

Behaviour of Zoo-housed Tigers: A Case Study

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Abstract: The truth is that tigers have had to survive in captivity because of hunting, poaching, the loss of their habitat and other anthropogenic threats. Captivity has been the only way to preserve the species. It is common that captive tigers develop abnormal behaviours because of the limited space where they live and the continuous contact with humans. A study of different behavioural aspects of Royal Bengal tiger (*Panthera tigris tigris*) housed in zoo was carried out over a period of one year only during their routine husbandry practices and visit hours and no experiments were conducted. This study uses scan sampling and instantaneous recording to collect data on the behaviour of tigers housed in different social groups. The behaviours of selected individual or a group were also recorded continually over 8 hours with the help of small surveillance cameras and Bushnell 10X40 binocular whenever necessary. Enclosed and confined to a small area they cannot do what they usually do in the wild: run, swim, climb trees, hunt, and so on. This study has also evaluated the effects of biological and environmental factors on the stereotypic behaviour of the tigers under captive conditions housed in zoos and suggests remedial measures. In general, tigers in captivity have little or no control over the duration, and nature of light, sound, odours, visitors or temperatures to which they are exposed to. These variables influence tiger activity or behaviour in captivity. So there is a need to improve the quality of life of tigers and raise the number of individuals in captivity.

Keywords: Tiger, captive, behaviours, space, stereotype, zoo

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I. Introduction

Having animals in captivity is not a recent practice. The captivity in zoos is a little more recent, dating to the eighteenth century. Since last 40 years zoos are shifting the focus from entertainment towards conservation based education^{1,2,3,4,5}. These establishments justify their existence for the sake of education, research, conservation, and recreation and the roles are often interconnected rather than separate^{6,7,8}. The confinement of animals is a very controversial and often disputable condition. Although many people argument against parks and zoos, as a large number of tigers, are captive in them. Globally zoological parks play a major role in the conservation of threatened species, but their adaptation in captivity is posing a major challenge. Stress generates from inadequate adaptation could lead to suppression of cognitive functioning and increased display of stereotypic behaviour. Tigers are among the most endangered animals on earth. Unlike wild tigers, zoos housed animals are subjected to contact with unfamiliar humans. Public exposure can be one of the determining factors in the expression of stereotypic pacing^{9,10,11,12}, the repetitive and apparently functionless locomotors behaviour displayed by captive animals¹³. Improvements to the captive environment must be ongoing and focus on providing the best husbandry possible. Understanding species biology and behaviour is an ongoing process. This study has evaluated the stereotypic behaviour of tiger under captive conditions.

II. Material and Methods

Study site: This study was conducted in Nandankanan Zoological Park (85° 48' 53" – 85° 81' 47.03"E and 20° 24' 00" – 20.399965°N) lies in between Cuttack, the former capital and Bhubaneswar, the present capital of Odisha. The park is at a distance of about 2 Kms from Baranga Railway Station. It is 22 kms from airport at Bhubaneswar and 11 kms from Bhubaneswar Bus Stand. The Zoological Park is situated inside the lush green forests of Jujhagarh forest of Chandaka Forest Division, Odisha. It is the host zoo for white tigers also. Nandankanan is the First Zoo in the country to become a member of world Association of Zoos and Aquarium (WAZA).

Study species: The study involved sampling of eight Royal Bengal Tigers (*Panthera tigris tigris* Linn.) housed in zoo was carried out over a period of one year. The study subjects were observed only during their routine husbandry practices and visit hours and no experiments were conducted.

Procedure methodology: Behavioural observation was taken as the most appropriate method to determine the effects of social group housing on the behaviour of captive tigers in different social groups. A

study of different behavioural aspects of tigers was undertaken and uses scan sampling and instantaneous recording to collect data on the behaviour of tigers housed in different social groups. Common methods for observing behaviour include focal animal sampling and scan sampling (sampling rules), alongside instantaneous or continuous recording (recording rules). In focal animal sampling, one individual is selected for observation. Continuous recording is often coupled with focal animal sampling, and the study duration was recorded for a pre-determined time period defined by the researcher¹⁴. The study consists of recording the activities of one selected individual or a group (adult male, adult female) continually over 8 hours. Observations were also recorded with the help of small surveillance cameras and Bushnell 10X40 binocular whenever necessary.

III. Results

The present work deals with the behavioural responses of normal coloured tigers in relation to food and feeding; resting and sleeping; cooling; and agonistic interactions. The subjects of study were 8 number of normal coloured tigers (n=8). Details of the tigers studied at Nandankanan Zoological Park are given in the Table-1. Observations sessions in which all occurrences of specified interaction were recorded. For data collection a check sheet was prepared. The data collected from the study of time activity profile as shown in the Table -2, Table -3 and Table -4 respectively.

Table 1: Details of the tigers Studied at Nandankanan Zoo

Sl No	Name of the Tigers	Sex
01	Renuka	Female
02	Manish	Male
03	Payal	Female
04	Shara	Female
05	Rishi	Male
06	Kunti	Female
07	Samrat	Male
08	Bijaya	Female

Table 2: Mean Time Spent in minutes by Tigers on different activities on summer days at Nandankanan Zoo

Time	Sleep	Rest	Move	Stand	Groom	Cooling	Feed	Drink	Other Activities	Total
08-09 PM	40.0	00	20.0	00	00	00	00	00	00	60
09-10 PM	00	20.00	25.5	5.5	7.0	2.0	00	00	5.0	60
10-11 PM	10.0	22.0	15.0	5.5	00	3.5	00	3.0	1.0	60
11-12 PM	7.5	30.5	00	00	00	22.0	00	00	00	60
12-01 PM	15.0	10.0	00	00	00	35.0	00	00	00	60
02- 03PM	00	25.0	20.0	3.0	4.0	5.0	00	00	00	60
03-04 PM	00	00	4.0	00	00	30.0	25.0	00	1.0	60
04-05 PM	00	11.0	7.0	00	5.0	15.0	20.0	2.0	00	60
Mean	9.062	15.18	11.43	1.75	2.0	14.062	5.625	0.5	1.0	00
S.D ±	±0.47	±0.73	±0.57	±0.21	±0.22	±0.69	±1.89	±0.32	±0.16	00
%Time spent	15.10	25.3	19.05	2.91	3.33	23.44	9.4	0.83	1.66	00

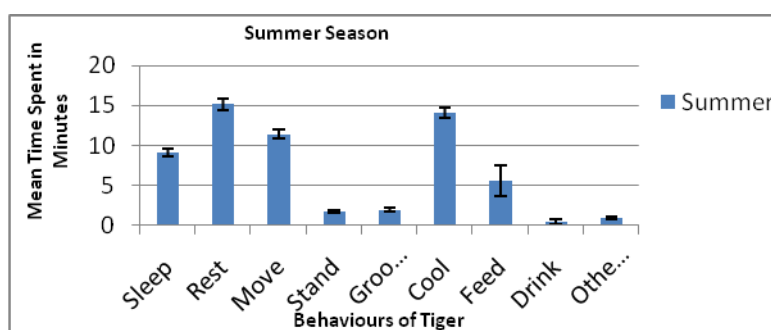


Fig.1: Time spent in minutes by Tigers on daily basis towards different behaviour during summer season.

Table 3: Mean time spent in minutes by Tigers on different activities on Rainy days at Nandankanan Zoo

Time	Sleep	Rest	Move	Stand	Groom	Cooling	Feed	Drink	Other Activities	Total
08-09 AM	50	4.0	5.0	00	00	00	00	00	1.0	60

09-10 AM	5.0	30.0	17.0	00	00	7.0	00	00	1.0	60
10-11 AM	5.0	33.0	16.0	1.0	1.0	4.0	00	00	00	60
11-12 PM	7.0	45.0	2.0	00	00	5.0	00	00	1.0	60
12-01 PM	00	48.0	3.0	1.0	1.0	5.0	00	00	2.0	60
02- 03 PM	11.0	40.0	7.0	00	00	00	00	1.0	1.0	60
03-04 PM	00	9.0	23.0	1.0	1.0	00	25.0	00	1.0	60
04-05 PM	10	23.0	4.0	00	00	00	20.0	2.0	1.0	60
Mean	11.0	29.0	9.625	0.375	0.375	2.625	5.625	0.375	1.0	00
S.D ±	±0.59	±1.38	±0.47	±0.08	±0.09	±0.19	±0.39	±0.08	±0.16	00
%Time Spent	18.33	48.33	16.04	0.63	0.63	4.37	9.37	0.62	1.66	00

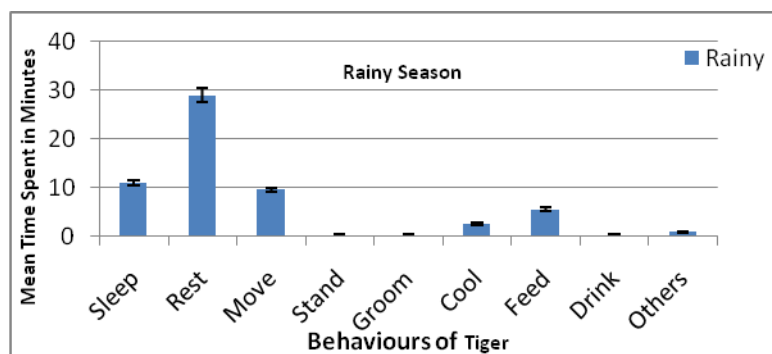


Fig.2: Time spent in minutes by Tigers on daily basis towards different behaviour during Rainy season.

Table 4: Mean time spent in minutes by Tigers on different activities on winter days at Nandankanan Zoo.

Time	Sleep	Rest	Move	Stand	Groom	Cooling	Feed	Drink	Other Activities	Total
08-09 AM	10.0	15.0	24.0	1.0	4.0	5.0	00	10.0	00	60
09-10 AM	18.0	10.0	20.0	2.0	00	10.0	00	00	00	60
10-11 AM	00	25.0	15.0	1.0	6.0	9.0	00	2.0	2.0	60
11-12 PM	00	53.0	5.0	00	2.0	00	00	00	00	60
12-01 PM	30.0	13.0	6.0	00	00	10.0	00	00	1.0	60
02- 03 PM	5.0	25.0	20.0	1.0	2.0	5.0	00	2.0	00	60
03-04 PM	00	00	28.0	00	00	00	30.0	00	2.0	60
04-05 PM	00	33.0	5.0	00	00	00	20.0	2.0	00	60
Mean	7.875	21.750	15.375	0.625	1.750	4.875	6.250	0.875	0.625	00
S.D ±	0.44	±1.29	±0.74	±0.08	±0.25	±0.36	±0.48	±0.09	±0.09	00
%Time Spent	13.12	36.25	25.62	1.04	2.91	8.12	10.41	1.45	1.04	00

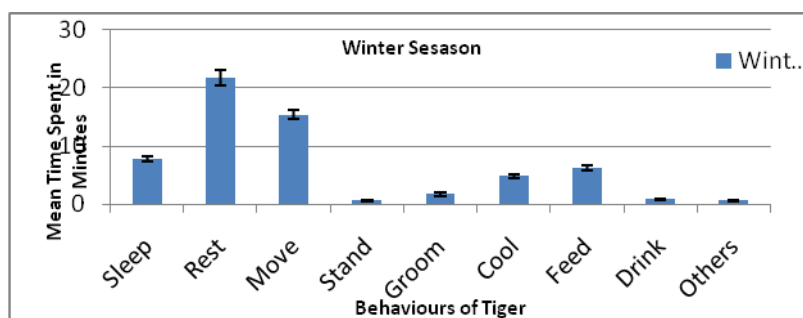


Fig.3: Time spent in minutes by Tigers on daily basis towards different behaviour during winter season.

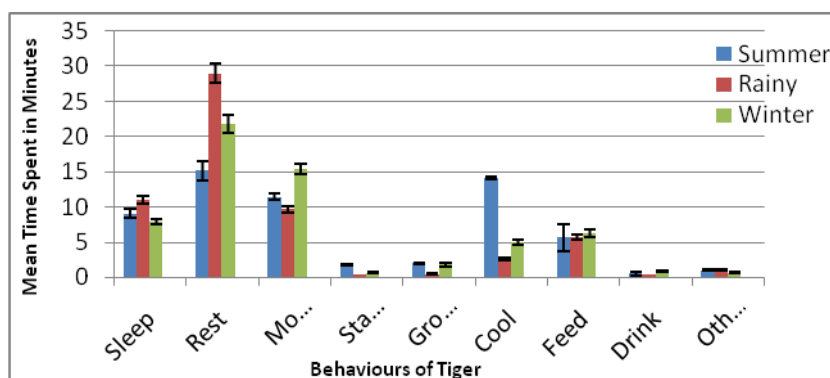


Fig.4: Comparative account of behaviours studied on daily basis in three successive seasons in a year.

The tigers are carnivorous animal. Flesh of whatever living thing in whatever state is acceptable to them¹⁵. Tigers were fed at times ranging from 3.30 P.M to 4.30 P.M. and were fed six days in a week with raw buffalo meat. During feeding time tigers were found to be restless and moved around in the enclosure. At the sight of the keeper with the food trolley, restlessness was more marked and all tigers became active. When the keeper moved inside the enclosure, tigers moved simultaneously with the movement of food trolley. The pacing behaviour with restlessness was observed around the food source followed by tigers standing on the hind legs and slapping on the wire mesh by fore paws and growling at the keeper. Tiger being a wild animal, it earns a high preference in different feed contents. The first choice of the tigers are the fatty tissues of the abdomen, intestines and muscular organs like the kidneys, hearts, liver, lungs¹⁶. They spent a maximum 25.3% of time in resting particularly from 9 A.M. to 3 P.M. Normal spent a maximum of 36.25% resting in winter season. Tigers spent a maximum 15.10% of time in sleeping and show maximum hours during 8-9 A.M. They were found to assume following postures during sleep (i) Lying flat on one side on the ground (ii) Lying in a rolling manner arching the back (iii) Lying flat on one side with chest and abdomen upward, the hind leg raised and the fore leg of the same side resting on the chest. In captive condition the tigers rush into the water body for cooling during summer and spent a maximum 23.44 % of time in cooling

IV. Discussion

This study investigates in detail the behaviour, spatial association, personality, of captive tigers housed in different social groups and that individuals vary in their responses to the captive environment. Captivity undoubtedly alters behaviour, which is undesirable from an aesthetic and scientific point of view. Animals will continually modify their behaviour to best fit their environment. A major problem with captivity is that all the essential requirements for survival are taken care of.

The behavioural studies reveal following aspects of tigers. At the sight of the keeper with the food trolley, restlessness was more marked and all tigers became active. Once food was kept inside the feeding chamber and shutter opened the tiger were found to rush hurriedly either remained or fed there or came out with a big piece of buffalo meat on the mouth to outside. The flesh and soft bones were swallowed. It was also observed that bones were held between pads of the fore paws and tiger gnawed on it. They were found to be very calm during feeding. Tigers were found to swallow grass blades and later vomited. They spent maximum time in resting during summer, winter and rainy season. During resting the tigers exhibit resting postures, i.e. with belly on the ground, forelegs forward and close together hind legs to both sides and head little lowered. In the rainy season, during rain tigers prefer to stay inside the resting cell. Tigers produced agonistic behaviour usually during feeding.

In general, animals in captivity have little or no control over the duration, and nature of light, sound, odours, visitors or temperatures to which they are exposed to. These variables influence tiger activity or behaviour in captivity. Environmental enrichment in suboptimal captive conditions may help reduce behavioural stress, which could lead to improved health, reproduction, and longevity. Delay in feeding caused pacing behaviour with aggressiveness, dislike and anger in tigers. For example, tigers housed in small enclosures paced more frequently than those in larger enclosures¹⁷. Therefore Stereotypic behaviours are commonly observed in large captive cats caused by a lack of a stimulating environment. This study concludes that large enclosures with psychological enrichments, viz., pool (with clean water) and stones, proper health care and positive keeper attitude are essential for tigers. Tigers develop abnormal behaviours because of the limited space where they live and the continuous contact with humans. Enclosed and confined to a small area they cannot do what they

usually do in the wild: run, swim, climb trees, hunt, and so on. Tiger is wide-ranging in nature and stereotype and stress decrease with enclosure size. Hence, to reduce their stereotype, the existing zoos with enclosures smaller than suggested by CZA need to enlarge their size,

V. Conclusion

Overall, the finding suggests that tigers in captivity should be managed in larger enclosures enriched with pool, and stones, and in appropriate social conditions with adequate veterinary care to reduce stereotypes and stress level. Positive keeper attitude plays a crucial role in the welfare of tigers in captivity. The study is promising and is comparable with their natural behaviour in the wild; for example, tigers require larger natural habitats.

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