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The Milk Quality of Camels as Compared to that of Cows and Sheep Under Natural Feeding Conditions in U.A.E.

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Abstract. Milk Quality of camels *(Camelus dromedarius)* was compared to that of Omani cows and local sheep. The parameters used to judge the quality of the milk were percent water, fat, protein, lactose and ash. Also some important minerals of milk were determined viz; Ca, Mg, K, Na, Fe, Mn, Cu and Zn. The data showed clearly that camel's milk compares favourably in its nutritive value with that of cows and sheep. The data is discussed in relation to natural feeding conditions practised in United Arab Emirates.

Additional key words: Camels, quality, nutrition, milk.

INTRODUCTION

It was the camel's ability to convert the scanty desert food sources into milk for human consumption that was instrumental in the domestication of this animal. In the desert steppe environment of Arabia few other sources of food are available apart from camel's milk (Sweet, 1965). This observation is still true for the extremely arid areas of Arabia but it is equally true now-a-days for all the drought-stricken areas of the world where continuous severe drought decimates cattle, sheep and goats populations. Even the animals stat do survive the drought are poor providers of food for man. It is this ability to lactate in adverse conditions that will elevat the camel from pure academcic interest to one of vital importance for human nutrition (Yagil, 1982).

However, camels also respond well to extensive husbandry practices and good nutrition and they can compare fairly well with other domestic animals.

Few studies are available on the quality of camel's milk compared to that of other domestic animal species (Yasin and Whaid, 1957; Knoess, 1976; Yagil and Etzion, 1980 a; Yagil, 1982). These studies were conducted mostly in areas of adverse conitions where drinking water is scarce, temperature is high and food is poor. However, in United Arab Emirates and other countries of the Gulf Co-operative council, Camel management for milk production has been improved siginificantly. Camels are often penned, stall-fed and watered in a fashion similar to cows and sheep which are raised for the same purpose. It is therefore, of interest to study milk quality of these camels and see how it compares to other species of domestic animals under similar conditions. The present study deals mainly with determination of water, fat, protein, lactose and ash content of milk. In addition some important mineral components of milk including Ca, Mg. K, Na, Fe, Mn, Cu and Zn were determined.

MATERIALS AND METHODS

The study was conducted at Al-Ain region (UAE) during the month of September 1987. The daily maximum and minimum temperature was 40 ℃ and 30 ℃ respectively.

Animals and Milk collection:

Milk samples were collected from camels, Omani cows and local sheep. All animals are raised in small private farms. Camels are fed mainly lucerne, Rhodegrass, barley, and about 1-2 kg of dates once a week and are allowed to browse for few hours daily. Cows and sheep are fod Rhodegrass, lucerne and wheat bran. All animals are fed twice a day, early morning and late evening while water is allowed ad lib.

Milk samples were collected in the morning into sterilized bottles (100 ml capacity) from each animal. One drop of formaldehyde solutoin

(37-41%) was added to each bottle as preservative. The samples were then transferred to a refrigerator in the laboratory and analysed within two days.

Laboratory Analysis:

Milk samples were seperately analysed for fat, protein and lactose by the Milk Scanner (Multispee M). The fundamental principle of the equipment is an infrared milk analyser. Certain molecular vibrations of the major individual components of milk, namely, fat, protein and lactose, absorb infrared radiation at distinctive wavelengths. By measuring the level of absorption at these wavelengths, quantitative determination of these components can be obtained. Analysis of ash and mineral componets of milk were derermined by atomic absorption spectrophotometry (AA-670-Shimadzu-Japan).

Completely Randomized Design was used to statistically analyse the data.

RESULT AND DISCUSSION

Significant differences were observed between animal species for most parameters studied. For this reason the protected LSD test was applied for each paramter between the species.

Table (1) summerizes the mean percent values of water, fat, protein, lactose and ash in milk. The mean values of these parameters in Omani cows and local sheep milk lie within the normal values reported in the literature, except that the average fat content in the milk of both species is lower than that reported by many investigators. (Ensminger, 1969, Yagil and Etzion, 1980) This may be attributed mainly to variations due to breed, climatic conditions, and level of nutrition. Camel's milk contained an average of 84.63 percent water as compared to 87.46 and 85.48 percent in cows and sheep milk, respectively. Water content in camel's milk is significantly lower than of cow's but similar to that of sheep' milk. The mean value of water content in camel's milk found in this study was similar to that reported by Yagil (1986) who stated that normally watered camels secrete milk containing 84 percent water while

Table: 1 **Chemical Composition of Camels, Cows and Sheep Milk (Mean Percent)**

	Water	Fat	Protein	Lactose	Ash
CAMEL	84.63 a*	6.05 a	3.93 a	4.34 a	1.04 a
COW	87.46 b	2.79 b	3.89 a	5.06 b	0.79 b
SHEEP	85.48 a	4.23 b	5.03 b	4.36 a	0.85 b
LSD 0.05	1.74	1.56	1.06	1.36	0.06

* mMeans within a column followed by the same letter are not significantly different at p ± 0.05 level according to the LSD test.

chronically dehydraated camel's drinking water for 1 hour once a week secreted milk with over 90 percent water. Similarly knoess (1976) observed that water content of camel's milk fluctuates from 84 to 90 percent.

The fat content of camel's milk is significantly higher than that of cows and sheep. Variation in fat content of camels's milk varies from 1.1 percent under scare availability of drinking water (Yagil and Etzion 1980 b) to 5.5 percent under accessible water (knoess 1976). The hgiher value of fat in camel's milk observed in this study may be attributed to availability of water and also to the good quality of ration presented to animals.

The protein content of camel's milk is similar to that of cow's, but is significantly lower than that of sheep. The value of protein content in camels's milk reported in this study lies within the range (2% to 5.5%) reported by Yasin and Wahid (1957). Kherasov (1961) examined 4 breeds of camels and found protein value to vary from 3.5 to 3.8 percent. Similar values were also reported by other investigators (Dahl and Hjort, 1976; El Amin, 1979). It is known that the protein content of the feed directly affects milk protein content. Under our experimental conditions, no significant differences in lactose content was observed between the three species of animals. These findings are in agreement with

those reported by Yagil and Etzion (1980b) who observed lactose content of 3.7, 4.8 and 3.7 percent in the milk of camels, cows and sheep respectively.

Ash content in camel's milk is significantly higher than that of cows and sheep. Many investigators reported ash content of camel's milk in the range of 0.7 to 1.0 percent. The value in this study lies within the higher limits reported. Again this may be attributed to the good quality of ration and other factors like availability of drinking water ad lib. It is interesting that the higher value of ash in camel's milk coinciedes with the general belief among the bedouins that camel milk is famous with its health giving qualities that include good bone growth particularly for children.

Table (2) summerizes the concentration of Ca, Mg, K, Na, Fe, Mn, Cu and Zn in milk of camels, cows, and sheep. Camel's milk contains significantly higher values of Ca, Mg, K, and Na when compared to cows and sheep's milk. This may explain the salty taste which usually characterises camel's milk. To my knowledge there are no reports on the major mineral componets in camel's milk. The concentrations of Fe, Mn, Cu and Zn are also significantly higher in camel's milk than in cows and sheep milk. The concentration of Mn, and Zn were undetectable in the milk of cows and sheeps in this study. The richness of camel's milk with these trace mineral adds to its credit since these elements possess important physiological and nutritional roles. Accepted values for trace

Table: 2 **Some major and trace mineral components of Camels, Cows and Sheep's milk (ppm)**

	Ca	Mg	K	Na	Fe	Mn	Cu	Zn
CAMEL	1654.5 a*	66.15 a	206.25 a	60.25 a	6.75 a	1.83 a	1.03 ab	4.8 a
COW	927.75 b	34.98 b	173.0 b	42.00 b	2.87 b	00 b	1.58 ac	00 b
SHEEP	995.75 b	32.95 b	173.25 b	43.00 b	1.10 c	00 b	0.73 b	00 b
L S D 0.05	207.06	6.99	10.11	6.70	1.63	0.73	0.63	1.63

* Means within a column followed by the same letter are not significantly different at $P < 0.05$ level according to LSD test.

elements in milk of most domestic animals including cows and sheep is not available. Unlike cows and sheep, camels are fed more lucerne than Rhodegrass and in addition camels are sometimes fed balanced rations with high content of minerals manufactured locally. These factors may explain the superiority of camel's milk in trace minerals.

In conclusion this study showed clearly that camel's milk compares very favourably in its nutritive value with that of cows and sheep. This study also suggests that in U.A.E. camels respond fairly well to good husbandry practices and better feeding systems. It is worth trying to conduct further studies on milk of camels to investigate in details the different factors which may influence its quality and auantity such as season, age, stage of lactation etc... under U.A. E. conditions.

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