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EFFECT OF FLUSHING SYSTEMS AND DIFFERENT LEVELS OF SELENIUM AND VITAMIN E INJECTION ON REPRODUCTIVE PERFORMANCE OF GEZIRA ECOTYPES (DUBASI AND SHUGOR) IN OFF-BREEDING SEASON.

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ABSTRACT

This study investigated the effect of flushing systems and different levels of Selenium and vitamin E injection on reproductive performance of Gezira ecotypes (Dubasi and Shugor) in off-breeding season using 36 ewes(18Dubasi and 18 Shugor) Aged between 2-3 years with body weight of 36 kg randomly allocated to six treatments. All groups used in flushing period and only the source of energy were different between rations. The ewes were divided into six groups: A-control (only received basal diet) group. B: treated with 50% concentrated feed. C: treated with 100% concentrated feed. D: group treated with Selenium + vitamin E half dose (1ml). E group treated with Selenium + vitamin E full dose (2ml). G group treated with100% concentrated feed and full dose of Selenium + vitamin E (2ml). Selenium + vitamin E were given one dose per week intramuscularly for 8 weeks. (4wks before mating and 4-after mating). The experimental lasted 24 weeks (from 1st of April to end September) In this study improved fertility percent of 100%, 133%, 100%, 133% and 133% were recorded for Shugor, while Dubasi recoded 100%, 133%, 100%, 100% and 133%for B, C, D, E and G experimental groups, respectively. The control experiment group recorded 67% fertility. Blood constituents revealed good results in all treatment groups. A significant (P≤0.01) increase in WBC, and lymphocytes were observed in all treatments compared to (A) group; while the neutrophils decreased significantly (P≤0.01) in treated groups, little effect on monocyte, and no effect on basophile, eosnophil, while a significant (P≤.O I) increase in (PCV) were observed in treated animals compared to (A) group. Blood plasma had greater concentrations of blood total protein, cholesterol, inorganic phosphorus as well as higher aminotransferase activity than those of control group. It can be concluded that reasonable dosage of Selenium + vitamin E particularly those given by intramuscular injection is recommended to promote performance of ewes during the gestation period as well as to achieve better reproductive aspects in out off season.

INTRODUCTION

Sudan has the largest livestock population in Africa with According to recent estimates, of (MARF, 2016), Sudan have about (106.6 million heads) of which 30.37 million heads of cattle, 40.21 million heads of sheep, 31.22 million heads of goats and 4.80 million heads of camel . The livestock are under traditional nomadic system in which animals are expected to tend for themselves to a large extent and to contest with environmental stresses imposed on them by nature. There are four types of Sudanese sheep (Desert, Nilotic, Arid upland and Equatorial upland) and seventeen breeds (El-Hag, 2001). Sudan desert sheep breed is one of the most important meat and milk producing sheep in Sudan and represent more than 65 percent of the total sheep in Sudan and nearly 100 percent of Sudanese sheep exports (El-Hag *et al*., 2001). Nomadic desert sheep are raised under open rangeland and obtain adequate feed from grazing during rainy season, but are on the verge of starvation during the dry season. Dry season pasture does not meet the maintenance requirement of sheep and may lead to loss of weight and mortality in young animals. Transhumant's and sedentary farmers raise desert sheep (Dubasi and Shugor ecotypes) to produce meat, milk and to a lesser extend skin (Abdelgadir *et al*., 1998). Sheep are well known for feeding on a wide spectrum of plant, and are said to posses some degree of nutritional wisdom which enable them to select food that meet their nutritional needs and avoid those that cause toxicosis (Provenza *etal*., 1994 a,b). It is generally agreed that unedequate nutrition is one the main factors accounting

for low sheep productivity in the country. The potential of any feed to support animal production depends on the quantity consumed by the animal and extent to which the feed meet energy, protein, mineral and vitamin requirement (Minson, 1990). Nutrition is one of the environmental cues that affect reproduction in domestic animals (Tatman *et al*., 1990). Direct effects of poor nutrition are reflected in reduced conception, embryonic losses, reduced lambing rate (Diskin and NisWender, 1989), and high ewe mortality (Yoder *et al*., 1990). Low lambing rate represent a major obstacle to sheep production (Schoenian and Burfening, 1990). Imbalances in trace, minerals, may occur in farm animals, especially sheep, whose intake of minerals depend largely on the content in the forage and thereby on the soil where lay grows. Sudan as many other countries in the world has low content of Selenium (Se) in the soil. Animals that mainly consume home produced roughages therefore easily suffer from Se. deficiencies, if they are not supplemented in an appropriate way. Se. is an important trace element that has a narrow range between deficiency and toxicity in sheep (Humann ziohaniea *et al*., 2013). Vitamin E is an antioxidant that prevents the oxidative damage of the sensitive membrane lipids. Some literature cited variety of defency systems due to suboptimal vitamins content of the food. These symptoms include decreased growth rates, lowered fertility and impairment of the immune system, and finally increased susceptibility to secondary infections (Blowey, 1993). This study was undertaken to evaluate the effects of strategic supplementary feeding prior to mating (flushing) and injecting different level of Se. and vitamin E on ewes in late wet season. The ultimate goal was to improve Sudan desert sheep (Dubasi and Shugor ecotype) production and reproductive ability in Gezira and similar ecological areas. The aim of the research is to collect information's and present recommendation of the best flushing system, best level of Se. and vitamin E supplementation for Sudanese desert sheep.

MATERIAL AND METHODS

Experimental site

This study was carried out at the Extension and Rural Development Centre (ERDC), Faculty of Animal Production, University of Gezira (Elmanagil town). Elmanagil town is located in the center of Gezira agricultural scheme 76 kilometres west Wad Medani, Gezira State, Sudan.

The area described as vast plains with heavy clay soil, with the largest agriculture scheme in the world. The scheme is an irrigated agricultural scheme from Blue Nile River by passive gravity surface irrigation and water canals are filled with water approximately all the year around.

Climate

The climate of Gezira state varies from poor Savanna climate in the northern part to rich woodland savanna in the southern part of the state. The climate is generally dry and hot during summer (March – June), warm and hot during the rainy season (July –October), moderately cool during winter (November –February) (Anon-2018). The mean maximum temperature (May – July) and minimum temperature (January). Temperature varies from 35c^{o} down to 10c^{o} in the northern part of the state and down to 16c^{o} in the central part and 40c^{o} down to 15c^{o} in the southern part of the state.

Experimental Animals

Thirty six mature (adult) ewes ecotype (Dubasi and Shugor) of age (2-3 years) and initial average body weight 36kg and four rams of (3-4year) age and average body weight 45kg were selected for this study. The experimental animals were housed in semi-open pens enclosed by corrugated steel, bamboo poles and steel bars of about three meters high and covered with zinc sheets each pen is provided with water and feed troughs. The floor is made of concrete with suitable slope for drainage.

Feed and feeding

Three complete diets were formulated to contain two levels of flushing system and three levels of Se. and vit. E. Every diet was composed of Sorghum, Groundnut cake, Wheat brand, Groundnut hull, Limestone and common salt. Chemical analysis and nutritive value of the ration are presented in table (1). The diet were offered to all experimental group in equal dietary allowances according to appetite (no refusal).Table (1) and (2) shows the ingredient proportion and chemical composition of the experimental diets. Water was freely available in water troughs. Whereas, multi minerals licking blocks available for animals in the stall.

Table 1: Show the ingredient proportion of experimental diet (by weight).

Ingredients (Ingr) (%)	Ration%			
	Ewes			Rams
	Control	50% flushing	100% flushing	50% flushing
Sorghum (Sorg.)	48	50	52	50
Wheat bran(W.B)	15	22	22	22
Groundnut cake G.N.C)	13	20	20	20
Groundnut hull(G.N.H)	21	5	3	5
Limestone	1.5	2	2	2
Salt	1.5	1	1	1

Total	100	100	100	100
Protein(C.P)	13%	17%	19%	17%
ME/Kilocalories (kcal)/kg	2.8	2.9	3.00	2.9

Table 2: Shows the chemical composition of experimental diets (dry matter basis).

Chemical analysis (%)	Concentrate feed mixture (CFM)		Groundnut hay (GH)	
	As fed	DM basis	As fed	DM basis
Dry matter	92.7	100	94.2	100
Organic matter	80.5	89.4	76.9	81.7
Crude protein	18.2	20.1	6.2	7.1
Crude fibre	14.8	16.3	33.3	35.2
Ether extract	4.3	5.2	1.4	1.6
NFE	45.3	48.5	39.2	41.2
Ash	11.1	11.9	14.2	14.9
M.E(kcal/kg)	-	-	-	-

Experimental procedure

The experimental animals were divided randomly into six groups 3 animals in each group (ecotype). The ewes were housed in shaded house and were allowed an adaptation feeding period of three weeks. The experimental animal were fed on complementary feed (concentrate and roughages) that contain crude protein and metabolic energy for all groups with feeding system, 60 percent concentrate ration and 40 percent groundnut hay roughages. The animals were properly tagged for ease identification, drenched with Albendazole (Bendazole-25, Alpha, Holland) and injected with Ivomec against the internal parasites and treated against the external parasites by using Cipermethrine after been cleaned with soap and water, and given prophylactic doses of oxytetracycline. The experimental animals were initially individually weighed by using small ruminant's balance (0 – 50 Kg capacity).

Thereafter, the ewes within each group were subjected to one of the flowing treatments,

Group (A) each ecotype: Represent the control group without flushing and selenium and vit. E injections.

Group (B) Flushing 50%, without Se. and vit.E supplementation.

Group (C) Flushing 100%, without Se. and vit.E supplementation.

Group (D) each ecotype: Control +Half dose of Selenium and vitamin E intramuscular injection at the rate of 1ml/head weekly.

Group (E) each ecotype: Control +Full dose of Selenium and vitamin E intramuscular injection at the rate of 2ml/head weekly.

Group (G) each ecotype: 100% Flushing +Full dose of Selenium and vitamin E intramuscular injection at the rate of 2ml/head weekly.

Acquisition of research material

The acquisition of sample was performed according to a precisely defined method with the intension to preserve the initial quality of blood and serum. The skin over the jugular vein was rubbed with 70% alcohol and disinfected by the application of tincture of iodine using a labeled vacationer tube with needle holder or by using disposable plastic tubes. Tubes containing blood sample were placed in racket in small ice box and then were transported to the laboratory. Blood samples were collected in sterile glass tube after the animals were bled from their jugular veins using plastic syringes. Immediately after blood collection samples were transported and transferred into vacuum capillary tube to determine the immediate measurement of hematological parameters.

The remaining parts of blood samples were left for 2-3 hours at room temperature after which the serum was clarified and separated by centrifugation for 10 minutes (Hettich EBA20, Germany) at 2000 rpm at room temperature after which the serum was poured in plastic tube stored in deep freezer at -20c^{o} for metabolic parameters.

Data collection

The data concerning reproductive parameters as well as blood chemical analysis for both haematologicaly and metabolic parameters were measured.

A-Reproductive parameters

The following reproductive parameters were measured: Fertility rate, Lambing Rate and Litter size.

B. Blood characteristics

- Blood Serum (total protein, albumin, glucose, cholesterol, Triglyceride).
- Blood hematologies (Haemoglobin, RBCs, WBCs and PCV).
- Blood minerals (Selenium. Calcium and Phosphorus).

Statistical Analysis

Data were reported as means ± S.E.M and were subjected to analysis of variance (ANOVA). Differences between groups means were tested with the Duncan multiple range tests. Means were considered significant $P \leq 0.05$ and $P \leq 0.01$). Statistical analysis was performed using computer software SPSS.18.0 (26) for window.

RESULTS AND DISCUSSION

A number of 36 ewes and 4 rams from Sudan desert sheep (Shugor and Dubasi ecotypes) were studies and statistically analyzed in this study. The collected data were analyzed statistically using Duncan multiple range test. Data are reported as means + S.E.M, and were subjected to one way analysis of variance (ANOVA), Differences between group means were considered significant (P≤0.05) statistical analysis were performed using a computer software SPSS 18.00 (SPSS, LED) survey.

The experiment was designed to investigate the effect of two flushing systems, and three levels of Selenium and vitamin E. supplementation on the productive ability, reproductive characters, and blood haematological and metabolic parameters. The experimental period extend for 24 weeks (from 1st of April to end September. In this study the ewes were classified in six experimental groups (three ewes in each group) the experimental group include control group (without flushing and without supplementation of Selenium and vitamin E). Two flushing experimental groups (high with 100% concentration and moderate with 50% concentration for B and C experimental groups), three levels of Selenium and vitamin E. the first level contain the control ration plus half dose of Se. and vit.E (without concentrate), the second level contain full dose of Se. and vit. E plus control ration (without concentrate, the third level contain control ration and 100% concentrate and full dose of Selenium and vitamin E.

Effect of two flushing and three supplementation levels of Selenium and vitamin E on Effect on reproduction

Table (3) present the results derived from the analysis of variance for the effect of Se + vit. E on some reproductive traits. Result of this table showed a high positive effect for two flushing systems and three levels of supplementation of Se. + vit. E on reproductive traits. The flushing and supplementation was found to be more effective in improving fertility and reproductive performance. All the experimental groups recorded 100% fertility in comparison to control group which recorded 67%. This result is in line with the result reported by Sulieman *et al* (1990). Also the result of this experiment showed high concentration rate reduced abortion and no ewe's mortality.

Effect on fertility

Table (3) present the result derived for the effect of flushing and supplementations on fertility percentage. The results of this table indicate high percentage level of fertility for all experimental groups. In this study a fertility percent of 100%, 133%, 100%, 133% and 133% were recorded for Shugor, while Dubasi recorded 100%, 133%, 100%, 100% and 133% for B, C, D, E and G experimental groups, respectively. The control group recorded 67% fertility. The highest fertility were recorded for C and G experimental groups for both Shugor and Dubasi ecotypes. This result besides confirming the beneficial effect of flushing and supplementation of Se. + vit. E also in line with all reported literature. This result is line with the result of Pilarezyk *et al*, (2004) who found significant improvement in reproductive indices (fertilization 96% and fecundity 137.5%) after application of Se in ewes.

Effect on litter size

In this study the litter size recoded 0.67, 1.0, 1.33, 1.0, 1.0 and 1.33for Shugor, while Dubasi recorded 0.67, 1.0, 1.33, 1.0, 1.0 and 1.33 for A, B, C, D, E and G experimental groups, respectively. This outcome confirms the positive effect of flushing and supplementation of Se. and vit. E on litter size. Our result was comparable to litter size reported by Girma (2008) who reported litter size for tropical breed varies between 1.08 and 1.75 with an average of 1.38. Solomon *et al*., (2010) reported that the litter size for Ethiopian Washera sheep breed was about 1.11.

Effect on lambing rate

All the above finding of this study in all reproductive traits are in line with Mukhtar and Fadlalla, (1988) who found that supplementary feeding has resulted in 17% increase in lambing percentage and 21% decrease in abortion.

Table 3: shows the effect of two flushing systems and three supplementation levels of Selenium and vitamin E on fertility, lambing rate and litter size.

Treatments	Breeds	No of ewes	Fertility %	Lambing rate	Litter size
A	Shugor	3	67%	67%	0.67
	Dubasi	3	67%	67%	0.67
B	Shugor	3	100%	100%	1
	Dubasi	3	100%	100%	1
C	Shugor	3	133%	133%	1.33
	Dubasi	3	133%	133%	1.33
D	Shugor	3	100%	100%	1
	Dubasi	3	100%	100%	1
E	Shugor	3	133%	133%	1.33
	Dubasi	3	100%	100%	1

G	Shugor	3	133%	133%	1.33
	Dubasi	3	133%	133%	1.33

A: Control group. B: treated with 50% concentrated feed. C: treated with 100% concentrated feed.
D: group treated with Selenium + vitamin E half dose. E group treated with Selenium + vitamin E full dose
G group treated with100% concentrated feed and full dose of Selenium + vitamin E.

Table (3): Effect of flushing systems and supplementation of Selenium and vitamin E on.

Blood components

Haematological parameters

Table (4) summarized the results derived from analysis of variance for the effect of two flushing systems and three supplementations of Se + vit,E on haematological parameter. The haematological parameters measured were haemoglobin concentration (Hb) White blood cells counts (WBCsx103/ml), Red blood cellscounts (RBCsx106/ml) and Packed cell volume (Pcv%).

Effect on Haemoglobin concentration

The result of this table for haemoglobin concentration indicate significant differences at (P≤0.05) level for all experimental groups for Shugor ecotype. The highest mean value of Haemoglobin concentration for Shugor recorded 9.87 g/dl, 10.40 g/dl and 9.78 g/dl for A, B and G experimental groups, respectively. Dubasi ecotype recorded non-significant difference at (P≥0.05) level between all experimental groups. The highest mean value of haemoglobin concentration for Dubasi ecotype recorded 10.17 g/dl 9.90 g/dl and 9.53 g/dl for A, C and G experimental groups, respectively.

Table 4: Effect of two flushing systems and three supplementation levels of Selenium and vitamin E on blood parameters (haematology).

Ecotypes	Periods	Treatments						SEM	Sig
		A	B	C	D	E	G		
Haemoglobin (g/dl)									
Shugor	0	10.33	9.13	9.60	9.27	9.45	9.34	0.70	NS
	1 month	9.67	8.93	9.70	9.17	9.20	9.32	0.44	NS
	2 month	10.27	9.40	9.60	9.26	9.39	9.78	0.31	NS
	3 month	9.87^{ab}	10.40^{a}	9.63^{ab}	9.13^{b}	9.10^{b}	9.98^{a}	0.36	*
Dubasi	0	9.93	9.63	9.93	9.40	9.80	9.76	0.54	NS
	1 month	9.53	9.56	9.90	8.57	9.73	9.60	0.51	NS
	2 month	10.10	8.53	9.70	8.73	9.88	9.72	0.51	NS
	3 month	10.17	9.37	9.90	9.23	9.44	9.53	0.47	NS
W.B.Cs x10^3/ml									
Shugor	0	15.47	15.50	15.53	13.30	14.22	15.12	1.51	NS
	1 month	17.30a	13.53b	17.10a	16.53a	17.11a	16.80a	0.89	*
	2 month	12.43b	16.90a	15.77ab	17.00a	16.87a	17.21a	1.30	*
	3 month	13.66	15.80	15.90	13.90	14.13	15.25	2.02	NS
Dubasi	0	10.33b	12.23ab	17.33a	15.33ab	13.87ab	17.47a	1.68	*
	1 month	12.20	16.50	16.03	15.23	14.98	15.08	1.46	NS
	2 month	10.53b	18.60a	18.13a	13.50b	15.33b	17.89a	1.21	*
	3 month	10.17b	15.40ab	17.00a	13.87ab	14.11ab	17.24a	1.67	*
R.B.Cs x10^6/ml									
Shugor	0	6.05	6.27	6.42	5.10	6.11	6.29	0.57	NS
	1 month	6.00	6.81	6.62	5.98	6.32	6.54	0.39	NS
	2 month	6.55ab	7.55a	7.09ab	6.05b	7.06ab	7.62a	0.34	*
	3 month	7.29	8.05	7.31	6.50	7.11	7.32	0.46	NS
Dubasi	0	6.61	6.03	6.95	6.35	6.33	6.70	0.45	NS
	1 month	6.19	7.25	7.13	6.31	6.21	6.66	0.34	NS
	2 month	7.46	6.48	7.58	7.01	7.13	7.65	0.46	NS
	3 month	8.03	7.04	8.07	7.38	7.18	7.76	0.62	NS
Packed cell volume %									
Shugor	0	19.73	20.43	21.00	19.07	20.09	21.11	1.68	NS
	1 month	19.70	22.77	21.93	19.70	21.88	20.71	1.41	NS
	2 month	21.47ab	24.97a	23.07ab	19.40b	22.99ab	25.00a	1.21	*
	3 month	24.30	26.67	24.03	21.00	23.55	25.09	1.80	NS
Dubasi	0	22.03	20.03	22.87	20.97	21.98	22.56	1.78	NS
	1 month	21.70	24.47	24.13	21.57	23.76	25.00	1.33	NS
	2 month	24.93	21.17	25.30	23.23	23.77	25.08	1.78	NS

	3 month	27.07	22.97	27.20	24.97	25.65	26.86	2.27	NS

[a-b] Means within rows with no common superscripts are significantly different. The values in the same row with different superscripts are significantly different (P<0.05).*: significantly
Sig: Significant. SEM: Standard error means. NS: no Significant

Effect on White blood counts (103ml)

The result of table (4) indicates high significant difference at (P≤0.05) level between all experimental groups, for white blood cells and for Shugor and Dubasi ecotypes. Strong positive effect was recorded for flushing and supplementation of Se + vit.E on the production of white blood cells and total leucocyte counts. Shugor ecotype, recorded $17.30*10^3$/ml, $13.53*10^3$/ml, $17.10*10^3$/ml, $16.53*10^3$/ml, and $16.80*10^3$/ml, while Dubasi, recorded $10.3*10^3$/ml, $18.60*10^3$/ml, $18.13*10^3$/ml $13.50*10^3$/ml, $15.33*10^3$/ml and $17.89*10^3$/ml for A, B, C, D, E and G experimental groups, respectively. The Data showed that the highest mean value of white blood cells count were recorded for B, C and G experimental groups. This result confirms the importance of two flushing and three supplementation levels of Se + vit. E in the production of strong high level of WBCs. This study confirms the high level of serum globulin in ewes flushing and treated with supplementation of Se + vit. E particularly Se supplementation enhances the immune globulin levels and may directly improve animal defense mechanism and reproductive performance. Sobiech and Kulela (2002) staled that the Selenium and vitamin E Strengthening the immunity of the animals (Milad, *et al*., 2001).

Effect on Red blood cell counts (RBCs 106/ml)

Table (4) present results derived from Duncan multiple range test for the effect of two flushing systems and three supplementation levels of Se + vit. E on red blood cells counts. In this study Shugor ecotype recorded statistically significant difference at (P≤0. 05) level for all experimental groups. The highest mean value of red blood cells count for Shugor ecotype were recorded for B and G experimental groups and were $7.55x10^6$/ml and $7.62x10^6$/ml , respectively. Dubasi ecotype recorded non-significant difference (P≥0.05) between all experimental groups. A mean value of $8.07x10^6$/ml and $7.76x10^6$/ml for C and G experimental groups, respectively.

Effect on Packed cell volume (PCV%)

Table (4) shows the results of analysis of variance for the effect of two flushing systems and three supplementation levels of Se + vit. E. A significant difference at (P≤0.05) level were recorded for Shuger ecotype for all experimental groups. The highest mean percentage value for PCV% for Shugor ecotype were 25.09%, 24.97% and 23.07% for C, A and G experimental groups, respectively. Dubasi recorded non-significant difference (P≥0.05) between all experimental groups. The highest mean percent value were 27.20%, 27.07% and 36.8% for C, A and G experimental groups, respectively. This study was in full agreement with the result reported by Shinde *et al*, 2007.

Effect of two flushing systems and three supplementation levels of Se +vit.E on differential white blood cells for both Shugor and Dubasi ecotypes

Effect on lymphocyte (%)

Table (5) summarized the results derived from analysis of variance for the effect of two flushing systems and three supplementation levels on the differential white blood cells for both Shugor and Dubasi ecotypes. Result of this table (4) indicate statistically significant difference at (P≤0.05) level for Dubasi compared to Shugor in A experimental group. Dubasi recorded a mean value of 46.11±5.55% in comparison to 43.87 ± 5.04% for Shugor in A experimental group. All other experimental group recorded approximately similar results without any differences between the two genetic groups (Shugor and Dubasi.)

Effect on Neutrophils (%)

A higher statistical significant difference at (P≤0.05) level was recorded for Neutrophils% in favour of Shugor in D experimental group. All other experimental groups recorded approximately similar results without any significant difference between them.

Effect on monocyte(%)

The monocyte % recorded non-significant differences (P≥0.05) between the genetic groups and for all experimental groups. The mean value of monocytes % range between 9.11±0.73 and 5.22 ±0.47 for Shugor, while Dubasi recorded a mean value ranging from 9,32±1.08 and 6.12±0.83% (Table.5)

Effect on Basophil(%)

A high significant difference at (P≤0.05) level was recorded for Basophil% for Dubasi in comparison to Shugor in A experimental group. All other experimental group recorded approximately similar result without any statistical difference between the genetic groups. The mean percent of basophil range between 0.97±0.07 and 3.22±1.8% in Shugor ecotype in A and G experimental groups, respectively. Dubasi recorded a mean percent ranging from 1.66±0.27 and 2.79±1.05% for A and G experimental groups, respectively.

Effect on Eosonophyls (%)

A high statistically significant difference at (P≤0.05) level were recorded for Dubasi in B and G experimental groups in comparison to Shugor ecotype. All other experimental group recorded approximately similar result without any statistical difference. The highest mean values of eosonophyl (%) were recorded in C and G experimental group and were 6.55±1.23%and

6.32±0.98% for Dubasi and Shugor in C experimental group.

The result of this table (5) reflects the positive response of flushing and supplementation of Se + vit. E in increasing the total serum globulin level and confirm the beneficial effect in improving immunity stale which is highly reflected on serum globulin levels of ewes on both ecotypes. This results agree results record by Segerson, *etal*., 1980.

Table 5: Effect of two flushing systems and three supplementation levels of Selenium and vitamin Eon differential white blood cell counts on Shugor and Dubasi ecotypes.

Items	Treatments					
	A	B	C	D	E	G
Lymphocytes(%)						
Shugor	43.87±5.04[b]	44.32±5.14	43.11±4.67	41.32±5.08	40.33±4.16	39.38±4.33
Dubasi	46.11±5.55[a]	44.76±5.12	45.65±5.01	41.45±5.00	41.34±4.79	40.21±4.14
Sig	*	NS	NS	NS	NS	NS
Neutrophils(%)						
Shugor	40.52±4.14	40.23±4.08	40.11±3.99	41.44±4.66[a]	42.32±5.01	43.33±5.04
Dubasi	40.60±4.13	40.65±4.45	39.88±3.76	40.22±3.87[b]	41.58±4.22	44.21±5.34
Sig	NS	NS	NS	*	NS	NS
Monocytes(%)						
Shugor	9.11±0.73	8.53±0.61	8.43±0.55	6.87±0.71	5.71±0.44	5.22±0.42
Dubasi	8.86±0.66	9.32±1.08	7.98±1.03	7.54±1.11	6.89±0.73	6.12±0.83
Sig	NS	NS	NS	NS	NS	NS
Basophils(%)						
Shugor	0.97±0.07[b]	1.43±0.17	1.88±0.88	2.00±1.02	2.25±0.99	3.22±1.08
Dubasi	1.66±0.27[a]	1.90±0.57	2.00±0.87	2.11±0.97	2.65±1.02	2.99±1.05
Sig	*	NS	NS	NS	NS	NS
Eosonophyls(%)						
Shugor	5.87±0.93	3.78±0.63[b]	6.32±0.98	4.73±0.73	5.54±0.91	4.33±0.88[b]
Dubasi	5.39±0.75	4.76±1.03[a]	6.55±1.23	5.32±0.87	4.87±0.91	6.32±0.94[a]
Sig	NS	*	NS	NS	NS	*

[a-b] Means within common with no rows superscripts are significantly different. The values in the same common with different superscripts are significantly different (P≤0.05). *: Significantly.
A: Control group. B: treated with 50% concentrated feed. C: treated with 100% concentrated feed.
D: group treated with Selenium + vitamin E half dose. E group treated with Selenium + vitamin E full dose
G group treated with100% concentrated feed and full dose of Selenium + vitamin E. Sig: Significant. NS: no Significant.

Effect of two flushing systems and three supplementation levels of Selenium and vitamin Eon serum blood components biochemical parameters

Table (6) summarized the result derived from analysis of variance for the effect of two flushing system and three levels of supplementation of Se + vit. E on serum blood components (biochemical parameters).

Effect on total protein

Results of table (6) indicate a high statistical difference at (P≤0.05) level for all experimental groups and for both ecotypes. Dubasi recorded a significantly higher total protein values compared Shugor ecotype. Dubasi recorded 6.50 g/dl, 6.50 g/dl, 6.62 g/dl, 6.40 g/dl and 6.65g.dl for B, C, D, E and G experimental groups respectively. Shugor recorded 6.45 g/dl, 6.45 g/dl, 6.58 g/dl, 6.22 g/dl and 6.18 g/dl for B, C, D, E and G experimental groups, respectively. Serum protein values (6.65 g/dl, and 6.18 g.dl) were recorded in this study and are in line with the results of Sil (1992) in cross bred cattle calves and slightly lower than values of (7.75 g/dl) reported by Singh (1991) in buffalo calves fed an ammoniated straw based ration. However these values are close to normal range of 6.75 – 7.82 g/100ml as reported by Gupla *et al*., (1988).

Effect on Albumin (g/dl)

Result of this table (6) showed a high statistical difference at (P≤0.05)on Albumin levels between all experimental groups and for both Shugor and Dubasi ecotypes. In this study the mean values of Albumin were 4.41 g/dl, 4.37 g/dl, 4.36 g/dl, 5.60 g/dl, 5.40 g/dl and 5.52 g/dl for Shugor, while Dubasi recorded 4.33 g/dl, 4.41 g/dl, 4.40 g/dl, 4.45 g/dl, 4.42 g/dl and 4.46 g/dl for A, B, C, D, E and G experimental groups, respectively.

Albumin is produced only in the liver and is a major plasma protein that circulates in blood stream. Albumin is essential for maintaining the oncotic pressure in vascular system. A decrease in oncotic pressure due to low albumin levels allows fluids to leak out from the interstitial spaces into peritoneal cavity producing scales. Albumin is also important in transportation of many substances such as drug, lipids, hormones and toxins that

are bound to albumins blood stream. A low serum albumin includes poor liver function. The most common reason for low albumin is chronic liver failure caused by Grrhosis (Pagana, 2002, Fischbachi *et al*., 2004).

Effect on Glucose (mg/dl)

Result in table (6) showed a high statistical significant differences at (P≤0.05) level for glucose for all experimental groups and for both ecotypes. The mean values of glucose were 49.80 mg/dl, 56.44 mg/dl, 60.09 mg/dl,58.87 mg/dl, 61.11 mg/dl and 60.88 mg/dl, while Dubasi recoded 50.88mg/dl, 54.98 mg/dl, 54.53 mg/dl, 58.47 mg/dl, 57.99 mg/dl and 59.01mg/dl for A, B, C, D, E and G experimental groups, respectively.

Blood glucose sources in ruminants are derived principally from gluconeogenic amino acids (Heitmam *et al*., 1973). Propionate, lactic acids, and to a lesser extend butyric acid (Coles, 1967).Propionate derived from rumen fermentation considered to be the major gluconeogenic precussor in ruminant feed (Young, *et al*, 1965). In liver and to lesser extend the kidney are the only endogenous sources of blood glucose.

Effect of cholesterol (mg/dl)

Table (6) present the result derived from analysis of variance for the effect of two flushing systems and three levels of Se + vit.E on cholesterol levels. The result of this table indicate strong effect on cholesterol and a high statistical significant difference at (P≤0.05) level were recorded for two consecutive month for both Shugor and Dubasi ecotypes and for all experimental groups. Shugor recorded a mean value of 45.60 mg/dl, 51.66 mg/dl, 53.52 mg/dl, 55.73 mg/dl, 54.87 mg/dl and 55.7 mg/dl, while Dubasi recorded 53.66 mg/dl, 59.60 mg/dl, 56.47 mg/dl, 55.41 mg/dl 56.41mg/dl and 60.13 mg/dl for A, B, C. D, E and G experimental.

Table 6: Effect of flushing and supplementation of Selenium and vitamin Eon serum blood components biochemical parameters.

Ecotypes	Periods	Treatments						SEM	Sig
		A	B	C	D	E	G		
Total protein (g/dl)									
Shugor	0	6.19	6.23	6.23	6.15	6.32	6.22	0.07	NS
	1 month	6.23	6.26	6.25	6.23	6.40	6.33	0.12	NS
	2 month	6.32	6.31	6.28	6.42	6.31	6.24	0.16	NS
	3 month	6.25^{b}	6.45^{ab}	6.42^{ab}	6.58^{a}	6.22^{b}	6.18^{b}	0.07	*
Dubasi	0	6.21	6.28	6.29	6.22	6.27	6.29	0.05	NS
	1 month	6.34	6.31	6.30	6.30	6.29	6.31	0.10	NS
	2 month	6.39	6.38	6.34	6.37	6.36	6.30	0.13	NS
	3 month	6.39^{b}	6.50^{b}	6.50^{b}	6.62^{a}	6.40^{b}	6.65^{a}	0.03	*
Albumin (g/dl)									
Shugor	0	4.14	4.21	4.20	4.17	4.19	4.17	0.03	NS
	1 month	4.18	4.23	4.26	4.26	4.24	4.23	0.04	NS
	2 month	4.25	4.29	4.32	4.29	4.28	4.30	0.04	NS
	3 month	4.41^{b}	4.37^{b}	4.36^{b}	5.60^{a}	5.40^{a}	5.52^{a}	0.35	*
Dubasi	0	4.17	4.22	4.24	4.21	4.23	4.22	0.03	NS
	1 month	4.25	4.27	4.28	4.29	4.30	4.27	0.04	NS
	2 month	4.29	4.31	4.36	4.34	4.32	4.30	0.03	NS
	3 month	4.33^{b}	4.41^{a}	4.40^{a}	4.45^{a}	4.42^{a}	4.46^{a}	0.02	*
Glucose (mg/dl)									
Shugor	0	49.92	50.56	48.67	51.54	49.66	50.21	1.26	NS
	1 month	51.45	53.41	51.74	52.55	53.28	53.45	1.69	NS
	2 month	52.15	55.50	55.59	55.59	64.67	55.88	1.36	NS
	3 month	49.80^{b}	56.44^{ab}	60.09^{a}	58.83^{a}	61.11^{a}	60.88^{a}	2.26	*
Dubasi	0	41.15	42.51	41.70	42.47	41.66	42.35	1.69	NS
	1 month	45.95	47.69	46.48	49.62	48.44	49.11	1.12	NS
	2 month	47.59^{b}	52.22^{a}	51.34^{ab}	55.69^{a}	55.77^{a}	56.12^{a}	1.35	*
	3 month	50.88^{c}	54.98^{b}	54.53^{b}	58.47^{a}	57.99^{a}	59.01^{a}	0.89	*
Cholesterol (mg/dl)									
Shugor	0	41.54	42.27	43.04	40.41	42.12	41.67	2.09	NS
	1 month	42.49	44.77	43.58	43.47	44.32	44.51	1.09	NS
	2 month	43.63^{b}	47.53^{ab}	47.58^{ab}	49.59^{a}	50.13^{a}	49.98^{a}	1.37	*
	3 month	45.60^{c}	51.66^{b}	53.52^{ab}	55.73^{a}	54.87^{a}	55.71^{a}	0.83	*
Dubasi	0	46.62	45.73	44.58	45.55	45.32	44.76	0.70	NS
	1 month	49.57	52.48	49.50	48.53	51.31	52.11	0.52	NS

	2 month	51.40[b]	56.63[a]	53.58a[b]	52.53[ab]	56.24[a]	56.46[a]	1.25	*
	3 month	53.66[b]	59.60[a]	56.47[ab]	55.41[b]	56.41[ab]	60.13[a]	1.09	*

[a-b] Means within rows with no common superscripts are significantly different.
The values in the same row with different superscripts are significantly different (P<0.05). *: significantly
A: Control group. B: treated with 50% concentrated feed. C: treated with 100% concentrated feed.
D: group treated with Selenium + vitamin E half dose. E group treated with Selenium + vitamin E full dose
G group treated with100% concentrated feed and full dose of Selenium + vitamin E.
Sig: Significant. SEM: Standard error means. NS: no Significant.

groups, respectively. Cholestrol is a sterol that is preset in all animal tissues. Free cholesterol is on integrated components of cell membrane and serve as a precussor for steroid hormones such as estrogen, testosterone and aldosterones as well as bile acids (Panel *et al*, 2005) Park *et al*., (1980) found that concentration of free cholesterol were highest for heifers on low protein 28.2 mg/100 ml as compared to high protein group 17.9 mg/100 ml).

Effect on triglycerides

Table (7) summarized the result derived from the analysis of variance for the effect two flushing systems and three supplementations on Se + vit.E on triglycerides levels for both Shugor and Dubasi ecotypes. A high significant differences at (P≤0.05) levels was recorded for Dubasi for three consecutive months for all experimental groups, while Shugor recrded a significant difference at (P<0.05) level in the first month for all experimental groups. The mean value of triglyceride for Shugor were 44.98 mg/dl, 43.35 mg/dl, 30.91 mg/dl, 53.18mg/dl, 33.42mg/dl and 38.67mg/dl, while Dubasi recorded 53.63 mg/dl, 43.88 mg/dl, 56.22 mg/dl, 55.40mg/dl53.09 mg/dl and 56.21mg/dl for A, B, C, D, E and G experimental groups, respectively. This result is in line with the result of Moeini and Jalilian 2014.

Effect on Calcium (g/dl)

Table (7) showed a high significant difference at (P≤0.05) level in the three consecutive months for all experimental for Dubasi ecotype, while Shugor recorded a high significant difference at (P≤0.05) level in the first month and for all experimental groups.

The highest mean value of Calcium recorded for Shugor were 11.31g/dl, 11.12 g/dl and 10.11g/dl, while Dubasi 10.16 g/dl, 10.80g/dl and 9.30 g/dl for A, E and G experimental groups, respectively.

Effect on phosphorus (g/dl)

Result of this table (7) showed a high significant difference at (P≤0.05) level for Shugor and all experimental groups for phosphorus levels. The highest mean values for phosphorus for Shugor ecotype were 7.25g/dl and 6.96 g/dl for Band C experimental group, respectively.

Dubasi ecotype recoded non-significant difference (P≥0.05) for all experimental groups for phosphorus levels.

Table 7: Shows the Effect of two flushing and three supplementation levels of Selenium and vitamin Eon serum blood components biochemical parameters.

Ecotypes	Periods	Treatments						SEM	Sig
		A	B	C	D	E	G		
Triglyceride (mg/dl)									
Shugor	0	33.37[ab]	43.35[ab]	30.91[b]	53.18[a]	33.42[ab]	38.67[ab]	6.29	*
	1 month	44.98	43.77	47.06	52.36	48.35	46.41	3.30	NS
	2 month	51.76	54.06	58.24	53.25	55.23	56.12	3.71	NS
	3 month	47.67	44.71	42.06	45.78	44.34	45.14	3.29	NS
Dubasi	0	41.89	38.82	47.34	49.79	40.18	39.25	3.56	NS
	1 month	47.59[ab]	43.75[b]	54.63[a]	52.58[ab]	46.65[ab]	45.23[ab]	2.88	*
	2 month	58.49[a]	53.63[a]	43.88[b]	56.22[a]	49.23[ab]	53.22[a]	2.91	*
	3 month	53.63[a]	43.88[b]	56.22[a]	55.40[a]	53.09[a]	56.21[a]	2.70	*
Calcium (g/dl)									
Shugor	0	15.81	15.76	16.08	16.22	15.12	15.77	0.84	NS
	1 month	11.31[a]	8.26[b]	10.00[ab]	9.53[ab]	11.12[a]	10.11[ab]	0.62	*
	2 month	10.65	10.17	9.95	10.55	9.99	10.05	0.49	NS
	3 month	10.22	8.50	9.48	9.56	8.66	9.75	0.70	NS
Dubasi	0	14.34	15.50	13.09	14.98	13.63	14.78	1.46	NS
	1 month	10.16[ab]	10.59[ab]	10.93[a]	9.27[b]	10.80[a]	9.30[ab]	0.45	*
	2 month	10.05[ab]	9.80[b]	11.34[a]	10.58[ab]	10.23[ab]	9.54[b]	0.44	*
	3 month	9.76[b]	9.26[b]	10.53[a]	9.53[b]	9.23[b]	9.18[b]	0.43	*
Phosphorus (g/dl)									
	0	4.62	5.61	4.94	5.09	5.11	5.34	0.47	NS

Shugor	1 month	3.51[b]	5.25a	3.68[b]	4.75[ab]	3.22[b]	4.31[ab]	0.45	*
	2 month	4.34[b]	6.78a	6.06[ab]	6.42[ab]	5.33[ab]	5.21[ab]	0.62	*
	3 month	5.28[b]	7.25a	6.96[a]	5.49[b]	6.88[a]	6.22[a]	0.43	*
Dubasi	0	5.43	4.49	5.36	3.68	4.22	3.99	0.56	NS
	1 month	4.93	4.39	4.75	5.29	4.89	4.31	0.61	NS
	2 month	5.63	4.98	5.59	5.12	5.34	4.97	0.40	NS
	3 month	6.53	6.02	6.22	6.57	5.99	6.07	0.33	NS

[a-b] Means within rows with no common superscripts are significantly different.
The values in the same row with different superscripts are significantly different (P≤0.05).
*: significantly
A: Control group. B: treated with 50% concentrated feed. C: treated with 100% concentrated feed.
D: group treated with Selenium + vitamin E half dose. E group treated with Selenium + vitamin E full dose
G group treated with100% concentrated feed and full dose of Selenium + vitamin E.
Sig: Significant. SEM: Standard error means. NS: no Significant

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