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Productive Performance of Ossimi Ewes Post-Lambing as Affected by Selenium Yeast and/or Vitamin E Supplemented Rations Under Two Different Housing Types

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ABSTRACT

This experiment was carried out to study the effect of selenium yeast (SeY) and/or vitamin E (VitE) supplemented diets which is a commercial antioxidants containing SeY and VitE on productive performance and some blood biochemical parameters of Ossimi ewes and their offspring under two different housing types. Eighty Ossimi ewes in late pregnant period were divided into two equal groups (40 ewes each), the first group averaged 40.38±0.93kg body weight and was settled in semi-opened house with concrete floor and roofed with west-east direction (1^{st} H). While the second group averaged 39.49±1.12kg body weight and was settled in fully shaded house, roofed by single asbestos sheetin and topped with rice straw bales and natural earthen ground with north-south direction (2^{nd} H). Each group randomly divided into four equal subgroups; G1: fed 40% rice straw + 60% concentrate feed mixture (control). G2: fed control + 0.3 mg SeY /kg diet. G3: fed control + 40 mg VitE /kg diet. G4 fed control + 0.3 mg SeY and 40 mg VitE /kg diet. Results indicated that ewes body weight was higher ($P<0.05$) for ewes of treated groups than untreated (control). Percentage of body weight changes during experimental period increased ($P<0.05$) from-0.26 to +1.79 % and from +0.18 to +3.69% for ewes treated by SeY plus VitE, in 1^{st} H and 2^{nd} H, respectively. There was significant ($P<0.01$) improvement for G4 in feed intakes and feed conversion, milk production and milk composition for ewes received SeY plus VitE compared to control. Data indicated that the supplementation with G4 had significantly ($P<0.01$) affected the weaning weight, total gain and average daily gain of suckling lambs in comparison to G1 for ewes and their lambs. Also, there were no significant ($P>0.05$) differences for all blood constituents' values among groups in the 1^{st} house. While, concentrations of serum total protein, albumin, globulin, glucose and cholesterol were significantly ($P<0.05$ and $P<0.01$) higher in the treated groups (G2, G3 and G4) than those in G1 in 2^{nd} house type. Concerning serum AST and ALT values obtained here in were within the normal range for healthy sheep. It was concluded that dietary supplementation with SeY plus VitE could be used for the improvement in productive performance of pregnant and lactating ewes post-lambing without any side effects on the general health. Also, sustenance in the second house type had useful impacts on improving growth rate, feed conversion rate, milk production and some related serum biochemical indicators.

Keywords: Housing, selenium yeast, vitamin E, production, ewe.

INTRODUCTION

Selenium and Vitamin E as antioxidants delay or inhibit oxidative injury to cellular molecule (Gutteridge and Halliwell, 1994). Selenium yeast (Sel- Plex) and organic selenium sources, such as plants contain seleno-amino acids are beneficial as selenium supplements. Selenium supplementation is often necessary because feeds grown in many areas of the world are deficient in selenium. Methods that have been used for selenium supplementation include injection, drenching and administering selenium-laden boluses and trace mineral salt mixtures. Inorganic selenium salts, primarily sodium selenite are generally used as selenium supplements. Selenium is also involved in the immune function of animals (Kincaid *et al.*, 1999). Turner and Finch (1990) reported a decreased lymphocyte response in lambs deficient in vitamin E and selenium. Similarly, Larsen (1988) observed a trend for increased immunoglobulin (IgG) concentrations in selenium supplemented ewes and lambs. Also, he found significantly increased titers to tetanus toxic in selenium supplemented lambs. Koyuncu and Yerlikaya (2007) reported that vitamin E requirements may be determined as the amount required for preventing peroxidation in the cellular membrane which is most capable to peroxidation. In addition, vitamin E prevents oxidative damage to sensitive membrane lipids by suppressing hydro peroxide formation (Chow, 2001).

Housing or suitable shelter that matches with climatic conditions and type of production system is needed to provide sheep and goats the optimal production. Sheep and goats need to be protected from extreme changes in climate and also from predator attack (Hamito, 2009). Azamel (1984) found that climatic conditions have direct and indirect effects on production and reproduction of livestock. Housing is made to modify the stressful environment to allow the animals to express their genetic potential levels of production. Shading may be a good avenue to avoid the impacts of the natural heat stress, particularly solar radiation on animals through providing protection. In this respect, the more efficient shading type is that modifies the surrounding temperature zone, and thus permits best thermoregulatory and productive condition. Environmental conditions (air temperature and humidity) influence the productive and reproductive performance related to housing system.

The present study was carried out to evaluate the effects of dietary supplementation with selenium yeast and/or vitamin E under two different housing types on productive performance of Ossimi ewes and their offspring.

MATERIALS AND METHODS

The present study was carried out at Faculty of Agriculture Experimental Station, Minia University, with partnership of Animal Production Research Institute (APRI), Ministry of Agriculture, Egypt, throughout the period from May until October, 2016.

Housing system:

Two housing types were used in current study:

1- First type was semi opened (20.0 m length × 5.0 m width) type house with concrete floor and roofed at 4 m height with west-east direction and divided into four pens partially sheltered at a stocking rate of one head / 1.5-2 m^2.

2- Second type was fully shaded (20.0 m length × 5.0 m width) type house roofed with single asbestos sheets at 4 m height and was topped with rice straw bales and natural earthen ground with north-south direction and divided into four pens partially sheltered at a stocking rate of one head / 1.5-2 m^2

Experimental design:

Eighty pregnant Ossimi ewes averaged (40.38±0.93 and 39.49 ±1.12kg) live body weight in the first and second housing type, respectively, 3-5 years old and had 2-3 parities were divided into two equal groups (40 ewes per each) according to age, body weight and parity. Each group was settled in one of the housing types and randomly divided into four equal subgroups; G1: fed 40% rice straw + 60% concentrate feed mixture (control). G2: fed control + 0.3 mg SeY /kg diet. G3: fed control + 40 mg VitE /kg diet. G4 fed control + 0.3 mg SeY and 40 mg VitE /kg diet. The calculated concentrations of vitamin E and selenium in the concentrate feed mixture were 13.09 and 0.22 mg/kg DM, respectively. Diets offered at two times; 9 am and 4 pm daily. Composite of feedstuff samples was analyzed according to the methods of AOAC (1995). All animals were weighed biweekly. The compositions of feed stuffs and the total mixed rations are presented in (Table 1).

Table 1. Proximate analysis of concentrate feed mixture (CFM), rice straw (RS) and total mixed ration (TMR) fed to Ossimi ewes on DM basis (%).

Items	Chemical composition (%), DM basis						
	DM	OM	CP	EE	CF	NFE	Ash
CFM	90.64	91.72	16.20	4.53	15.82	55.17	8.28
RS	91.13	85.55	3.41	1.20	38.33	42.61	14.45
TMR	90.84	89.25	11.08	3.20	24.82	50.15	10.75

CFM, concentrate feed mixture used in formulating the experimental rations contained 24 % Cotton seed meal; 40% Wheat bran; 30% Yellow Corn 1.5% Lime stone; 1 % Sodium chloride, 0.5% vitamins and mineral mixture and 3% Molasses; RS, rice straw; TMR, total mixed ration.

Climatic conditions

Ambient temperature (AT, °C) and relative humidity (RH, %) were recorded biweekly interval at 6:00 to 8:00 hrs. and at 12:00 to 14:00 hrs. are shown in Table 2. The Temperature Humidity Index (THI) was calculated from the AT and RH according to Hahn *et al.* (2003):

Where

THI=((AT*1.8)+32)-((0.55*(RH/100)))*(((AT*1.8)+32)-58).

Table 2. Variation of AT, RH and THI in different housing types of Ossimi ewes.

Items	Housing types		P. value
	1st house	2nd house	
Air Temperature (AT, °C)			
Morning	20.60±1.05^a	17.30±0.18^b	0.013
Afternoon	37.60±1.03^a	34.30±0.12^b	0.010
Average	30.90±1.41^a	24.82±0.74^b	0.013
Relative humidity (RH, %)			
Morning	80.60±1.50^a	68.60±2.27^b	0.002
Afternoon	36.40±1.15^a	33.80±0.37^b	0.047
Average	58.50±1.15^a	51.20±1.22^b	0.002
Temperature-humidity index (THI)			
Morning	64.17±0.96^a	61.20±0.16^b	0.017
Afternoon	91.34±1.31^a	87.10±0.21^b	0.013
Average	75.89±1.110^a	72.68±0.220^b	0.023

[a and b]: Means within each row with different superscripts are significantly differed (P<0.05).
THI = ((AT*1.8)+32)-((0.55*(RH/100)))*(((AT*1.8)+32)-58).

Milk production, milk sampling and analysis

The technique of hand milking was used to stimulate milk yield. Ewes have been milked twice daily every week by milking one teat, while the lamb suckles the other one. Total milk yield per ewe was calculated by using the follow equation:

Total milk yield / ewe = (Total milk yield in one teat×2 in the morning)+(Total milk yield in other teat×2 in the afternoon).

Biweekly, representative milk samples were individually collected post-lambing till weaning. Milk samples were preserved immediately after each milking by adding three drops of potassium dichromate. Milk constituents such as fat, protein, lactose, total solids and solids-not fat were determined using Milko-Scan® analyzer (USA), Bently 150, USA.

Blood sampling and biochemical studies

Blood samples were collected biweekly in the morning before feeding via the jugular vein from all ewes using 5ml tubes. Blood sample was put into a sterile vacutainer tube without an anticoagulant for serum biochemical analysis. The clear non haemolysed supernatant serum was quickly removed for analysis of various biochemical parameters. The obtained samples were kept at -20 °C till used.

Concentrations of total protein and albumin were evaluated in blood serum using kits of Diamond Diagnostic, EC Hannover, Germany. Globulin level was calculated as the difference between total protein and albumin. Glucose and cholesterol were quantified in blood serum by using kits of Spinreact, S.A.U., Ctra. Santa Coloma, 7 E-17176 Santé Steve de Bas (GI), Spain by means of spectrophotometer. Biodiagnostic reagent kits were used to determined ALT and AST activity.

Statistical analyses

Data were expressed as means ± S.E. and statistical analyses were performed with SAS (2002). Duncan's New Multiple Range Test (Duncan, 1955) of the same SAS program was applied to determine significant differences among all tested treatments for all parameters

RESULTS AND DISCUSSION

Performance of Ossimi ewes:

The change of Ossimi ewes' body weight (BW) during pregnancy period and immediately post-lambing till weaning as a result of SeY and/or VitE supplemented rations in two different housing systems as showed in Table (3). Average body weight at the beginning of experiment during late pregnancy was not differed significantly among treatments and housing types. However, it was insignificantly increased ($P>0.05$) after the treatment with supplemented rations for one month during pregnancy period, especially this group that treated by both SeY and VitE compared with the control. Moreover, BW was continued to increase in this group immediately post-lambing and at late period (at weaning) in different housing types.

Table 3. Body weight changes of Ossimi ewes as affected by SeY and VitE supplemented rations under two different housing systems.

Housing types	Ewes body weight (kg)	Groups				Means
		G1	G2	G3	G4	
First House	Initial	39.10±1.07	39.40±1.26	39.80±1.35	39.64±0.81	39.49±0.52
	At lambing	35.60±1.04	35.90±1.00	36.10±1.26	36.90±0.84	36.13±0.51
	At weaning	39.00±0.79	39.50±0.77	39.60±1.24	39.80±0.84	39.20±0.44^{B}
	% Change	-0.26	+1.02	+1.28	+1.79	
Second House	Initial	40.16±0.80	40.50±1.24	40.30±0.73	40.57±0.95	40.38±0.52
	At lambing	37.27±0.83	37.60±1.16	37.40±0.65	37.67±1.14	37.49±0.51
	At weaning	40.23±0.90	40.70±0.79	40.80±0.58	41.64±1.00	40.50±0.44^{A}
	% Change	+0.18	+1.35	+1.60	+3.69	
Overall means	Initial	39.63±0.74	39.95±0.74	40.05±0.74	40.10±0.74	39.94
	At lambing	36.44±0.73	36.75±0.73	36.75±0.73	37.29±0.73	36.81
	At weaning	39.61±0.62	39.05±0.62	40.00±0.62	40.72±0.62	39.85

$^{A\ and\ B}$: Means within each column with different superscripts are significantly differed ($P<0.05$).

% change = (Body weight at weaning- Initial body weight) / Initial body weight × 100.

The BW at the beginning, immediately post-lambing and at weaning was increased under the effect of the second house system compared with the first one (Table, 3). The BW reached heavier weight at late period of experiment (at weaning) in SeY+VitE group, while the light weight was found in control group. The simple impact of SeY and VitE supplemented rations on ewe's body weight could be due to its positive effect of increased thyroid gland activity which was related to the increase in growth rate of sheep or increasing of feed intake unite and feed conversion rate (Table 4). The percentage of body weight changes for G2, G3 and G4 groups were insignificant higher as compared with G1 group. While data in Table (3) reflected that body weight at weaning was significantly ($P<0.05$) heavier for 2nd house compared with 1st house, may be due to reduced temperature stress in 2nd house than 1st house.

Feed intake and feed conversion by different groups under two different housing types are shown in (Table 4). Comparisons among groups indicated that intakes of concentrates, rice straw, total dry matter intake (TDMI), kg/head/day and feed conversion (FC) for SeY+VitE group (G4) were significantly ($P<0.01$) improved compared with G1. While, supplementation of SeY (G2) or VitE (G3) alone were not significant ($P>0.05$) affecting compared with control group. Sejian *et al.* (2014) found that Se and VitE as antioxidant supplementation increased significantly feed intake and body weight of heat stressed Malpura ewes. Administration of Se improves daily weight gain and feed conversion of lambs (Gabryszuk and Klewiec, 2002). Mousaie *et al.* (2014) found that selenium supplementation improved feed intake and growth performance and could be beneficial in attenuating the adverse effects of transportation stress for ewe lambs.

Table 4. Feed intake and feed conversion of Ossimi ewes as affected by SeY and VitE supplemented rations under two different housing systems.

Housing types	Items	Groups				Means
		G1	G2	G3	G4	
First House	CFMI (Kg/h/d)	0.69±0.02^{b}	0.69±0.02^{b}	0.70±0.01^{b}	0.78±0.02^{a}	0.71±0.01^{B}
	RSI (Kg/h/d)	0.46±0.01^{b}	0.46±0.01^{b}	0.46±0.01^{b}	0.52±0.01^{a}	0.48±0.01^{B}
	TDMI (Kg/h/d)	1.15±0.03^{b}	1.15±0.03^{b}	1.16±0.02^{b}	1.30±0.03^{a}	1.19±0.01^{B}
	ADMY (Kg)	0.38±0.01^{b}	0.41±0.02^{b}	0.41±0.02^{b}	0.58±0.02^{a}	0.45±0.01^{B}
	Feed conversion*	3.02±0.08^{a}	2.80±0.13^{a}	2.83±0.10^{a}	2.24±0.04^{b}	2.66±0.06
Second House	CFMI (Kg/h/d)	0.73±0.02^{b}	0.71±0.01^{b}	0.74±0.01^{b}	0.83±0.02^{a}	0.75±0.01^{A}
	RSI (Kg/h/d)	0.49±0.01^{b}	0.47±0.01^{b}	0.49±0.01^{b}	0.56±0.01^{a}	0.50±0.01^{A}
	TDMI (Kg/h/d)	1.22±0.03^{b}	1.19±0.02^{b}	1.23±0.02^{b}	1.39±0.03^{a}	1.26±0.01^{A}
	ADMY (Kg)	0.43±0.01^{b}	0.46±0.02^{b}	0.43±0.04^{b}	0.61±0.03^{a}	0.48±0.01^{A}
	Feed conversion*	2.84±0.11^{a}	2.57±0.09^{ab}	2.86±0.24^{a}	2.28±0.06^{b}	2.61±0.06
Overall means	CFMI (Kg/h/d)	0.71±0.01^{b}	0.70±0.01^{b}	0.72±0.01^{b}	0.81±0.01^{a}	0.73
	RSI (Kg/h/d)	0.48±0.01^{b}	0.47±0.01^{b}	0.48±0.01^{b}	0.54±0.01^{a}	0.49
	TDMI (Kg/h/d)	1.19±0.02^{b}	1.17±0.02^{b}	1.20±0.02^{b}	1.35±0.02^{a}	1.23
	ADMY (Kg)	0.41±0.01^{b}	0.41±0.01^{b}	0.42±0.01^{b}	0.60±0.01^{a}	0.47
	Feed conversion*	2.92±0.08^{a}	2.67±0.08^{a}	2.83±0.08^{a}	2.26±0.08^{b}	2.64

$^{a\ and\ b}$: Means within each row with different superscripts are significantly differed ($P<0.05$).

$^{A\ and\ B}$: Means within each column with different superscripts are significantly differ ($P<0.05$).

DM= dry matter; CFMI= concentrate feed mixture intake; RSI= rice straw intake; TDMI= Total DM intake;

ADMY= Avg. daily milk yield.

*** Feed conversion = Total DM intake / Avg. daily milk yield.**

The obtained results may reflect the degradability values of DM and CP of this ration (El-Shahat and Abdel Monem, 2011). Also, feed conversion ratio for G4 calculated as DM kg/ kg milk was improved from 25.38 to 19.27 % in 1st and 2nd house, respectively, as compared with G1. This group had the best feed utilization efficiency of tested groups versus to control group. These results are in agreement with results obtained by Ibrahim (2017). Supplementation of SeY plus VitE used in the present study, positively enhanced the ewes and their suckling lambs' performance that strongly supported by the results that dietary vitamin E and Se improved daily feed intake, gain and maintained oxidative balance in sheep (Chauhan *et al.*, 2016).

On the other hand, Table 4 showed that under different housing types, TDMI and FC of lactating ewes were significantly ($P<0.01$) higher in 2nd house compared with the 1st one. Similar results were obtained by Kandemir *et al.* (2013) and Abozed (2014). Who reported that there was highly significantly positive correlation coefficient between feed intake and ambient temperature.

Performance of suckling lambs and milk production

Performance of suckling lambs and milk production as affected by Se and/or VitE supplemented diets in two different housing types are presented in Table 5. Survival rate were increased insignificantly ($P>0.05$) due to treatments, but the housing type didn't affect it. While, there were highly significant ($P<0.01$) increase in the other productive traits (growth performance of suckling lambs till weaning and milk production) in treated groups compared to control group. The best values of weaning weight, total gain, daily gain, total milk yield and average daily milk yield were obtained in treated group by SeY plus VitE compared to the control group and in 2nd house compared to 1st house (Table 5). Such trend was parallel to that reported by El-Shahat and Abdel Monem (2011) and Ibrahim (2017). Who reported that body weight of lambs born to selenium plus vit. E supplemented group was significantly higher than the control. The incidence of lamb mortality was increased only in control and Se group compared with selenium plus vit. E group.

Positive effects of SeY and VitE supplementation on body weight change of ewes and weight of their offspring in the present study may related to vitamin E and/or VitE supplementation role in protection against oxidative stress, improving immune system (Stewart *et al.*, 2012), and reducing cellular damage caused by endogenous peroxides (El-Shahat and Abdel Monem, 2011). Improvement of growth by selenium and/or vit. E supplementation may be due to the interaction of vit. E with fat and unsaturated fatty acids. There was positive correlation between unsaturated fatty acids concentrations and Se and/or vit. E content in diets (Yu *et al.*, 2008). Antioxidant supplementation (such as Se and vit. E) improved the ruminal enzyme activity (Faixová *et al.*, 2016). Yue *et al.* (2009) reported that Se and/or vit. E supplemented diets improved body weight gain and efficiency of feed conversion. Supplementation of both organic and inorganic Se with or without vit. E can improve growth performance of goats (Shi *et al.*, 2011) and growing male sheep (Ibrahim, 2017).

The significant increase ($P<0.05$) in milk production as a result of Se and/or vit. E supplemented diets may be due to increase of body weight and body condition score of ewes and /or increasing of prolactin level. It has been reported that there was an apparent circadian rhythm in circulating prolactin concentrations (Jackson and Jansen, 1991). Also, such differences in growth performance of Ossimi ewes rearing may be due to the significant increase of milk production for ewes that were treated by Se and/or vit. E compared with the control ewes as shown in Table 5.

Table 5. Performance of suckling lambs and milk production as affected by SeY and VitE supplemented rations under two different housing systems.

Housing types	Items	Groups				Means
		G1	G2	G3	G4	
First House	LBW (kg)	2.53±0.10^{b}	2.89±0.10^{a}	2.94±0.10^{a}	3.03±0.12^{a}	2.85±0.65
	WW (kg)	15.52±0.30^{b}	16.12±0.19^{b}	16.25±0.19^{b}	17.12±0.33^{a}	16.25±0.15
	TG (kg)	12.99±0.38^{b}	13.23±0.23^{ab}	13.31±0.24^{ab}	14.09±0.36^{a}	13.40±0.17
	ADG(kg)	173.20±5.11^{b}	176.40±3.10^{ab}	177.47±3.14^{ab}	187.87±4.74^{a}	178.67±0.22
	SR (%)	60.00±14.77	90.00±9.05	80.00±12.06	80.00±12.06	97.21±0.94
	TMY (kg)	26.78±0.63^{b}	28.88±1.18^{b}	28.70±1.20^{b}	40.92±1.26^{a}	31.32±0.72^{B}
	ADMY (g)	382.50±8.98^{b}	412.50±16.31^{b}	410.00±17.08^{b}	584.50±18.07^{a}	447.38±10.28^{B}
Second House	LBW (kg)	2.94±0.09^{c}	3.06±0.20^{bc}	3.44±0.16^{ab}	3.54±0.14^{a}	3.24±0.65
	WW (kg)	15.20±0.24^{c}	16.66±0.19^{b}	16.85±0.31^{b}	18.23±0.51^{a}	16.74±0.15
	TG (kg)	12.26±0.25^{c}	13.60±0.33^{b}	13.41±0.26^{b}	14.69±0.54^{a}	13.50±0.17
	ADG(kg)	163.47±3.37^{c}	181.33±4.35^{b}	178.80±3.46^{b}	195.87±7.22^{a}	180.00±0.22
	SR (%)	90.00±9.05	90.00±9.05	90.00±9.05	100.00±0.00	99.25±0.94
	TMY (kg)	30.02±0.55^{b}	32.13±1.41^{b}	30.38±2.51^{b}	42.39±1.81^{a}	33.73±0.72^{A}
	ADMY (g)	428.80±7.84^{b}	459.00±20.16^{b}	434.00±35.85^{b}	605.50±25.80^{a}	481.83±10.28^{A}
Overall means	LBW (kg)	2.74±0.09^{c}	2.97±0.09^{bc}	3.19±0.09^{ab}	3.28±0.09^{a}	3.05
	WW (kg)	15.36±0.22^{c}	16.39±0.22^{b}	16.55±0.22^{b}	17.68±0.22^{a}	16.50
	TG (kg)	12.62±0.24^{c}	13.42±0.24^{b}	13.36±0.24^{b}	14.40±0.24^{a}	13.45
	ADG(kg)	168.27±3.20^{c}	178.93±3.20^{b}	178.13±3.20^{b}	192.00±3.20^{a}	179.34
	SR (%)	69.64±1.35	99.00±1.35	98.39±1.35	98.89±1.35	98.23
	TMY (kg)	28.40±1.02^{b}	30.50±1.02^{b}	29.54±1.02^{b}	41.65±1.02^{a}	32.53
	ADMY (g)	405.65±14.54^{b}	435.75±14.54^{b}	422.00±14.54^{b}	595.00±14.54^{a}	464.61

$^{a, b \text{ and } c}$: Means within each row with different superscripts are significantly differed ($P<0.05$).

$^{A \text{ and } B}$: Means within each column with different superscripts are significantly differ ($P<0.05$).

LBW= lambs birth weight; WW= weaning weight; TG= total gain; ADG= average daily gain; SR= Survival rate; TMY= total milk yield; ADMY= average daily milk yield.

Also, Fiore *et al.* (2015) reported that T_3 and T_4 are correlated with milk yields and constituents being higher in high yielders (treated groups) and lower in low yielder (control). Collier *et al.* (1984) reported that the pituitary-thyroid axis is an important physiological factor controlling metabolic processes and milk secretion. Thyroid hormones (Thyroxin, T_4 and Triiodothyronine, T_3) synergize with other hormones to promote growth and development of the mammary gland and maintenance of lactation. Injection of thyrotropin-releasing hormone or thyroxin moderately increases milk production in cows (Lapierre *et al.*, 1990).

Milk composition:

Results presented in Table 6 showed that mean of milk constituents (fat, protein, lactose and ash %) under two different housing types were significantly (P<0.01) higher in treated groups compared with control group. But differences between treated groups were not significant (P>0.05). The superiority of treated groups in milk protein ratio might be due to increasing the level of total protein in serum blood in these groups compared to control group (Table 7) or improvement in prolactin levels. Prolactin is the primary hormone responsible for regulating milk protein synthesis and maintaining lactation (Neville, 1990). Table 6 showed that milk lactose percentage tended to be significantly (P<0.01) higher in treated groups than that of control one. Milk lactose % was insignificantly higher (P>0.05) in treated groups. The increase of lactose in milk is probably due to the increase in serum glucose in treated ewes compared to untreated ewes as shown in Table 7. It is known that, glucose and galactose are precursors for milk lactose (Cronje *et al.*, 1991). There was significant (P<0.01) difference in the percentage of total solid (TS) between treated groups compared to control group. There was no difference (P>0.05) between treated groups, they were the highest in milk TS, while control group was the lowest one. These differences between groups might be related to the differences in milk constituents in the different groups.

Table 6. Milk composition (%) of Ossimi ewes as affected by SeY and VitE supplemented rations under two different housing systems.

Housing types	Items	Groups G1	G2	G3	G4	Means
First House	Fat	6.43 ± 0.12^{b}	6.87 ± 0.19^{a}	7.28 ± 0.13^{a}	7.26 ± 0.12^{a}	6.70 ± 0.06
	Protein	4.62 ± 0.10^{c}	5.13 ± 0.10^{b}	5.49 ± 0.11^{a}	5.49 ± 0.05^{a}	5.18 ± 0.06
	Lactose	3.95 ± 0.15^{b}	4.90 ± 0.23^{a}	5.22 ± 0.17^{a}	5.09 ± 01.3^{a}	4.79 ± 0.82
	SNF	9.17 ± 0.26^{b}	10.79 ± 0.27^{a}	11.49 ± 0.30^{a}	11.33 ± 0.21^{a}	10.69 ± 0.14
	TS	15.60 ± 0.36^{b}	17.66 ± 0.42^{a}	18.77 ± 0.43^{a}	18.59 ± 0.30^{a}	17.39 ± 0.17
	Ash	0.60 ± 0.02^{b}	0.75 ± 0.03^{a}	0.78 ± 0.03^{a}	0.74 ± 0.04^{a}	0.72 ± 0.01
Second House	Fat	6.54 ± 0.09^{c}	7.03 ± 0.06^{b}	7.31 ± 0.15^{ab}	7.48 ± 0.13^{a}	7.10 ± 0.06
	Protein	4.89 ± 0.06	5.24 ± 0.06	5.15 ± 0.28	5.30 ± 0.08	5.15 ± 0.06
	Lactose	4.24 ± 0.14^{c}	4.60 ± 0.15^{bc}	5.35 ± 0.20^{a}	4.95 ± 0.12^{ab}	4.78 ± 0.82
	SNF	9.78 ± 0.20^{b}	10.56 ± 0.24^{ab}	11.30 ± 0.48^{a}	10.99 ± 0.23^{a}	10.65 ± 0.14
	TS	16.32 ± 0.22^{c}	17.59 ± 0.28^{b}	18.61 ± 0.38^{a}	18.47 ± 0.29^{ab}	17.75 ± 0.17
	Ash	0.65 ± 0.02^{c}	0.72 ± 0.02^{b}	0.80 ± 0.03^{a}	0.74 ± 0.02^{b}	0.73 ± 0.01
Overall means	Fat	6.49 ± 0.09^{c}	6.95 ± 0.09^{b}	7.30 ± 0.09^{a}	7.37 ± 0.09^{a}	6.90
	Protein	4.76 ± 0.09^{b}	5.19 ± 0.09^{a}	5.32 ± 0.09^{a}	5.40 ± 0.09^{a}	5.17
	Lactose	4.09 ± 0.12^{c}	4.75 ± 0.12^{b}	5.28 ± 0.12^{a}	5.02 ± 0.12^{ab}	4.79
	SNF	9.47 ± 0.20^{c}	10.68 ± 0.20^{b}	11.39 ± 0.20^{a}	11.16 ± 0.20^{ab}	10.67
	TS	15.96 ± 0.24^{c}	17.63 ± 0.24^{b}	18.69 ± 0.24^{a}	18.53 ± 0.24^{a}	17.57
	Ash	0.62 ± 0.02^{c}	0.74 ± 0.02^{b}	0.79 ± 0.02^{a}	0.74 ± 0.02^{b}	0.73

[a, b and c]: Means within each row with different superscripts are significantly differ (P<0.05).
SNF= solid not fat; TS= total solid.

Blood parameters:

Blood biochemical constituents (total protein, albumin, and globulin (g/dl)), A/G ratio, glucose and cholesterol (mg/dl) as well as ALT and AST activity (U/L) in treated groups under two different housing types are presented in Table 7. All blood constituents' values were within the normal physiological range for healthy sheep as reported by Reece (2004). There were no significant (P>0.05) differences for all blood constituents' values among groups in the 1st house type. While, concentrations of serum total protein, albumin, globulin, glucose and cholesterol were significantly (P<0.05 & P<0.01) higher in the treated groups than those in control group in 2nd house type.This increasing might be due to increasing of metabolic activity as a result of influencing the thyroid hormones (T_3 and T_4) in these groups compared with control group. The hypothalamus can modulate metabolism in organs like the liver, heart and adipose tissue. In addition, it can affect hormone secretion via autonomic innervation of endocrine glands, for example glucagon and insulin secretion by the pancreas. Also, the hypothalamus may affect thyroid hormone secretion via autonomic innervation of the thyroid gland. The classical view on the brain's involvement in the hormonal regulation of metabolism was dominated by two one-way roads. Hormones were thought to be the main factor via which the brain could control metabolic organs such as the liver (Klieverik, 2009). Concerning serum AST and ALT values obtained herein, they were within the normal range for healthy sheep.

Table 7. Blood serum constituents of Ossimi ewes post-lambing as affected by SeY and VitE supplemented rations under two different housing systems.

Housing types	Items	Groups				Means
		G1	G2	G3	G4	
First House	TP (g/dl)	5.81±0.26	5.36±0.20	5.25±0.19	5.52±0.19	5.49±0.08
	Alb (g/dl)	3.53±0.09	3.78±0.05	3.58±0.10	3.72±0.08	3.65±0.04
	Glob (g/dl)	2.28±0.32	1.58±0.20	1.67±0.16	1.80±0.10	1.84±0.08
	A/G ratio	1.54±0.31	2.39±0.29	2.14±0.39	2.07±0.14	$1.99±0.12^{A}$
	Glu (mg/dl)	62.89±2.61	66.23±1.81	68.25±1.80	69.47±2.54	$66.71±0.92^{A}$
	Chol (mg/dl)	99.31±1.68	98.61±1.74	93.06±2.52	90.97±3.68	95.49±1.64
	AST (U/L)	14.60±0.53	14.27±0.59	13.95±0.10	14.45±0.61	14.32±0.33
	ALT (U/L)	34.83±3.01	38.17±2.87	29.58±1.53	31.33±2.97	33.48±1.35
Second House	TP (g/dl)	$5.17±0.12^{c}$	$5.44±0.09^{bc}$	$5.87±0.10^{a}$	$5.63±0.09^{ab}$	5.53±0.08
	Alb (g/dl)	$3.44±0.08^{b}$	$3.45±0.10^{b}$	$3.63±0.08^{ab}$	$3.71±0.03^{a}$	3.56±0.04
	Glob (g/dl)	$1.73±0.06^{b}$	$1.99±0.12^{ab}$	$2.24±0.13^{a}$	$1.92±0.10^{ab}$	1.97±0.08
	A/G ratio	1.99±0.05	1.73±0.16	1.62±0.15	1.93±0.12	$1.81±0.12^{B}$
	Glu (mg/dl)	$56.93±1.75^{c}$	$64.30±1.18^{b}$	$64.47±1.07^{b}$	$69.12±1.31^{a}$	$63.71±0.92^{B}$
	Chol (mg/dl)	$104.19±5.83^{a}$	$90.28±2.83^{b}$	$93.06±1.17^{ab}$	$99.79±4.08^{ab}$	96.83±1.64
	AST (U/L)	16.02±0.75	13.23±1.03	14.12±0.77	13.25±0.59	14.15±0.33
	ALT (U/L)	33.50±2.68	36.42±2.70	35.92±2.62	28.58±2.94	33.60±1.35
Overall means	TP (g/dl)	5.49±0.11	5.50±0.11	5.56±0.11	5.48±0.11	5.51
	Alb (g/dl)	$3.48±0.06^{b}$	$3.74±0.06^{a}$	$3.60±0.06^{ab}$	$3.59±0.06^{ab}$	3.61
	Glob (g/dl)	2.01±0.12	1.75±0.12	1.96±0.12	1.90±0.12	1.91
	A/G ratio	1.73±0.16	2.14±0.16	1.84±0.16	1.89±0.16	1.90
	Glu (mg/dl)	$59.91±1.30^{c}$	$65.26±1.30^{b}$	$66.36±1.30^{ab}$	$69.30±1.30^{a}$	65.21
	Chol (mg/dl)	$101.75±2.32^{a}$	$94.44±2.32^{ab}$	$93.06±2.32^{b}$	$95.38±2.32^{ab}$	96.16
	AST (U/L)	15.31±0.47	13.75±0.47	14.03±0.47	13.85±0.47	14.24
	ALT (U/L)	34.17±1.91	37.29±1.91	32.75±1.91	29.96±1.91	33.54

a, b and c: Means within each row with different superscripts are significantly (P<0.05) different.

A and B: Means within each column with different superscripts are significantly (P<0.05) different.

TP= total protein (g/dl); Alb= albumin (g/dl); Glob= globulin (g/dl); A/G= albumin/ globulin ratio; Glu= glucose (mg/dl); Chol= cholesterol (mg/dl); AST= Aspartate aminotransferase (U/L); ALT= Alanine aminotransferase (U/L).

CONCLUSION

The present study shows that dietary supplementation with SeY and/or VitE to pregnant and lactating ewes had useful impacts on feed intakes, feed conversion, growth rate, milk production and some related serum biochemical indicators under two different housing systems. Finally, it can be concluded that dietary supplementation of SeY plus VitE (G4) in the second housing system for ewes was the best without any adverse effects on animal performance.

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الأداء الإنتاجي للنعاج الأوسيمي عقب الولادة وتأثره بإضافة خميرة السيلينيوم مع أو بدون فيتامين هـ للعلائق تحت نظامين إسكان مختلفين

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تهدف هذه الدراسة إلى تقييم إضافة خميرة السلينيوم مع أو بدون فيتامين هـ للعلائق على الأداء الإنتاجي وبعض صفات الدم الكيميائية للنعاج الأوسيمي وحملانها عقب الولادة تحت نظامين إسكان مختلفين. تم اختيار ثمانون نعجة أوسيمي في الفترة الأخيرة من الحمل عشوائيا، ثم قُسمت إلى مجموعتين متساويتين (٤٠ نعجة / مجموعة)، كان متوسط وزن النعاج بالمجموعة الأولى (٤٠,٣٨ ± ٠,٩٣ كجم) التي تم إعاشتها في حظيرة شبه مفتوحة، ذو أرضية خرسانية وتغطية السقف بالاتجاه غربي-شرقي، بينما كان متوسط وزن جسم النعاج بالمجموعة الثانية (٣٩,٤٩±١,١٢ كجم) والتى تم إعاشتها في حظيرة مظللة بالكامل بألواح الأسبستوس الفردية ومن فوقها بالات قش الأرز، ذو أرضية ترابية وتغطية السقف بالاتجاه شمالي-جنوبي) قُسمت كل مجموعة عشوائيا إلى أربع مجموعات فرعية متساوية (١٠ / مجموعة) المجموعة الأولى (المقارنة)، وغُذيت علي العليقة التي تحتوي علي ٤٠% قش الأرز و٦٠% علف المركز، المجموعة الثانية غذيت على عليقة المقارنة مضافا إليها ٠,٣ مجم خميرة السلينيوم / كجم من العليقة، المجموعة الثالثة غُذيت على عليقة المقارنة مضافاً إليها ٤٠ ملجم فيتامين هـ / كجم من العليقة، و المجموعة الرابعة غُذيت على عليقة المقارنة مضافاً إليها ٠,٣ ملجم خميرة السلينيوم + ٤٠ ملجم فيتامين هـ. خلُصت النتائج الى زيادة في نسبة تغير وزن جسم النعاج بالمجموعات المعاملة عنها في مجموعة المقارنة أثناء فترة التجربة عند مستوى معنوية ٥ % من – ٢٦و٠ إلى+ ٧٩و١ % ومن + ١٨و٠ إلى + ٦٩و٣ % للنعاج المقدم لها خميرة السيلنيوم + فيتامين هـ تحت نظام الإسكان الأول والثاني على التوالي. أيضا كانت هناك زيادة معنوية عند مستوى ١ % للمجموعة الرابعة المقدم لها خميرة السيلينيوم + فيتامين هـ في تحسن كفاءة الغذاء المأكول, الكفاءة التحويلية للغذاء، وإنتاج وتركيب اللبن مقارنة بالكنترول. كما اتضح من النتائج أن هناك تأثيرا معنويا عند مستوى ١ % لإضافة خميرة السيلينيوم + فيتامين هـ على وزن الفطام, معدل النمو الكلي، ومتوسط النمو اليومي للحملان الرضيعة مقارنة بمجموعة المقارنة. ولم يكن هناك أي اختلافات معنوية لقيم محتويات الدم بين مجموعات نظام الإسكان الأول، بينما كان تركيز كل من البروتين, الألبيومين، الجلوبيولين، والكوليسترول أعلى معنويا عند مستويات ٥ % و ١ % في المجموعات المعاملة عنها في مجموعة المقارنة تحت نظام الإسكان الثاني. كانت قيم إنزيمات الكبد (AST and ALT) في المُعدل الطبيعي الصحي للإغنام. يستنتج من هذه النتائج السابقة أن أفضل المعاملات كانت بالمجموعة الرابعة لذلك نوصي بإضافة خميرة السيلينيوم + فيتامين هـ لعلائق النعاج العشار والحلابة لتحسين الأداء الإنتاجي عقب الولادة، بدون أي تأثيرات جانبية على الصحة العامة. أيضا نوصي بنظام الإسكان الثاني لما له من تأثير مفيد لتحسين معدل النمو, معدل كفاءة تحويل الغذاء ، إنتاج اللبن وبعض صفات سيرم الدم الكيميائية.