

THE EFFECT OF FEEDING AND LIGHTING REGIMENS ON SOME BEHAVIOURAL PATTERNS AND PERFORMANCE OF BROILER CHICKS

BY

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SUMMARY

This study was carried out to investigate the effect of feeding and lighting regimens on behaviour and performance of broiler chicks. One hundred and fifty Arbor acres were used and divided into 3 equal groups, each of 50 chicks. The 1st group (G.1) received a continuous lighting and ad-libitum feeding acts as control, the 2nd group (G. 2) permitted ad-libitum feeding with only day-light while the 3rd group (G. 3) received a continuous lighting with intermittent feeding (three time daily, each of 2 hours). The results obtained indicated that, there was a significant ($P < 0.05$) increase in the food-searching behaviours as feeding frequency, feed bout, and ground pecking by birds with intermittent feeding (G.3), while there was no effect of light regimen on these patterns. There was no significant difference in the final body weight gain between groups although birds in groups 2 & 3 consumed significantly ($P < 0.05$) less food (3629.6, 3405.0 and 3420.0 g) and convert their feed more efficient (0.412, 0.423, and 0.421) than those in control group. Regarding the rest and comfort behaviours, there was no significant effect of feeding or lighting regimens except the resting and ground scratch % were significantly ($P < 0.05$) higher in group 3 than other groups. There were no significant effect of both treatments on agonistic behaviours except on fight and feather pecking patterns as their occurrences were higher between birds in group 3 than in the other two groups (1 & 2).

INTRODUCTION

There are many in which Ethology can help with

the welfare of animals. Studies of the behaviour have been helpful in clarifying the importance in the lives of modern farm animals, of such environmental factors as regular feeding and lighting regimes, and the rhythmus of other activities as sleeping and breeding.

Food restriction in poultry has been studied comprehensively (Bierer et al., 1965; Nir et al., 1987; Bower et al., 1988 and Lilburg and Nestor, 1993), and is now an accepted procedure in commercial practice for improving biological and economic performance. However, there appears to be no detailed information in the literature regarding the effect of food restriction in fowls may have on the behavioural patterns.

Routine husbandry procedures may result in stress response, when feed intake is restricted, animals may not fully satisfy their basic physiological and behavioural needs, thus feed deprivation may cause a stress response (Pinchasov, 1993) and influences aggressive and resting behaviour (Mench, 1988). It is generally accepted that deprivation of food and water causes an increase in general activity of birds (Donkoh et al., 1989 and Zulkifli et al., 1993), but the effect of an specific behavioural patterns is unknown. However, Simonsen (1979) and Preston (1988) found that birds given restricted access (RA) to food spent more time sitting and cage pecking while unable to feed than those feeding ad-libitum (AL) during the same period. Linda B. Murrphy and Preston (1988) found an increased feed-searching activity during feed withdrawal while Nir et al. (1987) found that less agonistic pecking and the length of bouts of drinking were reduced during a period of food deprivation compared with the ad-libitum.

Increased light pattern is beneficial in broiler flocks in reducing over all mortality and improving feed efficiency, with no reduction in body weight at marketing age (Proudfoot et al., 1979; Lewis and Perry, 1990; Classen et al., 1991 and Blair et al., 1993). However, continuous light may be against poultry welfare. The present work aimed to investigate the effect of continuous light, combined with ad-libitum or intermittent feeding and exposure to day light only on broiler performance.

MATERIAL AND METHODS

1- BIRDS, HOUSING AND MANAGEMENT:

One hundred and fifty, ten days old broiler chicks (Arbor Acres) obtained from El-Salam Company for Broiler Production were used in the current study for five consecutive weeks started from the 5th of July to the 10th of August, 1993 in a broiler house belonging to the Department of Hygiene and Animal Ethology, Faculty of Veterinary Medicine, Cairo University.

Birds were randomly divided into 3 equal groups, each of 50 birds, and were kept on a deep litter floor pen from wheat straw (Tibn), of 10 cm thickness with a stocking density of 10 chicks /square meter. Birds in all groups were fed on a commercial balanced ration obtained from the Factories of El-Salam Company for Broiler Production and were allocated into 3 adjacent pens.

Birds used in this study were vaccinated against Newcastle disease at one day old using eye drop vaccine and at 18th and 23th days of age with Lasota strain vaccine. Vaccination against Gumboro disease was also conducted at 14th day of age.

2- EXPERIMENTAL DESIGN:

Birds used in this study were subjected to three factorial treatments as they were divided into 3 equal groups, each of 50 chicks. The first group (G.1) was allowed ad-libitum (AL) access to food with continuous lighting (CL) throughout 24 hours and acts as control group, the second group of birds (G.2) were given restricted (FA) access to

food with continuous lighting (CL) throughout 24 hours as the food was offered to birds 3 times per day, each of 2 hours length (feed was given to birds from 08.00 to 10.00, 12.00 - 14.00 and 16.00 - 18.00 hr.); While the third group of birds (G.3) had received ad-libitum (AL) access to food with only the day-lighting and night darkness program.

3- OBSERVATION AND DATA RECORDING:

The observer entered the broiler house and moved slowly to a seated position and a sitting period of 5 minutes was allowed before observation began to let birds be familiar with the observer and showed no obvious signs of disturbance that may affect some behavioural patterns.

Observation and recording of the behavioural patterns and activities studied were made for 4 successive days / week in two observational sessions of 15 minutes for each group in average per the daily hours at 08.00 - 10.00 and at 13.00- 15.00 hrs., respectively according to Savory (1974 and 1976).

For each group, ingestive behaviour (including feeding frequency, drinking frequency, feed bowl and ground pecking), resting and sleeping behaviours, behaviours of comfort as well as agonistic encounters were observed and recorded according to Savory (1974) and Nir et al., (1987). Feed consumption throughout the experimental period (5 weeks), feed efficiency utilization as well as the final body weight and body weight gain were estimated for each group separately.

The obtained data were subjected to analysis of variance (ANOVA) according to Snedecor and Cochran (1967). The results of the experiment were presented in tables (1 and 2).

RESULTS

Effect of feeding and lighting

Table (1): Effect of feeding and lighting regimens on ingestive behaviour, final body weight and food consumption as well as feed efficiency utilization in broiler chicks.

Group Parameter	Group 1 (G.1) M ± SE	Group 2 (G.2) M ± SE	Group 3 (G.3) M ± SE	LSD
Ingestive behaviours				
Feeding frequency	0.88 ± 0.07	1.72 ± 0.07	1.75 ± 0.12	0.35*
Drinking frequency	0.88 ± 0.08	0.93 ± 0.095	0.94 ± 0.095	NS
Feed bout (second)	86.50 ± 8.95	88.00 ± 9.20	147.0 ± 15.2	50.50*
Ground pecking %	2.38 ± 0.21	4.98 ± 0.25	19.0 ± 0.25	14.10*
Final body weight gain (gm)	1495.0 ± 18.2	1441.0 ± 12.8	1410.0 ± 13.7	NS
Total feed intake (g)	3629.6 ± 22.83	3405.0 ± 19.78	3420.0 ± 12.81	101.5*
Feed efficiency (g/g)	0.412 ± 0.07	0.423 ± 0.09	0.412 ± 0.05	0.038*

* = There was a significant difference between groups at P < 0.05.
 G1 = Ad-libitum feeding with continuous lighting.
 G2 = Ad-libitum feeding with only day-lighting.
 G3 = Intermittent feeding with continuous lighting.

Table (2): Effect of feeding and lighting regimens on rest, sleep, comfort behaviours and activities as well as agonistic behaviour of broiler chickens.

Group Parameter	Group 1 (G.1) M ± SE	Group 2 (G.2) M ± SE	Group 3 (G.3) M ± SE	LSD
Resting (%)	19.5 ± 3.01	21.95 ± 5.4	41.39 ± 6.2	20.92*
Sleep (%)	31.62 ± 5.9	31.58 ± 6.7	40.73 ± 7.2	NS
Sleep bout (sec.)	99.00 ± 10.1	101.00 ± 12.4	120.45 ± 14.3	NS
Preening (%)	19.56 ± 4.5	18.45 ± 3.4	30.78 ± 4.2	NS
Wing/Leg stretch %	15.63 ± 2.1	5.00 ± 1.7	12.25 ± 3.8	NS
Ground scratch (%)	9.85 ± 2.4	6.47 ± 2.7	5.00 ± 1.8	3.5*
Fighting (%)	2.48 ± 0.05	3.13 ± 0.67	6.63 ± 0.67	2.5*
Flight (%)	3.00 ± 0.25	5.13 ± 0.57	3.75 ± 0.49	NS
Feather pecking (%)	3.75 ± 0.73	3.88 ± 0.62	8.98 ± 0.60	3.75*
Peck avoidance (%)	4.00 ± 0.70	2.05 ± 0.40	3.28 ± 0.60	NS

* = There was a significant difference between groups at P < 0.05.
 G1 = Ad-libitum feeding with continuous lighting.
 G2 = Ad-libitum feeding with only day-lighting.
 G3 = Intermittent feeding with continuous lighting.

DISCUSSION

1-INGESTIVE BEHAVIOUR AND PERFORMANCE:

Regarding the ingestive behavioural patterns, table (1) indicates that, there was a significant difference ($P < 0.05$) between groups in feeding frequency, feed bout (second), and ground pecking as chicks in groups 2 and 3 ate more frequently than those in control group (G.1) while birds in group 3 spent more time feeding and pecked the ground more than those kept in groups 1 and 2. At the same time, there was no significant difference between groups in the drinking frequency pattern. The significant increase in feeding frequency, time spent feeding (feed bout) and ground pecking by birds which received intermittent feeding or day-light is to compensate the time of feed withdrawal and to satisfy their needs of food. These findings agree with Preston (1987) and Linda B. Murrphy and Preston (1988).

From table (1) also it can be noticed that, there was no significant difference between groups in final body weight gain (1564.4, 1441.0 and 1352.0 g for groups 1,2, and 3, respectively). Although birds in groups 2 and 3 consumed significantly ($P < 0.05$) less food than those in control group (G.1). At the same time birds in group 1 and 2 convert their food significantly ($P < 0.05$) more efficient than those in group 3 which received continuous lighting and intermittent feeding. The high feed efficiency in birds received the day-light only (G.2) may be attributed to the less energy expenditure during the inactive period at night (Darkness period) and this energy was directed to increase the body weight gain. These results agree to some extent with that recorded by Whitehead et al., (1987) and Ruth C. Newberry (1993).

2- REST AND COMFORT BEHAVIOURS:

In respect to the rest and sleep behaviours, table (2) indicates that there was only a significant difference in resting % as the occurrence of this pattern was significantly ($P < 0.05$) high between birds in group 3 than those kept in groups 1 and 2; While there were no significant differences

between groups in sleeping % and sleep bout. The increased percentage of rest in group 3 (with intermittent feeding) was observed at the period of feed withdrawal.

On the other hand, there was no significant effect of intermittent feeding or lighting pattern on comfort behaviour and except in ground scratching behaviour as the occurrence of this pattern was significantly ($P < 0.05$) higher in control group than in other two experimental groups. This result agree with that observed by Simonsen (1979); Classen et al., (1991) and Pinchasov (1993).

3- Agonistic behaviours:

Regarding to the agonistic behaviours, there was only a significant ($P < 0.05$) increase in fighting and feather pecking behaviours between birds in group 3 than the other groups (1 & 2) and this may be attributed to the aggregation and competition of birds around feeding troughes at the time of feeding. These results agree to some extents with that recorded by Masic et al., (1974) and Mench (1988).

On conclusion, there was no significant differences in body gain between the different feeding and lighting regimens used in this study. However, borilers get rest and sleeping in the group fed ad-libitum under day light regimen.

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