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Effect of supplementation of organic zinc on the zinc level and quality traits of eggs in broiler breeders

N SONI[1], S K MISHRA[2], R K SWAIN[3], A DAS[4], N C BEHURA[5] and K SETHI[6]

Orissa University of Agriculture and Technology, Bhubaneshwar, Odisha 751 003 India

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ABSTRACT

Broiler breeder hens (264) of 32 weeks of age were distributed randomly in 4 dietary treatments. The dietary treatments were T_0: Broiler breeder ration containing 40ppm zinc (basal 29.8 ppm + 10.2 ppm inorganic zinc), T_1: T_0 + organic zinc (zinc methionine) @ 20ppm, T_2: T_0 + organic zinc @ 40ppm and T_3: T_0 + organic zinc @ 60ppm. The experiment was continued from 32 to 48 weeks of age. At 35, 39, 43 and 48 week, the egg quality traits and zinc level in the eggs were assessed. Expect the egg shell thickness, the other studied egg quality parameters viz. egg weight (g), egg length (mm), egg breadth (mm), egg shell thickness without membrane (mm), yolk height (mm), yolk diameter (mm), albumen height (mm), albumen weight (g), yolk weight (g), egg shell weight (g), shape index and Haugh unit of female broiler breeder of different treatments during the experimental period did not differ significantly in all the periods. The zinc content of egg shell of all the groups of broiler breeder birds did not differ significantly at 32 and 39 week of age but at 40 and 48 weeks of study, significantly higher egg shell zinc content was observed in T_3 group and lowest in T_0. The zinc content in the egg albumen of all the groups of broiler breeder birds did not differ significantly in all the periods of study. Except at 35 weeks, the zinc content of egg yolk and total egg differed significantly with lowest levels was observed in $T_{0.}$ The egg shell thickness and egg shell weight of 40ppm and 60ppm zinc supplemented group were significantly higher than all other groups. Other egg quality traits found to be unaffected among treatment groups.

Key words: Broiler breeders, Egg quality, Organic zinc, Zinc level in egg

Eggshell quality is one of the most important problems in poultry industry, influencing economic profitability of egg production and eggs hatchability. High eggshell breaking strength and lack of shells defects are essential for protection against penetrating bacteria such as *Salmonella* species in to the eggs (Swiatkiecz and Koreleski 2008). Most of the studies on nutrition effects on egg shell and bone quality in laying hens have been focused on macro-minerals (calcium and phosphorus) and vitamin D_3 (Ayasan and Okan 1999). In addition to this, some enzymes related with some microminerals are important for mineralization process. Zinc functions in the formation of eggs. Activity of carbonic anhydrase, an essential enzyme for eggshell formation and has been directly related to zinc status of hens (Underwood 1962). Carbonic anhydrase is a zinc dependant enzyme that plays a role in converting calcium into calcium carbonate which is needed for egg shell formation (Keshavarz 2001).

Zinc deficiency affects the quality of epithelium due to role of zinc in protein synthesis. Zinc also indirectly affects epithelial secretion, by affecting the structure of epithelium or directly during the synthesis of egg shell membrane. Zinc plays a role in the magnum during the deposition of albumen and in the isthmus where egg shell membranes are produced (Tabatabaie *et. al*. 2007). Due to some reports indicated that organic mineral sources such as amino acid complex or proteinates have higher bioavailability than traditionally used inorganic form (Wedekind *et al.* 1992, Ao *et al*. 2006, Feng *et al*. 2009), there is an increasing interest in their use as a source of micronutrient for poultry. Level of organic zinc for optimum eggshell quality in the layer diet is variable. As per the findings of some workers, supplementation of organic zinc layer diet resulted in non-significant effect on eggshell quality (Mabe *et al*. 2003) while Klecker *et al*. (2002), Hudson *et al*. (2004), Swiatkiewicz and Koreleski (2008) and Idowu *et al*. (2011) reported significant effect on eggshell quality.

Considering this variability, the present experiment was planned with the objective of studying the effect of supplementation of organic zinc on the shell quality and zinc content in egg of broiler breeders.

MATERIALS AND METHODS

Female broiler breeder birds of synthetic dam line,

Present address: [1,4]Ex-P.G. student, [2]Associate Professor (sumantakmishra@gmail.com), [3]Professor and Head (rkswainovc @yahoo.com), [6]Assistant Professor, Department of Animal Nutrition, [5]Associate Professor (ncbehura@gmail.com), P.G. Department of Poultry Science, College of veterinary Science and Animal Husbandry.

maintained under All India Coordinated Research Network Project on Poultry Breeding were selected for the study. Broiler breeder hens (264) of 32 weeks of age were distributed randomly in 4 dietary treatments with 3 replicate per treatment. The hens were selected on the basis of their body weight and egg production. The initial body weight of broiler breeders were 3.31±0.06 kg, 3.39±0.06 kg, 3.32±0.04 kg and 3.46±0.03 kg in T_0, T_1, T_2 and T_3, respectively. The hens were maintained in individual layer cages. Experimental diets were offered @ 150g/bird/day through the experimental period. The hens were provided 24 h free access to clean drinking water. Eighteen hours of lighting (including day light) was provided. A basal diet was prepared to meet the nutrient requirement of broiler breeders (BIS 1992). The ingredient composition and proximate composition of the basal diet is given in Table 1. The basal diet was analyzed for proximate composition as per AOAC (1995). The zinc content in the basal feed was determined by atomic absorption spectrophotometer (AAS) method as described by Piper (1996). The samples were aspirated in to atomic absorption spectrophotometer (ELECO-246) to determine the zinc content. The experiment continued for a period of sixteen weeks i.e. 32 to 48 weeks of age of the hens. The dietary treatments of the experiment were: T_0: Broiler breeder ration containing 40 ppm zinc (basal 29.8 ppm + 10.2 ppm inorganic zinc supplementation in form of $ZnSO_4$), T_1: T_0 + Supplementation of organic zinc (zinc methionine) @ 20ppm in the broiler breeder ration, T_2: T_0 + Supplementation of organic zinc @ 40ppm in the broiler breeder ration and T_3: T_0 + Supplementation of organic zinc @ 60ppm in the broiler breeder ration.

Table 1. Ingredient and proximate composition of breeder basal diet

Ingredients	Percentage	Proximate composition	Percentage on DM basis
Maize	60.00	Moisture	9.17
Soybean meal	19.60	Crude protein	16.08
De oiled rice bran	12.00	Ether extract	4.20
Mineral mixture#	3.00	Crude fibre	4.82
Oyster shell meal	5.00	Total ash	10.61
Common salt	0.30	Acid insoluble ash	2.54
L-Lysine	0.03	Nitrogen free extract*	64.39
DL- methionine	0.05	Calcium	2.97
Feed additives used (g/kg of diet)		Available phosphorus	0.42
Biocholine	0.50	Metabolisable energy*(Kcal/kg)	2751.25
Biobantox	0.50	Lysine*	0.84
Layvit	0.50	Methionine*	0.34
Livoline	0.25	Zinc	29.80 ppm
E-sel-powder	0.10		
K-zyme	0.50		

Mineral mixture (without zinc) contained (g/100g): calcium carbonate 33.28, magnesium oxide 1.48, ferrous sulphate 1.40, copper sulphate 0.05, manganese sulphate 0.04, potassium iodide 0.001, potassium chloride 17.09, sodium selinate 0.001; *calculated value.

At monthly interval, four eggs from each replicate of each treatment were collected to study the egg quality traits, which include egg weight, egg length, egg breadth, egg shell thickness, yolk height, yolk diameter, albumen height, albumen weight, yolk weight, egg shell weight, shape index, Haugh unit. The egg quality traits were assessed on the same day of collection of the eggs. At first, the eggs were subjected for assessment of physical measurements such as egg weight, egg length, egg breadth and shape index. Then the eggs were broken to determine the yolk height, yolk diameter, albumen height, albumen weight, yolk weight, and shell weight and shell thickness respectively. For the above study, the eggs were broken and content were poured carefully on a levelled glass plate placed on a table, so that, the yolk and the thick albumen remain intact. The apparatus used for measuring the different characters of the eggs were balance, flat plane glass slab, spirit level, digital calliper, spherometer. The shape index was calculated as per Shulty (1953) and the Haugh unit was calculated according to Haugh (1937). For determination of zinc content in total eggs, the collected eggs of each replicate were broken and the egg content were mixed together in a beaker and then transferred to a glass petridish for oven drying at 105°C for 24 h. For egg shell zinc content determination, the eggs were broken and the egg content was separated to get the egg shell with its membrane. The inner membrane was removed and the egg shell was washed and dried at room temperature; egg shell was oven dried at 105°C for 24 h. For determination of zinc content in albumen and yolk, after breaking the eggs, the albumen and yolk were separated and kept in separate petridish for oven drying at 40°C for 24 h (Tabatabaie *et al*. 2007); 1 g each of the samples were taken in a digestion tube and to it 10 ml of triacid mixture (7 ml HNO_3, 3 ml H_2SO_4 and 2 ml perchloric acid) were added and digested at 200°C. The process continued until the content appeared clear and colorless. The digested samples were filtered in to a volumetric flask. The content of digestion tube were repeatedly washed with triple distil water to obtain complete extract of the mineral. The samples were aspirated in to atomic absorption spectrophotometer (ELECO-246) to determine the zinc content. Data retrieved from the experiment was subjected to statistical analysis. The statistical analysis of the data was done according to Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

Egg quality traits: The average monthly egg weight (g), egg length (mm), egg breadth (mm), egg shell thickness without membrane (mm), yolk height (mm), yolk diameter (mm), albumen height (mm), albumen weight (g), yolk weight (g), egg shell weight (g), shape index and Haugh unit of female broiler breeder of different treatments during the experimental period (32–48) has been presented in Tables 2–4. Expect the egg shell thickness, the other egg

Table 2. Egg weight (g), egg length (mm), egg breadth (mm) of eggs of broiler breeder in different dietary treatments of zinc

Weeks	T_0	T_1	T_2	T_3	P value
Egg weight (g)					
35	62.07^a±0.65	60.34^a±0.78	62.88^a±1.00	60.33^a±0.81	0.11
39	60.66^a±0.64	60.76^a±1.00	62.15^a±1.02	62.04^a±0.78	0.55
43	61.91^a±0.65	62.63^a±0.70	62.90^a±0.64	63.81^a±0.59	0.28
48	62.92^a±0.39	63.83^a±0.90	64.34^a±0.64	64.60^a±0.63	0.35
Average	61.89^a±0.31	61.87^a±0.46	63.07^a±0.43	62.70^a±0.42	0.10
Egg length (mm)					
35	55.74^a±0.28	56.19^a±0.32	56.20^a±0.32	55.68^a±0.21	0.43
39	56.55^a±0.26	57.37^a±0.27	56.71^a±0.26	57.12^a±0.30	0.17
43	57.28^a±0.40	57.29^a±0.42	56.76^a±0.24	56.34^a±0.24	0.16
48	57.39^a±0.30	56.59^a±0.21	56.73^a±0.26	56.39^a±0.21	0.055
Average	56.74^a±0.18	56.86^a±0.17	56.60^a±0.14	56.38^a±0.14	0.17
Egg breadth (mm)					
35	42.82^a±0.32	44.09^a±0.32	43.21^a±0.28	43.06^a±0.31	0.08
39	43.37^a±0.32	42.30^a±0.33	43.16^a±0.34	43.41^a±0.33	0.10
43	44.12^a±0.38	43.62^a±0.38	43.82^a±0.34	42.73^a±0.36	0.07
48	42.49^a±0.27	43.30^a±0.28	43.11^a±0.32	43.55^a±0.32	0.15
Average	43.20^a±0.18	43.33^a±0.19	43.32^a±0.16	43.19^a±0.17	0.90
Egg shell thickness without membrane (mm)					
35	0.34^a±0.01	0.36^a±0.02	0.35^a±0.01	0.35^a±0.01	0.47
39	0.34^a±0.01	0.37^a±0.01	0.36^a±0.01	0.34^a±0.01	0.17
43	0.33^a±0.02	0.35^a±0.01	0.37^a±0.01	0.35^a±0.01	0.17
48	0.34^b±0.01	0.36^b±0.01	0.38^a±0.01	0.38^a±0.01	0.04
Average	0.34^b±0.01	0.36^a±0.01	0.36^a±0.01	0.36^a±0.01	<0.01

Means with different superscripts in a row differ significantly (P<0.05).

quality parameters studied did not differed significantly (P>0.05) in all the periods. Similarly, the average egg quality parameters studied did not differed significantly (P>0.05) in all the periods except the egg shell thickness. The corroborates with the findings of Idowu *et al*. (2011) who reported that egg quality parameters, viz. egg weight, egg length, egg breadth, albumen weight, albumen height, yolk weight, dry shell thickness, dry shell weight, shell index and derived egg quality like ESI, ESG and Haugh unit of control group did not differed significantly with that of zinc-proteanate fed group. Kidd *et al*. (1992) reported that on feeding of zinc both from inorganic and organic sources did not have any significant effect on egg weight and chick weight. Similar findings were also reported Mabe *et al*. (2003), Cheng and Guo (2004), Tabatabaie *et al*. (2007) and Swiatkiewicz and Koreleski (2008). In contrast to this, Klecker *et al*. (2002) and Hudson *et al*. (2004) reported significantly higher egg quality parameters in organic zinc fed groups than inorganic zinc fed group. Activity of carbonic anhydrase, an essential enzyme for eggshell formation and has been directly related to zinc status of hens (Underwood 1962). The significantly higher egg shell thickness in organic zinc fed group than that of inorganic fed group might be due to the increase activity of carbonic anhydrase as carbonic anhydrase is a zinc dependant enzyme that plays a role in converting calcium into calcium carbonate which is needed for egg shell formation (Keshavarz 2001). In the present experiment, organic zinc was supplemented with the hypothesis of better bioavailability of zinc from organic source, but no significant difference was observed in the studied egg quality parameters except egg shell thickness. Though non-significant difference, the egg quality parameters of organic zinc fed groups were better than the inorganic fed group. This might be due to higher bioavailability of organic zinc (Abdallah *et al*. 2009) than that of inorganic zinc and also essential role of zinc in egg formation.

Zinc content in eggs: Zinc content (ppm) of egg shell, egg albumen, egg yolk and total egg of broiler breeders in different dietary treatments of zinc is presented in Table 5. The zinc content of egg shell of all the groups of broiler breeder birds did not differed significantly (P>0.05) at 32 and 39 week of age. Further, at 40 and 48 weeks of study, significant difference in zinc content of egg shell of all the groups was observed. Highest egg shell zinc content was observed in T_3 group and lowest in T_0. This is in agreement with the findings of Idowu *et al*. (2011). They reported that zinc residue in egg shell of laying hens showed marked significant difference with zinc- proteanate and the control treatment group consistently having the lowest values. The non-significant difference in egg shell zinc content in the first two period i.e. 35 and 39 weeks of age might be due to peak laying period of the birds when much of the intake zinc might have been diverted towards egg production. The

Table 3. Yolk height (mm), yolk diameter (mm), albumen height (mm), albumen weight (g), yolk weight (g), egg shell weight (g) of eggs of broiler breeder in different dietary treatments of zinc

Weeks	T_0	T_1	T_2	T_3	P value
Yolk height (mm)					
35	$19.30^a\pm0.34$	$18.93^a\pm0.43$	$18.56^a\pm0.44$	$19.66^a\pm0.39$	0.27
39	$19.33^a\pm0.42$	$19.17^a\pm0.38$	$19.70^a\pm0.47$	$19.23^a\pm0.36$	0.81
43	$19.46^a\pm0.37$	$19.48^a\pm0.40$	$19.89^a\pm0.41$	$19.41^a\pm0.33$	0.79
48	$19.64^a\pm0.43$	$19.22^a\pm0.41$	$20.16^a\pm0.51$	$19.26^a\pm0.31$	0.42
Average	$19.43^a\pm0.19$	$19.20^a\pm0.20$	$19.58^a\pm0.24$	$19.39^a\pm0.17$	0.61
Yolk diameter (mm)					
35	$42.23^a\pm0.33$	$42.19^a\pm0.53$	$40.67^a\pm0.46$	$41.32^a\pm0.44$	0.07
39	$41.34^a\pm0.45$	$41.61^a\pm0.44$	$42.05^a\pm0.38$	$41.95^a\pm0.59$	0.74
43	$42.26^a\pm0.43$	$43.08^a\pm0.82$	$42.38^a\pm0.43$	$41.51^a\pm0.50$	0.35
48	$42.02^a\pm0.54$	$41.60^a\pm1.00$	$40.54^a\pm0.86$	$39.90^a\pm0.95$	0.34
Average	$41.96^a\pm0.22$	$42.12^a\pm0.37$	$41.41^a\pm0.30$	$41.17^a\pm0.33$	0.10
Albumen height (mm)					
35	$4.14^a\pm0.03$	$4.26^a\pm0.05$	$4.23^a\pm0.04$	$4.30^a\pm0.03$	0.06
39	$4.24^a\pm0.04$	$4.29^a\pm0.03$	$4.31^a\pm0.03$	$4.33^a\pm0.05$	0.39
43	$4.30^a\pm0.04$	$4.36^a\pm0.04$	$4.27^a\pm0.04$	$4.32^a\pm0.03$	0.47
48	$4.32^a\pm0.04$	$4.27^a\pm0.03$	$4.32^a\pm0.05$	$4.38^a\pm0.05$	0.41
Average	$4.25^a\pm0.02$	$4.29^a\pm0.02$	$4.28^a\pm0.02$	$4.33^a\pm0.02$	0.06
Albumen weight (g)					
35	$36.61^a\pm0.55$	$36.61^a\pm0.51$	$36.21^a\pm0.42$	$37.18^a\pm0.38$	0.54
39	$36.20^a\pm0.42$	$36.86^a\pm0.32$	$37.77^a\pm0.28$	$37.37^a\pm0.59$	0.06
43	$37.03^a\pm0.60$	$36.90^a\pm0.49$	$37.37^a\pm0.46$	$37.38^a\pm0.52$	0.61
48	$37.07^a\pm0.62$	$37.29^a\pm0.53$	$37.75^a\pm0.56$	$38.03^a\pm0.61$	0.64
Average	$36.62^a\pm0.25$	$36.92^a\pm0.23$	$37.27^a\pm0.23$	$37.49^a\pm0.26$	0.06
Yolk weight (g)					
35	$17.14^a\pm0.37$	$17.08^a\pm0.25$	$16.74^a\pm0.33$	$17.09^a\pm0.25$	0.77
39	$16.18^a\pm0.29$	$16.34^a\pm0.28$	$17.06^a\pm0.26$	$16.75^a\pm0.26$	0.11
43	$16.40^a\pm0.31$	$16.26^a\pm0.35$	$16.90^a\pm0.47$	$16.58^a\pm0.34$	0.65
48	$16.83^a\pm0.42$	$16.25^a\pm0.31$	$17.15^a\pm0.23$	$17.03^a\pm0.33$	0.23
Average	$16.64^a\pm0.18$	$16.48^a\pm0.15$	$16.96^a\pm0.16$	$16.86^a\pm0.15$	0.14
Egg shell weight (g)					
35	$6.45^a\pm0.11$	$6.25^a\pm0.17$	$6.27^a\pm0.23$	$6.23^a\pm0.15$	0.71
39	$5.41^a\pm0.14$	$5.91^a\pm0.21$	$6.02^a\pm0.25$	$6.17^a\pm0.20$	0.06
43	$5.76^a\pm0.23$	$6.16^a\pm0.32$	$6.28^a\pm0.27$	$6.20^a\pm0.27$	0.53
48	$6.14^a\pm0.25$	$6.78^a\pm0.22$	$6.61^a\pm0.25$	$6.69^a\pm0.26$	0.25
Average	$5.94^a\pm0.11$	$6.28^a\pm0.12$	$6.29^a\pm0.12$	$6.32^a\pm0.11$	0.07

Means with different superscripts in a row differ significantly (P<0.05).

Table 4. Shape index and Haugh unit of eggs of broiler breeder in different dietary treatments of zinc

Weeks	T_0	T_1	T_2	T_3	P value
Shape index					
35	$76.86^a\pm0.84$	$78.50^a\pm0.67$	$76.90^a\pm0.56$	$77.36^a\pm0.63$	0.30
39	$76.71^a\pm0.70$	$74.75^a\pm0.57$	$76.13^a\pm0.73$	$76.00^a\pm0.61$	0.20
43	$77.07^a\pm0.94$	$76.19^a\pm0.95$	$77.22^a\pm0.78$	$75.85^a\pm0.75$	0.62
48	$75.08^a\pm0.73$	$76.53^a\pm0.59$	$76.03^a\pm0.78$	$77.23^a\pm0.48$	0.14
Average	$76.43^a\pm0.41$	$76.49^a\pm0.40$	$76.57^a\pm0.36$	$76.61^a\pm0.32$	0.98
Haugh unit					
35	$59.63^a\pm0.32$	$62.02^a\pm1.28$	$59.58^a\pm0.76$	$61.28^a\pm0.70$	0.11
39	$61.08^a\pm0.57$	$61.77^a\pm0.99$	$61.23^a\pm0.70$	$61.58^a\pm0.42$	0.89
43	$60.46^a\pm0.67$	$60.76^a\pm0.63$	$59.66^a\pm0.97$	$59.42^a\pm0.68$	0.54
48	$60.23^a\pm0.46$	$57.27^a\pm1.85$	$59.14^a\pm0.79$	$59.93^a\pm0.78$	0.23
Average	$60.35^a\pm0.27$	$60.45^a\pm0.67$	$59.90^a\pm0.41$	$60.55^a\pm0.34$	0.74

Means with different superscripts in a row differ significantly (P<0.05).

Table 5. Zinc content (ppm) of egg shell, egg albumen, egg yolk, total egg of broiler breeders in different dietary treatments of zinc

Weeks	T_0	T_1	T_2	T_3	P value
Egg shell					
35	67.39±0.47	67.43±0.32	67.93±0.45	66.84±0.38	0.33
39	72.20±0.47	72.73±0.49	72.62±0.47	72.30±0.53	0.85
43	83.24^{c}±0.50	91.44^{b}±0.54	91.37^{b}±0.49	97.19^{a}±0.46	<0.01
48	85.51^{d}±0.67	87.66^{c}±0.46	92.15^{b}±0.32	96.75^{a}±0.45	<0.01
Average	77.08±1.29	79.81±1.70	81.02±1.85	83.27±2.34	0.12
Egg albumen					
35	0.30^{a}±0.01	0.33^{a}±0.01	0.35^{a}±0.01	0.33^{a}±0.01	0.18
39	0.38^{a}±0.015	0.39^{a}±0.01	0.36^{a}±0.02	0.37^{a}±0.01	0.81
43	0.39^{a}±0.01	0.37^{a}±0.02	0.39^{a}±0.02	0.40^{a}±0.01	0.79
48	0.36^{a}±0.01	0.39^{a}±0.02	0.39^{a}±0.02	0.41^{a}±0.01	0.43
Average	0.36^{a}±0.009	0.37^{a}±0.01	0.37^{a}±0.01	0.38^{a}±0.009	0.55
Egg yolk					
35	34.40±0.48	33.42±0.48	33.86±0.65	34.43±0.58	0.52
39	32.90^{b}±0.46	33.23^{b}±0.33	36.07^{a}±0.40	35.56^{a}±0.31	<0.01
43	34.51^{b}±0.57	38.23^{a}±0.57	37.72^{a}±0.53	38.33^{a}±0.48	<0.01
48	33.34^{b}±0.39	37.13^{a}±0.46	38.36^{a}±0.51	37.88^{a}±0.59	<0.01
Average	33.79^{b}±0.25	35.50^{a}±0.43	36.50^{a}±0.36	36.55^{a}±0.36	<0.01
Total egg					
35	54.27±0.28	53.76±0.35	54.13±0.34	53.94±0.34	0.70
39	52.99^{b}±0.53	54.58^{a}±0.36	55.29^{a}±0.38	55.11^{a}±0.43	<0.01
43	52.27^{b}±0.41	53.79^{a}±0.46	54.01^{a}±0.48	54.18^{a}±0.45	0.02
48	53.6^{b}±0.59	53.62^{ab}±0.24	55.002^{a}±0.43	54.80^{a}±0.31	0.03
Average	53.28^{c}±0.25	53.94^{b}±0.18	54.61^{a}±0.21	54.51^{ab}±0.20	<0.01

Means with different superscripts in a row differ significantly (P<0.05).

zinc content in the egg albumen of all the groups of broiler breeder birds did not differ significantly in all the periods of study. Plaimast *et al*. (2008) conducted experiment in layers in which the control diet was containing 60 μg zinc/ g diet in control group and both sources of zinc (inorganic and organic) were supplemented to provide at levels of 300 and 600 μg zinc/ g, respectively. They reported that zinc concentration in the egg white did not differ significantly even on increasing zinc content (both organic and inorganic) from 60 μg Zn/g to 600 μg Zn/g of diet. The zinc content of egg yolk of broiler breeders in different dietary treatments of zinc did not differ significantly (P>0.05) at 35 weeks of age. During further periods of study, the average zinc content of egg yolk differed significantly (P<0.05) with lowest levels observed in $T_{0.}$ Guo *et al*. (2002) reported that zinc content of egg yolks from laying hens was increased when they were provided diet with ZnAA rather than $ZnSO_4$. The increase in yolk zinc content probably involved the production of vitellogenin, a trace mineral transporting protein (Plaimast *et al*. 2008). Vitellogenin may be increased when zinc concentration increases because of transfer of zinc which is stored in the liver to the yolk of the eggs (Richards 1997). Moreover, majority of zinc and other trace elements in the egg are deposited in the yolk and much smaller quantities are deposited into albumen (Richards 1997). The total zinc content of egg of broiler breeders in different dietary treatments of zinc did not differed significantly at 35 weeks of age. During the further periods of study, the zinc content of total egg differ significantly (P<0.05) with lowest levels was observed in T_0. The average zinc content of total egg differed significantly (P<0.05) with lowest levels observed in T_0. Similar observations were also reported by Hudson *et al*. (2004). They reported that eggs from hens given diet with supplemental zinc from ZnAA had higher level of zinc content in the egg which they observed to be significantly higher in ZnAA group (62.8 ppm) than that of ZnSO4 group (56.0 ppm). Some researchers have reported that zinc content of hen's egg increased by supplementing zinc in the diet of laying hens (Mabe *et al*. 2003).

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