

Observations on the first inter calving interval for six, particularly early breeding white rhinos at Ziwa Rhino Sanctuary, Uganda

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Introduction

The Ziwa Rhino Sanctuary (RS) covers an area of 64.2 km² in the Nakasongola district of central Uganda. Before becoming a wildlife refuge in 2004, the area was part of a cattle ranching operation. Ziwa RS was established in 2005 and was operated under private management. In May 2021, the Uganda Wildlife Authority assumed responsibility for the management of Ziwa RS, and monitoring studies have been limited since then. Ziwa RS holds the only semi-wild (introduced from South Africa to East Africa in the 1960s) southern white rhinos (*Ceratotherium simum simum*) in Uganda. Three sub-adult males and three sub-adult females formed the founder population in 2005/2006. At the end June 2023 the white rhino population was 38.

The three founder sub-adult females started breeding in 2009/2010 when, at the age of 8.5 years old, one of the founder sub-adult males, *Taleo*, had reached maturity and became the dominant, assertive male. *Taleo* was the father, confirmed by genetic analysis, of the first six females born in the Sanctuary, as shown below.

Following the death of one of the founder breeding females *Nandi* in January 2021, as of the end of 2022 there were eight breeding females as follows:

Multi-calving, founder females: *Kori*, *Bella*

First born calving females: *Malaika*, *Laloyo*, *Donna*

Second born calving females: *Uhuru*, *Luna*, *Waribe*

White rhinos are generally reported to reach sexual maturity between 4 and 5 years of age but do not reproduce until 6 to 7 years of age.

The average age at first calving is a useful indicator of breeding performance which can be applied where the rhinos are individually known and frequently sighted. Females in rapidly growing populations may have their first parturition as young as 6.5 years but in populations with poor performance the age at first calving may lengthen to over 7.5 years (Owen-Smith 1975; du Toit 2006)

However, with only three adult females, *Taleo* used his strength to mate with the six sub-adult females, earlier than the 6.5 years normally expected.

The calving interval (CI) is the period between one calving and the next calving. One of the best indicators of population performance is the average inter calving interval (ICI) as it is largely independent of sex ratio. The measure is determined by observing the calving frequency of known females and averaging these values. In white rhinos, the ICI should be between 2.5 and 3 years (Kenya Wildlife Service 2021; Ververs et al. 2017).

ICI is used by the South African Development Corporation (SADC) on a scale to describe the level of fecundity in a white rhino population:

>3.5 years (42m) for ICI indicates poor to very poor fecundity; 3.1–3.5 years (37–42m) for ICI indicates moderately poor to poor fecundity; 2.5–3.0 years (30–36m) for ICI indicates good to moderate fecundity; <2.5 years (30m) for ICI indicates good to excellent fecundity. (du Toit 2006)

This paper presents observations on the ICI between the birth of the first and second calves of the six Ziwa females that produced their first calf at a particularly young age.

Results

Table 1 shows the age of the Ziwa RS founder females when they had their first and second calves and the resulting CI with an average of 25 months (range 23–27).

Table 2 shows the age of the Ziwa RS-born females at the time of first and second births, with the resulting CI being on average 34 months (range 27–44).

Table 3 shows a summary of the first and subsequent calving intervals recorded for the nine Ziwa RS breeding females with an average of 25 months (range 18–45).

Table 4 shows an analysis of ICIs for the Ziwa RS breeding females, illustrating a much longer average for the Ziwa RS-born females (34m) compared to the average from the founder females (24m).

Table 1. Breeding data and first calving interval for Ziwa founder females between 2010 and 2022

Rhino	First birth age	Second birth age	First CI
Nandi	9y 11m	11y 11m	23m
Bella	9y 9m	12y 0m	27m
Kori	10y 0m	12y 0m	24m
Average	9y 9m	12y 0m	25m

Table 2. Breeding data and first calving interval for ZRS-born breeding females between 2010 and 2022

Rhino	First birth age	Second birth age	First CI
Donna	4y 6m	7y 5m	35m
Luna	4y 9m	8y 5m	44m
Uhuru	5y 1m	7y 6m	29m
Malaika	5y 7m	7y 10m	27m
Laloyo	5y 7m	8y 7m	36m
Waribe	5y 8m	8y 7m	35m
Average	5y 3m	8y 1m	34m

Table 3. Calving Intervals for the Ziwa breeding females between 2010 and 2022

Calving intervals	1st	2nd	3rd	4th	5th	6th
Nandi	23	24	26	23	20	21
Bella	27	27	26	26	24	
Kori	24	24	26	23	18	23
Malaika	28	22				
Donna	36	37				
Laloyo	35					
Uhuru	30					
Luna	45					
Waribe	34					

Table 4. Analysis of the summaries of the Inter-Calving Intervals for the ZRS breeding females between 2010 and 2022

First ICI founder females	25m	n=3
First ICI ZRS born females	34m	n=6
All ICI all females	25m	n=25
All ICI all less ZRS born females	24m	n=19

Discussion

The average age of first calving of the three Ziwa RS founder females, at 9.75 years, was well above that of the 6.5 years indicated by du Toit (2006). This was likely due to the absence of a male of breeding age as the founder males were of the same age as the founder females at the time of introduction and were not in optimum condition to mate.

The average age of first calving of the six Ziwa RS-born females, at 5.25 years, was much earlier than that of the 6.5 years reported in the SADC guidelines (du Toit 2006). This was likely due to the lack of opportunity for the breeding male to find mating opportunities once the three founder females had conceived. As soon as each Ziwa RS-born female had reached a condition to conceive, the breeding male exerted his greater physical presence.

The ICI of the founder females at 24 months is well within the SADC performance indicator of <30 months to indicate good to excellent fecundity (du Toit 2006). All 25 calving intervals were below the 30-month threshold.

The ICI of the Ziwa RS-born females at 35 months is just within the SADC performance indicator of good to moderate fecundity. One of the CI, at 45 months, would even be rated as poor to very poor fecundity. The available mating data show that it was possible that the female could have had an absorbed miscarriage and conceived immediately after she lost the calf-in-utero, but this would have reduced the CI to just 40 months.

There is only one second CI available from the Ziwa RS born females, that for *Donna* at 37 months (Table 3). Therefore, it is not possible to postulate as to whether future CIs will be reduced to a level more similar to that of the founder females or not.

A literature search was unable to find any data for first CI of early-aged calving females for comparison.

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