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Effect of supplementation with different types of selenium on lactation performance and some blood parameters of Farafra and Saidi ewes and performance of their lambs.

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ABSTRACT

The aim of this study was to evaluate the effect of dietary selenium supplementation (organic or inorganic) to the diet of late pregnant and lactating ewes on their productive and growth performance of their suckling lambs. Sixty late pregnant ewes (30 Farafra and 30 Saidi) had age ranged from 2 - 4 years and of average weight 45.0 ± 1.4 kg for Farafra and 43.12 for Saidi ewes were used in this study. All ewes were chosen fertile and healthy, with single born lamb with every breeding and free of internal and external parasites. Ewes of every breed were divided into three similar groups (10 ewes each). All ewes fed in groups according to NRC (1985). The control group fed the basal ration + 100 gm starch powder without any supplement, while the tested group (T1) fed 0.3 mg Sodium Selinate/kg diet and the tested group (T2) fed the basal ration + 0.3 mg Selenium yeast /kg diet. Results indicated that milk yield was the highest with T2 (590 and 564 kg) followed by T1 (583 and 551 kg) and lastly the control (545 and 502 kg) for both breeds (Farafra and Saidi, respectively), the differences were significant only between Se-yeast ration (T2) and the control one. The improvement of milk yield was better with Saidi (9.76 and 12.35%) compared with Farafra ewes (6.97 and 8.26%) for the two tested treatments (T1 and T2, respectively). Milk contents of fat and total solid were slightly increased with the two tested rations in comparison with the control one, while protein content was significantly higher only with T2. compared with control ration. Body weight at birth and weaning was improved with the tested rations. The significance of improvement was associated only with T2 for weaning weight of Farafra ewes, in comparison with control ration. The daily gain and total gain measured for suckling lambs had the same trends of birth weaning weight among the dietary treatments. Also, the obtained data indicated that weaning weight, daily body gain (DBG) and total body gain (TBG) were significantly higher with Farafra than those of Saidi lambs with both treatments (T1 and T2). Hematocrit (Ht%), Sodium and Potassium levels did not significantly effected by the tested experimental rations. The highest value of total protein in Saidi ewes recorded with T2 (6.23 g/d) followed by T1 (6.06 g/d) and lastly the control (5.78g/d) but the differences were not significant. Also, similar trend respecting total protein was observed among the dietary treatment with Farafra ewes, but the difference was significant only between T2 and control ration. Total antioxidant was significantly higher in T1 and T2 compared with control group, while the highest value was recorded with T2 in both breeds.

Keywords: Organic & Inorganic Selenium, sheep, lambs, growth performance, physiological responses, antioxidants.

I

INTRODUCTION

Selenium (Se) is an essential trace mineral that required to maintain normal physiological functions and provides a significant dietary source of antioxidant defenses (Sordillo, 2013). It obtained by animals as part of the essential components of the diet and its transplacental transfer represents an important factor for physiological functions of offspring (Moeini et al., 2011). Selenium deficiencies play a role in numerous disorders and diseases as well as important economic livestock diseases and also problems that include impaired fertility, abortion, retained placenta and neonatal weakness (Spears, 2011).

The inorganic selenium has been found in many forms like selenate, selenite and selenide, etc. The current research results show that the bioavailability of these forms of minerals is extremely limited. Nutritionists have long recognized that minerals found in natural feedstuffs in a complex of organic compounds associate generally with increasing the availability of minerals compared to inorganic sources.

Ever so, selenium has an important antioxidant activity (Tinggi, 2008) and consequently plays vital role on reproductive, endocrine and immune systems of animals. Currently, Sodium selenite, as an inorganic, and selenium-enriched yeast, as an organic, forms of selenium are considered principal supplements to animal diets. Pivotally, selenium regulates various metabolic processes within the body and is an integral part of at least 25 seleno-proteins (Zhou et al., 2013), some of which have a peculiar enzymatic functions (Nazıroğlu et al., 2012). Additionally, Selenium could work as metabolic modifier (Dominguez-Vara et al., 2009).

High number of enzymes are selenium dependent with selenocysteine at different active sites (Nazıroğlu et al., 2013). Selenium functions as a redox center that helps to maintain membrane integrity (Özgül et al., 2012), protects prostacyclin production (Néve et al., 1996) and reduces the likelihood of propagation of further oxidative damage to biomolecules such as lipids, lipoproteins, and DNA (Özgül et al., 2012). Studies suggested that selenium might enhance immunity, growth, reproductive performance and the ability to resist disease (Ghazi et al., 2012). Selenium deficiency is in direct contact with increasing susceptibility to various diseases attack animals and decrease their productive and reproductive performance (Lyons et al., 2007).

Selenium is an essential micronutrient for sheep, and its deficiency can limit lambs' growth and survival. Adequate Se transfer from ewes to lambs is important to prevent Se-responsive diseases in lambs such as nutritional myodegeneration and unthriftiness (Muth et al., 1958). The most common inorganic Se sources are Na-selenite and Na-selenate, which usually provided in mineral premixes or injected. Organic Se sources are seleno-AA [e.g., selenomethionine (Se Met) and selenocysteine (SeCys)], which found in Se-yeast or in feeds grown on Se-rich soils. Provision of organic Se to the dam is an effective method to meet Se requirements of newborn lambs because Se crosses the placental barrier into fetal tissues and enters mammary secretions with greater transfer efficiency over a wider supplementation range for organic Se vs. inorganic Na-selenite (Taylor et al., 2009; Stewart et al., 2012).

The toxicity of organic Se is at least three times less than inorganic Se and organic Se is more protective than inorganic Se, as it incorporated into tissue reserves (Lyons et al., 2007).

The objective of this study was to evaluate the effects of feeding organic and inorganic Se forms to ewes on their productive performance during late pregnancy and lactation as well as the growth performance of their lambs.

MATERIALS AND METHODS

Experimental procedures used in this study were conducted at Mallawi Experimental Station, Minia Governorate, Animal Production Research Institute (APRI). Agriculture Research Centre (ARC). Ministry of Agriculture, Egypt.

Animals and management

A total of 60 ewes (30 Farafra and 30 Saidi) were chosen from the flock of Mallawi farm at the end of pregnancy stage of age ranged from 3 - 6 years and weight averaged 45.0±1.4 and 43.12± 1.2 kg for Farafra and Saidi ewes, respectively. All ewes were carefully chosen fertile and healthy, with single born lambs and free of internal and external parasites. Animals were fed in groups applying NRC standard allowances (1985). The basal ration used in the experiment consisted of 70% commercial concentrate feed mixture (CFM) plus 30% rice straw (RS), where its chemical composition is shown in Table (1).

Experimental design

Ewes of each breed were divided into three similar groups (10 ewes each) according to their age, parity and initial body weight.

Control group: Fed basal diet + 100 gm starch powder.

Inorganic Selenium group (T_1): Fed basal diet + 0.3 mg Sodium Selenate /kg diet.

Organic Selenium group (T_2): Fed basal diet + 0.3 mg Selenium yeast /kg diet.

Supplements were directly mixed with a suitable amounts of starch (100 gm) as a carrier material. Animals weighed biweekly and the amount of feeds were adjusted throughout the experiment according to changes in body weight.

Milk yield of ewes and some traits related to their lambs

Milk yield recorded weekly for each ewe from the fifth day post-lambing till the end of lactation season (75 days) where lambs weaned. Milk yield measured using lambs' suckling technique as reported by Ashmawy (1980). Birth weight of lambs, body weight gain over suckling period, weaning weight and survival rate were recorded for lambs.

Milk samples were analyzed for milk fat, protein and total solids as described by Ling (1963). Total nitrogen (TN) and non protein nitrogen (NPN) contents were determined according to A.O.A.C (2000) [total protein= (TN-NPN) x 6.38].

Blood sampling and measurements

Blood samples (6 ml) were collected from each animal via the jugular vein at morning before feeding and drinking. Those samples were divided into two parts. The first part was taken in a tube with anticoagulant for measuring hematocrit (Ht) by haematocrit capillary tubes, they centrifuged at 3000 r.p.m. for 15 minutes. The second part was taken in a tube without anticoagulant and centrifuged for separating serum which was freezed until the analyses of blood metabolites. Total protein, determined by Gornal et al., (1949), sodium determined by Trinder, (P 1951), potassium determined by Sunnderman, F.W. Jr and and Sunnderman F.W. (1958). and total antioxidant capacity were determined using commercial kits by colorimetric method (Keracevic, et al., 2001).

Statistical analysis:

Statistical analysis was carried out using SPSS 17.0 for Windows (SPSS, 2010). Data was analyzed by General Leaner Model (GLM) procedure. The following model was used:

$Y_{ijkl} = \mu + T_i + B_j + (TB)_{ij} + E_{ijk}$ Y ijkl The studied trait.

μ = The overall mean.

T i = The effect of treatment.

B j = The breed effect, j = (Saidi, Farafra).

(TB) ij = The effect of interaction between treatment and breed.

E ijkl = The experimental error.

Table (1): Proximate analysis of ingredients of the experimental ration.

	Chemical composition (%)						
	Moisture	**OM**	**CP**	**CF**	**EE**	**NFE**	**Ash**
CFM	9.70	92.7	14.6	15.9	4.1	58.1	7.3
RS	9.9	38	4.0	33.4	1.6	36.4	17

RESULTS AND DISCUSSION

Milk yield and composition

The effect of using the two selenium types (Inorganic & organic) in ewes rations (Farafra and Saidi) on average milk yield and composition are presented in Table (2). The obtained results indicated that milk yield was the highest with T2 (590 and 564 kg) followed by T1 (583 and 551 kg) and lastly the control (545 and 502 kg) for both breeds (Farafra and Saidi, respectively), but the differences were significant only between T2 and control ($P < 0.05$). The improvement in milk yield was better with Saidi (9.76 and 12.35%) compared with Farafra (6.97 and 8.26%) for the two treatments (T1 and T2, respectively). These positive effects of both selenium types on milk yield was observed also by Moeini et al., (2009) & Zhao et al., (2008) who worked on sheep. The improvement in milk yield may due to the positive and significant effect of Se-treatment on immunity, antioxidant capacity and productive performance as reported by Lyons et al., (2007) and Ghazi et al., (2012). The present results are in agreement with those obtained by Kholif and Kholif (2008) who stated that supplementing buffalo ration with 10mg/h/d selenized yeast or 10mg/h/d organic Se improved rumen fermentation and nutrient digestibility and also improved milk production and composition. Moreover, results here are in harmony with those obtained by Hassan et al., (2015) who demonstrated that dietary supplementation with micro-algae enriched with selenium improved body weight gain and feed conversion ratio, so it had a beneficial effect on health and overall growth performance of growing rabbits. They added that Se-algea supplementation, representing a natural organic combound, enhances antioxidative status and protect the tissues against oxidative damage for growing rabbit under hot condition. Additionally, rabbit meat can be fortified with selenium through dietary supplementation of Se-algae.

The negative effect of heat stress on milk production is primarily explained by a reduced feed intake and a decrease of nutrients uptake by the portal-drained vein, yet a decrease of milk protein content that related to a decrease in casein fraction (Bernabucci et al., 2002). It was reported that there are several benefits of probiotics on animal lactation performance including the ability to enhance intestinal health by stimulating the development of a healthy microbiota (predominated by beneficial bacteria), preventing enteric pathogens from colonizing the intestine, increasing digestive capacity, lowering pH and improving mucosal immunity (Uyeno et al., 2015).

The effect of experimental treatments on milk composition are presented in Table (2). Milk contents of fat and total solid were slightly differ among the experimental treatments and their values being within the normal range given by Khattb et al., (2018) and Phipps et al., (2008) for ewes, but the effect of both tested rations on protein percentage was positive as shown in Table (2). The differences were significant only between un supplemented (control) and the supplemented one (T2). The present findings are in agreement with those obtained by Kholif (2005) who used selenized yeast in lactating buffaloes diets to increase milk yield and its protein contents. Moreover, Kholif and Khorshed (2006) concluded that organic selenium supplementation to diets of lactating buffaloes improved rumen activity and milk constituents, while the yeast supplementation improved milk production and nutrient digestibility. Precisely, the results reported by Mateo et al., (2005) indicated that organic Se was more efficient (88%) in accumulating Se in lion of pigs compared to inorganic Se. Importantly, when Crosby et al., (2005) compared between inorganic Se (T1) and the organic one (T2), being 0.875mg/kg diet each, they found that T2 significantly increased the level of Se in ewe' milk (60.1 and 98.0 mg/L for T1 and T2, respectively), also ewe live weight loss, from day 78 of gastration to 24 h post-portum, was higher for T1 group (-5.5 Vs.-3.4 kg). Lastely, lambs from organic Se group had higher ADG in the frist 35-d post-partum (292 Vs. 326 g/d). Generally, with advent of organic Se, mainly from Se-enriched yeast, many problems related to inorganic Se began to disappear suggesting that the organic form of the element is more efficacious and ever so systematical of providing organic Se to livestock and human better returning to the nature's model. .

Table (2): Effect of different selenium types supplementation on milk yield and composition

Milk yield	Breeds	Treatments		
		Control	**Inorganic Se (T_1)**	**Organic Se(T_2)**
Avg. daily milk yield / ewe (gm)	*Farafra*	$545^{bA} \pm 18$	$583^{ab} \pm 12$	$590^{a} \pm 13$
	Saidi	$502^{bB} \pm 13$	$551^{ab} \pm 18$	$564^{a} \pm 20$
Fat, %	*Farafra*	5.45 ± 0.24	5.70 ± 0.30	5.72 ± 0.29
	Saidi	5.21 ± 0.15	5.48 ± 0.23	5.67 ± 0.31
Protein, %	*Farafra*	$4.28^{b} \pm 0.20$	$4.44^{ab} \pm 0.22$	$4.91^{a} \pm 0.18$
	Saidi	$4.07^{b} \pm 0.12$	$4.26^{ab} \pm 0.16$	$4.61^{a} \pm 0.20$
Total Solids, %	*Farafra*	13.66 ± 0.29	13.87 ± 0.36	14.03 ± 0.37
	Saidi	13.05 ± 0.42	13.25 ± 0.41	13.81 ± 0.39

a , b: Means in the same row with different small superscripts are significantly different.
A, B: Means in the same column with different capital superscripts are significantly different.

Growth performance of lambs:

Results of the effects of selenium supplementation on growth rate of lambs are presented in Table (3). Body weight of lambs at birth and weaning were improved by the tested dietary treatments compared with control one. The significance of improvement was only corresponded to ration T2, in respect of weaning weight of Farafra lambs. Similarly, daily body gain (DBG) had significant increase with adding organic Se to ration of Farafra ewes. The same trend was observed also with total body gain (TBG) among the three treatments for both breeds. As comparison between breeds, the obtained data indicate that weaning weight, DBG and TBG were significantly higher with Farafra than those of Saidi lambs in respect of both treatments (T1 or T2) (as shown in Table 3). The positive effects of selenium supplementation on growth performance of lambs may refer to the role of selenium of helping protection against oxidative stress, improving immune system and reducing the incidence of subclinical disease (Stewart et al., 2012); minimizing cellular damage caused by endogenous peroxides (El-Shahat and Abdel Monem, 2011). Also, the good response to Se addition on growth may be due to the interaction of Se with fat and unsaturated fatty acids (Hedder et al., 2016). In this respect adding Se improved the ruminal enzyme activity and body weight gain of small ruminant as reported by Yue et al., (2009) and Faixoua et al., (2016). These results are matched with the findings obtained by Capper et al., (2005) who reported that antioxidants supplementation to ewes during pregnancy and lactation periods improved body weight gain, survival rate and antioxidant status of suckling lambs. Similarly, Muñoz et al., (2009) reported that dietary antioxidants improved lamb' survival and growth performance. Our results may be attributed to the higher milk production of supplemented ewes that reflected on higher weight gain of their suckling lambs. Generally, higher mineral levels and more bioavailable forms are needed for optimum health and productive performance for different farm animals. Definitely, the important modulatory effects of organic forms of trace elements (chelation processes) could enhance absorption routes and reduce competition with certain sites. Also, the chelate form is less likely interact with other minerals during digestion and remain soluble and absorbable. The higher bioavailability means that such feeds can more confidently meet mineral demands for their farming animals. The present results respecting growth performance are in agreement with those reported by Hassan et al. (2015) who found that selenium enriched by Spirulina supplementation into the diets of rabbits improved growth performance, antioxidative status and that rabbit utilized Se more efficiently vs. the control diet contained the natural Se. Precisely, Hafez et al., (2011) fed kids on diet fortified by 1gm/h/d of selenized yeast and got 33.67% increase in daily gain compared to the control one, that only have natural Se in its ingredients.

Table (3): Effect of selenium type supplementation on growth rate of suckling lambs

Item	Breeds	Groups		
		Control	**Inorganic Se (T1)**	**Organic Se (T2)**
Birth weight (kg)	*Farafra*	3.36 ± 0.09	3.51 ± 0.12	3.58 ± 0.12
	Saidi	3.15 ± 0.12	3.24 ± 0.11	3.33 ± 0.11
Weaning weight (kg)	*Farafra*	13.05^{b} ± 0.23	14.02^{abA} ± 0.46	14.50^{aA} ± 0.55
	Saidi	12.61 ± 0.39	12.89^{B} ± 0.44	13.18^{B} ± 0.46
Daily gain (gm)	*Farafra*	129^{b} ± 4.2	140^{abA} ± 4.2	145^{aA} ± 4.4
	Saidi	126 ± 3.9	129^{B} ± 3.5	131^{B} ± 3.8
Total gain (kg)	*Farafra*	9.68^{b} ± 0.17	10.52^{abA} ± 0.36	10.88^{aA} ± 0.31
	Saidi	9.46 ± 0.29	9.67^{B} ± 0.23	9.88^{B} ± 0.31
Survival rate (%)	*Farafra*	90.0	100	100
	Saidi	90.0	100	100

a , b: Means in the same row with different small superscripts are significantly different.
A, B: Means in the same column with different capital superscripts are significantly different.

Table (4): Effect of different selenium types supplementation on some blood parameters of ewes.

Item	Breeds	Treatments		
		Control	**Inorganic Se (T1)**	**Organic Se (T2)**
Haematocrit (%)	*Farafra*	30.7 ± 0.9	31.4 ± 0.7	31.7 ± 0.8
	Saidi	30.8 ± 0.10	31.3 ± 0.9	31.2 ± 0.9
Total Protein (g/dl)	*Farafra*	5.54^{b} ± 0.21	5.91^{ab} ± 0.24	6.29^{a} ± 0.18
	Saidi	5.78 ± 0.20	6.06 ± 0.26	6.23 ± 0.18
Sodium (meq/l)	*Farafra*	136.3 ± 2.5	142.5 ± 3.8	145.1 ± 2.3
	Saidi	140.2 ± 2.0	146.6 ± 3.5	144.0 ± 4.1
Potassium (meq/l)	*Farafra*	5.26 ± 0.09	5.39 ± 0.13	5.37 ± 0.10
	Saidi	5.19 ± 0.11	6.43 ± 0.10	5.45 ± 0.13

a , b: Means in the same row with different small superscripts are significantly different (P <0.05).

Blood measurements:

The effect of supplementation with different selenium types (inorganic or organic) on some blood parameters of both breeds (Farafra and Saidi) are presented in Table (4).

The obtained results indicate that most tested blood profile parameters, as hematocrit (Ht%), Sodium and Potassium, did not significantly affected by the tested rations for both breeds. The slight increases of Na and K elements in supplemented groups may had favorable effect on the acid base balance during heat stress, which cause an excessive loss of these elements. Meanwhile, the value of total protein was significantly higher with T2 (6.29) compared with the control ration (5.54 g/dl for Farafra ewes, while the difference between inorganic Se-ration (T1) and control was not significant respecting the same breed. Otherwise, with Saidi breed, total protein concentration was insignificantly increased with both inorganic/organic Se-rations (T1&T2) compared with control one, where the highest value was recorded with (T2). This result may attributed to supplementation of selenium and its significant effect on improving nitrogen utilization. Similar results were observed by El-Badawi et al., (2011) who found significant increase in TP in antioxidant supplemented group. The results of the current study are in agreement with those obtained by Kholif and Kholif (2008) who found that diets contained different levels of selenized yeast did not affect serum total protein, albumin and globulin in comparison with the free one with lactating buffaloes. On the contrary, Hossam et al. (2015) found significant increase in total protein and globulin concentrations with increasing the levels of Se-algae in the diets of growing rabbits, being 0.05, 0.1, 0.2, 0.4 and 0.5 mg/kg diet.

Generally, the obtained values are within the normal range recorded by Tain (1986), Kameko (1989) and El-Moghazy et al., (2018) for healthy sheep and goats.

Table (5): Effect of different selenium types supplementation on blood total antioxidant capacity of ewes and their lambs.

Item	**Breeds**		**Treatments**		
			Control	**Inorganic Se (T1)**	**Organic Se (T2)**
Total Antioxidant capacity (mmol/L)	**Ewes**	*Farafra*	$0.52^b \pm 0.04$	$0.67^a \pm 0.04$	$0.69^a \pm 0.04$
		Saidi	$0.48^b \pm 0.04$	$0.64^a \pm 0.06$	$0.67^a \pm 0.05$
	Lambs	*Farafra*	$0.49^b \pm 0.03$	$0.60^a \pm 0.04$	$0.62^a \pm 0.03$
		Saidi	$0.46^b \pm 0.03$	$0.58^a \pm 0.04$	$0.59^a \pm 0.04$

A, b: Means in the same row with different small superscripts are significantly different .

Antioxidant capacity status:

The effect of using selenium (organic or inorganic) in rations of Farafra and Saidi ewes and their born lambs on antioxidant capacity measure are presented in Table (5). The obtained data indicate that total antioxidant capacity was significantly higher in dietary treatments , (T1 and T2) compared with that of control one. The highest value was recorded with T2 in both breeds. This positive response with the two tested treatments (T1&T2) on antioxidant capacity was reported also by Osgul et al. (2012), Pregel et al. (2005) and Hayder et al., (2016). This result might due to that Selenium, either organic or inorganic, play an essential role on controlling antioxidant activity by balancing the pro- and antioxidant status of the body (Arthur, 2000; Wang and Quinn, 2000; Burke et al., 2007). Their protective effects involve all the three types of antioxidant defense systems in animal cells (prevention of radical formation, prevention and restriction of chain formation and propagation, and excision and repair of damaged parts of molecules) (Surai, 2006). The improvement in total antioxidant capacity that resulted in the present study are matched with that obtained by Sathya et al. (2007) who showed a reduction in plasma concentrations of lipid peroxidation products in buffaloes after injection of Se (30 mg) and vitamin E (1,000 mg). The present findings are in accordance with those obtained by Hossam et al. (2015) who concluded that dietary Se-algae supplementation resulted in favorable significant effect on serum blood antioxidative properties as measured by total antioxidant capacity (T-AOC) and TBARS as indexes of oxidation and antioxidant enzymes such as glutathione peroxidase (GSH-PX), superoxide dismutase (SOD) and catalase (CAT). They observed significant increase in TAC, GSH-PX,SOD and CAT as Se-algae levels increased in the diet of rabbits. More recently, Ibrahim and Mohammed (2018), compared sodium selenite (SS), Se-yeast (SY) and nano-Se (NS) as supplements in the diet of growing lambs, and found that SY/NS-rations markedly surpassed the SS-ration respecting the concentrations of serum biochemical parameters, i.e. total protein, globulin, glucose, TAS and GSH-PX. Metabolically and favorably, the organic Se more deposited in the muscle tissue and animal organs than inorganic one. (Behne et al., 2009). In consequence, such vital organic additive (different sources of organic Se) can enhance antioxidative status and protect the tissues againist oxidative damage for farm animals, and so potentially boosting their productive performance.

CONCLUSION

Based on the key finding of this study and its broad discussion with the results obtained by the other scientists, it could conclude that organic Se-ration potentially improve the productive performance of ewes and lambs in comparison with either inorganic Se-ration or free of Se-supplement one.

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<u>الملخص العربي</u>

تأثير استخدام مصدرين مختلفين من السلينيوم (عضوي ومعدني) على الأداء الانتاجي وبعض مقاييس الدم في الأغنام الصعيدي والفرافرة وبعض خصائص الحملان المولوده

[1]فاطمة السيد سبع- [1]ايمن العربي خليل و [2]ايمن عبده الموافي

1 قسم بحوث الأغنام والماعز معهد بحوث الانتاج الحيواني- مركز البحوث الزراعية-دقي-جيزة –مصر

2 قسم الخدمات البيطرية-معهد بحوث الانتاج الحيواني-مركز البحوث الزراعية دقي-جيزة-مصر

تمت التجربة في محطة بحوث التربية بملوي - مركز البحوث الزراعية -محافظة المنيا بهدف دراسة تاثير استخدام نوعين مختلفين من السلينيوم علي اداء النعاج (الفرافرة والصعيدي) في اواخر فترة الحمل وعلى معدل نمو نتاجها.
تم إستخدام عدد ستون من النعاج (30) الفرافرة و (30) الصعيدي (في نهاية فترة الحمل مع متوسط عمر يتراوح من 2 إلى 4 سنوات ومتوسط الوزن للفرافرة 1.4 ± 45.0 كجم و 1.2 ±43.12 للنعاج الصعيدي . كانت النعاج المستخدمة متماثلة في مرحلة الانتاج ومعدل الخصوبة وقسمت الي ثلاث مجموعات متماثلة (10 نعاج لكل مجموعة) وتمت التغذية وفقا لمقررات NRC 1985 وكانت المعاملات كالتالي :مجموعة كونترول بدون اي اضافات (100جم نشا للمقارنة) المعاملة الاولي عليقة متزنة (+0.03مجم سلينيات صوديوم / كجم عليقة متزنة وكانت المعاملة الثانية تحتوي علي 0.3مجم سلينيوم عضوي/كجم عليقة مع متابعة الحملان المولوده من النعاج لاستكمال التجربة .تم حساب انتاج اللبن وتحليل مكوناته خلال فترة الرضاعه وكذلك تسجيل وزن المواليد ووزن الفطام ومعدل النمو للحملان المولوده وتمت دراسة تاثير الاضافه علي بعض مكونات الدم ومضادات الاكسده .تم إجراء التحليل الإحصائي باستخدام برنامج (2010) SPSS
أهم النتائج المتحصل عليها أن معدل إنتاج اللبن أعلى مع T2 (590 و 564 كجم) يليه T1 (583 و 551 كجم) وأخيرا المجموعة غير المعاملة (545 و 502 كجم) للسلالتين الفرافرة والصعيدي وكانت الاختلافات معنوية (P <0.05) . كان التحسن في إنتاج الحليب أفضل مع نعاج الصعيدى (9.76 و12.35 ٪) مقارنة بالفرافرة (6.97 و8.26 ٪) للمعاملتين T1 و T2 على التوالي .كانت محتويات الحليب من الدهون والمواد الصلبة الكلية الصلبة مختلفة قليلاً بين المعاملات ، حيث كان الفرق كبيرًا فقط بين مجموعة الكونترول و T2 . وقد اظهرت الدراسة وجود فرق في وزن الجسم للحملان المولوده عند الولادة والفطام مقارنة بالمجموعة الكونترول .وكانت الفروق واضحه مع T2فقط في أوزان الفرافرة .وبالمثل ، فإن الزيادة اليومية في الجسم (DBG) كانت كبيرة مع إضافة السلينيوم العضوى لنعاج الفرافرة .أشارت البيانات التي تم الحصول عليها إلى أن وزن الفطام ، DBG و TBG كانا أعلى بكثير مع الفرافرة عن الحملان الصعيدي في كلا المعاملتين (T1or T2) . لم يتأثر الهيماتوكريت (Ht ٪) والصوديوم والبوتاسيوم نتيجة للإضافة بينما سجلت أعلى قيمة للبروتين الكلي في الصعيدي مع (6.23) T2 تليه T 1 (6.06) وأخيرا الكونترول (5.78) ولم يكن الفرق معنويا. كان مجموع مضادات الأكسدة أعلى بكثير في T1 و T2 مقارنة مع مجموعة الكونترول .تم تسجيل أعلى قيمة مع T2 في كلا السلالتين.
مما سبق يتضح ان اضافة السلينيوم العضوى أو المعدنى لعلائق النعاج الفرافرة أو الصعيدي (ادي الي تحسن ملحوظ في انتاج اللبن وتركيبة في مقارنة بالكونترول كذلك ادي الي تحسن وزن الميلاد والوزن عند الفطام ومعدل النمو للحملان الناتجة ولم يحدث تغير في مكونات الدم بين المعاملات والكونترول ولكن كان هناك زيادة معنوية في مضادات الاكسدة الكلية في الدم للمعاملات المختبرة مقارنة بالكونترول.