

CHAPTER I: INTRODUCTION

Bangladesh is a South Asian country marked by lush greenery and many waterways. Natural resources abound there. The 840 different species of animals in Bangladesh are abundant in the forestland, including 578 species of birds, 119 species of mammals, 124 species of reptiles, and 19 species of amphibians. According to the Bangladesh National Conservation Strategy, 17.4% of Bangladesh's land is forested (Rahman, 2017). However, Bangladesh Forest Research Institute reported that the amount of forest land in Bangladesh has decreased to 7 to 9% based on the Forest Land Workshop, 2018 on forest land in Chittagong (BFRI, 2018). The forest ecosystem helps in the maintenance of wildlife habitat. Thus, the depletion of forests may result in the extinction of many wild species. Currently, in Bangladesh, about 17 wildlife species are extinct, 19 species are critically endangered, and 32 species are endangered (Azad et al., 2005). The *Panthera tigris tigris* also known as the Royal Bengal Tiger, is a subspecies of tiger that has already been listed as a critically endangered species (Goodrich et al., 2015). They are native to the Indian subcontinent and are recognized as one of the keystone species of the universe (Kumar, 2021). The Bengal tiger is the official symbol of both Bangladesh and India and is widespread in several countries in Asia, such as India, Bangladesh, Nepal, and Bhutan (Kumar, 2021).

According to their availability in the environment, different prey kinds may be killed at frequencies other than those anticipated. This is known as prey selectivity (Grey, 2009). Large felids' preference for prey, which ultimately defines their feeding habits, has a significant impact on how they travel through their environment, choose habitats, organize their social groups, distribute throughout space, and succeed in reproducing (Sunquist & Sunquist, 1989). Although tigers consume prey ranging in size from frogs to the 1,000 kg Gaur (*Bos gaurus*), deer species make up the majority of their diet, contributing up to 75% of the tigers' range-wide prey biomass needs (Biswas & Sankar, 2002; Grey, 2009). As a direct or indirect portion of the tiger's food chain, it operates as both an icon of conservation and an umbrella species whose protection aids the existence of other species. It is a top predator which lies at the top of the food chain and is necessary to sustain ecological systems and processes

(Terborgh & Andresen, 1998; WWF, 2014) so that a food web is made up of all the interrelated and overlapping food systems in an ecosystem.

The best-known Royal Bengal Tiger is the tiger of the Sundarbans (*Panthera tigris tigris*), as they love to inhabit in the mangrove. Large-scale infrastructural development, the consequences of human-induced climate change, and rising demand for natural resources that end in habitat degradation have put unprecedented stress on biodiversity and resulted in declining tiger population in particular (Sodhi et al., 2004). They are also hunted because of the high demand for their skin and some of their body parts which are essential to making medicines in the Asian regions and a result of human-wildlife conflict; people kill tigers whenever they get a chance and smuggle them out. It is upsetting that tigers have lost 93% of their native area worldwide despite a lengthy conservation history (Sanderson et al., 2010). In the wild, the population has decreased from an estimated 100,000 individuals 100 years ago to less than 4,000 now (Seidensticker, 2010). Tigers now only persist in a sustainable population in the Sundarban.

Zoos and Safari parks are doing their best to conserve species both ex-situ and in-situ with pros and cons. The pros include restoring population of threatened species or those losing habitats, maintaining numbers and genetic diversity through periodic release, research on captives and formulating new strategies for conserving wild species. On the flip side, the negatives include possibility of inbreeding depression, heavy cost involved, and only a limited portion of the gene pool being conserved. Despite all these, a zoo or safari park can play a significant role in helping to rescue the wildlife specially tigers that are ecologically vulnerable. In Bangladesh, zoo and safari park is also playing an important role in saving and conserving tigers and other wildlife species. There are two safari parks and roughly seven zoos that are well-known in our country. Specifically, these include the zoos in Dhaka, Rajshahi, Rangpur, Chattogram, Khulna, Comilla, Savar Cantonment Zoo, Gazipur Bangabandhu Safari Park, and Dulahazra Safari Park. There were 11 tigers at the Dhaka Mirpur Zoo up until August 16, 2021, while there are none at the Rajshahi Zoo, one tiger at the Rangpur Zoo, and 12 tigers in Chattogram Zoo.

Chattogram zoo founded in February 28, 1989 at Foy's Lake in South Khulshi, Chattogram. It comprises of 6 acres of land, with 66 species and almost more than 600 animals. The zoo is surrounded by beautiful green hilly surroundings. MA Mannan, a former deputy commissioner of the Chittagong District, and a few other prominent citizens of the city first took the initiative to start a private zoo at Foy's Lake in 1988 for the purposes of entertainment, instruction, and zoo animal research. At first, there were 23 creatures of 5 separate species and the infrastructure was minimum. But due to proper scientific management and captive breeding, the number of animals are increasing day by day. The best examples of captive breeding are Python, Sambar deer and Royal Bengal Tiger. In the meantime, 53 young pythons are artificially reproduced in the incubators and they are released in the natural habitat of Shitakund Ecopark. Besides, because of efficient management, the population of the nearly extinct Sambar deer is also expanding here. Lastly, the Royal Bengal tiger shed the light on the zoo by their successive cubbing, and increasing the number of tigers. Due to the effective action of the management committee and the Chattogram District Commissioner, this zoo is working for the recreation of the visitors as well as the implementation of the educational programs. As a result, they run various programs among the school across the country to familiarize students with the zoo animals, illegal wildlife poaching, and create awareness about the need to save endangered species. In the future, this zoo is embracing various policies to raise the number of endangered species.

It is crucial to improve breeding efficiency and increase the number of Bengal tigers kept in captivity in order to preserve the species' existence on Earth. Tiger conservation is an extremely emergent issue nowadays and gaining up-to-date knowledge of the nutrition, management, behavior and reproductive parameters of this species may contribute in the conservation policies. For this purpose, the study was conducted to understand and improve knowledge about captive tigers in Chattogram Zoo.

Objectives:

- To assess the Royal Bengal Tiger's nutrition and management at the Chattogram Zoo.
- To understand well about Royal Bengal Tiger's breeding parameters at the Chattogram Zoo.
- To investigate the behavioral changes of the tigers in captivity and in the presence of the visitors.

CHAPTER II: MATERIALS AND METHODS

2.1 Location of the study:

Chattogram, located in Southern Bangladesh, is the second largest of the country's nine administrative divisions, featuring rolling green hills, lush woods, a cool climate, and extensive sandy beaches. Visitors from all over the world come to enjoy its lush hills and forests, big sandy beaches, and comfortable chilly climate. It is nestled between hill ranges and the Bay of Bengal, on the banks of the Karnaphuli River. Nature lovers will enjoy the lovely Patenga Beach and the man-made Foy's Lake, which has beautiful landscape and diverse flora and fauna and is a popular picnic spot for locals and visitors alike. The Chattogram Zoo next to it, is another attraction for the visitors. It is renowned for its hilly landscape and natural beauty. During the holidays, all the family members, especially the younger ones come here to enjoy their quality time.

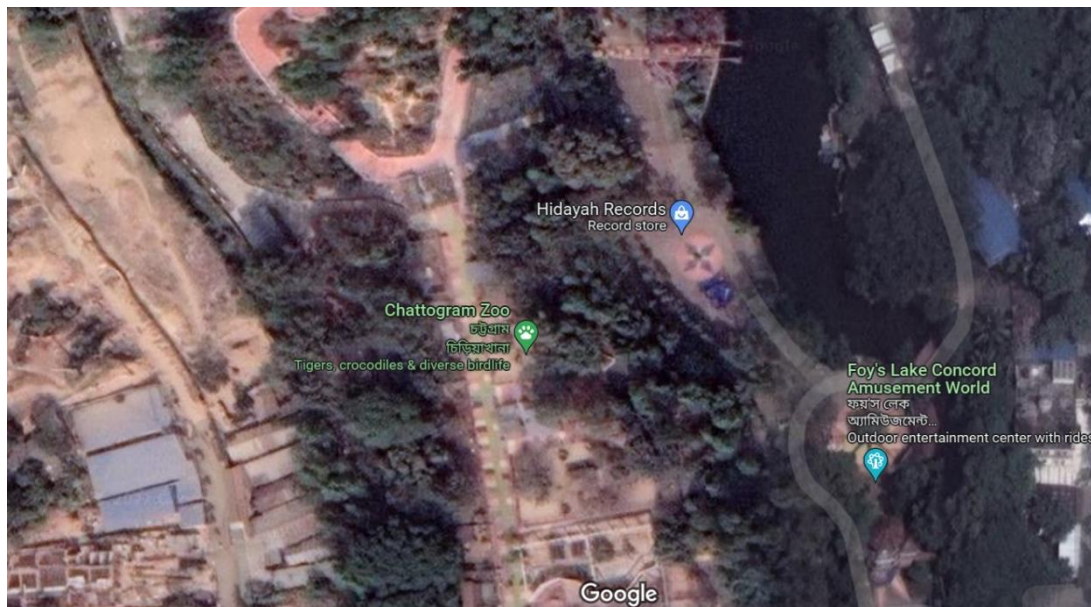


Figure 1: Location of Chattogram Zoo (Source: Google map)

2.2 Study duration:

The study was carried out at Chattogram Zoo, Foy's Lake, south Khulshi, Chattogram; during the period from April 2022 to May 2022. Almost 30 cages keep the animals for the visitors, 4 of these cages are for tigers.

2.3 Environmental condition of the study area:

The local environmental conditions have a significant impact on the breeding of Royal Bengal Tigers in zoos, as well as on their health, interactions with spectators, and productivity. Thereat, the research area's environmental situation is reviewed. In June and January, the highest and lowest recorded temperatures were 34°C and 14–20°C, respectively. Winter lasted from December to February, while summer extended from March to June, with temperatures ranging from 29 to 40°C. Rainfall began in June and persisted through September.

2.4 Collection of data:

The subjects were 16 healthy captive tigers from the zoo. There were eleven females (one old individuals, three adults, six subadults, and one cub) and five males (one adults, one subadults, and three cubs). Data were collected through direct interaction of zookeeper and then the curator of Chattogram Zoo. In the beginning, we developed a structured open-ended questionnaire for both qualitative and quantitative data about the growth, nutrition, reproduction and behavior of the tigers in captivity. The 16 tigers' instantaneous samples from a total of 364 hours from 10 am to 5 pm daily for 30 days, were examined for recording behavioral data. The observational phase was including six weekdays and one weekend days. During this phase each tiger was observed a total of five times per day for 10 to 15 minutes long period every hour, with three times in the morning, and three times in the evening. All tigers were similarly observed throughout the week. The mean temperature was recorded during the study period was 32.3°C. The zookeeper provided the majority of the information, but later, the curator provided information that was used to authenticate that information. Curator of Chattogram Zoo, gave each one a different name immediately after birth. No new animals were introduced into the existing groups, the enclosures' typical configuration was not altered prior to this investigation, and no extra enrichment was supplied during the observations.

2.5 Compilation of data:

After collection, all the data were compiled in Microsoft Excel, 2019. A descriptive statistical analysis was performed and the results were expressed as table, map and flowchart.

CHAPTER III: RESULT AND DISCUSSION

3.1 Tiger population in Chattogram Zoo:

Current tiger population are presented in Figure 2. At present, the total number of tigers in Chattogram zoo is 16. At first, two tigers were imported from South Africa at 9 Dec, 2016. They were named Raj (male) and Pari (female). They were then aged 11 months and 9 months.

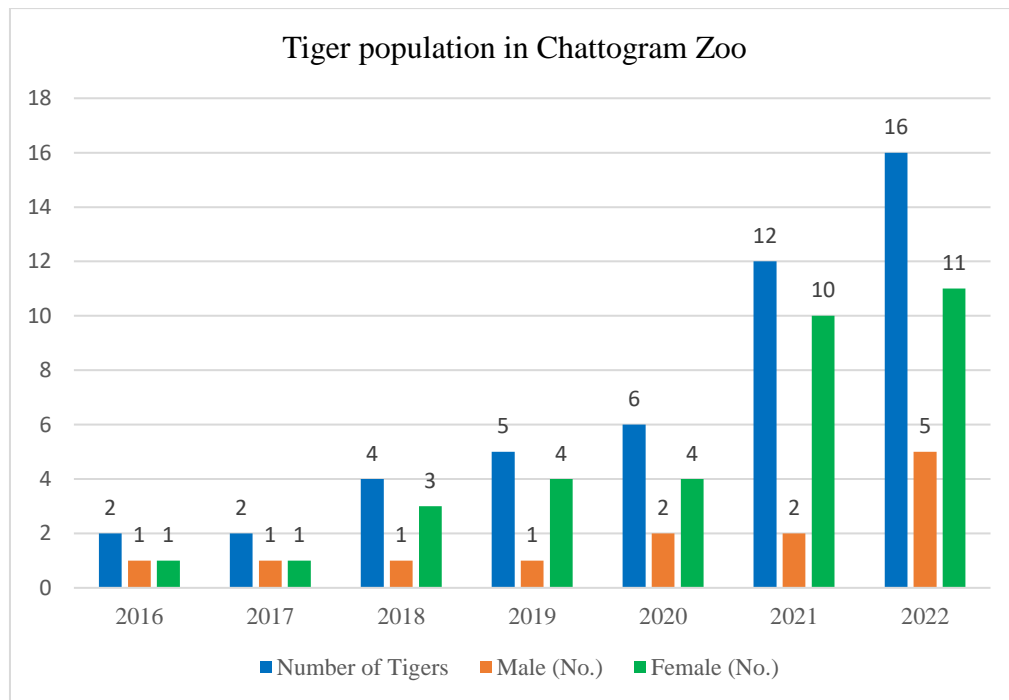


Figure 2: The population of tigers in Chattogram Zoo over time

Then after caring for them for a long time, the first three cubs were born in their house at 19 July, 2018 out of which two were albino and one was orange black striped. Among these three, one albino died as well as one albino and one orange black striped were survived. They were named after Shuvra (female) and Joya (female). After that, the number of tigers gradually increased. The pedigree chart is showed in Figure 3. Corona (female) is the child of Raj and Pari, born on 30 dec, 2019. They had another child with Corona, who died shortly after birth. Raj and Jaya gave birth to three cubs at 14 Nov, 2020. At 15 Nov and 18 Nov two cubs died one after another. Last one is named Jo Byden (male). The cause of death was that the mother did not allow breastfeed the cubs immediately after birth. As a result, they

died of weakness. At 26 Aug, 2021, Raj and Shuvra gave birth orange black striped cub, named Tuntuni (female). 6 May, 2021, Pari gave three cubs and at 7 May Jaya gave two cubs and they died due to maternal neglect. At last, 30 July, 2022, Raj and Pari gave four albino cubs. They named after Shangu, Halda, Padma, Meghna.

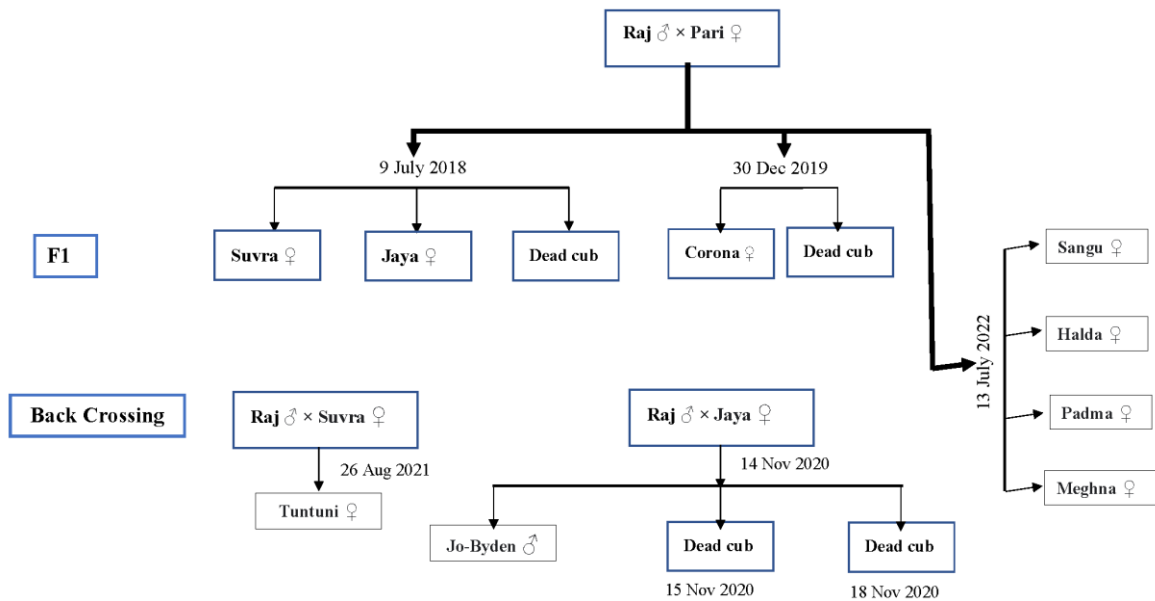


Figure 3: The pedigree chart of tigers in Chattogram Zoo

3.2 Animals housing

Tigers, like all big cats, are strong as well as territorial and need their own territory. Tigers are often solitary creatures who prefer to live by themselves. Therefore, enclosures should be as big as possible. Stereotypical attitude is supposed to result from a lack of available space. It is advised that each animal have at least 37m² of floor space and at least 3.5m of height in their cages. Besides, each extra tiger in the enclosure should require a minimum of 50% more room than the original requirement (Bahar, 2020). In our study area, there were four cages for twelve tigers. Each cage had a close enclosure and a roaming area. The enclosure size of Cage 1 and Cage 2 were approximately 12 feet in length and 10 feet in width. Enclosures in Cage 3 and Cage 4 were approximately 10 feet long and 8 feet wide. In the roaming area, half of the cage was roofed whereas the other half was open. The length, width and height of the roaming area of Cage 1 and 2 was 15 feet, 30 feet and 12 feet.

Likewise, the length, width and height of the roaming area of Cage 3 and 4 was 30 feet, 30 feet and 12 feet. Raj (mature tiger) was kept in Cage 1; Pari (mature tigress), her cubs and Shuvra (mature tigress) in Cage 2; Joya (mature tigress), her cubs and Tuntuni (growing tigress) in Cage 3; and lastly, Jo Byden (growing tiger) and Corona (growing tigress) were kept in Cage 4. In Cage 3 and 4, apart from the enclosed room, there were another small hut made of bricks at one end. The size of the small hut was 12 feet length, 8 feet width. During our study period, we saw that, Joya and her cubs were lived in this small hut of Cage 3 for maternity care. Alignment of each cage was spherical. They are permitted unrestricted access to a den inside and outside, but they are confined in the enclosure during the night for security purposes. The floor of the roaming area was partly paved and partly unpaved. The unpaved floor was covered with soil and small patches of grass. During feeding, the tigers were first kept in the closed enclosure and then opened after providing food into the feeding cubicle. Besides, sometimes these enclosures were used for newborn cub management, and for sick animals. Usually each of these enclosures contains one or two water holes, a feeding cubicle. Daily meals were served in 4 square feet circular feeding cubicle. For uninterrupted flow of fresh water, each enclosure had watering trough of 12 square feet, 20 square feet, 48 square feet and 4 square feet respectively. Outside the cages, there were a gutter of 1 foot wide to remove the wastewater from the cages. There was a perimeter fencing installed around the cage approximately 2 feet away which is made of chain-link fence for maintaining secure distance between the tigers and the visitors. It also served the “no feeding from visitors” policy of the zoo and reduced disturbance to the tigers. There was no separate isolation shed for the tigers. However, there was a quarantine shed in the entrance which was about 200 square feet. Whenever a tiger was found to be pregnant, it was separated from the other tigers two to three months before giving birth and kept in a separate cage that served as a maternity box. If newborn cub was neglected by the mother, they were immediately placed in a separate area, where they were kept with cotton pillows and bedding. Rubber balls and dolls were supplied for the growing cubs to play with. Each enclosure had proper ventilation and drainage system. The cages were cleaned daily between 7am and 10am in the morning, and filled the watering

hole by 10 am. Once a week, everything in each cage was disinfected with disinfectant.

Managing wildlife in a forest like environment is important in every zoo, so some environmental enrichment is done inside the enclosure. The behavioral and physiological reactions of animals to captivity are significantly influenced by environmental conditions. Environmental enrichment is dependent on understanding these responses in order to develop new and better strategies for designing enclosures and caring for animals (Carlstead & Shepherdson, 1994). Enrichment may help boost fertility in captivity, which is frequently required for reintroduction operations involving captive animals (Carlstead & Shepherdson, 1994; Martin & Shepherdson, 2012). In terms of this, it can be said that enrichment has also been thought of in this zoo; wooden dolls of different shapes, animal figures, wooden logs are kept in its cage, so as to provide an entertainment for its mind. There were two logs having five feet length in Raj's cage. The cage, which was Jo Byden's, features tall cemented log. On it he sat, lounging, occasionally observing the visitors. Besides, there were three and one log in the other cages. At some point during the daylight, they went to the water hole to play and bathe.

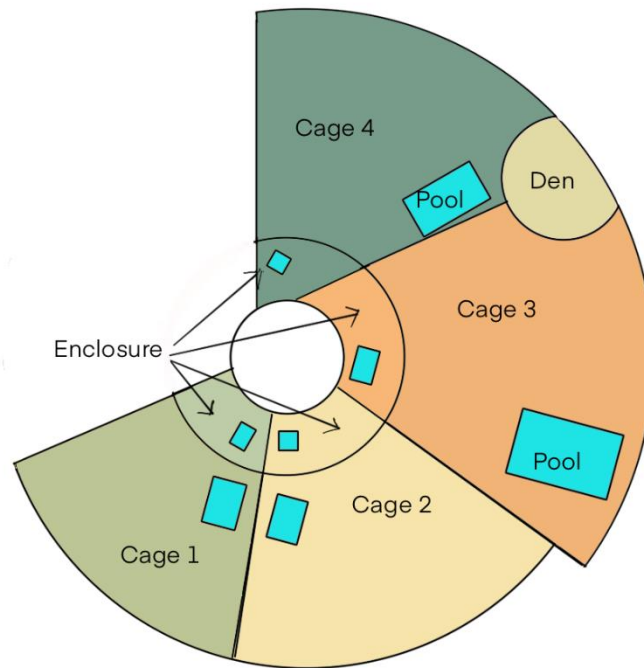


Figure 4: Diagram of cages of tigers in Chattogram Zoo.

3.3 Feeding:

The feeding of Royal Bengal Tigers is one of the most crucial parts for tiger conservation in zoos to keep them healthy and nourished. Another thing to consider is feeding habits (Bahar, 2020). When feeding captive tigers, it is important to understand the specific nutritional needs of felids, which include the need for high protein and fat diets, as well as the inclusion of dietary vitamin A (as retinol), arachadonic acid, taurine, and niacin (Dierenfeld et al., 1994). The feeding practices are mentioned in Table 2. During the course of our study, Raj and Pari were about 7 years old. Their regular amount of daily feed was 10 kg each; either beef or chicken was provided. The subadult cubs of Pari were supplied with 3 kg of beef or chicken daily. Joya and her young cubs, Corona with Jo Byden separately got 9 kg of meat to share. Adult female Shuvra was provided with 5 kg of meat and growing tigress Tuntuni was supplied with 2 kg meat. Beef was served 3 days per week and chicken 3 days per week whereas fasting is practiced one day per week. To encourage their predatory behavior sometimes live broilers were released in the cages for them to hunt. The keeper served the food everyday between 3 pm and 3:30 pm in the

enclosure. After finishing feeding, they were allowed to roam in the roaming area while the keeper cleaned the leftovers and troughs. Feeding and watering troughs were cleaned everyday by spray from a water pipe and sterilization was conducted at 6-day intervals. Normally, feeding took one to two hours and about 0.5 to 1.5 kg of leftovers were available from daily meals, with most of the leftovers being bones.

From a study in Chitawan National Park, Nepal, Sunquist (1981) proposed, 5–6 kg meat for a tigress and 6-7 kg for a tiger per day. This result is in alignment with the current study. Normally adult tigers are fed to keep their bodies in good condition, with general maintenance energy requirements of $140 \times (\text{body mass in kg})^{0.75}$ kcal (Kleiber, 1961). According to that the requirement of maintenance energy for adult tiger and tigress should be 7500 and 6000 kcal respectively. In Chattogram Zoo, the tiger and tigress are provided with 9500 to 10000 kcal per day to meet the additional nutritional requirement for roaming, maintaining temperature, exercise, play and most importantly for reproduction. According to Schaller (2009), Bengal tigers needed between 5.4 and 6.8 kg per day during the long term feeding in the wild. In the study of Population characteristics of tigers and its prey, Tamang (1979) pointed out that, free-ranging tigers consume a daily requirement of 7 kg. However, Sankhala (1977) suggested, approximately 10–12 kg of meat is consumed daily by a tiger in the wild environment. The dissimilarity in amount may be expected as diet in wild environment is completely different from captive environment where the composition and amount of the meat will vary every time. Dierenfeld (1987) suggested, diet amounts should be increased by 10-20% in outdoor animals during the winter months, and decreased by the same amount during the summer months when hunger lowers. Similar practice was observed while feeding the tigers in winter in this zoo. In some zoo the practice of hunting is limited. For example, Mohapatra et al. (2010) and Palita (1997) reported that, in Nandankanan Biological Park, India tigers were housed in enormous outside cages, but they were not allowed to hunt or catch their own food. Most management programs have discovered that fasting tigers one to two days per week improves their appetites and body conditions. On these days, either no food is fed or shank or other huge bones are provided to chew. Providing bones (femur bones, oxtails, rawhide) has an additional function in

supporting periodontal health and provides an opportunity for more natural feeding behaviors, which is considered enriching to the animals (Dierenfeld, 1987). Similar observation was seen in our study. One day in a week, they were not given any food except water. It is important for fat degradation of the body which decreases the prevalence of diabetes, arthritis, obesity, reproduction (Bahar, 2020). The feeding and cleaning practices in this zoo is similar to that of Dierenpark Amersfoort, the Netherlands where both tigers were released outside after they finished their meals (Goldsborough, 2017).

Table 1: Feeding of tigers in Chattogram Zoo

Tiger's Name	Age (year)	Feed	Amount (kg)	Frequency of feeding /day	Leftover (kg)	Water	Watering frequency/day
Raj	7	Beef, Chicken	10	1	1.1 - 1.5	<i>Ad libitum</i>	1
Pari	6	Beef, Chicken	10	1	1.2 - 1.5	<i>Ad libitum</i>	1
Pari's cubs	2	Beef, Chicken	9	1	0.9-1.4	<i>Ad libitum</i>	1
Shuvra	4	Beef, Chicken	5	1	0.5	<i>Ad libitum</i>	1
Jaya	4	Beef, Chicken	5	1	1.1 -1.2	<i>Ad libitum</i>	1
Jaya's cubs	2	Beef, Chicken	4	1	1	<i>Ad libitum</i>	1
Corona	3	Beef, Chicken	5	1	0.6	<i>Ad libitum</i>	1
Jo Byden	2	Beef, Chicken	4	1	0.4	<i>Ad libitum</i>	1
Tuntuni	2	Beef, Chicken	2	1	0.4	<i>Ad libitum</i>	1

3.3.1 Feeding changes during pregnancy and lactation:

During pregnancy, the amount of food kept almost the same, only they were given different supplementation such as, calcium, vitamin, electrolytes. Dierenfeld (1987) recommended, increasing the food to *ad libitum* during lactation.

3.4 Reproduction Parameters:

During the study period, we collected reproductive parameters of tigers which are shown in the Table 2. There are five male and eleven female tigers. We estimated individual approximate birth weight, age of puberty in month, gestation period and month of cubbing. Birth weight of tigers ranging from 600 to 900gm. Gestation length of the females were 98- 105 days. The gestation period of Corona, Tuntuni, Halda has not been recorded so far. The average age of puberty of Raj, Pari, Shuvra and Jaya is 30 months. Others have not yet reached puberty. They gave birth throughout the year.

Reproductive success is essential for any species' survival and continuation as well as understanding the reproductive parameters of those species (for example, age at first reproduction, reproduction, reproductive rate, litter size, interbirth interval, and breeding period) is vital to adopt effective conservation strategies during this time period (Carter et al., 1999). Reproductive factors are critical in determining population turnover, potential growth rates, and are critical markers for detecting the lineage persistence in a population (i.e., lineage loss, individual fitness, etc.) population viability and to investigate meta-population dynamics (For example, determining the reproductive output of source populations) (Kelly, 2001). Sexual maturity attained at four to five years in males and three to four years of females in the wild Royal Bengal Tiger. Maximum age of tiger has been recorded in captivity twenty to twenty-six years; this may also be near about their age in the wild. Tiger mating can happen at any time of year, however it is most likely to happen between November and April, these observation was reported by (Kaplanov, 1948).

Table 2: Reproductive parameters of tigers in Chattogram Zoo.

Name of tiger	Sex	Birth weight (gm)	Age of puberty (month)	Gestation period (days)	Month of birth
Raj	Male	800	30	-	January
Pari	Female	790	25	98-103	March
Shuvra	Female	600	37	99-105	July
Jaya	Female	690	28	98-101	July
Corona	Female	760	-	-	December
Jo Byden	Male	820	-	-	November
Tuntuni	Female	750	-	-	August
Shangu	Male	820	-	-	July
Halda	Female	740	-	-	July
Padma	Male	680	-	-	July
Meghna	Male	700	-	-	July

We estimated morphology of the cubs, mean litter size, mortality percentage of females (Pari, Jaya and Shuvra), which are shown in the Table 3. By far, Pari have given birth the greatest number of times. Pari gave nine cubs in three parities, among them two were died. She gave birth highest number of albino cubs. Albino cubs could not be given by Shuvra and Jaya. The range of litter size was from 1 to 4. The highest mortality of cubs was up to 100% whereas the lowest was nil. Cubbing interval ranged from 6 to 31 months.

Table 3: Cubbing history of tigresses in Chattogram Zoo.

Name	Parity	Morphology of the cubs	Litter size	Dead cub	Mortality %	Cubbing interval (months)
Pari	1	Albino, black striped	3	1	33.3	-
	2	Orange black striped	2	1	50	17
	3	Albino, black striped	4	0	0	31
Shuvra	1	Orange black striped	1	0	0	-
Jaya	1	Orange black striped	3	2	66.6	-
	2	Orange black striped	2	2	100	6

3.5 Care and management of abandoned cubs:

Some tigers presented with abnormal behavior, e.g., cub abandonment and inappetence, because of the lack of nursing or maternity experience; when this occurred, hand-rearing was carried out to enhance the survival rate of the captive tigers, that was reported by Yuan et al. (2020). Same observation was seen in our study. In this case, the cubs were given local goat's milk which was fed with equal amount of water mixed with milk. Up to 8 months of age they were fed only milk, after which they were gradually introduced to meat. Cubs who receive mother's milk and care immediately after birth, were kept with their mother for up to one year.

Tiger cubs that were neglected by their mothers grew up in human contact. During the observation period, Shuvra or Jaya's children grew up under the loving care of the curator. During this time, they were first fed with bottle milk, then slowly introduced to meat. During this period their physical growth rate over time was regularly recorded. After raising them to themselves until six months of age, they began preparing to be placed in cages with other tigers. To introduce the new cub to the cage, it was first kept in the cage with its urine and feces for a few days, so that the other tigers can become familiar with its smell and so that when the new cub was introduced to the cage, others did not suddenly show aggression. After the baby was placed in the cage, he was kept under close observation every moment. From the first day, the time spent in the cage was gradually increased, so as to get comfortable in the new environment and with the new companions. If anyone tried to attack the new cub, it was immediately removed from the cage. According to the zoo sources, on 14 November, 2020, a tigress named Jaya gave birth to three cubs. Realizing that the tigress was not going near the baby, the zoo authorities removed the third cub and started nurturing it. Joe Biden, the third cub, then grew up in the office room of the quarantine center and a room in the zoo under the care of Deputy Curator and two other staff members. Five and a half months after its birth, the cub was placed in a cage. He walked for an hour in the afternoon outside the cage every day. These tigers

were placed in a cage with another tiger when they were one year old. Growing up in a somewhat different environment while playing with people.

3.6 Vaccination and medication history:

Good management and care can prevent any disease. Since zoo animals are always in cages, where they eat and rest, their rooms must always be kept clean and regularly disinfected. Vaccination of high prevalence diseases of that place at the right time should be given. In the Chattogram Zoo, those who are 6 months old were given the rabies vaccine for the first time and booster dose once every year. As zoo animals are susceptible to endo- and ectoparasites, regular deworming was practiced in parasite management. Other frequently occurring disease was maggot infestation which were occurred from any kind of wound. Sometimes the tigers wounded themselves during sports, eating, running or fighting which were managed accordingly.

Some researchers reported many other diseases in tigers in captivity. The report of Nguyen et al. (2022), was the first report of prevalence of ocular disease in a population of captive non domestic felids. Wheelhouse et al. (2015) reported canine vestibular disease in 14 Sumatran tiger cubs in Australian zoos. Chronic renal diseases of captive cheetahs were observed in a breeding centre of cheetah, which was due to medullary fibrosis and resulting from age and or stress related tubular and glomerular hypoxia, (Mitchell et al., 2018). A 9-year-old male tiger (*Panthera tigris*) confined in a zoo in Maharashtra, India, tested positive for *Trypanosoma evansi* (Upadhye & Dhoot, 2000). Due to less prevalence of these diseases in this particular region and proper management, these types of fatal diseases were not recorded in Chattogram Zoo.

3.7 Behavior:

Given the large number of tigers kept in captivity (Ng & Nemora, 2007), it is crucial to analyze the impact on the animals' behavior for two reasons. To begin, because natural selection can 'design' a population to fit its captive environment, we must ensure that caged animals undergo minimal genetic change (Kirkwood, 2003; Mason et al., 2007). In our study, twelve captive tigers were observed between April 2022 and May 2022 at Chattogram Zoo. Using instantaneous behavioral sampling at 1-

minute intervals, each tiger was observed by the same observer for 6 days in a row (Sunday through Saturday) between 10:00 and 17:00 hours during the study. A data sheet with the observed behaviors and their corresponding times was created. The analysis ignored observations when the animals were veiled.

3.7.1 Feeding Behavior:

Appetitive behaviors represent a significant part of wild felids' behavioral repertoire. Wild cats spend the majority of their time hunting for foods (Dierenfeld, 1987; Schaller, 2009); and they appear to be highly motivated to engage in appetitive behaviors (Shepherdson et al., 1993). Lions and tigers typically stalk their prey before charging from a short distance away or lying in wait to ambush prey as it wanders by in the wild (Guggisberg, 1975; Seidensticker & McDougal, 1993). As such, Lindburg, (1988) had beautifully divided these appetite behaviors into four classes: 1) locating, 2) capturing, 3) killing and 4) consuming prey. Despite sleeping an average of 21 hours every day, lions will "hunt, mate, and feed at all times of the day" (Sankhala, 1977). In the wild, tigers have been observed engaging in these activities throughout daytime hours. They were given food every day at 3 pm. Food was always served with the same keeper. As a result, they bond with the protector. Whenever he walked in front of the cage, everyone starts roaring at the sight of him. Since food was given at the same time every day, they started calling as soon as it is time. There was also a lot of shuffling around the cage, mainly in an attempt to get the keeper's attention. Male tigers fought among themselves over food and they ate their share as soon as they were given food, then they fought over the female tiger's food. Jo Byden did this more. During our study period, we didn't design any enrichment procedures that are typically designed to elicit typical feeding behaviors observed in the wild. Simple feeding enrichment treatments have been discovered to alter felid behavior. For example: Extensive research on cats has focused on intricate devices that replicate hunting potential, resulting in decreased pacing, increased activity, jumping, pouncing, rolling, and public visibility (Markowitz et al., 1995; Markowitz & LaForse, 1987). In several previous enrichment trials, the administration of ice balls boosted standing, locomotion, sniffing, licking, biting, and paw manipulation in African lions (Powell, 1995). After a live fish presentation, a

fishing cat (*Felis viverrina*) demonstrated decreased napping and increased hunting behaviors, behavioral diversity, and utilization of space, and hunting behaviors were still persistent 7 days later (Shepherdson et al., 1993). The use of live prey on occasion has been suggested as a way for reducing stereotypic behavior linked with displacement feeding behavior (Dierenfeld, 1987). In Bashaw et al. (2003), to promote the successful performance of feeding behavior in zoos did an experiment on two species of felids: Sumatran Tigers and African Lions.. In which, the introduction of live fish increased the diversity and frequency of eating activities, whereas the presentation of horse leg bones increased their frequency. On the day of the presentation, Fish lessened the tigers' stereotypic behavior from 60% to 30% of scans. In both species, bone presentation decreased stereotypic behavior while increasing nonstereotypic activity.

3.5.2 Reproductive Behavior:

The reproductive behavior in captive male and female tiger were different. In Chattogram Zoo, tigers usually caged in pairs. Same pairs of tigers were allowed to mate repeatedly, Raj and Pari had the highest number of cohabitations. Mutual trust grew as they continued to be together. In another study, the tigress in estrus became restless and moved frequently, marking in the structures of the enclosure, i.e., the wall, the fence (chain linked mesh). The tiger sniffed the marking spots and then scowled, his tongue sticking out and his nose furrowed (Palita et al., 1996). The courting couple's and the male's mating calls were more comparatively deep-throated, louder, and brief (Palita et al., 1996). Similar observation was found in these captive tigers. Both daytime and nighttime were used for mating. Only during the daytime was mating visible for this investigation. The morning hours saw a higher frequency of mating. The male separated from the female and began to roam around the enclosure after each copulation. Following a successful copulation, the tigress lay still for three to five minutes before flipping onto her back. The tigress in estrus initiated the mating process. Palita et al. (1996) also found that to entice the male, female tigers engaged in a variety of mating activities. However, after successful mating the conception was not confirmed immediately. They were subjected to close observation for the next couple of months. After a few months,

when a little swelling was seen on one side of the tigress's abdomen, the pregnancy was confirmed and then special care was given to the tigress. Sunquist, (1981) stated that the female displayed constant vocalizing, pacing, rubbing and rolling when she accepted the male. Females may also display aggression toward the male during receptivity, stated in Sunquist & Sunquist, (1989).

3.5.3 Maternal Behavior:

Tiger cubs are born blind and their care and protection solely depends on their mother. The maternal behavior of the tigers included being alert and secretive. To provide privacy, during this time the entire cage was covered with a black curtain so that the tigress did not feel any discomfort. They licked their cubs to improve circulation and bowel movement. The eyes of tiger cubs will open between six and twelve days. However, they may not have whole vision for several weeks. It was seen, the tigress may also consume the cubs' feces to protect them from prospective predators who detect their odors. They are often spotted to move their cubs from one place to another in the cages. However, due to confinement, these felines might abandon, kill, trample or eat their cubs. For this reason, right after birth the tigress and her cubs were kept under observation for 10 hours. Meanwhile, the entire cage was kept under the coverage of CC cameras. In most cases, it was seen that the mother cared for her cubs, fed them with milk. But in some tigresses, there were some exceptions where the cubs were neglected or attacked which was mostly observed in their first parity. The mother's refusal of the cub at first parity may have been due to her prior experiences and the fact that she was not accustomed to feeding her young. These types of neglected cubs were separated soon after birth since the curator recognized their history of behavior. There are few reasons a tigress might decline to nurse her young. The causes may include the cubs failing to suckle within few hours of birth, the animals in captivity showing stereotypical behavior or the cubs exhibiting anomalies etc. A report by Berry (2011) observed maximum time was spent by the mothers doing feeding the cubs. The mother also spent cleaning the cubs, around 9-10% of her time and spent very little time cleaning herself. The circulation of cubs' blood stimulated by licking. This is a well-known phenomenon,

and it may be critical to initiating the circulation of the cubs immediately after delivery (Guggisberg, 1975).

3.7.4 Behavior in the presence of keeper:

Any pet is a devotee of its' master. They always want to be by the master's side, and are seen rushing to help in times of trouble. This loyalty is rarely seen in wild animals. But they are very happy when they see their keeper or protector. In terms of providing food for animals, zookeepers are on the front lines. As a result, they have a huge chance to affect how the animals in their care fare in terms of animal welfare. Creatures in keepers' care are typically fed, cleaned, trained, and given enrichment on a daily basis, resulting in developing a relationship. As seen during the study, they were very friendly with their keepers and zoo curator. The zoo curator checked the health of each animal every morning, so he had a regular silent conversation with the animals, and the animals felt comfortable seeing him. Tiger cubs that were abandoned by their mothers were brought up by keepers and curator. They played with those cubs every day, feed them. As a result, a good relationship was formed between them. As they grew up, their violence increased, and they were caged. As they called them by name, they responded and came closer to them.

3.7.5 Competitive Behavior:

Competition is a common among wild animals. They always try to influence each other. In social animals, males' rivalry for mates has an impact on each individual's ability to reproduce (Boesch et al., 2006). In the forest they compete for prey. During the observation period, it was seen that they fought over who could eat more than who. They fought among themselves while playing, and whoever was stronger won. Effectuation was more common in males. Jo Byden, Tuntuni and Corona were more playful than the others.

3.7.6 Behavior in presence of visitors:

As seen during the study, the tigers actually roamed around the cage for visitors. Some sat in the pool, wagging their tails in the puddles. According to research, an

animal's welfare is greatly influenced by the interactions between various individual animal characteristics (such as species traits, genetics, temperament, and life experience) and environmental characteristics (such as social grouping, enclosure design, and sensory environment) and one important aspect of a zoo's environment is the presence of visitors (Sherwen & Hemsworth, 2019). The presence of visitors in the vicinity of the enclosure, occasionally inside the edifice, or in close proximity to the animals is a regular occurrence for the animals during the zoo's operating hours (Salas & Manteca, 2017). The effects of zoo animal interactions on visitors are pretty ambiguous, and might be regarded as negative, neutral, or positive.

3.8 Introduction of captive animals in the wild:

Species reintroduction is the deliberate release of a species into the wild, from captivity or other areas where the organism is capable of survival (Campbell - Palmer & Rosell, 2010). So far, no tiger from this zoo has been reintroduced into the wild. However, they are very hopeful that they will participate in such activities in the future. In the meantime, they have taken the final decision to release the tiger and other animals into the wild environment for the under-construction Night Safari Park in Selimpur Forest of Shitakund. Besides, as mentioned earlier, 53 pythons were released in the natural habitat of Shitakund.

A vast range of ecological and socioeconomic factors determine the effectiveness of reintroduction (Griffith et al., 1989; Kleiman, 1989; Miller et al., 1996, 1999; Reading & Clark, 1989). Genetics, demography, disease, habitat requirements, and behavior are all important biological issues (Miller et al., 1999; Reading & Clark, 1989). Locomotion skills (e.g., moving in complex environments, constructing homesites like dens and nests, and movement patterns), predator avoidance (recognition and evasion), foraging (including finding, identifying, acquiring, and handling food), interacting in social groups (including courtship, mating, and raising and training young), habitat selection, and avoiding conflicts with humans are all important behavioral traits that may influence reintroduction success (Derrickson & Snyder, 1992; McPhee, 2004; Miller et al., 1996).

CONCLUSION

At present, Chattogram is conserving 16 tigers. Their management, housing, feeding, different behavior, reproductive behavior is important for many aspects. These data will be very helpful for management of other captive tigers as well as help in conserving this threatened species. Zoo is very nice place for breeding of endangered species which are proved in this case. Because it was observant how the number of tigers has increased.

LIMITATIONS

In this current study, we have given enough information about housing, feeding, behavior, reproductive parameters of tigers of Chattogram zoo. However, there was limited time to study the reproductive parameters and behaviors based on different seasons. Also, there were very limited fund to conduct the research. The study population was limited to Chattogram Zoo. The data from other Zoos and Safari Parks might enrich the information about captive breeding and management of tigers in Bangladesh.

Reference:

- Azad, M. A. K., Hashem, M. A., & Hossain, M. M. (2005). Study on human Royal Bengal tiger Interaction of in situ and ex situ in Bangladesh. *Journal of Biological Sciences*, 5(3), 250–252.
- Bahar, F. (2020). *Status and management practices of Royal Bengal Tiger in Bangladesh National Zoo*. Department of Anima Production & Management.
- Bashaw, M. J., Bloomsith, M. A., Marr, M. J., & Maple, T. L. (2003). To hunt or not to hunt? A feeding enrichment experiment with captive large felids. *Zoo Biology: Published in Affiliation with the American Zoo and Aquarium Association*, 22(2), 189–198.
- Berry, A. D. (2011). *Maternal behavior of tigers: time allocation in a mother tiger*. Ball State University.
- BFRI. (2018). Forest Land Workshop. *Bangladesh Forest Research Institute*. <http://www.bfri.gov.bd/>
- Biswas, S., & Sankar, K. (2002). Prey abundance and food habit of tigers (*Panthera tigris tigris*) in Pench National Park, Madhya Pradesh, India. *Journal of Zoology*, 256(3), 411–420.
- Boesch, C., Kohou, G., Néné, H., & Vigilant, L. (2006). Male competition and paternity in wild chimpanzees of the Tai forest. *American Journal of Physical Anthropology: The Official Publication of the American Association of Physical Anthropologists*, 130(1), 103–115.
- Campbell - Palmer, R., & Rosell, F. (2010). Conservation of the Eurasian beaver *Castor fiber*: an olfactory perspective. *Mammal Review*, 40(4), 293–312.
- Carlstead, K., & Shepherdson, D. (1994). Effects of environmental enrichment on reproduction. *Zoo Biology*, 13(5), 447–458.
- Carter, J., Ackleh, A. S., Leonard, B. P., & 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. *Ecological Modelling*, 123(2–3), 207–223.
- Derrickson, S. R., & Snyder, N. F. R. (1992). Potentials and limits of captive breeding in parrot conservation. In *New world parrots in crisis*. Smithsonian Institution Press.
- Dierenfeld, E. S. (1987). Nutritional considerations in captive tiger management. In *Tigers of the world: the biology, biopolitics, management, and conservation of an endangered species* (pp. 149–160). Noyes Publications.
- Dierenfeld, E. S., Bush, M., Phillips, L., & Montali, R. (1994). Nutrition, Food Preparation and Feeding. In *Management and Conservation of Captive Tigers, Panthera tigris*. Minnesota Zoo.
- Goldsborough, Z. (2017). The effect of visitor density on the behaviour of two Siberian tigers (*Panthera tigris altaica*) housed in a zoo enclosure. *Animal Welfare*, 10(2), 169–183.
- Goodrich, J., Lynam, A., Miquelle, D., Wibisono, H., Kawanishi, K., Pattanavibool, A., Htun, S., Tempa, T., Karki, J., & Jhala, Y. (2015). *Panthera tigris*. *The IUCN Red List of Threatened Species 2015: e. T15955A50659951*. International Union for Conservation of Nature and Natural Resources.
- Grey, J. (2009). *Prey selection by tigers (Panthera tigris tigris) in the Karnali Floodplain of Bardia National Park, Nepal*. Citeseer.
- Griffith, B., Scott, J. M., Carpenter, J. W., & Reed, C. (1989). Translocation as a species conservation tool: status and strategy. *Science*, 245(4917), 477–480.
- Guggisberg, C. A. W. (1975). *Wild cats of the world*. New York: Taplinger Publishing Company.
- Kaplanov, L. G. (1948). Tigers in Sikhote-Alin. *Tiger, Red Deer, and Moose, Materialy k Poznaniyu Fauny i Flory SSSR*. Moscow: Izd. Mosk. Obschestva Ispytateley Prirody, 18–49.
- Kelly, M. J. (2001). Lineage loss in Serengeti cheetahs: consequences of high

- reproductive variance and heritability of fitness on effective population size. *Conservation Biology*, 15(1), 137–147.
- Kirkwood, J. K. (2003). Welfare, husbandry and veterinary care of wild animals in captivity: changes in attitudes, progress in knowledge and techniques. *International Zoo Yearbook*, 38(1), 124–130.
- Kleiber, M. (1961). The fire of life. An introduction to animal energetics. In *The fire of life. An introduction to animal energetics*. John Wiley & Sons, Inc., New York: London.
- Kleiman, D. G. (1989). Reintroduction of captive mammals for conservation. *BioScience*, 39(3), 152–161.
- Kumar, A. (2021). Conservation Status of Bengal Tiger (*Panthera tigris tigris*)-A Review. *Journal of Scientific Research*, 65(2), 1–5.
- Lindburg, D. G. (1988). Improving the feeding of captive felines through application of field data. *Zoo Biology*, 7(3), 211–218.
- Markowitz, H., Aday, C., & Gavazzi, A. (1995). Effectiveness of acoustic “prey”: Environmental enrichment for a captive African leopard (*Panthera pardus*). *Zoo Biology*, 14(4), 371–379.
- Markowitz, H., & LaForse, S. (1987). Artificial prey as behavioral enrichment devices for felines. *Applied Animal Behaviour Science*, 18(1), 31–43.
- Martin, M. S., & Shepherdson, D. J. (2012). Role of familiarity and preference in reproductive success in ex situ breeding programs. *Conservation Biology*, 26(4), 649–656.
- Mason, G., Clubb, R., Latham, N., & Vickery, S. (2007). Why and how should we use environmental enrichment to tackle stereotypic behaviour? *Applied Animal Behaviour Science*, 102(3–4), 163–188.
- McPhee, M. E. (2004). Generations in captivity increases behavioral variance: considerations for captive breeding and reintroduction programs. *Biological Conservation*, 115(1), 71–77.

- Miller, B., Ralls, K., Reading, R. P., Scott, J. M., & Estes, J. (1999). Biological and technical considerations of carnivore translocation: a review. *Animal Conservation Forum*, 2(1), 59–68.
- Miller, B., Reading, R. P., & Forrest, S. (1996). *Prairie night: black-footed ferrets and the recovery of endangered species*. Smithsonian Institution Press.
- Mitchell, E. P., Prozesky, L., & Lawrence, J. (2018). A new perspective on the pathogenesis of chronic renal disease in captive cheetahs (*Acinonyx jubatus*). *PLoS One*, 13(3), e0194114.
- Mohapatra, R. K., Mishra, A. K., Parida, S. P., & Mishra, S. (2010). Behavioural responses to environmental enrichment in captive tigers (*Panthera tigris*) at Nandankanan Zoological Park. *Orissa. e-Planet*, 8(2), 44–48.
- Ng, J., & Nemora. (2007). *Tiger trade revisited in Sumatra, Indonesia*. TRAFFIC Southeast Asia.
- Nguyen, L., Boorstein, J., Wynn, E. R., Welihozkiy, A., Baldwin, T., Stine, J. M., & Miller Michau, T. (2022). Prevalence and type of ocular disease in a population of aged captive nondomestic felids. *Veterinary Ophthalmology*, 25(1), 31–43. <https://onlinelibrary.wiley.com/doi/epdf/10.1111/vop.12913>
- Palita, S. K. (1997). *Biological studies of the white tiger Panthera Tigris linn with special reference to Nandankanan biological park Orissa India*.
- Palita, S. K., Patra, A. K., & Patnaik, M. R. (1996). *Studies on the reproductive behaviour of the tiger (Panthera tigris Linn.) in captivity* (pp. 188–197).
- Powell, D. M. (1995). Preliminary evaluation of environmental enrichment techniques for African lions. *Animal Welfare*, 4, 361–370.
- Rahman, L. M. (2017). *Forest Resources*. Bangladesh National Conservation Strategy. [https://bforest.portal.gov.bd/sites/default/files/files/bforest.portal.gov.bd/notices/c3379d22_ee62_4dec_9e29_75171074d885/4.Forest resources_NCS.pdf](https://bforest.portal.gov.bd/sites/default/files/files/bforest.portal.gov.bd/notices/c3379d22_ee62_4dec_9e29_75171074d885/4.Forest%20resources_NCS.pdf)
- Reading, R. P., & Clark, T. (1989). An Interdisciplinary Examination. In G. JL (Ed.),

- Carnivore behavior, ecology, and evolution* (Vol. 2). Cornell University Press.
- Salas, M., & Manteca, X. (2017). Visitor effect on zoo animals. *Behaviour*, *167*, 65–73.
- Sanderson, E. W., Forrest, J., Loucks, C., Ginsberg, J., Dinerstein, E., Seidensticker, J., Leimgruber, P., Songer, M., Heydlauff, A., & O'Brien, T. (2010). Setting priorities for tiger conservation: 2005–2015. In *Tigers of the World* (2nd ed.). William Andrew Applied Science.
- Sankhala, K. (1977). *Tiger!: The Story of the Indian Tiger*. Simon & Schuster.
- Schaller, G. B. (2009a). *The Deer and the Tiger: Study of Wild Life in India*. University of Chicago Press.
- Schaller, G. B. (2009b). *The Serengeti lion: a study of predator-prey relations*. University of Chicago press.
- Seidensticker, J. (2010). Saving wild tigers: a case study in biodiversity loss and challenges to be met for recovery beyond 2010. *Integrative Zoology*, *5*(4), 285–299.
- Seidensticker, J., & McDougal, C. (1993). Tiger predatory behaviour, ecology and conservation. *Symposium of the Zoological Society of London*, 105–125.
- Shepherdson, D. J., Carlstead, K., Mellen, J. D., & Seidensticker, J. (1993). The influence of food presentation on the behavior of small cats in confined environments. *Zoo Biology*, *12*(2), 203–216.
- Sherwen, S. L., & Hemsforth, P. H. (2019). The visitor effect on zoo animals: Implications and opportunities for zoo animal welfare. *Animals*, *9*(6), 366.
- Sodhi, N. S., Koh, L. P., Brook, B. W., & Ng, P. K. L. (2004). Southeast Asian biodiversity: an impending disaster. *Trends in Ecology & Evolution*, *19*(12), 654–660.
- Sunquist, M. E. (1981). *The social organization of tigers (Panthera tigris) in Royal Chitawan National park, Nepal*. 336, 1–98.

- Sunquist, M. E., & Sunquist, F. C. (1989). Ecological constraints on predation by large felids. In *Carnivore behavior, ecology, and evolution* (pp. 283–301). Springer.
- Tamang, K. M. (1979). Population characteristics of the tiger and its prey. *International Symposium on Tiger*, 22–24.
- Terborgh, J., & Andresen, E. (1998). The composition of Amazonian forests: patterns at local and regional scales. *Journal of Tropical Ecology*, 14(5), 645–664.
- Upadhye, S. V., & Dhoot, V. M. (2000). Trypanosomiasis in a tiger (*Panthera tigris*). *Zoos' Print Journal*, 15(8), 326.
- Wheelhouse, J. L., Hulst, F., Beatty, J. A., Hogg, C. J., Child, G., Wade, C. M., & Barrs, V. R. (2015). Congenital vestibular disease in captive Sumatran tigers (*Panthera tigris* ssp. *sumatrae*) in Australasia. *The Veterinary Journal*, 206(2), 178–182.
- WWF. (2014). *Annual Report*. World Wide Fund for Nature-India. https://wwfin.awsassets.panda.org/downloads/annual_report_2014.pdf
- Yuan, Y., Pei, E., & Liu, Q. (2020). Reproductive parameters of female South China Tigers in captivity. *European Journal of Wildlife Research*, 66(3). <https://doi.org/10.1007/s10344-020-01375-0>

ACKNOWLEDGEMENT

Inestimable praises, thanks and adoration goes to the Almighty God, the beginning and the end of everything, for His infinite mercies, loving kindness and divine favour towards me.

*It is with immense gratitude that I acknowledge my Supervisor **DR. Kona Adhikary** (Assistant Professor, Department of Animal Science and Nutrition, CVASU) for her supervision, support and providing the facilities to complete the report.*

I also express deep appreciation to Dean and External Affairs for giving the chance to me to fulfill my study.

I would like to acknowledge the cooperation and support of DR. Md. Shahadat Hossain Suvo (Deputy Curator of Chattogram Zoo) for assisting with the collection of data for the study.

I also like to give thanks to the keepers of Chattogram Zoo for support and providing the materials needed for the study.

I am indebted to my family for their spontaneous blessings, support and encouragement that was needed for completion of my report.

Most importantly, I am very much thankful to Chittagong Veterinary and Animal Sciences University (CVASU) for giving me opportunity for my study.

BIOGRAPHY

The author, Farhana Farsa, was born and brought up in Chattogram, a beautiful city. She attended Dr Khastagir Government Girls' High School, where I completed her Secondary School Certificate. Then she completed her Higher Secondary Certificate from Chattogram Govt Girls' college. For being an avid lover of animals, she had dreamed of becoming a veterinarian from her childhood. So, she got herself admitted in Chattogram Veterinary and Animal Sciences University. After completing her DVM degree, she wants to get involved in the field of research. Her research interest includes working on Bioinformatics and she also have an interest in conservation of wildlife.

APPENDIX-I

Study on Nutrition, Management, Reproduction and Behavior of Royal Bengal Tigers in captivity in Chattogram Zoo

Date:

Description:

Name of the zoo:

Location:

Total number of tigers:

Male	Female	Cub	Total
Source:			

Housing:

- a) Alignment:
- b) Area: Length × Width × Height (ft³)=
- c) Floor type: a) Paved b) Unpaved
- d) Roof type:
- e) Manger:
- f) Watering trough:
- g) Roaming area:
- h) Captive cage:
- i) Hiding area:
- j) Environmental enrichment (Log/pool):
- k) Drainage:

Other sheds:

Shed	Isolation shed	Quarantine shed	Maternity box
Area (ft ²)			
Floor			
Bedding			
Facility (if any)			

Have proper ventilation? A) Yes B) No

Feeding:

Tiger	Age	Feed	Amount	Frequency	Leftover	Water	Frequency

Changes in feed during pregnancy:

Amount:

Supplementation:

Other care:

-

-

Colostrum feeding:

Weaning age: (Days)

Feeding of weaned cub:

Reproductive performance:

Id. no	Parity	Birth wt (kg)	Age of puberty (month)	Gestation period (days)	Season of birth	Litter size and sex	Mortality (%) (Cause)	Mean interval between litters

Mean reproductive rate:

Mean litter size:

Morphology of the cubs:

Vaccination and medication history:

Vaccine	Age at 1 st dose	Boostering	Disease	Treatment

Behavior:

Feeding behavior:

Reproductive behavior:

Maternal behavior:

Competitive behavior:

Presence or absence of visitors:

Presence of keeper:

Companion behavior:

Introducing new animals in the cage:

Signature

