ± 1.1 | 7.14 ± .24 | 175.3 ± 11.6 | 41.6 ± 2.4 | 29.7 ± 1.1 |
| | 3 | 1.682 ± .104 | 38.6 ± 1.7 | 8.2 ± .53 | 176.2 ± 9.9 | 49.4 ± 3.9 | 28.7 ± 1.2 |
| | 4 | 2.003 ± .074 | 28.5 ± 0.71 32 | 9.68 ± .17 | 151.6 ± 8.9 | 50.7 ± 3.1 | 33.5 ± 1.2 |
| | 5 | 2.052 ± .071 | ± .77 | 9.35 ± .39 | 163.6 ± 6.5 | 48.8 ± 3.3 | 32.1 ± 1.2 |
| Gr2 Confined | 1 | 1.642 ± .137 | 25.6 ± .71 | 8.15 ± .24 | 14.1 ± 8.7 | 49.6 ± 4.9 | 29.2 ± 1.1 |
| | 2 | 1.897 ± .122 | 30.5 ± .84 | 7.38 ± .21 | 163.3 ± 7.4 | 38.6 ± 2.2 | 24.5 ± 1.1 |
| | 3 | 1.667 ± .179 | 30.5 ± 1.3 | 8.23 ± .29 | 165.8 ± 15.4 | 53.8 ± 8.9 | 27.4 ± 1.1 |
| | 4 | 1.877 ± .157 | 30.1 ± .79 | 8.46 ± .84 | 163.3 ± 25.3 | 53.9 ± 7.4 | 24.9 ± 1.1 |
| | 5 | 1.897 ± .109 | 29.1 ± 1.1 | 9.33 ± .23 | 156.6 ± 11.1 | 49.4 ± 4.5 | 31.6 ± 1.1 |

Significant at P < 0.05.

Rbcs = Red blood cell count
PCV = Packed cell volume
Hb = Haemoglobin

MCV = Mean corpuscular volume
MCH = Mean corpuscular haemoglobin
MCHC = Mean corpuscular haemoglobin concentration

Hurnik (1992), reported that comfort behaviours in caged birds were reduced to 14 - 19 % and the range of activities was limited than those in pens.

Physiological performance:

Results of Table (3) Rbcs (million / ml) increased in goslings kept in open with increasing the bird's age, Hb % (gm / ml) also increased with age of the birds. The same was clear with PCV %, MCV, MCH, and MCHC.

Productive performance:

From Table (4) it can be mentioned that goslings kept in the open system showed a pronounced increased in feed consumption (Kg / wk) and a marked increase in mean body weight (kg) than those kept in confinement and they also showed more feathering than the other in confinement.

II-Confined system:

Behavioural patterns:

Ingestive behaviour:

From Table (1) it can be found that most patterns of ingestive behaviour were not significantly different (P < 0.05) with the periods of observations, and slight increase were seen at 10.00 - 11.00 hrs.). Birds in confined system were more pecking at ground, searching for food compared with goslings in the open, with more space allowance, and more comfortable environment.

Resting-standing and sleeping behaviour:

From Table (1) it can be found that resting, standing and sleeping patterns were not significantly different (P < 0.01) in goslings kept in confinement with different periods of observation. From observations it can be said that goslings in confinement were not frolicking, running, playing, seeking and seeking for shelter as compared with those in the open.

Comfort behaviour:

Table (4): Total feed consumption (Kg) and the Mean body weight (Kg) of young gaslings in open and closed system of Management along 6 weeks experiment.

| Week | Group | Total Feed Consumption Kg / week | Mean body weight (Kg) |
|------|-------|----------------------------------|-----------------------|
| 1 | G1 | 6.518 | 0.554 ± 0.043 |
| | G2 | 4.138 | 0.525 ± 0.032 |
| 2 | G1 | 10.853 | 0.862 ± 0.06 |
| | G2 | 10.7.10 | 0.757 ± 0.057 |
| 3 | G1 | 14.000 | 1.245 ± 0.07 |
| | G2 | 10.150 | 1.121 ± 0.11 |
| 4 | G1 | 17.500 | 1.732 ± 0.039 |
| | G2 | 11.725 | 1.206 ± 0.108 |
| 5 | G1 | 17.500 | 1.984 ± .067 |
| | G2 | 17.500 | 1.554 ± 0.096 |
| 6 | G1 | 21.000 | 2.1191 ± 0.104 |
| | G2 | 18.550 | 1.696 ± 0.084 |

G1 = Open system group.
G2 = Confined system group.

From table (2) it can be mentioned that preening, oiling, scratching, W / L stretch, wing flap, body weight were not significantly (P < 0.05) differ by groups of observation, splashing the body with water was not so clear as with goslings in the open.

Physiological performance:

From Table (3) it can be found that most of the blood parameters were not significantly (P < 0.05) changed along weeks of observation. However, Hematocrit (million / ml), Hb %, MCHC. Slightly increased with developing age of the goslings.

Productive performance:

From Table (4) it can be mentioned that goslings kept in confinement showed less food intake, and final body weight of 1.696 (kg) while those kept in open reached a final body weight of 2.191 (kg). Goslings in confinement obtained less feathering than those in confinement.

From all of the above results it can be concluded that goslings kept in open system of management consumed more food / wk., obtained good feathering, higher body weight were more active, more exploring, and performing most of their ingestive resting, running, sleeping, playing and more comfortable than those kept in confinement. The goslings in open system followed a natural daily ethogram and were timed by nature than those prevented from the environmental elements which evoking their emotionality to adjust and satisfy their behavioural needs. Results agree with that of Moreng et al. (1961). McBride (1968), Balton et al. (1972), Weaver et al. (1982) and Gill & Leighton (1989). Black & Hughes (1974), Tanaka and Hurnik (1992) who concluded that the restricted movement and crowding may have a detrimental effect of bird growth, their ability to satisfy their ethological needs and performance.

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