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EFFECT OF IODINE-TREATED WATER ON THE PERFORMANCE AND SOME BEHAVIOURAL PATTERNS OF MEAT-STRAIN CHICKS

BY

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SUMMARY

Some behavioural patterns (ingestive, body care and comfort) as well as the performance of meat-strain chicks which received iodine treated water for 49 days were investigated.

One hundred fifty one-day-old Arbor Acres chicks which were divided into three equal groups (I, II and III) each of 50 chicks were used. Chicks of group (I) which recived water treated with 10 ppm active iodine showed good ingestive behaviour represented by high feeding (42.4 %), drinking (38.8%) and the length of feeding time elapsed (82.8 second / bird), and consequently a high body weight gain (1634.0 g) and feed efficiency (0.443). At the same time, a marked increase in a comfort, resting, sleeping and body preening behaviours were observed in comparison with chicks in group (II) that received water treated with 25 ppm active iodine which showed the least marked increase in body weight gain (141.0 g) and feed eficiency (0.387), while birds in control group (III) which received non-iodine treated water showed a high feeding (40.8%), ground pecking (18.2%), sleeping (22.1%) and body preening (32.5%) with consequently a moderate in feeding efficiency utilization (0.418).

Iodine treated water increase the concentration of haemoglobin and erythrocytic count, without a significant difference observed between the three groups.

In conclusion, the addition of iodine in drinking water (10 ppm) can significantly affect and improve the behaviour of maintenance, and act as a good growth promoting factor represented by increase in both body weight gain and feed efficiency.

INTRODUCTION

The meat chicken environment allows each bird behavioural freedom and the potential for large-scale movement and social interactions with thousandas of other birds. However, little is known of how meat chickens utilize their environment. Such information is of economic importance as patterns of feeding and drinking behaviours and the amount of activity and rest will influence growth and efficiency of food utilization (Meltzer, 1983).

It is well documented that iodine is an essential nutrient in poultry diets. Kruger et al., (1981) and stanley et al. (1984) reported inproved growth in egg-type pullets and broiler chickens, using low levels of supplemented iodine in the drinking water. Meanwhile, iodine was considered as one of the most practicable water disinfectant and widely used against a variety of poultry pathogens (Micheal and Roger, 1959 and Gershenfeld, 1977).

Although many reports were published on the use of iodine as a growth stimulant to increase body weight in chicks (Dhillon et al., 1982 and El-Agrab, 1991), yet no attempts have been made to examine their action on the behavioural response and blood parameters of broiler chicks.

The purpose of the present work was to assess the

effects of iodine treated water on the behaviour of maintenance represented by ingestive behaviour, comfort and body care behaviour, in addition to some haematological aspects and performance in meat-strain chicks (broilers).

MATERIAL AND METHODS

One hundred and fifty white "Arbor Acres" one-day- old chicks obtained from El-Salam Poultry Company, were reared under the standard of hygienic conditions in Department of Hygiene and Animal Ethology, Faculty fo Veterinary Medicine, Cairo University.

The chicks were housed in a clean well-ventillated built up litter. The floor of the house was bedded by fresh clean wheat straw "Tibn" forming a deep litter of 10 cm depth which had been turned up weekly. The house was provided with gas heaters to adjust the environmental temperature according to the age of birds. The maximum and minimum ambient temperature recorded during the experimental period were 34°C and 25°C, respectively. Relative humidity inside the house ranged between 60 ad 80%. The birds were vaccinated against Newcastle disease (Hitchner B1) and Gumboro disease in drinking water at 7 and 12 days old, respectively. The chicks were raised together for 2 weeks, then were randomly divided into three groups (I, II and III). At 3rd week of age, the water supply of two groups (I and II) was treated with iodophore compound (Crown-Chemical Company Limited-Ambrehurst Kent).

Birds in both groups I and II received iodophore treated water contained 10 and 25 ppm active iodine respectively, for drinking while group III, the control received non-iodine treated water. The birds were fed ad-libitum on commercial ration, the commerical starter ration given to chicks from one-day-old till 21 days, then grower till the age of 35 days, afterthat, the finisher ration was used till the end of the experimental period (49 days). The amount of food consumed for each group was recorded and the feed intake per birds in grams was calculated.

Regarding to the increase in body weight, ten chicks were randomly selected & identified from each group and were weighed weekly till the [illegible] of the experimental period. The mean [illegible] efficiency was calculated as the ratio between daily feed consumption and daily weight gain [illegible] each group (Abasiekong, 1988).

At the 14th day old, blood samples were taken weekly from the identified chicks via a brachial vein puncture. Blood was collected in sterile dry centrifuge tubes erythrocytic count, packed cell volume by a microhaematocrit procedure and the determination of haemglobin levels by the cyanomethemoglobin method (Sunderman et al., 1953).

BEHAVIOURAL OBSERVATION

In order to register the behavioural patterns of each of the tested groups, each group was watched twice daily for a total of 30 minutes at a randomly determined time at 9 a. m. to 2 p.m. for 3 days per week. Some behavioural patterns were measured according to percentage of action (%) and others were recorded as length of time elapsed per unit in seconds (Dawson and Siegel, 1966). The following behavioural patterns were recorded.

1- Ingestive behaviour

Ingestive behaviour concerned with selection and consumption of food and water including feeding (%), feeding bouts (second / bird), drinking (%) and ground pecking (%).

2- Comfort and body care behaviours:

Which include resting (%), sleeping (%), head and foot preening (%) and body shaking (%).

All data were examined by analysis of variance using the multiple range test to compare treatment means (Steel and Torrie, 1980). All statements of significant differences imploy a probability of 0.05.

RESULTS

Table (1): Effect of iodine treated water on ingestive behaviour and performance in meat-strain chicks.

Parameter \ Group	Iodine treated water		untreated water
	10 ppm I	25 ppm II	Control III
Ingestive behaviour			
Feeding (% of bird)	42.4 ± 5.4^{a}	35.2 ± 7.5^{b}	40.8 ± 3.4^{a}
Drinking (% of bird)	38.8 ± 11.8^{a}	21.8 ± 5.9^{b}	22.0 ± 2.7^{b}
Length of feeding time (Sec./bird)	82.8 ±8.1^{b}	92.5 ± 11.9^{a}	74.2 ± 5.6^{b}
Ground pecking (%)	8.8 ± 2.7^{c}	14.7 ± 4.9^{b}	18.2 ± 4.1^{a}
Food intake (g/bird)**	3690.0	3645.0	3710.0
Body weight gain (g)***	1634 ± 77.9^{a}	1410.0 ± 85.0^{c}	1552.0 ± 45.2^{b}
Feed efficiency Gain/food intake (g/g)	0.443 ± 0.005^{a}	0.387 ± 0.003^{c}	0.418 ± 0.004^{b}

Means ± SE within eahc raw bearing different superscripts differ significantly at P<0.05.

* Ingestive behaviour was measured at 14 days of age until the end of the experiment (49 days old).

** Food intake (g) per bird throughout the experimental period (49 days).

*** Body weight gain (g) at the end of the experiment.

Table (2): Influence of iodine-treated water on comfort behaviour and haematological parameters in meat-strain chicks.

Parameter \ Group	Iodine treated water		untreated water
	10 ppm I	25 ppm II	Control III
Resting (% of bird)	50.9 ± 9.8^{a}	48.8 ± 5.8^{a}	35.2 + 5.7^{b}
Sleeping (% of bird)	22.5 ± 4.7^{a}	19.2 ± 5.7^{a}	22.1 ± 5.1^{a}
Body preening (%)	29.2 ± 8.1^{ab}	27.2 ± 5.7^{b}	32.5 ± 9.2^{a}
Foot preening (%)	2.5 ± 1.1^{b}	4.2 ± 2.0^{a}	2.8 ± 1.7^{b}
Body shaking (%)	5.8 ± 2.3^{b}	6.3 ± 2.0^{ab}	7.5 ± 3.1^{a}
Erythrocytes (x 10^{6}/ul)	2.84 ±0.07^{a}	2.97 ± 0.05^{a}	2.81 ± 0.06^{a}
Heamoglobin (g/dl)	9.10 ±0.20^{a}	9.48 ± 0.23^{a}	9.11 ± 0.20^{a}
Packed cell volume (%)	27.90 ± 0.71^{a}	29.30 ± 0.63^{a}	27.35 ± 0.53^{a}

Means ± SE within each raw bearing different superscripts differ significantly at P < 0.05.

DISCUSSION

The influence of iodine-treated water on the ingestive behaviour and performance of meat-strain chicks was summerized on the Table (1). Ingestive behaviour, concerned with selection and consumption of food and water. Behaviour was characterized by frequent changes amongest the different groups. It could be noticed that, there was no significant difference in the feeding percentage in both groups (I and III) while a clear significant difference between these groups and the other group (II) that received a 25 ppm iodine in drinking water. At the same time the chicks in group (I) that received a 10 ppm iodine, shows an increase in drinking (38.8%) when compared with control III (22.0%) and group II (21.8%).

On the other hand, iodine play an important role in the increase of time spent feeding, it was in group I (82.8 sec.) and 92.5 second in group II while in the control one (I) reached 74.2 second/bird during the observation peroid. In contrast, ground pecking% in the control group (18.2%) was higher than in the other iodine treated water groups I (8.8 %) and II (14.7%).

It can be noticed that, iodine in drinking water in a level of 10 ppm play an important role in growth stimulation as it increases the body weight in chicks as previously mentioned by Dhillon et al., (1983) and El-Agrab (1991). The highest body weight gain recorded in experiment was recorded in chicks received 10 ppm iodine in drinking water, group I (1634.0 g) while the control group III (1552.0 g) and II (1410.0 g). In the same time the highest value of feed efficinecy was recorded in group I (0.443) followed by 0.418 in group III and the lower one (0.387) in the group II.

Miller et al., (1975) suggested that the added iodine in the drinking water have an effect on the endocrine system, particularly the thyroid gland. A second possibility is an alternation of the microflora of the gut, thus increasing the availability of the nutrients to the bird. Murphy and Preston (1988) mentioned that altered feeding or drinking behaviour may be important for performance if they affect competition between birds or overall energy expenditure.

Table (2) presents the combined results f comfort, body care behaviours and erythrocyte haemoglobin and packed cell volume meat-strain chicks under influence of iodin treated water (groups I and II) and untreate group (III). It is clear that, birds on both groups and II showed a marked increase in restin behaviour (50.9 and 48.8%, respectively) whe compared with the control one (35.2%). N significant differences in sleeping were found between the groups. In the aspect of preening, it is noticed that body preening in group II (27.2 %) was lower than both groups I (4.2%) and III (32.5%), while the foot preening was highly in group II (4.2%) than other groups I (2.5%) and III (2.8 %). Body shaking was observed and occurrence was high in group III (7.3%) than others. I (5.8%) and II (6.3%). Regarding to the influence of iodinized water on blood parameters it can be noticed that there was no significant differences between the groups except slightly increase of these parameters than the control group. The high level of iodine (group II) showed a high RBCs (2.97 x 10^6 / µl) than the low iodine level group I (2.84 x 10^6 / µl) and control group (2.81 x 10^6 / µl) . The haemoglobin concentration in both groups I (9.10 g/dl) and II (9.48 g / dl) while in control group III (9.11 g / dl). Packed cell volume was clearly related with both total erythrocyte and haemoglobin concentrations. sturkie (1965) stated that the number of erythrocytes and corpuscular volume are influenced by age, sex hormone, hypoxia and other factors, also androgen and cortical hormone increase erythropioesis.

In conclusion, it is worth while noting that the addition of iodine of low level in drinking water can significantly affect and improved the behaviour of maintenace, as well as ingestive comfort and body care behaviour in one aspect and improved the blood constituent represented by erythrocytic count and hemoglobin level on the other one. The good internal haematosis will be reflect on good growth as well as high body weight gain and feed efficiency in the meat-strain chicks.

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