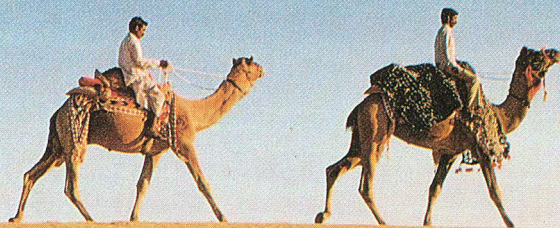




NRC on CAMEL

An Introduction

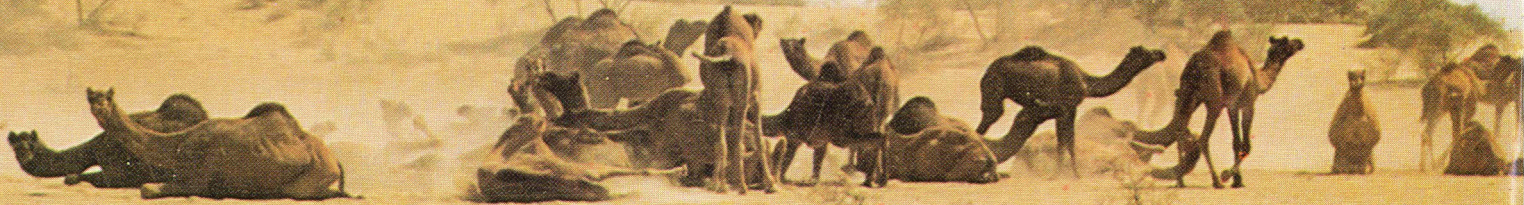


NATIONAL RESEARCH CENTRE ON CAMEL
INDIAN COUNCIL OF AGRICULTURAL RESEARCH
POST BAG - 07, BIKANER - 334 001, INDIA



The National Research Centre on Camel was established on 5th July, 1984. Prior to 1984 this Centre was known as Camel Breeding Farm under the aegis of College of Veterinary and Animal Science (RAU), Bikaner and before that with Department of Animal Husbandry, Government of Rajasthan. Over the years NRCC has developed modern laboratories and very good infrastructural facilities. The Centre has generated large body of scientific data on various aspects in Indian camels.

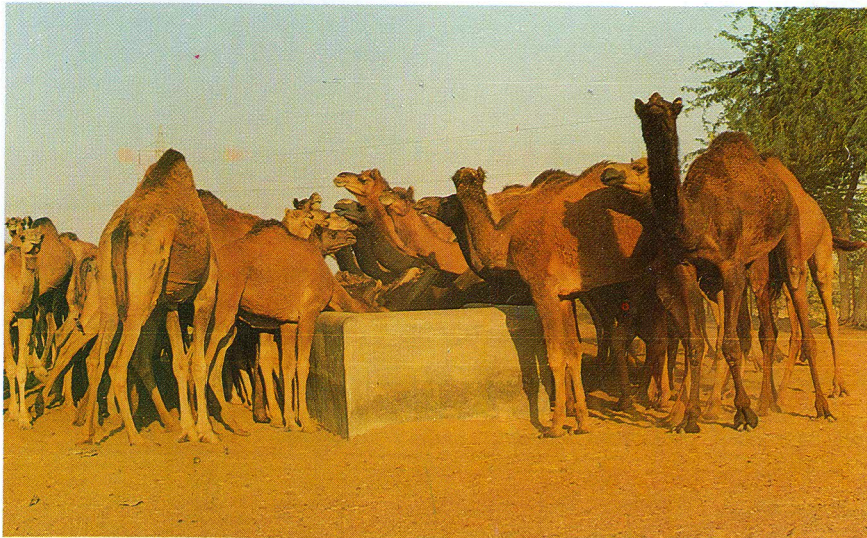
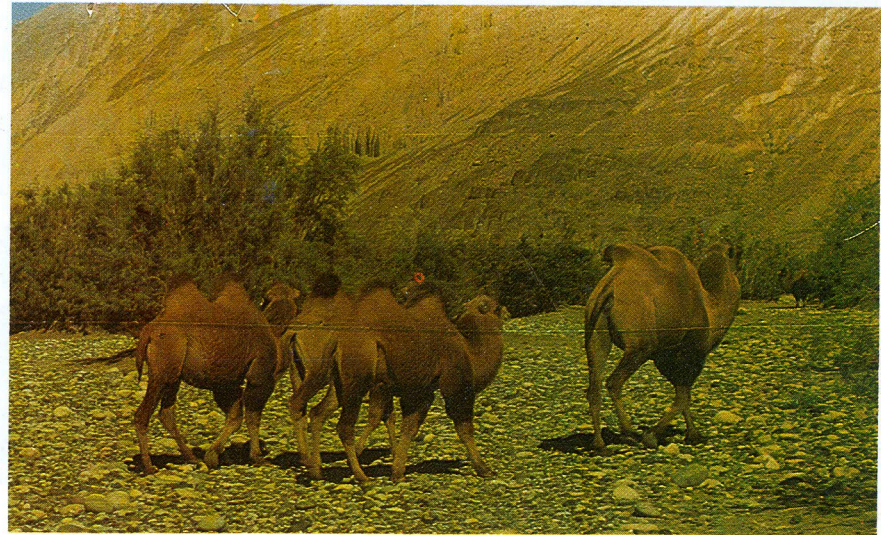
The National Research Centre on Camel, Bikaner is located in the Jorbeer area at a distance of about 10km from Bikaner city. The geographical location is 28.3° North Latitude and 73.5° East Longitude at MSL of 234.84m. The topography of the area is arid undulating desert with vast ranges of sand dunes. The soil type is mostly loose and sandy. The climate is mostly dry and hot with average annual rainfall of around 260-270mm. The summer temperature ranges between 30° C to 45°C and winter temperature between 4°C to 28°C.



Introduction

Camel is an important component of the desert ecosystem where the flora of usually marginal land can hardly meet the needs of human food and energy. The camel is popularly known as "Ship of the desert" traversing long distances on sandy stretches carrying men and material. The camel possesses many unique qualities which make it distinctly superior to other domesticated livestock in the hot arid and semi-arid desert ecosystem. It withstands harsh deserts conditions because of the unique physiological and morphological features added with ability to withstand water scarcity and also to make good use of meager vegetation. The camel has a life-style which is much more in keeping with the production conditions and recuperation capacity of arid range lands.

Camel belongs to the family camelidae in the suborder tylopoda of the order Artiodactyla. The genus camelus, has two species viz. *Camelus dromedarius* (single humped or dromedary) inhabiting dry hot lands of Africa, Asia and *Camelus bactrianus* (double humped camel) having habitat in cold arid lands of central palaeartic. The other species in the family camelidae are Vicuna (*Vicugna vicugna*), Guanaco (*Lama guanacoe*), Lama (*Lama glama*) and Alpaca (*Lama pacos*). These species are called as new world camelidae having habitat in South America. The majority of Indian camels belong to *Camelus dromedarius*. However, a very small number of double humped camels (*Camelus bactrianus*) are found in cold desert of Nubra valley (Ladakh) in Jammu & Kashmir state where it could be an endangered animal.



The total world camel population is estimated to be 18.831 million, of which India has third highest camel population of 1.520m (FAO, 1994) after Somalia and Sudan. The Indian camel population is mostly confined to Rajasthan, Gujrat, Haryana and Punjab (93.12% of total Indian camel population) with highest intensity of camel in the north western arid districts of Rajasthan (55.7% of total Indian camel population). Indian camels can be broadly classified into baggage camel and riding camel. The baggage camels are sturdy and heavy build while the riding camels are comparatively fine and lighter in conformation. In the desertic adverse physical environmental conditions, camel is ideally suited for riding and transportation of man and material as well as for agricultural operations.

In Rajasthan and Gujrat, camel is a symbol of pastoral societies inhabiting the desert areas. In addition to the supportive role, camel has played significant role in civil law and order, defence and battles from the ancient times till date. Camels formed an important component of Mauryan Army (C.322-232 BC) and continued through Mughal period (1200-1700 AD) to the present times. The famous Ganga- Raisala of the erstwhile Bikaner state was accepted as Imperial Service Troop and participated in World Wars I and II. In independent India the Ganga Jaisalmer Raisala was constituted in 1948 and in 1954 this corps formed part of the 13, Grandeur's Regiment. Presently, the camel corps constitutes an important wing of Border Security Force of Indian Para-Military Service.

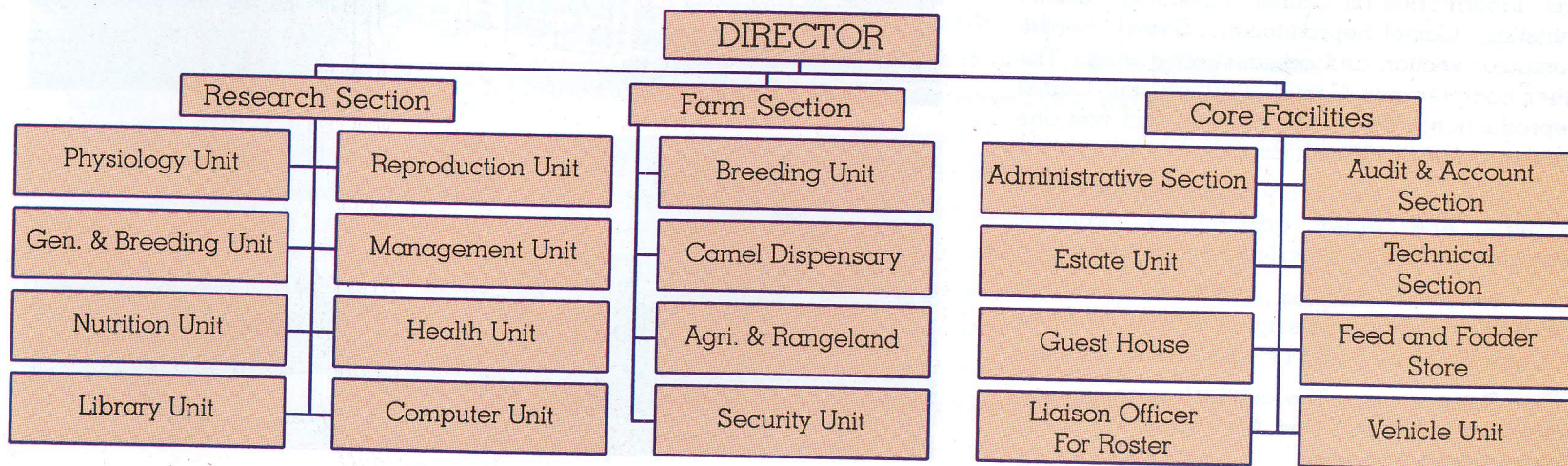
Most of the areas where camel play a traditional role are subject to continuous social and economic changes. Different production systems are now emerging which tend to be commercially oriented. In this process the role of camel apart from provider of source of bioenergy will assume additional dimension particularly as a source of milk and other by-products such as hairs, hides and bones which are gaining prominence in the small scale handicraft sector. Considering the importance of camel in the socio-economic development of arid and semi-arid zones, the National Commission on Agriculture (1976) recommended establishment of Research Institution specifically dedicated to camel improvement. Consequently, the Government of India approved the establishment of NRCC at Bikaner under auspices of ICAR during the last phase of VI Plan. The National Research Centre on Camel at Jorbeer, Bikaner (Rajasthan) came into existence on 5th July, 1984. The physical facility available at the erstwhile camel breeding farm, comprising of 149 Bikaneri camels and about 824 ha of land were transferred by the Government of Rajasthan to ICAR for establishing NRC on Camel.

Our Mandate

1. To undertake basic and applied research for improvement of camel.
2. To act as a repository of information on camel research and development.
3. To provide leadership and co-ordinate camel research with state agricultural universities for generating location specific technologies.
4. To act as a centre for training in research methodologies specific to camels.
5. To collaborate with national and international agencies for camel research and development.
6. To provide consultancy.



ORGANOGRAM NATIONAL RESEARCH CENTRE ON CAMEL, BIKANER



Infrastructure

The NRC on Camel has Camel farm unit, Research laboratories, Range land, Residential complex and Guest House as a part of infrastructural facilities. The total area of NRCC campus is 824 ha.

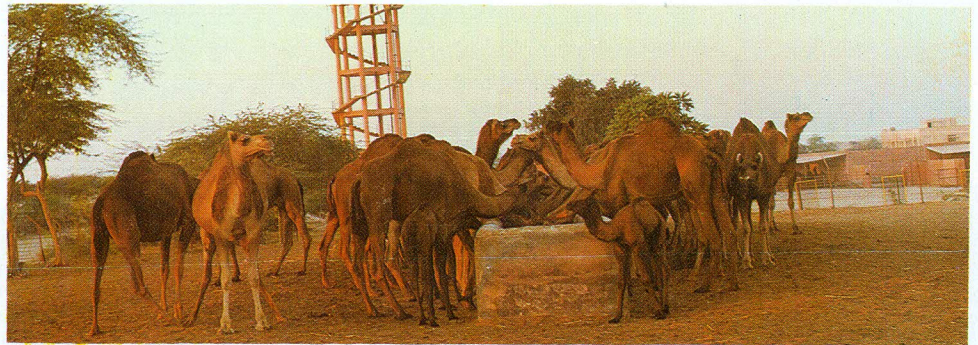
Farm : The farm maintains an elite herd of about 240 camels comprising of Bikaneri Jaisalmeri and Kachchhi camels. The camel farm is equipped with one Camel Dispensary and Disease Diagnostic Laboratory block, 6 open sheds, 6 roofed sheds, 3 camel boxes, 1 metabolic shed and 1 shed with provision for individual feeding. The farm also has fodder and feed godown, one experimental feed pelleting plant and weigh bridge.

Laboratories : NRC on Camel has modern laboratories in 2 different complexes. One complex has laboratories for Camel Physiology, Camel Genetics, Camel Reproduction, Camel Health, Computer section and administrative wing. The other complex has Camel Nutrition and Camel Reproduction labs.. The research unit has one seminar hall with 120-seat capacity.

Library : The library subscribes around 29 journals and other abstracting services. Photocopying facility is available in the library.

Residential complex : NRC on Camel has residential colony comprising of 2 type V, 4 type IV, 5 type III, 9 type II and 13 type I staff quarters.

Guest house : The centre has one guest house with A/c and Non A/c rooms which can accommodate 8 guests.



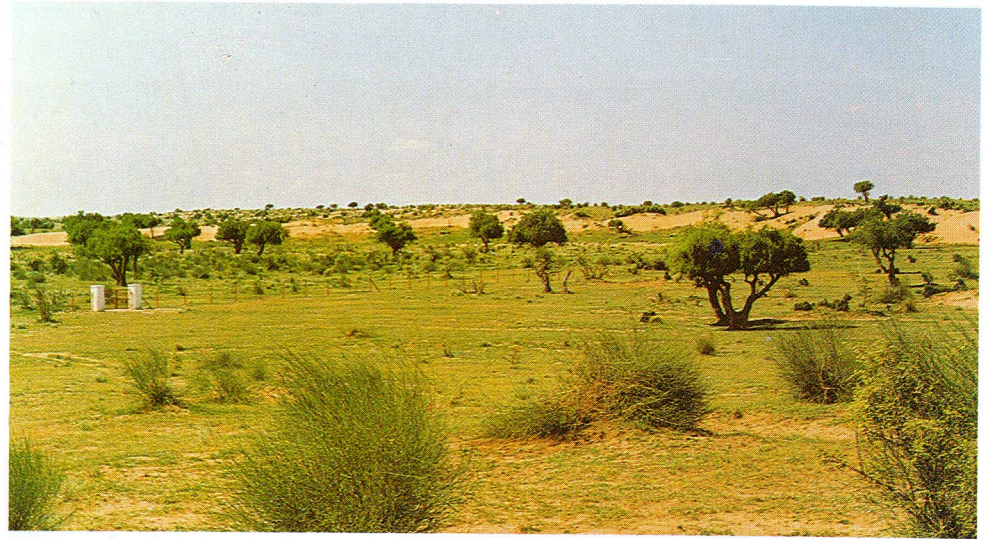
Rangeland : The NRC on Camel has 824 ha land partitioned in 5 blocks with 3 tube wells. About 650 ha of area has been fenced and 35 ha of land has been brought under perennial silvipasture comprising of grasses, shrubs and trees. Main grasses are sewan (*Lasiurus sindicus*) and Blue panic (*Panicum antidotale*).

Major Research Programmes/Schemes

1. To study work standards in camel
2. To study quantitative and qualitative genetic parameters in Indian camel
3. To develop suitable managemental practices for camel rearing
4. Studies on camel nutrition
5. Studies on camel reproduction
6. Blood group and biochemical polymorphism studies in Indian camel
7. Network collaborative programme on crop based production system
8. Development of Embryo Transfer Technology in camel
9. Evaluation and conservation of double humped camel in cold desert

Thrust areas

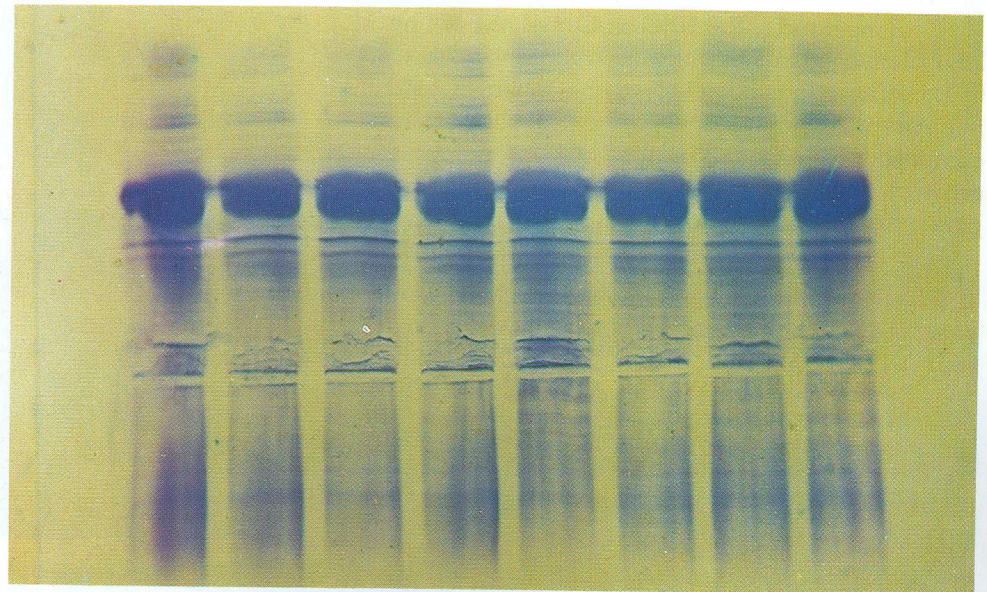
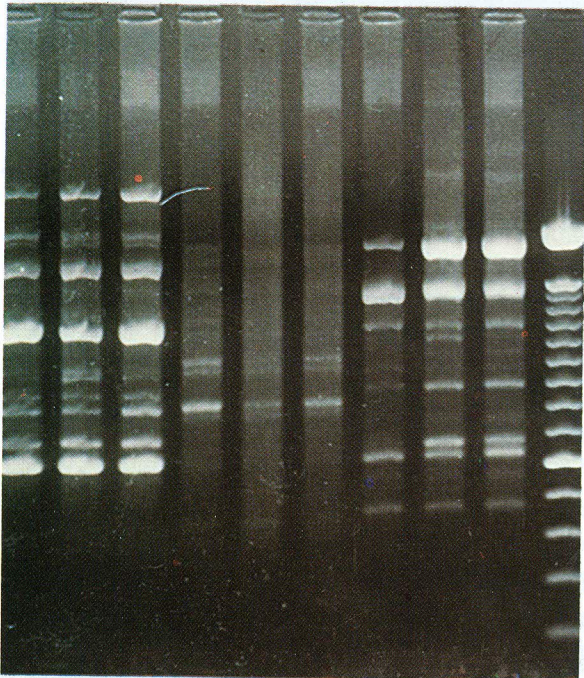
- Evaluation and conservation of camel genetic resources
- Improvement of reproductive efficiency, economic and qualitative traits
- Work physiology of camel



- Development of ETT in camel
- Genome analysis/gene mapping in camel
- Disease surveillance and epidemiology
- Evaluation of non-conventional feed resources
- Camel biotechnology
- Socio-economic and cultural aspects related to camel husbandry
- Camel informatics
- Camel products and byproducts
- Racing camel
- International collaboration
- Rangeland management
- Human resource development

Salient Research Findings

- NRCC has developed an elite camel herd consisting of Bikaneri, Jaisalmeri, and Kachchhi breeds.
- Genetic parameters have been estimated for several traits of economic importance.
- Calf mortality brought down to 3-5% following improved management practices as against 20-30% in field condition.

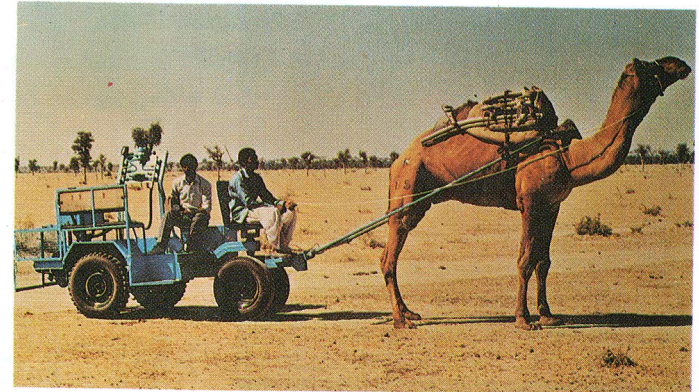


Serum-LDH (Lactate Dehydrogenase) polymorphism

←PCR-RAPD profile of camel DNA

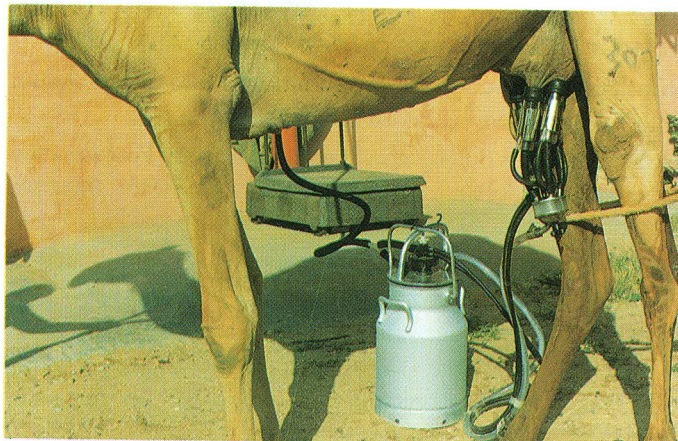
- Breeding efficiency of camel herd has been improved significantly in terms of age at first calving and calving interval.
- Biochemical and hematological studies indicated almost negligible genetic variability in Indian dromedary camels.
- Random amplification of polymorphic DNA technique showed genetic variability in Indian dromedary camel.
- Useful baseline data have been generated on draughtability, riding, ploughing capacity and fatigue index of Indian camel.

- i. Indian camel generate draft force of 90 to 125 kg amounting to 17-22% of body weight.
 - ii It could haul 1.5 to 2 tones for 4 h without showing sign of distress.
 - iii Draft camel is capable of ploughing at a pace of approximately 2.5 km/h.
 - iv Physiological markers viz. Lactate and CK were found to be useful for fatigue under work stress.
- Results indicated a significant association of body length, draught capacity and height at withers with speed during racing.
 - Adaptive response of Indian camel to water restriction in different climatic condition indicated that it can withstand up to 20% of body loss and recoup up to 96% of lost body weight after single rehydration.
 - Certain physiological/hematological parameter viz. blood, urea, creatinine, bilirubin, cholesterol and physiological responses serve as very good markers for adaptability for water restriction.
 - Studies on poll glands indicated higher cellular activity and large quantity of androgens during breeding season than that of serum level. It is closely associated with male reproductive function.



- Camel milk production potential :

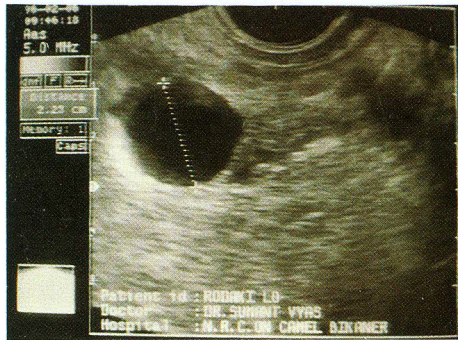
Lactation milk yield	: 1665 lt / 305 days
Daily milk yield	: 5.4 lt



Camel milk :

pH	6.5-6.8	Protein (%)	2.5-4.5
Mean Sp. Gr.	1.03	Lactose (%)	2.9-5.8
Freezing point (°C)	0.57	Ash (%)	0.8-0.95
SNF (%)	8.9-14.3	Water (%)	86-88
Fat (%)	2.9-3.8		

- Camel milk is comparable to other conventional sources in appearance and nutritive value but high in Vitamin C content and has comparatively longer shelf life.
- Milk fat globules are smaller in size and have more unsaturated fatty acids.
- Camel milk has high concentration of lactoferrins.
- Milk production from rear teats is higher than front teats.



Camel Hair :

Production potential	0.7 to 1.2 kg coarse hair/ yr	Fibre tenacity	15-17 g/tex
Fineness of camel hair	26 μ - 38 μ	Blend sliver strength	11-19 g/tex
Medulated fibre	53-78 %	Camel hair yarn strength	1.63-2.24 g/tex
Fibre length	51- 67 mm	Camel hair blend- yarn strength	2.7-3.1 g/tex

- Camel hair is an important byproduct utilized by the camel keepers for preparation of mattresses, bags, and ropes etc.
- Significant breed difference exists in hair production.
- Hair from young calves and bactrian camels is finer as compared to other age groups. Its blend with wool, polyester and silk waste have good commercial prospects.
- Steroid hormones in male camel increased with age and were significantly higher during rutting season. However, thyroid hormones were not affected by age and reverse trend observed during rutting season.
- Mating elevated testosterone and cortisol levels in camel but has no effect on thyroid hormones.
- Hormonal profile in she camels enumerated at different stages of gestation.
- Hormonal therapy indicated possibility to induce early puberty in prepubertal heifers and in sexual behavior during non breeding season with 75% ovulations and 25-35% conception.
- Ultrasonography in she camel revealed follicular cycle during non breeding season. Pregnancies can be achieved during the month of June without male effect or exogenous hormonal therapy. The new born calves from these pregnancies survived with extra managerial care.
- Under development of ETT in camel, superovulation and non surgical embryo flushing have been accomplished.
- Tris-egg yolk citrate proved to be better extender for preservation of camel semen up to 70h at refrigerated temperature.
- Analysis of feed resources available in Bikaner region indicated higher crude protein values in tree leaves followed by bushes/shrubs, leguminous crops and grasses.

- Feeding of urea molasses mineral blocks to growing camel calves enhanced nutrient utilization and growth.
- Higher growth was observed in camel calves under stall feeding as compared to that under sewan pasture and 3 tier system.
- Nutrient intake and utilization in growing calves, dry, pregnant, lactating camels and breeding studs have been worked out.
- Disease surveillance in camels indicated Trypanosomiasis and sarcoptic mange to be major parasitic infections.



Extension :

1. Breeding input is provided through genetically improved sires to the camel breeders.
2. Distribution of genetically improved studs to Panchayat samities through state animal husbandry department.



Human Resource Development :

A Short Course on "Camel management and health is organized" of 2 week duration every year for field veterinarians from State Animal Husbandry Departments and personnel from Indian Army, Border Security Force and Agricultural Universities.

3. Organization of Camel health camps/Kisan Gosthies in adopted villages and camel fairs.
4. The Centre participates in "Bikaner Camel Festival" organized by RTDC every year. The Centre also conducted Camel Safari in collaboration with Indian Army and collected scientific data on camel keeping, nutrition and health etc.

National Collaborations :

- State Agricultural Universities :
Rajasthan Agricultural University, Bikaner
CCS Haryana Agricultural University, Hisar
- ICAR Institutes :
CSWRI, Avikanagar, NDRI, Karnal
NBAGR, Karnal

International Collaboration

- CIRAD - EMVT, France



National Research Centre on Camel, BIKANER has been placed in the Tourist Map of INDIA due to its recognition as one of the important tourist centers by the RTDC, Government of Rajasthan. This is one of the Research Institute of its kind dedicated to Camel Research and Development. Every year around 8000 tourists visit this Centre from various countries and different parts of India. NRCC is kept open to national and international tourists from 15.00hrs to 17.00hrs on working days.

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