

The efficacy of Feeders colors on ingestive behavior, welfare and some blood parameters of quails

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ABSTRACT: *This work was done to determine the effect of different colors of feeders on ingestive behavior, welfare and some blood parameters of quails. A total of 210 quail chicks (Coturnix coturnix japonica), one day old, which rearing with us till the age of 7 days then it randomly distributed into five treatments 42 quails in each (14 birds x 3 replicates) as control or commercial type (white), red, blue, yellow and green feeders. The results showed that, blue, green and yellow feeders colors groups cause an increase in overall ingestive behavior (feeding and drinking), good welfare parameter (lower tonic immobility duration, tonic immobility induction) and less cortisol level while, red feeder group had a longer tonic immobility duration more tonic immobility induction numbers and more cortisol level (bad welfare parameters). So, we concluded that using different feeders color (blue, green yellow) may be enhanced ingestive behavior without negatively effect on blood parameters or quails welfare.*

KEYWORDS: Feeder colors, behavior, quails and welfare

1. Introduction

Quails are reared for dual purposes, egg and meat production. Coturnix is widely distributed in Europe, Africa and Asia. Nowadays quail become widely distributed in Egypt and is kept for meat production since it had palatable meat [1], Birds have different cones (red, green, blue, and ultraviolet) which help it to visually differentiate colors [2]. On the other side, previous work reported that colors had significant effects on all kinds of behavior as eating, drinking and the highest frequency of walking found in blue, green and red light groups respectively, While, birds show more calmness (more sleep, sitting) behavior when it reared in blue color condition [3].

2. Materials and methods:

Ethical approve

This research was done in research lab in veterinary medicine faculty new valley university under number (04-2023-200247) from medical ethics committee, Assiut University.

2.1. Birds and management

A total of two hundred and ten one day old non-sexed Japanese quail chicks were used in this study. Divided into

5 equal groups (3 replicates x 14 bird) as the following control one [the feeder color was the commercial feeder color (red and white), and 4 groups according to feeder color as Red, Green, Blue and Yellow group (Fig. 1) Birds reared in multi decked batteries. Each one is about (90 x 50 x 30 cm.) area per group the management process is carried out according to the recommendations of [4]. Lighting cycle was 23 hours and 1 hour of darkness was used. The temperature was set initially at 37°C and gradually reduced at a rate of 3°C/week [5]. 24 % Cp and 2.8 Mcal ME / Kg diet were used [6]. The birds were fed and drinking ad-libitum on the mash diet and had free access to fresh and clean water during the period of the experiment.

2.2. Measured parameters:

2.2.1. Behavioral observations:

The Behavioral observation was started when birds were 7 days old and extended up to 42 days old. The behaviors of the experimented quails were recorded, observed and analyzed according to the recommendations of [7]. Birds were observed three times/day as the following: 1- At early morning 7.0 – 8.0 am, 2- Late morning 11.0 -12.0 pm, 3- in late afternoon 3.0 – 4.0 pm. The recorded behavior was analyzed according to [1] as 1- Ingestive behavior: A- Feeding: quail peck at the feed in the feed trough (number

of bouts /bird/recorded hour). B-Drinking: quails obtaining water at the drinkers (number of bouts/bird/recorded hour) the obtained number was divided by the total behavior number to get the proportion of activity.

2.3. Bird welfare:

2.3.1. Tonic immobility test:

The TI test was done according to the method of [5, 8] and obtained TI Induction number mean numbers of trails to backing quails and not moved away until 10 seconds. While, TI duration, Means the time needed by backed bird to adjust itself in seconds

2.4. Blood parameters:

Blood parameters levels were calculated according previous work to [9]. At the end of the experiment (42 days), 6 birds from each treatment were randomly weighed and slaughtered. During the bird's exsanguinate 2-3 cm³ blood samples from each quail were collected in a test tube with or without anti-coagulant which take steps as kept at room temperature (30 minutes), then stored at a refrigerator (60 minutes) after that, centrifuged at 3000 r.p.m(10 minutes) and finally transferred to another Epindoorf's tube and stored at -20 °C, until analysis. Total proteins, albumin, inorganic phosphorus and calcium and cortisol were determined.

2.5. Statistical analysis:

All data were analyzed using SPSS 11.0 statistical software (Spss, Inc, Chicago, IL,2001) [10] by one way analysis of variances (ANOVA) followed by LSD TEST. The obtained results were showed as the mean ± SE.

3. Result

3.1. Quail behavior:



Figure 1: Feeders color

Table 1: Effect of different feeders colors on ingestive behavior of quail

Group	Control	Yellow	Red	Blue	Green
item	Ingestive behavior proportion				
	1) Feeding behavior				
2 nd week	0.24 ± 0.005 ^{ab}	0.24 0 ± .018 ^b	0.220 ± .037 ^b	0.220 ± .004 ^b	0.310 ± .027 ^a
3 th week	0.240 ± .023	0.330 ± .054	0.260 ± .053	0.280 ± .039	0.270 ± .011
4 th week	0.180 ± .032	0.150 ± .024	0.180 ± .036	0.150 ± .007	0.190 ± .049
5 th week	0.090 ± .019 ^b	0.130 ± .020 ^{ab}	0.100 ± .011 ^b	0.110 ± .006 ^{ab}	0.170 ± .031 ^a
6 th week	0.030 ± .026 ^b	0.070 ± .036 ^b	0.050 ± .000 ^b	0.67 ± 333 ^a	0.050 ± .025 ^b
Over all	0.160 ± .021	0.180 ± .030	0.20 0 ± .027	0.290 ± .078	0.200 ± .14
	2) Drinking water				
2 nd week	0.080 ± .012	0.080 ± .015	0.110 ± .009	0.110 ± .018	0.080 ± .010
4 th week	0.070 ± .005 ^b	0.120 ± .009 ^a	0.070 ± .005 ^b	0.050 ± .004 ^b	0.070 ± .004 ^b
5 th week	0.07 ± 0.010 ^{ab}	0.080 ± .010 ^{ab}	0.090 ± .011 ^a	0.070 ± .002 ^{ab}	0.050 ± .012 ^b
6 th week	0.000 ± .000	0.110 ± .074	0.050 ± .024	0.080 ± .000	0.050 ± .026
Over all	0.060 ± .008	0.100 ± .024	0.080 ± .06	0.080 ± .007	0.200 ± .015

Means S ± EM in each column with no common superscript letter differ significantly (p < 0.05).

Table 2: Effect of different feeders colors on blood parameters

Group	Control	Yellow	Red	Blue	Green
item					
Protein (g/dL)	5.28 0 ± .13 ^a	4.380 ± .19 ^b	4.450 ± .26 ^b	4.370 ± .28 ^b	5.300 ± .34 ^a
Albumin (g/dL)	2.030 ± .08	1.840 ± .08	1.920 ± .10	2.000 ± .17	2.060 ± .20
Globulin	3.250 ± .13 ^a	2.550 ± .20 ^b	2.530 ± .20 ^b	2.370 ± .18 ^b	3.240 ± .20 ^a
A/G ratio	0.630 ± .04 ^b	0.740 ± .06 ^{ab}	0.780 ± .08 ^{ab}	0.860 ± .07 ^a	0.64 ± 0.05 ^b
Calcium (mg/dL)	11.210 ± .51	11.010 ± .58	9.850 ± .57	9.920 ± .19	10.350 ± .49
Phosphorus (mg/dL)	18.700 ± .93 ^{ab}	15.411 ± .17 ^b	15.231 ± .01 ^b	21.572 ± .85 ^a	18.551 ± .04 ^{ab}
Ca /Ph ratio	0.600 ± .04 ^{ab}	0.750 ± .11 ^a	0.660 ± .06 ^{ab}	0.500 ± .07 ^b	0.560 ± .03 ^{ab}

Means S ± EM in each column with no common superscript letter differ significantly (p < 0.05).

The data tabulated in Table 1 claimed that, there was an increase between treated groups (blue, red and yellow) with control group (white feeders) in overall weeks (2-6 weeks) in feeding or drinking behavior. Besides that, there were non-significant differences between treated groups (blue, red and yellow) with control group (white feeders) in the feeding or drinking behavior at the 2nd, 3rd and 5th weeks. While feeding behavior was increase in green feeder at the 2nd and 5th weeks and in the blue feeders group at 6th week. Drinking behavior had a significant increase in quails fed in yellow feeder color in 4th weeks.

3.2. Quail welfare

3.2.1. Tonic Immobility Test:

Data presented in Figs. 2 and 3 showed that the red color had the longest tonic immobility duration and highest tonic immobility induction number plus higher cortisol levels on the other side, green, red, blue and yellow feeder color groups had a significant decrease effect on tonic immobility duration, tonic immobility induction number and cortisol levels in comparison with control one.

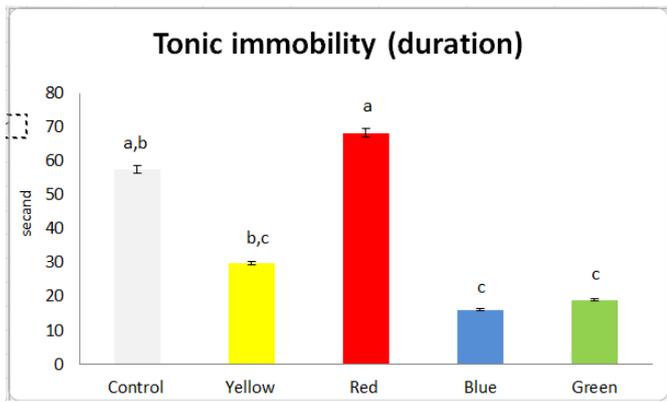


Figure 2: Effect of different feeders colors on tonic immobility duration of quail

3.3. Cortisol level:

Fig. 4 mentioned that the red and control feeder color had the highest cortisol level in comparison with the green, blue and yellow feeders colors.

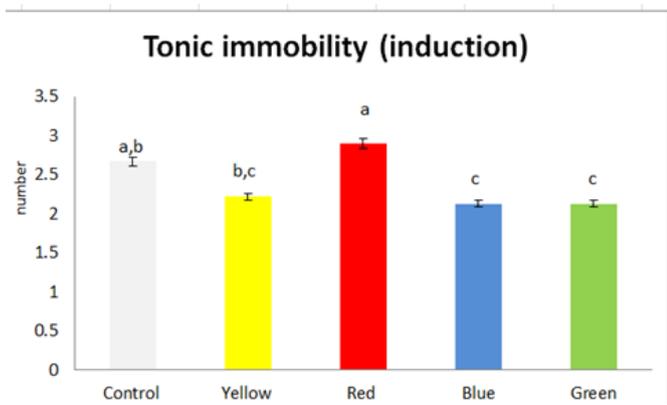


Figure 3: Effect of different feeders colors on tonic immobility induction of quail

3.4. Blood parameters:

Data presented in Table 2 indicated that blue, red and yellow feeders groups had a decreased level of total protein. While, globulin level was increased significantly in compared with control (white) feeder, There was a non-significant difference in protein level between control group and green color feeder group. On the other side, A non-significant differences of calcium level among the control group and others groups were recorded.

4. Discussion

4.1. Quail behavior:

Overall obtained data was in agreement with previous findings of [11, 12, 3] who found an increased in feeding

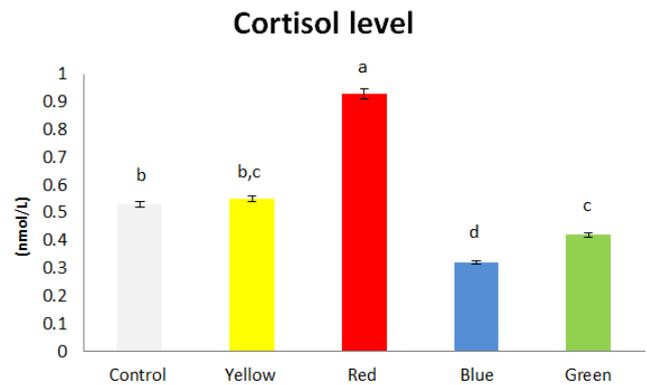


Figure 4: Effect of different feeders colors on cortisol level ((nmol/L) of quail

behavior in (bright red ; (yellow and red) and blue light respectively. While, the non-significant obtained data in 2nd,3rd and 5th weeks was in the same line with previous findings of [13] and [14], it may be due to green light-stimulated feed intake [11, 4] which reflected in increase the drinking behavior

4.2. Quail welfare

he ability to facing stressors may be affected by light exposure [15]. Our data of the blue, yellow and control feeder color was in agreement with previous work of [11] who said that, shorter duration of TI in broiler reared under blue and green light while [16] reported that, the white light group had the longer duration of tonic immobility test in comparison with other groups. This finding may be due to the efficacy of light color on brain organization which reflected in the behavioral responses, including fear behavior [16]. On the other side, the higher cortisol level in the red group was agreed with previous findings of [17] who reported that birds reared in red light showed an elevation in serum corticosterone level. Concern with the level of cortisol, high level found in the control group in consistence with [12] who said that, quail reared under white light color had the highest stress effect. The higher cortisol level in the red or control feeder color may be due to birds reared in red or white light group were show more active, (high walking activity in the white light group) and more aggression conflict in red light one [11, 18]. Finally, the lower level of cortisol in green or blue feeder may be due to the dimness of blue and green light which give

calmness to birds reared under them [19, 4, 20, 21] stated that blue light treatment had lower stress response which may be due to decrease in serum interleukin-1 level

4.3. Blood parameters:

The non-significant difference between control group and other groups in protein or calcium level was agreed with previous finding of [22, 6] The significant decrease in globulin level in the red feeders color may be due to lower level of feeding behavior and more aggressive one as stress factor.

Conclusion

Green, blue and yellow color feeders can be used in quail rearing period without any harmful effect on ingestive or welfare parameters in contrast red color feeder may lead to a bad effect on the quail's welfare parameters.

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Conflict of interest

“The author(s) declare(s) that there is no conflict of interest”

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