



CHANGES IN BIOCHEMICAL DIAGNOSTIC PARAMETERS OF SUDAN NUBIAN GOAT'S KIDS FED DIFFERENT LEVELS OF NATRON AND MINERALS BLOCK

Babeker E.A.^{1,2*}, Elfatih Abdallah A.E.² and Elmansoury Y.H.³

¹Department of Biology (Basic Science), College of Science and Arts in Uglat Asugour, Qassim University, Buraydah, Kingdom of Saudi Arabia.

²Department of Biology, Faculty of Science, University of Bakht Elruda, Sudan.

³Department of radioisotopes, Central veterinary Research Laboratories, Khartoum, Sudan.

* Corresponding Author's e-mail: esamalibabeker@gmail.com

ABSTRACT: *Forty male of Nubian Kids goats at age of 5 -7 months, their average body weight was from (6.5 to 12.5kg) were used in this study to investigate the effect of different levels of Natron and Mineral block (0%, 1%, 2%; and 1%, respectively) on some blood metabolites (glucose, total cholesterol total protein, albumin, globulin and urea). The animals were divided into four equal groups each randomly. The experimental period covered twelve weeks. Blood samples were collected every two weeks for chemical analysis, they were taken three times, before feeding in the morning, after feeding at midday and in the evening the study showed variation in blood metabolites. In the evening the total protein value was significantly higher ($P<0.05$) in Mineral block. The albumin values in Mineral block 1%, Natron1% and Control were lower before feeding and increase significantly after feeding. The higher Creatinine values after feeding were recorded for treatment groups (including control). The Urea value in Natron1% was higher before feeding and decrease significantly after feeding. However, the significant ($P<0.05$) increase in the glucose values for Control, Natron1%, Natron2% and Mineral block 1% observed at midday and in the evening. When comparing cholesterol values for animals in Control, Natron 1% and Natron 2% throughout the day it was shown a significant ($P<0.05$) higher in the evening and midday than the morning. The values of total protein, albumin and Creatinine for control and treatment groups showed no significantly ($P<0.05$) from the morning to the evening.*

KEYWORDS: Natron Salt, Minerals Block Supplementation, Nubian Goat's Kids, Biochemical Parameters.

INTRODUCTION

The significance of determining haematological and biochemical indices has been an important component of of domestic animals has been well documented (Babeker and Elmansoury, 2013) and the changes of these parameters have been studied in cattle (Obi, T.U. and Anosa, V.O. 1980), sheep (Tambuwal, et al., 2002) and goats (Waziri, et al., 2010 and Hassan, M.M, et al., (2012). There is a great variation in the haematological and biochemical parameters as observed between breeds of goats (Waziri, et al., 2010).

The biochemical traits as blood metabolites for domestic animals have been investigated as indicator for metabolism (Zubcic, 2001). However, few studies have been carried on



indigenous goat breeds of the Sudan (Hassan, 1967). Natron is natural mineral salts used by herders in Sudan as they believe in improving their herd health, production and reproduction. Multi-mineral block is hard, stone-like blocks scattered around the animal farm for animals to lick which contain a range of mineral elements to supplement the basic mineral need of the animals. Since most developing countries are characterized by poor quality roughages which constitute the major portion of rations fed to ruminants (Hadjipanayiotou et al., 1993). In addition, Natron and multi-mineral block are used as a prophylactic agent and a feed supplement to goats. This study was initiated in order to evaluate the effect of different levels of Natron salts and mineral block supplementation in goat's diet on biochemical parameters as a health indicator in goats.

MATERIAL AND METHODS

Experimental Site: The present Experiment was carried out under the semi-arid condition of White Nile State-Sudan, at the Faculty of Science, University of Bakht Alruda, in Edduiem locality (Latitudes 130 and 290 North, Longitudes 200 and 320 East) 200 km from Khartoum.

Experimental Animals: Forty male of Sudan Nubian Kids goats at age of 5 -7 months, their average body weight was from (6.5 to 12.5kg) were used in this study. The animals were purchased from local small market in Edduiem city locality they bear the typical characteristic of the indigenous Nubian breed, head convex with pronounced running nose and long pendulous ears. Black being the dominant color with gray ears, light marbling found in some animals. Mature animals body weight ranged from 18- 35kg and body size 70-75cm at wither height. The animals were housed in shaded goat's pen; for 14 days on adapt in period. They were vaccinated with Ivermectin against endoparasite Ectoparasite 0.2ml per/kg body weight; with drawal period. The animals were divided randomly into four groups each of ten animals according to their live weight. First groups with average weight 9.70 kg; used as control (zero Natron salt fed). The second group was 10.10 kg, the third group 10.01 kg and the fourth group 10.58 kg they fed different levels of Natron and Mineral block (0%, 1% Natron, 2% Natron; and 1% Mineral block, respectively). The period of this study was eleven or twelve -weeks.

Experimental Procedure:

Feedlot Performance

Body Weight: The animals were weighed firstly and weekly until the end of the ten weeks, and weighed at the end of the experiment. The animals were weighed individually by the pan balance.

Feed Intake and water Intake: Feed and water were offered approximately at the same time in the morning (08.00-09.00) hr. The food offered was weighed in a single pan balance - to the nearest 100g. The food and water were offered in the fodder basins and the remaining amounts from the previous day were measured, so that the amounts of food and water consumed were determined.



Blood collection and analyses:

The blood samples needed for testing were taken every two weeks from the jugular vein of the experimental animals three times before feeding in the morning (08.00-09.00) and after feeding at midday (01.00-02.00) and in the evening (06.00-07.00). Samples were taken in plain tube, coagulated at room temperature for 2 hours, centrifuged for 10 minutes at 3000 rpm and stored at +4 °C for subsequent biochemical analysis.

- Serum albumin determination by (BCG) method according to (Dumas et al .1971., Tietz, 1986; Young, 2000).
- Serum total protein was determined by the Biuret reagent method according to King and Wootton (1965).
- The technique of determination of glucose by enzymatic and colorimetric GOD-PAP method according to (Trinder, 1969)- Cat-Germany.
- Blood urea concentration was determined by using colorimetric method by using commercial (Crescent) kits (KSA, LTD). (Chaney A.L & Marbach, 1962).
- Total cholesterol determination it was measured by the enzymatic calorimetric method (Richmond, 1973) using the commercial (Crescent) kits (LTD, KSA).

RESULTS

Table (1): Overall Biochemical of goat's kids as affected by fed different levels of Natron salts and Mineral block supplementation in the morning at 0hr.

Parameter	Control (0%)	Natron (1%)	Natron (2%)	Mineral Block (1%)
Glucose (mg/dl)	73.75±2.02 ^a	72.05±2.32 ^a	70.80±4.11 ^a	75.00±2.73 ^b
Cholesterol (mg/dl)	61.03±2.30 ^a	79.26±2.08 ^b	85.56±2.47 ^c	84.76±1.71 ^c
Total protein (mg/dl)	6.77± 0.19 ^a	7.43± 0.09 ^b	6.97± 0.09 ^a	7.79± 0.11 ^c
Albumin (mg/dl)	2.53± 0.05 ^a	2.57± 0.06 ^a	3.05± 0.08 ^b	3.67± 0.10 ^c
Creatinine (mg/dl)	0.99± 0.04 ^a	1.16± 0.06 ^a	1.37± 0.07 ^b	1.45± 0.08 ^b
Urea (mg/dl)	14.68± 0.41 ^a	16.98± 0.46 ^b	16.61± 0.18 ^b	16.06± 0.43 ^b

^{a,b,c} means in the same row with different superscripts are significantly different from each other ($P < 0.05$).



Table (2): Overall Biochemical of goat's kids as affected by fed different levels of Natron salts and Minerals block supplementation at midday after 4hrs.

Parameter	Control (0%)	Natron (1%)	Natron (2%)	Mineral Block (1%)
Glucose (mg/dl)	75.33±2.50 ^a	75.20±2.06 ^a	81.30±2.43 ^b	78.36±2.37 ^b
Cholesterol (mg/dl)	65.43±2.12 ^a	81.86±1.56 ^b	89.60±2.14 ^c	85.20±1.83 ^b
Total protein (mg/dl)	6.92± 0.10 ^a	7.47± 0.08 ^b	7.02± 0.10 ^a	7.81± 0.11 ^c
Albumin (mg/dl)	2.59± 0.06 ^a	2.61± 0.07 ^a	3.12± 0.09 ^b	3.74± 0.10 ^c
Creatinine (mg/dl)	1.04± 0.05 ^a	1.21± 0.06 ^a	1.44± 0.07 ^b	1.53± 0.08 ^b
Urea (mg/dl)	15.60± 0.11 ^a	16.27± 0.19 ^a	16.51± 0.19 ^b	16.02± 0.51 ^a

^{a,b,c} means in the same row with different superscripts are significantly different from each other ($P < 0.05$).

Table (3): Overall Biochemical of goat's kids as affected by fed different levels of Natron salts and Minerals block supplementation in the evening after 8hrs.

Parameter	Control (0%)	Natron (1%)	Natron (2%)	Mineral Block (1%)
Glucose (mg/dl)	77.06±2.04 ^a	75.00±2.24 ^b	81.93±2.56 ^c	79.70±2.37 ^c
Cholesterol (mg/dl)	63.90±2.63 ^a	80.70±1.86 ^b	90.80±1.75 ^c	85.10±2.40 ^{bc}
Total protein (mg/dl)	7.07± 0.09 ^a	7.58± 0.05 ^b	7.10± 0.09 ^a	7.90± 0.11 ^c
Albumin (mg/dl)	2.61± 0.06 ^a	2.67± 0.07 ^a	3.18± 0.09 ^b	3.83± 0.09 ^c
Creatinine (mg/dl)	1.07± 0.06 ^a	1.26± 0.07 ^a	1.49± 0.08 ^b	1.60± 0.09 ^b
Urea (mg/dl)	15.70± 0.16 ^a	16.13± 0.16 ^{ab}	16.51± 0.19 ^b	16.46± 0.48 ^{ab}

^{a,b,c} means in the same row with different superscripts are significantly different from each other ($P < 0.05$).

Table (4): Overall Biochemical of goat's kids of Control (0%), Natron (1%), Natron (2%) and Mineral Block (1%), pre and post feeding.

Parameter	Treatment	Control (0%)	Natron (1%)	Natron (2%)	Mineral Block (1%)
	Pre. feeding	73.75±2.02	72.05±2.32 ^A	70.80±4.11 ^A	75.00±2.73 ^A
	Post. Feeding	75.38±1.26	74.08±1.27 ^B	79.93±1.49 ^B	79.70±2.37 ^B
	Overall	74.46±2.04 ^a	73.65±2.24 ^a	75.93±2.56 ^b	77.38±1.44 ^b
Cholesterol (mg/dl)	Pre. feeding	61.03±2.30 ^A	79.26±2.08 ^A	85.56±2.47	84.76±1.71
	Post. Feeding	63.90±2.63 ^B	80.70±1.86 ^B	90.80±1.75	85.10±2.40
	Overall	63.45±1.36 ^a	80.61±1.06 ^b	88.65±1.24 ^c	85.02±1.14 ^d
Total protein (mg/dl)	Pre. feeding	6.77± 0.19	7.43± 0.09	6.97± 0.09	7.79± 0.11
	Post. Feeding	6.92± 0.07	7.49± 0.04	7.03± 0.05	7.83± 0.06
	Overall	7.07± 0.09 ^a	7.58± 0.05 ^b	7.10± 0.09 ^a	7.90± 0.11 ^c



Albumin (mg/dl)	Pre. feeding	2.53± 0.05 ^A	2.57± 0.06 ^A	3.05± 0.08	3.67± 0.10 ^A
	Post. Feeding	2.61± 0.06 ^B	2.67± 0.07 ^B	3.18± 0.09	3.83± 0.09 ^B
	Overall	2.57± 0.03 ^a	2.62± 0.04 ^a	3.12± 0.05 ^b	3.74± 0.05 ^c
Creatinine (gm/dl)	Pre. feeding	0.99± 0.04 ^A	1.16± 0.06 ^A	1.37± 0.07 ^A	1.60± 0.09 ^A
	Post. Feeding	1.07± 0.06 ^B	1.26± 0.07 ^B	1.49± 0.08 ^B	1.45± 0.08 ^B
	Overall	1.03± 0.03 ^a	1.21± 0.03 ^b	1.43± 0.04 ^c	1.53± 0.05 ^d
Urea (mg/dl)	Pre. feeding	14.68± 0.41 ^A	16.98± 0.46 ^A	16.61± 0.18	16.06± 0.43 ^A
	Post. Feeding	15.70± 0.16 ^B	16.13± 0.16 ^B	16.51± 0.19	16.46± 0.48 ^B
	Overall	15.32± 0.15 ^a	16.46± 0.17 ^b	16.54± 0.11 ^b	16.18± 0.27 ^b

A, B means in the same column with different superscripts are significantly different from each other ($P < 0.05$).

a, b, c, d means in the same row with different superscripts are significantly different from each other ($P < 0.05$).

Table (5): Overall Biochemical of goat's kids as affected by fed different levels of Natron salts and Minerals block supplementation after 0hr, 4hrs and 8hrs.

Parameter	Morning	Midday	Evening	
Glucose (mg/dl)	0%	73.75±2.02 ^a	75.20±2.06 ^b	77.06±2.04 ^b
	1%	72.05±2.32 ^a	75.33±2.50 ^b	75.00±2.24 ^b
	2%	76.56±2.72 ^a	81.30±2.43 ^b	81.93±2.56 ^b
	1%	75.00±2.73 ^a	78.36±2.37 ^b	79.70±2.37 ^b
	Cholesterol (mg/dl)			
0%	61.03±2.30 ^a	65.43±2.12 ^b	63.90±2.63 ^b	
1%	79.26±2.08 ^a	81.86±1.56 ^b	80.70±1.86 ^b	
2%	85.56±2.47 ^a	89.60±2.14 ^b	90.80±1.75 ^b	
1%	84.76±1.71	85.20±1.83	85.10±2.40	
Total protein (mg/dl)	0%	6.77± 0.19	6.92± 0.10	7.58± 0.05
	1%	7.43± 0.09	7.47± 0.08	7.10± 0.09
	2%	6.97± 0.09	7.02± 0.10	7.90± 0.11
	1%	7.79 ±0.11	7.81± 0.11	7.07± 0.09
	Albumin (gm/dl)	0%	2.53± 0.05	2.59± 0.06
1%		2.57± 0.06	2.61± 0.07	2.61± 0.06
2%		3.05± 0.08	3.12± 0.09	3.83± 0.09
1%		3.67± 0.10	3.74± 0.10	3.18± 0.09
Creatinine (gm/dl)		0%	0.99± 0.04	1.04± 0.05
	1%	1.16± 0.06	1.44± 0.07	1.49± 0.08
	2%	1.37± 0.07	1.53± 0.08	1.60± 0.09
	1%	1.45± 0.08	1.21± 0.06	1.07± 0.06



Urea (gm/dl)				
	0%	14.68± 0.41 ^a	15.60± 0.11 ^b	16.13± 0.16 ^b
	1%	16.98± 0.46 ^a	16.27± 0.19 ^{ab}	15.70± 0.16 ^b
	2%	16.61± 0.18	16.51± 0.19	16.51± 0.19
	1%	16.06± 0.43	16.02± 0.51	16.46± 0.48

^{a,b,c} means in the same row with different superscripts are significantly.

Table (1): show Biochemical of goat's kids as affected by fed different levels of Natron salts and Minerals block supplementation in the morning (08.00-09.00) Ohr after feeding. Biochemical parameters of goat's kids observed showed variation in control and treatment groups. The values of Glucose, Cholesterol, Total protein and Albumin were significantly higher ($P>0.05$) at Minerals block 1%, where the values of Creatinine and Urea were significantly lower ($P>0.05$) in Control.

The Glucose: Control had Glucose ranged from 65.60-78.40 mg/dl with a mean value of 73.75 ± 2.02 mg/dl, Natron 1% had Glucose ranged from 59.20-80.40 mg/dl with a mean value of 72.02 ± 2.32 mg/dl, Natron 2% had Glucose ranged from 66.40-75.80 mg/dl with a mean value of 70.80 ± 4.11 mg/dl and Mineral block 1% had Glucose ranged from 67.20-79.20 mg/dl with a mean value of 75.00 ± 2.73 mg/dl.

The Cholesterol: Control had Cholesterol ranged from 51.40-64.60 mg/dl with a mean value of 61.03 ± 2.30 mg/dl, Natron 1% had Cholesterol ranged from 80.20-81.80 mg/dl with a mean value of 79.26 ± 2.08 mg/dl, Natron 2% had Cholesterol ranged from 80.00-91.20 mg/dl with a mean value of 85.56 ± 2.47 mg/dl and Mineral block 1% had Cholesterol ranged from 79.80-92.40 mg/dl with a mean value of 84.76 ± 1.71 mg/dl.

The Total protein: Control had total protein ranged from 6.49-7.28 mg/dl with a mean value of 6.77 ± 0.19 mg/dl, Natron 1% had total protein ranged from 7.34-7.84 mg/dl with a mean value of 7.43 ± 0.08 mg/dl, Natron 2% had total protein ranged from 6.50-7.58 mg/dl with a mean value of 6.97 ± 0.09 mg/dl and Mineral block 1% had total protein ranged from 7.24-8.44 mg/dl with a mean value of 7.79 ± 0.11 mg/dl.

The Albumin: Control had Albumin ranged from 2.38-2.82 mg/dl with a mean value of 2.53 ± 0.05 mg/dl, Natron 1% had Albumin ranged from 2.38-2.84 mg/dl with a mean value of 2.57 ± 0.06 mg/dl, Natron 2% had Albumin ranged from 2.70-3.54 mg/dl with a mean value of 3.05 ± 0.08 mg/dl and Mineral block 1% had Albumin ranged from 3.12-4.30 mg/dl with a mean value of 3.67 ± 0.10 mg/dl.

The Creatinine: Control had Creatinine ranged from 0.88-1.18 mg/dl with a mean value of 0.99 ± 0.04 mg/dl, Natron 1% had Creatinine ranged from 0.96-1.48 mg/dl with a mean value of 1.16 ± 0.06 mg/dl, Natron 2% had Creatinine ranged from 1.02-1.84 mg/dl with a mean value of 1.37 ± 0.07 mg/dl and Mineral block 1% had Creatinine ranged from 1.00-2.00 mg/dl with a mean value of 1.45 ± 0.08 mg/dl.



The Urea: Control had Urea ranged from 14.28-16.02 mg/dl with a mean value of 14.68 ± 0.41 mg/dl, Natron 1% had Urea ranged from 15.38-16.76 mg/dl with a mean value of 16.98 ± 0.46 mg/dl, Natron 2% had Urea ranged from 15.52-17.70 mg/dl with a mean value of 16.61 ± 0.18 mg/dl and Mineral block 1% had Urea ranged from 15.86-18.96 mg/dl with a mean value of 16.06 ± 0.43 mg/dl.

The data in Table (2): shows Biochemical of goat's kids as affected by fed different levels of Natron salts and Minerals block supplementation at midday (01.00-02.00) 4hr after feeding. The data indicated that the most Biochemical parameters of goat's kids showed variation in control and treatment groups except urea. The data indicated that the values of Glucose was higher in natron2% and mineral block, Cholesterol was higher in natron2%, Total protein and Albumin were significantly higher ($P > 0.05$) in Minerals block 1%, where the values of Creatinine was higher in natron2% and mineral block.

The Glucose: Control had Glucose ranged from 64.56-77.49 mg/dl with a mean value of 75.33 ± 2.50 mg/dl, Natron 1% had Glucose ranged from 60.40-82.20 mg/dl with a mean value of 75.20 ± 2.06 mg/dl, Natron 2% had Glucose ranged from 75.80- 86.40-mg/dl with a mean value of 81.30 ± 2.43 mg/dl and Mineral block 1% had Glucose ranged from 67.61-79.20 mg/dl with a mean value of 78.36 ± 2.37 mg/dl.

The Cholesterol: Control had Cholesterol ranged from 59.60-67.08 mg/dl with a mean value of 65.43 ± 2.12 mg/dl, Natron 1% had Cholesterol ranged from 80.67-84.48 mg/dl with a mean value of 81.86 ± 2.14 mg/dl, Natron 2% had Cholesterol ranged from 83.23-93.42 mg/dl with a mean value of 89.60 ± 2.14 mg/dl and Mineral block 1% had Cholesterol ranged from 80.78-90.96 mg/dl with a mean value of 85.20 ± 1.83 mg/dl.

The Total protein: Control had total protein ranged from 6.39-7.48 mg/dl with a mean value of 6.92 ± 0.10 mg/dl, Natron 1% had total protein ranged from 7.43-7.94 mg/dl with a mean value of 7.47 ± 0.08 mg/dl, Natron 2% had total protein ranged from 6.15-7.88 mg/dl with a mean value of 7.02 ± 0.10 mg/dl and Mineral block 1% had total protein ranged from 7.62-8.04 mg/dl with a mean value of 7.81 ± 0.11 mg/dl.

The Albumin: Control had Albumin ranged from 2.36-2.85 mg/dl with a mean value of 2.59 ± 0.06 mg/dl, Natron 1% had Albumin ranged from 2.67-2.87 mg/dl with a mean value of 2.61 ± 0.07 mg/dl, Natron 2% had Albumin ranged from 2.75-3.45 mg/dl with a mean value of 3.13 ± 0.09 mg/dl and Mineral block 1% had Albumin ranged from 3.21-4.35 mg/dl with a mean value of 3.74 ± 0.10 mg/dl.

The Creatinine: Control had Creatinine ranged from 0.97-1.20 mg/dl with a mean value of 1.04 ± 0.05 mg/dl, Natron 1% had Creatinine ranged from 0.99-1.58 mg/dl with a mean value of 1.21 ± 0.06 mg/dl, Natron 2% had Creatinine ranged from 1.06-1.74 mg/dl with a mean value of 1.44 ± 0.07 mg/dl and Mineral block 1% had Creatinine ranged from 1.02-2.01 mg/dl with a mean value of 1.53 ± 0.08 mg/dl.

The Urea: Control had Urea ranged from 13.82-16.09 mg/dl with a mean value of 15.60 ± 0.11 mg/dl, Natron 1% had Urea ranged from 14.98-16.57 mg/dl with a mean value of 16.27 ± 0.19 mg/dl, Natron 2% had Urea ranged from 15.15-17.66 mg/dl with a mean value of 16.51 ± 0.19 mg/dl and Mineral block 1% had Urea ranged from 15.56-18.86 mg/dl with a mean value of 16.02 ± 0.51 mg/dl.



Table (3): shows the Biochemical of goat's kids as affected by fed different levels of Natron salts and Minerals block supplementation in the evening (06.00-07.00) 8hr after feeding. The Glucose, Cholesterol, Total protein, Albumin and Creatinine of all the treatment groups (including control) were significantly different ($P < 0.05$), while the Urea were similar in all the treatment diets.

The Glucose: Control had Glucose ranged from 61.96-77.79 mg/dl with a mean value of 77.06 ± 2.04 mg/dl, Natron 1% had Glucose ranged from 58.99-82.30 mg/dl with a mean value of 75.00 ± 2.24 mg/dl, Natron 2% had Glucose ranged from 74.89- 85.40-mg/dl with a mean value of 81.93 ± 2.56 mg/dl and Mineral block 1% had Glucose ranged from 66.99-80.20 mg/dl with a mean value of 79.70 ± 2.37 mg/dl.

The Cholesterol: Control had Cholesterol ranged from 58.69-65.68 mg/dl with a mean value of 63.90 ± 2.63 mg/dl, Natron 1% had Cholesterol ranged from 80.17-83.84 mg/dl with a mean value of 80.70 ± 1.86 mg/dl, Natron 2% had Cholesterol ranged from 84.03-92.74 mg/dl with a mean value of 90.80 ± 1.75 mg/dl and Mineral block 1% had Cholesterol ranged from 81.08-89.69 mg/dl with a mean value of 85.10 ± 2.40 mg/dl.

The Total protein: Control had total protein ranged from 6.34-7.38 mg/dl with a mean value of 7.07 ± 0.09 mg/dl, Natron 1% had total protein ranged from 7.03-7.76 mg/dl with a mean value of 7.58 ± 0.05 mg/dl, Natron 2% had total protein ranged from 6.52-7.58 mg/dl with a mean value of 7.10 ± 0.09 mg/dl and Mineral block 1% had total protein ranged from 7.72-8.30 mg/dl with a mean value of 7.90 ± 0.11 mg/dl.

The Albumin: Control had Albumin ranged from 2.25-2.80 mg/dl with a mean value of 2.61 ± 0.06 mg/dl, Natron 1% had Albumin ranged from 2.58-2.85 mg/dl with a mean value of 2.67 ± 0.07 mg/dl, Natron 2% had Albumin ranged from 2.55-3.48 mg/dl with a mean value of 3.18 ± 0.09 mg/dl and Mineral block 1% had Albumin ranged from 3.25-4.08 mg/dl with a mean value of 3.83 ± 0.09 mg/dl.

The Creatinine: Control had Creatinine ranged from 0.95-1.21 mg/dl with a mean value of 1.07 ± 0.06 mg/dl, Natron 1% had Creatinine ranged from 0.98-1.50 mg/dl with a mean value of 1.26 ± 0.07 mg/dl, Natron 2% had Creatinine ranged from 1.10-1.54 mg/dl with a mean value of 1.49 ± 0.08 mg/dl and Mineral block 1% had Creatinine ranged from 1.06-2.11 mg/dl with a mean value of 1.60 ± 0.09 mg/dl.

The Urea: Control had Urea ranged from 14.28-16.40 mg/dl with a mean value of 15.70 ± 0.16 mg/dl, Natron 1% had Urea ranged from 15.08-16.35 mg/dl with a mean value of 16.13 ± 0.16 mg/dl, Natron 2% had Urea ranged from 15.10-17.37 mg/dl with a mean value of 16.51 ± 0.19 mg/dl and Mineral block 1% had Urea ranged from 15.59-18.58 mg/dl with a mean value of 16.46 ± 0.48 mg/dl.

The results in table (4) shows the Biochemical of goat's kids of Control (0%), Natron (1%), Natron (2%) and Mineral Block (1%), pre and post feeding. The results showed variation in biochemical parameter from 0hr to 8hrs (before and after feeding) in some treatment groups (including control), where in other showed no variation. The Glucose increase significantly ($P < 0.05$) 8hrs after feeding in Natron 1%, Natron 2%, Mineral Block and overall. Cholesterol and Albumin increase in control, Natron 1% and overall. Urea increase in control, Natron 1% and Mineral Block, where decrease in overall. Creatinine increase in all levels of treatment groups (including control).



The results in table (5) shows the Biochemical of goat's kids as affected by fed different levels of Natron salts and Minerals block supplementation after 0hr, 4hrs and 8hrs. The results indicated that some biochemical parameters (Glucose, Cholesterol and Urea) of control and treatment groups showed variation during the day, where some of them (Total protein, Albumin and Creatinine) showed no variation during the day. The values of Glucose and Cholesterol for treatment groups (including control) increased significantly ($P < 0.05$) during midday and the evening, where Urea for control increased significantly ($P < 0.05$) during midday and the evening. The values of Total protein, Albumin and Creatinine for control and treatment groups showed no significantly ($P < 0.05$) during morning, midday and the evening.

DISCUSSION

Table (1): shows the serum biochemical of goat's kids as affected by fed different levels of Natron salts and Minerals block supplementation in the morning (08.00-09.00) 0hr after feeding. The data showed variation in control and treatment groups. The data showed that the Glucose value of 75.00 ± 2.73 mg/dl was higher at Minerals block 1% compared at control, natron 1% and natron 2%. Also, Total protein value of 7.79 ± 0.11 mg/dl was significantly higher ($P > 0.05$) in Minerals block 1% compared in control, natron 1% and natron 2%. The Cholesterol values of 85.56 ± 2.47 and 84.76 ± 1.71 mg/dl were higher at natron 2% and Minerals block 1% compared to control and natron 1%. Serum Albumin and Creatinine values were significantly higher ($P > 0.05$) in Minerals block 1% than those in control and natron 1%. The Urea value of 14.68 ± 0.41 mg/dl was significantly lower ($P > 0.05$) in control compared to Urea values in natron 1%, natron 1% and Minerals block 1%, which were in similar values. Similarly, the values of Creatinine and Urea were in agreement with the report of KAMALU et al., (1988).

Table (2): shows the serum biochemical of goat's kids as affected by fed different levels of Natron salts and Minerals block supplementation at midday (01.00-02.00) 4hr after feeding. The glucose concentration were 81.30 ± 2.43 mg/dl and 78.36 ± 2.37 mg/dl in Natron 2% and Mineral block 1% which were higher than 75.33 ± 2.50 mg/dl and 75.20 ± 2.06 mg/dl in Control and Natron 1% respectively. The high glucose concentration was higher than 69.27 ± 1.16 mg/dl reported for the Sahel goats (Mohammed A. and others, 2010). The Cholesterol value of 65.43 ± 2.12 mg/dl was significantly lower ($P > 0.05$) in Control compared to values in treatment groups. The serum cholesterol levels depend on the amount and quality of protein offered in the feed (Esonu et al., 2001). The Total protein values in goat's kids on Mineral block was the highest followed by Natron 1% with Natron 2% and Control having the lowest but they were similar. Also, Albumin values in goat's kids on Mineral block was the highest followed by Natron 2% with Natron 1% and Control having the lowest but they were similar. The highest Creatinine value was recorded for goat's kids on Mineral block followed by Natron 2% which were significantly ($P < 0.01$) higher than the value for goat's kids on Natron 1% which was similar to that for that on Control. The Urea value on Natron 2% with Control, Natron 2% and Mineral block having the lowest but the differences were not significant among them.

Table (3): shows the results of serum biochemical for goat's kids as affected by fed different levels of Natron salts and Minerals block supplementation in the evening (06.00-07.00) 8hr



after feeding. The results indicated that Cholesterol value was 63.90 ± 2.63 mg/dl in Control which was significantly lower ($P < 0.01$) than 80.70 ± 1.86 , 90.80 ± 1.75 and 85.10 ± 2.40 mg/dl in Natron1%, Natron2% and Mineral block respectively. The Urea value did not show any significant difference between treatment groups (including Control). The values obtained in this study were within the normal range of 12–28 mg/dl of serum reported by KanekoJJ (1989) but did not tally with the findings of Muna, et al., (2013) in Nubian goats under concentrate supplementation with different Natron levels. The Total protein value was significantly higher ($P < 0.01$) in Mineral block followed by Natron1% than those in Natron2% and Control which were similar. However, goat's kids on Mineral block had a higher Albumin value than those on the other three treatment groups (including control). HALA. (2015) in her study of some blood metabolites in Nubian goats documented that the total protein and albumin values were higher in Natron salts levels as compared to Control. This result similar to the present findings. Serum Glucose value was 75.00 ± 2.24 mg/dl in Natron1% which was significantly lower ($P < 0.01$) than 81.93 ± 2.56 and 79.70 ± 2.37 mg/dl in Natron2% and Mineral block, this value was similar to 79.70 ± 2.37 mg/dl for Natron4% obtained for Nubian goats (HALA 2015). But the values for Natron2% and Mineral block obtained in this study did not tally with the findings of E.A.BABEKER and Y.M. ABDALBAGI (2015) in Sudan Nubian goats under different levels of Moringa. The Creatinine values were similar and significantly higher ($P < 0.01$) in Mineral block and Natron2% than those in Control and Natron1%. According to Mbassa and Poulsen (1991) Creatinine levels increased in the oldest Girgentana goats and urea levels were higher in young Girgentana goats than in adult goats.

Table (4) shows overall biochemical of goat's kids of Control (0%), Natron (1%), Natron (2%) and Mineral Block (1%), pre and post feeding. The glucose values in Natron1%, Natron2% and Mineral block 1% were lower before feeding and increase significantly after feeding. The animals on Control and Natron1% had the highest Cholesterol value (63.90 ± 2.63 and 80.70 ± 1.86 mg/dl) after feeding which were significantly ($P < 0.01$) higher than those before feeding. TIETZ (1994) attributed the increase in Cholesterol to the physiological alteration of endocrine function. The serum cholesterol levels depend on the amount and quality of protein offered in the feed (Esonu et al, 2001). The serum total protein increased significantly in overall. The albumin values in Mineral block 1%, Natron1% and Control were lower before feeding and increase significantly after feeding. The higher Creatinine values after feeding were recorded for treatment groups (including control) which were significantly ($P < 0.01$) higher than those before feeding. HALA (2015) in her study of some blood metabolites in Nubian goats documented that the total protein, albumin, and Creatinine values were higher in Natron4% and Natron6% as compared to Control. The Urea value in Mineral block 1% increased significantly after feeding, while in Natron1% was higher before feeding and decrease significantly after feeding. Mbassa and Poulsen (1991b) observed that urea decreased in goats at early and mid-lactation directly proportional to the parity, so that the higher the parity the more the decrease. According to Nolan and Leng (1970) urea levels decreased in pregnant animals, and related that to the great requirements of such animals for protein and the transfer of urea to the digestive tract to meet their requirements.

Table (5) shows the serum biochemical of goat's kids as affected by fed different levels of Natron salts and Minerals block supplementation after 0hr, 4hrs and 8hrs (in the morning, at midday and in the evening). The results indicated that some serum biochemical parameters of



control and treatment groups showed variation during the day, where some of them showed no variation during the day. The significant ($P<0.05$) increase in the Glucose values for Control, Natron1%, Natron2% and Mineral block 1% observed at midday and in the evening, which were higher than those in the morning. Serum glucose for Mineral block (81.93 ± 2.56 mg/dl) was higher than 70.04 ± 1.19 mg/dl observed at 4 weeks reported by Mohammed A et al., (2010) who found that there was decrease in the number of glucoses in pregnant Sahel goats, the decrease became significant ($P<0.05$) as from 12 weeks up to 20 weeks. U.K. Sandabe and S.U.R. Chaudhary (2000) reported that the serum glucose level was higher in rainy than dry-hot and cold seasons and difference across seasons was significant ($P<0.05$). Cholesterol values for animals in Control, Natron1% and Natron2% were significant ($P<0.05$) higher in the evening and midday compared to values in the morning, where the Cholesterol value in Mineral block1% did not show any significant difference from the morning up to the evening. According to El Hassan (2002) total protein, albumin and globulin levels increased gradually with age. On the other hand, Bhattacharyya and Dattagupta (1987) reported that total proteins mean value was 7.70 ± 0.02 g/100 ml and blood proteins were significantly correlated with age. While, Joshua and Aba-Adulugba (1990) reported that neither breed nor age had any statistically significant effect on serum protein, albumin and globulin values. In this study the values of Total protein, Albumin and Creatinine for control and treatment groups showed no significantly ($P<0.05$) from the morning to midday and the evening. U.K. Sandabe and S.U.R. Chaudhary (2000) reported higher value for Total protein during rainy season. Whereas, Urea in control increased significantly ($P<0.05$) during both midday and the evening. Low level of serum urea would indicate the efficiency of urea recycling and nitrogen conservation (Silanikove, 2000).

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