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EFFECT OF SELENIUM AND ZINC SUPPLEMENTS ON EACH INDIVIDUAL OR MIXTURE ON SOME CARCASS CHARACTERISTICS AND GLUTATHIONE ACTIVITY IN MALE LAMBS KURDI BREED SHEEP

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Abstract

This study was conducted to investigate the effect of Selenium (Se) or Zinc (Zn) supplements each alone or mixture on some carcass characteristics the and Activity of glutathione in Liver and kidney tissues of Kurdi lambs, aged between 3-4 months, average live body weight of (20-23) kg. the Lambs were divided randomly into four groups (3 lambs for each group). first group control group basal diet without Selenium or Zinc, Second group Selenium (sodium selenite) was added as 0.5 mg / kg of fed, Third group Zinc (zinc sulphate) was added as 100 mg/kg of fed , fourth group added (Selenium with Zinc) At a concentration of 0.5 100 mg / kg fed. Selenium and Zinc were given capsules daily for 90 days. The results showed of The differences were significant ($P \leq 0.05$) on some carcass characteristics the (Head, Fore limb, Hind limb, Hide, Lunch, liver, Kidney traits, Thigh circumference trait and Heart), There were no significant differences (N.S) in spleen weight, Carcass length and Carcass circumference between the coefficients of added and the control group, The differences were significant ($P \leq 0.05$) in the Glutathione activity in Liver and kidney tissues in the treatment of selenium or zinc supplementation individually or mixed between them compared to the control group. The results concluded that the added of selenium or zinc supplements improved significantly of some carcass characteristics and Glutathione activity in Liver and kidney tissues of Kurdi lambs.

***Keywords*:** Selenium, zinc, Glutathione, Lambs Sheep.

Introduction

The major sources of meat are buffalo, cow, sheep and goat however, the meat of lamb is frequently used in the Middle East and Asia. Generally, meat is considered as valuable fed for humans providing many essential nutrients such as proteins, vitamins , fat and minerals (Se and Zn) Which are of paramount importance for the growth of the human body (Schonfeldt and Gibson, 2008). Requirements for trace elements are required in small quantities (less than 100 mg / kg dry matter), they are involved in the work of enzymes or as enzymes (CO - enzymes) This affects the oxidation and metabolism, development and reproduction and contribute to growth and production and improve the efficiency of immunity and productivity performance (Yatoo *et al.*, 2013). In their diet, sheep need mineral supplements to achieve the highest productivity and health performance at levels of addition to their needs (Ademi *et al.*, 2017)Increased selenium concentrations in animal products by supplementing selenium sources in the fed of animals may protect the health of human and animal from selenium-dependent diseases by the expression of many species of selenoproteins in their bodies (Finley, 1999). The extent of selenium retention in the animal products is greatly dependent onto animal species and the chemical forms of the element**.**The optimum concentration of selenium is 120 - 150 micrograms / ml in the blood. Whereas 25 - 50 micrograms / ml in the blood are considered low (Overnes *et al.*, 1985). The European Food Safety Authority (EFSA, 2014) determined that selenium should be added to the diet from (0.2 to 0.5 mg/kg) dry matter to avoid toxins and environmental pollution**.**Dietary zinc supplementation significantly improves production performance and increased sheep body weight (Shahat and Monem, 2011**)**. Zinc is essential for the body as it is important for protein synthesis, complete wounds and growth performance and the addition of zinc should be at a concentration of (45 to 75 ppm) in feed (Maan and Sihag, 2014). Selenium and zinc are rare elements that affect metabolism and health, and their lack of food leads to health disorders. Selenium plays an important role in antioxidants and endocrine glands, and it is also a very specific factor in the early stages of growth, especially with low food protein and is required for protein synthesis and glutathione peroxidase (Pavlata *et al.*, 2009). For large areas of the world, the consumption of the selenium by people is scanty (Fairweather-Tait *et al.*, 2011). Also, zinc deficiency is very widely predominant throughout the world. It is more common in developing countries, due the consumption of protein grains (Schlegel-Zawadzka, 2011). In light of this, increased consumption of meat reinforced with Se and Zn may provide a means for improving the Se and Zn status in humans**.**Selenium (Se) and Zinc (Zn) are an important nutrient for animal health and hormonal regulator, and improves of the situation of antioxidants, and some serum biochemical indicators, (Palani *et al*., 2018a). The low level of Selenium and Zinc in the blood of Kurdi sheep is due to its low level in plants, and to its low concentration in the soil of Sulaimani governorate which is, in Kurdistan Region of Iraq (Palani, 2019) The added of selenium or zinc significantly improves the growth efficiency of the Kurdi lambs, (Palani *et al*., 2018c). The aim of this study was to illustrate the effect of Se and Zn supplementation individually or in combination, on some carcass characteristics and Glutathione activity in Liver and kidney tissues of kurdi lambs.

Materials and Methodology

The present study was conducted at University of Sulaimani, College of Agricultural Sciences Engineering, Animal Science Department in Kurdistan Region of Iraq on 12 lambs of Kurdi sheep between the ages of 4-5 months and 22.9 kg body weight and divided the lambs into four groups

of 3 lambs per Group I, the first group without any additives, the second group added Selenium (sodium selenate) Na_2SeO_3 at a concentration of 0.5 mg / kg feed, the third group added Zinc (zinc sulfate) $ZnSO_4$ at a concentration of 100 mg / kg feed, the fourth group added (Selenium with Zinc) At a concentration of 0.5 + 100 mg / kg feed, the lambs were randomly distributed The lambs were fed 90 days and 3% of the animal's body weight was fed. The concentrations of the feed center were as follows: ground barley 60% wheat bran 26% soybean 12% table salt 1% limestone 0.5% vitamins and minerals mixture 0.5%. The chemical composition of the diet was dry matter 89.90%, organic matter 85.54%, crude protein 15.60%, crude fiber 7.40%, crude ether extract 2.19%, nitrogen-free extract 60.35%, ash 4.36%, digested protein 12.17%, and total digested nutrients 67.24% (NRC, 2001). As for coarse fodder, barley hay was given free to eat from it to reduce saturation, and to reach selenium and zinc to the animal was used empty gelatin capsules Weigh a minute amount of Sodium selenite (Se) and zinc sulphate (Zn) with a delicate sensitive scale and the weight of the diet consumed and then mixed in corn powder and fill in empty gelatin capsules and capsules were given to animals by mouth daily in the morning as soon as fed. where the feed were cut off from the experiment animals for 12 hours before the end of fattening (90 days) all lambs were slaughtered for carcass quality estimation, After slaughter, Objective measurements of carcasses were recorded: Hide, Hind limb, Fore limb, Head, Lunch, Liver, Heart, Spleen, Kidney, Carcass length, Carcass circumference at chest and Thigh circumference, Glutathione in testicular tissue was estimated using the Moron *et al*. (1979) method .The study data were analyzed statistically using Complete Randomized Design (CRD) to determine the influence of additives selenium and Zinc separately and mixed between them) on the weight and size of testis and semen qualities. Data analysis was performed according to XLstat (2016) and then the significant differences were compared using the Duncan polynomial test (1955, Duncan).

Results and Discussion

The results of (Table 1) showed significant differences (P≤0.05) in the treatment of selenium addition and the treatment of zinc addition and their mixture for Head, Fore limb, Hind limb and Hide Compared to the control group.

Table 1 : Effect of selenium and zinc or their mixture on some external characteristics (Mean ± Standard Error).

Parameters				Treatment
Hide (kg)	Hind limb (g)	Fore limb (g)	Head (g)	
3.35 ± 0.07 c	377.0 ± 10.7 c	374.3 ± 6.3 c	1732.3 ±58.6 b	Treatment (Control)
4.51± 0.0 a	462.3 ± 41.3 ab	465.0 ± 9.4 a	1976.3 ±24.4 a	Treatment (Se)
4.09 ± 0.1 b	490.0 ± 4.5 a	455.0 ± 3.7 a	2029.6 ±49.1 a	Treatment (Zn)
3.96 ± 0.0 b	408.0 ± 11.3 bc	429.3 ± 4.6 b	1971.0 ±34.7 a	Treatment (Se+Zn)

Means with different letters in rows are significantly different (P≤0.05).

Table (2) showed significant differences (P≤0.05) in Lunch, liver and Kidney traits where the weight of traits increased in selenium and zinc supplementation treatments or their combination compared to the control group. Also the differences were significant (P≤0.05) in Thigh circumference trait where increased in selenium treatment, zinc addition treatment and treatment or their combination compared to the control group. The differences were significant (P≤0.05) in Heart trait where the weight in treatment of selenium addition and zinc supplementation increased compared to treatment of addition of their mixture and control group. There were no significant differences (N.S) in spleen weight, Carcass length and Carcass circumference at chest in selenium or zinc supplementation treatments individually or in combination.

Table 2 : Some Carcass characteristics of lambs supplemented with of selenium and zinc or their mixture (Mean ±Standard Error).

Treatment				Parameters
Treatment (Se+Zn)	Treatment (Zn)	Treatment (Se)	(Treatment Control)	
571.0 ± 5.8 c	651.3 ± 6.6 a	607.3 ± 6.8 b	52.0 ± 12.0 d	Lunch (g)
583.6 ± 2.3 a	576.0 ± 4.7 a	606.3 ± 12.4 a	464.0 ± 19.6 b	Liver (g)
142.3 ± 4.9 b	165.6 ± 5.4 a	159.3 ± 3.8 a	127.0 ± 6.0 b	Heart (g)
67.3 ± 1.8 a	65.6 ± 4.6 a	58.3 ± 4.9 a	52.6 ± 4.9 a	Spleen (g)
107.3 ± 9.3 a	107.0 ± 4.7 a	106.0 ± 3.2 a	82.0 ± 4.0 b	Kidney (g)
60.3 ± 0.3 b	61.6 ± 1.7 b	68.0 ± 1.5 a	64.3 ± 2.6 ab	Carcass length (cm)
37.3 ± 0.8 a	35.5 ± 1.2 a	38.0 ± 0.7 a	± 1.4 a34.8	Carcass circumference at chest (cm)
41.6 ± 0.3 a	40.3 ± 0.3 b	42.3 ± 0.3 a	38.2± 0.3 c	Thigh circumference (cm)

Means with different letters in rows are significantly different (P≤0.05).

In the present study Selenium or Zinc or mixed supplemented groups had higher weight gains than the unsupplemented groups. Kumar *et al.* (2008) observed significantly (P≤0.05) higher growth rate in lambs with Selenium (0.15 or 0.3 ppm) Similar reports were recorded by Rodrigues *et al.* (2006). However, the results of this study are disagreeing with the finding of researches which established by Vignola *et al.* (2009) observed no significant (N.S) effect of Se supplementation (sodium selenite, 0.3 or 0.45 ppm) to the basal diet (0.13 ppm) on carcass yield. Lee *et al.* (2007)

observed no significant changes in carcass characteristics with dietary Selenium (sodium selenite, 0.9 mg/kg DM) supplementation.

This may be due to the ability of the mineral elements to stimulate the building of skeletal muscle fibers (Rannem *et al.,* 1995). Zinc also plays a role in cell division because of its association with nucleic acids. Zinc is essential for growth hormones and stimulates thyroid hormones because of their important role in metabolism (Zhao *et al.*, 2016). Selenium is a very specific factor in the initial growth stages, especially with the decrease in food protein. Selenium is involved in the construction of protein in mitochondria (Pavlata *et al.*, 2009). is found out t the low level of selenium and zinc in the blood of Kurdi sheep is due to its low level in plants, and to its low concentration in the soil of Sulaimani governorate which is in Iraq Kurdistan Region, and therefore when adding improves the growth of lambs Palani (2019). The added of selenium or zinc significantly improves the growth efficiency of the Kurdi lambs, Palani *et al*. (2018c).

Table 3 : Activity of glutathione (GSH) in liver and Kidney of lambs supplemented with of selenium and zinc or their mixture. GSH concentration (μ mol/g wet tissue) (Mean ± Standard Error).

Treatment				Parameters
Treatment (Se+Zn)	**Treatment (Zn)**	**Treatment (Se)**	**(Treatment Control)**	
1.958.6 ± 3.1 a	1.392.0 ± 5.4 a	1.408 ± 9.4 a	0.681 ± 8.4 b	Liver
2.087 ± 7.9 a	1.718 ± 5.3 a	1.766 ± 3.2 a	0.823 ± 4.2 b	Kidney

Means with different letters in rows are significantly different (P≤0.05).

Table 3 showed that glutathione activity in Liver tissues increased in selenium and zinc supplementation or a combination of them compared with the control group. The differences were significant (P≤0.05) and glutathione activity at the addition of selenium with zinc was higher compared to other treatments. Glutathione activity increased significantly and differences were significant (P≤0.05) in kidney tissues in the treatment of selenium or zinc supplementation individually or mixed between them compared to the control group. Glutathione activity in kidney tissues when selenium was added with zinc was higher compared with other treatments.

The deposition of Selenium in the livers and kidney of calves fed Selenium-yeast was increased. In experiment of Scholz *et al.* (1981) the Se concentrations in livers positively correlated with those in the feed. As observed also by other authors (Scholz *et al.*, 1981; Daun and Åkesson, 2004), the activity of GSH-Px in the livers and kidney responded well to dietary Selenium and Zinc supplementation in the present experiment.

This is because selenium and zinc are catalysts for the synthesis of antioxidants and glutathione enzymes, which increases the antioxidant state (Berte Ismann *et al.*, 2007). The concentration of selenium in the blood is associated with the activity of glutathione peroxidase, which indicates that selenium in the blood is associated with glutathione (Whangar and Belstein 1986,). Selenium (Se) is an important nutrient for animal health, and improves of the situation of antioxidants, Palani *et al.* (2018a). It was indicated the added of Selenium or Zinc supplements improve significantly of the case of antioxidants of Kurdi male lambs, Palani *et al*. (2018c).

Conclusions

Present investigation has shown the beneficial effect of supplementation of selenium and zinc on some carcass characteristics and Glutathione activity in Liver and kidney tissues which may provide better protection to from oxidative damage. Which may play a role in good on growth efficiency of kurdi lambs.

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