policy, many problems are faced. Due to inbreeding effects, weak Kittens with various nervous syndromes, developmental anomalies occur and many unnatural behaviours are observed. It is very difficult to manage the animals during medical problems, as Dhaka Zoo has no squeeze cage facility with proper equipments. Severe economic loss of managing this large group should be considered also. Male and female ratio and habitat constraints are also major areas of concern.

Recommendations

1. Increasing the area of the tigers and immediate reconstruction of the sheds to make them naturalistic.
2. Considering the inbreeding effects, feed cost minimization (economic), male and female ratio and habitat constraints - a complete and long term breeding road map is needed for maintenance of proper book keeping.
3. Animal exchange programme should be strengthened.
4. Adequate laboratory facilities and a complete Veterinary unit should be developed in Dhaka Zoo, Bangladesh.
5. Print and audio-visual media should take active part with positive reporting.
6. Regular training, workshop and seminars should be arranged to identify, solve the problems and related matters. This will improve research also.
7. Zoo legislation or Act should be prepared at the earliest.

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Spotted Deer (*Cervus axis*) Herd in Dhaka Zoo: Case report

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The Spotted Deer Park in Dhaka Zoo was established in 1978-1979 with a breeding group of 30 (18 females & 12 males) deers collected from Sundarbans with the help of forest department of Bangladesh. Since then the group has propagated very successfully and the present population consists of about 195 animals. This population has created habitat constraints and at present management activities have been increased. The present study took 4 months to document herd behaviours, problems and possibilities along with the habitat conditions. This study has focused on population status and associated management conditions, corner (sheds), and related factors and some recommendations.

Dhaka Zoo was officially inaugurated and opened to the visitors on 23rd June, 1974. It is a zoo with a nice landscape and the site is at Mirpur, about 16 km from Dhaka central point. The river Turag is on the Northwest and very near to the zoo. It took about 11 years (1964-1974) to start the zoo that went though the process of site selection, infrastructure development, animal collection from abroad and inside the country, staff recruitment and independence war of 1971. Earlier it was almost like a jungle with much woodland, fruits trees and the population of the inhabitants was very low. The entire area was very eco-friendly and beautiful. At present the total area of the zoo is 186.63 acres (75.55 hector) in which 2 lakes cover 32 acres of the land.

The Spotted Deer Park covers a total of 9 acres that includes one large (6.6 acres) and two small (total 2.4 acres) sheds. The large shed is situated just adjacent to the main gate of Dhaka Zoo. It is bounded by the wall of central poultry farm on two sides, Zoo Veterinary Hospital (quarantine block), animal nutrition section on one side, and a residential quarter, visitor's path and a public toilet on the fourth side. One open drain (for the drainage of water and waste) along with an inner water line and sewerage line pass inside the uneven topography in the shed.

During transect walks for ungulate sighting, data on number, age and sex (in possible cases) were recorded. Animal density per acre/hector was calculated. The network of paths, trees, boundaries, other structures, land quality, and changing behaviours were recorded. Johnsingh and Sankar (1991) was followed to study on food habits of ungulates and habitat utilization by large mammals while Sathyakumar (2000) was followed for status of mammals in this analysis. Strategy and techniques, various processes for analysis were partially followed based on the paper on Spotted Deer herd by Srinivasulu, *et al.* (1999). Some secondary data were collected from Dhaka Zoo also.

Results & Discussion

The survey was carried out at four different stages from March – June 2006 at 3 Deep Park sheds. In all three sheds, 53 adult males, 35 sub-adult males, 39 adult females, 36 sub adult females and 32 fawns were counted. Excluding the fawns, the density of Spotted Deer within the sheds was 18.11 animals/acre and including the fawns it was 21.66 animals/acre. But at Guindy National Park, Chennai, the density was between 1.84 to 2.39 animals/ hector (Raman *et al.,* 1996) while at Pochermal Deer breeding centre, Pocharam Wildlife Sanctuary, Medak District, it was 1.42 animals/hectare (Srinivasulu, 1998b). Here in Dhaka Zoo, the density of animals in this aspect is very high and it is 53.57 Deer/ha. The ratio of male: female was 88:75 excluding the fawns. If we compare the ratio of the animals, males are much higher in number than

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the animals, males are much higher in number than females. Considering the population around last six years (June, 2000 - May, 2006), birth rate is very good (152; average 25.33 animals/year) in comparison with the rate in selected semi-captive deer parks (Srinivasulu,1998a) of Andhra Pradesh, India. During this period (6 years) 28 numbers of animal (Adult male 11, adult female 9 & fawns 8) had died and 140 (64 males & 76 females) animals were sold. Four (1 male & 3 females) animals were donated during this tenure. In Bangladesh, animal lovers who have sufficient land (area), can purchase Spotted Deers from the Dhaka Zoo on payment for rearing with certain rules and conditions. Same rules and regulations are even now applicable and also same system is being practiced in some other zoos.

The Visual Body Condition (VBC) index is the easiest to measure considering various factors and constraints of the habitat, and various body conditions of the animals, (Srinivasulu, 1998b). Physical condition of the animal is a sensitive and easily measured response to the condition of its habitat (Riney, 1982). Only 3 males and 2 females were in bad condition due to injured legs and developmental anomalies (1 male & 1 female) while the rest were either in fair or good body condition (Table-1).

Table - 1. Visual body condition & composition of the herd (as on June, 2006) in Dhaka Zoo, Bangladesh.

Sex & age class	Total	Good	Fair	Bad	% pop*
Adult male	53	22	28	3	32.51 %
Sub adult male	35	29	6	0	21.47 %
Adult female	39	25	12	2	23.92 %
Sub adult female	36	27	9	0	22.08 %
Fawns	32				
*(Excluding the fawns)					

Possibilities

It has created great hope and inspiration among the general people (visitors) for deer farming since successful breeding is possible in a very general environmental condition without proper grazing area (habitat). We know that disease and rate of disease prevalence in deer is lower than the goat. They do not suffer from PPR (Pesti des Petitis Ruminants - fatal and economic disease) which is very detrimental to goat farming. They suffer from some common diseases like *Collibasillosis* & *Salmonellosis* (also tuberculosis). They attract the visitors by their beauty and intrinsic values.

Factors affecting management and possibilities

The main shed (6.6 acres) is totally without grass, hard and of uneven topography with sticky reddish soil. Rainfall makes it clayey and slippery. In rainy season, almost 20% of the shed goes under water (partial flooding or water logging), that persists for about 2-3 months as the shed is very near to a lake.

A severe panic was observed in the herd while darting 2-4 animals, which created medical problems and also death. While darting the animals, some animals jumped in the swamp with the dart. More number of males is a big issue that creates serious problems during their rutting season. Here, inbreeding is also a major factor. Animals fight when feed is supplied and dominating behaviour is observed severely. Some high rise trees are in the shed which includes 15 Jackfruit trees (*Artocarpus heterophyllus*), 12 Koroi trees (*Albizia procera*) and 3 Palm trees (*Borassus flabellifer*) that are not sufficient for giving proper shade on sunny days or hot weather. Concentrate mixture of rice polish, wheat bran, soybean meal cake etc. with vitamin - mineral premix, iodized salt in proper ratio and grasses (*Brachiaria mutica*, Zea mays etc.) are given. Leafy vegetables are also supplied in adequate proportions. Only one shed covering 1.5acre has some green grass. The feed ratio and quantity varies seasonally.

Recommendations

1. Increase the area of the Spotted Deer corner by the side of the south lake or reptile pool
2. A complete and long term breeding road map has to be drawn out, considering the inbreeding effects, feed cost minimization (economic), male and female ratio and habitat constraints.
3. Some land raising (earth filling) in the lakeside of the large (main) shed has to be done.
4. Shed partitioning, by rotation grazing 2/3 exposure in a year is strongly recommended.

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