

Nutrition of Wildlife

Nutrition and feeding of Omnivores

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Indian Giant Squirrel

- Order: Rodentia
- Family: Scuridae
- Genus: *Ratufa*
- Species: *R. indica*
- Conservation: LC

Indian giant squirrel is an arboreal species. Its distribution is endemic to deciduous, mixed deciduous and evergreen forest of peninsular India.

Ratufa indica has dorsal coloration that varies from creamy beige, buff, tan to brown, the ventral parts and front legs are usually creamy in colour and the head is brown (Tritsch, 2001).

- They have short, round ears, a broadened hand with an expanded inner paw for gripping, and large, powerful claws used for gripping tree bark and branches.
- Females can be distinguished from males by their three sets of mammae. Total body length could be upto 36 cm and tail length is 36 cm and body weight is approximately 1.5 to 2 kg (Nowak 1999).

- They seldom come down from the tree. They can jump up to 6 m with the help of the 2 ft long tail.
- They make sphere shaped nest with twigs and leaves. They are solitary animals living alone or in pair.
- Their natural diet consists of fruits and leaves (Paulraj, 1988).
- Reproductive behavior of *R. indica* is poorly known. There is some evidence that breeding occurs throughout the year, or several times during the year. Litter size is usually 1 or 2 young, but may be as many as 3. Gestation period in a close relative, *Ratufa bicolor*, was recorded to be 28 to 35 days in length
- Giant squirrels spend most of their time in trees, where they gather their food. Giant squirrels are omnivorous, feeding on fruits, flowers, nuts, bark, bird eggs, and insects. They feed by standing on the hind legs and using their hands to handle food. Giant squirrels also use their large tail as a counter-weight, improving their balance.

- Like artiodactylids, rodents, primates, lagomorphs and some marsupials are able to produce salivary protein rich in proline to overcome the adverse effect of tannins on protein utilization
- .Overall protein requirement for maintenance of rodents is 15% of CP on DM basis (NRC, 1995) The maintenance energy requirement for a 500 g squirrel has been reported to be 137 Kcal ME/day. This requirement could be met by providing 33.3 g of food on dry matter basis.
- The metabolizability of gross energy was 72%. Voluntary feed consumption always exceeded calorie requirement .
- Husband (1976) had reported that ME requirement for California ground squirrel was 162 Kcal ME/kg $W^{0.75}$ which would be equivalent to 180 Kcal DE/kg $W^{0.75}$.
- NRC (1995) recommended 12% crude protein, 0.5% Ca, 0.4% P, 35 ppm Zn, 50 ppm Fe and 5 ppm Cu for rodents.

- **Suggested guidelines for feeding**

- Nuts are important sources of ALA. However, their proportion should not be more than 5 % of the total diet on dry matter basis. Real nuts i.e. almond, walnut may be used instead of peanut. Peanuts are susceptible to aflatoxicosis. Any fungal mould should be monitored regularly and feed should be got tested for aflatoxins on regular basis.
- Nuts should be given only after the vegetables have been consumed.
- Proportion of soft fruits could be curtailed by 25% with an equal increase in the proportion of vegetable (carrots, cabbage, and spinach). A diet containing 200 g banana, 150 g other hard fruit (pear/ apple/hard guava) 100 g cabbage/other vegetables, 100 g spinach, 25 g bread, 50 g soaked gram and 25 g of peanut will be adequate.
- The whole ration may be divided into 2 or more meals.
- Bread could be replaced with equal amount of grains.

Crested Indian Porcupine

- Order: Rodentia
- Family: Hystricidae
- Genus: *Hystrix*
- Species: *H. indica*
- Common name: Sahi (Hindi)



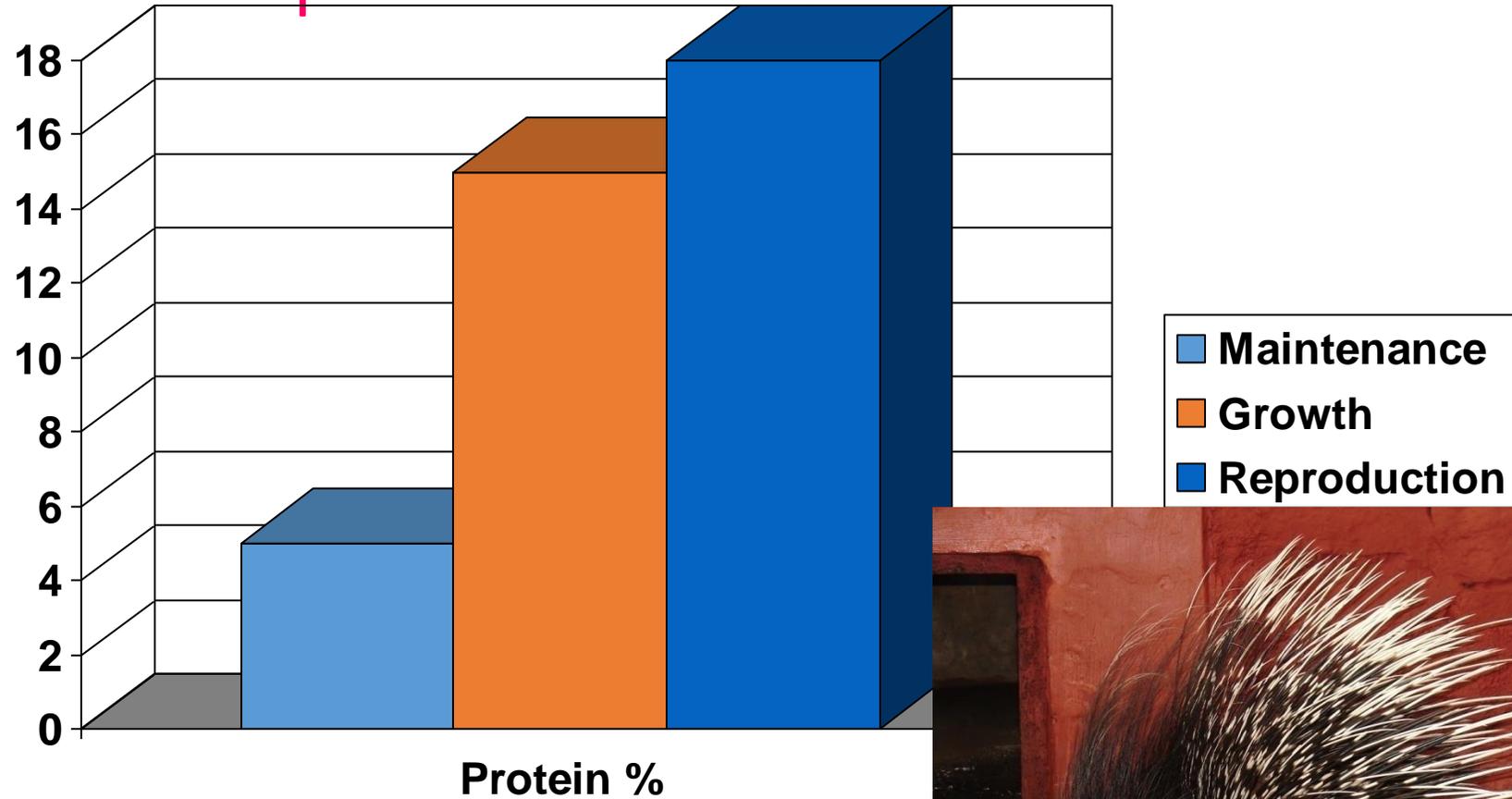
The crested porcupine is widely distributed in south Asia and the Middle East. It is well adapted to diversified ecological region ranging from scrubland, tropical and sub-tropical grassland and mountains. Upward quills cover every part of the body except ventral parts, muzzle and ears of porcupine. Quills are modified hairs. They are much thicker than normal hairs and are filled with a spongy matrix. Porcupine quills are not hollow. **Body length of an adult porcupine ranges from 70-90 cm and body weight ranges from 11-18 kg .**

It can produce upto 4 litter in a year. The porcupine has one precocial offspring after a long gestation period of 209-217 days (Shadle, 1948).

- They are nocturnal animals and make burrows. Porcupines are generalist feeder. They can thrive well on a variety of plants including fruits, grains and roots. They also raid on crops. Occasionally they have been reported to gnaw on bones to extract minerals.
- **Porcupines gnaw on deer bones.** Bone contains calcium, phosphorus and sodium, as well as protein. On a DM basis, deer antlers contained 52-56% ash, 45% protein and 1% fat. It is unclear as to whether porcupines gnaw on bones for calcium, magnesium, sodium or protein.
- Porcupines can survive on diet containing low levels of protein. Most closely related species is the guinea pig. Their digestive system is similar to that of guinea pigs.
- However, there are some major physiological differences between the two species. **Guinea pigs cannot synthesize Vitamin C whereas porcupines are capable of synthesizing it. Porcupines can utilize fibrous diets more efficiently than guinea pigs. A porcupine is a hind gut fermenter, but not cecotrophic.**

- Generally the digestive efficiency of fore-gut fermenters (ruminants) is more efficient than hind-gut fermenters. However, porcupine is an exception. Large caecum, separation chamber in caecum, resorption of Na, efficient mastication of food to very small particles, large distal colon and reduced metabolic faecal nitrogen excretion are some of the mechanisms adapted by porcupine to utilize fibrous materials more efficiently.
- Porcupine reduce the protein loss in faeces and thus improve the efficiency of utilization of dietary proteins. Their natural diet may contain considerable amount of tannins, lignin and arabinose which are known to impair protein utilization. Using the models of Robbins (1993), a hindgut fermenter of porcupine's weight would retain particulate digesta for 21 hours and liquid digesta for 28 hours; however, on actual experimentation porcupine retained digesta twice as long. Further, porcupine has been reported to be efficient in mastication which might help them in achieving higher fibre digestibility

Protein requirements of rodents



- Free ranging porcupines prefer high energy nut and fruit diet, but they can also consume variety of plant materials containing higher level of tannins. The mechanism of overcoming the adverse impact of tannins on protein utilization as discussed in section for squirrels may also be applicable for porcupine. The maintenance energy requirement was similar in both summer and winter season. It was estimated that $106 \text{ kcal ME/kgW}^{0.75}$ was adequate for maintenance of body mass.
- The average water consumption was 137 and 53 ml kg BW/day during summer and winter, respectively.
- Average dry matter digestibility in crested Indian porcupine was 76.5%.
- The diet of porcupine should contain 6-10% crude protein, 0.2-0.5% Ca and 0.2 - 0.5% P. Fournier

- **Suggested guidelines for feeding**
- Porcupine should be fed at least twice daily to maintain gut health. Usually hindgut fermentation is reduced after 12h of feeding.
- They can conserve fat very efficiently, so diet should contain very less amount of fat. Browsers and grasses could be included in the diets.
- Use of items like bread, milk and egg should be stopped.
- Feeding of excessive amount of pulses is not necessary. An amount of 50 g Bengal gram on dry matter basis would suffice. This much amount may be soaked in water and then fed to porcupines.