Camel rearing in India

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As desert land area is prone to frequent drought, the small and marginal farmers of this region rely heavily on livestock enterprise for their sustenance. The livestock should be compatible with crop cultivation instead of competing with it for land and water resources. Camel rearing enterprise fits well with such requirements. In comparison to other livestock species camel remain neglected until this century when it drew attention because of its unique adaptive characteristics for survivability in harsh conditions of the desert ecosystem. The camel "Ship of the desert" uses various adaptive mechanisms rather than bullock for survival in the desert. Since maximum of the gross cultivated area of our country is non-irrigated camel hold a significant potential for financing. Camel energy is not only cost-effective but also profitable and remunerable. Camel rearing system should be focused on higher growth performance, suitable body conformation, and good health status requiring lower economic intervention.

THE camel has been domesticated more recently than other animals. The most probable period of domestication of camel is prior to 1800 BC. The methods of camel keeping are now changing worldwide because the grazing land is decreasing as more land is put under cultivation reducing the free grazing land. Camels which are largely maintained under extensive system are now facing problem and their management needed a better alternate system which is socially acceptable and economically viable.

Camel rearing practices by Intensive Management System for camel keepers

Due to shift in cropping pattern, camel keepers are facing a great

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Camel feeds

problem to rear their camels in extensive system of management. So they are forced to rear their camels in intensive and semi-intensive systems of management. But these systems may

not be as economical as extensive management system and growth performance of animal is also affected. In field conditions, the breaking age of camel is about 3 to 4 years of age, i.e.

camel calves who are reared under extensive management condition, used to achieve 350 to 400 kg body weight around that age. After achieving this body weight, body conformation reached to a level suitable for putting the camel to work such as carting, thereby becoming economically sustainable. This intensive system is mainly followed in cities/big towns as source of livelihood by transporting various materials namely foodgrains, gas cylinders, building materials, fodder etc. Under this system camel are stall fed exclusively on purchased feed from market. Some of these camel owners also do agriculture farming during rainy season (July to October months).

Camel rearing practices by Extensive System for camel rearers

In this system camels are allowed to graze freely and reproduce freely. All the camels are collected once in the spring season for hair shearing, treatment against mange, branding etc. The animals are released for free grazing again after above operations. It is usually necessary to collect camel herds during the 3 months of the rainy season (July to September) to prevent them from damaging crops. Most, but not all herders also like to supervise their camels during the breeding season which traditionally falls between the two Hindu festivals of Diwali (around November) and Holi (around March) in order to prevent fights between competing males.

Camel rearing practices by Semi-extensive System for camel keepers

In this system camels are maintained around cities and villages in the marginal area. During severe drought period camels are fed special feed lots for 2- 4 months, during this period daily gain are expected to be more.

Camel rearing practices by Rakia's Large camel herds are owned by

Rakia/Rabri community. Other groups like Jats, Rajputs, and Muslims owned small number of camel. The Rakia's are intimately familiar with the lineage of their camel and provide information on the performance of camel of the last 7-8 generations. The recent camel management by Rakia's are extremely diverse, varying from free ranging for most of the year at one extreme to continuous closely supervised herding at the other. The ecological setting and the degree of competition from other land use strategies determine which particular herding system is adhered to it. Many of the migratory camel herd return at regular intervals to the villages for water, but they can be several hundred km away from their owners home. The Rakia's are able to keep track of their movements because they can identify the footprints of each of their camels.

Feeding management practices for farmers

Camels mostly get feed from trees, bushes and rarely from grasses. In stall feed conditions the average feed consumption is maximum in the initial 2 hr which decreased subsequently. The camel continued to consume feed during night's time and consume 35- 40% of total feed consumption during night alone.

The following age wise feeding schedule should be followed for camel for scientific and economic management:

Age (months) group of camel	Dry fodder and concentrate
Up to 12 month of age	2.5 kg fodder + 0.5 kg concentrate mixture
1-2 year	5 kg fodder + 1 kg concentrate mixture + 30 g salt
2-3 year	8 kg fodder + 1.5 kg concentrate mixture + 90 g salt
Above 3 year	12 kg fodder + 2.5 kg concentrate mixture
Adults	14 kg fodder + 3 kg concentrate mixture

In semi-intensive condition camels are provided with dry fodder, viz. moth, guar, mumphali chara. Concentrates are mostly molasses, oil (from groundnut or sesame). The ability of camel to survive long period under hot dry climate without water is legendary. Through ages, the anatomy and physiology of camel has evolved mechanisms to combat the hostile environment of the desert, to thrive on scanty food, to dissipate body heat and to survive without water for long periods. Modified structure of the four stomachs, ability to digest coarse vegetation, rise in body temperature, passing of concentrated urine and dry feces are some fine examples. It has been estimated that a well-fed camel could carry some six months energy on its back while cattle are unlikely to run out of food more than two-three months.

Nutritional requirement of camel

The DM consumption of an adult camel is 1.8 to 2.0% of body weight. Intake of DM increases with higher energy requirements. The maintenance requirement of 500 kg male is 45 to 55 MJME and 260 to 300 g DCP. For each additional one hour work approximately 8 MJME is needed. For females, the energy requirement is 40-45 MJME and 260 gm DCP and about 5 MJME and 50 gm DCP for each additional one kilogram of milk. Daily requirement for 10 hr work is 136 MJME and 300 g DCP. Metabolic energy requirement of about 300 kg camel is 5,424 kcal per day. The camels very efficiently utilize metabolic energy content of the fodder and utilize with about 68 - 70% efficiency. The metabolizable energy requirement of camel is lower than other ruminants.

Rearing practices for round the year for camel keepers

As part of scientific management practices, the camels must be provided both prophylactic and

curative measure to control ecto-parasite and internal parasites. The calves and pregnant females are given vitamin A. A course of antibiotics is given to check diarrhea.

Housing management for farmers

Following three types of shelter of camel may be constructed.

Thatched roofed open type kuchchha shelter: It may be constructed according to locally available ecofriendly agricultural materials. It may have covered as well as open area. The roof made up of khemp (*Leptadenai pyrotechnica*). One side of roof is supported by wall and other side by pillars (14"). Kuchchha manger may be constructed with mud plastering in side covered area. The enclosure are made up with balli/bamboo of 6 ft height. Front side of enclosure is having a gate which is of sliding type. The height of roof is 15 ft (Back) and 12 ft (front) with sufficient slope. The covered area is 33 ft (length) × 14 ft (breadth). The floor is kuchchha with lose sand dune. Total area space of this shelter has length – 40 ft, breadth – 33 ft. It is open type shelter.

Dimension of manger: Length 32 ft, breadth – 2.5 ft, inside depth 1.5 ft, height of front wall from ground 3.5 ft.

Asbestos roof close type concrete shelter: It may have covered and open area. The covered area is covered by asbestos roof with concrete wall at 3 sides. The floor is made with loose sand dune. The manger is of concrete / pucca type. The open area is enclosed with balli/bamboo having a gate at front side. The gate is of sliding type. The total area (covered and open), height of roof, dimension of manger and enclosure are almost similar to the thatched roofed open type kuchchha shelter.

Under tree shed/loose housing system: In this system the open type paddock is provided and it is enclosed by wire fencing. The fence

Schedule of scientific rearing practices for round the year.

Month	Activity schedule
January	Breeding, calving, providing vitamin A, screening for ecto and endo parasites
February	Breeding, calving, providing vitamin A
March	Calving, clipping, de-worming, insecticide spraying, prophylactic treatment for surra
April	Soil treatment (to combat mange), branding
May	Screening for ecto and endo parasites
June	Screening for ecto and endo parasites
July	Screening for trypanosomiasis
August	Screening for trypanosomiasis
September	De-worming and prophylactic treatment for surra
October	Spraying for ecto parasites, providing vitamin A to pregnant female, weaning of calves, soil treatment (to combat mange)
November	Providing vitamin A, supplementation of concentrate to breeding male and female, insecticide spraying
December	Breeding, supplementation of concentrate to breeding males, screening for ecto, endo parasites

is supported by iron angle. Some kikar trees (*Prosopis juliflora*) are there to provide shed to camels. The floor is kuchchha with loose sand dune. Kuchchha manger is constructed with mud plastering just beneath the tree sheds. The manger is round type. The dimension of manger, height of fence etc are almost equal to other two types of shelter.

Sign of labour pain during parturition in camel

The post partum mortality of camel calf can be reduced by adapting scientific management practices during parturition. The following behavioral signs of labour pain of parturient camel should be watched carefully:

- The parturient camel wants to be alone and separate from the main herd. It is very common and prominent sign.
- Shows two grooves on either side of the root of tail.
- Concavity between the site of pin bone which is mainly due to relaxation of sacro-siatic ligaments.
- Vulva is visible, swollen and round.
- Repeated lying down-standing up.
- Superficial mammary vein become tense and tortuous.
- Swelling of udder and teat are very common sign which indicates that delivery process is likely to

start very soon. Whereas some other sign, viz. 'Looking to the Flank' and 'aggressiveness' are not so common.

- The pregnant camel, showing sign of parturition should be kept in isolation.

Rearing of newly born calf

The below mentioned important points should be followed for scientific management of newly born calf.

- Assistant should be provided in case of difficult situation of expulsion of foetus.
- The naval cord should be ligated properly and dressed regularly for 2-3 days with antiseptic solution.
- Just after birth nasal opening of calf should be cleaned with soft and clean cloth, and other part of the body should be cleaned.
- After 1-2 hr of expulsion of foetus, colostrums must be provided to calf.
- In order to avoid calf diarrhea excess amount of colostrums are not provided.
- Generally parturition occurs during cold season. Special care should be taken to avoid direct cold wind to neonate.
- If parturition occurred in month of April or May then it should be protected from hot climate and try to keep it in some cool place or

under tree shade, to avoid heat stroke.

To avoid night blindness and calf diarrhoea, 3 - 4 days after birth of calf vitamin A injection (1 to 1.5 ml) and Cloramphenical (1 g) may be given.

Generally weaning is not practiced and regular milk feeding from dam should be allowed for 9-10 months.

Calf should be allowed to move with dam for proper growth and to develop browsing and grazing activities as earliest possible.

Rearing of pregnant camel

The below mentioned important points for pregnant camel should be followed strictly.

- Advanced pregnant camels should be supplemented with mineral mixtures.
- The age at mating should be 3-4 years.
- The vitamin A injection should be given to pregnant camel about 2-3 months before parturition.
- Proper care should be given in case of first birth.
- The pregnant camel should not be allowed for grazing at least one week before the expected date of parturition.
- Attention should be given for expulsion of placenta after parturition.
- If dam is not adopting her calf after parturition, it is practice that a piece of thin cover is placed on the calf and it is made to smell by the camel. Sometimes in such cases dam and calf should be kept in an enclosure to solve these problems.
- After milk suckling by calf, if excess milk is in the udder, it should be stripped out.

Rearing of male/rutting camel

The following points for male/rutting camel should be followed.

- The age should be 5-6 years for breeding purpose.

- The male breeding camel should be kept away from female camels during rut as they may injure other animals.
- To prevent bite, male breeding camel should be secured properly and separately.
- They are not allowed to go for grazing but exercise should be provided daily.
- Vitamin A should be given as a prophylactic measure.
- As breeding male camel loose their body weight during rutting season, special feeding/concentrate should be provided.

Rutting in male camels

In India rutting in male camel occurs during winter season. Rutting symptoms are as follows:

- Loss of appetite and weight loss are the main signs of rutting.
- Aggressiveness, making territory, restlessness.
- There is copious secretion from poll (occipital) gland. The secretion is dark brown with acrid smell and androgens are present. Histologically the poll gland resembles endocrine gland. The secretion of the poll gland attracts females during breeding season.
- Characteristically male in the rut eject out soft palate (gula) from its mouth by filling air from trachea. Air is retained for about 5 to 10 seconds, after which it is expired with a gurgling sound, the pressure is released and gula collapses.
- A camel in rut stands with hind legs apart.
- Flapping the tail up and down with frequent micturation and throwing urine over back again and again.
- The hind portion of the back gets soiled with urine and dirt results in thick black streak on the back.

Sexual desire can be reduced, if rutting males are put to hard work. Ideal ratios of male to females during breeding season are 1 male to 5-7

females. One camel stud can breed three females per day at peak of the breeding season subject to good management and health. Keeping extra males is desirable to provide genetic diversity and to check inbreeding for wider and efficient selection.

Production aspects of camel

To increase the population of camel various production aspects of camel and its product and byproduct are explored as follows. One farmer can use these aspects to increase household economy and can extract maximum benefit from a camel.

Camel milk: It is opaque white with normal milky odours, slightly salty or sweet in taste.

Camel milk's fat is lower in percentage terms as compared to cow and buffalo but it is spread throughout the milk in small micelles which make it easier to digest. Protein is present in sufficient nutritional quantities for human purposes. The shelf-life of raw camel milk is 8-9 hours or much higher than cattle and buffalo milk. It can be further extended up to 18-20 hours at 37°C by activation of camel lacto-peroxidase system. The concentration of lactoferrin and lysozyme in camel colostrum/milk is higher than bovines. Camel milk contains high concentration of Vitamin C, higher percentage of calcium, salt and urea as well as micro minerals, making it a complete food. Vitamin C (ascorbic acid) gives the milk its sweet taste while at the same time brings about its low pH. The latter property stabilizes the milk and keeps it potable for relatively long periods. Special properties of camel's milk were the reason for man to take a milking camel with him to cross vast deserts. Camel milk is generally regarded as a tonic by the herdsmen. Beliefs in its healing qualities are widespread. Additionally, Arabs regard it as an aphrodisiac.

Management of milking camel

Preparation of camel for milking:

Following points should be taken care of during preparation of camel for milking.

- The milking place should be thoroughly cleaned after each milking.
- Dusty fodder and any materials should be avoided in the milking place.
- The hind quarters, thighs and udders of camel should be brushed or washed before milking.
- If there is more hair growth in the udder region, it should be clipped periodically.
- Just before milking (after suckling by calf), the udder should be wiped with a cloth dipped and squeezed in some weak antiseptic solution.
- In cold weather, warm antiseptic solution should be used for the purpose.
- Apart from the camel's udders and the milker's hands, especially milking pails and cans should be clean.
- The milkers should wear clean dress and cover their heads with suitable caps, to avoid fall of loose hair in milk. Their nails should be periodically trimmed and hands cleaned and disinfected between each milking by dipping in an antiseptic solution.

Hand milking

Camels are generally milked from the left side. There is no hard and fast order of teats while milking; the engorgement of teats due to letdown should be the actual guideline. Milking in camel is usually done in standing position. Usually milker stands on left side of camel on one leg, while thigh of other leg is used to place milking container over it. The frequency of milking is not fixed. It can be carried out twice/thrice in a day or as per yield. One milker, depending on his skill may milk 10

to 12 camels including activities connected with milking like cleaning the camel, udder and feeding of concentrates. Machine milking and automatic udder washing equipments may make the tasks associated with milking easier and less time consuming. But, in a developing country like India where providing labour is a major social objective for any enterprise and where labour is relatively cheap, hand milking is encouraged.

Milking pail and storing

The aluminum containers, steel buckets are used for milking. Storing milk in metallic container or in earthen pots is common practice.

Machine milking

Milking machines use alternating negative and atmospheric pressures with the help of a double chambered teat-cup assembly. A number of factors influence the efficiency of machine milking like vacuum level, pulsation rate (the number of cycles of alternating vacuum and normal atmospheric pressure per minute) and the pulsation ratio (the proportion of time of vacuum and atmospheric pressure applied).

Production and management of camel hair

The camel hair and its products can be an important source of additional income for camel keepers. The handicraft articles made up of camel hair, provide work to rural women in the field of grading of hair, tops preparation, spinning of hair, weaving, embroidery with 100% specialty hair and blending with sheep wool, goat hair, cotton and other products. Camel hair is used in village cottage industry for preparation of common utility items, viz blankets, bags, mattresses, ropes, floor rugs etc. It is widely use in rural cottage industry of Rajasthan and Gujarat for preparation of various items.

Management of camel skin

Camel skin, if processed properly can be used for making leather goods, viz. shoes, sandals etc. Recently camel skins are used for making fancy items of tourist interest, viz purse, bag, stool cover, jewellery box and various decorative items etc. In the olden times, camels skin were utilized to make containers for storing and carrying water, oil and ghee etc. It is well suited for the application of colour and in Rajasthan there is a tradition of making elaborately painted small container (*kuppi*) by using camel skin.

Management of camel bone

Camel bones are as important raw material for the manufacture of jewellery in some parts of the world. In India since ivory has been banned, it has often been replaced by camel bone. Recently camel long bones are used for making fancy and decorative items. Camel bone is also made into bone-meal for fertilizer.

Management of camel dung

Dung ranks as an important byproduct. Camel dung is good source of organic manure and dry dung is also used as fuel. For pastoralists inhabiting barren territories it can be the most important source of fuel. In the semi-arid parts of India it has values as a fertilizer and sold by camel herd owners. Land owners compensate camel breeders in cash or in kind for overnight stays on their fields. Brick factory are also using camel dung as fuel.

Management of camel as game animal

In recent times, the use of camel as a race animal in the Gulf countries and certain Arabian countries has gained enormous importance. Very large money is involved and the economic importance of camel as race animal has increased tremendously.

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goat for their sustenance. In pastoral and agriculture subsistence societies, goats are kept as a source of investment and as an insurance against disaster. They are also used in ceremonial feasting and for the payment of social dues. Goat manure is prized as garden manure in many countries.

A study on economics of goat production starting with a unit of 5 animals to unit of 100 animals with different sections of farmers was undertaken by CIRG (Central Institute of Research on Goat). Net income of ₹ 212/goat a year from 10 heads and ₹ 252/goat a year from 50 heads has been reported. Milk contributed the highest (66.6 – 84.4%) income followed by the sale of animals (13.4 – 30.3%) and manure (1.0 – 3.4%). The goats accounted for 28 to 31% of the value of livestock assets and 16 to 19% of gross receipt from crops and

livestock. This further indicated that investments for small goat units are modest and there is quick pay off due to fast multiplication. It also indicated that risk in goat farming is much lower when compared to crop production.

Bottlenecks

- * Feed scarcity due to shrinkage of grazing lands and low level of nutrition and managerial efficiency.
- * Misconception about goats that they destroy vegetation and cause ecological degradation.
- * Lack of interest for commercial goat production and lack of knowledge on successful rearing of kids.
- * Genetic potential of 75% non-descript goats has not been studied.
- * Lack of awareness to adopt improved technologies due to

poverty, illiteracy and little or no say in decision making process. Non-availability of elite breeding males, effective vaccines, grazing lands and feed resources.

SUMMARY

Goat sector generates about 4.0% rural employment and about 20 million families belonging to small, marginal and landless labourers are engaged in goat keeping. Goats contribute 8.5% of the total meat and 4.0% of milk production of the country. India exports 3 lakh live goats, 280 MT goat meat and 25 MT goat skins and earns over 4 m US Dollars during 2003. Thus the rapidly changing patterns of demand for livestock and livestock products point to goat production being an important component of the agricultural economics of India.

Camel rearing...

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Camel safari is very much popular for tourist.

Management of camel for marketing

The animal husbandry nevertheless plays a vital role in the economy of India and contributes more than 60 % of the GDP of the region. The camel marketing through livestock fairs in western Rajasthan has opened new avenues for farmers. Marketing of camel is considered an important trade in the Rajasthan where it is widely used as draught animal. The camels are mostly marketed at big animal fair such as Nagour, Pushkar, Tilwara, Phalodi and Gogameri.

The average cost of camel varies according to age and sex. The camel of either sex and more than 7 year age group is costlier (Rs 40,000 to 50,000). On the other hand male camel is costlier than female in all age groups. Due to continuous

drought since last three years the cost of camel appears to be going down but still farmers get maximum of their expectation from this livestock (camel) in hot arid region.

Management for carting

The comparative study between camel and bullock carting systems revealed that pay back period is almost double in case of bullock carting as compared to camel carting, where as the benefit cost ratio is $\frac{3}{4}$ the time high in case of camel carting as compared to bullock carting. Due to short pay back period and higher benefit cost ratio camel carting is profitable and advantageous over the bullock carting for small dry land farmer in the hot arid Thar desert. Indian camel carry the load of 1.5 to 2 tonnes for 4-6 hour covering a distance of 30-40 km on two and four wheel cart without showing signs of distress. It can work for 4 hr at a stretch and 6 hr with 2 hr rest in between. The speed, draught force, work performance and power output

reduce with the increase in distance covered.

Thus abbreviation of 'CAMEL' may be expanded as 'C' – carrier, 'A' – arid zone, 'M' – multipurpose, 'E' – eco-friendly and 'L' – livestock. Rapid change in agro-ecological condition and industrializations in recent past has its impact on camel production and management systems. It is essential in future to adopt scientific management practices from birth to production to get efficient utilization of camel resources round the year for different purposes.

SUMMARY

The methods of camel keeping are now changing worldwide because the grazing land is decreasing as more land is put under cultivation reducing the free grazing land. Camels which are largely maintained under extensive system are now facing problem and their management needed a better alternate system which is socially acceptable and economically viable.