

Observations on the copulations of white rhinos at Ziwa Rhino Sanctuary, Uganda

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Introduction

Little detailed information has been published about the copulation of white rhinos (*Ceratotherium simum*) in the wild. Copulation is generally reported to last up to an hour (Groves 1972). Since June 2010, the rangers at Ziwa Rhino Sanctuary, Uganda have monitored the rhino population 24 hours a day for every day of the year to increase understanding of rhino behaviour including reproductive patterns (Patton et al. 2011). Between September 2010 and November 2018, they observed 60 timed and 20 untimed copulations by the two main breeding males (Taleo and Moja), two newly breeding males (Augustu and Hassani), seven breeding females (Nandi, Bella, Kori, Donna, Malaika, Laloyo, Uhuru), and two pregnant sub-adult females (Waribe and Luna).

Results

Table 1 shows a summary of the total of 80 timed and untimed copulations. Moja was recorded copulating 50 times, Taleo 22 times, Augustu 7 times and Hassani just once. Multiple same day copulations occurred on 17 out of 57 times—on one occasion four times in a single 24-hour period, on three occasions three times a day and 14 occasions twice a day. The table also illustrates the choice of mate with only two females copulating with an exclusive male; six with two different males and in one instance a female copulated with three males. During the same calving period, five of the females copulated with two different males and two females with three different males.

Table 2 shows a summary of the duration of the copulations in minutes for each breeding male. The mean duration of a copulation of the five breeding

males was 17 minutes. Based on a 16-month gestation period as reported in Patton et al. (2018), the duration of the copulations that led to conception is summarised in **Table 3**. Of the eight conceptions, one was the result of three, same-day repeated copulations, four of two repeated copulations and three of a single copulation.

Table 4 shows the number of months when a female was first mated after the birth of her new calf and the identity of the male responsible with as near complete accuracy as possible. Of the three older females, the months between new calf birth and mating was shortened with increasing age for Nandi and Kori, while it remained consistent for Bella. Of the 15 records, Taleo and Moja were equally the first-choice mate, 7 times each, with Augustu chosen once.

The age at which a non-breeding female allowed a first mating is shown in **Table 5** with the average of 3 years and 1 month ($n = 6$).

The age at which juvenile/teenage males had their first mating was 17 years and 2 months for Hassani at his only time of mating, while Augustu was 8 years and 7 months old at first mating. Hassani copulated for only 7 minutes while Augustu copulated for 20 minutes. The two older males, Taleo and Moja, had mated before records were started.

A total of 71% of copulations occurred during daytime and 29% during night-time as shown in **Table 6**. On 14 occasions, copulations occurred more than once on the same day with an average of 4 hours between each (range 1–9 hours).

Discussion

A comprehensive study of rhinos in captivity carried out by Lindemann (1982) reported on 12 individuals, where copulation lasted from 5 to 40 minutes, with an average number of copulations 2.3 ($n=31$, range 1–12). Fouraker and Wagener (1996) stated that in captivity

“rhinos may remain coupled for 30 minutes to one hour.” Data collected by Rookmaaker (1998) on captive white rhino showed that the youngest mothers were 4 years 4 months and 4 years 11 months of age at first parturition, and males could even have mated before their third year.

In Umfolozi, South Africa, Owen Smith (1973) observed seven wild white rhino copulations lasting between 15 to 28 minutes. All were seen during the day but Owen Smith concluded that there was no reason why mating should not occur at night. As only in one case was a repeat mating seen (after 3 hours), it seemed that a single copulation was the norm.

The data in this study represent the most comprehensive analysis of copulation in wild white rhinos. The experience of Ziwa rhinos shows that copulations are more likely in daylight hours, last for around 10 to 25 minutes and may be repeated on the same day with an average four-hour interval. Repeat copulations may often be necessary for conception. Females may mate with more than one male within the same calving period.

References

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Table 1. Summary of 60 timed copulations and 20 copulations not timed of white rhinos at Ziwa Rhino Sanctuary

Female	No. of Copulations in one Tay	Length of each Copulation (mins)	Male
Nandi	4 on one occasion	40–21–45–50	Taleo
	3 on one occasion	23–14–19	Taleo
	2 on three occasions	28–10/NT–NT/NT–NT	Taleo/Moja
	1 on six occasions	15–23–21–17–20–NT	Moja
Bella	3 on one occasion	NT–19–12	Moja
	2 on two occasions	6–30/NT–NT	Taleo
	1 on five occasions	20–31–NT–NT–NT	Moja/Taleo
Kori	2 on two occasions	18–8/NT–NT	Moja/Taleo
	1 on five occasions	22–NT–NT–NT–NT–NT	Moja/Taleo
Donna	2 on one occasion	13–13	Taleo
	1 on two occasions	21–21	Taleo
Malaika	1 on six occasions	18–23–14–5–22–NT	Taleo/Moja/Augustu
Laloyo	3 on one occasion	5–7–15	Moja
	2 on one occasion	5–13	Moja
	1 on seven occasions	13–13–11–18–18–20–NT	Taleo/Moja
Uhuru	2 on two occasions	14–16/14–16	Augustu
	1 on four occasions	12–15–15–13	Moja/Augustu
Waribe	2 on two occasions	9–12/15–14	Moja/Augustu
	1 on one occasion	7	Hassani
Luna	2 on one occasion	17–12	Moja
	1 on three occasions	7–14–12	Moja

Table 2. Average Copulation length for each breeding male (minutes)

Male	Average Copulation time	n	range
Taleo	23 minutes*	16	6-50*
Moja	14 minutes	36	5-31
Augustu	18 minutes	7	14-23
Hassani	7 minutes	1	
MEAN	17 minutes	60	5-50

*in the case of Taleo, the four long copulations on one day are extreme in comparison to the other data and could be due to the observers recording more of the mating process than the copulation phase. If these data are removed (see Table 1) the average time of copulation for Taleo is reduced from 23 to 18 minutes, range 6-30 (n=12).

Table 3. Length of time in minutes taken for copulations resulting in conception

Female	Length of believed conception copulation	Male
Nandi	28-10	Taleo
Nandi	21	Moja
Bella	NT-19-12	Moja
Kori	18-8	Moja
Donna	13-13	Taleo
Malaika	22	Augustu
Laloyo	18	Moja
Luna	17-12	Moja

Table 4. Number of days after birth of new calf when the first mating takes place

Female	First mating after birth of new calf (days)	Male
Nandi	187	Taleo
Nandi	234	Moja
Nandi	87	Taleo
Nandi	79	Moja
Bella	300	Taleo
Bella	133	Taleo
Bella	279	Moja
Kori	203	Taleo
Kori	218	Moja
Kori	276	Moja
Kori	56	Taleo
Donna	165	Taleo
Malaika	374	Moja
Laloyo	216	Moja
Uhuru	34	Augustu
MEAN	189	(n=15)

Table 5. Age of female at first mating

Female	Age of first mating
Donna	2y 11m
Malaika	3y 6m
Laloyo	2y 11m
Uhuru	3y 1m
Waribe	3y 6m
Luna	2y 8m
MEAN (n=6)	3y 1m

Table 6. Number of copulations by Day (7am to 6.59pm) and by night (7pm to 6.59am) for each female rhino.

Female	No. Day	No. Night	TOTAL
Nandi	11	4	15
Bella	8	3	11
Kori	7	0	7
Donna	3	0	3
Malaika	2	4	6
Laloyo	6	5	11
Uhuru	5	1	6
Waribe	4	2	6
Luna	2	1	3
ALL (n=9)	48	20	68