

Review on the Desert Adaptations in Camel at Region of Thar Desert in Churu District, Rajasthan, India

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ABSTRACT

The study conducted in the Thar Region of Churu district including villages also at Rajasthan state in India. It includes a study on Desert adaptations which founds in Camel in Thar Desert. Thar desert one of the tropical deserts. In region of Thar Desert xerophytic plants and xerocole animals are found. All herbivorous animals depend on vegetations found here. Camel belongs to mammalia class of chordate phylum. The Camel is able to live in Thar Desert with its adaptations for this type of environment. Adaptations makes comfortable to an animal or a plant to well develop in particular area where they are founds. Find out the amazing adaptive features of camel in this study.

KEYWORDS: - Camel, Adaptation, Desert, Thar, Churu, Hot, Environment, Rajasthan, Vegetations, Sand dunes,

INTRODUCTION: -

All live organisms on the earth are lived in aquatic or areal or terrestrial habitat. Different and specific geographical conditions create many types of terrestrial regions on the earth. The terrestrial habitats are represented in form of many sub habitat or biomes like – “Tundra, alpine, forest, tropical savanna biome and Desert biome etc.”¹ The desert biome is different from all other biomes. Environment conditions of desert are differ from all other biomes. On the basis of temperature the desert biome is two types- Hot Desert and Cold Desert. “Hot Deserts are the areas located near the Tropic of Cancer which show deficiency in terms of rainfall.”² Temperature may range from very hot as in Hot Deserts to very cold as in Cold Deserts. In the world Sahara, Gobi, Sindh Rajasthan(Thar Desert), Chile, North America and Australia desert are include in Hot Desert. “In Thar Desert temperature range from 41° C to 50° C and sometimes it increases up to 51°C”³. High temperature is one of the important factors for the adaptation of the organisms here. Some part of desert often remains rainless. “Average annual precipitation is less than 10cm in Thar desert”⁴. In Desert relative conditions of abiotic factors is called xeric conditions. “Shortage of drinking water availability particularly in the summer is a major problem in the desert.”⁵The plants and animals which are found here according to these xeric conditions are called xerophytes and xerocolles respectively. In vegetations xerophytic plants, shrubs and herbs are found here. Vegetations of a specific area decide the animals which live there. All herbivorous animals are depending on the vegetation found here. Herbivore animals feed on vegetations. The vegetation found here can be divided into three types viz. annuals, fleshy and thorny shrubs. “Acacia, Prosopis, Capparis,

Calligonum, Euphorbia, Laptadenia and Calotropis etc. are hallmark of the entire Thar Desert”⁶. The vegetation found here in desert is edible by the creatures here. Herbivorous animals feed on leaves of plants found here. Green plants are the producer here and play an important role as first tropic level in ecosystem. “Most of the plants belonging to poaceae family are source of fodder for the animals found in the region”⁷. In xerocole Great Indian bustard, Desert fox, Blackbuck, Indian gazelle, Camel, Hedgehog, Mongoose and Antelope etc. are found here.

“Camel has been declared as the state animal of Rajasthan in the year 2014 by the state government”⁸. Camel is an herbivorous animal and having second tropic level in food chain. Camel is a three tier grazer in the desert. It belongs to mammalia class of Chordate phylum. In categories of consumers the camel is having position of primary consumer. It is a quadruple mammal and each foot having only two toes. Camels are ruminants’ animals. They chew cud and have a complex 4 chambered stomach. It has long neck and a short tail. Camel is ungulates animal. Camels are so well adapted for desert life that they are known as “the ships of desert”⁹. It is a ruminant animal. Camel is a viviparous animal that gives birth to a baby after a complete pregnancy. Its gestation period is about 13 months. During pregnancy, the fetus is nourished by the placenta. “In ruminates ungulate animals Syndesmo-chorial placenta are found”¹⁰. The presence of placenta is a prime example of an embryonic adaptation. Here only one hump camels are found in Thar region of Churu. The most common species which is found in all over Churu district is *Camelus dromedaries*. Camels like to eat dry and green fodder. “In ancient times, farmers used camels for agricultural purpose on large scale”¹¹. It is easy to train to become a pet. The camel has great attachment to his farmer. In villages some farmers still have camels and feed them dry fodder of crops. They also feed on herbs and shrubs. “On land of Thar Desert camels feed on trees like *Prosopis cineraria*, *Tecomella undulata*, *Acacia nilotica*, *Ficus religiosa* and *Calligonum polygonoides* etc”¹². There is a Marwari proverb for camel and goat:

“Oont chhode Akaro,
Bakari chhode Kankro”

“Due to having highly adaptation for Desert farmers uses it to carry fodder, wooden and ride to travels along the sand dunes”¹³.

Adaptations develop after a long evolutionary journey and become fixed due to inheritance. In other words we can call it acclimatization. “Acclimatization is notorious that each species is adapted to the climate of its own home”¹⁴. It is the process in which an individual organism adjusts self to a change in the environment. According to the type of environment an organism lives in, structural, functional and behavioral changes are occurs within it, which is called adaptation. “Adaptation can be defined as occurrence of genetic changes in a population or species as a result of natural selection so that it adjusts to new or altered environment conditions”¹⁵. Any organism which lives in its habitat is adaptive for its environment situations. For example Polar bear lives at the North Pole and cannot be found in a Desert area because of it is adaptable for cold condition. On earth pole environment conditions are coolest and temperature is below 0°C. Some adaptations are developed inside the organism living in a particular area according to that area, which are helpful in living, tolerating adverse conditions and surviving. “Some desert animals are nicely adapted for high extremes of temperature”¹⁶. Camel species *Camelus dromedaries* that found in Thar region of Churu district has such numbers of adaptations and highly adapted to this Desert region. For study purpose the author choose many villages like- Bhuchawas, Togawas, Bhaleri, Khandwa, Chalkoi, Redi, Lunaas, Pithana, Sarayaan, Rayatunda and Bhamara etc.

All these villages are populated by farmers and they grow crops in their farms. Farmers grow both crops Rabi and Khareef which totally depends on rainfall.

OBJECTIVES OF STUDY:-

- To know and find out the scientific reasons behind the adaptations presence in the camel.
- To know and confirm how the adaptations found in camel are useful in its life.
- To study of camel`s adaptations found in Thar Desert of Churu district.

REGION AND AREA:-

Rajasthan is a largest state and situated in Northern West in India. It covers 3, 42,239 square km. area of India. Its geographical location 23.3 to 30.12 North latitude and 69.30 to 78.17 East longitude. Rajasthan cover about 10% of total India`s geographical area. 1444km boarder lies along with Pakistan. In India Rajasthan share its border with five other states name- Punjab, Haryana, Madhya Pradesh, Uttar Pradesh and Gujarat. Rajasthan literally means ‘the land of kings’. “The state was formed on 30 march 1949 when Rajputana - name adopted by the British Raj for its dependencies in the region”¹⁷. Rajasthan is known for its ancient civilization, its culture, historical buildings and the Thar Desert. Its major features include the ruins of the Indus Valley civilization at Kalibangan and Balathal. Camel and Chinkara (*Gazella bennetti*) are the state animals. Godawan / Great Indian bustard (*Ardeotis nigriceps*) is the bird of state.

Thar Desert is a hot desert and also known as Great Indian Desert. The spread of the Thar Desert in India is mainly found in Rajasthan. “2/3 part of Rajasthan comes in this region”¹⁸. It situated in India and Pakistan. It is the world 20th largest Desert. About 90% of the desert is spread in India and the remaining 10% in Pakistan. Thar Desert covers 3,162 square km area in Rajasthan. This region can be easily recognizable by presence of sand dunes which move one place to another via blowing with sand storms. In Rajasthan it is spread over 11 districts. “It is an arid region which spread in Bikaner, Jodhpur, Jaisalmer, Barmer, Nagour, Jalore, Pali, Jhunjhunu, Sikar, Churu, Ganganagar districts of Rajasthan”¹⁹. According to the environment, the flora found here keeps itself has a variety of adaptations. The leaves of plants found here are small and have a layer of wax on it. Due to high temperature and low humidity, the air here is dry and hot. “In most of hot deserts, there occur plants such as cacti, water storing succulents such as acacias, euphorbia, cacti and prickly pears etc.”²⁰. Scattered trees are the main feature of the desert here. The mammalian fauna of Indian Desert includes many species like Camel, Cow, Goat, Deer, Jackal, Nilgai, Desert fox, Gazelle and Sheep etc. The people here are cattle herders. They het milk from them and their dung is used as fertilizer in the fields. “All the desert mammals have well specialized adaptations for survival in thermal extremes and low humidity”²¹.

Churu district keeps a part of the Thar Desert which can be easily identified by small and big sand dunes. It is arid zone where low abnormal precipitation occurs and has low humidity due to excessive evaporation. It is believes that Churu was a village of Jats known as Khalera ka Bas. The temperature here is so high during the day time and it drops so much during night. During day time the temperature of both air and sand is high and sometimes this temperature rises up to 51°C. The temperature here gets very low during the winter nights. “Acacia leaves and soft fruits are fed to animals and camels”²². Hot winds blow here in the summer season and strong dust storms blow here in the months of May and June. Here the annual rainfall is less on average, due to which the problem of water shortage persists in this area. Some part of this area gets water for irrigation and drinking from IGNP. The underground water

level is very deep and the water here is taken on saline. The flora and fauna found here face the scarcity of water and high temperature. “A sanctuary named as Talchhapar sanctuary which is specially known for blackbuck is situated in Churu district”²³. It was established in 1971. This sanctuary is situated in Sujangarh Tehsil of Churu district. With the blackbucks it is also home to a variety of birds. Here in the Tal chhapar, a special type of grass ‘Mothiya’ is found. The wild life of Churu district having many kinds of birds, reptiles and mammal species. “A fox species *Vulpes vulpes pushila* which is known as Desert fox is habituated here by making different types of caves on sand dunes for survival”²⁴. The study was conducted in fields around district and villages.

MATERIALS AND METHODS:-

For the study, the author selected an area around the city and various villages. Study was conducted in both season summer and winter. On daily bases author visited 5-7 camels per day for observation. Author travelled village to village in Desert of Churu district for this work. The study was done by photography, direct observation and tape measurement method.

To clearly distinguish adaptive characters author use a camera for photography. For the measurement purpose a tape was used by which measure limb length, head and eye lashes etc.

RESULT AND DISCUSSION:-

The present study was done in Thar Desert coming inside Churu district of Rajasthan state. For this study author collect data from field region like- villages, agricultural field and around Churu city etc. The author studied the desert adaptations found in camels in this region. It founded that camel having special adaptations to face the adverse conditions of Thar Desert. In camel species structural and functional adaptations are developed that helps to survival in inhospitable Thar Desert.

Adaptations are Mention Following found in study-

(A) Structural Adaptations

- 1. Strong & long feet** - In camel two pairs strong leg are found which are longest structures in proportion to the size of the body. Hind legs are longer than the fore legs. Long legs are adapted for walk and run on sand dunes in the Thar Desert. Due to length of feet camel can feed on trees and these keeps the body high on warm sand.



Figure- 1,2. A young camel with a farmer it has about cm long strong feet.

- 1. Long neck-** Camel has a long neck. It make easy to feed shrubs on ground and with long leg feed on tall trees like- Prosopis, Acacia, Tecomella and Ficus etc.



Figure- 3,4. A mother camel and its child feeding on *Prosopis cineraria* with the help of long neck and tall feet. And showing long neck of a young camel.

- 1. Long and dense eye lashes-**

In camel eyes are protected by long and dense eye lashes from blowing sand particles. It was measured in 5-7 camels and average length 5.4 cm found. While walking in a storm, the eyelashes cover the eyes, so that the particles of sand do not enter the eyes, while the front objects can be seen from inside it.

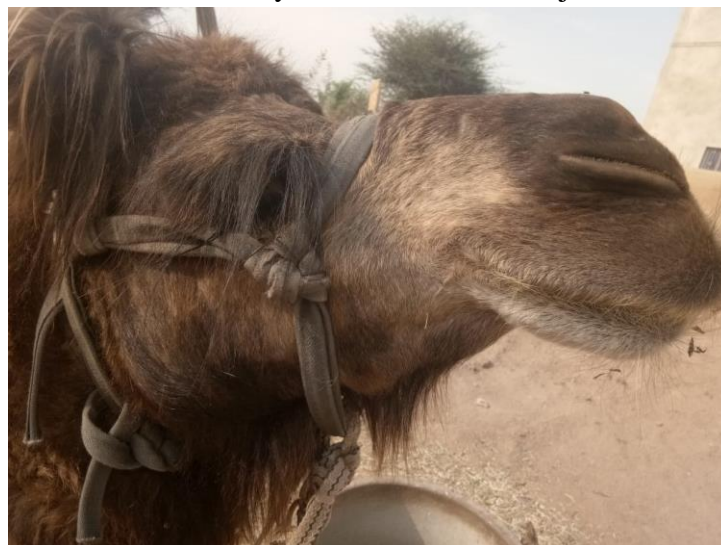


Figure-5. Long and dense eyelashes of camel which give protection from dust particle.

2. Padded feet-

The presence of padded feet is a special adaptation for camel to live in Desert. Pads are adapted to walk and run on sand dunes in Thar Desert. The padded feet do not sink into the sand, which helps in walking and running on sand dunes.



Figure-6, 7: Padded feet of camel which help to walk and run on sand dunes.

3. Long cylindrical nostrils-

In the camel nostrils are cylindrical and flat. It opens in a cleft on upper lip. In a dust storm, it closes its nose to prevent sand particles from entering its respiratory tract.



Figure- 8,9: Long and cylindrical nostrils of camel.

4. Hairs on body-

Presence of hairs are also a desert adaptation for camel to prevent water loss from body surface. Ear's hair act as a barrier for sand to enter in ear. On the back of camel hair are present in form of wool that is a protective adaptation for camel in winter season. Wooly hairs prevent from cold in winter.

5. Water cell-

Presence of water cell in the rumen of camel is showing an amazing physiological adaptation to face water deficiency in Thar Desert. Water cells store water in rumen portion of stomach when camel drink water.

2. Functional Adaptations

1. Heat tolerance-

The body temperature of a camel is labile. It is up to 40° C during day time and it goes down to 34° C at night. This type of adaptation is helpful in tolerating the high temperature of Thar Desert.

2. Tolerance against dehydration-

Due to labile temperature camel can work without sweating up to 41°C. It is special phenomenon to prevent water loss. Camel conserves water in its body by this type of adaptations.

3. Stored fat / Hump-

In camel there is no adipose tissue beneath the skin. But fat are stored at hump region in camel. Sizes of any camel's hump represent the stored fat quantity. By oxidation of the stored fat camel can full fill water and energy requirement in days of scarcity.



Figure-10, 11: showing different size of Fatty hump of camel.

4. Concentrated urine-

Camel is a ureotelic animal. Ureotelic organisms excrete out waste products of body in form of urea. For excrete to urea from the body animal need less water comparison to ammonia. Camel excretes highly concentrated urine to conserve water inside body. This adaptation helps the camel to face insufficiency of water in desert and make easy to survive in Thar Desert in such conditions.



Figure: 12, 13: Showing Urine excretion and Dry faeces of the camel.

5. Dry faeces-

Another functional adaptation are found in the camel to prevent excessive water loss from body. To face water stress camel developed a functional adaptation in its physiology is that it exit highly dry faeces as it can do.

3. Behavioral Adaptations-

1. Occasional drink-

In Desert camel faces the problem of not found of sufficient water for drink. To face this problem Camel must have an occasional drink of water but can go for long periods of time using water stored in the body.



Figure- 14 : Showing occasional Drink by a Camel group & a female camel in Field.

2. Close the nostrils-

Dust storms are the identity of Thar Desert. A behavioral adaptation is used by camel when they walk in dust storm. During this they close their massive nostril to prevent enters of sand particles in respiratory system.



Figure -15: Farmer using camel to carry fodder from agriculture field.

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