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Effect of Dietary Addition of two Selenium Sources on Productive Efficiency and Selenium Content in Tissues in Growing Rabbits

Kheld H. Elkholy[1*], Tag El-Deen H. Tag[1], Atia Abd El-Latif[2] and Aml Mekawy[1]
[1]*Poultry Production Dept., Faculty of Agriculture, Dameita University*
[2]*Animal Production Research Institute, Sakha, Agricultural Research Center*

This study was conducted to compare different sources of selenium (Se) and their effects on production performance in growing rabbits. Seventy-five mixed sex growing APRI line rabbits aged five weeks was assigned randomly into five experimental groups. The first (1st) group act as untreated (control) that fed *ad libitum* a commercial basal pelleted diet, whereas the other groups (2nd, 3rd, 4th and 5th) were fed the basal diet supplemented with 0.3 mg Se-yeast kg^{-1} diet as organic Se form (OSe), 0.3 mg OSe kg^{-1} diet plus 200 mg Vit. E kg^{-1} (OSe + Vit. E), 0.3 mg Se kg^{-1} diet as inorganic Se form (ISe) and 0.3 mg ISe kg^{-1} diet as Na_2SeO_3 plus 200 mg Vit. E kg^{-1} (ISe + Vit. E), respectively. The study was lasted for eight weeks throughout the fattening period, from 5 weeks to 13 weeks. The results revealed that final body weight (FBW), daily weight gain (DWG) and performance index (PI) were significantly ($P \leq 0.01$) higher for growing APRI rabbits in treated groups than those of the control group. There were insignificantly differences in liver %, kidney %, heart % and giblets % of the rabbit groups received OSe as compared with ISe. Rabbits received the OSe or ISe had the highest digestibility coefficients (%) of dry and organic matter and crude protein. The Se concentration in the hindleg was significantly higher in the groups added with OSe and OSe + Vit. E than other groups. It could be concluded that Se addition in either organic or inorganic form of growing rabbit in diets exerted some benefits on growth efficiency, digestibility of nutrients, carcass traits, and the residual Se in meat in growing rabbits.

Keywords: Rabbits, Selenium, Productive performance, Digestibility, Meat

Introduction

Weaning is a stage in which all young animals suffers from a lot of stress, caused by the separation from the mother, the transfer into different environment and change in the nutrition. This stress can't be easily tolerated by a young rabbits, resulting in increased concentration of cortisol in systemic circulation and hence immune-suppresion and increased probability diseases exposure (Serkan et al., 2012). When animals exposed to stress, selenium (Se) is used as antioxidant micro-mineral to decrease the adverse effects of free radicals. In this regard, Se is needed for lots of organic chemistry functions in each humans and animals such as antioxidant and immune function (Mahima et al., 2012). Thus, Se is one amongst the essential trace mineral (NRC, 1977), serving as a necessary co-factor in the antioxidant enzymes likewise glutathione peroxidase (GSH-Px), catalase enzyme (CAT), and superoxide dismutase (SOD) within the body; to counteract the damaging effects of reactive oxygen species (ROS) and a lot of peroxides in rabbits (Zhang et al., 2011), that are work to manifest and increase in their damaging activity in tissues of rabbits throughout stress (Liu et al., 2011).

The source of Se is important to provide enough protection. The dietary micro-mineral Se can be supplied for rabbits in organic (OSe) or inorganic (ISe) soure, the latter being historically additional used. In spite of their necessities are low, however if they're not met traditional physiological.and production standing, the antioxidant system may be compromised, causing serious consequences for the animal's normal metabolism (Surai, 2006). On the other hand, source of Se either OSe or ISe controls interactions between dietary Se and GSH-Px activity (Bermingham et al., 2014). Comparing with ISe,

*Corresponding author: khelkholy@yahoo.com
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OSe has a very important profit because the proven fact that selenomethionine is employed within the body as an amino acid (in same way as methionine). Organic Se builds up Se reserves in body tissues, primarily in muscles, in form of selenomethionine, which could improve antioxidant defenses throughout stress conditions (Surai et al., 2016).

Vitamin E (Vit. E) had been reportable to be a wonderful biological antioxidant that protects cells and tissues from free radicals that elicited lipoperoxidative harm (Koinarski et al., 2005). Both Se and vitamin E are essential and highly efficient antioxidants which help to protect rabbits against oxidation of lipid and protein (Muller et al. , 2002; Ebeid et al., 2013).

Also, dietary addition of Se in rabbits is helpful to induce lipid oxidative stability therefore protective meatquality (Dokoupilová et al., 2007). Ebeid et al. (2013) indicated that supplemental dietary Vit. E, Se, or Vit. E+Se enhanced growth performance, Vit. E and Se content in raw meat, meat oxidative stability, serum antioxidative status and immune responsiveness in growing rabbits.

According to our knowledge, there's a scarcity of knowledge relating to the utilization of Se in different sources for improving some production indices of rabbits especially during fattening period attempt to ameliorate weaned stress. Therefore, the objective of the present study is to compare inorganic with organic sources of Se with/or without Vit. E on growth performance, digestibility of nutrients, carcass characteristics, the pH of parts of gastrointestinal tract, and Se content in raw meat in growing rabbits.

Materials and Methods

Diets and animals

Seventy-five APRI weaned rabbits (Egyptian line selected for litter weight at weaning) consistent with Abou Khadiga et al. (2010) were divided randomly into 5 experimental groups of 15 rabbits each of 5 wk of age with an average live body weight of 662.2±9.07 g. The five experimental groups were as follows: The first group was fed ad libitum a commercial pelleted basal diet in line with NRC (1977) recommendations and served as a untreated (control), while the other groups (second; third, fourth and fifth) were fed the basal diet supplemented with 0.3 mg OSe/kg diet, 0.3 mg Ose/kg diet plus 200 mg Vit.E/kg, 0.3 mg Se/kg diet as ISe (Na_2SeO_3, Sigma-Aldrich Chem. Co., St. Louis, MO, USA).and 0.3 mg ISe/kg diet as Na_2SeO_3 plus 200 mg Vit.E/kg, respectively. All the experimental animals were healthy and clinically free from external and internal parasites and were kept in the same management and hygienical conditions.

TABLE 1. Ingredient and chemical composition of experimental diet.

Items	% as fed
Ingredients	
Clover hay	40.5
Wheat bran	25.0
Yellow corn	14.0
Soybean meal (44%)	11.0
Molasses	3.00
Vinasse	3.00
Bone meal	1.75
Calcium carbonate	0.70
Sodium chloride	0.55
Vitamins & Mineral Premix [1]	0.35
DL-Methionine	0.15
Calculated chemical composition, [2]	
Ash	7.8
Crude protein	18.0
Ether extract	3.00
Crude fiber	14.0
Digestible energy, kcal/kg[3]	2720

[1] Vitamins and minerals premix per kilogram diet contains:

Vit. A, 6000.0 IU; Vit. D, 900.0 IU; Vit. E, 40.0 mg; Nicotinic acid, 50.0 mg; Iron, 50.0 mg; Vit. B_1, 2.0 mg; Vit. B_6, 2.0 mg; Vit. K_3, 2.0 mg; Vit. B_2, 4.0 mg; Vit. B_{12}, 10.0 µcg; Biotin, 50.0 µcg; Folic acid, 10.0 mg; Choline chloride, 250.0 mg; Zinc, 50.0 mg; Manganese, 85.0 mg; Copper, 5.0 mg; Iodine, 0.2 mg; Selenium, 0.1 mg; Cobalt, 0.1 mg.

[2]According to NRC (1977) for rabbits.

[3]Digestible energy (kcal/kg DM)= 4253 - 32.6 CF (% DM) – 114.4 Ash (% DM). According to Fekete and Gippert(1986).

Housing

The present study was carried out at the Sakha Experimental Station, Animal Production Research Institute, Agricultural Research Center, Egypt, during breeding season from January to March, 2017. Rabbits were housed individually in individual cages (35×35×60 cm) of standard conventional universal galvanized wire batteries. All cages were equipped with feeding hoppers that were product of galvanized steel sheets, and automatic drinking nipples. The batteries were situated in exceedingly well aired building. Averages of ambient temperature, relative humidity and temperature humidity index inside building were 22.6±0.6°C, 71.0±3.4% and 21.3, respectively, which show absence of heat stress.

Experimental parameters

Live body weight (BW, g) and daily feed intake (DFI, g) were recorded weekly for each rabbit during the growing period (from weaning up to slaughtering commercial age: 13 wks of age). Daily weight gain (DWG, g) and feed conversion rate (FCR, g/g) were calculated weekly. Also, relative growth rate (RGR, %) and performance index (PI, %) were calculated on a group basis:

$$\text{Relative growth rate, \%} = [(W_2 - W_1)\,x100]/\,[1/2\,(W_2+W_1)]$$

whereas: W_1= The initial weight, g and W_2 = The final body weight, g.

Performance index, %= (Final live body weight "FBW, kg"/Feed conversion ratio"g/g") ×100

At the termination of the experiment period, an *in vivo* digestibility trial was carried using 20 male rabbits (4 rabbits in each treatment) for 5 days to determine the digestion coefficients (DC) of the different nutrients of the experimental diets. The DFI was measured and excrement output was collected daily. The excrement was separated from hair and scattered feed. The collected excrement for rabbits of every treatment was pooled along, and dried at 60 C until constant weight. The dried excrement for the ordered 5 days was left few hours to induce equilibrium with the atmosphere then ground, well mixed and hold on in screw-top glass jars for analysis. The analysis of each feed and excretory product was administered in line with A.O.A.C (2005). The values of total digestible nutrients (TDN, %) was calculated in line with Cheeke et al. (1982). The digestible energy (DE, Kcal/Kg diet) values of the current experimental diets were calculated in line with the equation of Schiemann et al. (1972) as following formula:

DE (Kcal / Kg diet) = [(5.28×(DCP g / Kg))+ (9.51 × (DEE g / Kg)+ (4.2 (DCF+DNFE g / Kg) /0.3]

where: DCP= digestible crude protein", DEE= digestible ether extract", DCF= digestible crude fiber and DNFE = digestible nitrogen free extract, respectively.

At the end of the experiment (at the marketing age, 13 wks), four growing rabbits from every experimental group were taken in random way for slaughter when being fasted for twelve hours. When complete hemorrhage, the following carcass traits were determined: dressing percentage (weight of hot eviscerated carcass including liver, heart, abdominal fat and head divided by the live body weight); organs weight as a percentage of live body weight (spleen, kidneys, liver, heart and gastro-intestinal tract "GIT"). The values of pH were measured for stomach, small intestine and caecal contents after filtrated using an OP-110 (Radelkis pH-meter; Hungary).

Selenium mineral content (µg/kg) in meat

Selenium content of the hindleg meat measured by device of atomic absorption in step with Hoenig and van Hoeyweghen (1986). Hindleg meat samples were obtained from the rabbits (three rabbits/group) by cutting the meat from bone for meat and take one gram of sample and add on three milliliters of nitric acid and a couple milliliters of perchloric acid and leave them over night at room temperature and at the morning place them in hot water bath "72°C" for three hours. After that, it filtrate by a whatman paper and complete the filtrate to twenty five cm with deionized water. Aliquots of the filtrates were wont to measure the Se metals concentration by atomic absorption spectro-photometer (M. 210 VGP, Buck Scientific, USA) with an oxidizing air acetylene flame.

Statistical analysis

Data of the experiment were statistically analyzed by ANOVA test according to **SPSS** (2013) computer program which used fixed model as follow :

$$Y_{ij}=\mu + \alpha_i + e_{ij}$$

where: Y_{ij} = Observation of the j^{th} rabbit in the treatment i; μ = Overall mean,; α_i = Effect of the treatments (i = 1, 2, 3, 4 & 5); e_{ij} = Random error component. Data presented as percentages values were transformed to the corresponding arcsine before statistically analyzed (Warren and Gregory, 2005).

Results and Discussion

Growth performance

Data in Table 2 shows that, FBW, DWG and PI in the whole fattening period (6-13 wks) were significantly (P≤0.01) higher for rabbits in treated groups than those of the control group. There was no significant effect due to addition of different sources of Se on DFI and RGR of APRI rabbits. All these results are in agreement with findings of Dokoupilová et al. (2007); Zhang et al. (2011) and Syvyk et al. (2018) in rabbits.

Selenium source addition did not statistically affect growing rabbits performance in the this study (Table 2), which in line with the finding of Hada et al. (2013), who found insignificant differences between Se-yeast or sodium selenite in the performance of broilers. Also, in rabbits, Marounek et al. (2009) and Amer et al. (2018) showed that there was an insignificant difference between OSe and ISe in values of FBW and DWG. On the other hand, these results are totally different from results reported by Yang et al. (2012), who showed that the effects of OSe were better than that of ISe on broiler growth performance. Results also show that lowest FBW, DWG and PI were recorded in combination of Vit. E with OSe or ISe addition groups than Se alone fed groups. The present findings are in disagreement with Kanchana and Jeyanthi (2010) in laying hens. The reason for the contradiction among the results might be due to the result of the difference in the species used, age of animals, duration and the amount of Vitamin E and Se addition to the diet.

Despite the actual fact that the results are ambiguous, most authors agree that Se addition during times of redoubled stress has a positive impact on DWG. The trend of FBW result might be a mirrored image of FC that was better for the rabbits on treated groups than those belongs to control group. Consequently, increases in growth performance parameters for treated groups could be because of that Se according to be concerned in body metabolism and growth (Liu et al., 2011), since it has been shown to create an integral part of the deiodinases (Zhang et al, 2011), Where, the iodothyronine deiodinase enzymes convert the pro-hormone thyroxin (T_4) to triiodothyronine (T_3) which was the active form. The T_3 is a main hormone which regulates growth by dominant the body's energy and protein anabolism (Preter, 2000).

The current study indicated that Se addition in either organic or inorganic form has shown be effective to diminish adverse effects of weaning stress on weaned rabbits.

TABLE 2. Effect of Se source and vitamin E supplementation on growth performance of growing APRI rabbits during fattening period

Parameters	Treatments					Sig.
	Control	Organic Se (OSe)	OSe + Vit. E	Inorganic Se (ISe)	ISe+Vit.E	
Initial body weight (g)	754.4±7.85	754.5±23.50	755.0±16.68	752.5±21.41	756.0±13.86	NS
Final body weight (g)	2177.5^{c}±11.53	2235.5^{ab}±21.43	2168.5^{c}±14.02	2272.0^{a}±14.03	2206.5^{bc}±20.00	**
Daily weight gain (g):						
6-13 weeks	25.41^{bc} ±0.39	26.44^{ab} ±0.34	25.29^{c}±0.35	27.07^{a} ±0.30	25.94^{bc} ±0.42	**
:(Feed intake (g/d						
6-13 weeks	93.89 ±1.58	92.97±0.92	93.24 ±0.37	92.60±1.37	93.20±0.82	NS
Feed conversion ratio:						
6-13 weeks	3.71^{a} ±0.10	3.52^{ab} ±0.07	3.69^{a} ±0.04	3.42^{b} ±0.06	3.60^{ab} ±0.06	*
Relative growth rate:						
6-13 weeks	97.25±2.29	99.09±1.40	97.10±2.00	100.18±1.34	98.15±1.50	NS
Performance index (%):						
6-13 weeks	59.14^{c} ±1.63	63.74^{ab} ±1.73	58.81^{c} ±0.82	66.56^{a} ±1.36	61.50^{bc} ±1.52	**

Sig.= Significance, ***:Significant at 0.1% level of probability, **:Significant at 1% level of probability, *:Significant at 5% level of probability, NS:Non-significant

Means within the same row bearing different letter superscripts (a, b, c) are significantly different (P≤0.05)

Digestibility of nutrients

Results reported in this study clearly indicate that, addition of organic/inorganic Se with or without Vit. E had some effects on the digestion kinetics in rabbits. Table 3 shows that, rabbits received the OSe or ISe had the highest digestibility coefficients (%) of dry and organic matter and CP. These results are in consistent with Min et al. (2011), while different from those reported by Amer et al. (2018) who showed that insignificant differences on digestion coefficient for DM, OM, and CP between the Se treated groups and control group. Also, no significant differences in the digestion coefficient of DM, OM, and CP between the OSe group and ISe one. In contrary to the current results, Min et al. (2011) demonstrated that OSe was obviously better than ISe. As mentioned before Tinggi (2008), Se has been used as a substitute for sulfur in protein synthesis, and therefore the resultant selenoprotein shows higher biological activity. The groups of proteins that contain Se as an integral a part of their polypeptide chain are referred to as selenoproteins. This improvement of CP digestibility caused by Se addition, may be the role of Se known to be part of specific selenoprotein that plays a role in RNA by its incorporation into purines and pyrimidines bases (Pond et al, 2004). In addition, Se can carry out some functions of Vit. E as an antioxidanat agent and improving nutrient utilization as general (Elnour et al, 1998). Also, the significant increase of CP digestibility in treated groups compared to control one, can be mentioned from the point that improving in the digestibility of some nutrients may be reflected on better growth performance as shown in Table 2. So, the present study suggested that Se in any forms with or without Vit. E could be successfully incorporated into the diet of weaned rabbits without any harmful effects on nutrient digestibility and performance. Marounek et al. (2009) showed that the impact of Se sources may well be additional pronounced if Se-supplements were fed for a longer period of time (until sexual maturity).

TABLE 3. Effect of selenium source and vitamin E addition on apparent digestibility (%) and nutritive values of growing APRI rabbits during fattening period

Parameters	Treatments					Sig.
	Control	Organic Se (OSe)	OSe + Vit. E	Inorganic Se (ISe)	ISe+Vit.E	
Digestibility coefficients (%):						
Dry matter	65.63^{b}± 0.42	68.87^{a} ±1.02	67.99^{ab} ±0.71	70.58^{a}±1.23	68.59^{a}±0.45	*
Organic matter	69.08^{b}±0.71	72.06^{a} ±0.72	71.37^{a}±0.53	73.03^{a}±0.76	71.84^{a}±0.53	*
Crude protein	75.21^{b}±0.81	78.3 ^{a} ±0.61	77.73^{a} ±0.65	79.73^{a} ±0.44	77.90^{a}±0.72	**
Crude fibers	27.570.75±	27.920.85±	27.900.56±	27.660.42±	27.840.53±	NS
Ether extract	74.590.78±	74.880.36±	74.680.57±	75.180.50±	75.820.19±	NS
NFE	73.680.52±	73.980.49±	74.120.81±	74.490.61±	74.170.53±	NS
GE	65.830.44±	65.770.67±	65.900.06±	64.930.30±	65.500.65±	NS
:(%) Nutritive values						
Total digestible nutrient (TDN)	64.140.33±	64.910.27±	64.880.35±	65.440.32±	64.990.34±	NS
Digestible crude protein (DCP)	13.06^{b}±0.14	13.59^{a}±0.11	13.49^{a}±0.11	13.84 ^{a} ±0.08	13.52^{a}±0.13	**
Digestible energy (De, kcal/g)	2.43^{a}±0.01	2.420.02±	2.430.00±	2.390.01±	2.410.02±	NS

Sig.= Significance, ***:Significant at 0.1% level of probability, **:Significant at 1% level of probability, *:Significant at 5% level of probability, NS:Non-significant

Means within the same row bearing different letter superscripts (a, b) are significantly different (P≤0.05)

Carcass characteristics

Results tabulated in Table 4 were clearly that, rabbits received different sources of Se with or without Vit. E had the best values (P<0.05) of dressing percentage when compared to control (untreated) group. However, there were insignificantly differences in these values besides relative weights of liver, kidney, heart and giblets of the rabbit groups received Ose as compared to ISe. The current results are in agreement with Yang et al. (2012). In contrary to the present results, Amer et al. (2018) found no significant differences between the untreated group and other Se treated groups in all carcass characteristics. No significant effect of Se source on dressing out percentage was observed (Table 4). These results were in line with findings with Amer et al. (2018). In contrary to the present results, Edens (1996) reported that higher meat yield was associated with organic Se addition. In this regard, Edens (1997) presented a correlation between Vit. E and organic Se regarding their effects on increased dressing percentage in broilers.

It looks that the literature continues to be thin on the result of different Se sources on rabbit's carcass traits. The rise in carcass traits for treated groups could also be in the main associate with the rise in growth performance and digestibility. Therefore, pre-slaughter weight is taken into account to be one in all the foremost necessary issue touching carcass traits in rabbits. Szendro et al. (1995) demonstrated the necessary effect of pre-slaughter BW on carcass traits. It is a standard apply in feeding trials to use weights of some internal organs just like the kidneys as indicators of toxicity if there was any serious result of anti-nutritional factors on them being major detoxification organs (Amber et al., 2014). It had been obvious during this study that the weight of organs like kidney was insignificantly affected by totally different Se supply. Also, insignificantly variations among treated groups for relative weights of heart, kidney and liver indicated that addition of Se had no adverse influence on growth of rabbits.

The pH of parts of gastrointestinal tract

In 13 wks - old rabbits, a dietary addition with Se had no influence on pH scale for stomach, intestine and caecal (Table 5). An analogous state of affairs was ascertained in rabbits received combination of Vit. E and OSe or ISe. However, these values are among the traditional normal physiological range in accordance with the age (Gidenne, 2009; Celia et al., 2016).The pH scale level in specific areas of the gastro intestinal tract (GIT) could be an issue that establishes a selected microorganism population, and conjointly affects the digestibility and absorptive value of most nutrients. Many authors studied on this matter (Uddin et al. 2014; Celia et al. 2016).

TABLE 4. Effect of selenium source and vitamin E addition on carcass traits of growing APRI rabbits during fattening period

Parameters	Control	Treatments				Sig.
		Organic Se (OSe)	OSe + Vit. E	Inorganic Se (ISe)	ISe+Vit.E	
Live weight	2486.3±17.64	2325.0±178.21	2275.0±42.72	2491.7±58.12	2535.0±37.53	NS
Dressing%	52.36^{b}±0.53	54.66^{a}±0.61	54.25^{ab}±0.85	55.50^{a}±0.62	54.64^{a}±0.49	*
% Liver	03.50±0.28	03.56±0.095	03.58±0.14	03.53±0.23	03.57±0.23	NS
% Kidney	00.73±0.04	00.73±0.04	00.71±0.01	00.73±0.02	00.73±0.02	NS
% Heart	00.28±0.01	00.26a±0.01	00.27±0.01	00.27±0.01	00.27±0.01	NS
% Giblets	04.53±0.26	04.53±0.06	04.57±0.13	04.52±0.24	04.57±0.23	NS
GIT%	20.83^{a}±0.19	18.60^{b}±0.53	18.13^{b} ±0.46	17.99^{c}±0.28	18.05^{b}±0.25	**

Sig.=Significance, ***:Significant at 0.1% level of probability, **:Significant at 1% level of probability, * :Significant at 5% level of probability, NS:Non-significant

Means within the same row bearing different letter superscripts (a, b) are significantly different (P≤0.05)

TABLE 5. Effect of selenium source and vitamin E addition on gastrointestinal pH of growing APRI rabbits during fattening period

Parameters	Control	Treatments				Sig.
		Organic Se (OSe)	OSe + Vit. E	Inorganic Se (ISe)	ISe+Vit.E	
Stomach pH	01.71±0.09	01.71±0.25	01.73±0.07	01.72±0.17	01.71±0.13	NS
Intestine pH	07.27±0.07	07.30±0.21	07.53±0.07	07.63±0.12	07.53±0.18	NS
Caecum pH	06.60±0.26	06.90±0.06	06.73±0.03	06.77±0.09	06.73±0.09	NS

Sig.= Significance, NS: Non-significant.

Mineral content in meat

The concentration of Se (µg/kg) in the hindleg increased significantly (P<0.05) in the OSe group and OSe + Vit. E one compared with other groups (Figure 1). In OSe group, the Se concentration within the hindleg meat was larger than in control (untrated) rabbits by 28.0%. This has also been shown in rabbits by Amer et al. (2018) and Dokoupilová et al. (2007) who found that hindleg meat of rabbits received OSe contained fourfold a lot of Se than the meat of control (untreated) rabbits.

In the current study, the Se addition in the organic form resulted in higher tissue Se concentrations than the Se addition in the selenite form. Similar result obtained by Marounek et al. (2009) who stated that OSe form are more practical in increasing Se content in tissues than Na selenite. In this respect, Kanački and Ružić (2014) demonstrated that ISe remains in the tissues for a short period of time. They added that a small amount of Se incorporates into selenoproteins and the rest is being excreted in the urine. While, OSe contains most Se in the selenomethionine form, that is non-specifically incorporated into proteins instead of methionine (Rayman, 2004), in order that its bioavailability is higher. This has also been found in pigs (Zhan et al, 2007), and rabbits (Marounek et al., 2009; Ebeid et al., 2013).

The increased Se concentrations in rabbit's tissue not only decrease oxidative stress, including protection from peroxidation damage for unsaturated fatty acids (Korniluk et al, 2007; Ebeid et al., 2013), but can also decrease the pale soft meat incidence and drip loss from breast meat (Downs et al., 2000). Upon this, dietary Se has positive effect on the oxidative stability and quality of rabbit meat, which completely reflects on client acceptance.

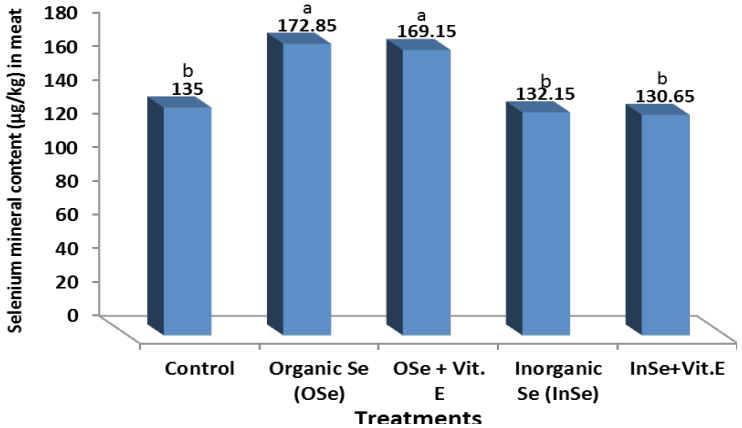

Fig. 1. Effect of selenium source and vitamin E addition on mineral content in meat of growing APRI rabbits during fattening period

Conclusion

It could be concluded that Se addition in either organic or inorganic form of growing rabbit in diets exerted some benefits on the performance characteristics which in turn may be ameliorate weaned stress. Although rabbits received OSe result in increased Se content in animal tissue as compared to ISe. Further studies are required to investigate the effects of OSe and ISe on the production and immune responses till sexual maturity of rabbits.

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تأثير الإضافة الغذائية لمصدرين من السيلينيوم على الكفاءة الإنتاجية للأرانب ومحتوى أنسجتها من السيلينيوم

خالد حسان الخولي[١] ، تاج الدين حسن تاج [١]، عطية ابراهيم عبد اللطيف[٢] و أمل اسماعيل مكاوي[١]
[١] قسم إنتاج الدواجن - كلية الزراعة - جامعة دمياط
[٢] محطة البحوث الزراعية بسخا - معهد بحوث الإنتاج الحيواني- مركز البحوث الزراعية

هذا البحث اجرى لدراسة تأثير إضافة أشكال مختلفة من السلينيوم وتأثيرها على معدل النمو وهضم المواد الغذائية ومواصفات الذبيحة وحامضية بعض أجزاء القناة الهضمية في الأرانب النامية علاوة على ذلك تاثير مصادر السلينيوم على محتوى اللحم من السلينيوم . أجريت الدراسة على ٧٥ أرنب نامي مفطوم حديثاً لخط الأبري على عمر ٥ اسابيع عند وزن 662.2±9.07 جم قسمت عشوائيا على ٥ مجاميع لتقييم تأثير السلينيوم بأشكاله المختلفة العضوى والغير عضوى مع تأثير إضافة او بدون إضافة فيتامين هـ .قسمت الأرانب إلى ٥ مجموعات تجريبية متساوية. غذيت المجموعة الأولى بدون اضافة (مجموعة ضابطة)، بينما المجاميع الآخرى (الثانية والثالثة والرابعة والخامسة) غذيت على نفس العليقة ولكن الاضافة كانت كالآتي : (٠،٣ ملجم se yeast كمصدر عضوى و ٠،٣ ملجم se yeast + 200 ملجم فيتامين هـ وذلك لكل كجم عليقة و 0.3 ملجم سلينات صوديوم كمصدر غير عضوى و 0.3 ملجم سلينات صوديوم+ 200 ملجم فيتامين هـ وذلك لكل كجم عليقة على التوالي. استمرت الدراسة لمدة 8 اسابيع خلال فترة النمو من عمر الفطام (5 اسابيع) حتى عمر التسويق (13 اسبوع) . أوضحت النتائج المتحصل عليها من هذه الدراسة أن الوزن النهائي للجسم ومعدل الزيادة اليومية ودليل النمو فى فترة التسمين (13-6 أسبوع) كانت أعلى معنوية في المجموعات المعاملة عن مجموعة المقارنة. ولكن لا يوجد فروق معنوية عند استخدام السلينيوم على معدل الاستهلاك اليومي ومعدل النمو النسبي للأرانب النامية. بالإضافة إلى أنه لا يوجد فروق معنوية فى معامل الهضم المادة الجافة والمادة العضوية والبروتين الخام بين المجموعات المعاملة بالسلينيوم العضوى والغير عضوى بالاضافة إلى عدم وجود فروق معنوية بين هذه القيم بجانب الأوزان النسبية للكبد والكلى والقلب والأحشاء الداخلية لمعاملات الأرانب المعاملة بالسلينيوم العضوى مقارنة بالسلينيوم الغير عضوى. وايضاً هناك زيادة معنوية فى تركيز السلينيوم (مللي ميكروجم/كجم) بالفخذ فى المجموعات المعاملة بالسلينيوم العضوى والسلينيوم العضوى + فيتامين هـ مقارنة بباقى المجموعات. ومما سبق فإن الدراسة أوضحت في مجملها ان اضافة السلينيوم بالشكل العضوى والغير عضوى للأرانب النامية في العليقة أدى إلى زيادة في معدل النمو ومعامل هضم العناصر الغذائية ومواصفات الذبيحة. كما أوضحت النتائج أن التغذية على السيلينيوم العضوي أدى إلى زيادة محتوى اللحم من السلينيوم مقارنة بباقي المجموعات.