

**Original Article****Status and Management Practices of Royal Bengal Tiger in Bangladesh National Zoo**Bahar F<sup>1</sup>, Zaber MAA<sup>1\*</sup>, Ahmed MJ<sup>2</sup>, Sahajee SR<sup>3</sup><sup>1</sup>Department of Animal Production and Management, Sher-e-Bangla Agricultural University, Dhaka-1207<sup>2</sup>Department of Pathology, Sher-e-Bangla Agricultural University, Dhaka-1207<sup>3</sup>Department of Physiology, Sylhet Agricultural University, Sylhet-3100**ABSTRACT****Article History**

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The Royal Bengal Tiger (*Panthera tigris tigris*) is the national animal of Bangladesh in addition to India. These most majestic mammalian cats are found in Sundarban mainly. It is a globally endangered and nationally critically endangered species that are conserved by Convention on International Trade in Endangered Species (CITES). The current study was carried out to establish the status of tigers within the Bangladesh National Zoo. There are 9 tigers, including 5 males and four females, in the study tenure. The beef was supplied every day except Sunday at  $8.47 \pm 2.36$  kg beef and  $0.35 \pm 0.14$  kg liver per animal per day, whereas only  $1.56 \pm 0.53$  kg of broiler was allowed on Sunday. The zoo experienced born of several cubs in the last 10 years and 75% of them are male. However, unfortunately, some of the cubs were died due to cold stress, inbreeding, trypanosomiasis and renal failure. The zoo is a lovely place for breeding and conservation of endangered animals. But many problems are faced due to the lack of proper breeding policy. Housing and other management facilities were recorded well but not internationally standardized. Finally, it can be concluded that Bangladesh National Zoo is a good place for tiger conservation beyond some limitations.

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**Introduction**

The Royal Bengal Tiger, binomially known as *Panthera tigris tigris* (Linnaeus, 1758), is considered the national Animal of Bangladesh and India. The tiger is loved, feared, and revered by the human race for its grace, beauty, strength, ruthlessness and other supernatural and natural characteristics (Tamang, 1993). Among eight sub-species of tiger, the Bengal tiger is found within India, Bangladesh, Nepal, and Bhutan. From the 100,000-150,000 tigers that may be present 150 years ago, we are left with 5,000-7,000 animals (Thapar, 1996; WWF, 1999).

Bangladesh National Zoo is situated in the Mirpur area of Dhaka, the capital of Bangladesh. The zoo is home to many species of native and non-native wildlife as well as wild animals and welcomes around three million visitors every year. It was established in 1974 and has an area of 186-acre (75 square hectares). The Royal Bengal tiger is an excellent

species to monitor the general health of the Sundarbans (Ali Reza *et al.*, 2000).

The feeding of the Royal Bengal Tiger is the most crucial aspect to preserve animals in zoos. The amount of meat consumed daily is contingent on body weight. In general, tigers consume feed (meat) of 5 to 7 percent of body weight. At Bangladesh National Zoo, a Tiger eats 7-12kg of beef daily. Special nutritional requirements for felids should be considered when feeding tigers in captivity, such as the requirement for high fat and protein diets and the inclusion of vitamin A in the diet (as retinol), arachidonic acid taurine as well as Niacin. Bush *et al.*, (1987) pointed out that the precise nutritional needs for each nutrient are not specific to tigers, and thus, requirements are extrapolated from domestic felids (NRC, 1984). Diets are developed to be prepared, and fed in various ways; some are suitable for dietary requirements; however, others do not. This can cause tigers

to develop nutrition-related health issues (e.g., chronic illness and nutritional disorders or poor reproduction).

Habitat is an additional element for tigers' proper management in zoos. It includes feeding, food reproduction, health, reducing diseases, and so on. They can survive in the habitats like mangroves and tropical dry forests, Tropical moist evergreen forests, sub-tropical and temperate forests, Subtropical moist deciduous forests, Alluvial Grassland, temperate broadleaf mixed Conifer forest, and Boreal Taiga (WWF, 1998).

Thus, the current research was carried out at the Bangladesh National Zoo to study the management techniques of the Royal Bengal Tiger, to report what the feed schedule is (feeding schedule, materials as well as security), and to determine the condition of the habitat, consider what action can be implemented to improve their management. To examine the production pattern for the Royal Bengal Tiger at Bangladesh National Zoo and learn the reproducibility profile of the Royal Bengal Tiger at the Bangladesh National Zoo.

## Materials and Methods

### Study Design

The necessary data for this experiment were collected from the total Royal Bengal Tiger population at Bangladesh National Zoo, Mirpur, Dhaka, including adult males, adult females, juveniles and infants from January to December 2019.

### Environmental condition of the study area

In the Royal Bengal Tiger production in a Zoo, tourist and their interaction are greatly influenced by the local environmental situation. Therefore, the ecological condition of the study zone is overviewed. Maximum and minimum temperatures observed in May and January ranged between 34°C and 15-20°C. The summer season continued from April to June 24-32°C, and winter lasted from December to February. Rainfall started in May and continued up to September. Approximately 92% of the annual rain occurs during the rainy season. The maximum humidity was observed at 86% from July to September and the minimum about 47% from January to April (BBS, 2019).

### Parameters Studied

The current analysis covered different facets of the Royal Bengal Tiger, such as feeds and feeding, production and reproduction profile and herd management, husbandry practices, health care, vaccination and deworming.

### Statistical Analysis

Data were compiled and tabulated for statistical analysis. Analysis of mean, standard error of the mean, standard deviation and variance was done with the aid of SPSS (Version 20.0).

## Results and Discussions

### Status of Royal Bengal tiger at Bangladesh National Zoo Population size

At present in Bangladesh National Zoo; production and conservation status from 2010 to 2020 is presented in Table 1. It was found that Royal Bengal Tigers in Bangladesh National Zoo were decreasing day by day due to cub death mainly. For this reason, in 2020 four Royal Bengal Tigers had been imported from South Africa.

The result indicated an undulating curve of the population size of the Royal Bengal Tiger at the Bangladesh National Zoo. But in the recent years, it was found positive. The results were much similar to Rangpur Zoo and Chottogram Zoo. The result is also supported by the population of tigers of the country. The current total of tigers is believed to be 3,159, based on field data from 2009 to 2014 and at 4,240 as per official estimates released in 2011 by the Global Tiger Recovery Program. In addition, the number of free-ranging Bengal Tigers in Bangladesh (Sundarban) as of 2016 was estimated at 106 (Tiger census through pug marking). But previously the population of Royal Bengal Tiger was about 445 in the year 2005 (Ziaur and Syed, 2006). It indicates that the tiger population in free-range decreasing day by day. Now in captivity total population of the Royal Bengal tiger is 25.

**Table 1. Population size of tiger in Bangladesh National Zoo.**

Year	Number of tigers	Male (No.)	Female (No.)	Death (No.)
2010	9	6	3	1
2011	10	7	3	1
2012	9	6	3	-
2013	9	6	3	-
2014	9	6	3	-
2015	9	6	3	3
2016	8	6	2	2
2017	7	5	2	1
2018	6	4	2	-
2019	6	4	2	1
2020	9	5	4	-

### Sourcing of Royal Bengal Tiger at Bangladesh National Zoo

Record book of Bangladesh National Zoo showed that there were a total of 4 cubs born including 3 males and 1 female in the zoo from the tenure of last ten years (2010 to 2020). The zoo was enriched with one male cub in the year 2010, 2015, and 2016 (Table 2). A female cub was also born in 2010 along with her male sibling.

**Table 2. Sourcing record of tiger in Bangladesh National Zoo.**

Year	Number of tigers born			Number of tigers donated/bought			Source
	Male	Female	Total	Male	Female	Total	
1990	3	3	6				
1991	1	2	3				
1992	2	2	4				
1995	3	1	4				
1998	3	1	4				
2003	2	2	4				
2004	3	1	4				
2007	2	1	3				
2008	1	1	2				
2010	1	1	2				
2015	1	0	1	0	1	1	Forest dept.
2016	1	0	1				
2019				2	2	4	Bought

The graph of the birth record showed a negative trend. Most (58%) of the cubs were male and the rest (42%) were female. There was no new cub in 4 years. Chattogram Zoo was enriched with some cubs including a rare white tiger in the

meantime. However, Bangladesh National Zoo bought 2 male and 2 female tigers in 2019 and the Department of Forest donated 1 female tiger in 2015.

According to Carter *et al.* (1999), the success of reproduction is crucial to the survival and long-lasting existence of any species. Understanding the reproductive parameters of a species (e.g., the age at which they first reproduce, their reproductive rate, the size of a litter, inter-birth interval and breeding time) is crucial to establishing efficient conservation strategies. Since conservation of species is the first goal to set up a zoo, it should get higher importance to make more cubs as the tiger is marked as globally Endangered (IUCN, 2003) and nationally Critically Endangered (IUCN Bangladesh, 2000).

### Death of Royal Bengal Tiger at Bangladesh National Zoo

Record book of Bangladesh National Zoo showed that there were a total number of 9 deaths occurred in the zoo from the tenure of 2010 to 2020. One tiger died in 2010, 2011, 2017, and 2019; two of them died in 2016 and 3 died in 2015.

Causes of death were recorded in the zoo record book as per the standard method. The cause of death in the last ten years is illustrated in Table 3.

**Table 3. Causes of death of tiger in Bangladesh National Zoo.**

Year	No. of Death			Causes of Death
	Male	Female	Total	
2010	1	0	1	Diaphragmatic hernia
2011	1	0	1	Kidney failure
2015	1	2	3	2 for senility and 1 for acute renal failure
2016	0	2	2	Trypanosomiasis
2017	1	0	1	Senility
2019	1	0	1	Trichomoniasis

Most of the deaths of tigers in Bangladesh National Zoo were due to Senility (34%) followed by renal/kidney failure (22%), trypanosomiasis (22%), trichomoniasis (11%) and diaphragmatic hernia (11%). The number of deaths was found lower in recent years that indicating better cub health management practices in the zoo.

### Body Weight of Royal Bengal Tiger at Bangladesh National Zoo

Record book of Bangladesh National Zoo showed that there were a total of 9 tigers having a mean bodyweight of  $136.44 \pm 16.62$  kg. Five males were having a mean bodyweight of  $140.00 \pm 15.00$  kg and 4 females had  $132.00 \pm 19.73$  kg.

### Management of Tiger in Bangladesh National Zoo

Management of tiger includes feeding, housing, breeding, biosecurity, and health care.

### Feeding and Nutrition

Healthy and balanced diet are compulsory for better health. Tigers are obligatory carnivores. Bangladesh National Zoo provides a balanced diet for the tigers. Here, Bangladesh National Zoo offered  $8.47 \pm 2.36$  kg of beef and  $0.35 \pm 0.14$  kg liver per tiger per day in the study period. Sunday was termed as an off day considering the tiger's health condition. Every tiger was allowed to  $1.56 \pm 0.53$  kg of broiler on Sunday.

During the study period, it was found that the feed was weighed and daily records were kept as to how much was offered to individual tiger and how much was consumed.

A healthy bull was slaughtered after inspection by a veterinary officer in early morning on every weekday. After processing, it was transferred to the enclosure at the required amount.

Determination of ration amounts is a dynamic process to meet changes in metabolic needs, such as seasonal needs, illness, pregnancy, lactation and growth. Proper body weight was maintained to avoid obesity by diet alterations. These changes were reflected not only energy but also vitamin and mineral needs. Records of stool consistency assisted in determining if the diet was poorly digested or possibly inducing diarrhea indicative of enteric disease. The food was offered on a non-contaminated surface. In most situations, feeding was done on the enclosure floor.

Bush *et al.* (1987) pointed out that, exact nutritional requirements for all nutrients are not known specifically for tigers; therefore, requirements are extrapolated from data on domestic felids (NRC, 1984). Rations are formulated, prepared and fed.

Kleiber (1964) recommended that adult tiger requires 140 kcal energy per kg to maintain body condition. Thus, a tiger averaging 123 kg requires 5170 kcal/day, whereas a 160 kg male requires 6300 kcal.

The amount of food consumed was increased by 10-20% in winter while decreasing to the equivalent amount in the summer when appetite is lower. The diet should be increased to ad libitum during pregnancy and lactation.

### Habitat of Royal Bengal Tiger

In the years 1986-1989, sheds for tigers were built at Bangladesh National Zoo, Bangladesh. The condition of the sheds and water house, the dimensions of the space and the quality of the protection net and bar were all observed. Except for the moat, sheds were not naturalistic and did not protect animals from visitors' attention. The sheds are somewhat circular and are divided into two sections with 18-20 feet distance from the middle that is the center of the building. Each part has a small extra space and the appropriate locking device or access (squeezing device). A Waterhouse measures 8 feet in length and 6 feet wide, with 5 feet of depth in each shed. A facility to climb to and down is provided. Certain areas have non-concrete flooring and there is a wooden post within every part of the shed. One moat houses an indoor dwelling, a small bush with 25 square feet of land, grass and a water hose 80 feet in length with 11 feet width and 8 feet deep to swim in. There are stairs to climb to and down. There is also a Waterhouse in the two moat blocks. Scottish Govt. (2019) suggested that single cats have at minimum 37m<sup>2</sup> of floor space area. The enclosures should be at a minimum of 3.5m high. The required distance must be multiplied by 50% of every additional cat added to the enclosure.

### Reproductive feature

As of today (2020) male and female ratio is 5:4 at Bangladesh National Zoo. All of the animals are sexually mature. The nine animals are of two and three years old. They were all kept in captivity for breeding. Reproductive parameters help determine the amount of turnover in a population as well as growth potential are important indicators for determining lineage persistency within a population (Holt *et al.*, 2003) and the viability of the

population (Kelly, 2001; Balmeet et al., 2012) as well as to study the meta-population dynamics (Chapron et al., 2008). In general, breeding occurs between November and December (winter), but during summer, it can happen. According to the zoo authorities in Dhaka, Bangladesh, breeding rates are higher in the winter months than in summer. The typical birth occurs after 8 months gestation, but occasionally 2 babies are born. Kerley et al. (2003) said that reproductive parameters could differ across subspecies within populations of tigers due to various habitats, climatic conditions, prey density, and other environmental variables. The information on how reproductive parameters differ between subpopulations of the same species that live in different habitats is vital for planning range-wide conservation (Kerley et al., 2003).

### Herd management

Tigers rapidly adjust to human presence and machinery once they are observed with tasty food. There are some squeeze cages and other facilities to handle the tiger or give feed or vaccination or medication.

A daily, weekly and monthly routine were maintained to make the hard management easier. The supervisor of the carnivore's department maintained and regulated the schedule whether the responsible laborers have done their work or not.

### Health care

Observation in Bangladesh National Zoo reveals that the visual body condition of the tigers was good. Among 9 tigers, a male tiger at case number C21 was suffering from senility. From all the sheds and moats, samples (stool) were collected. The samples were examined regularly for detecting major parasitic infestations. Other preventive measures (vaccine, deworming, etc.) were taken properly. It was reported by the zoo authority that in the year 2020, the death of a female tiger was occurred due to the cause of Trypanosomiasis disease. So, at present zoo authority is very careful about vaccination and another visual health checkup. During the examination period, no tiger was sick in the Bangladesh National Zoo except senility of 1 male. The tiger we identified did not see any disease in the year. But we tried very well to observe it clearly. Here we have learned from past history that due to the absence of bacteria, viruses, parasites and providing proper nutrition there are usually no diseases. However, during the examination, we did not use any medicines in the tiger.

### Vaccination and deworming

Prevention is better than cure. Bangladesh National Zoo is maintaining a vaccination schedule for tigers against Feline panleukopenia, Feline calicivirus, Feline viral rhinotracheitis, Feline chlamydiosis, and Rabies.

Deworming was done by applying Albendazole tablet at every 3 months interval. The number of tablets varied between 1 and 2 according to the bodyweight of the tiger.

### Factors affecting the management

Bangladesh National Zoo is a very nice place for breeding and conservation of endangered animals but due to lack of proper breeding policy, many problems were faced. Because of the inbreeding effect, weak cubs suffering from diverse nervous disorders, developmental anomalies can occur and numerous unnatural behaviors are observed. It is difficult to control the animals when they are suffering from medical

issues due to the fact that Bangladesh National Zoo does not have a squeeze cage facility that is equipped with the right equipments. The enormous economic losses of a large number of animals are taken into consideration. The ratio of females and males and habitat restrictions are both essential areas to be concerned about.

### Summary and Conclusion

From 1986 through 1989, the Bengal tiger's sheds were designated in Bangladesh National Zoo, Bangladesh. At present Bangladesh National Zoo is conserving 9 tigers (5 male and 4 female). Among them, 4 tigers are recently imported from South Africa. Every day for each adult tiger,  $8.47 \pm 2.36$  kg beef and  $0.35 \pm 0.14$  kg liver were supplied. Once a week,  $1.56 \pm 0.53$  kg of broiler was provided per tiger. At present (2020) male: female ratio is 5:4 in Bangladesh National Zoo. According to zoo officials, all the animals are sexually mature. All Nine animals range from 2 to 3 years old, and they were bred in captivity. Due to the effects of inbreeding weak cubs suffering from various neurologic disorders, developmental anomalies are observed, and several unnatural behavior patterns are observed. Female and male ratios and habitat limitations are other significant concerns.

### References

- Ali Reza AHM, Chowdhury MM and Santiapillai C (2000). *Tiger paper, January - March*. **27(1)**: 1-5.
- Ziaur A and Ahasan, Syed (2006). Status of Bengal tigers in Dhaka Zoo. *Zoos' Print Journal*, V 21, number 12, (RNI8:3). 12.
- Balme GA, Batchelor A, Britz NDEW, Seymour G, Grover M, Hes L, Macdonald DW and Hunter LTB (2012). Reproductive success of female leopards *Pantherapardus*: the importance of top-down processes. *Mammal Rev* **43**:221–237
- Bush M, Phillips LG and Montali RJ (1987). Clinical management of captive tigers. In *TIGERS OF THE WORLD*. R.L. Tilson and U.S. Seal, eds. Noyes Publications: Park Ridge, NJ, Pp. 171-199.
- Carter J, Ackleh AS, Leonard BP and Wang H (1999). Giant panda (*Ailuropoda melanoleuca*) population dynamics and bamboo (subfamily Bambusoideae) life history: a structured population approach to examining carrying capacity when the prey are semelparous. *Ecol Model* **123**:207–223.
- Chapron G, Miquelle DG, Lambert A, Goodrich JM, Legendre S and Clobert J (2008). The impact on tigers of poaching versus prey depletion. *Applied ecology*. **45**: 1667-1674.
- Holt WV, Pickard AR, Rodger JC and Wildt DE (2003). Reproductive science and integrated conservation. Cambridge University Press, Cambridge, UK
- IUCN (2003). IUCN red list of threatened species. <www.redlist.org>.
- IUCN-Bangladesh (2000). Red book of threatened mammals of Bangladesh. IUCN, Dhaka. pp 71.
- Kelly MJ (2001). Lineage loss in Serengeti Cheetahs: consequences of high reproductive variance and heritability of fitness on effective population size. *Conserv Biol* **15**:137–147
- Kerley LL, Goodrich JM, Miquelle DG, Smirnov NY, Quigley HB and Hornocker MG (2003). Reproductive parameters of wild female Amur (Siberian) tigers (*Panthera tigris altaica*). *J Mammal* **84**: 288–298.



- Kerley LL, Goodrich JM, Miquelle DG, Smirnov EN, Quigley HB and Hornocker MG (2002). Effects of roads and human disturbance on Amur tigers. *Conservation biology* **16** (1): 97-108.
- Kleiber M (1964). *The Fire of Life*. Wiley: New York.
- Linnaeus C (1758). *Systema Naturae per regna trianaturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Editiodecima, reformata* [10th revised edition], **1**:41.
- National Research Council (1984) *Nutrient Requirements of Cats*. National Academy of Sciences: Washington, DC.
- Tamang KM (1993). *Wildlife management plan for the Sundarbans reserved forest*. Report of the FAO/UNDP project (no. BGD/84/056) entitled 'Integrated Resource Development of the Sundarbans Reserved Forest'. Pp. 113.
- Thapar V (1996). The tiger – road to extinction. In: V.J. Taylor and N. Dunstone, eds. *The exploitation of mammal populations*. Chapman and Hall, London, Weirheim, New York, Tokyo, Melbourne, Madras. Pp. 292-301.
- WWF (1999). *Tigers in the wild: 1999 WWF species status report*. WWF, Gland. 31 pp. 64.