Milk Composition and Mineral Concentration Affected by Elevation and Grazing Season in the Rangelands of North Sabalan Mountain, Iran

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***Abstract*—This study was aimed to evaluate the effect of environmental factors on variations in milk composition and concentration of some macro minerals in Moghani sheep grazing in north of Sabalan rangelands. For surviving the effect of rangeland elevation, milk samples were collected from 60 grazing Moghani sheep in three elevation sites (respectively1300-1800, 1800-2500 and 2500-3200m). Effect of season was studied by sampling in two grazing season (spring and summer). Milk composition including Fat, Protein, Lactose, SNF (Solids Non Fat) and Ash was determined using Milcoscan. Studied Macro minerals included Calcium, Phosphorous, Sodium, Potassium and Magnesium. Mineral concentration was measured using Atomic Absorption Spectrophotometer and flame photometer. Analytical software of SAS (9.1) was used for Statistical analyses. Results of this study showed the significant effect of elevation on Fat, Protein, SNF and Ash ($p<0.05$). Protein and Lactose had higher percentage in the first, Fat in the second and SNF and Ash in the third elevation site. Elevation of sites had significantly affected the concentration of all studied macro minerals. Among the milk composition parameters, Fat and Lactose were significantly different between the seasons ($p<0.05$), and collected milk samples in summer showed the higher amounts of these parameters. Among the studied macro minerals, concentration of Ca, P and Na showed significant difference between spring and summer. Higher concentration of them was observed in summer. There was significant interaction between the elevation and season for Fat and all studied macro minerals. Overall according to the results of this study, environmental factor such as elevation and season had affected the studied parameters of Moghani sheep milk in Sabalan Mountain.**

***Index Terms*—milk composition, mineral, elevation, season, rangeland, moghani sheep**

I. Introduction

Animal products contribute significantly to the total nutrients in human food supply [1]. They provide a nearly ideal pattern of amino acids and account for over 60% of the total protein intake. furthermore, they are a primary source of many vitamins and minerals, including vitamin B12, vitamin B6, riboflavin, niacin, zinc, phosphorus, and calcium [2].

Milk along with meat is the main products of domestic animals. Bovine milk is dominant type of consumed milk in global milk production. However, in certain parts of the world and local contexts, milk from other animal species like sheep has a significant share in milk consumption as well [3], [4].

Milk of all mammals contains the same principal components, namely water, proteins, fats, carbohydrates, vitamins and minerals, but between the species or even within a same species the milk composition may differ considerably. These variations can be due to the influence of genetic factors (not only at the species level but also at the breed level), physiological factors (e.g. lactation stage, milking interval), nutritional factors (e.g. feed energy value and composition) and environmental conditions (e.g. location and season) [5].

In pasture-based milk production systems, using available farm resources in order to reduce feeding costs, the composition and functional properties of dairy animal's milk are of considerable importance to the dairy farmer, manufacturer and consumer [6]. In this system effect of environmental factors is highlighted. Therefore, researchers have been studied a series of these factors. For example, Larsen *et al* (2010) studied the influence of climatic conditions and season on milk composition in Sweden; they have reported that differences in milk composition could be related to climatic differences [7]. Because legumes are more dominating in the leys of central Sweden and maize growing is limited to southern Sweden. Mayer and Fiechter (2012) have studied the Physico-chemical characteristics of sheep and goat milk in Austria as influenced by seasonal effects and regional differences [8]. They have reported the considerable seasonal differences on sheep and goat milk in the study area. Furthermore, in rangeland condition Khan *et al*, (2005) have reported the significant effect of season on grazing sheep and goats milk mineral concentration [9].

Iran is a country, in which milk production especially sheep milk is highly depended on rangeland and it can be influenced by a variety of environmental factors. However, there is a lack of research on these factors on

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milk composition and mineral concentration of grazing animal and most of the studies are concentrated on plants. For example, Abarghani *et al*. (2013) have studied the effects of seasonal changes on blood and serum macro minerals concentration of grazing sheep in Sabalan rangelands of Iran. They have reported that grazing season can significantly affect the mineral concentration of blood and serum [10]. According to the Bhat *et al*. (2011), analyses of blood, serum and urine for bioelements has limited value. They noted that blood mineral level often does not correspond to their contents in the whole body, because the composition of plasma results from supplementation of deficiencies by different homeostatic mechanisms [11]. Therefore, the aim of this study was to investigate the effect of environmental factors (rangeland elevation and season) on milk composition and some macro minerals concentration in Moghani sheep in the rangeland of Sabalan.

II. Materials and Methods

A. Study Area

Study area was selected at the north of Sabalan Mountain in the northwest of Iran. Northern Sabalan is located at 47°43', 47°52'E; 38°35', 38°16'N. Three sites at different elevations including 1300-1800m (the first site), 1800-2500m (the second site) and 2500-3200m (as the third site) were selected to study the effect of rangeland elevation on milk composition and some macro minerals concentration in Moghani sheep. These sites have moderate summer and cold winter, 3 to 4 months of year covered with snow. Average rainfall varies from 300 to 550 mm and temperature from 8 to 11°C. For study the effect of season, milk samples were collected during two grazing seasons (spring and summer that Moghani sheep herds are grazing on this rangeland).

B. Milk Samples

Milk samples were collected from three different herds belonged to the Shahsavan nomadic people in three elevations in the North of Sabalan Mountain. Twenty healthy Moghani sheep in similar age and weight were chosen and marked for collecting milk samples in each site. Milk samples were taken into 120 ml bottles [9].

For collecting milk samples, whole milk of each sheep were milking into a bucket, after mixing required amount were transferred into the bottles.

In this study from the milk composition the amount of Fat, Protein, Lactose, SNF and Ash were determined, which their percentage were determined using Milcoscan. Moreover, the concentration of Macro minerals of Calcium, Phosphorous, Sodium, Potassium and Magnesium were measured. Atomic absorption spectrophotometer (Shimdzu, AA-6300) was used for measuring concentration of Ca, P, and Mg and flame photometer (Corning, Flame Photometer 410) for Na and K concentration.

C. Statistical Analyses

Samples were analysed in a completely randomized design with factorial arrangement, by elevation and season as the variables at the significance level of 5 percent. Duncan multiple range test was used for ranking differences among means. Data were analysed using SAS 9.1 software.

TABLE I. Milk Composition of Moghani Grazing Sheep in Three Elevation Sites in Grazing Seasons

Composition%	Significance of season or elevation	season				
		elevation	spring		summer	
			Mean	SEM	Mean	SEM
Fat	E*, S*,ES**	1	7.26	0.19	6.74	0.21
		2	6.24	0.16	6.41	0.17
		3	6.65	0.15	6.69	0.16
Protein	E* S:ns,ES:ns	1	4.67	0.25	4.40	0.27
		2	4.34	0.20	4.08	0.22
		3	4.53	0.19	4.29	0.20
Lactose	E: ns, S*, ES:ns	1	12.83	0.29	12.24	0.31
		2	11.20	0.23	11.58	0.25
		3	12.34	0.22	12.12	0.23
SNF	E*, S:ns, ES:ns	1	1.19	0.03	1.14	0.03
		2	1.05	0.02	1.08	0.02
		3	1.14	0.02	1.13	0.02
Ash	E*,S:ns, ES:ns	1	5.17	2.06	7	2.25
		2	19.11	1.68	21	1.78
		3	37.1	1.59	39	1. 68

E:Elevation, S: Season, ES: Elevation × Season interaction, *:significant in 5 percent, ns: non-significant.

III. Results and Discussion

Table I shows the effects of elevation and season on chemical composition of grazing Moghani sheep milk in North of Sabalan mountain rangelands. Studied factors (including rangeland elevation and grazing season) was significantly affected percentage of milk fat ($p<0.05$). Higher amount of this parameter was observed in milk of grazing Moghani sheep milk at the second elevation

(1800-2700). Moreover, between the seasons fat showed higher percentages in the summer milk. Among elevations, at the first elevation it showed higher concentration in spring, but in the second and third elevations, fat was higher in the summer milk. Rangeland elevation was significantly affected the protein percentage ($p<0.05$), in contrast, season had no significant effect on protein percentage. Higher amount of protein was observed in milk samples of the first elevation (1300-1800). Moreover, results showed that protein percentage was higher in grazing sheep milk in spring at all studied elevation sites. Lactose was not significantly different among the elevation sites, however grazing season had significant effect on the percentage of this parameter ($p<0.05$). Among the study seasons, the milk of sheep, which were grazing in spring, had higher lactose. Milk solid non-fat was significantly affected by rangeland elevation ($p<0.05$), and we found higher content of SNF in milk of grazing Moghani sheep in the third elevation (2500-3200). Moreover, results showed that season did not have significant effect on SNF. Percentage of Ash was significantly affected by elevation ($p<0.05$). Moghani sheep that were grazing in third elevation (2500-3200), had higher percentage of Ash in their milk. Ash content of milk in this study did not differ significantly between grazing seasons but in all three elevation sites it was higher in summer. Interactions of studied factors (rangeland elevation and grazing season) had significant on fat profile of milk. Previous studies have also reported the effect of elevation on milk composition [12], [13], as we found the significant effect of elevation on the percentage of Fat, Protein, SNF and Ash.

TABLE II. MILK MINERAL CONCENTRATION OF MOGHANI GRAZING SHEEP IN THREE ELEVATION SITES IN GRAZING SEASONS.

Mineral (mg/kg)	Significance of elevation or season	elevation	season		
			spring	summer	SEM
Ca	E*, S*,ES*	1	821.57	1016.24	22.39
		2	849.58	816.05	18.01
		3	903.56	971.58	17.03
P	E * S*,ES:*	1	219.15	298.52	8.29
		2	213.79	280.14	6.67
		3	329.13	311.98	6.31
Na	E*, S*, ES:*	1	816.67	1007.42	44.16
		2	715.53	901.76	35.52
		3	843.57	1005.92	33.59
K	E*, S:ns, ES:*	1	1253.08	1614.35	76.62
		2	871.13	927.47	61.64
		3	1369.30	1084.62	58.30
Mg	E*,S:ns, ES:*	1	87.73	95.83	1.50
		2	89.48	83.88	1.21
		3	98.99	101.11	1.14

E: Elevation, S: Season, ES: Elevation×Season interaction, *:significant in 5 percent, ns: not significant.

Effects of elevation and grazing season on mineral concentration in milk are shown in Table II. According to the results, the effects of both elevation and season on concentration of Ca in milk was significant ($p<0.05$). Moghani sheep that were grazing in third elevation (2500-3200m) showed the highest concentration of this element in their milk. Additionally, Ca was significantly higher in summer milk ($p<0.05$). Concentration of P was significantly affected by both elevation and season ($p<0.05$). Concentration of Phosphorus showed higher amount in milk in the third elevation and between seasons, it was higher in summer. Moreover the effect of elevation on the concentration of K was also significant. However, results of this element were different from the other macro minerals. On the other hand, milk of grazing sheep in the first elevation was richer in K and season did not have significant effect on the profile of this element. According to the results, concentration of Mg was also significantly affected by elevation and this mineral showed higher concentration in milk of grazing sheep in the third elevation. The same as K, grazing season did not show significant effect on the concentration of Mg.

Interaction of elevation and season was significant in all macro elements concentration in milk of Moghani sheep ($p<0.05$). This means that, both studied factors were controlling the variations of mineral concentration in Moghani sheep milk in the studied area.

Concentration of minerals in milk of grazing animals can be affected by the concentration of theses minerals in soil and plants [14]. Many factors can affect plants mineral composition such as plant genotype, soil environment, climate and the stage of phenology [15]. In rangeland forage quality and mineral concentration is

dependent to environmental variations due to the factors like precipitation and temperature which causes variations on minerals concentrations in grazing plants [16]. Furthermore, in higher elevations amount of rain and humidity will result in later vegetation stages, so plants of higher elevations will have higher nutritional quality which can be reflected in milk of grazing animals [14]. Feeding from these plants can affect the mineral state in animal tissues. Gorlier *et al*. (2012) in studying nutritional quality of plants reported that, due to the late phenological stages in higher elevations, nutritional quality of plants were significantly higher in high elevation [17]. These mentioned facts have compatibility with higher concentration of minerals of milk in grazing sheep in the third elevation (2500-3200). Moreover, higher percentage of Ash and minerals in the third elevation are the same as above statement. Abilleira *et al*. (2012) have studied the effects of seasonal changes on the evolution and composition of part time grazing ewes. They noted that lean dry matter, fat, protein, Calcium and Magnesium content increased throughout the milking season [18]. This report is similar to our findings of higher concentration of mineral and fat percentage in summer. Khan *et al* (2005) reported the effect of grazing season on milk mineral concentration in rangelands of Pakistan with higher amount of Ca in summer milk which supports the results of this study.

Previous studies had reported milk composition and mineral concentration different ranges, for example, Mayer and Fiechter (2012) in studying sheep and goat milk composition in Austria reported the average percentages of 5.75, 5.21, 4.64 and 0.853% for fat, protein, lactose and ash, respectively. By comparing this data with our results, it was founded that except protein other components were higher in Moghani sheep milk in comparison with sheep milk in Austria. Zamberlin *et al*. (2012) reported concentration ranges of major mineral elements based on the other studies (9, 10, 17, 18, 19, and 21) respectively for Ca: 1360-2000, P: 800-1450, Na: 290-310, K: 1740-1900 and Mg: 80-190 milligram per kilogram [19]. Comparison of these ranges with our results showed that an average amount of Ca and P was lower and Na higher than previous reports but K and Mg were in these reported ranges.

For more comparison, effects of rangeland elevation and grazing season on soil samples in studied area is shown in Table III. According to the table, effect of elevation was significant on concentration of Calcium ($p<0.05$) and it was higher in second elevation. Moreover, Concentrations of all minerals in soil were significantly affected by season. Our results showed higher amounts of them in spring ($p<0.05$). By comparing mineral concentration in soil and milk samples, it was observed that among elevation sites concentration of phosphorous and magnesium were similar to milk samples, in contrary there weren't any similarity of milk and soil mineral content between seasons. This shows that elements with different procedure might be affected by other effective factors such as temperature, management, genetic, maturity interaction with other elements, etc [20]. Moreover, Interaction of elevation and season were significant in all elements in soil samples.

TABLE III. SOIL MINERAL CONCENTRATION IN THREE ELEVATION SITES IN GRAZING SEASONS

Mineral	Significance of elevation or season	elevation	season	
			spring	summer
Ca	E*, S*,ES*	1	4150.3	1372.7
		2	3024.7	131.7
		3	1443.3	1086.1
		SE	250.77	250.77
P	E:ns S*,ES:*	1	180	40.6
		2	144.6	45.6
		3	164	61.6
		SE	2.42	2.42
Na	E:ns, S*, ES:*	1	671.3	601.3
		2	692.3	358
		3	660.3	372
		SE	12.54	12.54
K	E:ns, S*, ES:*	1	316.6	603.6
		2	359.3	572.6
		3	510.6	911.3
		SE	5.35	5.35
Mg	E:ns,S*, ES:*	1	97.3	65.4
		2	104.3	54.8
		3	102	63.5
		SE	1.85	1-85

E: Elevation, S: Season, ES: Elevation×Season interaction, *:significant in 5 percent, ns: not significant.

According to Table IV, effect of elevation was significant on mineral concentration of plant samples. Phosphorous, sodium, potassium and magnesium were significantly different among elevation sites ($p<0.05$). All

of the macro minerals of growing plants were higher in second elevation (1800-2500 m). Surprisingly, based on the results effects of elevation on plants mineral content were completely different from sheep milk so there weren't any compatibility between them.

Concentration of plants mineral concentration such as phosphorous, sodium, potassium and magnesium were significantly affected by season ($p<0.05$). In contrast to elevation, effect of season on concentration of P, Na and Mg has the same procedure between plant and milk.

Results of plants mineral content indicated the significance of Interaction between elevation and season on Phosphorous, sodium, potassium and magnesium ($p<0.05$). On the other hand, Interaction of elevation and season were significant in all elements except Ca in plant samples.

By comparing interaction of studied factors in milk, soil and plant samples it was observed that except Ca in all three type of samples this effect was significant on other elements which means elevation and season along with each other are responsible for variations of minerals in milk, soil and plants of north of Sabalan rangeland.

TABLE IV. PLANT CONCENTRATION IN THREE ELEVATION SITES IN GRAZING SEASONS

Mineral (mg/kg)	Significance of elevation or season	elevation	season	
			spring	summer
Ca	E: ns, S: ns, ES: ns	1	3948	2983
		2	3638	3329
		3	3677	2644
		SE	1293.7	1293.7
P	E*, S*,ES:*	1	1542.3	2489.3
		2	2301	4352.3
		3	801	3057.3
		SE	33.6	33.6
Na	E*, S*, ES:*	1	16	1464
		2	22.6	1652.3
		3	17.1	1431.3
		SE	17.9	17.9
K	E*, S*, ES:*	1	133.6	1066
		2	211	4384
		3	160	3511.3
		SE	4.8	4.8
Mg	E*,S*, ES:*	1	1104.3	322
		2	103	447.3
		3	106.3	418.3
		SE	2.07	2.07

E: Elevation, S: Season, ES: Elevation×Season interaction, *:significant in 5 percent, ns: not significant

In conclusion, Although results of this study showed that studied factors (rangeland elevation and grazing season) were effective on variations of milk composition and macro minerals content of grazing Moghani sheep in Sabalan rangelands but because of the differences in milk mineral content with soil and plant samples in this study, it shows the effect of other factors over than elevation and season. So for better understanding and improvement in animal's performance, it is recommended to study the effect of other effective factors in this rangeland, too.

REFERENCES

[1] NRC. Desiging Foods: Animal Product Options in the Marketplace. National Academy Press, Washington, DC. 1988, pp. 367.

[2] D. E. Bauman, L. H. Baumgard, B. A. Corl, and J. M Griinari, "Biosynthesis of conjugated linoleic acid in ruminants," *J. Anim. Sci.* vol. 77, pp. 1-15, June 1999.

[3] S. Gerosa and J. Skoet, "Milk availability: Trends in production and demand and medium-term outlook," *Food and Agriculture Organization of United Nation, ESA Working Paper*, no. 12-01, February 2012.

[4] E. Coni, B. Bocca, and S. Caroli, "Minor and trace element content of two typical Italian sheep dairy products," *Journal of Dairy Research*, vol. 70. pp. 355-357, November 1999.

[5] W. L. Claeys, C. Verraes, S. Cardoen, J. B. De Block, A. Huyghebaert, K. Raes, *et al.*, "Consumption of raw or heated milk from different species: An evaluation of the nutritional and potential health benefits," *Food Control*, vol. 42, pp. 188-201, August 2014.

[6] A. L. Roca Fernandez and A. Gonzalez Rodriguez, "Effect of dietary and animal factors on milk fatty composition of grazing dairy cows," *Iranian Journal of Applied Animal Science*, vol. 2. pp. 97-109, June 2012.

[7] M. K. Larsen, J. H. Nielsen, G. Butler, C. Leifert, T. Slots, G. H. Kristiansen, *et al.*, "Milk quality as affected by feeding regimens in a country with climatic variation," *Journal of Dairy Sci*ence, vol. 93. pp. 2863–2873, July 2010.

[8] H. K. Mayer and G. Fiechter, "Physical and chemical characteristics of sheep and goat milk in Austria," *International Dairy Journal*, vol. 24, pp. 57-63, June 2012.

[9] Z. I. Khan, M. Ashraf, A. Hussain, L. R. McDowell, and A. M. Yaseen, "Concentrations of minerals in milk of sheep and goats grazing similar pastures in a semiarid region of Pakistan," *Small Ruminant Research*, vol. 65, pp. 274–278, October 2005.

[10] M. Abarghani, M. Mostafaei, K. Alamisaed, A. Ghanbari, M. Sahraei, and R. Ebrahimi, "Investigation of calcium, phosphorous

and magnesium status of grazing sheep in Sabalan region," *Journal of Agricultural Science and Technology*, vol. 15, pp. 65-76, January and February 2013.

[11] M. S. Bhat, M. Shaheen, R. Zaman, and A. Muhee, "Mineral Inter-relationship among soil, forage and dairy cattle in Kashmir, Indian," *Vet. World*, vol. 4, pp. 550-553, September 2011.

[12] W. Bovolenta, E. Ventura, Piasentier, and F. Malossini. "Supplementation of dairy cows grazing an alpine pasture: Effect of concentrate level on milk production, body condition and rennet coagulation properties," *Annales de Zootechnie*, vol. 47, pp. 169–178, February 1998.

[13] S. C. Bugaud, S. Buchin, J. B. Coulon, A. Hauwuy, and D. Dupont. "Influence of the nature of alpine pastures on plasmin activity, fatty acid and volatile compound composition of milk," *Le Lait Dairy Science and Technology*, vol. 81. pp. 401–414, November 2000.

[14] M. collomp, U. Butikofer, R. Sieber, B. Jeangros, J. O. Bosset, "Corollation between cow's milk fat produced in the lowlands, Montains and highlands of Switzerland and botanical composition of the fodde," *International Dairy Journal*. vol. 12. pp. 661–666, April 2002.

[15] F. N. Suttle, *Mineral Nutrition of Livestock*, CAB International, UK. 2010, p. 587.

[16] S. Varmaghany, M. Moosavi, and H. Jafari, "Determination of minerals in range plants of ilam province," *Pajouhesh & Sazandegi*, vol. 73, pp. 104-109, August 2006.

[17] A. Gorlier, M. Lonatti, M. Renna, C. Lussiana, G. Lombardi, and L. M. Battaglini, "Changes in pasture and cow milk compositions during a summer transhumance in the western Italian Alps," *Journal of Applieed Botany and Food Quality*, vol. 85 pp. 216-223, July 2012.

[18] E. Abilleira, M. Virto, A. I. Najera, J. Salmeron, M. Albisu, F. J. Perez, *et al*., "Effects of seasonal changes in feeding management under part time grazing on evolution of the composition and coagulation properties of raw milk from ewes," *Journal of Dairy Science*, vol. 93, pp. 3902-3909, May 2010.

[19] S. Zamberlin, N. Antunac, J, Havranek, and D. Samarzija, "Mineral elements in milk and dairy products," *Mljekarstvo*, vol. 62, pp. 111-125, May 2012.

[20] Y. W Park and H. I. Chukwu, "Trace mineral concentrations in goat milk from French-Alpine and Anglo- Nubian breeds during the first 5 months of lactation," *Journal of Food Composition and Analysis*, no. 2. pp. 161-169, July 1989.

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F. M. Aghjeh Qeshlagh, M. Bayat, M. Sharari, J. Seifdavvati, and M. Rouhani, "Effect of two fungui (phanerochaete chrysosporium and pleurotus) on chemical composition and degradability of alnus subcordata saw dust as ruminant feed," *Animal Science Journal Pajouheash & Sazandegi*, vol. 105, pp. 81-92, 2014.

F. M. Aghjeh Qeshlagh, Zh. Pashaeri, A. Mahdavi, M. D. Shakouri, and A. Ghorbani, "Determination of nutritive value of Artemisia using of in vitro, gas production and nylon bag techniques," *Journal of Animal Research*, vol. 22, no. 3, pp. 37-47, 2012.

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A. Ghorbani and A. As Ghari, "Study the influence of ecological factors on *Festuca ovina* distribution in southeast rangelands of Sabalan, *Journal of Range and Desert Resreach*, vol. 21, no. 2, pp. 368-381, 2014.

A. Ghorbani, V. Ahmadalei, and A. Asghari, "Study the effect of distance from village on plant diversity and composition in rangeland of southeastern Sabalan," *Rangeland Journal*, vol. 8, no. 2, pp. 178-191, 2014.

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2. The Rapid separating and enrichment of 4,4'-dimethylsterols of vegetable oils by solid Phase extraction, Journal of American Oil Chemistry Society, 2010, 87: 1155–1159

3. Production and Characterization of a Functional Iranian White Brined Cheese by Replacement of Dairy Fat with Vegetable Oils, Food Science and Technology International, - 2013, 19(5): 389-398.

4. Optimization of Extraction Process of Bioactive Compounds from Bene Hull Using Subcritical Water, Food Science and Biotechnology, 2014, 5(23): 1459-1468.