



Short communication

Effect of organic and inorganic sources of selenium on semen quality in roosters

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<p>Article history Received: 6 Oct, 2015 Revised: 8 Nov, 2015 Accepted: 11 Nov, 2015</p>	<p>Abstract The present study was conducted to find the effect of organic and inorganic Se on the semen quality of roosters. Three experimental groups were constituted with total of 24 males (these groups) supplemented with organic Se (0.35 mg/kg), inorganic Se (0.35 mg/kg) and without any supplementation (control). The results revealed that Se supplementation in both form improved sperm concentration and total number sperm per ejaculate with no effect on the semen volume. Further semen quality was not affected by the age of the roosters. Additionally, organic Se proved to be the superior form in comparison with inorganic Se. Keywords: Selenium; rooster; semen</p>
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Introduction

It has been well documented that selenium (Se) is an important trace element that plays an essential role in the animal and poultry reproduction (Surai, 2002; Khan, 2011). This element is also an important constituent of approximately 25 selenoproteins inside the body (Ursini et al., 1997; Kryukov et al., 2003) which take part in the regulation and control of diverse physiological functions including maintenance of well-balanced redox system, regulation of gene expression, thyroid function, and integrity of sperm morphology (Surai, 2002; Khan, 2011). In animals including poultry, this element can be found in high concentration in the tissue like endocrine glands and reproductive organs (Jankowski et al., 2011). Selenium is an integral part of the spermatozoa and one of the essential parts for the process of spermatozoa. In Se deficient roosters, the number of Sertoli and Leydig cell decreased significantly affecting adversely sperm formation and testosterone secretion (Edens and Sefton, 2002).

The special characteristic of Se is its anti-oxidative property and its active role in the formation of glutathione peroxidase which is important constituent of spermatozoa and seminal plasma. This essential element has important consequence for fertility and its deficiency causes a number of defects including reduced number of spermatozoa, sperm motility and fertilizing ability of sperm in domestic animals (Surai, 2000; Jankowski et al., 2011). Inorganic form of Se is found as selenite or selenate and selenomethionine in the organic form (Jankowski et al., 2011). Literature review suggests that organic form provides greater Se reserves in the body and a more efficient transfer to the egg (Surai, 2002). It has been reported that Se supplementation in the organic form in broiler breeder semen suggests that the effect is linked with timely development of secondary sexual characteristics and improved hormonal profile (Edens, 2002). The present study was designed to find the effect of organic and inorganic sources of Se on the semen quality of roosters.

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Materials and Methods

Twenty seven males were maintained under standard husbandry conditions. Feed was supplemented with inorganic Se (0.25 mg/kg of Se from sodium selenite) and water was provided *ad libitum*. Roosters were provided 14 hours light period. At 22 week of age, the roosters were randomly distributed into three groups. The birds in group I served as control (with no Se supplementation in the feed), the birds in group II were supplemented with 0.35 mg/kg of organic Se obtained from Sel Plex (Alltech Inc.), and the birds in group III were provided with 0.35 mg/kg of inorganic Se in the form of sodium selenite. The birds were fed the Se-enriched diet for three week before study parameters were recorded. Semen was collected from individual birds by the method of abdominal massage (Burrows and Quinns, 1937). Semen characteristics were determined at an interval of 2 week. Semen volume was measured with the help of a syringe with graduation of 0.05 ml. Sperm concentration was determined using the photometric method (Bakst and Cecil, 1997). Two-way ANOVA was used to analyze the results of the experiment. Differences between means were separated by Duncan's tests. The differences were considered significant at $P \leq 0.05$. Statistica software (Version 9.0, 2007, StatSoft Inc., Tulsa, OK) was used for statistical analysis.

Results

Semen from roosters fed Se had a higher sperm concentration and total number of sperm (Table 1). Nonetheless, no significant difference was found between roosters fed organic and inorganic Se. Ejaculate volume did not witness any significant differences over the 7 week evaluated. Furthermore, age had no significant effect on the semen quality parameters.

Discussion

The results in the present suggested that diets containing additional amount of Se can improve the reproductive capacity of male birds. In line with our research, an improved semen quality after Se supplementation has been documented previously for poultry (Ebeid, 2009; Jankowski et al., 2011).

In the present study, we found that supplementation with organic and inorganic Se resulted in improved semen quality of roosters in the form of sperm concentration and total number of sperm. Dimitrova et al. (2007) demonstrated that supplementation of 0.3 ppm Se to the basal diet of Turkey enhanced semen quality in shape of improved fertilising capacity of spermatozoa. Research has demonstrated that deficiency of Se causes poor sperm function (Leonhard, 2000).

Table 1: Effect of form of Se on the quantities parameters of rooster semen

Item	Age of male (wk)	Ejaculated volume (ml)	Sperm concentration ($\times 10^9$ /ml)	Total number of sperm ($\times 10^9$ /ejaculate)
Se supplementation				
No Se	24 (N=8)	0.42	5.17	3.21
	26 (N=8)	0.40	3.62	2.55
	28 (N=8)	0.54	4.42	3.66
	30(N=8)	0.46	4.22	3.11
Organic Se	24 (N=8)	0.46	5.54	3.66
	26 (N=8)	0.52	4.91	3.72
	28 (N=8)	0.58	5.26	4.61
	30(N=8)	0.71	5.16	5.18
Inorganic Se	24 (N=8)	0.59	6.42	5.11
	26 (N=8)	0.44	4.72	3.18
	28 (N=8)	0.50	5.64	3.98
	30(N=8)	0.58	5.62	4.58
Main effect Se supplementation				
No Se (N=24)		0.45	4.35 ^b	3.13 ^b
Organic Se (N=24)		0.56	5.21 ^a	4.29 ^a
Inorganic Se (N=24)		0.52	5.60 ^a	4.21 ^a
Age of male (wk)				
24 (n=24)		0.49	5.71 ^a	3.99
26 (n=24)		0.45	4.41 ^b	3.15
28 (n=24)		0.54	5.10 ^{ab}	4.03
30(n=24)		0.58	5.06 ^{ab}	4.29
SEM		0.018	0.130	0.145

^{a-b}Means within a column with different letters are significantly different ($P \leq 0.05$). Letters indicate statistical significance during the reproductive season; 1N = number of males; n = number of ejaculates.

The results of the present research suggest that diets supplemented with Se can enhance the reproductive performance of rooster males. In line with our research, several authors have documented improved semen quality in poultry species (Ebeid, 2009; Jankowski et al., 2011). In our study, sperm concentration and total number of sperm per ejaculate were significantly high in the treated groups. Findings of the present study indicated that semen volume and total number of sperm were superior in birds fed with organic Se than non-organic Se indicating that the form of Se is important in improving the reproductive capacity of the roosters (Surai, 2002; Ebeid, 2009; Edens and Sefton, 2009; Jankowski et al., 2011).

In the present study, the results indicated that semen volume remained unaffected by the age of the roosters. Similar observation was also recorded in the past (Kotłowska et al., 2005). It is according to the previous finding that quantitative semen parameters alter only slightly during reproductive period (Jankowski et al., 2011).

Conclusion

The result of the present indicated that supplementation of Se improved the semen characteristics in roosters.

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