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Camels: Masters in Desert Adaptation

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Abstract

Camels are remarkably adapted to survive in some of the most extreme desert environments on Earth, characterized by intense heat, scarce water, and shifting sands. Their anatomical adaptations enable them to endure wide temperature fluctuations, minimize water loss, and navigate sandy terrain effectively. Key features include their humps, which store fat that can be metabolized for energy and water; wide, padded feet that prevent sinking into sand; and long eyelashes and closable nostrils that protect against blowing sand and dust. Additionally, camels possess thick fur that insulates them from both heat and cold and the ability to drink large quantities of water when available, storing it efficiently in their bodies. These adaptations collectively allow camels to thrive where few animals can, making them essential for transportation and survival in desert regions

Introduction

'World Camel Day' is celebrated every year on June 22nd to recognize the importance of camels and camels, especially in a dry and semi-arid region. It highlights their livelihood, cultural heritage and contribution to food security. This day reminds of the challenges and the need for conservation efforts to dissolve the population of camels.

As per the 20th Livestock Census the total Camel population in the country is 2.5 lakhs in 2019, decreased by 37.1% over previous Census. There are more than 35 millions of camels distributed in different parts of world and 0.25 millions of camels i.e. 0.72% of world population in India with maximum number in the state of Rajasthan followed by Haryana, Punjab, Uttar Pradesh and Gujarat. It is customary to state that camel is a ship of desert, because the animal is used for transport, ploughing, drawing water from the well, crushing and defense etc and is helpful for the livelihood of poor people and most suited in desert. It can sustain the odd desert climatic conditions and can work for hours together without water and thrive well on poor plan of nutrition even under harsh agro climatic conditions due to constitutional adaptability of its body to the desert conditions.

The important features in this regard are as follows-

Height: - The great height of the body due to long limbs keeps the body of animal considerably away from the hot sandy soil and perhaps helps the animal in keeping the body cool. Long limbs also help in covering the long distance in short time as each step taken by the animal covers a long distance.

Big flat foot: - The flat and big foot does not sink in the sand and the pad present in the foot also spreads all around and enhances the quality of good hold on the sandy ground. This also helps the animals for swift walking on the hot sandy soil. The thick pad in the sole also protects the animal from the high temperature, helps in walking on the uneven rough surface and also saves/protect the foot of the animal for not getting injured by big /small, sharp/ thorny objects and also acts as shock absorber.

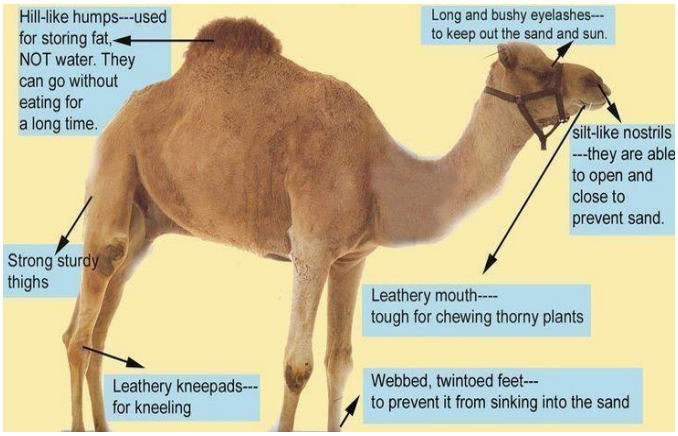

Fig 1. Pictorial representation of Camel peculiarity

Horny pads and sitting posture:- In camel presence of horny pads below the chest (chest pad) and over the joints (elbow, knee and stifle) support the animal in sitting and getting up and hence protect the animals joints from injuries likely to occur against the hard surface. The camel had a specific sitting posture with folded fore and hind limbs below the body and hence whole of the animal's body is supported on the folded limbs and chest pad which keeps the ventral surface of the body above the ground from extreme hot and cold in contrast to cow and buffalo. It prevent animal from extreme hot and cold conditions of the ground.

Long neck: - The long neck keeps the head and specially the brain of the animal away from the ground and high in the air and hence keeps the part cool by keeping the same in open airy environment. Moreover long neck is very much adapted for procuring the food i.e. green leaves and twigs from high trees and bushes etc available on the tops of *Acacia* or similar scanty tree leaves available in the desert area.

Hump: - The presence of hump with lot of fat deposition in it certainly is good source of stored/reserved food energy which can be utilized and mobilized by the animals at the time of need during the lean months of fodder availability. However, the fats on oxidation produce metabolic water. The presence of double hump in African camels in contrast to single hump in Indian camel is also probably to have more water source during odd conditions and heavy work in the African countries which are still dry and hot.

Small and wide skull:- The brachycephalic (small and wide skull) with cephalic index of 50 is useful and probably convenient for 1) for procuring the food (leaves and twigs etc.) from thorny bushes with least chances of facial injuries, 2) the absence of facial tuberocity, facial crest, facial groove and other ridges etc make the facial surface smooth and further facilitates the animal for procuring food from thorny and dense bushes and trees without getting any obstruction and hurdles and with least chances of facial injuries.

The eyes were short with circular orbits, complete orbital rim, and strong supra-orbital process, lateral in position and slightly protruded. The third eyelid was well developed and protects the cornea. There were double rows of thick and thorny eye lashes which provide protection to the eyes during dusty and stormy conditions. Lateral position of the eyes with slight protrusion probably provide large field of vision to the animal.

Fig 2. Pictorial representation of Camel long legs and typical horny pads

Short protruded orbits/eyes with lateral position: - The presence of relatively small orbits with complete strong orbital rim, lateral in position, protruded and with double layers of eye lashes probably are safety measures for protecting the eyes from dust, sun light, heat and other possible injuries /hazards in stormy conditions of the desert and this is in support of body adjustment to

the odd climatic conditions in the desert. Small eyes with double layers of eye lashes inspite of protecting the eyes from dust etc also acts as means of less evaporation of water from the eyes in the camel being a desert animal. Large body size helps in heat up slowly during the summer.

Thick hairy skin: - The skin of camel is thick especially the epidermis forms a thick and dense long hairy coat which acts as shield / barrier in the sun's radiation and slows the conduction of heat from the environment.

Fig 3. Pictorial representation of Camel Toes and Nails and its sole

Urine and faeces:- Passing concentrated urine and dry hard balls of stool are also important characteristics as adaptability of the camel to the desert condition as these also reduce the loss of water from the body. Kidney of the camel which is multi pyramidal with thick medulla containing long loop of Henle probably has important role and absorbs more water from the filtrate and help in conservation of water in the body. Every animal/ individual adapts itself to the surroundings. However, the constitutional adaptability perhaps is directly proportional to oddness of climatic conditions as is evident in camel. The endocrine control mechanism through the complex interplay of water and mineral regulating hormones are more efficient in camel.

Red blood cells (R.B.C.):- The RBC of the camels were large in size, elliptical biconvex in shape and non-nucleated. As animal drinks water these cells swells up to 240 percent of their normal size in contrast to other animals where if the R.B.C. swell more than 130 percents of their normal size burst out causing death of the animal. Probably this is for conservation of more water in the body for emergency. This resilient property makes the camel less vulnerable and resistant to fragility and climatic stresses.

Conclusion

Gross anatomical structural adaptation is observed in this animal /species. It needs to be further co-related with gradual developmental, histological and physiological changes with the functions. Sorne aspects of its behavioral nature is worth studying. Although the brain size is relatively small but it has tremendous capacity of remembrance of pathways where it has traveled, so much so that riders sleep but the animals reaches to the destination. The susceptibility of camel is high. In passing out of this species genetic characteristics should be studied. Beneficial genes should be exploited wherever possible. Especially in the phase of decreasing population of the camel species. Camel has shown great potential of adaptability as far as body attribute such as height, shape, long leg and foot pads are concerned. It is capable of sustaining on scarce vegetation and low water intake unlike other livestock species. Thousands of years of sustenance in harsh climatic conditions have made this animal very well adaptive which show, this species of animal is an ancient creature.

References

Mostafa Kandil Soliman Functional Anatomical Adaptations of Dromedary (Camelus Dromedaries) and Ecological Evolutionary Impacts in KSA International Conference on Plant, Marine and Environmental Sciences (PMES-2015) Jan. 1-2, 2015 Kuala Lumpur (Malaysia).

Abuagla, I. A.; Ali, H. A.; Ibrahim, Z. H. An anatomical study on the eye of the one-humped camel (*Camelus dromedarius*). International Journal of Veterinary Science 2016 Vol.5 No.3 pp.137-141 ref. 21.

Schmidt-Nielsen, R. C. Schroter, A. Shkolnik Desaturation of Exhaled Air in Camels K: Proceedings of the Royal Society of London. Series B, Biological Sciences, Vol. 211, No.1184 (Mar. 11, 1981), pp. 305- 319, FAO. Production Yearbook 1990, No. 44. Modified by Marc Breulmann.