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GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILERS AS AFFECTED BY FEED COLOR

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SUMMARY

A total number of 120- one day old chicks were randomly assigned into four equal groups to investigate the effect of feed color on their growth performance and carcass characteristics. The first group was fed non color feed and considered as a control group (C). While, second, third and fourth treatment groups (T1, T2 and T3) were fed green, orange or red feed, respectively. The obtained results showed that feeding colored diets had significant positive effect on body weight, body weight gain, feed consumption and feed conversation throughout the experimental period. Also, there were significant differences in carcass color, dressed carcass percentages, carcass cut-up parts (breast and drum percentages) or muscles (breast), gizzard, carcass deep (cm) and abdominal fat percentages. However, no significant differences (P>0.05) existed in most giblets (heart and liver percentages) and thigh percentages. It could be concluded, that birds fed orange feed had the best performance. Consequently, feed color for broiler chicks should be in orange color.

Keywords: Broiler, feed color, growth performance, carcass traits

INTRODUCTION

The broiler industry is constantly searching for ways to improve its product and quality in order to meet the demands of the increasingly discriminating consuming public. Numerous references exist on increasing poultry meat yields and improving carcass quality. For this reason, many manipulations have been used in broiler feeds in recent years. It is reported that additional benefits can be gained by coloring broiler diets as an attraction for feed consumption. Manipulation of feed for improving feed consumption and health of broilers and the possible application of coloring of feed to birds is still at challenging stage. Early nutrition plays a vital role in early life and productivity of broilers (Knight and Dibner, 1998; Henderson *et al. (*2008). Feeding strategy in growing broiler chickens should be considered to produce birds with maximum lean body mass, best feed conversion ratio and maximum body weight. Delayed feeding was found to be the main factor affecting growth in broiler chicken (Pinchasov, 1991).The importance of early feeding of newly hatched chicks on their performance was adequately demonstrated by several studies (Juul-Madsen *et al*., 2004**;** Farghly and Glaal 2016; Farghly *et al.,* 2016a&2017; Farghly 2017 and Farghly and Mahrose 2017).

During first week of broiler's life, maximum growth (approximately 20% of total) occurs (Noy and Sklan, 2001). Nowadays, interest in early nutrition research has increased due to the strong correlation between 7d old weight and final weight. During chicks early age, the development of the digestive system is much faster than the rest of the body. The length and weight of the proventriculus, gizzard, liver, pancreas, and intestine (duodenum, jejunum, ileum) significantly increase in the first week of life (Nitsan *et al.,* 1991a). Early in life, digestion and absorption of nutrients early in life depends primarily on pancreatic enzyme activity (Nitsan *et al.,* 1991b). Pancreatic enzymatic reserve (trypsin, chymotrypsin, amylase and lipase) in the chick is weak at hatch. Feed intake stimulate these secretions dramatically which are noticed in the first week of life. The immune system starts to develop during the embryonic phase and continues for the first week after hatching. Feed provides nutrients for the growth and development of both primary and secondary lymphoid organs.

Broiler chickens make a sensible choice when given the option of choosing between diets differing in color. It has been reported that delayed access to feed impairs not only intestinal development but also development of gut-associated lymphoid tissue (GALT) like the bursa of fabricius, cecal tonsils and meckel's diverticulum. So delay in feed and water consumption directly suppresses the immune system (Jull-Madsen *et al.,* 2004). The realization that it is necessary for animals to be able to differentiate between foods with different nutrient compositions by colour, taste and/or position, and that they need to be taught to associate the sensory properties of foods with their yields of nutrients, has made it possible to envisage a learned appetite for each of the essential nutrients. Chicken preferred high color contrast or differing colors over familiar colors (Osorio *et al.,* 2009). Birds can improve the balance between their nutrient requirements and their nutrient intake if they can be taught to select an appropriate feed. The present study was performed to know the best desirable colors to suffice welfare and enhance productivity in broiler chicks.

MATERIALS AND METHODS

The present experiment was carried out at the research poultry farm of Poultry Production Department, Faculty of Agriculture, Assiut University, Assiut, Egypt. A total number of 120-one day old Cobb broiler chicks were randomly assigned into four equal groups and three replicates/group to investigate the effect of feed color on their growth performance, carcass characteristics and economical efficiency. The first group fed non color feed and considered as control group (C). While, second, third and forth treatment groups (T1, T2 and T3) were fed on artificially colored green, orange and red feed, respectively. The newly hatched chicks were exposed to continuous lighting for 24 hrs/day during the first three days of age. Thereafter, the photoperiod was decreased gradually (one hr/wk) to 12 hrs (growing) with light intensities of 5 and 10 Luxes, respectively. All chicks had free access to fresh drinking water and given the experimental starter diets containing 23% CP and 12.56 J ME/g as starter from 0 to 3 wks old and grower diets containing 21% CP and 12.97 J ME/g s grower from 4 to 6 wks old.

Performance parameters: Individual body weights of broilers were recorded after release of hatch, 1, 2, 3, 4, 5 and 6 weeks of age. Feed intake was recorded replicate wise at the end of every week. The average feed consumption of each replicate was calculated based on the number of survived chicks. The ratio between feed intake and weight gain was determined to obtain the feed conversion efficiency (FCR).

Carcass traits: At the end of 42 days of age, one bird representing the mean body weight of each replicate was fasted over night and sacrificed by cervical dislocation. They were dressed for recording the weights of ready-to-cook yield, giblets (liver, heart and gizzard), abdominal fat pad and breast meat. The composition of breast meat for moisture, protein and fat (AOAC, 1995) was estimated. The weights of bursa and spleen were recorded. The protein content was determined using A.O.A.C. (1995) methods.

Statistical analysis:

Data collected were subjected to ANOVA by applying the General Linear Model (GLM) Procedure of SAS software (SAS Institute, version 4, 2000). Duncan (1955) was used to detect differences among means of different groups. Before analysis, all percentages were subjected to arcsine transformation to approximate normal distribution.

The following model was used for analysis of variance: $Y_{ij} = \mu + S_i + e_{ij}$

Where: Yij = observation, μ = overall mean, Si = treatment effect, e ij = experimental errors.

RESULTS AND DISCUSSION

Body weight and gain:

The mean values for live body weight and gain on different experimental feed colors from 1 to 42 days are shown in Tables (1 and 2). It could be noticed that the orange feed color group significantly increased body weight followed by green and red feed color groups as compared to control group at all studied ages. Also, the final maximum body weight gain per bird i.e., 72.4, 67.2, 68.2 g was gained by the birds fed on orange, green and red feed color groups. The reason of better performance of birds fed on orange feed color may be due to the highest feed intake of these birds during the first week. It is established that broilers performance is closely related to feed intake during the first 7 days which significantly affect final live weight (Lilburn, 1998). Findings of this study is in close agreement with the previous outcomes of Saki, (2005) and Henderson *et al. (*2008) who demonstrated the positive correlation ($P<0.05$) of pre-starter diets with marketable live weight of broilers. The interaction of intestinal growth, digestive functions and diet is critical during the post hatch period. Adequate protein availability in the pre-starter phase seems to be essential to increase muscle development in later phases (Yang *et al.,* 2009).

Table 1. Effect of feed color on body weight (g) of broiler chick

Treatments	Ages (body weight, g)						
	1 day	1wks	2wks	3wks	4wks	5wks	6wks
Control	63.4±0.3	190.6±5.9^{b}	496.9±9.7^{ab}	913.2±7.0^{c}	1423.0±14.3^{b}	1882.3 ±19.6^{b}	2227.1±20.9^{c}
Green	63.6± 0.4	190.0±4.0^{b}	471.3±6.9^{c}	945.9 ±9.8^{b}	1400.9±11.7^{b}	1868.4±12.3^{b}	2334.8±18.4^{b}
Orange	63.1±0.3	209.18±4.1^{a}	509.1±7.6^{a}	1058.4±10.9^{a}	1478.0±17.8^{a}	1975.6 ±25.8^{a}	24828±18.1^{a}
Red	62.8±0.3	190.84±3.5^{b}	478.8±6.0^{bc}	965.6 ±10.7^{b}	1412.2 ±14.8^{b}	1865.4±14.4^{b}	2340.0±19.3^{b}

$^{a-c}$ Means in the same column with different superscripts are significantly different ($P\leq0.05$)

Table 2. Effect of feed color on body weight gain (g/d) of broiler chick

Treatments	Ages (body weight gain, g)					
	0-1wks	1-2wks	2-3wks	3-4wks	4-5wks	5-6wks
Control	18.2 ±0.6^{b}	43.5 ±0.7^{a}	57.7 ±1.5^{c}	52.1 ±2.3^{c}	65.1 ±2.1	47.8 ±1.6^{c}
Green	18.1 ±0.51^{b}	40.2 ±0.7^{c}	67.8 ±1.8^{b}	65.0 ±2.2^{b}	66.8 ±1.4	67.2 ±1.4^{b}
Orange	20.9 ±0.6^{a}	42.8 ±0.9^{ab}	80.2 ±2.1^{a}	80.7 ±2.8^{a}	70.3 ±1.8	72.4 ±1.3^{a}
Red	18.3 ±0.56^{b}	41.1 ±0.7^{b}	69.5 ±1.9^{b}	63.6 ±2.5^{b}	65.0 ±1.6	68.2 ±1.4^{b}

$^{a-c}$ Means in the same column with different superscripts are significantly different ($P\leq0.05$)

It seems that this could stimulate the development of the gastrointestinal tract (crop, small and large intestine) and to increase the growth performance of birds (Speake *et al.,* 1998). Farghly *et al. (*2016a) found that birds fed a diet with molasses had superior body weight and body weight gain percentages compared to birds fed normal feed or feed with yolk odor. Farghly and Glaal *(*2016) found that supplementing diets with skim milk, molasses, fresh egg and fresh fish meat significantly (P≤ 0.05) increased body weight and body weight gains compared to control birds. Birds fed diets contained molasses and fresh fish meat significantly (P≤ 0.05) increased body weight gains compared with that obtained from birds either fed diets contained skim milk or fresh whole egg. Farghly (2017) and Farghly and Abou-Kassem (2014) observed that final body weight and body weight gain of birds fed green and red significantly (P≤0.05) increased than those of non colored feed group. However, in contrast to these findings Farghly and Sharara *(*2016) found that colored feed insignificantly affected body weight performance in local turkey. They concluded that the local turkey prefer green feed as well as green feeders over orange, yellow, red feeders and white, orange, yellow and red feeds, respectively.

Feed consumption and conversion:

Tables (3 and 4) show the mean values for feed consumption per bird and conversion on different experimental feed colors treatments from 1 to 42 days. The maximum amount of feed i.e., 147.9 and 152.42 g was consumed by the birds fed red and orange feed colors groups, while the minimum feed intake i.e., 105.5 and126.3 g was consumed by the birds fed on non color and green feed colors. Difference in feed consumption may be due to different colored feed. Feed intake is a critical factor determining broilers performance especially body weight gain with the compensatory growth (Lilburn, 1998and Yang *et al.,* 2009). Thus enhanced feed consumption achieved through any feeding program particularly focused on early nutrition can maximize birds growth (Henderson *et al.,* 2008 and Valencia *et al*., 2009). The best feed conversion (1.88) was observed by the birds fed on green feed color but it was medium in body weight during sixth week. Non and red feed color were worst in feed conversion i.e., 2.22 and 2.17. This finding is in close agreement with the results of Farghly and Abou-Kassem (2014) who reported that feed color significantly (P<0.05) affect feed consumption and feed conversion in indigenous Egyptian turkey. While, no significant differences (P>0.05) were observed among birds fed green and red group. Farghly *et al. (*2016a) found that birds fed diets with molasses, odor and fish odor throughout the experimental period had superior feed conversation compared to birds fed non odor feed or feed with yolk odor. Farghly and Glaal *(*2016) found that supplementing diets with skim milk, molasses, fresh egg and fresh fish meat significantly (P≤ 0.05) improved feed conversion compared with birds fed diets contained either skim milk or fresh whole egg. Farghly *et al. (*2016 b) found that using of molasses as early dietary supplementations during the first two weeks of Japanese quail age is highly recommended. In contrast, Farghly and Sharara *(*2016) indicated that colored feed and feeders insignificantly affected feed consumption. It was concluded that the local turkey prefer green feed as well as green feeders over orange, yellow, red feeders and white, orange, yellow or red feeds, respectively. Farghly and Mahrose (2017) and Farghly (2017) found that turkey poults fed green feed were insignificantly higher in their BW than the other groups and that was reflected on the marketing weight. While, they showed insignificant differences in FC and FCR of the experimental groups due to feed color.

Table 3 Effect of feed color on daily feed consumption (g/b/d) of broiler chick (Mean±SE)

Treatments	Ages (feed consumption , g/b/d)					
	0-1wks	1-2wks	2-3wks	3-4wks	4-5wks	5-6wks
Control	22.0 ±3.2^{b}	68.3 ± 5.7^{ab}	104.0 ± 6.7	114.2 ±10.5^{b}	122.7 ±16.7	105.5 ± 7.5^{c}
Green	32.1 ±2.3^{a}	74.5 ± 1.7^{ab}	111.3 ±8.2	125.2 ±1.4^{b}	128.2 ± 4.2	126.3 ±10.5^{bc}
Orange	33.4 ±1.1^{a}	81.0 ±0.8^{a}	114.5 ±1.8	150.8± 7.78^{a}	130.2 ± 20.2	152.42 ±3.1^{a}
Red	33.5±0.2^{a}	78.2±0.3^{ab}	105.5 ±4.8	130.2 ±4.48^{ab}	126.5 ± 6.62	147.9 ±18.7^{ab}

$^{a-c}$ Means in the same column with different superscripts are significantly different (P≤0.05)

Table 4. Effect of feed color on daily feed conversion ratio of broiler chick (Mean±SE)

Treatments	Ages (feed conversion ratio)					
	0-1wks	1-2wks	2-3wks	3-4wks	4-5wks	5-6wks
Control	1.22 ±0.02^{b}	1.56 ±0.08^{b}	1.43 ± 0.07^{b}	2.24±0.24	1.88 ±0.24	2.22 ±0.08
Green	1.80 ±0.23^{a}	1.85 ±0.04^{a}	1.64 ± 0.05^{ab}	1.92 ±0.04	1.92 ±0.02	1.88 ±0.17
Orange	1.60 ±0.03^{ab}	1.89 ±0.03^{a}	1.80 ±0.11^{a}	1.87 ±0.11	1.86 ±0.29	2.11 ±0.01
Red	1.83 ±0.04^{a}	1.90 ±0.02^{a}	1.52±0.05^{b}	2.05±0.07	1.94 ±0.09	2.17 ±0.25

$^{a-b}$ Means in the same column with different superscripts are significantly different (P≤0.05)

Dressing percentage and organs weights:

The mean values for dressing percentage and weights of different organs at sixth week of age of broilers fed on different experimental feed color treatments are shown in Tables 5, A, B and C. Maximum dressing and heart percents were those of the birds fed on orange, green and red feed colors groups while, the minimum dressing percentage was observed for the birds fed on non feed color group. Statistical analysis of liver, thigh and back-wing percentages revealed non-significant differences (P>0.05) among the feed colors treatments. Non color feed group (control) had significant higher gizzard percentage as compared to other groups. Orange color feed group had significant higher breast drum and abdominal fat percentages than other groups. Orange and red color feed group had significant higher breast muscles and carcass color percentages than green and non color feed groups. Farghly and Glaal *(*2016) revealed that molasses and fresh fish meat supplementations groups had superior dressed carcass, gizzard and liver percentages. Otherwise, no significant differences (P≤0.05) existed in abdominal fat, carcass cut-up parts and meat quality traits. In neonate broilers, minimizing the post-hatch holding time and providing early access to feed is desirable to initiate not only growth, but also the development of intestines (Moran, 1985; Yang *et al.,* 2009), pancreas (Jin *et al.,* 1998) and immune system (Jull-Madsen *et al.,* 2004). It was therefore, hypothesized that if nutrients could be intubated into crop, it may stimulate the growth of gastrointestinal tract even during the transportation of chicks from hatchery to farm, since feeding chicks in transit may not be practically possible. Reason of this disagreement may be the use of different feed technologies like coloring employed by these previous researchers, respectively to improve digestibility of broiler diets for the accelerated development of GIT. Henderson *et al. (*2008**)** observed non-significant (P>0.05) differences for abdominal fat and organs weight (except for liver) due to different feeding programs for broilers. In contrary to that Dibner *et al.* (1998) reported significance of early nutrition on development of primary immune organs like bursa of fabricius.

The results of the present study are in disagreement with the findings of Farghly and Abou-Kassem (2014) who, found insignificant differences (P>0.05) in the percentages of dressed carcass, heart, liver, gizzard and abdominal fat percentages were found among all groups. Also, no significant differences (P>0.05) in most meat quality were found among all experimental feed color groups except juiciness values. Farghly *et al. (*2016a) observed no significant differences (P>0.05) in all carcass characteristics percentages. However, Farghly *et al. (*2017&2016 b) found that the carcass traits of the birds fed on the starter ration, supplemented with each of the sugar syrup and molasses increased relatively as compared to those of the control group. Farghly and Mahrose (2017) observed insignificant differences in dressed carcass, heart, liver, gizzard and abdominal fat among all experimental groups except juiciness which was significantly (P<0.05) higher in the group of birds fed green feed.

Table 5 (A). Effect of feed color on carcass traits of broiler chick (Mean ± SE)

Treatments	Traits				
	Dressed%	Heart%	Liver%	Gizzard%	Giblets %
Control	74.82 ±1.04^{b}	0.42 ± 0.01^{b}	2.53 ± 0.07	1.09 ±0.07^{a}	4.36±0.12
Green	75.96 ± 0.76^{ab}	0.52 ± 0.02^{a}	2.71 ± 0.10	1.19 ±0.02^{ab}	4.57±0.11
Orange	77.85 ± 0.88^{a}	0.50 ± 0.01^{a}	2.62 ± 0.09	1.20 ± 0.02^{b}	4.28± 0.12
Red	77.77± 0.50^{a}	0.52 ± 0.02^{a}	2.51 ± 0.03	1.23 ± 0.04^{ab}	4.34± 0.06

$^{a-b}$ Means in the same column with different superscripts are significantly different (P≤0.05)

Table 5(B). Effect of feed color on carcass traits of broiler chick (Mean ± SE)

Treatments	Traits				
	Breast %	Drum%	Thigh %	Back&Wings%	Abdominal Fat %
Control	24.36 ± 0.60^{b}	4.59 ± 0.08^{b}	5.93 ±0.25	19.86 ±1.05	1.37±0.09^{b}
Green	24.83±0.32^{b}	4.57 ± 0.08^{b}	5.79±0.14	18.96 ±0.20	1.64±0.09^{ab}
Orange	26.81±0.37^{a}	4.95±0.08^{a}	5.92±0.13	18.52±0.17	1.67± 0.10^{a}
Red	24.93 ± 0.17^{b}	5.08 ±0.10^{a}	6.21± 0.11	18.75±0.30	1.37±0.10^{b}

$^{a-b}$ Means in the same column with different superscripts are significantly different (P≤0.05)

Table 5 (C). Effect of feed color on carcass traits of broiler chick (Mean ± SE)

Treatments	Traits				
	Muscles, %			Carcass deep (cm)	Carcass Color
	Breast	Drum	Thigh		
Control	19.00 ± 0.37^{b}	3.06±0.04	4.36±0.09	22.83±0.32^{b}	1.66± 0.22^{c}
Green	19.00 ±0.35^{b}	3.13±0.11	4.54± 0.06	23.83± 0.22^{a}	2.33± 0.28^{b}
Orange	20.06±0.45^{ab}	3.16±0.10	4.49 ±0.06	24.20±0.17^{a}	4.66±0.14^{a}
Red	20.49±0.28^{a}	3.22±0.04	4.62±0.11	23.05 ± 0.09^{b}	4.50 ±0.15^{a}

$^{a-c}$ Means in the same column with different superscripts are significantly different (P≤0.05)

Mortality:

Mortality percentage which was independent of color treatments revealed remarkable difference among the different experimental feed color. The mortality rates of the four studied feed color groups were 33.2, 15.2, 9.1 and 3.0 %, respectively (Table, 6). Likewise, post-hatch feeding in early few days helps inimmunity development and improves the resistance of birds to pathogen agents (Bigot *et al.,* 2001).

Table 6. Effect of feed color on mortality rate of broiler chicks (%)

Treatments	Ages								
	1 day	1wks	2wks	3wks	4wks	5wks	6wks	Total	Mortality%
Control	**0**	**0**	**1**	**0**	**2**	**2**	**6**	**11**	**33.3**
Green	**0**	**0**	**0**	**0**	**1**	**1**	**3**	**5**	**15.**2
Orange	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**3**	**9.**1
Red	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**3.0**

These results are in harmony with findings of Farghly and Abou-Kassem (2014) who showed that, the mortality rates of the six studied feed color groups were 10.00, 6.66, 10.00, 10.00, 3.33 and 3.33 %, respectively. Farghly *et al. (*2016a) found that birds fed feed with molasses, odor and fish odor throughout the experimental period had superior livability percentages compared to birds fed non odor feed or feed with yolk odor. Otherwise, no significant differences (P>0.05) existed in bone lengths (Shank, drumstick and keel bone) and plumage conditions. Consequently, diets for local turkey chicks should be supplemented with molasses odor and fish odor. Farghly and Glaal *(*2016) found no significant differences (P≤0.05) existed in bone measurements, plumage conditions and mortality rate. Consequently, it could be recommended to present the diets containing 10% of molasses and fresh fish meat for broiler chicks during early feeding period. Farghly *et al. (*2016 b) found that the birds fed on the starter ration, supplemented with each of the yeast, sugar syrup and molasses decreased in mortality percentage as compared to those of the control. Farghly and Mahrose (2017) found that, the mortality rates of the studied feed color groups (non color, orange and green) were 6.67, 5.00 and 3.33 %, respectively.

CONCLUSION

The use of feed coloring treatments for feeding broilers from 0 to 42 days of age, could reach better performance at 42 days of age than in case of using control feed (non-color feed). In this case, growth performance in broiler chicks fed orange feed color significantly improved in comparison with other groups. Use of feed color in starter diets had no adverse effect on carcass characteristics or quality.

REFERENCES

A.O.A.C. (1995). *Official Methods of Analysis, 13th ed. Association of Official Analytical Chemists, Washington, DC.*

Bigot, K., S. Tesseraud, M. Taouis and M. Picard, 2001. Alimentation néonatale et développement précoce du poulet de chair. INRA Prod. Anim., 14(4): 219-230.

Dibner JJ, Knight CD. and FJ Ivey. 1998. The feeding of neonatal poultry. World Poultry 14(5): 20-31.

Duncan, D.B. 1955. Multiple range and multiple F test. Biometrics 11: 1-42.

Farghly M. F. A. 2017. Use of feed color and odor as attractive tools for managing turkey chicks at early feeding. Egyptian J. Nutrition and Feeds, (Under publish).

Farghly M. F. A. and D. E. Abou-Kassem 2014. Impacts of feed color and form on growth performance of local turkey. Egyptian J. Nutrition and Feeds, 17(3): 537-547.

Farghly M. F. A., Abouelezz F.M.K., M. A. Abdelnabi and M. M. Kotb 2016a. Effect of feed odor on growth performance and carcass characteristics of local turkey. *9th International Poultry Conference*, 7 – 10 November 2016, Hurghada, Red Sea, Egypt.

Farghly M. F. A. and A. E. Glaal 2016. Effect of dietary natural odor and flavor sources in early feeding on broilers performance. Seventeen Conference of Animal production on Sustainable Livestock Development: Challenges and Opportunities, October 10-13, 2016, Sharm El-Sheikh, Egypt.

Farghly M. F. A., H. Y. El-Hammady, A. H. Madian and S. F. Ahmed 2016b. Impact of early dietary supplementing with some performance promoters on the production of Japanese quail. Seventeen Conference of Animal production on Sustainable Livestock Development: Challenges and Opportunities, October 10-13, 2016, Sharm El-Sheikh, Egypt.

Farghly, M. F. A. ., H. Y. El-Hammady, M. G. Abdelfattah and Asmaa I. Mostafa 2017. Impact of light and feed colors on performance of growing japanese quail. The 16th Scientific Conference of Animal Nutrition, 28 November to 1 December 2017, Luxor, Egypt (accepted).

Farghly M. F. A. and Kh. M. Mahrose 2017. The response of growing native turkeys to different feed colours and forms. J Anim Physiol Anim Nutr. 2017;1–8.

Farghly M. F. A and H. H. Sharara 2016. Effect of feed and feeder color on growth performance and carcass characteristics of local turkey. 9th International Poultry Conference, 7–10 November 2016, Hurghada, Egypt.

Henderson, S.N., J.L. Vicente, C.M. Pixley, B.M. Hargis and G. tellez, 2008. Effect of an early nutritional supplement on broiler performance. Poult. Sci., 7(3): 211-214.

Jin, S. H., A. Corless and L. J. Sell. 1998. Digestive system development in post-hatch poultry. Worlds Poult. Sci. J. 54:335-345.

Juul-Madsen HR, Su G. and P.Sorensen 2004. Influence of early or late start of first feeding on growth and immune phenotype of broilers. British Poultry Science 45: 210-220.

Knight, C. D. and J. J. Dibner 1998. Nutritional programming in hatchling poultry: Why a good start is important. Poult. Dig. Aug/Sept., pp: 20-26.

Lilburn, M. S. 1998. Practical aspects of early nutrition for poultry. J. Appl. Poult. Res. 7: 420–424.

Moran, E. T. 1985. Digestion and absorption of carbohydrates in fowl through perinatal development. J. Nutr. 115:665-674.

Nitsan, Z., G. B. Avraham, Z. Zoref and I. Nir. 1991a. Growth and development of the digestive organs and some enzymes in the broiler chick after hatching. Br. Poult. Sci. 32: 515-523.

Nitsan, Z., E. A. Dunnington and P. B. Siegel 1991b. Organ growth and digestive enzyme levels to 15 days of age in lines of chickens differing in body weight. International J. Poult. Sci. 70: 2040-2048.

Noy Y. and D.Sklan 2001. Yolk and exogenous feed utilization in the posthatch chick. Poultry Science 80:1490-1495.

Osorio, D., Ham, A.D., Gonda, Z. and Andrew, R.J. 2009: Sensory generalization and learning about novel colours by poultry chicks. Q J Exp Psychol (Colchester). 62(7):1249-56.

Pinchosav, Y. 1991. Relationship between the weight of hatching eggs and subsequent early performance of broiler chicks. Br. Poult. Sci. 32:109-115.

Saki, A. A. 2005. Effect of Post-hatch Feeding on Broiler Performance Int. J. Poult. Sci. 4(1): 4-6.

SAS institute, 2000 JMP®, Statistics and Graphics Guide Version 4. SAS Inst. Inc. Cary, NC.

Speake, B.K., R. Noble and A. Murray, 1998. The utilization of yolk lipids by the chick embryo. World's Poult. Sci. J., 54: 319-334.

Valencia, D. G., M. P. Serrano, E. Jiménez-Moreno, R. Lázaro, and G. G. Mateos 2009. Ileal digestibility of amino acids of pea protein concentrate and soya protein sources in broiler chicks. Livest. Sci. 121: 21–27.

Yang, H., Z. Wang, S. Shi,, J. Lu and W. Li, 2009. Effects of starter feeding time on body growth and viscera development of newly hatched chicks. J. Anim. Sci., 8: 585-593.

أداء النمو وصفات الذبيحة لدجاج التسمين تحت تأثير لون الغذاء

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أجريت التجربة على عدد ١٢٠ كتكوت عمر يوم لدراسة تأثير استخدام لون الغذاء على أداء النمو وصفات الذبيحة لدجاج التسمين. تم تربية كل الكتاكيت على الأرض ثم قسمت إلي أربعة مجاميع (مقارنة ، ٣ معاملات): وفيها غذيت الطيور على علف غير ملون وذلك بالنسبة لمجموعة الكنترول، و بالنسبة لمجموعات المعاملة ١ ، ٢ و٣ فغذيت على علف باللون الأخضر، البرتقالى و الأحمر على التوالي. أوضحت النتائج المتحصل عليها أن لون الغذاء له تأثير معنوى على وزن الجسم، والزيادة فى وزن الجسم، استهلاك العلف و الكفاءة التحويلية خلال فترة التجربة. ايضا يوجد هناك اختلافات معنوية فى لون الذبيحة، نسبة التصافى، اجزاء الذبيحة، القانصة، عمق الذبيحة، نسبة دهن التجويف البطنى. بينما ، لا يوجد اختلافات معنوية فى باقى نسب الحوائج و الورك. نستخلص مما سبق ان الطيور المغذاة على العلف ذات اللون البرتقالي كانت الأفضل فى الأداء.