

Milk Composition of Libyan Maghrebi Camels (Camels Dromedaries) Reared Under Farm and Desert Conditions

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Abstract—For the purpose of present study, the female camels called Maghrebi camels, found in South-west of Libya, the first seven camels among them were reared under farm management condition (desert condition), all the female camels of the second group were milked three times a week, while the camels of the first group were milked twice a day and the milk samples were taken once every alternate month for the first six months of lactation, the samples collected were immediately refrigerated and transferred to the laboratory, atomic components (mineral & elements) and chemical composition of milk respectively.

The statistical analysis of data obtained from study showed that the desert camels bulk milk has higher amount of calcium, zinc, sodium and potassium, while those contents were at a lowest amount in farm camels milk.

The mean values has significant effect at ($p < 0.05$) and they were (114 ± 5.35 , 0.58 ± 0.52 , 69.26 ± 1.10 , 154.57 ± 5.50) and (85.96 ± 1.30 , 0.42 ± 0.021 , 43.14 ± 9.77 , 148.11 ± 8.80 mg/100g) respectively.

The other comparison between mean values of major composition are included in the tables of this study.

Keywords—Milk Composition, Libyan Maghrebi, Camels (Camels Dromedaries) Reared, Farm, Desert Conditions.

I. INTRODUCTION

THE total population of camels in the world is about 19 million of which 14 million are in Africa (FAO/WHO/OIE, 1992). The vast majority of camels are dromedaries (one-humped camel) are found particularly in desert areas and the population of camels in Libya is estimated to be around 250000 and they are all dromedarie camels (Chapman, 1991, Wardeh 2004). Indigenous dairy camels in Libya can be classified into Sirtawi, Maghrebi and Fakhreya. Sirtawi are found In Sirt area in the middle coastal zone in Libya, they are medium in size, hump is not well developed. Selected Sirtawi female camels in certain private farms and herds respond to feeding by producing high amounts of milk 3000-4000 kg/305 days, (Wardeh, 1989). Maghrebi camels are restricted to the North African territories extending from Egypt to Morocco, and they are medium in size with small but pointed hump. The Maghrebi camel generally respond to feeding and their milk gain is

about 3500 grams per day. (Wilson, 1984, zaid, 1991). Fakhreya are well known for their milk production 3500 kg per year under natural grazing condition in the southern and western areas from Benghazi in Libya (Wardeh, 1991). Most camel milk produced in Libya was traditionally consumed fresh as raw milk. However, camel milk is gaining more popularity, and several commercial farms are being established to supply fresh milk to consumers. Although the composition of camel milk has been studied in various parts of the world (Mehaia et al, 1994), especially in Bactrian camels (Zhang et al., 2005). However the Libyan camels are which being reared under farm management condition or under poor pastoral land (desert condition), need more composition, protein, fat, water, lactose, ash and mineral contents of camels milk, In addition, they are required to have comparative studies of their products with the product of the other mammals.

II. MATERIALS AND METHODS

A. Study Camels

The Libyan Maghrebi female dromedary were divided into two groups homogenous for age and parity. They cohabit in the same Zawia area but they reared under different environmental conditions. The first seven female camels were reared under poor pastoral (desert condition). Areas south of Zawia in Libya. This particularity allows the comparing the milk composition of those groups of animals. All female camels were in good health and in first lactation period (2nd to 5th month of lactation). Camels Females of the first group were milked every morning whereas camel females of second group were milked three times a week.

B. Milk Samples

The animals were hand milked in the morning. The sampling started one month postpartum and continues alternate month, for the first six months of lactation. The samples were collected once in the middle of the month of collection, and were taken first from the farm group and then from the desert group on the next day respectively. Each sample represented all camels in each groups. The samples were collected and immediately transported in an ice bah to the laboratory.

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C. Proximate Analysis

Samples were analyzed for total solids, fat, ash and titratable acidity in accordance with the procedures outlined in Association of Official Agriculture Chemists 1980 (AOAC 1980). The PH was measured with WTW PH 410, D8120 Wlheim. The acidity estimate by titration with 0.1 sodium hydroxide, and the amount proportion of lactose was determined by finding the difference.

D. Determination of Protein Fraction

Nitrogen was determined by the standard micro-Kjeldahl method of the AOAC, 1980. A nitrogen conversion factor of 6.38 was used for calculation of protein content of milk sample.

E. Mineral analyses

For the determination of mineral elements the ash was dissolved in 2% HCL. The final diluted solution for calcium and magnesium determination contained 1% lanthanum to overcome phosphate interference. All miner except phosphorus were determined with a pye Unicam SP9 atomic absorption spectrophotometrically using the procedure of Watanabe & Olsan 1965.

III. RESULTS AND DISCUSSION

Libyan dromedaries are adapted to hot arid lands and therefore their milk product is probably effected by these difference in environment. The chemical composition of milk samples of the two groups of Maghrebi female camels are presented on Table 1. The data obtained showed a wide range of variation in the chemical composition (Jeness & Patton,

1959) especially under uncontrolled environmental condition as is mostly the case locally. Our data showed that the significant effect between the mean values of the two milk groups at ($P < 0.05$) were found to be in water, lactose, ash and total solids, these significant effects may be attributed to some factors such as age, number of calving, management, stage of lactation, sampling technique used (Abu-Lehia, 1987 and Alshaikh and Salah, 1994) and feed quality (Yagil, 1987, Yasin, 1957). In this study, the first group of female camels were under good feeding (farm condition), whereas the second group were under poor feeding of fry and wet shrubs and desert shrubs and insufficient in drinking water (thirst). The most important factor in camel milk for peoples living in dry zone is its water content (Wilson, 1998). The proportion of the mean values of camel milk contents of the two groups ranged from 90.02 ± 0.11 to 88.88 ± 0.32 , 3.94 ± 0.31 to 5.12 ± 0.12 , 0.67 ± 0.077 to 0.92 ± 0.029 and 9.92 ± 0.12 to 10.8 ± 0.086 of water, lactose, ash and total solids respectively. As for the stages of lactation and in the same precedent the proportion of mean values contents of water, fat, protein, ash and total solids of the first and the second groups ranged from 89.87-90.14, 2.54-2.86, 2.28-3.05, 0.58-0.77, 9.79-10.07 and 88.46-89.24, 2.54-2.68, 2.28-3.05, 0.82-0.92 and 10.68-10.88 respectively. In addition our data in table 1 showed the mean values of the first and the second groups bulk milk PH were that 6.67 ± 0.12 and 6.3 ± 0.08 and the mean values of acidity expressed as lactic acid were 0.13 ± 0.009 and 0.22 ± 0.04 respectively. The different values of the major proportions of milk contents indicated that the stage of lactation has a significant of each group at ($P < 0.05$).

TABLE I
CHEMICAL COMPOSITION OF BULK MILK FROM FARM AND DESERT MAGHREBI CAMELS OF LIBYA

Component	Farm Maghrebi Camels milk (Lactation Months)			Means	Desrt Maghrebi Camel milk (Lactation months)			Means
	1 st	2 nd	3 rd		1 st	2 nd	3 rd	
pH	6.4	6.6	6.7	6.67 ± 0.12	6.4	6.2	6.3	6.3 ± 0.08
Acidity	0.12	0.14	0.14	$0.13 \pm 0.009^*$	0.25	0.16	0.26	$0.22 \pm 0.04^*$
Water %	89.87	90.14	90.06	$90.02 \pm 0.11^*$	88.94	89.24	88.46	$88.88 \pm 0.32^*$
Fat %	2.86	2.58	2.54	2.66 ± 0.14	2.28	2.30	2.35	2.31 ± 0.029
Protein %	2.05 ^a	2.63	2.28 ^a	1.65 ± 0.32	2.68	2.58	2.67	2.64 ± 0.044
Lactose %	3.58 ^a	3.92	4.32 ^a	$3.94 \pm 0.31^*$	4.97	4.97	5.42	$5.12 \pm 0.12^*$
Ash %	0.58 ^a	0.66	0.77 ^a	$0.67 \pm 0.077^*$	0.95	0.88	0.92	$0.92 \pm 0.029^*$
TS %	10.07	9.79	9.91	$9.92 \pm 0.12^*$	10.88	10.68	10.84	$10.8 \pm 0.086^*$

*means of the same content of the two group camel milk which have significant different $p < 0.05$ a,b indicate significant differences $p < 0.05$ in resultant of first and second group respectively.

Farm Maghrebi camel milk exhibited the highest water, fat, protein and total solids contents. On the other hand, there were some difference in PH, Titratable acidity and ash contents between mean values are contents of bulk camel milk of each group. Table (2) and table (3) summarizes the average of five major minerals (Ca, Mg, P, Na and K) and four trace elements (Cu, Fe, Mn, And Zn) in the milk of Libyan Maghrebi camels which reared under farm and desert conditions. There were wide variations in mineral contents.

This may be due to the differences of the feeding and environmental conditions. However the concentrations of Ca, Na and K of desert Maghrebi camels milk were higher than in milk of the other group which reared under farm condition. These results were found to have a significant effect at ($p < 0.05$), but the lowest concentrations were presented in the mean values of Phosphorus and Magnesium. While Farm Maghrebi camel milk.

TABLE II
MINERAL CONTENT (MG/100G) IN BULK MILK OF FARM AND DESERT MAGHREBI CAMELS OF LIBYA

Component	Farm Maghrebi Camels milk (Lactation Months)			Means	Desrt Maghrebi Camel milk (Lactation months)			Means
	1 st	2 nd	3 rd		1 st	2 nd	3 rd	
Ca	84.34	85.29	87.45	85.69±1.30*	120 ^b	115	107 ^b	114±5.35*
Mg	11.04	10.00	12.10	11.05±0.57	6.84	7.57	7.48	7.30±0.32
P	97.40 ^a	81.05 ^a	88.60 ^a	89.02±6.68*	63.58	62.70 ^b	69.18 ^b	65.15±2.87*
Na	43.10 ^a	31.20 ^a	55.21 ^a	43.14±9.77*	67.77 ^b	70.40 ^b	69.61	69.26±1.10*
K	152.35	125.83	156.11	148.11±8.80*	147.12 ^b	156.35	160.23 ^b	154.57±5.5*

* Means Of The Same Content Of The Two Group Of The Two Group Camel Milk Which Have Significant Different P<0.05 A, B Indicate Significant Differences P<0.05 In Resultant Of First And Second Group Respectively.

Had the highest mean value contents of P and Mg, Table (3) shows the mean values of Fe, Zn, Cu, and Mn of desert Maghrebi camel milk were slightly higher than farm Maghrebi camel milk. The mean value contents of these

elements in the first and second groups milk were almost 0.26±0.02, 0.43±0.021, 0.14±0.02, 0.01±0.008 % and 0.28±0.04, 0.58±0.052, 0.24±0.004 % respectively.

TABLE III
TRACE ELEMENTS (MG/100G) IN BULK MILK OF FARM AND DESERT MAGHREBI CAMELS OF LIBYA

Component	Farm Maghrebi Camels milk (Lactation Months)			Means	Desrt Maghrebi Camel milk (Lactation months)			Means
	1 st	2 nd	3 rd		1 st	2 nd	3 rd	
Cu	0.11	0.14	0.16	0.14±0.02	0.05	0.06	0.62	0.24±0.27
Fe	0.23	0.26	0.28	0.26±0.02	0.23	0.30	0.31	0.28±0.04
Mn	0.011	0.010	0.021	0.01±0.008	0.031	0.022	0.020	0.024±0.004
Zn	0.44	0.42	0.39	0.42±0.021*	0.51 ^b	0.63 ^b	0.61	0.58±0.052*

*means of the same content of the two group camel milk which have signification different **p<0.05** b indicate significant differences **p<0.05** in resultant of second group respectively.

The statistical analysis of the study showed significant effects in the percentage of ash and the some other results of milk at (P<0.05), all of which is summarized in the tables of this study. These results were comparable with many reports from various parts of the world, such as (Abu-lehia 1987, Ahmed 1988, Gnan 1986, Yagil 1987, Yasin 1957 and Farag 1992). A massive convergent was found in the levels of chemical composition and the mean values of mineral contents of Maghrebi camel milk, specifically in levels of water, ash protein, total solids and some elements such as Ca, K, Na and Zn. In the others observation there were some results of the present study that showed similarity between the two groups especially in the major percentage of the amount of trace elements.

IV. CONCLUSIONS

From the foregoing results it could be concluded that Desert Magrebi camels milk contains higher amounts of Na, Ca, and K, and slightly lower contents of fat, protein and lower in P and Mg, while Farm Maghrebi camels milk had the lowest contents of Na, K, Zn and Ca and highest amounts of water and the higher amounts of Mg. The expectation of this study is to signal the necessity for making more extensive studies to explore factors that influence Libya camels milk composition specially minerals, trace elements and vitamins and the uses of Camel milk as therapeutic for many human diseases.

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