

## A STUDY ON MATING BEHAVIOUR OF GREAT INDIAN ONE-HORNED RHINOCEROS IN CAPTIVITY

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### Abstract

The Great Indian one-horned rhinoceros (*Rhinoceros unicornis*), the second largest land animal, is one of the most threatened species. Kanpur Zoological Park, Kanpur presently houses four rhinoceros in its collection (3:1). The current study was carried out on a female and a male rhino which are housed in rhino area of Kanpur Zoo. Behavioural observations were recorded using simple observation method and data was collected and analysed. Observations revealed that the female takes initiative in pre-mating play by producing whistling sounds and frequent micturition. She was even found running towards the male to stimulate him for courtship. Interpretations indicate that the desire of courtship and mating in Indian rhinoceroses does not always synchronize. Males experience a period of rut as does the female in oestrus and these episodes of rut and heat must correspond before mating takes place. The oestrous signs in female such as whistling, frequent micturition, moving towards male were observed; while repeated urination, penis protrusion and Flehmens reactions were important signs exhibited by the male. For mating, the female may be first introduced to the enclosure followed by the male so that female gets familiar with the enclosure. Duration of mating was found to be as long as 70 minutes.

**Key Words** Mating behaviour, Rhinoceros, Conservation breeding, Captive breeding, Courtship

### Introduction

The Great Indian one-horned rhinoceros (*Rhinoceros unicornis*) is the second largest land animal. At present living rhinoceros are represented by five species and four genera (Fowler and Miller, 2015). Poaching for their horns (for medicinal use) and loss of habitat makes them one of the most threatened species. These threats are the major drivers of their declining population in wild that need to be managed (in-situ measures) as well supplemented (ex-situ conservation techniques). Conservation breeding is the key to reintroduce the captive bred species into the wild, therefore it is essential to understand the

reproductive behaviour of the species, especially in captive facilities. Our study focuses on the concept of understanding the reproductive behaviour of Indian one horned rhinoceros in zoos for future conservation programmes.

The basic anatomy of the female reproductive system is similar in all species, with a bicornuate uterus, which has a short body and long tubular horns (Fowler and Miller, 2015) to accommodate a large foetus. In the male rhinoceros, the testicles are held close to the body along the perpetual fold and are

positioned horizontally. The relaxed penis is curved caudally, a position that results in the characteristic backward directed urination in male. (Fowler and Miller, 2003). They normally produce one calf after completion of around 480 days of gestation (Fowler and Miller, 2015).

### Materials and Methods

The study was conducted using simple visual observation technique with the help of binoculars, stop watch and a camera. Study further involved thorough discussion with the experienced keepers, veterinarians and wildlife managers and the history and treatment sheets of the both the animals were studied and each event since 2011 was noted in a chronological order.

The Female rhinoceros named Manu coded in Indian National Stud Book as No.118 was born on 22.06.2002 in Kanpur Zoological Park, Kanpur, India. Usually, female rhinoceros attain sexual maturity at the age of 4.5 years (Fowler and Miller, 2015). To breed rhinoceros in Indian zoo conditions has always been a challenging task considering receptivity of both sexes, safety of animals and resources available. The first attempt to mate Manu was made when she was six years old. Of the seven attempts to breed this female only two attempts were found to be (including present study) successful. Selected male, Rohit identified as No. 85 in Indian National Stud Book of Rhinoceros was born on 20.06.1989 in Kanpur Zoological Park, Kanpur, India. He had experienced two matings with another female before being introduced to Manu.

### Observations

For the convenience of the study and to better understand the breeding behaviour, the observations were divided into two parts i.e., pre-mating behaviour and mating behaviour. Pre-mating behaviour involved courtship behaviour (pre-copulation) displayed by

both the sexes during their sexual excitement i.e., oestrus in female and rut in male in their respective enclosures. In case of female, first signs of heat were observed with inconsistency in feeding and as the left-over feed increased along with movement towards male exhibit followed by eye contact. As the intensity of heat increased, feed consumption further decreased. This indicated that routine diet is affected during courtship. Another important behaviour observed was the frequency of urine discharge which was found proportional to the heat. The female was also observed producing low whistling sound to attract male. The female moved to-and-fro and spent most of the time close to the common dividing wall (low height approx. 1.5 meters) that had male standing on other side.



Fig 1. Male and female Greater Indian one-horned rhinoceros.



Fig 2. Mating behaviour of Greater Indian one-horned rhinoceros.

The male demonstrated repeated penis protrusion when in rut and constant looking in the direction of the female. Recurring micturition in his exhibit & Flehmen response were also documented during the study.

After 16 hours of observation, female was introduced to the male. Before mating, both the animals were kept separately and were closed in the different houses of the mating enclosure. The female was introduced to common area an hour before male to get acquainted with the enclosure. The enclosure had a large open area with a dry moat and a wallowing pool. Both sexes showed repeated urine discharge over the ground. On observation in context of frequency and volume of urine output, female showed more frequent but less urine discharge in contrast to male who had more discharge but was less frequent. The male exhibited Flehmen on smelling the female urine, while the female produced whistling sound throughout this period. After which, the animals were noted chasing each other, initially male was chased by female and was later reversed. Both the sexes used moat during chase. The chase was recorded to last for 60 minutes.

Later both the sexes were seen standing face to face with their snouts touching each other for three minutes. Soon the male mounted the female and mating started. On being mounted, the female was observed initially moving back for few meters followed by very slow forward movement. After ten minutes while already in copulation both the sexes went into the wallowing pool slowly and remained in it till the end of mating. The total mating time recorded by the team was 70 minutes. The whole event was recorded as a single effort and was found to be non-violent. Both the sexes remained in same enclosure for next 24 hours and were separated the next day.

## Results and Discussion

The results of the study were noted and were compared with available references. Few of our results were at par with the results of earlier researchers; however, the study also revealed new findings and few of results deviated from earlier records.

Results suggest that the male and female should be well acquainted with each other and the male should be in proper receptivity before being introduced to the female, as earlier attempt of the mating had gone into vain. It is therefore important to have both sexes in acceptance. According to Laurie, 1982 male rhinoceros may get aggressive and can cause serious injuries to female whereas female may also repel the male advances by simply turning and snorting.

According to Dutta, 1991 during mating, males may become very aggressive and may kill female and moreover rhinoceros females may become aggressive too, especially during courtship chases in wild, which may result in scrapes, cuts or deeper wounds. Best time to mate the female is minimum 16 hours after showing the first sign of oestrus. As up to this period the female peaks in the oestrus cycle and the male following her due to rut also begins to show sexual urge and chances of infighting become less. In captivity the female should be introduced first inside the mating enclosure, at least in an hour in advance to make her familiar with the enclosure so that even if infighting breaks out she can defend herself by running to a safer place (like moats etc).

The study revealed some signs of the oestrous among rhino females such as inappetance or less consumption of feed in small frequencies due to ongoing hormonal fluctuation. Guldenschuh and Houwald, 2002 also indicated that as the intensity of heat increases the female gradually decreases the diet due to increased

level of hormones. Frequent movement of female towards male and repeated micturition all over ground to distribute pheromones on a larger area, so that number of males may approach her, was one of the most significant signs. Under natural circumstances this gives her added advantage to select best male to mate. Snorting or whistling sound made by females to attract the male was another important sign.

The male showed repeated penis protrusions during rut, staring at the female to show dominance, frequent micturition to send signal to the female regarding being receptive to mate and Flehmen response. Similarly, Laurie, 1982 found that Bulls test the female's reproductive status by tasting her urine, which is then followed by a pronounced curling of the upper lip, known as 'Flehmen response'.

In our study the only female of Kanpur Zoo was mated with the only breedable male who happened to be her father. According to the study of Zschokke and Baur (2002) neither gestation period nor birth mass was affected by inbreeding. However, inbred calves grew slower and had a lower mortality rate. They concluded by suggesting the lack of negative effects of inbreeding of mother and offspring suggests that inbreeding avoidance in the Indian rhinoceros may be not as important as it is in other species. The day time was selected for mating due to convenience of the availability of the man power to control the possible infighting among male and female. Our decision of mating during day time followed Tripathi, 2013 who suggests that courtship and mating behaviour can occur at any time of the day or night among Indian rhinos.

Observations also revealed that the female takes initiative in pre-mating play by producing whistling sound and by frequent micturition, even chasing the male was recorded. This act of courtship was observed

for 60 minutes and was followed by actual mating (copulation) which lasted for more than an hour. It was also observed that mating began at the ground of the enclosure followed by movement of both the sexes inside the wallowing pool while male remaining mounted over female. The results of our observations are similar to Srivastava and Nigam, 2010, who opine that mating in rhino is initiated by female who runs around the potential breeding male by making loud sounds and frequently squirting urine and occasionally pushing the male. The male rhino then chases the female for hours till the female rhino gets exhausted and remain in same place and then mating initiates.

In a similar study by Laurie, 1982 it was found that if the female turned and ran and the male chased her, sometimes over several kilometres. The male generally squeak-panted during such chases while the female honked or bleated very loudly. After such a chase the male usually caught up with the female again by following her scent. Similarly in our study it was found that until the female is receptive, she may repeatedly drive the male away with mock charges and other defensive behaviour. Loud whistling by Indian Rhinos announces reproductive condition and location, which typically occurs 6-10 hours prior to courtship or breeding activity. The whistling attracts bulls that respond with pre-copulative behaviour, such as prolonged chases. Such behaviour ensures that females ultimately mate with the strongest (most dominant) male in the vicinity. It was also found that the female suffered mating stress for three days but returned to normal behaviour after three days. The reason may be exhaustive pre-mating run and long duration mating and due to bearing weight of a mounted rhino bull over her back for seventy minutes.

## Conclusion

This study is especially helpful in captive breeding as it defines that both the rhinos should only be allowed for mating when both the sexes are socialized to promote successful mating and to also prevent infighting in captivity. This study also revealed the signs of receptiveness in both sexes.

## Acknowledgement

Authors are thankful to Mr Deepak Kumar, IFS, Director, Kanpur zoological park, Kanpur, India for providing all facilities to conduct the study. Thanks are also due to Mr K Praveen Rao, IFS, chief conservator of forest, wildlife, western region, Kanpur for providing photographs.

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# IZYB

INDIAN ZOO  
YEAR BOOK

2021  
VOLUME IX



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**Suggested citation:** (an article of IZYB as example)

Sahu S. K., Sahoo, N., Panda S. K. & Mohapatra, D. (2021) Cytotoxicosis in a Bengal tiger (*Panthera tigris* ssp. *tigris*) at Nandankanan Zoological Park, Odisha. Indian Zoo Year Book. Vol. IX: 1-5.