

Milk Production Potential of Marecha Dromedary Camel in Desert Thal Punjab, Pakistan

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Abstract

Livestock provides food and livelihood support to its keeping communities of arid and semi-arid areas in the world. Camel milk is liked due to nutrient richness and therapeutic peculiarities, but facts about milk quality are unknown, to a large extent. Current study was performed to attain the knowledge about milk production and composition of high producer Marecha camel. It is of great value to evaluate scientific findings on camel milk in the context of the production system. Pastoral herds of camel under traditional conditions provide a field for scientific studies and contribute its share to food security and sovereignty. In present study, 100 samples were collected from she-camels during initial stage of lactation to study milk production and composition in Mankera Tehsil of District Bhakkar. The mean milk yield and range of Marecha she-camel was found to be 5.62 ± 0.27 and 3-8 kg in extensive management system. The fat, protein, lactose, SNF and total solids percentage was 4.44, 3.42, 4.82, 8.96 and 13.38.

Keywords: Livestock; Camel; Dairy; Pastoral; Production system

Introduction

Without exaggeration the camel has been the most ignoring specie among the ruminants in Pakistan. It has been remained the victim of deliberate neglect and disregard of scientists along with development workers for a long time. There were no efforts in terms of lack of planning and research on it to improve its productivity. Had it been a useless and an unproductive animal, if it is so its population would have diminished gradually but it is steadily increasing the other way round. Paper records show its population stagnating but probably is not so. Now internationally there is a growing awareness in respect of camel as it has been termed and considered as a "food security animal". However, a resurgence of interest has been shown about last two decades in this species. Regarding the exploitation of production potential of camel, most of the work has been performed by such scientists belonging to those countries that even do not possess any population of camel. Pakistan has a sizable population of camel (1 million) [1], so it should be more than enough to make us realize our responsibilities towards multi-purpose domestic camel specie. In spite of much urbanization in the country its population remains stable and has not shown a downward trend so this fact clearly speaks the usefulness of one humped camel in Pakistan. It is high time to investigate its peculiarities and to exploit its productive potential especially in terms of milk and meat production and to explore the possibilities of growing export of live animals to the Middle East countries [2].

Camel plays a vital role in the subsistence pastoral economy in the diverse eco-zones extending from India and Gobi desert in central Asia [3]. Camels were mainly domesticated for the purpose of milk production [4]. The great importance for pastoralists and agro-pastoralists is of camel as it produces more milk during drought conditions for longer periods than any other domestic animal species adapted to arid and semi-arid habitats. Milk yield varies with the age, breed, management conditions, feeding and stage of lactation. Under pastoral conditions it is very difficult to estimate the daily milk yield of camel. Because the calves suckle their dams throughout the lactation period and the variation in the milking frequencies among various pastoral groups.

Camel is said to be a good producer of milk and it is an important source of income especially for people of arid, semi-arid and desert areas. Its milk contains higher values of vitamin C [5] and is an

important source of food in the pastoral community [6,7]. Therefore, need is to explore its production potential under various management systems as camel has genetically excellent potential for milk production along with its longer lactation period (390-410 days) than other ruminants. Their feed requirements are also comparatively less than other dairy animals, particularly in the deserted areas where camel are the only source of milk.

Under traditional pastoral management system camel produce more milk than any other type of domestic animal species when reared in the same environment i.e. in arid and semi-arid areas. It illustrates that camel has a great potential as a dairy animal in its natural habitat. The Marecha camel used as a beloved companion, loader carrier, transport provider, racing/dancing purpose, milk and meat. It produces milk in harsh and hostile conditions with ample high temperature and scarcity of feed and water so this characteristic enables its herders to live in deep desert and use the milk as food security. As it found in deep desert, therefore milked when the pastoral family needs it [8,9]. Marecha she-camel can produce up to 10 liters milk per day [8]. Probably the Marecha is the best milk yielder in the world, with an average annual milk yield of 4179 liters while lactation length varies from 270-540 days having the total milk yield as 1300-4200 kg [10].

Materials and Methods

Description of the study area

Tehsil Mankera of District Bhakkar is located between $31^{\circ}10'$ and $32^{\circ}22'$ North Latitude and $70^{\circ}47'$ and 72° East Longitude, most of the area comprises on the deserted plains named as Thal desert. This area

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comes under the agro ecological zone-III. Sandy deserts having narrow strips of sand ridges and dunes while the climate is arid to semi-arid with mean summer temperature goes up to 45.6 °C and in winter it falls from 5.5 to 1.3 °C. Mean annual rainfall ranges from 150-350 mm, increasing from south to north [11].

Sampling method, data collection and statistical analysis

A total of 100 households, who owned adult she-camels were selected using purposive sampling technique. All animals were carefully examined before the start of sampling and those were found physically healthy, milked twice a day (morning and evening) and their milk production was recorded. All samples were collected and examined in duplicate. The milk samples were collected in sterile plastic bottles and transported to Dairy lab; Camel Breeding and Research Station Rakh Mahni and analyzed. The determination of milk composition included fat, protein, lactose, SNF and total solids were estimated by using Milky Lab Analyzer. Microsoft Excel 2010 was used for data compilation and all the experimental data was presented to analysis of variance for statistical analysis [12].

All animals were allowed grazing/browsing for 10 hours daily and fed gram crop residue rest after adlib. The forage species available for grazing/browsing like kikar, phulai, beri, siras, jand, khagal, dhaman, persain, khawi, kali bui, bhakra, kari, laana, phog, karir and khar laana were analyzed for percent dry matter, crude protein, crude fiber, ether extract and ash [13]. Neutral detergent fiber (NDF) and acid detergent fiber (ADF) was also determined (Figure 1) [14].

Results and Discussion

Mean milk yield and range of Marecha she-camel was found to be 5.62 ± 0.27 and 3-8 kg (Table 1). These findings are in line with the findings of Hussien [15], Gedlu [16], Kebebew [17] and Tezera [18] who reported range from 4.5-7.5 liter milk per day in Eastern African camels while in contrast with the findings of Zeleke [19] who reported range as 1.5-3.1 liter/d in Ethiopian camels. Khan [20] reviewed various breeds of camel and reported a wide range as 3.5 - 40 kg daily milk yield of camel in different production systems. Melaku [21] and

Bekele [22] reported 2.5 liter and 4.14 ± 0.04 kg daily milk yield in Ethiopian camel while Farah [7], Ali [8] and Ahmad [23] reported range for daily milk yield of Pakistani camel as 3-10 kg that supports the findings of present research. Recently Raziq [24] while studying Kohi camel in mountainous areas of Balochistan reported mean daily milk yield of 10.2 ± 0.43 kg. 5.4% samples were found to be positive with mastitis while 94.6% were negative. Eisa [25] reported range for milk in Sudanese camel as 5-10 kg/day. Kamoun [26] studied milk yield of Tunisian camel and reported average daily milk production was to be 6.72 ± 2.46 liter. Nagy [27] studied milk production of dromedary camels under intensive management in United Arab Emirates and reported average daily milk yield as 6 ± 0.12 kg (Table 1).

Fat and protein percent of camel milk were found to be 4.44 ± 0.46 and 3.42 ± 0.04, these finding are in line with the findings of Knoess [28], Yagil and Etzion [29], Kappeler [30], Mohammad [31] Iqbal [32] and Khaskheli [33] who reported range of fat and protein percentage as 2.4-5.5% and 2.5-4.5%, respectively. Raziq et al. [34] reported fat and protein percentages as 2.63% and 4.01%, respectively in Kohi camels in Balochistan. Present findings are in contrast with the findings of Elamin and Wilcox [35] who reported 3.15% fat and 2.81% protein in milk of Majaheim camel in Saudi Arabia, Mehaia [36], Morin and Rowan [37], Konuspayeva [38] reported fat and protein percentage up to 3.22 and 2.91. Mal [39,40] reported ranges for fat and protein percentages as 2.60-3.20 and 3.73-3.89, respectively in Indian camel's milk. Mal and Pathak [41] reported fat and protein percentages as 5.5% and 3.87%, respectively in Indian Bactrian camel's milk and these findings match with the findings of present study.

Lactose percentage of camel milk was found to be 4.82 ± 0.04 and this finding is in agreement with Guliye [42] who reported lactose percentage as 4.81 in Bedouin camels, Konuspayeva [38] reported lactose as 4.46 ± 1.03. Reported range for lactose percentage was to be 2.9-5.8% in dromedary camel's milk [20,32]. Reported mean value for percentage of lactose was to be 4.91 ± 0.61% in Mauritanian camel's milk [43]. Reported percentage of lactose was to be 4.16% in Majaheim camel's milk in Saudi Arabia [35]. Mehaia [36] reported 4.43% lactose in Majaheim, 4.46% in Hamra and 4.44% in Wadah camel's milk, respectively in Saudi Arabia. Morin and Rowan [37] reported sugar content as 6.5% in Llama camel's milk in USA. Yagil and Etzion [29] reported lactose percentage as 4.6 in dehydrated camels. Aljumaah et al. [44] reported range for lactose as 2.9-4.12 gm/100 gm.

SNF and total solids percentage were found to be 8.96 ± 0.07 and 13.38 ± 0.08 [20,32] while reported percentages for SNF and total solids in camel's milk ranged between 8.9-14.3% and 11.5-17.8%, respectively. Present findings are not in line with the findings of Elamin and Wilcox [35] who reported 7.8% SNF and 10.95% total solids in milk of Majaheim camel in Saudi Arabia. Reported SNF and total solids percentages were 8.13% and 11.35% in Majaheim, 7.78% and 10.63% in Hamra and 7.61% and 10.07% in Wadah camel's milk, respectively in Saudi Arabia [36]. Aljumaah et al. [44] studied physico-chemical quality of camel milk and reported range for total solids and solids not fat were to be 7.76-12.13 and 5.56-8.29 gm/100 gm. Mal [39,40] reported ranges for SNF and total solids percentages as 7.25-8.25 and 9.85-11.45; respectively in Indian camel's milk. Reported SNF and total solids percentages were to be 9.18% and 14.68%, respectively in Indian Bactrian camel's milk [41]. Meiloud [43] reported mean values for SNF and total solids as 8.88 ± 0.08 and 11.80 ± 1.0 in Mauritanian camel's milk. Soffer breed, first stage of lactation and semi nomadic system showed highest concentrations of SNF and total solids while these values have been decreased by subsequent parity [45]. Nagy [27] studied milk production of dromedary camels under intensive management in



Figure 1: Restraining of Marecha she-camel for milk sampling.

Parameters	Average	Range
Milk Yield (M)	3.16 ± 0.15	2-4
Milk Yield (E)	2.46 ± 0.14	1-4
Milk Yield (Total)	5.62 ± 0.27	3-8
Fat %	4.44 ± 0.46	3.95-4.90
Protein %	3.42 ± 0.04	2.75-3.95
Lactose %	4.82 ± 0.04	3.87-5.10
SNF %	8.96 ± 0.07	7.42-9.47
Total solids %	13.38 ± 0.08	12.32-14.35

Table 1: Milk production and composition of She-camels in Mankera Tehsil of District Bhakkar, Punjab.

Feed/Forage Species	DM	CP	EE	CF	NDF	ADF	Crude Ash
Gram Straw (<i>Cicer arietinum</i>)	93.53	9.72	2.60	44.4	68.7	47.6	7.83
Kikar (<i>Acacia nilotica</i>)	28.5	16.71	1.79	25.08	55.4	25.4	5.94
Phulai (<i>Acacia modesta</i>)	53.4	13.23	2.21	35.40	46.6	28.78	6.94
Beri leaves (<i>Ziziphus mauritiana</i>)	40.2	15.52	5.77	28.02	48.3	26.9	8.48
Siras (<i>Albizia labbek</i>)	37.3	16.17	6.58	27.25	43	29	16.33
Jand (<i>Prosopis cineraria</i>)	46.15	16.86	6.52	19.14	47.5	29	4.95
Khagal (<i>Tamarix aphylla</i>)	31.9	12.81	3.25	17.32	42.4	31.6	13.03
Dhaman (<i>Cenchrus ciliaris</i>)	31.9	14.69	3.94	26.51	38.53	18.15	15.71
Persain (<i>Suaeda fruticosa</i>)	30.3	10.57	5.52	33.14	48.7	27.6	7.54
Khawi (<i>Cymbopogon schoenanthus</i>)	34.6	9.53	2.01	35.67	62.1	43.5	7.14
Kali Bui (<i>Kochia indica</i>)	33.78	10.80	4.91	27.61	58.6	39.76	13.32
Bhakra (<i>Tribulus terrestris</i>)	32.1	8.76	4.58	32.63	46.7	35.4	9.64
Kari (<i>Capparis spinosa</i>)	36.7	17.84	1.18	30.75	51.8	33.5	6.97
Laana (<i>Haloxylon salicornicum</i>)	34.2	15.85	3.09	32.33	51.34	37.5	11.93
Phog (<i>Calligonum polygonoides</i>)	34.7	8.95	4.82	23.42	49.6	31.9	8.76
Karir (<i>Capparis decidua</i>)	49.4	16.75	1.52	24.64	53.6	37.8	14.76
Khar Laana (<i>Haloxylon recurvum</i>)	47.9	12.36	3.32	24.95	49.2	31.3	12.15

Table 2: Proximate analysis (%) of crop residue and different grazing/browsing species.

United Arab Emirates and reported average fat, protein, lactose, total solids and solids-not-fat (SNF) concentrations were 2.51 ± 0.03 , 2.60 ± 0.01 , 4.03 ± 0.03 , 9.98 ± 0.03 and $7.56 \pm 0.03\%$, respectively.

Camel's milk contains 4.9% fat, 3.7% protein, 5.1% lactose, 0.70% ash and 14.4% total solids [46]. Camel milk is liked due to its nutrient richness and therapeutic peculiarities. People used camel milk as a remedy for many diseases like liver dysfunction, diabetes, long bone pain, tuberculosis, asthma, piles, spleen ailments, food allergies and arthritis and also as an aphrodisiac [47,48]. Additionally camel milk has higher phosphorus contents so it is superior to the milk of other domestic species (Table 2) [48].

Conclusion

The Marecha camel is a good milk producer under the traditional management system. Its milk quality evaluated in current study proved to be an excellent, containing high protein, fat and lower lactose levels. The lower lactose content makes it an alternative for consumption by children who have food allergies to the lactose contents or when breast milk is in deficiency/not available. The moderate levels of fat make it a good choice for people with hypertension, arteriosclerosis and vascular diseases.

In Pakistan malnutrition strikes to the people in remote areas where protein deficiency is a major issue. Camel husbandry system is in a state of flux as pastoralists are deviating from one place to another so make it difficult to take care of surplus milk. Camel milk could be a source of income if proper handling condition could be made available in remote areas. This definitely could become a source of income for poor pastoralists that will assist food security on a country level.

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