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RESEARCH ARTICLE

Improvement in reproductive efficiency in farm camels under hot arid region

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ABSTRACT

Number of matings during the follicular cycle and data on conception rate were collected and analysed in indigenous camels (Bikaneri, Jaisalmeri and Kachchhi breeds) managed under semi-intensive system. Ovarian activity during breeding and non-breeding season was examined ultrasonographically. It was revealed that follicular growth and regression is a gradual and sequential process in absence of ovulation. Apart from breeding season follicular growth was also observed in 50 percent of the camels during non-breeding season. The mean conception percentage under single mating, 2 matings at an interval of 24 and 48 hours from 1991-92 to 1997-98 did not show significant variation in Bikaneri, Jaisalmeri and Kachchhi breed with conception of 60.14, 53.12 and 56.94 percent respectively and a over all conception of 56.85 percent, where as the mean percent conception with 2 matings at 72 hrs interval during the follicular cycle in Bikaneri, Jaisalmeri and Kachchhi was 80.0, 72 and 71.43 percent respectively with overall conception 75.8 percent. An improvement of about 10 to 15 percent could be observed in conception rate when given 2 matings at interval of 72 hours as compared to single mating and 2 matings at an interval of 24 to 48 hours.

Key words : Camel, dromedary, reproductive efficiency, ultrasonography, conception rate

Among the various domestic livestock of hot arid/ semi arid region camel (*Camelus dromedarius*) occupies a special signifidcance due to its physiological and anatomical constitution to sustain the extreme harsh climatic conditions and scanty vegetation (Williamson and Payne, 1987). In fact it is the back bone of rural economy for the poor and marginal farmers by performing various day to day activities of draught, transportation, agricultural operations, riding, producing milk and hair (Bhakat and Sahani, 2001). Camel is a seasonal and induced ovulator (Musa and Abusineina, 1978). In India the breeding season is winter extending from December to March months. Some of the reproductive traits viz., conception (%) studied over the years under natural breeding varied from 53.0 to 60.0 percent with overall conception of 56.85 percent (Annual Reports, 1991-97) this coupled with long gestation length 388.3±0.68 days, long calving interval 740.7±10.67 days and age at first calving 2026.02±95.41 pooled over breeds (Sahani, 2001) do reflect slow reproductive efficiency of camel.

In order to improve the reproductive efficiency of camel, folliculogenesis during breeding and non-breeding season using ultrasonography and mating (Single and two matings at 24, 48 and 72 hr interval) was studied in indigenous breeds of camel during breeding season so that easy practical and economical approach of reproductive efficiency of direct field utility can be tested.

MATERIALS AND METHODS

Experimental camels belonging to 3 indigenous breeds of herd of National Research Centre on Camel, Bikaner (Bikaneri, Jaisalmeri and Kachchhi) reared under semi intensive system of management were utilised. Camels were provided 7 hr grazing in farm range land area (9.00 AM to 4.00 PM and later on supplemented with locally grown leguminous fodders moth chara (*Phaseolus aconitifolius*), guar chara (*Cymopsis tetragonoloba*) during the evening hours along with twice daily watering.

During breeding season one adult camel with normal genitalia and which have calved at least once was selected for daily screening of both the ovaries for a period of 30 days, she camels was not bred during this period. During non-breeding season 16 she camels which did not conceive in previous breeding season were selected for ultrasound examination at weekly interval during peak summer months (May/June) when the ambient temperature ranged from 35.5°C to 45.0°C and the maximum relative humidity in summer varied from 46 to 68 percent and minimum from 18 to 27 percent.

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Ovarian examination : The ovaries were examined by endovaginal annular array mechanical sector, 5 MHz transducer of real time scanner-200 (Pie-Medicals, Netherlands) as described by Vyas and Sahani, 2000). All follicles ≥ 0.5 cm in diameter and corpora lutea present in both the ovaries were counted measured using internal electronic calipers. The observations were recorded using video cassette recorder interfaced with scanner.

Mating of camels : She camels of the farm herd confined in corrals were mated individually by the selected stud during the breeding season. Majority of studs used could copulate successfully without any human assistance. Over the years camels were bred by single mating and 2 matings at an interval of 24, 48 and 72 hr with the same stud during the same follicular cycle. Conception percentage was recorded and compared from 1991-2000.

RESULTS AND DISCUSSION

Non-breeding season : Out of the 16 she camels, follicle size ≥ 1.0 cm in diameter could be observed only in 8 she camels and these were bred. Out of these 8 she camels, 4 camels conceived and calved in subsequent year. Since the calving took place during peak summer months (June/July) the calves were kept under shady trees to avoid direct radiation and hot wind effect during day time, no mortality was observed.

Breeding season

Leaf ovary : A follicle measuring 1.68 cm in diameter was found on 1st day of examination it grew upto 4.0 cm on day 13th and then regressed by day 17th. A small follicle was found between day 2nd and 6th but did not exceed beyond 1.00 cm. Another follicle was observed from day 11th to day 25th, this did not grew beyond 1.3 cm during the period under observation.

Right ovary : On day 1 of examination only one follicle was located, which measured 2.59 cm. A phase of gradual increase of follicle started again on day 17th and it attained a size of 2.9 cm on day 26th, it regressed thereafter reaching 2.2 cm on day 30th. The second follicle measuring 0.6 cm in diameter was found on day 6th of examination. It did not show marked change upto 24th day and grew thereafter to 1.99 cm on day 29th. A third follicle 0.8 cm diameter was observed between day 20th and day 27th of examintion. Single and two matings at interval of 24, 48 and 72 hrs comparison of single mating and two matings at an interval of 24 and 48 hrs did not show significant difference. Breed and follicular cycle wise pooled and overall conception percentage under single mating and two mating at 24 and 48 hrs interval over the years 1991-97 are presented in Table 1. The average percent conception during 1st follicular cycle in 3 breeds varied from 25.78 to 27.77 percent with an

Table 1. Follicular cycle wise conception rate in female camels during breeding seasons from (December-February) in the year 1991-92 to 1997-98

Breeds	1st			2nd			3rd			4th			Overall		
	No. of camel mated	No. conc-eived	% conc-eption	No. of camel mated	No. conc-eived	% conc-eption	No. of camel mated	No. conc-eived	% conc-eption	No. of camel mated	No. conc-eived	% conc-eption	No. of camel mated	No. conc-eived	% conc-eption
Bikaneri	143	38	26.57	84	39	46.42	25	8	25	4	1	2.5	143	86	60.14
Jaisalmeri	128	33	25.78	78	27	34.61	30	8	26.67	1	–	–	128	68	53.12
Kachchhi	72	20	27.77	38	14	36.84	19	3	15.78	7	4	57.14	72	41	56.94
Pooled	343	91	26.53	200	80	40	74	19	25.67	12	5	41.66	343	195	56.85

Table 2. Follicular cycle wise conception rate in camels during breeding seasons (1998-99)

Breeds	1st			2nd			3rd			4th			Overall		
	No. of camel mated	No. conc-eived	% conc-eption	No. of camel mated	No. conc-eived	% conc-eption	No. of camel mated	No. conc-eived	% conc-eption	No. of camel mated	No. conc-eived	% conc-eption	No. of camel mated	No. conc-eived	% conc-eption
Bikaneri	30	9	30	18	9	50	7	5	71.43	1	1	100	30	24	80
Jaisalmeri	25	6	24	19	4	21.05	14	8	57.14	2	0	–	25	18	72
Kachchhi	7	1	14.29	4	3	75	1	1	100	–	–	–	7	5	71.43
Pooled	62	16	25.80	41	16	39.02	22	14	63.63	3	1	33.33	62	47	75.80

overall of 26.53 percent. Conception during 2nd follicular cycle was significantly higher and ranged from 34.61 to 46.42 percent with an overall of 40.0 percent. The conception percent during 3rd follicular cycle was observed to be lower than 2nd and varied from 15.78 to 32.0 percent with a overall of 25.67 percent and conception for 4th cycle ranged 25.0 to 57.14 percent with a overall of 41.66 percent. The breed wise overall conception percent in Bikaneri camels was 60.14 percent, Jaisalmeri 53.12 percent and Kachchhi 56.94 percent with an overall of 56.85 percent.

The conception rate for two matings at an interval of 72 hr during the year 1998-99 are present in Table 2. During first follicular cycle conception rate varied from 14.29 to 30.0 percent with overall of 25.8 percent, in 2nd follicular cycle it ranged from 21.05 to 75.0 percent with overall 39.02 percent. Percent conception during 3rd follicular cycle varied from 57.14 to 100 percent with an overall conception of 63.63 percent and the average for 4th cycle was 33.33 percent.

The breed wise pooled percent conception in Bikaneri, Jaisalmeri and kachchhi was 80.0%, 72.0% and 71.43% respectively with an overall conception of 75.8 percent. Similar trend was also observed during the year 1999-2000 and the conception percentage in Bikaneri and Kachchhi was 69.0 percent and 100 percent respectively with an overall of 75.0 percent. During 2000-2001 the overall conception was 71.05 percent, thus indicating higher probability of fertilization during two mating at 72 hr interval as compared to single and two mating at interval of 24 and 48 hours, which may be attributed to the ovulation in the dromedary camel which occurs at 24-36 hr after copulation (Marie and Anouassi, 1986). The delay inb ovulation after 1st mating in the present study may be responsible for availability of ova for fertilization when second mating was given at interval of 72 hrs.

Results indicated that apart from regular breeding season (winter) folliculogenesis also takes place during subsequent non-breeding season (May/June) in females, which do not conceive during breeding season. Follicular growth and regression is a gradual and sequential process in absence of ovultion, similar finding have also been reported by Skidmore *et al.* (1996). It was also observed that only one follicle grows at a time to mature, the growth of other follicle followed the process of regression of matured follicle which is consistent with follicular wave theory proposed for cows by Ginther *et al.* (1989) and dromedary camel by Skidmore *et al.* (1997).

Significant improvement in percent conception is possible, when she camels are mated twice at an interval of 72 hr as compared to single mating and two mating at an interval of 24 and 48 hr during the breeding season.

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