

## **Effect of Milking Techniques on Milk Production Potential in Indian Camel Breeds under Farm Conditions**

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### **ABSTRACT**

Daily milk production in 4 lactating camels each of Bikaneri and Kachchhi breed, belonging to second and third parities, and 3 lactating camels of Jaisalmeri breed from third parity was studied. The daily milk production was recorded twice a day at 12-hr intervals by 3 different milking techniques, viz. teat stripping and machine milking. The average daily production by 2-teat and 4-teat stripping, and machine milking in Bikaneri camels was  $4.19 \pm 0.11$ ,  $3.2 \pm 0.15$  and  $2.66 \pm 0.16$  kg/day, respectively. The corresponding figures in Jaisalmeri were  $3.72 \pm 0.17$ ,  $2.17 \pm 0.16$  and  $2.02 \pm 0.19$  kg/day, respectively. The average daily production in Kachchhi camels with 4-teat stripping and machine milking was  $3.94 \pm 0.13$  and  $3.42 \pm 0.14$  kg, respectively. The morning, evening and total daily production per day was higher under 2-teat stripping followed by 4-teat stripping and machine milking. The contribution of breed and parity was significant ( $p < 0.01$ ) under all the 3 milking techniques. The daily milk production with 2-teat stripping varied from  $2.37 \pm 0.27$  to  $6.73 \pm 0.27$  kg/day, with 4-teat from  $0.66 \pm 0.26$  to  $5.15 \pm 0.25$  kg/day and with machine  $1.45 \pm 0.23$  to  $5.22 \pm 0.04$  kg/day. The daily milk production was highest during 6<sup>th</sup> month of lactation and then it started declining. The month-wise daily average of second parity females varied from  $1.6 \pm 0.31$  to  $4.64 \pm 0.31$  kg/day and for third parity from  $2.13 \pm 0.25$  to  $5.86 \pm 0.25$  kg, respectively.

The contribution of parity on month of lactation was significant ( $P < 0.01$ ). As compared to evening, the morning milk yield was about 10.0 to 27.0% higher during different months of lactation. The chemical composition of milk during early and late phases of

lactation indicated that pH, fat %, SNF and total solids were significantly higher during late phase of lactation. However, the proteins were also higher but not at significance level. Vitamin C was higher at early phase of lactation.

**Key words:** Breeds, Milking Techniques, Camel, India.

## **INTRODUCTION**

So far camel milk is not marketed in an organized way except that it is utilized by camel keeper's societies for household consumption. The significance of camel milk and its nutritive value and production potential has been reported by Knoess (1984), Khanna and Rai (1993) and Yagil *et al.*, (1994). Camel has special characteristics, viz. better adaptability in dry hot regions as compared to other livestock, especially during drought; longer lactation length that may continue up to 16-18 months; and camel milk has longer shelf life of milk. The present study is an attempt to know the milk production potential of different breeds under different milking techniques and factors affecting milk production and composition.

## **MATERIALS AND METHODS**

Daily milk production in 4 lactating camels each of Bikaneri and Kachchhi breeds and belonging to second and third parities, and 3 lactating camels of Jaisalmeri breed from third parity maintained at the National Research Centre on Camel, Bikaner, was recorded. The camels were reared under a semi-intensive system of management, fed moth chara fodder (*Phaseolous aconitifolius*) ad libitum and supplemented with crushed guar phalgati (*Cyamopsis tetragonoloba*) 2.5 kg/camel for 4 months. Composition of moth chara indicated approximately 8.6% CP, 3.2% EE, 17.0% CF, 17.0 total ash and 53.8% NFE on DM basis (AOAC 1980). Milk yield was recorded twice a week at 12 hour intervals (morning 7.00 AM and evening 7.00 PM). Milk fat (ISI 1970), Solid non-fat (SNF) and total solids (ISI 1980) were estimated. Three milking techniques were adapted:

1. Simultaneous milking of 4 teats by hand stripping.
2. Two-teat milking of one side and allowing calf to suckle the other 2 teats for better letdown.
3. Machine milking after initial let-down through calf suckling

The data were analyzed through least-Squares Maximum and Likelihood method (Harvey, 1987) by taking into account the effects of breed, parity and milk techniques.

## RESULTS AND DISCUSSION

Breed and parity-wise least-square means for morning, evening and total daily milk production by 3 different milking methods is presented in Table 1. The average daily milk production by 2- teat, 4- teat stripping and machine milking in Bikaneri lactating camels were  $4.19 \pm 0.11$ ,  $3.20 \pm 0.15$  and  $2.66 \pm 0.16$  kg/day, and in Jaisalmeri  $3.72 \pm 0.17$ ,  $2.17 \pm 0.16$  and  $2.02 \pm 0.19$  kg/day, respectively. The average daily production in Kachchhi camels by 4-teat stripping and machine milking method was  $3.94 \pm 0.13$  and  $3.42 \pm 0.14$  kg, respectively. In all the breeds the morning, evening and total daily milk production was higher with 2-teat stripping followed by 4-teat stripping and machine milking. The higher milk yield with 2-teat stripping and allowing calf to suckle has been reported by Simpkin (1994). The effect of breed and parity was significant ( $P < 0.01$ ) for morning, evening and total production in all the 3 milking methods. The daily averages of second and third parity lactating camels with 2-teat stripping method were  $3.50 \pm 0.22$  and  $4.40 \pm 0.08$  kg with 4-teat stripping  $2.48 \pm 0.16$  and  $3.74 \pm 0.09$  kg and with machine milking  $2.12 \pm 0.18$  and  $3.28 \pm 0.10$  kg, respectively.

The contribution of parity was significant ( $P < 0.01$ ) with all 3 methods of milking. The month-wise average daily milk production by all 3 methods of milking (Table 2) indicated significant ( $P < 0.01$ ) contribution of month on morning, evening and total daily production. The daily milk production under 2-teat stripping varied from  $2.37 \pm 0.27$  to  $6.73 \pm 0.27$  kg with 4-teat stripping from  $0.66 \pm 0.26$  to  $5.15 \pm 0.25$  kg/day and machine milking  $1.45 \pm 0.23$  to  $5.22 \pm 0.04$  kg/day. The average daily milk production by 2 and 4 teat stripping was highest during month 6 of lactation and with machine milking during month 4 of lactation. Milking by all 3 methods indicated morning production to be 12 to 27% higher than evening production. This trend has also been reported by Sahani et al (1996).

Table 1: Breed and parity wise least square means of daily milk production (kg/day) with different milking techniques in lactating camels.

	<b>Milking Method</b>													
	2 Teat						4 Teat						Machine	
	No.	M	E	P	No.	M	E	P	No.	M	E	P		
Bikaneri	88	2.24±.1	1.94±.1	4.19±.1	44	1.72±	1.50±.1	3.22±.2	28	1.43±.1	1.23±.1	2.66±.2		
Jaisalmeri	60	2.0±01	1.71±.1	3.72±.2	51	1.20±.1	0.97±.1	2.17±.2	26	1.11±.1	0.09±.1	2.02±.2		
Kachchhi	-	-	-	-	55	2.09±.1	1.85±.1	3.94±.1	35	1.83±.1	1.58±.1	3.42±.1		
Parity I	22	1.88±.1	1.62±.1	3.50±.2	44	1.34±.1	1.14±.1	2.48±.2	28	1.15±.1	0.96±.1	2.12±.2		
<b>Parity II</b>	126	2.37±.04	2.03±.04	4.40±.1	106	2.00±.1	1.73±0.4	3.74±.1	61	1.76±.1	1.52±.1	3.28±.1		

M = morning, E = evening, P = pooled production.

Table 2: Month-wise least square means of daily milk production (Kg/day) with difference milking techniques in lactating camels

month	Milking Method														
	2 Teat						4 Teat						Machine		
	No.	M	E	P	No.	M	E	P	No.	M	E	P	M	E	P
2 <sup>nd</sup>	10	2.78±.2	2.34±.2	5.13±.3	13	1.47±.1	1.30±.2	2.77±.3	11	2.65±.1	1.95±.1	4.60±.1			
3 <sup>rd</sup>	12	1.88±.2	1.67±.1	3.56±.3	13	0.77±.1	0.67±.1	1.45±.3	10	2.58±.1	1.921±.1	4.49±.1			
4 <sup>th</sup>	14	1.56±.1	1.22±.1	2.78±.3	13	1.95±.1	1.32±.1	3.28±.3	11	2.93±.1	2.29±.1	5.22±.1			
5 <sup>th</sup>	14	1.02±.1	0.83±.1	1.85±.3	14	2.63±.1	2.24±.1	4.87±.3	11	2.73±.1	1.80±.1	4.63±.1			
6 <sup>th</sup>	14	3.68±.1	3.04±.1	6.73±.3	14	2.73±.1	2.24±.1	5.15±.3	11	2.2±.1	1.8±.1	4.00±.2			
7 <sup>th</sup>	14	2.32±.1	2.04±.1	4.37±.3	14	1.71±.1	1.57±.1	3.29±.3	13	1.73±.1	1.44±.1	3.17±.2			
8 <sup>th</sup>	14	2.68±.1	2.37±.1	5.05±.3	14	1.66±.1	1.53±.1	3.20±.3	13	2.50±.1	2.27±.1	4.77±.23			
9 <sup>th</sup>	14	17.3±.1	1.55±.1	3.29±.3	14	2.28±.1	2.01±.1	4.30±.3	13	2.09±.1	1.89±.1	3.98±.2			
10 <sup>th</sup>	14	1.73±.1	1.51±.1	3.25±.3	14	1.83±.1	1.61±.1	3.45±.3	13	1.65±.1	1.46±.1	3.11±.2			
11 <sup>th</sup>	14	1.22±.1	1.14v.1	2.37±.3	13	0.35±.1	0.29±.1	0.65±.3	13	0.95±.1	0.70±.1	1.66±.2			
12 <sup>th</sup>	14	2.73±.1	2.36±.1	5.10±.3	14	0.97±.1	0.82±.1	1.79±.3	13	0.82±.1	0.61±.1	1.43±.2			

M= morning, E = evening, P = pooled.

The average daily milk production of Bikaneri females of parities 2 and 3 was  $2.95 \pm 0.17$  and  $3.82 \pm 0.13$  kg, of Kachchhi  $3.41 \pm 0.17$  to  $4.81 \pm 0.23$  kg, and of Jaisalmeri females of parity 3 was  $3.11 \pm 0.12$  kg. The average daily production of parity 2 and 3 females under 2-teat stripping were  $3.97 \pm 0.25$  and  $4.80 \pm 0.14$  kg; with 4-teat milking  $3.02 \pm 0.16$  and  $3.70 \pm 0.14$  kg and with machine milking  $2.56 \pm 0.22$  and  $3.23 \pm 0.19$  kg. The month-wise daily average for parity 2 females varied from  $1.61 \pm 0.31$  to  $4.64 \pm 0.31$  kg and for parity 3 from  $2.13 \pm 0.25$ ,  $5.86 \pm 0.25$  kg, respectively. The milk production indicated an increasing trend up to month 6 of lactation. The contribution of parity on month of lactation was significant ( $P < 0.01$ ). In both parities females, morning production was about 10 to 36% higher than evening production during different months of lactation.

Chemical composition of milk was studied in the early and late lactations. The pH ( $6.38 \pm 0.03$ ), fat % ( $3.1 \pm 0.15$ ), SNF % ( $8.22 \pm 0.25$ ) and total solids % ( $11.32 \pm 0.36$ ) were significantly higher during the late phase of lactation. However, protein % ( $3.87 \pm 0.17$ ) and casein % ( $3.01 \pm 0.14$ ) contents were also higher in late phase of lactation but differences were not significant. Vitamin C content mg% ( $5.18 \pm 0.36$ ) was higher in early phase of lactation than in late stage of lactation.

Bechmann and Schultess (1987) reported total solids to range between 10.8 and 13.0% and fat between 2.8 and 4.2%, which are in agreement with their results. These findings clearly reflect that Indian camel breeds possess milk production potential and the contribution of various factors such as month of lactation, parity, breed and method of milking have significant effect on daily milk production.

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