IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 9, Issue 5 Ver. I (May. 2016), PP 71-73
www.iosrjournals.org

Effect of Organic Selenium in Broiler Diet on Slaughter Traits and Plasma Lipids

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Abstract: *The abstract Regarding to basic selenium characteristics and problems in using of sodium selenite as inorganic source of selenium, the assignment of this experiment was replacement of inorganic selenium in concentrate fodder with organic selenium as selenium methionine.*
Hybro type chickens were used as experimental material. The 150 broilers were separated into 3 groups: control, with 0.3 mg/kg of sodium selenite, treatment 1 group with organically bound selenium (Sel-Plex) added to achieve 0.3 mg/kg of selenium, and treatment 2 group fed with meals with no addition of selenium.
At the end of experiment control slaughter was performed (10 chickens per group), choosing the chickens that in the best way represent an average weight of their groups. Organic selenium contributed in improvement of carcass composition, especially in increasing the dressing percentage, breast meat yield and decreasing the abdominal fat content, together with plasma cholesterol and triglycerides level. The results of above mention experiment show that addition of organic selenium in meals has positive impact on carcass composition and plasma lipid status of fattening chickens.
Keywords: *abdominal fat, broiler, cholesterol, carcass, triglycerides*

I. Introduction

The introduction of the paper should explain the nature of the problem, previous work, purpose, and the contribution of the paper. Biochemical processes depend on presence of sufficient amount of trace elements and it is very important for obtaining and maintaining good health state and high production results [1]. One of these elements is selenium. It plays important role as a part of glutathione peroxidase (GSHpx) and phospholipid hydroperoxide glutathione peroxidase (PH-GSHpx) the major antioxidant enzymes. Deficiency of this element affects animals and promote many diseaes such is liver necrosis, exudative diathesis, poor feathering etc. [2]. Inorganic forms of selenium, selenite and selenate, are predominate forms of selenium in poultry trace mineral premixes although sodium selenite express a negative pro-oxidant influence. When fed in excess, selenium is toxic to tissue cells and becomes an environmental contaminant through fecal excretion [3].

Therefore, the maximum levels for feeding selenium to various animals are subject of work of regulatory bodies worldwide. Yet, there is a fact that inorganic selenium is not in the natural form that animals can fully metabolize and is therefore poorly absorbed and retained, which cause selenium deficiencies even at the maximum allowable selenium feeding levels. Sel-plex, or selenomethionine form of selenium is natural and god metabolized within the body to yield high bioavailability and retention [4]. As organic sources are more readily absorbed they are in turn more readily metabolized to support selenium dependent body functions while reducing the threat of selenium toxicity and environmental polution.

Organically bound selenium that contains a cocktail of selenium compounds with selenomethionine as the primary form of selenium is very similar to the organic profile in plants [5]. There are evidences that organic form of selenium is more effective than sodium selenite and showing better physiological effect in organism. Investigations have shown that organic form of selenium has better influence than sodium selenite in terms of induction of feathering and in reducing drip loss from breast meat [6][7]. Tissue accumulation and retention was better using organically bound selenium versus inorganic form [8]. Body weights and feed conversions can be improved in broilers fed organic selenium comparing them to those fed selenite [7].

Rutz, et al, [9] found differences when inorganic selenium (sodium selenite) was administered in doses of 0.5 ppm selenium, and organic selenium in doses of 0.3 ppm in broiler cickens, where organic selenium expressed the superior efficiency. They recorded a higher body weight and feed conversion ratio in broiler chickens, which received feed supplemented with organic selenium (Sel-Plex). Similar results, with positive effect of organic selenium on production abilities of broiler chickens have been presented in our previous papers [10] [11][12].

Considering all above mentioned we found interesting to perform a trial with the aim of recording the influence of the organic selenium on some slaughter parameters in broiler chickens at one commercial farm in Serbia.

II. Materials and Methods

Hybro type chickens were used as experimental material. The 150 broilers were separated into 3 groups: control, with 0.3 mg/kg of sodium selenite (C), treatment 1 group fed with meals with no addition of selenium (T1) and treatment 2 group with organically bound selenium added to achieve 0.3 mg/kg of selenium (T2).

At the end of experiment, which lasted 42 days control slaughter was performed (10 chickens per group), choosing the chickens that in the best way represent an average weight of their groups. Chickens were slaughtered after 12 hours of food deprivation. The carcass yield and meat quality were determined by cutting. In order to determine the meat quality, by cutting, the carcass weight, and weight of the component parts: breast, legs, back, wings, and abdominal fat were determined. At the same time, blood samples were taken for cholesterol and triglycerides content determination (ILAB 300 PLUS photometry).

The data were statistically analyzed by analysis of variance and testing by Tukey-Kramer Multiple Comparisons Test using software Graphpad Instat.

III. Results and Discussions

Table 1. Slaughter traits in the experiment

Group	C	T1	T2	P
Carcass mass (g)	1333.57 ± 20.23^{ab}	1275.00 ± 21.50^{a}	1360.00 ± 20.5^{b}	P=0.02 *
Breast mass (g)	380.8±11.06	376.17±12.01	387.53±11.7	P=0.781 NS
Drumstick and thigh mass (g)	394.40±10.83	385.41±11.26	395.89±12.96	P=0.793 NS
Abdominal fat mass (g)	32.20±2.85	33.00±2.95	30.24±2.76	P=0.981 NS

*Values in the same row with different superscript letter are significantly different

At the end of the experiment the highest body weight is obtained in group T2 fed with added organic selenium, which in relation to the control group K, with added inorganic form of selenium, was higher, as well as in comparison to the T1 group without added selenium, which achieved the lowest body weight.

Chickens' carcass mass in the control group was 1333.57 g, which is in relation to the T1 group better for 4.5%, while the T2 group achieved carcass mass of 1360 g which is 6.6% better in relation to the control group. This has resulted in dressing percentage that was significantly different ($P<0.05$) between groups T1 and T2.

Breast mass in the group fed diet with added organic selenium was 387.53 g, which was 1.76% higher in comparison to the control group and 3.01% in relation to the group T1, which was fed with selenium supplement. Organic selenium in the amount of 0.3 mg per kilogram increased amount of drumstick and thigh in comparison to other two groups.

The lowest amount of abdominal fat was found in experimental group T2 in comparison to other groups, with no determined statistical significance ($P>0.05$), but with tendency for lowering the amount of fat.

Table 2. Serum lipids in the experiment

Group	C	T1	T2	P
Cholesterol, mmol/L	2,41±0,094	2,43±0,098	2,34±0,065	P=0,069 NS
Triglycerides, mmol/L	$1,28\pm0,02^{ab}$	$1,31\pm0,02^{a}$	$1.235\pm0,01^{b}$	P=0,033 *

*Values in the same row with different superscript letter are significantly different

The use of organic in fattening chickens gives more favorable responses in terms of production results, while insufficient amount of selenium in the fodder mixture can cause the reduction of production efficiency.

In comparison with the results presented by other authors, we can find our results similar in regard to slaughter parameters, although the final body weights of chickens were slightly different, but yet confirmed in regard to organic selenium effects [10][11]. Edens [2] by examining both sources of organic and inorganic selenium and combining the different levels of selenium, found that there was an improvement that was in compliance with our research. The use of organic selenium in fattening chickens is giving more favorable responses in terms of production results, while insufficient amount of selenium in the fodder mixture can cause the reduction of production efficiency.

Abdominal fat was decreased in our research as an effect of the supplement but difference was not significant ($P>0.05$). Similar results were given by Gholam et al [13], were an organic selenium additive did not decrease the level of abdominal fat enough to find statistical significance, although it was lower.

Kang et al. [14] reported that selenium exerted a hypocholesterolemic effect where total cholesterol and triglyceride levels in rabbits were decreased, that is in accordance with our results. Also, Dhingra and et al [15] claimed that Se deficiency regulates the LDL receptor which is important in regulating the cholesterol level in plasma.

IV. Conclusion

In the experiment after examination of organic selenium in relation to the inorganic selenium source, following conclusions can be made:

- The group of chickens fed with organic selenium obtained the highest body weight;
- The mass of the carcass was highest in the group fed with the addition of organic selenium and the lowest proportion of abdominal fat was registered in relation to the other two groups;
- Total cholesterol and triglyceride levels in broilers were decreased under the influence of organic selenium;
- Achieved results in these experiment indicate that the application of organic selenium improves the growth of fattening chickens, as well as several parameters of meat at slaughtering. The results in this study impose the need for further research with different levels of organic selenium in the mixture of fodder for feeding fattening chickens.

References

[1]. Stolić N., Aleksandra Jevtić-Vukmirović, Filipović P., Organski selen u krmnoj smeši i njegov uticaj na kvalitet trupa pilića u tovu XII Savetovanje o Biotehnologiji. Čačak 2007 god, str 201-207.
[2]. Edens, F.W., T.A. Carter, C.R. Parkhurst and A. E. Sefton, Effect of selenium source and litter type on broiler feathering. J. Appl. Poultry Res. 2000, 9:407-413.
[3]. Koller, L., Exon J., The two faces of selenium deficiency and toxicity are similar in animals and man. Can J.Vet.Res., 1986, 50, 297-306.
[4]. Schrauzer, G.N., Selenomethionine: A review of its nutritional significance, metabolism, andtoxicity. J. Nutri., 2000, 130:1653-1656.
[5]. Kelly, M.P. and R.F. Power., Fractionation and identification of the major selenium-containing compounds in selenized yeast. J. Dairy Sci. 1995;78:237
[6]. Ferket, P.R. and E.A. Foegeding., How nutrition and management influence PSE in poultry meat In: Proceedings from BASF Technical Symposium, Multi-State Poultry Feeding and Nutrition Conference, Indianapolis, IN, 1994, pp. 64-78.
[7]. Edens, F.W., Organic selenium: From feathers to muscle integriu to drip loss. Five years onward: No more selenite! In: Biotechnology in the Feed Industry. Proc. 12th Annual Symposium (T.P. Lyons and K.A. Jacques, eds.). Nottingham University Press, Nottingham, UK, 1996, pp. 165-185.
[8]. Norheim,G and K.Moksnes., Distribution and elemination of seleniur and gluthatione peroxidase(GSH-Px) in chikens after suplementation with sodium selenite or selenimethionine.In:Proceedings:Fifth International Symposium on Trace Elements in Man and Animals.CAB,Farnham Royal,Slough,UK, 1985, pp 493-495.
[9]. Rutz, F., Pan, E.A., Xavier, G.B., and Anciuti, M.A., Meeting selenium demands of modern poultry: responses to Sel-plex TM organic selenium in broiler and breeder diets, Nutritional Biotechnology in the Feed and Food Industries, Lyons, T.P. and Jaques K.A. Eds, 2003, 147-161
[10]. Perić L, Milošević N, Žikić D, Kanački Z, Džinić N, Nollet L, Spring P., Effect of selenium sources on performance and meat characteristics of broiler chickens. J Appl Poult Res. 2009;18:403–409.
[11]. Krstic B, Jokić Z, Pavlović Z, Zivković D., Options for the production of selenized chicken meat. Biol Trace Elem Res. 2012; 146:68–72.
[12]. Savaram Venkata Rama Rao, Bhukya Prakash, Mantena Venkata Laxmi Narasimha Raju, Arun Kumar Panda, Saharia Poonam, Orugonda Krishna Murthy, Effect of supplementing organic selenium on performance, carcass traits, oxidative parameters and immune responses in commercial broiler chickens. Asian-Australas J Anim Sci 2013 Feb;26(2):247-52
[13]. Gholam Reza Zaboli, Abdolhossein Miri, Hasan Hoseynyan Bilondi, The effect of dietary antioxidant supplements on abdominal fat deposition in broilers. Life Science Journal 2013;10(2s)
[14]. Kang, B.; Bansal, M. and Mehta, U. Hyperlipidemia and type I 5′-monodeiodinase activity: regulation by selenium supplementation in rabbits. Biol. Trace Elem. Res., 2000, 7: 231-239.
[15]. Dhingra, S. and Bansal, M. Attenuation of LDL receptor gene expression by selenium deficiency during hypercholesterolemia. Mol Cell Bioch*em., 2006, 282:75-82.*