J. Food and Dairy Sci., Mansoura Univ., Vol. 5 (6): 377 - 387, 2014

PHYSICOCHEMICAL PROPERTIES AND MINERALS PROFILE OF SHAMI GOATS' MILK PRODUCED UNDER DESERT CONDUCTION

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ABSTRACT

The effect of salinity stress on some physicochemical properties and minerals profile of Shami goats' milk produced under desert condition were investigated. Goats' milk samples were collected from a herd kept at Ras Sudr Research Station, Desert Research Center, Egypt. Forty animals were divided equally into different four groups of feeding systems. Groups 1 and 2, fed on barseem hay, while groups 3 and 4, fed on salt tolerant fodder (*alfalfa*). Both of group1 and 3 were offered fresh drinking water, while group 2 and 4 were offered saline drinking water. Bulk samples were collected at the 1st week of kidding after colostrums, and weekly up to 4 weeks. Total milk yield, fat, protein, lactose, ash, total solids, pH and specific gratify were examined. Mineral concentrations in analyzed milk samples were calcium, magnesium, potassium and sodium (macroelement). In addition to boron, cobalt, chromium, copper, iron, manganese, molybdenum, selenium, and zinc as microelements. While, heavy metals were aluminum, arsenic, cadmium, lead, mercury, nickel, strontium and vanadium. The results show that milk yield and milk composition were not significantly ($P<0.05$) affected by the feeding systems expect lactose and ash, which were significantly ($P<0.05$) affected. Concentrations of all minerals were significantly ($P<0.05$) among the four studied groups. Calcium concentration in all groups was lower than normal level in goat milk; which might be due to contamination of goat's milk by lead from consumption contaminated feeding stuffs and/or water. Concentrations of molybdenum in the studied groups fed barseem hay (group 1 and 2) have lower than the groups fed alfalfa (group 3 and 4). The results show that an opposite relation between molybdenum and copper. Most of mineral variation could be due to the interaction effect of both saline tolerance plant and saline water on milk.
Keywords: Shami goat, salinity stress, milk yield, milk composition and minerals.

INTRODUCTION

Milk is an ideal source of macroelement, such as calcium (Ca), potassium (K) and phosphorus (P). Moreover, microelements and even heavy metals can be found in milk (Lampert, 1984). Microelements such as copper (Cu), iron (Fe), selenium (Se) and zinc (Zn) are known to be essential for normal growth. However, heavy metals such as arsenic (As), cadmium (Cd), mercury (Hg) and lead (Pb) have no beneficial effects on human. Hunt and Nielsen (2009) found that fourteen of the minerals present in bovine and human milks (calcium, chloride, cobalt, copper, iodine, iron, magnesium, manganese, molybdenum sodium, phosphorus, potassium, selenium and zinc) have well-established essential physiological functions that range from structural components of body tissues to essential components of many enzymes and other biologically important molecules. Another seven minerals (arsenic, boron, chromium, fluorine [as fluoride], nickel, silicon and vanadium) are not considered essential, but might be beneficial, based on the evidence that they have a role in some physiological processes in one or more mammalian species (IDF, 2008). Moreover, mineral contents of original goat and cow milk are affected by diet, breed, individual animal, stages of lactation, season, management, environmental conditions, locality, stage of lactation, and health status of the udder, etc. (Herrera et al., 2006; Park et al., 2007). Although these essential elements could be toxic when taken in excess; both toxicity and necessity vary from element to element and from species to species (Tripathi, et al. 1997). In milk, mineral elements occur in several chemical forms, including inorganic ions and salts, or as parts of organic molecules such as proteins, fats, carbohydrates and nucleic acids (Zamberlin et al., 2012). Thus measurements of metals contents are very helpful in assessment of quality of milk during its manufacturing treatment and production. Also, milk composition can be related to nutritional supply; therefore, milk mineral profile can be an appropriate tool to evaluate trace mineral nutritional status of dairy goats (Greppi et al., 1995). The objective of this work was to determine the physicochemical properties and minerals profile of Shami goats' milk, which fed salt tolerant plants and offered saline drinking water.

MATERIALS AND METHODS

Data were collected from Shami goats herd located at South Sinai Research Station located at Ras Sudr city, South Sinai governorate through ICBA-DRC Bilateral Project, blogging to Desert Research Center, Ministry of agriculture, Egypt. These goats were randomly divided into equal 4 groups (10 of each). Group 1 (G1) and group 2 (G2) were received barseem hay, while group 3 (G3) and group 4 (G4) were received *alfalfa* cultivated in salt soil and irrigated with salt water (6000 ppm.) as salt tolerant plant (STP). Group 1 and 3 were drinking fresh water, while G2 and G4 were drinking underground saline water (6000 ppm). All groups received concentrate feed mixer to cover their nutritional requirements. Bulk samples were collected at the 1st week of kidding after colostrums and weekly up to 4 weeks. Goats were kept away from their kids for 12 hours, and then one tit was hand milking. So, daily milk yield (DML) was estimated as amount of milking milk multiplied by 4. Chemical composition of ration and water analyses were presented in Tables (1 and 2).

Bulk milk samples within each group were chemically examined. Fat, total protein, lactose, SNF and specific gravity were determined using an infrared milk analyzer (Lactoscan – mega-netco, India). Another milk sample was used for estimating ash content following the official methods of analysis issued by the Association of Official Analysis Chemists (AOAC, 2012). The pH value was measured electrometrically using Lab. pH meter with a glass electrode, Hanna model 211 digital pH meter.

For inerals analyses of the milk, milk samples were dried overnight at 102 ºC and ashed at 550ºC for 6 h; the ash was analyzed as described by Kondyli *et al.* (2007). The (all mineral) aluminum, (Al), arsenic, (As), boron, (B), calcium (Ca), cadmium, (Cd), cobalt, mg/l (Co), chromium (Cr), copper (Cu), iron (Fe), ead (Pb), magnesium (Mg), manganese (Mn), mercury (Hg), molybdenum (Mo), nicel (Ni), selenium (Se), strontium (Sr), vanadium (V) and zinc (Zn) concentrations were determined by inductively coupled argon plasma, iCAP 6500Duo, thermo scientific, England. While, sodium (Na) and potassium (K) concentrations were determined using a corning 410 Flame Photometer (Ciba Corning Diagnostics Scientific Instruments, Essex, England).

Table (1): Chemical composition of feed rations at South Sinai Research Station.

Chemical composition (%)	Experimental rations		
	AlfaAlfa	**Barseem Hay**	**CFM**
Dry Matter (DM)	91.35	88.8	89.66
Crude Protein (CP)	18.82	17.5	14.2
Crude Fiber (CF)	20.63	28.2	8.14
Ether extract (EE)	2.51	1.38	3.36
Nitrogen free extract (NFE)	50.49	41.3	69.74
Ash	7.55	11.61	4.56
Na (%)	1.40	0.70	0.631
K (%)	1.72	1.24	0.759
Ca (%)	0.962	0.682	0.359
P (%)	0.666	0.233	0.511

CFM = concentrate feed mixture.
After El-Hawy (2013)

Table (2): Chemical analysis of drinking ground tape and saline water at South Sinai Research Station.

Parameters	Tape water 274 ppm	Saline water 6000 ppm
Total dissolved solids (mg/l)	274.00	5980.00
Electric conductivity (µs/cm)	0.53	9.96
pH	7.63	7.23
Sodium concentration (mg/l)	2.40	86.00
Potassium concentration (mg/l)	0.15	0.36
Calcium concentration (mg/l)	1.75	15.00
Magnesium concentration (mg/l)	2.25	19.00
Hardness * concentration (mg/l)	4.00	34.00
Carbonate concentration (mg/l)	0.40	0.20
Bicarbonate concentration (mg/l)	2.60	3.00
Chloride concentration (mg/l)	2.47	61.34

After El-Hawy (2013)

RESULTS AND DISCUSSION

Results obtained for dre milk yield(DMY) are shown in Table (3). There are no significant differences (P>0.05) among the four studied groups. At the first week of lactation, the average DMY was 0.82, 0.89, 0.95, 0.80 and 0.72 kg in G1, G2, G3 and G4, respectively. The results show that DMY increased and reached a maximum (peek) at the 2nd week (1.18 kg). Also, the results show that G2 was of the highest DMY, and showed persistence from the 2nd week (1.31±0.416 kg) up to the 4th week (1.32±0.220 kg). This result could be due drinking saline water (G2), which let the doe in this group to drink much water than other groups. So, let to increase the DMY. In general, the overall average daily milk yield (0.80 kg) was less than 1.87 kg, which obtained by Hadjipanayiotou (2004) who fed Damascus goat on barley and corn grains. Also, this overall average daily milk yield was less than 1.90 kg, which obtained by Güney *et al.* (2006) on Damascus goats. This means that milk production was not affected by feeding on salinity plants tolerant Combs and Hartnell (2007) and Digby *et al.* (2008).

Table (3): weekly milk yield in goat milk during lactation as affected by different feeding systems.

Week / Group	Daily milk yield (Kg)				Means
	W1	**W2**	**W3**	**W4**	
G1	0.82	1.33	0.84	0.58	0.75±0.206
G2	0.89	1.31	1.35	1.32	1.02±0.304
G3	0.95	0.96	0.75	0.84	0.77±0.204
G4	0.80	1.37	0.93	0.73	0.86±0.304
Means	0.84	1.18	0.89	0.81	
	±0.185	±0.416	±0.215	±0.220	

G1= barseem hay+ fresh water, G2= barseem hay+ saline water of 6000ppm,
G3= alfalfa + fresh water, G4= alfalfa+ saline water of 6000ppm

Results recorded for pH value are shown in Table (4). There are no significant differences (P>0.05) among the four studied groups. In milk obtained during lactation period, the overall average of pH values was 6.74. The pH values were higher at the beginning of lactation period in relation to the end of lactation (6.72 vs. 6.49). It seems to be similar to the milk pH in goats (6.77) (Baldi *et al.*, 2002). Also, it was close to 6.8, which obtained by Scharfen *et al.* (2007). Anderson (1992) suggested that milk proteins could be responsible for the pH change in milk because, like blood proteins, they have the ability to control pH as a result of their buffering capacity. However, as proteins are more anionic rather than cationic, an increase in protein concentration should will lead to an increase in pH. This was not observed in the present study. Another possible explanation is that an increase of organic acids such as acetic, pyruvic, and lactic occurred in the milk.

Table (4): pH value in goat milk during lactation as affected by different feeding systems.

Group \ Week	pH values W1	W2	W3	W4	Means
G1	6.78	6.80	6.78	6.60	6.67±0.084
G2	6.70	6.70	6.90	7.03	6.78±0.084
G3	6.70	6.88	7.03	6.70	6.73±0.084
G4	6.70	6.75	6.90	6.95	6.76±0.084
Means	6.72	6.80	6.93	6.81	6.74
	±0.047	±0.076	±0.100	±0.174	

G1= barseem hay+ fresh water, G2= barseem hay+ saline water of 6000 ppm,
G3= alfalfa + fresh water, G4= alfalfa+ saline water of 6000 ppm,

Results of chemical composition of goat milk among the different studied groups at each week during lactation period are present in Table (5). The averages of fat, protein, lactose, ash, SNF, TS and specific gravity were 3.95, 3.74, 4.27, 0.803, 8.81, 12.76% and 1.031 sequentially. These results show that the groups have no significant ($P < 0.05$) effect on all milk components except of both lactose and ash. These results are agreed with Digby (2007) and Digby *et al.* (2008), who concluded that no significant differences between a high salt diet (NaCl 13% of dry matter) and control diet (NaCl 0.5% of dry matter) on fat and protein content in the milk samples. Fat average value (3.95%) was within the range of 2.14-4.50%, which obtained by Zeng (1996), and 2.5-4.4%, which obtained by Pandya and Ghodke (2007) in goat milk. Also, protein (3.74%) value was within the range of 2.6-4.1 %, which obtained in goat milk by Raynal-Ljutovac *et al.* (2008). The results obtained within this study on lactose and TS agree with that reported by Raynal-Ljutovac *et al.* (2008) (lactose and TS were 4.3-4.76% and 11.6-14.8%, respectively, which obtained in milk from different goat breeds) and the concentration of TS found in goat milk was similar to that reported by Mahmood and Usman, (2010) (12.0-13.73%).

Table (5): Chemical composition of goat milk during lactation as affected by different feeding systems.

Group	% Chemical composition Fat	Protein	Lactose	Ash	SNF	TS	Specific gravity
G1	3.96^{a}	3.64^{a}	4.62^{a}	0.719^{a}	8.98^{a}	12.94^{a}	1.032^{a}
G2	4.14^{a}	3.99^{a}	3.98^{b}	0.837^{bc}	8.81^{a}	12.94^{a}	1.031^{a}
G3	3.94^{a}	3.90^{a}	4.34^{ab}	0.791^{b}	9.03^{a}	12.97^{a}	1.032^{a}
G4	3.76^{a}	3.44^{a}	4.13^{b}	0.865^{c}	8.43^{a}	12.19^{a}	1.030^{a}
Means	3.95	3.74	4.27	0.803	8.81	12.76	1.031
±SE	0.275	0.247	0.143	0.0199	0.323	0.395	0.0014

$^{a,\ b}$ superscript letters within column are significant at $P<0.05$, otherwise are not significantly.
G1= barseem hay+ fresh water, G2= barseem hay+ saline water of 6000 ppm,
G3= alfalfa + fresh water, G4= alfalfa+ saline water of 6000 ppm,

Similar results of SNF within all groups (8.11-978%) were obtained by Pandya and Ghodke (2007). But the results of Pandya and Ghodke (2007) are nearest with our results obtained on ash within all groups (ash was 0.83-0.98 %).

Specific gravity of milk samples collected from studied group is given in table (5). The specific gravity in G1 was higher than that in G4. There was no significant (p>0.05) differences among studied groups on specific gravity. Specific gravity was found in range of 1.030-1.032. The specific gravity of all groups of goat milk was similar to finding of Mahmood and Usman, (2010).

Table 6 shows the results of the mineral concentrations in the four studied groups of milk samples. All groups show significant (P < 0.05) differences on all studied minerals macroelement, microelements and heavy metal. These results agree with Cashman (2006), who concluded that variations in milk mineral could be due to the differences of feeding types. In general, most of the mineral concentrations in analyzed milk samples were within the normal ranges presented in the literature for milk

Table (6): Minerals composition in goat milk as affected by different feeding systems.

Meniral	G1	G2	G3	G4
Macroelement				
Calcium, mg/l (Ca)	$583.7^{b}\pm0.520$	$604.3^{a}\pm0.511$	$322.4^{d}\pm0.36$	$343.2^{c}\pm0.317$
Potassium, mg/l (K)	$1350^{b}\pm1.33$	$1280^{c}\pm1.14$	$1250^{d}\pm1.16$	$1390^{a}\pm1.28$
Magnesium, mg/l (Mg)	$39.06^{d}\pm0.0371$	$64.78^{b}\pm0.065$	49.38c±0.044	$65.91^{a}\pm0.062$
Sodium, mg/l (Na)	$430^{d}\pm0.40$	$550^{b}\pm0.50$	490c±0.51	$570^{a}\pm0.523$
microelements				
Boron, mg/l (B)	$0.1133^{a}\pm0.0001$	$0.0912^{b}\pm0.0002$	$0.0682^{d}\pm0.0001$	$0.0824^{c}\pm0.0001$
Cobalt, mg/l (Co)	$0.0065^{a}\pm0.00001$	$0.0035^{d}\pm0.00001$	$0.0043^{c}\pm0.00001$	$0.0055^{b}\pm0.00001$
Chromium, mg/l (Cr)	$0.0582^{a}\pm0.00001$	$0.017^{c}\pm0.00001$	$0.0242^{b}\pm0.00001$	$0.0254^{b}\pm0.00001$
Copper, mg/l (Cu)	$1.471^{a}\pm0.0015$	$1.262^{b}\pm0.0013$	$0.5377^{d}\pm0.0005$	$0.624^{c}\pm0.0002$
Iron, mg/l (Fe)	$0.3667^{a}\pm0.0004$	$0.1122^{d}\pm0.0001$	$0.1288^{c}\pm0.0001$	$0.2236^{b}\pm0.0002$
Manganese, mg/l (Mn)	$0.1429^{c}\pm0.00006$	$0.1478^{b}\pm0.0001$	$0.1255^{d}\pm0.0002$	$0.1625^{a}\pm0.0002$
Molybdenum, mg/l (Mo)	$0.0056^{d}\pm0.00001$	$0.0072^{c}\pm0.00001$	$0.0087^{b}\pm0.00001$	$0.0109^{a}\pm0.00002$
Selenium, µg/l (Se)	Nil	Nil	Nil	Nil
Strontium, mg/l (Sr)	$1.688^{a}\pm0.0017$	$1.194^{b}\pm0.0012$	$0.5683^{c}\pm0.0006$	$0.5362^{d}\pm0.0005$
Zinc, mg/l (Zn)	$5.88^{a}\pm0.0051$	$2.056^{b}\pm0.0021$	$0.8262^{d}\pm0.0009$	$1.32^{c}\pm0.00011$
Heavy metal				
Aluminum, mg/l (Al)	$37.19^{a}\pm0.0325$	$16.94^{c}\pm0.0144$	$14.59^{d}\pm0.0152$	$28.05^{b}\pm0.030$
Arsenic, mg/l (As)	$0.2612^{b}\pm0.0003$	$0.0962^{d}\pm0.0001$	$0.1201^{c}\pm0.0001$	$0.8088^{a}\pm0.0004$
Cadmium, mg/l (Cd)	$0.0105^{b}\pm0.00003$	$0.0018^{a}\pm0.00002$	$0.0027^{c}\pm0.00005$	$0.0014^{d}\pm0.00002$
Lead, mg/l (Pb)	$0.0499^{c}\pm0.00001$	$0.0611^{b}\pm0.00003$	$0.0479^{d}\pm0.00007$	$0.0618^{a}\pm0.00009$
Mercury, µg/l (Hg)	Nil	Nil	Nil	Nil
Nickel, mg/l (Ni)	$0.020^{d}\pm0.00004$	$0.0283^{c}\pm0.00006$	$0.0318^{b}\pm0.00005$	$0.0461^{a}\pm0.00005$
Vanadium, mg/l (V)	$0.142^{a}\pm0.028$	$0.0141^{c}\pm0.0001$	$0.0129^{d}\pm0.0002$	$0.0168^{b}\pm0.00001$

[a, b, c and d] superscript letters within column are significant at P<0.05, otherwise are not significantly.

G1= barseem hay+ fresh water, G2= barseem hay+ saline water of 6000 ppm,
G3= alfalfa + fresh water, G4= alfalfa+ saline water of 6000 ppm

The mean calcium (Ca) concentration was 583.7, 604.3, 332.4 and 343.2 mg/l for G1, G2, G3 and G4, respectively, which is lower than that reported by Kondyli et al. (2007) for goat milk (132 mg/100g), and Bettoni and Burlingame (2013) (100-134 mg/100ml).

Potassium (K) concentration (Table 6) was significantly higher in G4 (1390 mg/l), followed by G1 and G2 (1350and 1280 mg/l, respectively), while G3 recorded the lowest value of K concentration (1250 mg/l). These results are within the range of those presented by Roddguez et al. (2002) and García et al. (2006), which were 1212-2160 mg/l 0.84-1.81 g/kg in goat milk. While the results were lower than 152mg/100ml, that reported by Kondyli et al. (2007) in goat milk. Moreover, these results are in harmony with those reported by El-Hawy (2013) in blood K in the same experimental.

Magnesium (Mg) content was 39.06, 64.78, 49.38 and 65.91 mg/l for G1, G2, G3 and G4, respectively, which was lower than that reported for goat milk by several authors (García et al. 2006, Imran et al. 2008, Bettoni and Burlingame, 2013) were 70-220, 139 and 130-140 mg/l, respectively. Mg concentration recorded the highest value in G4 (65.91 mg/l), while G1 recorded the lowest value (39.06 mg/l). This result could be due the interaction effect of both saline tolerance plant and saline water on milk. This result agreed with El-Hawy (2013) on mineral blood profile of the same experimental animal.

Sodium (Na) concentrations (Table 6) were higher in saline water groups (G2 and G4) than other two studied groups (G1 and G3), this result could be due to the interaction effect of both saline tolerance plane and saline water on milk. This result agreed with El-Hawy (2013) on mineral blood profile of the same experimental animal. This result indicated that type of roughages did not affect Na concentration and might be attributed to aldosterone level. This result had within concentration of average of Na content (García et al. 2006) was 0.31-0.88 g/kg and Roddguez et al. (2002) were 288.8-906.0 mg/l in goat milk.

Copper (Cu) was 1.471, 1.262, 0.537 and 0.624 mg/l in G1, G2, G3 and G4, respectively. The value of milk Cu content in G1 was the highest levels of studied groups. This result could reflect to that normal purchased concentrate feed mixer, which fed to animal in G1, has added mineral in factors.

Iron (Fe) is a vital component of haemoglobin in the blood required for the transfer of oxygen and enzyme systems and is necessary for red blood cell formation and function and brain function (WHO / FAO, 1996), which is transmitted to the milk. The mean Fe content of the goat milk in this study was 0.3667, 0.1122, 0.1288 and 0.2236 mg/l for G1, G2, G3 and G4, respectively. This result was within the range of 0.193-1.167 mg/l obtained by Roddguez et al. (2002) in goat milk and lower than 0.55, 0.6 mg/l, which obtained by Park, 2000 and Soliman 2005, respectively on fresh goat milk.

Manganese (Mn) in all studied groups was ranged from 0.125 to 0.162 mg/l. These values were in agreement with the reported by Khan et al. (2014) and higher than that reported by Kondyli et al. (2007) in goat milk.

Concentrations of molybdenum (Mo) in tissues, blood and milk vary according to the level of molybdenum within feed intake. Concentrations of

Mo in G1 and G2, which feeding barseem hay were 0.0056 and 0.0072 mg/l, respectively have lower than values of Mo in G3 and G4, which feeding alfalfa (0.0087 and 0.0109 mg/l, respectively). Also, the results show that an opposite relation between Mo and Cu. This observed agree with Casey et al. (1995), who indicated that there is an inverse relationship between the concentration of Cu and Mo.

Zinc (Zn) is essential part of more than 200 enzymes involved in digestion, metabolism and reproduction (WHO/ FAO 1996). G1 was comparatively high of Zn in all studied groups (5.88 mg/l). The study showed that average Zn content in the four studies groups was 2.52 mg/l, which included within 1.37-6.06, 3.1-4.6 and 1-5 mg/l that reported by García et al. (2006); Kondyli et al. (2007) and Bettoni and Burlingame (2013), respectively.

Cadmium (Cd) ranged from 0.0014-0.0105 mg/l. Cd concentrations were varying greatly among all studied groups. The results showed that the level of Cd may record lower level than those (2.38 ng/g) indicated in goat milk by Khan et. al. (2014) and those (0.070- 0.112 and 0.094-0.142 mg/l) indicated in cow's and buffalo's milk, respectively by Ebn et al. (2009).

Lead (Pb) was detected in normal concentrations ranged from 0.0411 to 0.0618 mg/l with a mean value of 0.055 mg/l, which included within range obtained by Ebn et al. (2009) in cow's (0.040-0.960 mg/l) and buffalo's milk (0.044-1.088 mg/l) but lower 3.35ng/g than, which obtained by Khan et al. (2014) in unknown type of milk . Increased Pb concentration in goat milk reflected to contamination of this milk. This contamination of goat's milk may be due to exposure to Pb from consumption of contaminated feeding stuffs and/or water. The results indicate that there has been an increasing of Pb in milk of groups that drinking salt water (G2 and G4) than that drinking tape water (G1 and G3); which reflect that saline water has more Pb contamination than tape water. This is consistent with the changes that have occurred in the proportion of calcium as a result of drinking salt water (G1 vs. G2 and G3 vs. G4). This result could explain the increase of Ca in blood obtained by El Hawy (2013) in the same animal experimental, which led to increase Ca in milk as a result of Ca out of the bone. The research indicated that the increase in the proportion of Pb affect the representation of Ca in the body (which is set in the body automatically). This means that the increase in the rates of Pb malfunction occur in both parathyroid hormone (PTH), Calcitonin hormone and thus occur out of calcium from the bone (Cathcart, 1981 and Ross, 2011).

CONCLUSION

In conclusion, the study shows clearly that minerals content of goat milk, ash and lactose were affected by feeding system and type of drinking water. Most of the mineral concentrations in analyzed milk samples in studied groups were within the normal values for goat milk. Most of mineral variation could be due to the interaction effect of both saline tolerance plant and saline water on milk. The Ca concentration within all studied groups shows lower concentration than that reported in goat milk. Moreover, groups drinking saline water have high values of Pb than groups drinking tape water, which reflect that saline ground water used in experimental station to animal drinking has more Pb contamination than tape water. Also, increasing of Pb was caused to decrease Ca concentration in milk.

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الخصائص الفيزيائية وصورة المعادن للبن الماعز الشامي المنتج تحت الظروف الصحراوية

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تم دراسة تأثير الملوحة على بعض الخصائص الفيزيائية والكيميائية وصورة المعادن للبن الماعز الشامي المنتج تحت الظروف الصحراوية. تم جمع عينات لبن الماعز من القطيع المربى في محطة بحوث رأس سدر التابعة لمركز بحوث الصحراء، مصر. تم تقسيم أربعين حيوان بالتساوى على أربع مجموعات مختلفة من نظام التغذية. المجموعتين ١، ٢ كانت تتغذى على دريس برسيم، بينما المجموعتين ٣، ٤ تتغذى على علف متحمل الملوحة (برسيم حجازى). كانت كلا من المجموعتين ١، ٣ تشرب مياة عذبة بينما المجموعتين ٢، ٤ تشرب مياة مالحة. تم تجميع عينات مجمعة فى الاسبوع الاول بعد السرسوب حتى الاسبوع الرابع. تم تقدير كمية اللبن المنتجة، التركيب الكيميائى للبن من دهن ، بروتين، لاكتوز ، رماد ، مواد صلبة وكذلك درجة الحموضة والوزن النوعى للبن. كذلك تم تقدير تركيز المعادن فى اللبن الكالسيوم، الماغنيسيوم، البوتاسيوم، الصوديوم (كعناصر كبرى). هذا بالإضافة إلى البورون، الكوبالت، الكروم، النحاس، الحديد، المنجنيز، الموليبدينوم، السيلينيوم، الزنك باعتبارها عناصر صغرى. في حين، كانت المعادن الثقيلة هى الألومنيوم، الزرنيخ، الكادميوم، الرصاص، الزئبق، النيكل، السترونتيوم، الفاناديوم. لم يكن هناك تاثير معنوى ($P>0.05$) لنظام التغذية على انتاج اللبن والتركيب الكيميائى له ولكنها كانت معنوية فى الرماد واللاكتوز. كذلك كانت معنويه ($P < 0.05$) فى تركيزات المعادن جميعها بين المجموعات الاربعة محل الدراسة. اظهرت الدراسة أنخفاض فى تركيز الكالسيوم فى جميع المجموعات اقل من المستوى الطبيعى فى لبن الماعز، ويرجع هذا الى حدوث تلوث للبن الماعز عن طريق الرصاص سواء باستهلاك الحيوانات لاعلاف ملوثه و/او الماء به. كذلك وجد ان تركيزات الموليبدينوم في المجموعات المغذاه على دريس برسيم (المجموعتين ١، ٢) أقل من تلك المغذاه على برسيم حجازى (المجموعتين ٣، ٤). كذلك أوضحت النتائج أن هناك علاقة عكسية بين الموليبدينوم والنحاس. يمكن القول ان أغلب المعادن فى اللبن تأثرت بالتغذية على النباتات الملحية والمياة المالحة.