



Research Article

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Optimal application of organic zinc in drinking water to improve the immune responses and to balance the hormones in broiler breeder hens

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ABSTRACT

Zinc in antioxidant systems, strengthen the immune system are effective hormone. The purpose of this study, the effect of different levels of zinc on blood parameters, safety breeder hens were hormone. Methods: In this study 60 Ross 308 broiler breeder hens from week 19 to 31 were divided randomly into 5 groups. Birds of a diet based on corn and soybean meal with 110 mg per kg mineral supplements fed on. Used source of organic zinc (Zn-methionine), who is drinking at levels of 0, 100, 200, 300 and 400 mg per liter in drinking water was used from the beginning of week 19. Each of the 5 treatments, 3 replicates each were 4 chickens. In the week of 26 (5% of production) and 31 (peak), blood samples from 12 birds per treatment were collected. Measured parameters included serum concentrations of FSH, LH, estradiol, cortisol, insulin, IGF-1 and IgY. In stage 5% of production, particularly on the amount of organic 300 ppm increase in serum LH. Serum insulin with the amount of organic 400 ppm on the stage and receive 5% of the organic content of 300 ppm at the peak of increased production. Serum cortisol amounts of organic 300 ppm on the stage and receive 5% of the peak value of 200 and 100 ppm on organic production declined. At peak production, getting 100 ppm Zinc serum IGF-1 was increased. In stage 5% of amounts 400, 300, 200 ppm on the organic increase in serum IgY. The results showed that the amount of organic ppm 300 for the production of drinking at 5% and the amount of the organic ppm 100 for beverage can production at the peak of egg production areas for improvement and provide immune response breeders.

Key words: Zinc, Broiler breeder, Immune system response.

INTRODUCTION

Zinc in many body tissues chicken significant concentration can be found. Zinc in many antioxidant systems involved and effective in improving and immune system hormone. More than 200 chemical reaction leading to the production of vital proteins known as enzymes that are directly related to the intervention. Insulin in insulin-producing cells in the pancreas to secrete form is attached to the stored until needed. Zinc deficiency leads to a deficiency in insulin-dependent systems. One of them is the reproductive system and the production of sex hormones. Zinc is also essential for the activity of the enzymes involved in energy metabolism and deficiency leads to muscle weakness, especially in female athletes[1]. Due to increase in the human population, the need for food resources is an important question. Food sources for human beings can refer to white meat poultry submitted that plays a particular role in this regard. In poultry prevention of diseases through proper implementation of health and bio-security program. Normally severe food restriction of broiler chicken in the period as a strategy to increase profitability and viability goes to work. Diet food restriction leads to improved resistance to infectious diseases are kind. In addition to improving humeral immune response, prevent destruction of the thymus gland and the exchange that naturally occur with age. The role of the immune system by increasing the number of thymocytes and lymphocytes T cells and the activity of immune cells and neutrophils and macrophages and production of antibodies and interferon production and reduce the permeability of the cells against the virus. To improve the performance of the team and myelin and lymphocyte proliferation and the production of enzymes such as DNA and RNA meta-

effective. In addition to the decreased production of IL-2 dietary zinc deficiency causes lymphoid organs protect the integrity and function of T cells is. Add the chicken breast with methionine in the diet improves the immune system and increase resistance against Salmonella and E.coli antibodies titer in next generation will be [2, 3]. The purpose of this study, the effect of adding various concentrations of zinc in the diet breeder Changes in hormonal parameters in blood safety.

EXPERIMENTAL SECTION

Out of 30,000 broilers breeder hens in the randomly selected 60 pieces of chicken were numbered. Different treatments since the beginning of the nineteenth week by week's end thirty-first was applied at a salon. Day-old chicks of broiler breeder strains were raised until the age of 19 standard weekly schedules.

The composition of the methionine at four levels: 100, 200, 300 and 400 mg per liter in drinking water were added. This material was measured by a digital scale with a precision of a hundredth of a gram. Drinking water supplemented lighting during the hours of the herd was in accordance with the management plan. Repeat the experiment with five treatments and art treatment 3 (4 hens in each replicate) were performed. The experimental units per treatment (12 birds) with a numbered plaque and individuals. During the test period, management profile programs such as vaccinations and antiparasitic drugs and antibiotics were treated like feeding. Feeding various vitamins was also on the agenda. Treatments were applied as follows:

Treatment 1: control without using a combination of methionine on drinking

Treatment 2: the concentration of organic drinking 100 ppm

Treatment 3: the concentration of organic drinking 200 ppm

Group 4: the concentration of organic drinking 300 ppm

Group 5: the concentration of organic drinking 400 ppm

Experimental materials: the organic composition of zinc-methionine was tested using the existing amount of 180,000 mg per kg. The combined company build brand Zinpro America Avila Zinc. These additives can be used on both drinking and premixes are mixed in the feed. In this experiment, the compound was used for drinking.

Diets: chicken diet based on corn and soybean meal with standard ratios between nutrients according catalogs received this race. For birds test three diets: in weeks 19 to 25 weeks 26 weeks 25% of production and 25% of the peak production was made during the trial period. The difference in the nutrient content of the diet there for treatment. The difference between treatments due to the difference in the amount received for the organic composition of zinc-methionine was drinking. Tables prepared diets based on the needs of the Ross 308 broiler breeder hens catalog. 1. The mineral supplement of 25% for Ross 308 broiler breeder strain catalog was based on each kilogram contains the following compounds: 4000 ppm copper, 800 ppm iodine, iron, 20,000 ppm, and 48,000 ppm min., 120 ppm and 44,000 ppm zinc selenium. 2. Special vitamin supplement of 25% on the basis of Ross 308 broiler breeder strain catalog, which contains compounds per one kilogram follows: IU/kg 4400000 Vitamin A, IU/kg 1400000 vitamin D3, IU/kg 40000 vitamin E, mg / kg2000 vitamin K3, mg/kg 1200 Vitamin B1, mg/kg4800 vitamin B2, mg/kg22000 vitamin nicotinic acid, mg/kg 6000 vitamin pantothenic acid, mg / kg 2000 vitamin B6, mg/kg120 vitamin biotin, mg/kg800 vitamin folic acid, mg/kg12 g of vitamin B12 and g/kg3 antioxidants.

Measurement of blood parameters: at week 26 (5% of production) and 31 (peak) blood sampling was performed 12 repetitions in treatment the wing vein. Parameters measured included blood concentrations of FSH, LH, estradiol, cortisol, insulin, IGF-1 and IgY was in my head. Blood samples three cc disposable syringe and at certain hours of the day (5-3 pm) was performed. Blood samples three cc disposable syringe and at certain hours of the day (5-3 pm) was performed. The blood samples were centrifuged and the serum was separated from the plasma.

RESULTS AND DISCUSSION

Effects of the organic drinking on average, LH, FSH and estradiol serum: ANOVA test results showed, the organic increase in serum LH Step 5% production did not change significantly ($P < 0.01$). In Step 5% of the amount of the organic ppm 300 for drinking caused the highest increase in serum LH ($P < 0.01$). 5% in stage production, significant amounts of organic ppm 400 and 300 on serum FSH to control in the amounts of 200 ppm and 100 did not cause the organic decrease in serum FSH ($P < 0.01$). At the height of production, the amount of organic ppm 300 on serum FSH drinking reduces the amount was 200 ppm ($P < 0.05$). In stage 5% of the amount of organic ppm 200 for drinking led to a significant reduction in serum estradiol ($P < 0.01$) (Table 3-1).

Table 3.1 Comparison of the effects of different levels of organic zinc for drinking on average, LH, FSH and estradiol serum

Estradiol(pg/mL)		FSH (mIU/mL)		LH (mIU/mL)		Concentration	Treatment
pic	5%	pic	5%	pic	5%		
70.58	58.58 ^a	4.22 ^{ab}	6.58 ^a	3.05	7.81 ^b	ppm0	1
69.66	56.75 ^a	4.15 ^{ab}	5.68 ^c	3.34	8.14 ^{ab}	ppm100	2
71.66	52.16 ^b	4.44 ^a	6.21 ^b	3.22	7.72 ^b	ppm200	3
70.08	60.83 ^a	3.95 ^b	6.70 ^a	3.21	8.46 ^a	ppm300	4
70.09	59.72 ^a	4.20 ^{ab}	6.93 ^a	3.40	8.19 ^{ab}	ppm400	5
2.145	1.547	0.102	0.126	0.124		0.151	SEM
0.971	0.002	0.027	0.0001	0.343		0.007	P _{value}
10.55	9.31	8.43	6.81	13.30		6.52	CV

Common letters in each column indicate no difference and non-common letters indicate a significant difference in the level of $\alpha = 5\%$.

Effect of the Organic for drinking on average, insulin, cortisol and serum IGF-1: Analysis of variance showed that, at 5% of the amount of organic ppm400 for drinking increased serum insulin ($P < 0.01$). At the peak of production for drinking increased amounts of organic 300 ppm on serum insulin ($P < 0.01$). In stage 5% of the amount of organic 300 ppm for drinking decreased serum cortisol compared to other treatments ($P < 0.01$). In stage 5% of the amount of organic 100 ppm for drinking compared with serum cortisol levels were 300 ppm and 200 on the organic increase ($P < 0.01$). At the height of production, the amounts of organic 200 and 100 ppm for drinking decreased serum cortisol compared to the control ($P < 0.01$). At the peak of production also amounts on organic 400 and 300 ppm for drinking increased serum cortisol compared to the control ($P < 0.01$). At the height of production, the amount of organic 200 ppm for drinking caused the greatest decrease in serum cortisol concentration ($P < 0.01$) (Table 3-2).

Table 3-2- Compare the effects of different levels of organic zinc for drinking on average, insulin, cortisol and serum IGF-1

IGF-1 (ng/mL)		(ng/mL) cortisol		(mIU/mL) insulin		concentration	treatment
pic	5%	pic	5%	pic ¹	5%		
47.55 ^{bc}	30.75	60.45 ^b	53.86 ^{ab}	2.29 ^b	2.36 ^b	ppm0	1
52.16 ^a	31.12	54.25 ^d	54.84 ^a	2.30 ^b	2.36 ^b	ppm100	2
48.43 ^b	30.76	57.43 ^c	53.18 ^b	2.33 ^{ab}	2.42 ^b	ppm200	3
44.92 ^c	31.10	64.43 ^a	51.29 ^c	2.35 ^a	2.37 ^b	ppm300	4
47.93 ^{bc}	31.81	67.11 ^a	54.02 ^{ab}	2.33 ^{ab}	2.62 ^a	ppm400	5
1.110	0.567	1.052	0.493	0.012	0.028		SEM
0.0008	0.057	0.0001	0.0001	0.022	0.0001		P _{value}
7.99	2.97	6.01	3.20	1.87	4.01		CV

Common letters in each column indicate no difference and non-common letters indicate a significant difference in the level of $\alpha = 5\%$.

Effect of the Organic for drinking on average IgY: The results of analysis of variance showed that, at 5% production increase in downloads on organic drinking increased significantly $P < 0.01$ IgY) serum so that the values of 400, 300 and 200 ppm on organic Beverage maximum amount of head were compared to control ($P < 0.01$). At peak production, the amount of organic ppm 200 for drinking serum IgY was significantly decreased ($P < 0.01$). Also, IgY organic serum used on other surfaces showed no significant difference with control treatment (Table 3-3).

Table 3.3 Comparison of the effects of different levels of organic zinc for drinking on the mean serum IgY

IgY (UR/mL)		concentration	treatment
pic	5%		
18.31 ^{ab}	16.69 ^d	ppm0	1
18.03 ^{bc}	16.76 ^{cd}	ppm100	2
17.92 ^c	17.04 ^{bc}	ppm200	3
18.25 ^{ab}	17.21 ^b	ppm300	4
18.41 ^a	17.54 ^a	ppm400	5
0.103	0.115		SEM
0.007	0.0001		P _{value}
1.95	2.34		CV

Common letters in each column indicate no difference and non-common letters indicate a significant difference in the level of $\alpha = 5\%$.

In birds, ovulation requires the formation of LH peak and peak progesterone is essential for the formation of the LH peak. The main progesterone hormone secreted by the granulosa cells of mature follicles (F1) in birds. Affects the ovaries and the hypothalamus to stimulate ovulation for LH peak. Before ovulation, progesterone production by the follicle F1 for 6 to 8 hours of peak hormone GnRH from the hypothalamus remains and the cause is. Following the phenomenon of the anterior pituitary LH and FSH increases. Increased levels of progesterone secreted by the granulosa cells of mature follicles (F1) which is increased by stimulating LH complements the positive feedback loop that LH peak 4 to 6 hours before ovulation provides [4, 5, 6]. FSH concentration leads to an increase in estradiol concentration is [7]. High concentrations of estradiol stimulates hypothalamic-pituitary necessary to effect

positive feedback of progesterone to stimulate the formation of vitellogenin in the liver, regulate calcium metabolism, promote and maintain efficiency sustain oviduct and secondary sexual characteristics. Low concentrations of estradiol led to a weakening trend analysis and follicular development is oviduct [8, 9, and 10]. 5% in the production phase, the organic supplement drinking water with 300 ppm increases the amount of serum or serum FSH levels with increasing the concentration of estradiol did not change. This lack of coordination in serum FSH increases or changes in serum estradiol level with other similar studies, the alignment changes did not match the three hormones [4, 5, and 8]. In amounts of 200 ppm 100 and the organic reduction in the amount of 200 ppm on organic FSH estradiol was decreased ($P < 0.01$). FSH estradiol decreased with decreased estradiol and FSH. This reduces alignment with other similar studies, the alignment changes were in these two hormones [7]. At peak production, LH and estradiol concentrations were not affected by treatments on organic but organic content of 300 ppm on FSH was decreased ($P < 0.01$). FSH decrease was associated with decreased serum estradiol or change the amount of LH. This inconsistency in reducing the amount of LH serum estradiol or with other similar studies, the alignment changes did not match the three hormones [4, 5, 6, and 7]. Organic was observed using the serum LH levels in the ppm 300 for beverage production increased 5%, but the amount of the organic decrease in FSH and estradiol levels were 200 ppm. So at least in this age of the organic ppm 300 for Beverage estimated. At the peak value of 300 ppm on organic production decreased LH and FSH concentrations of estradiol, but not under the influence of organic zinc. So the minimum requirement to organic in this age, less than 300 ppm on a drinking Organic estimated. Increased concentrations of serum LH in response to receiving the organic can be caused by increased stimulation of the production of progesterone and is stimulatory effect of progesterone on LH production [11, 12, and 8]. High concentrations and prolonged cortisol can lead to increased insulin secretion. Liver glycogen storage increases cortisol and increased blood glucose by stimulating the catabolism of protein and stimulates gluconeogenesis routes. In a healthy bird, the resultant action of insulin and cortisol helps maintain blood glucose levels are within normal limits. Cortisol is secreted from the adrenal glands in birds. Mammalian secretion of cortisol ACTH hormone secreted by the anterior pituitary gland primarily regulated. Serum cortisol concentration increases due to different environmental stimuli that represent non-specific response of the bird is stressful environmental conditions. In the chicken progesterone inhibits the secretion of cortisol. At the time of ovulation that the rapid increase in progesterone, estradiol and LH occurs, plasma concentrations of cortisol are reduced. Reduced serum cortisol concentrations increased system throughput cell-mediated immunity with lymphocyte percentage drop in circulation. At the same time the bird allergy and infectious viral diseases increases. In chicken plasma concentrations of cortisol, 20 and 2 hours before ovulation that lives at the highest level for this time of the LH surge before ovulation to regulate and eventually cause the egg stuff. In this study was observed in the 5% of the amount of organic ppm 400 for drinking increased the concentrations of serum insulin and other values were used on organic control ($P < 0.01$). In stage 5% of the amount of organic ppm 300 for drinking decreased serum cortisol and other values were used on organic control ($P < 0.01$). 5% in stage production, which was expected to reduce serum cortisol in response to the organic content of 300 ppm, the concentration of serum insulin use this level as a result of reduced, which, as shown in Table 3-2 serum insulin concentration of 300 ppm on the amount of organic matter did not fall. This reflects the impact of other factors that play a role in regulating the levels of these hormones. The 5% organic production that reduces the amount ppm 300 on serum cortisol were associated with the highest serum LH (Table 3-1), probably due to increased progesterone at this stage and that correspond with other [13, 14]. At the peak of production for drinking increased amounts of organic ppm 300 on serum insulin and other values were used on organic control ($P < 0.01$). At the peak of 200 ppm and 100 on organic production amounts to reduce serum cortisol and ppm 400 and 300 on serum cortisol amounts of organic increase compared to the control ($P < 0.01$). At the peak of production increased amounts of cortisol and insulin ppm 300 on the penis, which has significant change in serum LH than 5% in production was witnessed on stage. The effective blood [13, 14]. At the height of production, the amount of organic ppm 100 for drinking have significantly increased serum IGF-1 as compared to the control ($P < 0.01$). At peak production, more than ppm 100 on organic values for drinking did not because significant differences in IGF1 serum control (Table 3-2). Poultry is thought the effects of growth hormone on the growth of somatic cells in circulation by increasing the concentration of insulin-like growth factors (IGF-1) by increasing their production of the liver. Pituitary secretion of growth hormone and IGF-1 plasma levels in chickens taken pituitary reduced. These chicks are taken in pituitary growth hormone injections increased the concentrations of IGF-1 and long-term growth is improving. In vitro, as well as increased production of growth hormone IGF-1 from the liver cells, especially in the presence of insulin. IGF-1 blood concentrations increase in a negative control cycle, thereby reducing the production and secretion of growth hormone. The use of IGF-1 in vitro and in vivo in chickens reduces the secretion of growth hormone. IGF poultry have similar effects on metabolism and insulin regulation plays an important role in the proliferation and differentiation of cells and tissues are growing. The liver is the production and secretion of peptides into the blood stream, although these peptides are also produced in many other tissues and environmental effects (autocrine-paracrine) are [15, 16]. Research has shown that IGF-1 on the growth of ovarian follicles and egg production is important [17, 18, and 19]. Was observed at the peak of production for drinking increased amounts of organic ppm 100 on serum IGF-1 and other amounts received on organic cause no significant difference with control ($P < 0.01$). However, the amounts of organic ppm 200 and 100 compared with 300 ppm of

the organic increase in serum IGF-1 ($P < 0.01$) (Table 3-2). 200 ppm and 100 on organic diets were compared with 300 ppm of the organic decrease in serum cortisol was at the peak of production (Table 3-2). The amount ppm 100 ppm 300 on organic compared to the amount at the peak of production was reduced serum insulin levels (Table 3-2). Value of 200 ppm to 300 ppm organic compared to the amount of the organic increase in serum FSH levels peak production was also (table 3-1) stimulatory effect of IGF-1 with the result of research on the growth of ovarian follicles correspond reported [17, 18, and 19]. So it was observed that at the peak of production increased serum IGF-1 reduced the use of organic together with insulin, and cortisol and serum FSH was increased. In a similar study on pigs, increased the increased the concentrations of IGF-1 and IGF-1 receptor gene expression in intestinal mucosa were [20]. Immunoglobulin G (IgG), immunoglobulin with the highest concentrations in blood serum. IgG is a 7S immunoglobulin. IgG, immunoglobulin birds is greatest. Immunoglobulin G ability opsonized out, agglutination and sedimentation of the antigen is out. Some IgG subtypes may be transferred to our cells and therefore increased sensitivity type, participate. IgG immunoglobulin IgG larger birds and mammals because compared to the original, 7S immunoglobulin IgG in mammals, birds with certain differences in their structure and physicochemical characteristics, These proteins are found in birds IgY. Immunoglobulin IgY antibodies of the immune system against pathogenic antigens in the blood is produced. In stage 5% of the herd with severe stress, yet not encountered, was seen getting on Organic minimum requirement is 200 ppm. Chicken with stress will peak in intense that are known to produce stress, and birds make you more susceptible to diseases. At the height of production, the amount of organic ppm 200 for drinking was significantly decreased serum IgY. 200 ppm organic serum IgY value on the amount of organic ppm100 showed no significant difference, but serum IgY 200 ppm 300 ppm on organic than organic lower, and the difference is statistically significant ($P < 0.01$). Therefore, since the peak value of 300 ppm get the minimum amount of the organic is organic with no significant statistical control, to strengthen the immune system, get the organic content of 300 ppm is the minimum amount required. The result of humoral immune responses resulting from the use of the organic corresponded to other similar studies [21, 22, 23, and 24].

CONCLUSION

5% in stage production, feeding on the organic ppm 300 for drinking can increase and decrease in serum cortisol serum LH and IgY egg production in breeder provide areas for improvement. At the peak of production, feeding of the ppm100 the organic drinking can increase IGF-1 and a decrease in serum cortisol production areas for improvement mother's egg supply.

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