



TORGAMBA ♂

♀ BINA

# CURATOR'S REPORT 2002

Dedi Chandra, Marcellus Adi, Nico van Strien (eds)

Yayasan Suaka Rhino Sumatera, Jakarta & Bogor, 15 April 2003



**Sumatran  
Rhino  
Sanctuary**

**Way Kambas National Park**



**Suaka  
Rhino  
Sumatera**

**Taman Nasional Way Kambas**

# **CURATOR'S REPORT 2002**

**A Compilation of the materials published in the monthly Curator's Reports from the Sumatran Rhino Sanctuary (SRS) Managed Breeding Facility in Way Kambas National Park, Lampung Province, Indonesia.**

***Way Kambas, 15 April 2003***

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**THE SUMATRAN RHINO SANCTUARY FIELD PERSONNEL:**

Site Manager : Marcellus Adi C.T. Riyanto, DVM

Animal Curator/Veterinarian: : Dedi Candra, DVM

Facilities Supervisor: : Sumadi

Keepers : 1. Dede Nurdin  
2. Lamijo  
3. Rakimin  
4. Rois Subadri  
5. Sugiono  
6. Sarno  
7. Sunarto  
8. Yuhadi

Household Keeper : Suratno

Cooker : Cecep

Guards : POLHUT (National Park Guards)

Driver/food collector : Surono

## Part 1

# FOOD and WEIGHT TABLES

### PRINCIPAL FOOD ITEMS (in order of importance) :

BROWSE: Collected in villages and outside SRS

jackfruit (*Artocarpus heterophylla*),  
various *ficus sp*, various forest  
pulai (*Alstonia scholaris*),  
waru (*Mallotus mollucanus*),  
mahang hijau (*Macaranga triloba*),  
akar jitan (*Strophantus caudatus*),  
akar merah (*Mussaenda frondosa*),  
keputihan (*Clibadium surinaraense*),  
akar mencret (*Meremia peltata*),  
kasapan (*Croton caudatus*), and  
torop (*Artocarpus elasticus*).

### FRUITS :

banana,  
carrot,  
sweet-potato,  
pineapple,  
papaya,  
watermelon,  
rose apple,  
pumpkin,  
mango.

**JANUARY 2002**

**FOOD AND WEIGHT (in Kg)**

Date	♀ BINA			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits	
1	25.0	5	-	23.0	5	-
2	20.0	4	-	34.0	4	-
3	14.0	4	-	22.0	4	-
4	10.0	4	-	31.5	4	-
5	22.0	6	-	30.0	4	-
6	34.0	6	-	39.0	5	-
7	22.5	6	-	31.0	5	-
8	27.0	4	-	27.0	4	-
9	27.0	6	-	27.0	6	-
10	23.0	4	-	30.0	6	-
11	26.0	6	-	26.0	7	-
12	20.0	6	-	22.5	6	-
13	26.0	6	-	45.0	6	-
14	16.0	6	-	26.0	6	-
15	19.5	6	-	30.0	5	-
16	20.0	6	-	37.0	3	-
17	23.0	5	-	23.0	5	-
18	18.0	5	-	31.5	5	-
19	16.0	5	-	27.0	5	-
20	18.0	5	-	23.0	5	-
21	19.0	5	-	22.0	5	-
22	24.0	5	-	24.0	5	-
23	27.0	2	-	31.0	4	-
24	25.0	3	-	23.0	3	-
25	18.0	4	-	18.0	4	-
26	24.0	4	-	27.5	4	-
27	10.0	5	-	16.0	5	-
28	17.0	5	-	18.0	5	-
29	27.0	5	-	24.0	5	-
30	13.0	5	-	20.0	5	-
31	19.0	5	-	24.0	5	-
Mean	21.0	4.9	-	26.9	4.8	-

FEBRUARY 2002

**FOOD AND WEIGHT (in Kg)**

Date	♀ BINA			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits	
1	21.9	5	-	19.5	5	-
2	9.0	5	-	23.0	5	-
3	20.0	3	-	12.0	3	-
4	17.0	3	-	26.0	3	-
5	13.0	3	-	18.0	4	-
6	12.0	4	-	21.0	4	-
7	14.0	5	-	18.0	4	-
8	15.0	5	-	21.0	4	-
9	12.0	5	-	23.0	5	-
10	14.0	5	-	22.0	5	-
11	12.0	5	-	20.0	3	-
12	16.0	5	-	20.0	5	-
13	17.0	5	-	26.0	5	-
14	13.0	5	-	18.0	5	-
15	24.0	5	-	25.0	5	-
16	15.0	5	-	20.0	5	-
17	10.0	5	-	17.0	5	-
18	16.0	5	-	23.5	5	-
19	13.0	2	-	19.0	4	-
20	15.0	5	-	23.0	5	-
21	13.0	5	-	25.0	5	-
22	14.0	5	-	18.0	5	-
23	8.0	5	-	25.0	5	-
24	18.5	5	-	25.0	5	-
25	22.0	5	-	26.0	5	-
26	37.0	5	-	33.0	5	-
27	24.0	5	-	26.0	5	-
28	8.0	5	632.0	33.0	3	687.0
Mean	14.7	4.3	632.0	20.2	4.1	687.0

MARCH 2002

## FOOD AND WEIGHT (in Kg)

Date	♀ BINA			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits	
1	22.0	5		34.5	5	
2	23.0	5		26.0	5	
3	23.0	5		21.0	5	
4	12.0	10		20.0	5	
5	18.0	2		21.0	3	
6	20.0	0		22.0	0	
7	16.0	4		22.0	5	
8	19.0	4		23.0	5	
9	19.0	4		17.5	5	
10	19.0	4		22.5	5	
11	19.0	4		25.0	5	
12	21.0	4		33.0	5	
13	18.5	5		25.0	5	
14	18.0	5		20.0	5	670.0
15	25.0	5	638.0	40.0	0	
16	33.0	3		28.0	5	
17	20.0	3		35.5	3	
18	11.0	5		38.5	5	
19	13.0	3		30.0	2	
20	22.0	4		30.0	4	
21	16.0	3		25.0	3	674.5
22	9.0	3	642.5	35.0	3	
23	21.0	5		37.5	5	
24	27.0	5		36.0	5	
25	20.0	5		33.0	3	
26	27.0	5		30.0	5	
27	19.0	5		22.0	5	
28	18.0	5		32.0	5	
29	17.0	2		17.0	0	
30	22.0	2		37.0	3	668.5
31	16.0	3	635.5	22.0	3	
Mean	19.5	4.1	638.5	28.1	3.9	671.0



APRIL 2002

**FOOD AND WEIGHT (in Kg)**

Date	♀ BINA			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits	
1	18.0	5		32.5	5	
2	14.0	5		24.0	5	
3	19.0	5		31.0	5	
4	24.0	5		23.0	5	
5	18.0	5		34.0	5	
6	19.0	5		23.5	5	661.0
7	23.0	5		27.0	5	
8	22.0	5		30.0	5	
9	26.0	5		35.0	3	
10	22.0	5		25.0	5	
11	24.5	3		37.0	5	
12	25.0	2		34.0	2.5	
13	18.0	3		23.0	3	674.0
14	16.0	3	622.0	31.0	4	
15	16.0	5		21.0	6	
16	26.0	6		25.5	5	
17	12.0	6		22.0	5	
18	28.5	5		20.0	3	
19	30.0	4		24.0	3	
20	22.0	6		23.0	6	678.0
21	25.0	6	632.0	27.5	6	
22	21.5	5		17.5	4	
23	25.0	5		27.0	6	
24	34.0	5		28.5	5	
25	29.0	5		29.0	5	
26	25.0	5		25.0	5	
27	17.0	5		17.0	5	
28	23.0	3.5		23.0	3.5	
29	23.0	2		21.0	2	
30	8.0	3		15.0	3	
<b>Mean</b>	<b>21.1</b>	<b>4.4</b>	<b>627.0</b>	<b>25.0</b>	<b>4.4</b>	<b>671.0</b>

MAY 2002

**FOOD AND WEIGHT (in Kg)**

Date	♀ BINA			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits	
1	28.0	0		29.0	3	
2	20.0	2		25.5	2	
3	29.0	5		24.0	5	
4	22.0	5		24.0	4	
5	22.0	5		6.0	5	
6	21.0	5		22.0	3	
7	28.0	4		28.0	4	667.0
8	18.0	3		23.0	5	
9	21.0	5		20.0	5	
10	25.0	5		23.0	5	
11	25.0	5	638.5	21.0	4	662.0
12	21.5	2		31.0	2	
13	22.5	2		23.5	2	
14	26.0	2		36.0	2	
15	23.0	4		31.5	2	
16	26.0	5		27.0	5	
17	25.0	5		25.0	5	
18	35.0	5		35.0	5	
19	16.0	4		24.0	5	
20	26.0	3		31.5	4	661.5
21	22.0	5	627.0	30.0	4	
22	26.0	5		30.0	5	
23	26.0	5		27.0	5	
24	25.0	4		32.0	4	
25	26.0	4		40.0	4	667.0
26	24.0	4	634.5	43.0	5	
27	16.5	4		21.0	5	
28	21.0	4		36.0	5	
29	26.0	5		34.0	5	
30	28.0	5		29.0	5	
31	27.0	5		30.0	5	
Mean	24.1	4.1	633.3	28.5	4.2	664.4

JUNE 2002

**FOOD AND WEIGHT (in Kg)**

Date	♀ BINA			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits	
1	21.5	4		29.0	4	
2	29.5	4		24.0	8	
3	25.0	4		39.0	4	
4	34.5	4		34.0	4	
5	21.5	4		32.0	6	
6	36.0	3		28.0	3	
7	30.5	4		34.0	4	
8	36.0	4		32.0	4	
9	26.0	4		30.0	4	
10	27.0	5		27.0	6	
11	24.0	4.5		24.0	4.5	
12	31.5	4.5		30.0	4.5	
13	25.0	5		34.0	5	
14	27.5	5		29.5	4	
15	28.5	4	645.5	33.0	5	
16	18.0	4		27.0	4	
17	25.0	5		23.0	5	
18	25.0	5		26.5	5	
19	22.0	5		28.0	5	
20	19.0	6		30.0	6	
21	22.0	5		30.5	6	
22	20.0	4		28.0	5	
23	26.0	4		30.0	4	
24	22.0	5		28.0	5	
25	24.0	5		23.0	4	
26	23.0	5		21.0	4	
27	29.0	6	653.0	30.0	6	
28	25.0	4		26.0	5	
29	22.0	4		22.0	5	644.0
30	20.5	4	642.0	24.0	5	
Mean	24.7	4.3	646.3	27.6	4.6	644.0

JULY 2002

**FOOD AND WEIGHT (in Kg)**

Date	♀ BINA			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits	
1	33.0	3		32.5	4	
2	24.0	6		32.0	5	
3	30.0	2		38.0	4	
4	31.5	5		35.0	5	
5	34.0	5		33.0	5	
6	36.0	4	650.0	31.0	4	
7	31.0	5		37.0	5	663.0
8	28.0	5		29.0	5	
9	28.0	5		35.5	5	
10	29.0	5		27.0	5	
11	27.5	4		32.0	4	
12	25.0	5		41.0	5	
13	26.0	5		32.0	5	671.0
14	25.0	5	638.0	32.0	5	
15	26.0	5		31.0	5	
16	29.0	5		29.0	4	
17	21.0	4		25.0	4	
18	19.0	6		21.0	6	
19	28.0	4		29.0	4	
20	27.0	3		37.0	3	660.0
21	27.0	5	627.0	35.0	5	
22	31.0	5		35.0	4	
23	31.0	5		34.0	4	
24	24.0	5		26.0	5	
25	23.0	5		33.0	6	
26	27.0	5		30.0	5	
27	30.0	5		27.0	5	
28	30.0	4		31.0	5	668.0
29	29.0	5	632.0	32.0	5	
30	29.0	5		34.0	5	
31	34.0	5		33.0	5	
Mean	28.2	4.7	639.3	31.9	4.7	665.5

**AUGUST 2002**

**FOOD AND WEIGHT (in Kg)**

Date	♀ BINA			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits	
1	23.0	6		37.0	6	
2	31.0	5		30.0	5	
3	35.0	6		29.0	5	664.0
4	29.0	5	646.0	42.0	5	
5	30.0	5		25.0	5	
6	26.0	5		26.0	5	
7	26.0	5		33.0	5	
8	28.0	2		40.0	6	
9	27.0	6		44.0	6	
10	29.0	5		34.0	6	666.5
11	39.0	5	-	39.0	5	
12	31.0	5		38.0	5	
13	30.0	6		30.0	6	
14	38.0	6		37.0	5	
15	27.0	4		29.0	5	
16	29.0	5		29.0	5	
17	35.0	5		35.0	5	
18	24.0	5		25.0	5	680.0
19	17.0	5	634.0	35.0	5	
20	33.0	4		31.0	5	
21	24.0	4		29.0	4	
22	22.0	5		31.0	5	
23	24.0	6		20.0	6	
24	29.0	6		38.0	6	670.5
25	30.0	5	646.5	43.0	5	
26	38.0	5		39.0	5	
27	30.0	5		41.0	5	
28	32.0	5		43.0	5	
29	35.0	3		33.0	3	
30	32.0	3		35.0	3	
31	32.0	5		37.0	5	
Mean	29.5	4.9	642.2	34.1	5.1	670.3

# SEPTEMBER 2002

## FOOD AND WEIGHT (in Kg)

Date	♀ BINA			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits	
1	23.0	3	635.5	30.0	6	659.5
2	25.0	4		35.0	4	
3	22.0	5		28.0	5	
4	30.0	5		31.0	5	
6	34.0	5		49.0	5	
6	25.0	5		41.5	5	
7	29.0	5		42.0	6	691.0
8	27.0	5	650.5	46.0	5	
9	34.0	5		34.0	5	
10	25.0	3		36.0	3	
11	28.0	4		29.0	5	
12	28.0	4		37.0	5	
13	30.0	5		36.0	5	
14	36.0	5	658.0	57.0	5	685.5
15	26.0	5		20.5	6	
16	27.0	4		45.5	5	
17	41.0	5		34.0	5	
18	30.0	5		31.0	5	
19	33.0	5		40.0	5	
20	39.0	5		33.0	5	
21	18.0	5	-	23.0	4	684.0
22	34.0	6		47.0	5	
23	36.0	4		39.0	5	
24	35.5	6		35.5	6	
25	33.5	4		33.0	4	
26	33.0	4		28.0	4	
27	24.0	4		28.0	5	
28	23.0	5		22.0	5	
29	32.0	4	652.0	30.0	4	682.0
30	24.0	4		29.0	4	
Mean	28.6	4.5	649.0	33.9	4.7	680.4



OCTOBER 2002

**FOOD AND WEIGHT (in Kg)**

Date	♀ BINA		Weight	♂ TORGAMBA		Weight
	Browse	Fruits		Browse	Fruits	
1	25.0	4		31.0	5	
2	25.0	5		41.0	4	
3	30.5	4		52.0	4	
4	29.0	5		49.5	5	
5	29.0	4		41.0	5	
6	30.0	4	662.0	47.0	4	
7	37.0	4		50.0	4	
8	31.0	4		48.0	3	
9	26.0	6		42.0	5	
10	34.0	5		32.0	5	
11	31.0	5		32.0	5	
12	32.0	5		27.0	5	
13	34.0	6	648.5	38.5	6	
14	26.0	6		37.0	6	
15	29.0	5		43.0	6	
16	37.0	4		47.0	5	687.0
17	32.0	5		34.0	5	
18	37.0	7		45.0	6	
19	43.0	6	657.0	32.0	6	694.0
20	38.0	6		35.0	6	
21	51.0	5		38.0	6	
22	47.0	5		40.0	5	
23	33.0	6		43.0	6	
24	35.0	4		41.0	4	
25	38.0	2		31.0	2	
26	34.0	4		34.0	5	
27	26.0	5		34.0	5	
28	30.0	4		38.5	4	
29	27.0	4		39.0	4	
30	29.0	5		38.0	5	
31	30.0	5		39.0	5	
<b>Mean</b>	<b>32.8</b>	<b>4.8</b>	<b>655.8</b>	<b>39.4</b>	<b>4.9</b>	<b>690.0</b>

**NOVEMBER 2002**

**FOOD AND WEIGHT (in Kg)**

Date	♀ BINA			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits	
1	38.5	6		35.0	6	
2	33.0	5	659.0	44.0	6	690.5
3	31.0	6		39.0	6	
4	27.0	6		37.0	6	
5	33.0	5		42.0	6	
6	28.5	6		43.0	6	
7	33.0	6		38.0	4	
8	19.0	6		36.0	5	
9	27.0	6	653.5	25.0	6	676.5
10	37.0	4		33.5	5	
11	38.0	5.5		45.0	5	
12	49.0	5		49.0	5	
13	41.0	6		36.0	5	
14	30.0	6		34.5	5	
15	37.0	5		31.0	5	
16	40.0	5		38.0	5	678.0
17	36.0	4		44.0	4	
18	44.0	4	661.5	38.0	5	
19	24.0	5		40.0	5	
20	27.0	5		33.0	5	
21	28.0	6		36.0	6	
22	33.0	6		31.0	6	
23	29.5	5		35.5	5	693.5
24	22.0	5		44.0	5	
25	26.0	5		36.0	5	
26	30.0	5		32.0	5	
27	20.0	6		30.0	6	
28	31.5	6		37.0	6	
29	33.0	6		44.0	6	
30	33.0	7	664.5	42.0	5	692.0
Mean	30.6	5.3	659.6	36.4	5.2	686.0

DECEMBER 2002

FOOD AND WEIGHT (in Kg)

Date	♀ BINA		Weight	♂ TORGAMBA		Weight
	Food taken			Food taken		
	Browse	Fruits		Browse	Fruits	
1	31.0	5		50.0	5	
2	29.0	5		42.0	5	
3	43.0	5		43.0	5	
4	36.0	5		39.0	5	
5	38.0	5		38.0	5	
6	27.0	6		32.0	6	
7	30.0	5	665.5	34.0	5	676.5
8	27.0	5		41.0	5	
9	18.0	5		47.0	5	
10	19.0	5		23.0	5	
11	31.0	5		52.0	5	
12	21.0	3		41.0	5	
13	27.0	4		46.0	5	
14	39.0	5		38.0	5	668.0
15	35.0	5	671.0	35.0	5	
16	25.0	5		44.0	4	
17	34.5	2		22.0	2	
18	31.0	2		38.0	3	
19	26.5	5		36.0	5	
20	24.0	5		33.0	5	
21	35.0	6	663.5	38.0	6	656.0
22	21.0	5		24.0	5	
23	26.0	5		35.0	5	
24	28.0	5		41.0	5	
25	27.5	5		42.0	5.5	
26	39.0	5		39.0	5	
27	36.0	5		37.0	5	
28	23.0	5		45.0	5	
29	34.0	5		33.0	6	
30	22.0	6		30.0	6	
31	18.0	6		32.0	6	
Mean	29.1	4.8	666.7	37.7	5.0	666.8

Part 2

**GENERAL OBSERVATIONS  
and  
TREATMENT RECORDS**

# JANUARY 2002

EVENTS AND ACTIVITY	
♀ BINA	<ul style="list-style-type: none"> <li>- Together with Torgamba on 7 - 9 January</li> <li>- Together again in the central area on 27 - 28 January</li> <li>- Palpation per vaginal and per rectal on 27 January for ovulation analysis. (Result: Bina have good condition in her genitalia tract and cycle on ovary; one follicle on left ovary).</li> <li>- Together again in the central area on 31 January - 1 February</li> <li>- Activities pattern graphic attached</li> </ul>
♂ TORGAMBA	<ul style="list-style-type: none"> <li>- Together with Torgamba on 7 - 9 January</li> <li>- Blood sample collection on 23 January 2002 (5 cc) for Blood analysis.</li> <li>- Together again in the central area on 27 - 28 January</li> <li>- Together again in the central area on 31 January - 1 February</li> <li>- Semen collection using massage method (massage penis and massage accessories glands) on 26 January. Semen was observed under microscope, result: semen fluid (seminal fluid and spermatozoa), some dead sperms were seen.</li> <li>- Activities pattern graphic attached</li> </ul>
MEDICATION and SPECIAL TREATMENTS	
♀ BINA	<p><b>Conjunctivitis on both eyes:</b> Treated with ZnSO<sub>4</sub></p>
♂ TORGAMBA	<p><b>The Eye:</b> No discharge</p> <p><b>Hind leg wound :</b></p> <ul style="list-style-type: none"> <li>- A wound 1 cm wide and about 2 cm long found in Torgamba hind leg in the afternoon of 31 January in center area. There was bleeding and little inflammation but no infection yet. No serious wound.</li> <li>- Possibly stabbed by broken wood when running in center area or from Bina's teeth.</li> <li>- Treated with Hydrogen Peroxide, betadine, antibiotic topical ointment and swat (fly repellent).</li> <li>- Latest condition, the wound become dry and healed. No blood or inflammation</li> </ul>

REPRODUCTION

♀ BINA

**Period of 7 - 9 January**

Estrus signs were observed on 7 January but unclear. Only detected a redness of the vulva, no swelling and no discharge.

Bina showed interest to be mounted, she did some **Courtship (Standing Heat)** on 7 January (15.40, 16.07, 16.52, 17.22, 17.31, 17.45, 17.59, 18.23 and 18.36).

There was only good response from Torgamba on 7 January

**Period of 27 - 28 January**

Estrus signs were observed on 27 January but unclear. Only detected a redness and slight swelling of the vulva. No estrus discharge was observed.

Since 25 January Bina was already approaching center area and did not want to move from the gate to the center. Bina and Torgamba together again in center area, but when they were together on 27 January there was no reaction from Torgamba and Bina was released to her paddock.

**Period of 31 January - 1 February**

The signs of estrus on 30 January were not clear. The vulva was reddish but not swollen and no discharge was observed.

Bina showed interest to be mounted, she did some **Courtship (Standing Heat)** at 31 January (09.40, 10.50, 11.21, 11.29, 12.08, 12.20, 12.41, 13.00, 13.20, 13.22, 13.26 and 13.43).

We separated them on 1 February

♂ TORGAMBA

**Period of 7 - 9 January**

Since 5 January Torgamba was already approaching the center area and he did not want to move from the gate.

There was some serious courtship on 7 January

Most of the mounting happened in the afternoon.

Torgamba mounted Bina 9 times on 7 January: 15.40 for 8 minutes without erection, 16.67 for 13 minutes without erection, 16.52 for 13 minutes with erection, 17.22 for 3 minutes with erection, 17.31 for 3 minutes with erection, 17.45 for 3 minutes with full erection and **intromission**, 17.59 for 13 minutes with full erection and **intromission**, 18.23 for 7 minutes with full erection and **intromission**, 18.36 for 15 minutes with full erection and **intromission**.

We separated them on 9 January.

**Period of 27 - 28 January**

When together with Bina on 27 January, no serious courtship was observed during this period. Torgamba seemed tired and weak (effect from sperm collection with massage method).

There was no big interest from Torgamba to approach Bina. Mostly he avoided Bina

We separated them on 28 January

**Period of 31 January - 1 February**

Again some serious courtship in this period.

Torgamba mounted Bina 11 times on 31 January: 9.40 for 2 minutes, 10.50 for 7 minutes without erection, 11.21 for 5 minutes, 11.29 with erection, 12.08 for 3 minutes without erection, 12.20 for 5 minutes, 12.41 for 4 minutes with erection, 13.00 for 3 minutes without erection, 13.22 for 2 minutes with erection, 13.26 for 8 minutes without erection and 13.43 for 2 minutes with **full erection, intromission and ejaculation** (possibly).

**Note :**

There was 4 times **intromission/penetration** on 7 January: 17.45 - 17.48, 17.59 - 18.12, 18.23 - 18.30 and 18.36 - 18.51, but Torgamba's penis can only penetration 15 - 20 cm deep.

On 31 January only once **intromission and ejaculation** (13.43 - 13.45). Post mounting liquid dripped from the penis during relaxing in the last minutes. It seemed that he did ejaculation, but it was difficult to collect sperm and difficult to see whether there was any semen dribbling from Bina's vagina, because she ran to the forest.



# FEBRUARY 2002

## EVENTS AND ACTIVITY

♀ BINA

- Together with Torgamba on 18 - 19 February.
- Together in the central area on 21 -22 February
- Blood sample collection on 19 February (10 cc) for Blood analysis. Method collect with Sedative/analgesic (Dormosedan) by Retno from Taman Safari Indonesia.
- On 25 February Palpation per vaginal Bina for monitoring status Hymen post mating in center area (Full Intromission), result: Good condition.
- Together again in the central area on 25 - 26 February
- Activities pattern attached on graphics

♂ TORGAMBA

- Together with Bina on 18 - 19 February.
- Together in the central area on 21 -22 February
- Together again in the central area on 25 - 26 February
- Activities pattern graphic attached

## MEDICATION and SPECIAL TREATMENTS

♀ BINA

- Conjunctivitis on both eyes:** Treated with Zn SO4
- Blood Sample Collection**
- Sedative/analgesic (Dormosedan: Detomidine Hydrochloride 10 mg/ml). Dose: 1.2 ml IM
  - Antidote (antisedan: Atipamezol Hydrochloride 5 mg/ml). 0.6 ml IM
  - Vitamin Neurotrophic (neurofort) 20 tabs PO

♂ TORGAMBA

The Eye: No discharge

## REPRODUCTION

♀ BINA

**Period of 18 - 19 February**  
Estrus signs were observed on 17 February but unclear. Only detected a reddish vulva, no swelling and no discharge.  
Bina, no interest to be mounted and we separated them on 19 February

**Period of 21 - 22 February**  
No serious courtship in this period.

**Period of 25 - 26 February**  
The estrus period on 25 - 26 February showed with the signs on the vulva change: reddish, swollen and discharge flow appeared on 19 February  
Bina showed interest to be mounted, she did some Courtship behavior (**Standing Heat**) on 25 February :15.24, 15.55, 16.04, 16.07, 16.08, 16.40, 16.41, 16.42, 16.55, 16.57, 17.03, 17.23, 17.33, 17.41, 17.42, 17.54, 18.36, 18.45, 19.10, 20.17 and 20.53.  
We separated them on 25 February, Torgamba stay in center area and Bina entered to center stall for observation after the full intromission.

## ♂ TORGAMBA

**Period of 18 - 19 February**

Since 16 February Torgamba was already approaching the center area and he did not want to move from the gate.

No serious courtship in this period and we separated them on 19 February

**Period of 21 - 22 February**

No serious courtship in this period.

**Period of 25 - 26 February**

Very serious courtship in this period.

Torgamba mounted Bina 20 times on 25 February: 15.24, 15.55, 16.04, 16.07, 16.08, 16.22, 16.42, 16.57, 17.03, 17.23, 17.33, 17.41, 17.45, 17.54, 18.37, 18.42, 18.48, 19.11, 20.11 and 20.54 (afternoon to evening).

Torgamba pierced Bina's hymen with penis (17.04). This intromission is the **First Successful mating** in the SRS since 1998.

We separated them on 25 February (21.02) because Bina will be observed in the center stall.

## Details of Courtship Behavior between Bina (B) and Torgamba (T) on February 25, 2002

- 10.45 T was already approaching center area and he did not want to move from the gate.
- 13.35 Keeper detected redness dilatation of B's Vulva but no discharge.
- 14.17 B released from the yard and went to central area.
- 15.15 The gates of B and T to center area were opened.
- 15.21 After T walked with some snorting and spraying urine, met with B in front of B's gate, directly horn to horn and head to head (HH) pushing for two minutes. B suddenly turn her body and present her back and started courtship behavior (Standing Heat/SH). B and T look very interest to do courtship in this period.
- 15.24 T direct chin rest and started to mount, but only two minutes and down. B walk and T follow.
- 15.28 After 20 minutes HH, B SH again and T direct mount. The penis erection. Mount for 5 minutes but no intromission. B avoid and walk, T follow
- 16.04 T mount for a minute and down, penis not erect.
- 16.07 T mount for a minute, again penis not erect.
- 16.08 T mount again for 11 minutes, penis erect but no intromission.
- 16.22 T mount for 8 minutes, penis erect but no intromission.
- 16.42 T chin rest and star mounting for 8 minutes. Try to take good position, penis full erect, **Intromission/penetration** for 5 minutes but T's penis can only penetration 15 – 20 cm deep and **ejaculation** (because post intromission liquid semen dripped from the penis and relaxing in the last minutes).
- 16.57 T chin rest mount for 3 minutes, penis erect but no intromission.
- 17.03 T chin rest and mount again. This time take 9 minutes. **Penis full erect** and try to get better position, **Successful Intromission/penetration** ( ± 55 cm long) for 8 minutes and **ejaculation** because post intromission T's penis was relaxing in the last minutes and smeared with blood (from penis flaps to ± 25 cm long ), may be from B's vulva (**B's hymen was broken, because the hymen was confirmed by the strong bleeding after the copulation**). **B and T MATE SUCCESSFULLY FOR THE FIRST TIME in Sumatran Rhino Sanctuary since 1998.**
- 17.23 T mount for 2 minutes and penis full erect, no intromission.
- 17.33 T chin rest and mount for 2 minutes, but no erection
- 17.41 B SH, T chin rest and than start mating but only stay for a minute and down.
- 17.45 T chin rest and mount again only for one minute, no erection
- 17.48 T wallowed for 5 minutes
- 17.54 After walk together, B stop and SH, T mount again for 6 minutes and down, penis not erect. B walks, T follows.
- 18.10 Both were fed together by keeper.
- 18.28 T foraged alone
- 18.37 T mount for 5 minutes, penis erect but no intromission.

- 18.47** T mount for 3 minutes, penis erect but no intromission.
- 19.05** Sleeps together for 5 minutes
- 19.11** T chin rest and mount for 27 minutes, penis erect but no intromission.
- 19.48** B foraged
- 20.11** T chin rest and mount for 35 minutes but no erect.
- 20.54** T chin rest and mount for 6 minutes, penis not erect.
- 21.02** We separated them. T stay in center area, B entered to center stall for observed (reproduction examination). B's vulva still looked redness and swollen. 23.45 blood still seen on the outside of B's vulva, palpation per vaginal for monitoring Hymen (was broken) and treatment with antibiotic topical ointment (little). Body temperature still normal ; 36.5 ° C (22.36). Defecation and urinate still normal but no sleep because narrow stall and still interest to do sexual activities with T.

**February 26, 2002**

- 00.42** Blood still seen on the outside of B's vulva when B sit down on floor and body temperature 36.6 ° C.
- 02.23** Blood still visible.
- 03.55** Temperature: 36.2 ° C. (normal)
- 18.10** Temperature: 36.5 ° C. (normal)
- 13.00** Temperature: 37.3 ° C. (high), because in center stall the sun is very hot.
- 13.05** B entered to new paddock (3) for avoid met T and B direct wallowing. Activities: normal and good condition.

**February 27, 2002**

Temperature become normal ( 36.1 ° C). Vulva not swollen and no discharge.

# MARCH 2002

EVENTS AND ACTIVITY	
♀ BINA	<ul style="list-style-type: none"> <li>- Together with Torgamba on 18 March</li> <li>- Ultrasonography (USG) for monitoring tract genitalia (ovarial's follicle and hymen condition) on 5 March. Personal: Collaboration between USA teams, IPB teams, TSI and SRS Team.</li> <li>- Blood sample collection on 5 March (5 cc) for Blood analysis</li> <li>- Activities pattern attached on graphic</li> </ul>
♂ TORGAMBA	<ul style="list-style-type: none"> <li>- Together with Bina on 18 March</li> <li>- Semen collection examination on 5 March for Spermatozoa analysis. Personal: Collaboration between USA teams, IPB teams, TSI and SRS Team.</li> <li>- Blood sample collection on 5 March 2002 (5 cc) for Blood analysis.</li> <li>- Blood sample collection (from tail) on 16 March(5 cc) for experiment and Blood analysis</li> <li>- Activities pattern graphic attached</li> </ul>
MEDICATION and SPECIAL TREATMENTS	
♀ BINA	<p><b>Conjunctivitis on both eyes:</b> Treated with The ZnSO<sub>4</sub>.</p> <p><b>Special Treatment :</b></p> <ul style="list-style-type: none"> <li>- Anesthesia: Butorphanol 40 mg (4.0 ml), azaperone 40 mg (1.0 ml) IM. Anti inflammatory (Flunixin 600 mg 12 ml IM) Antidote: Naltrexone 200 mg (4.0 ml) IM</li> <li>- The Hymen was confirmed by the strong bleeding after copulation (<b>25 February</b>).</li> <li>- Observation on <b>5 March</b> (morning): Vaginal examination for persistent hymen evaluation.</li> <li>- Intensive monitoring/investigation with manual palpation, Ultrasonography (USG), speculum and endoscope.</li> <li>- <b>Results:</b> Normal reproductive tract with no evidence of vaginal stricture, hymen or fluid accumulation (no inflammatory, no bleeding and no infection ). Condition of the vagina is very good.</li> <li>- Manual Palpation: Normal vestibule and vagina</li> <li>- Endoscopic exam: the color of the vaginal mucosa was pale without any evidence of irritation or inflammation.</li> <li>- USG of the left ovarial showed corpus luteum of 24 mm and &lt; 20 mm in diameter at 7 days after estrous. interprets: Bina was ovulation in this period (<b>25 February</b>). Pregnancy check via USG at approximately 20 days post-breeding.</li> <li>• USG again at <b>17 march</b>. Result: Embryo/vesicle no identified but found two large corpus luteum (20 mm and 29 mm in diameter) at 20 days after estrous.</li> <li>• A further investigation after the second weeks is required to confirm a pregnancy (<b>24 March</b>).</li> <li>- <b>Result:</b> not found embryo in uterus (No yet pregnancy) but we found several follicles in the ovaria (Bina's cycle still normal and regular). Corpus luteum regressed (10 mm and 17 mm)</li> </ul>

♂ TORGAMBA

**The Eye: No Discharge****Special Treatment :**Observation on **5 March** (afternoon) :

Anesthesia (sedative): Butorphanol 25 mg (2.5 ml), azaperone 40 mg (1.0 ml) IM.

Antidote: Naltrexone 125 mg (2.5 ml) IV and IM

Semen collection examination with massage method and electro ejaculator method.

Result :

- Massage: 0.5 ml semen.
- Electro ejaculator: no result.

**REPRODUCTION**

♀ BINA

**Period of 18 March**

Estrus signs were observed on 17 March but unclear. Only detected a reddish vulva no swelling and no discharge.

Bina showed no interest to be mounted in this period. She always avoided and ran away from Torgamba.

We separated them on 18 March

♂ TORGAMBA

**Period of 18 March**

Since 10 March Torgamba was already approaching the center area and he did not want to move from the gate.

Torgamba very interest to do courtship but no response from Bina.

We separated them on 18 March

**APRIL 2002**

EVENTS AND ACTIVITY	
♀ BINA	<ul style="list-style-type: none"> <li>- Together with Torgamba on 6 - 7 April</li> <li>- On 21 April Reproduction post mating (Full Intromission), USG</li> <li>- Result: Good condition, was found several follicles on the right ovary.</li> <li>- Together again in the central area on 25 - 28 April</li> <li>- Activities pattern graphic attached</li> </ul>
♂ TORGAMBA	<ul style="list-style-type: none"> <li>- Together with Torgamba on 6 - 7 April</li> <li>- Together again in the central area on 25 - 28 April</li> <li>- Activities pattern graphic attached</li> </ul>
MEDICATION and SPECIAL TREATMENTS	
♀ BINA	Conjunctivitis on both eyes: Treated with ZnSO4.
♂ TORGAMBA	The Eye: No discharge
REPRODUCTION	
♀ BINA	<p><b>Period of 6 - 7 April</b> Estrus signs were observed on 5 - 6 April but unclear. Only detected a reddish vulva no swelling and no discharge. Bina, not interest to be mounted, she always moved away when Torgamba was ready for mounting. We separated them on 7 April</p> <p><b>Period of 25 - 28 April</b> The estrus period on 25 - 26 April with the signs on the vulva change: reddish, swollen, but no discharge. Bina showed interest to be mounted, she did some Courtship Behavior (<b>Standing Heat</b>) on 25 April :12.05, 12.08, 12.17, 12.26, 12.39, 12.43, 13.16, 13.32, 12.23, 14.36 and 14.42. Bina <b>Standing Heat</b> 15 times on 25 April We separated them on 28 April</p>
♂ TORGAMBA	<p><b>Period of 6 - 7 April</b> No serious courtship in this period. We separated them on 7 April</p> <p><b>Period of 25 - 28 April</b> Serious courtship in this period. Torgamba <b>mount</b> Bina 12 times on 25 April: 12.05 for 1 minute, 12.08 for 2 minutes, 12.17 for 1 minute without erection, 12.26 for 2 minutes with erection, 12.39 for 1 minute, 12.43 for 3 minutes without erection, 13.16 for 4 minutes with erection, 13.32 for 10 minutes without erection, 14.10 for 2 minutes, 14.23 for 2 minutes, 14.36 for 2 minutes with erection and no intromission. 14.42 for 32 minutes with <b>full erection and intromission ( 29 minutes)</b> but Torgamba's penis can only penetrate 20 -25 cm deep. We separated them on 28 April</p> <p><b>Note :</b> There was only once <b>Intromission (14.45 - 15.14)</b></p>



MAY 2002

EVENTS AND ACTIVITY	
♀ BINA	- Together with Torgamba on 14 - 18 May. - Activities pattern graphic attached
♂ TORGAMBA	- Together with Bina on 14 - 18 May. - Activities pattern graphic attached
MEDICATION and SPECIAL TREATMENTS	
♀ BINA	Conjunctivitis on both eyes: Treated with ZnSO <sub>4</sub>
♂ TORGAMBA	The Eye: No discharge
REPRODUCTION	
♀ BINA	<b>Period of 14 - 18 May</b> The estrus period on 14 - 18 May with the signs of the vulva change: reddish, swollen and discharge observed on 14 - 15 May. Bina showed interest to be mounted but no response from Torgamba, he always avoided Bina. We separated them on 18 May
♂ TORGAMBA	<b>Period of 14 - 18 May</b> During this period Torgamba did not show any strong interest in courtship and mounting. We separated them on 18 May

# JUNE 2002

EVENTS AND ACTIVITY	
♀ BINA	<ul style="list-style-type: none"> <li>- Together with Torgamba on 9 - 12 June</li> <li>- Ultrasound examination on 2 June</li> <li>- Activities pattern graphic attached</li> </ul>
♂ TORGAMBA	<ul style="list-style-type: none"> <li>- Together with Bina on 9 - 12 June</li> <li>- Activities pattern graphic attached</li> </ul>
MEDICATION and SPECIAL TREATMENTS	
♀ BINA	Conjunctivitis on both eyes: Still treated with ZnSO <sub>4</sub> .
♂ TORGAMBA	The Eye: No discharge
REPRODUCTION	
♀ BINA	<p><b>Period of 9 - 12 June</b>            The estrus period on 8 - 12 June with the signs of the vulva change: reddish, swollen but no discharge.            On 8 - 10 June No serious courtship, Bina showed interest to be mounted but no respond from Torgamba, he mostly avoided Bina., and we separated them. Torgamba returned to his paddock but Bina stayed in the center area.            On 11 June Torgamba and Bina did not want to move from the center area fence and looked very interest in courtship. Torgamba and Bina kept together again in center area (07.36).            When together Torgamba and Bina directly started to do serious courtship. Bina showed interest to be mounted, she did some Courtship Behavior (<b>Standing Heat</b>) on 11 June :07.42, 07.53, 08.21, 08.25, 08.43, 12.34, 15.36 and 16.09            We separated them on 12 June</p>
♂ TORGAMBA	<p><b>Period of 9 - 12 June</b>            Torgamba no Intense courtship was observed on 8 - 10 June, Torgamba mostly avoided Bina when Bina started to respond and he entered to his paddock.            On 11 June Torgamba did not want to move from center area fence, he showed interest in courtship and mounting with bina.            Torgamba and Bina kept together again in center area on 11 June.            Intense courtship was observed on 11 June, Torgamba <b>mount</b> Bina 8 times: 07.42, 07.53, 08.21, 08.25, 08.43, 12.34, 15.36 and 16.09 (morning to afternoon).            We separated them on 12 June.</p>

**Details of Courtship Behavior between Bina (B) and Torgamba (T) on July, 2002 :**

- 07.36** Kept in the center area again (morning). B still estrus. T was already approaching the center area and he did not want to move from the center area fence.
- 07.39** T and B directly started to do Courtship in front off center area stall, horn to horn pushing and head to head.
- 07.42** B SH and T direct chin rest T start to mount but only two minutes and down. B walks away and T follow, penis erect but no intromission.
- 07.50** Courtship again
- 07.51** T avoids and B follows
- 07.53** B SH again and T mounts for 5 minutes, penis erect but no intromission
- 08.21** B SH, T mounting for 2 minutes, penis erect but no intromission
- 08.25** B SH, T try to take good position in beside center area gate and mount for 11 minutes, penis full erect and Intromission for 2 minutes. T allowed his keepers to stand beside him when he was mounting. They even try to help holding the penis to make an intromission, but T's penis can only penetrate  $\pm$  22 cm deep (till the flaps). T always has difficulty to find a good position when mounting.
- 08.42** B walk to center wallow, T follow ( B and T very serious and interested to do courtship in this period, because since 25 February no serious courtship between them). B and T directly courtship in the wallow.
- 08.43** B SH, T mount for 27 minutes in the wallow with good position, penis **Full Erection and Full Intromission** for 16 minutes (still help by keeper because T has a difficulty finding B's Vulva), **successful intromission** (  $\pm$  55 cm long) and no bleeding seen from T's penis or B's vulva, only one wound we found on top vulva but not serious. **This intromission is second successful in SRS.**
- 09.40** Wallowing together
- 12.34** B SH, T still interested and mounting again for 24 minutes but penis not erect.
- 13.27** Wallowing together again
- 15.34** Courtship
- 15.35** B SH, T mounting for 17 minutes but penis not erect.
- 16.09** B SH, T T mount for 9 minutes but penis no erect. No more contact or courtship.

**June 12, 2002**

B and T good condition and normal daily activities

**JULY 2002**

<b>EVENTS AND ACTIVITY</b>	
♀ BINA	<ul style="list-style-type: none"> <li>- Together with Torgamba on 29 - 31 July</li> <li>- Ultrasound examination on 23 July. Result: Left ovary two active follicles (11 mm and 17 mm), Right ovary Corpus Luteum (25 mm) and Uterus no vesicle or embryo.</li> <li>- Activities pattern graphic attached</li> </ul>
♂ TORGAMBA	<ul style="list-style-type: none"> <li>- Together with Bina on 29 -31 July</li> <li>- Activities pattern graphic attached</li> </ul>
<b>MEDICATION and SPECIAL TREATMENTS</b>	
♀ BINA	Conjunctivitis on both eyes: Still treated with ZnSO4
♂ TORGAMBA	The Eye: No discharge
<b>REPRODUCTION</b>	
♀ BINA	<p><b>Period of 4 - 7 July</b>                      No clear sign of estrous, vulva only reddish but not swollen and no discharge. Bina showed interest to do courtship. Bina was already approaching the center area and she didn't want to move from the center area gate, and even slept there. No courtship in this period</p> <p><b>Period of 26 - 29 July</b>                      Again no clear sign of estrous but Bina still interest to meet Torgamba. No mating in this period</p>
♂ TORGAMBA	<p><b>Period of 4 - 7 July</b>                      Torgamba was not interested to approach the center area. He always avoided the center area. Again there was no good response from Torgamba</p> <p><b>Period of 26 - 29 July</b>                      When together with Bina in the center area, Torgamba showed no interest to mate with Bina. No mating in this period</p>

**AUGUST 2002**

**EVENTS AND ACTIVITY**

♀ BINA

- USG examination on 3 August by Agil, Bambang, Nico and SRS. **Result:** Left ovary (Found two follicle, 11 mm and 17 mm). Right ovary (Found one Corpus Luteum, 25 mm). Uterus (No Vesicle or Embryo /not yet pregnant). **Interpretation:** Lost embryo, Normal and regular estrous cycle or irregular cycle (season)
- Together with Torgamba on 6 - 7 August in the center area.
- Together again on 10 - 13 August, in the center area.
- Kept together with Torgamba on 16 - 17 August.
- USG examination on 31 August, **Result:** No clear image, because Bina's vesica of urinary full urine and rectum full of feces.
- Activities pattern graphic attached

♂ TORGAMBA

- Together with Bina on 6 - 7 August in the center area.
- Together again on 10 - 13 August in the center area.
- Together with Bina on 16 - 17 August.
- Activities pattern graphic attached

**MEDICATION and SPECIAL TREATMENTS**

♀ BINA

- Conjunctivitis on both eyes:** Treated with Zn SO4
- Scratch During Courtship :**
- Some scratches were found after hard courtship with Torgamba, but no serious wounds.
  - Possibly stabbed by Torgamba's horn during courtship
  - Treated with Hydrogen Peroxide, Antibiotic topical ointment (salp) and SWAT (fly repellent)

♂ TORGAMBA

- The Eye:** No discharge
- Scratch During Courtship :**
- Some scratches were found after hard courtship with Bina, but no serious wounds.
  - Possibly stabbed by Bina's horn during courtship
  - Treated with Hydrogen Peroxide, Antibiotic topical ointment (salp) and SWAT (fly repellent).

**REPRODUCTION**

<p>♀ <b>BINA</b></p>	<p><b>Period of 6 - 7 August</b>                  The estrous signs was difficult to detect, vulva reddish but not swollen and no discharge.                  No Serious Courtship was observed during this period. Bina was interested to mate with Torgamba but Torgamba mostly avoided Bina. Bina always followed when Torgamba avoided.</p> <p><b>Period of 10 - 13 August</b>                  Together with Torgamba again on 10 - 13 August. The estrous sign was difficult to detect, vulva reddish no swelling and no discharge.                  On 10 - 12 August Bina and Torgamba only horn to horn and head to head pushing. Bina mounted Torgamba two times on 10 August (23.38 and 23.47)                  Again there was no good respond from Torgamba for mating with Bina.</p> <p><b>Period of 16 - 17 August</b>                  Bina is more aggressive than Torgamba in sexual activity, but received a very poor response from Torgamba, except horn to horn and head to head pushing on 16 - 17 August                  Bina mounted Torgamba on 16 August (21.19)                  Vulva reddish, swollen and discharge was observed on 17 August (clear signs of estrus)</p>
<p>♂ <b>TORGAMBA</b></p>	<p><b>Period of 6 - 7 August</b>                  Torgamba did not show any interest to mount Bina when the estrous came at around 6 - 7 August. Some courtship occurred but mostly Torgamba avoided and walked away first.</p> <p><b>Period of 10 - 13 August</b>                  On 10 - 12 August Bina and Torgamba only horn to horn and head to head pushing. Again there was no good respond from Torgamba for mating with Bina.</p> <p><b>Period of 16 - 17 August</b>                  Again Torgamba not so interest to do mating or courtship with Bina, except horn to horn and head to head pushing, but when Bina ready to be mounted, Torgamba did not show a good response to do mounting. He always avoided.</p>

# SEPTEMBER 2002

EVENTS AND ACTIVITY	
♀ BINA	<ul style="list-style-type: none"> <li>- Together with Torgamba on 1 - 2 September</li> <li>- Ultrasound examination on 22 September.</li> <li>- Result: No signs of pregnancy. Right ovary one active follicle (11 mm), left ovary one active follicle (20 mm) and uterus oedema (estrus condition)</li> <li>- Activities pattern graphic attached</li> </ul>
♂ TORGAMBA	<ul style="list-style-type: none"> <li>- Together with Bina on 1 - 2 September</li> <li>- Activities pattern graphic attached</li> </ul>
MEDICATION and SPECIAL TREATMENTS	
♀ BINA	Health: Good condition
♂ TORGAMBA	Health: Good condition
REPRODUCTION	
♀ BINA	<p><b>Period of 1 - 2 September</b>            The vulva was reddish on 30 August but not swollen and no discharge was observed. Bina showed interest to be mounted, she did some Courtship Behavior(<b>Standing Heat</b>) on 1 September: 16.04, 16.12, 17.06, 18.22, 18.45, 18.48, 18.54, 19.10, 19.24 and 19.31. Only one day (1 September) there was a good response from Torgamba</p> <p><b>Second Period of 20 - 29 September</b>            Estrus signs were observed on 21 September, redness and a slight swelling of the vulva but no estrus discharge was observed. No serious courtship, and we separated Bina for Ultrasound Examination. Next afternoon Bina entered again to the center area for courtship with Torgamba.            Bina Courtship Behavior(<b>Standing Heat</b>) on 23 September (16.47) and mounted the male once (19.54). On 24 September Courtship Behavior(<b>Standing Heat</b>) (01.25) and mounted 3 times (01.19, 04.38 and 07.40)            We separated them on 24 September (afternoon).            Together again in the center area on 28 September. Serious courtship was observed but no response from Torgamba. On 29 September Bina mounted the male 3 times (16.57, 18.26 and 21.22)            We separated them on 30 September</p>

## ♂ TORGAMBA

**Period of 1 - 2 September**

There was some serious courtship on 1 September.

Torgamba mount Bina on 1 September: 16.05 for 1 minute penis not erect, 16.02 for 3 minutes penis erect, 16.32 for 1 minute penis not erect, 17.06 for 1 minute penis not erect, 18.22 for 11 minutes penis erect, **intromission and ejaculation**, 18.45 for 1 minute penis not erect, 18.49 for 1 minute penis not erect, 18.54 for 2 minutes penis not erect, 19.11 for 1 minute penis not erect, 19.25 for 4 minutes penis erect and 19.31 for 34 minutes penis full erect, **full intromission (28 minutes) and ejaculation**. This intromission is **third Successful mating** in SRS since 1998.

**Note** :There was 2 times full intromission and possiblt ejaculation on 1 September.

**Second Period of 20 - 29 September**

Torgamba and Bina were kept together in the center area on 21 September but no positive response from Torgamba, and he always avoided Bina. On 22 September Bina entered to her paddock for Ultrasound Examination but Torgamba stayed in the center area. On 23 September, Bina entered again to the center area.

Torgamba **mounted** once on 23 September (16.47 for 2 minutes with penis erect and good position), once on 24 September (01.25 for one minutes without erection)

Together again in the center area on 28 September. Torgamba is not interest i mating with Bina.

We separated them on 30 September

**Details of Courtship Behavior between Bina (B) and Torgamba (T) on September 1, 2002 :**

- 15.32 B and T kept together in the center area
- 15.46 Good courtship. B and T more intense in courtship in this period.
- 16.04 B SH, Chin Rest and T mounting for 1 minute, penis not erect
- 16.12 B SH, Chin Rest and T mounting for 3 minute, penis erect . After 3 times mounting B avoids and T follows.
- 16.51 T walked away and B followed
- 17.02 Suddenly B turns and present her back, B ready to be mounted but no response from T
- 17.06 B SH, Chin Rest and T mounting for 1 minute, penis not erect
- 18.22 B SH, Chin Rest and T mounting for 11 minute, penis **full erect, full Intromission and ejaculation** (post mating the penis looks wet).
- 18.45 B SH, Chin Rest and T mounting for 1 minute, penis not erect
- 18.48 B SH, Chin Rest and **18.49 T** mounting for 1 minute, penis not erect
- 18.54 B SH, Chin Rest and T mounting for 2 minutes, penis not erect
- 19.10 B SH, Chin Rest and **19.11 T** mounting for 1 minute, penis not erect
- 19.24 B SH, Chin Rest and **19.25 T** mounting for 4 minutes, penis erect
- 19.31 B SH, Chin Rest and try to take good position, T mounting for 34 minutes, penis **Full Erect, Full Intromission/penetration and Ejaculation. Third Successful Intromission in SRS**
- 23.44 B turn and present her back, no response from T



**OCTOBER 2002**

**EVENTS AND ACTIVITY**

- |            |  |
|------------|--|
| ♀ BINA     | - Together with Torgamba on 19 - 20 October<br>- Activities pattern graphic attached |
| ♂ TORGAMBA | - Together with Bina on 19 - 20 October<br>- Activities pattern graphic attached     |

**MEDICATION and SPECIAL TREATMENTS**

- |            |   |
|------------|---|
| ♀ BINA     | Conjunctivitis on both eyes: treated with ZnSO <sub>4</sub> .   |
| ♂ TORGAMBA | <p><b>Problem on Mastication</b></p> <p>- 24 October, It was observed that Torgamba could not masticate big branches of leaves. He can only eat young leveafs. It was difficult when located which part of the mouth is pain, whether the teeth (left), gums or the tongue. Treated with:</p> <ul style="list-style-type: none"> <li>- Vitamin neutrophic (Neurobion) 10 tab,</li> <li>- Ardivit 5 tab and Hemaviton 5 Tab</li> <li>- Anti Inflammatory (Phenylbutazone) 3 tab,</li> </ul> <p>for 3 days. He started eating normal at the second day.</p> <p><b>The Eye</b></p> <p>- No discharge from both eyes.</p> |

**REPRODUCTION**

- |            |  |
|------------|--|
| ♀ BINA     | <p><b>Period of 19 - 20 October</b></p> <p>Since 17 October Bina always approaches the center area and did not want to move away from the center gate and looks very interested in doing courtship. The vulva was reddish and a little swollen on 19 October but discharge was not observed. Bina showed interest to be mounted, she did some Courtship Behavior (<b>Standing Heat</b>) on 19 October: 15.02, 15.25, 15.33, 15.51, 17.05, 17.14, 17.21, 17.40, 18.40, 18.55, 19.11, 19.40 and 19.44. Only one day (1 September) there was a good response from Torgamba</p>  |
| ♂ TORGAMBA | <p><b>Period of 19 - 20 October</b></p> <p>There was some serious courtship on 19 October<br/>Torgamba mount Bina 13 times on 19 October: 15.02 for 2 minutes penis erect, 05.25 for 1 minute penis not erect, 15.33 for 4 minutes penis erect, 15.51 for 2 minutes penis not erect, 17.05 for 1 minute penis not erect, 17.14 for 2 minutes penis erect, 17.21 for 12 minutes penis full erect and intromission (11 minutes) till the flaps (± 25 cm), <b>17.40 for 11 minutes penis full erect, full intromission (10 minutes) and ejaculation (?)</b>, 18.40 for 2 minutes penis erect, 18.55 for 3 minutes penis erect, 19.11 for 3 minutes penis erect and intromission (2 minutes), 19.40 for 1 minute penis erect, 19.44 for 26 minutes penis full erect and intromission (24 minutes). <b>This is the fourth successful intromission in SRS since 1998.</b></p> <p><b>Note:</b> There was 4 times intromission with once <b>FULL INTROMISSION</b> and may be once ejaculation ( ? ) on 19 October.</p> |

**Details of Courtship Behavior between Bina (B) and Torgamba (T) on October 19, 2002 :**

- 14.55** T entered the center area and directly started courtship with B.
- 15.02** T Chin Rest and Mount for 2 minutes, penis erect. T very interest and runs to follow B
- 15.25** B SH, T Chin Rest and mounting for 1 minute, penis not erect
- 15.28** Horn to Horn and head to head
- 15.33** B SH, T Chin Rest and mounting for 4 minutes, penis erect. Its was difficult to follow them in the forest.
- 15.51** B SH, T Chin Rest and mounting for 2 minutes, but penis no erect
- 17.02** Almost for one hour B and T showed no sexual activities
- 17.05** B SH, T Chin Rest and mounting for 1 minute, penis not erect
- 17.07** T mounting for 1 minute, penis not erect
- 17.13** B SH, T Chin Rest and mounting for 2 minutes, penis start to become erect and more spirit for mating.
- 17.21** T Chin Rest and Mounting for 12 minutes with penis erect, T try for good intromission but difficult and helped by keepers. Intromission not full (till flaps) because bad position in the forest.
- 17.40** B SH, T Chin Rest and mounting for 11 minutes, with penis full erect and full Intromission/penetration but with assistance in the penetration process because for Tit is still difficult to find B's vulva. Intromission occurred 10 minutes and ejaculation (possibly). **This is the fourth successful intormission.**
- 18.40** B SH, T Chin Rest and mounting for 3 minutes, penis full erect again, no intromission
- 18.55** Chin Rest and mounting for 3 minutes, penis erect, no intromission
- 19.11** T Chin Rest and mounting for 3 minutes, penis erect and T try intromission again for 2 minutes, but not successful
- 18.40** T Chin Rest and Mounting for 1 minute, penis still erect but no intromission
- 18.44** B SH, T Chin Rest and mounting for 26 minutes, penis erect and intromission again till the flaps only. T stamina looks less in this period because very intense mating in this period. For success ful mating, daily monitoring for signs of estrus (B) and Libido (T) is very important
- 20.01** No more sexual activities since this time. B entered to K1 and T entered to K3 (change of paddock for both B and T).

# NOVEMBER 2002

## EVENTS AND ACTIVITY

♀ BINA	<ul style="list-style-type: none"> <li>- Together with Torgamba on 13 - 16 November</li> <li>- Activities pattern graphic attached</li> </ul>
♂ TORGAMBA	<ul style="list-style-type: none"> <li>- Together with Bina on 13 - 16 November</li> <li>- Activities pattern graphic attached</li> </ul>

## MEDICATION and SPECIAL TREATMENTS

♀ BINA	<p><b>Conjunctivitis on both eyes:</b> Still treated with The ZnSO4.</p> <p><b>Preventive Medicine :</b></p> <ul style="list-style-type: none"> <li>- Multivitamin and mineral (ARDIVIT) 10 tabs / week</li> <li>- Mineral Block (every day)</li> </ul>
♂ TORGAMBA	<p><b>Preventive Medicine :</b></p> <ul style="list-style-type: none"> <li>- Multivitamin and mineral (ARDIVIT) 10 tabs / week</li> <li>- Mineral Block (every day)</li> </ul> <p><b>The Eye :No discharge</b></p>

## REPRODUCTION

♀ BINA	<p><b>Period of 13 - 16 November,</b></p> <p>Estrus signs were observed during meeting with Torgamba on 13 - 16 November but unclear. Only detected a reddish vulva, no swelling and no discharge. Bina is more aggressive than Torgamba to do sexual activities, but received a very poor response from Torgamba.</p> <p>Bina Mounting Torgamba at 13 November two times (15.13 and 15.46), 14 November two times (15. 26 and 15. 29) and 16 November one time (05. 09)</p>
♂ TORGAMBA	<p><b>Period of 13 - 16 November,</b></p> <p>During meeting with Bina in central area at 13 -16 November, still not so interested in mating, except horn to horn pushing and other courtship behavior, but when Bina ready to be mounted, Torgamba did not show good response.</p>

**Details of courtship Behavior between Bina (B) and Torgamba (T) on November 11, 2002 :**

- Morning** B activities more to the center area. B intense approach to the center area and did not move from this area.
- Afternoon** B directly to the center area and entered to center area. T entered to his stall and received penis massage. Penis rapidly erect and after released from stall T goes directly to the center area. In the center area gate T looks very interest for mating with B
- 14.40** T gate opened by keepers and he walk to the center area and directly approach B. B runs away and T chases her ( ± 25 minutes)
- 15.06** Both meet near the gate and directly start horn to horn and head to head pushing ( ± 1 hour)
- 16.25** B good courtship behavior, but no response from T
- 16.26** B good courtship behavior, but no response from T
- 16.27** B SH, T shows interest in mating and doing Chin Rest. Mounting for 1 minute penis not erect. The location in the forest not ideal for mating
- 17.29** B SH again and T mount for 2 minutes, penis not erect.
- 22.40** No mating activities, B and T fed by keepers and sleep together.
- 22.44** Wake up together, directly start courtship and B SH, T Chin Rest and tries mounting (good location and position). T mounts for 13 minutes with penis full erect and intromission (12 minutes), and then down because B moving and make steps forward. Intromission was success till flaps only( ± 25 cm deep)
- 23.11** B SH, T Chin Rest and directly mounting for 19 minutes, penis full erect, full Intromission/penetration and ejaculation, also thrushing by T is very clear. The mating process is assisted by the keepers. This is the fifth successful mating in SRS. We succeeded in collecting sperm from penis and vulva (8 cc). Under the microscope only few spermatozoa were found (1 – 5 spermatozoa)
- 24.30** Sleep together close to observation post. No more contact after that.

# DECEMBER 2002

## EVENTS AND ACTIVITY

♀ BINA

- Together with Torgamba on 2 - 5 December
- Together again in the central area on 25 - 27 December.
- Ultrasound examination on 28 December (morning). Result: Not yet pregnant, only found several active follicles.
- Activities pattern graphic attached

♂ TORGAMBA

- Together with Torgamba on 2 - 5 December
- Together again in the central area on 25 - 27 December.
- Ultrasound examination on 28 December (Afternoon) for monitoring tract reproduction.
- Activities pattern graphic attached

## MEDICATION and SPECIAL TREATMENTS

♀ BINA

**Conjunctivitis on both eyes:** treated with ZnSO4

**Head Wound :**

- One wound 1 cm wide and 3 - 4 cm long was found on the head in the morning of 25 December. There was hyperaemia, a bleeding and inflammation and a little infection. Possibly stabbed by Torgamba's horn during courtship.
- Threatened with: Hydrogen Peroxide (H2O2), Betadine, Antibiotic topical ointment and SWAT (fly repellent)
- Latest condition, the wound become dry and healed. No blood or inflammation

♂ TORGAMBA

**The Eye:** No discharge

## REPRODUCTION

♀ BINA

### Period of 2 - 5 December

No clear signs of vaginal change except a slight redness of the vulva. Bina showed interest for courtship and mounted on 2 December. Bina once SH (17.33).  
 On 3 December, again serious courtship but no response from Torgamba and Bina mounted Torgamba three times on 2 December: 15.40, 17.07 and 19.22  
 On 4 December, Bina showed interest to be mounted throughout this period. She did some courtship behavior (Standing Heat): 14.53, 16.46, 17.20, 17.25, 17.32, 17.36 and 1740. There was a good response from Torgamba.  
 We separated them on 5 December (Afternoon)

### Period of 25 - 27 December

Signs of estrus was detected on 25 December (morning): reddish, little swollen but no discharge.  
 Bina was already approaching the central area On 25 December (15.15 - 17.06), serious courtship but no response from Torgamba.  
 On 26 December, again serious courtship, Bina showed interest to be mounted and Torgamba start response. Bina did some Courtship behavior ( Standing Heat): 06.33, 07.01, 07.40, 08.05, 08.27, 13.09  
 We separated them on 27 December (Afternoon)

## ♂ TORGAMBA

**Period of 2 - 5 December**

Serious courtship and Torgamba mounted Bina once on 2 December (17.33 for 3 minutes but penis not erect).

On 3 December no sexual response from Torgamba.

On 4 December Torgamba mounted Bina 7 times: 14.53 for 1 minute, 16.46 for 2 minutes but penis not erect. Since 17.06 Torgamba increasing sexual activities and succeeded in mounting but without intromission. 17.20 for 2 minutes with penis erect, 17.25 for 3 minutes with penis erect, 17.31 for 3 minutes with penis erect, 17.37 for 1 minute with penis erect and 17.40 again for 1 minute with penis erect.

We separated them on 5 December (Afternoon)

**Period of 25 - 27 December**

When Bina stayed in the central area, Torgamba approaching the central area too (25 December). Torgamba does not show much interested in mating, except horn to horn pushing and other courtship behavior, but when Bina was ready to be mounted, Torgamba did not show a good response.

On 26 December, Bina and Torgamba did a serious courtship and Torgamba mount 5 times: 06.33 for 1 minute, T's penis directly erects but intromission did not occur, 07.01 for 4 minutes also with erection but no intromission, 07.40 for 2 minutes with penis erect again no intromission, 08.05 for 1 minute, 08.27 for 1 minute and 13.09 for 2 minutes; the last three mounting without erection. No more mounting after that. We separated them on 27 December (Afternoon)

**Part 3**

**SEXUAL BEHAVIOR  
OBSERVATIONS RECORDS**

**SEXUAL BEHAVIOR RECORDS of BINA AND TORGAMBA, 2002**

Month (date)	Days of Courtship	♀ Vaginal Oestrus Signs	Days to Cycle	♀ Standing heat	♂ Mounting	♂ Erection	♂ Penetration	♂ Ejaculation
January (7-9)	1 (7)	+	32	9x	9x	7x	4x ± 20 cm	
January (27-31)	2 (31)	++	24	11x	11x	5x	1x ± 15 cm	1x
February (18-26)	1 (25)	+++	25	20x	20x	10x	2x (1 Full)	1x
March (18-19)	1 (7)	+	21					
April (6-7)	1 (6)	+	20					
April (25-28)	2 (25)	++	18	10x	10x	6x	1x	
May (14-18)	2 (15)	+++	19					
June (9-12)	3 (11)	0	28	8x	8x	5x	2x (1 Full)	1x
July (4-7)	NC (4)	NC	22					
July (26-29)	NC (26)	NC	22					
August (10-17)	2 (10)	+	15		2x (B)			
September (1-2)	1 (1)	++	21	11x	11x	4x	1x (1 Full)	1x
September (20-29)	2 (23)	++	19		7x (B)			
October (19-20)	1 (19)	+++	29	13x	13x	10x	4x (1 Full)	1x
November (11-12)	1 (11)	+++	23	4x	4x (5x B)	2x	2x (1 Full)	1x
December (2-5)	3 (2)	+	21	8x	8x (3x B)	5x		
December (25-27)	1 (26)	+	23	6x	6x	3x		
<b>AVERAGE</b>			21					

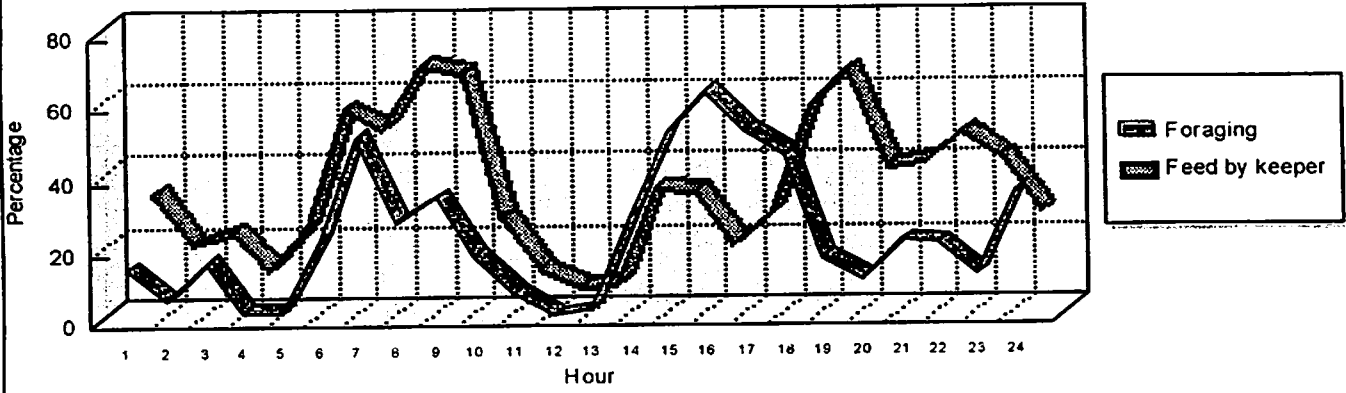


**Part 4**

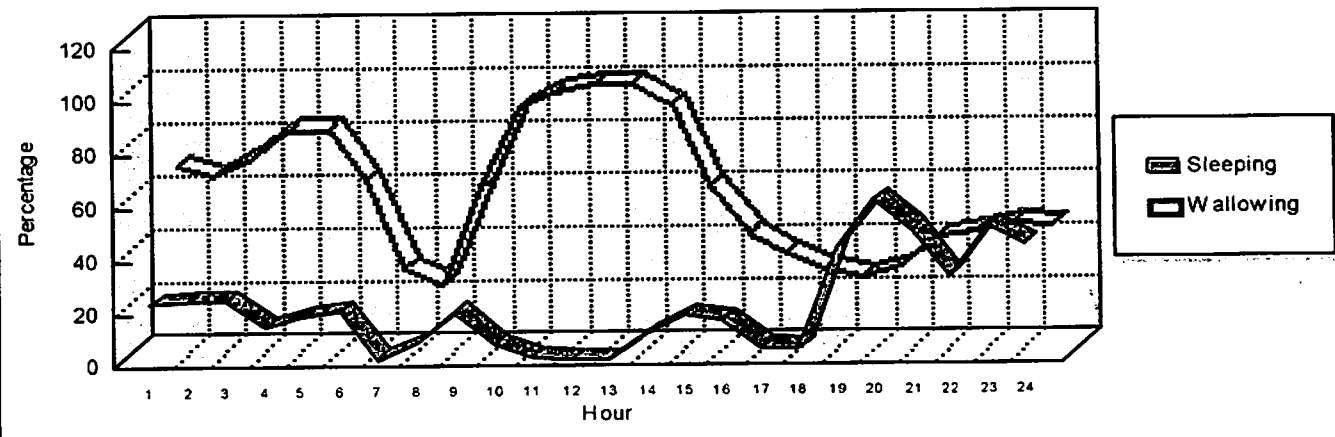
**DAILY ACTIVITY PATTERN**

# BINA

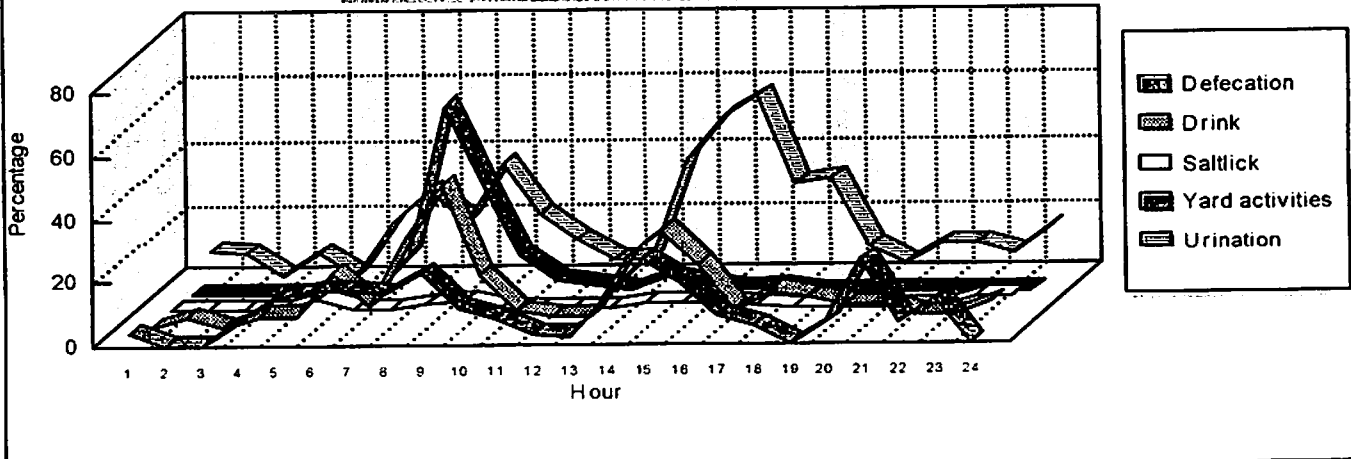
**Feeding Activites Pattern of Bina**  
1 January - 31 December 2002



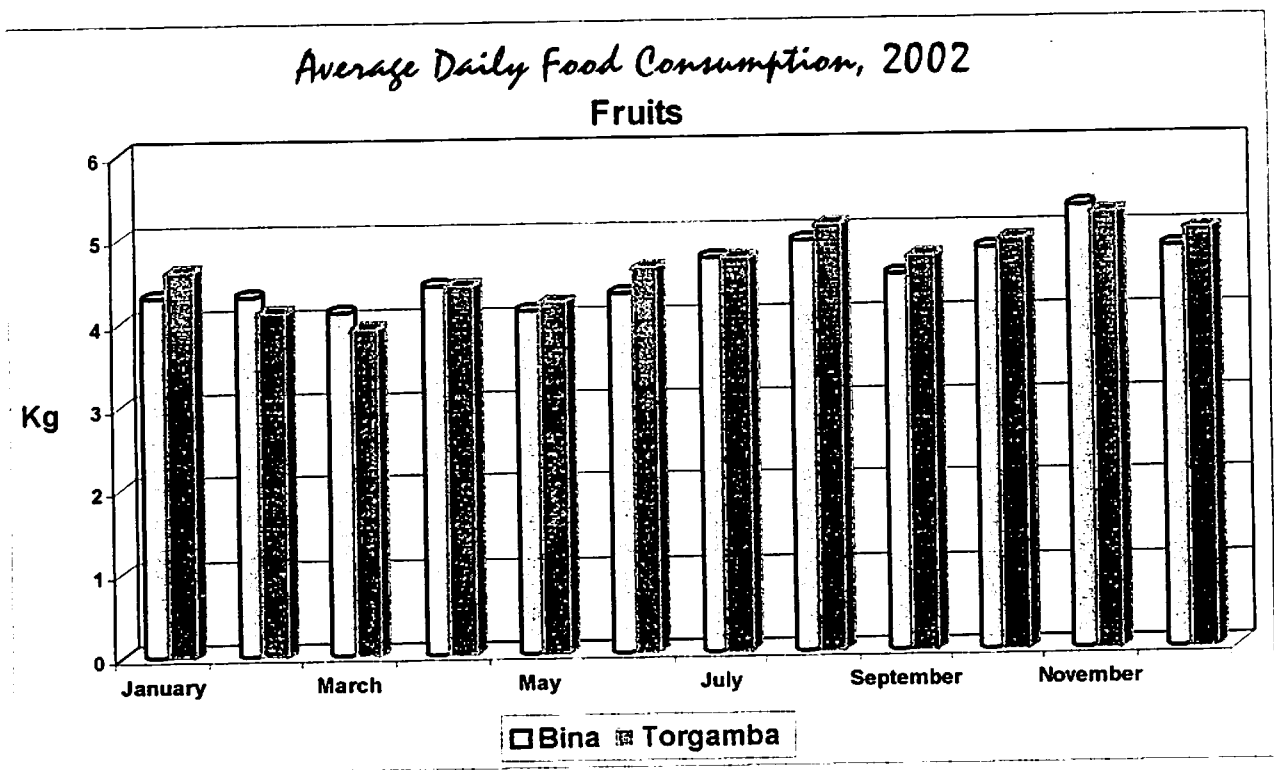
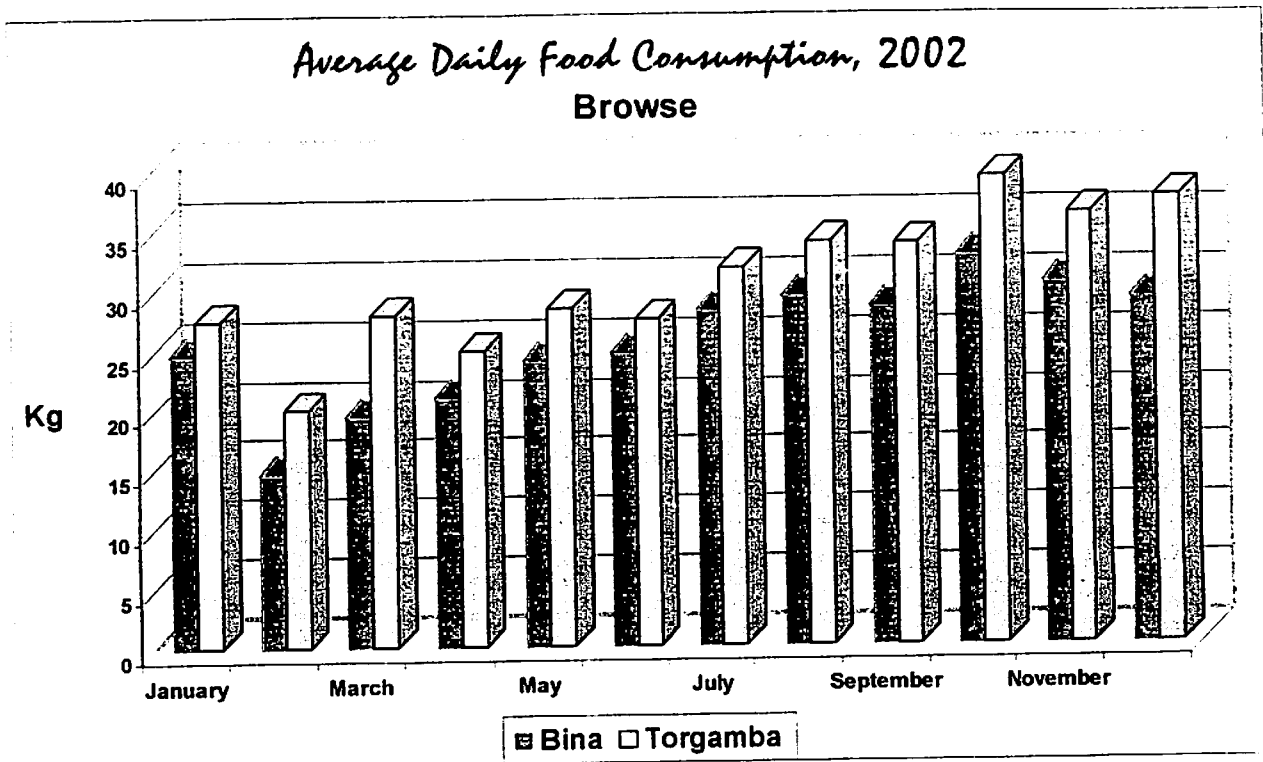
**Resting Activites Pattern of Bina**  
1 January - 31 Decem ber 2002



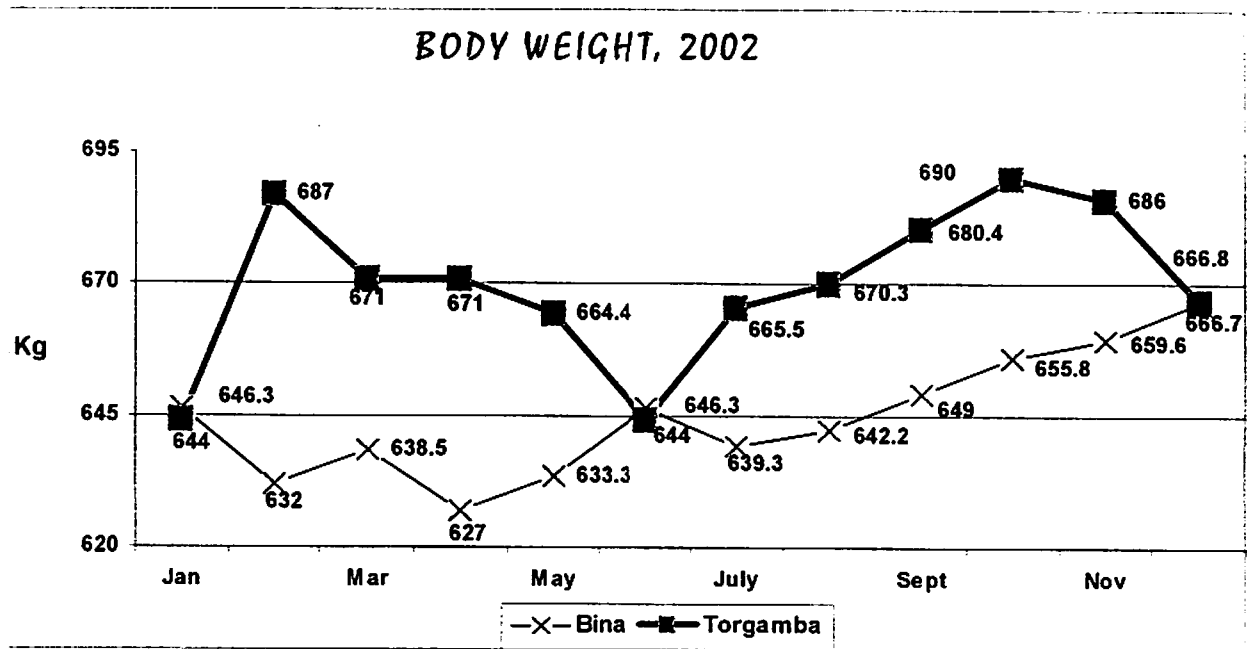
**Other Activites Pattern of Bina**  
1 January - 31 Decem ber 2002



Part 5  
**FOOD CONSUMPTION  
AND  
WEIGHT**



**AVERAGE DAILY FOOD CONSUMPTION (BROWSE AND FRUITS)**



**Part 6**

**APPENDICES**

-

**Pictures of  
Successful Matings  
at the  
Sumatran Rhino Sanctuary,  
Way Kambas,  
Lampung, Indonesia**

FIRST SUCCESSFUL MATING  
(25 February 2002)



Wallowing



Mounting



Erection



Keeper watching



Assisted intromission



Data recording by keepers

*All photographs on this page made by Dedi Candra*

SUCCESSFUL INTROMISSION (25 February 2002)



*All photographs by Dedi Candra*



COURTSHIP TO INTROMISSION (25 February 2002)



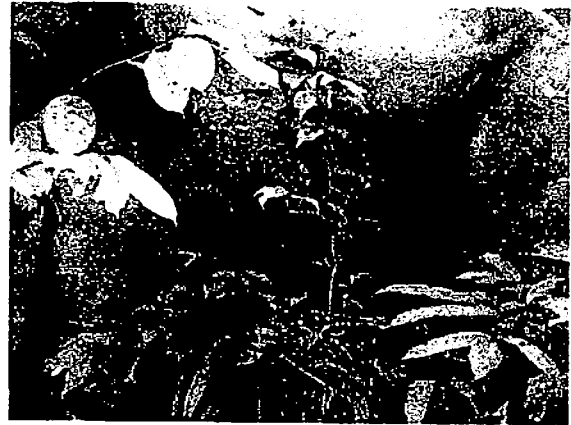
Courtship



Mounting



Assisting



Intromission



Penis after intromission



Blood from vulva after intromission

*All photographs by Dedi Candra*

# PHOTOS OF ENDOSCOPY AND ULTRASOUND EXAMINATION

**SRS Way Kambas Lampung**

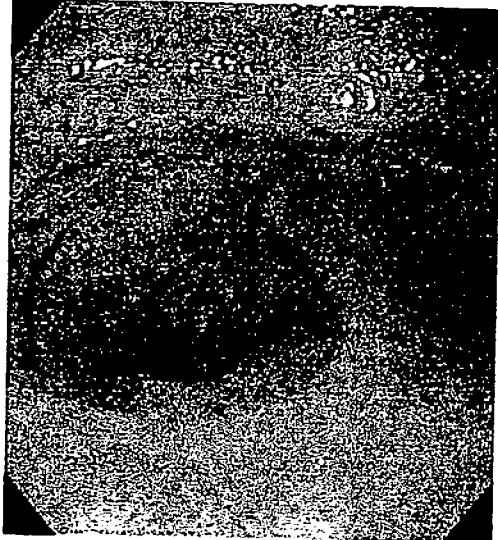
**REPORT (ENDOSCOPE)**

ID : BINA  
Organ : Vagina  
Date : March 5, 2002  
Time : 07:46:37

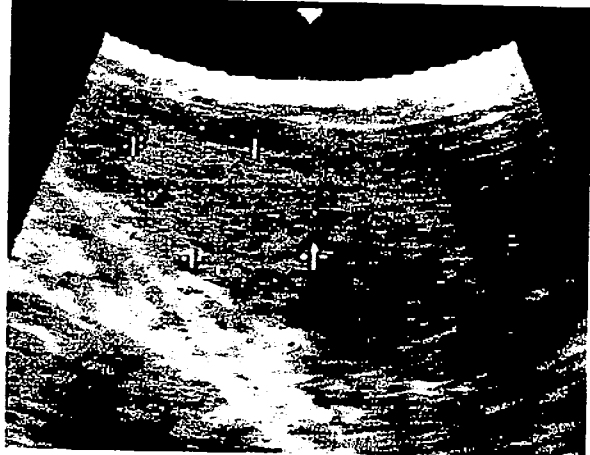
SCV ----- 3

Comment :

The condition of Bina's Vagina is very good, not inflamed and no serious wounds. This is a picture made 7 days post mating (February 25, 2002)



**SUMATRAN RHINO SANCTUARY – WAY KAMBAS**



**Investigation with Ultrasound ( USG )**

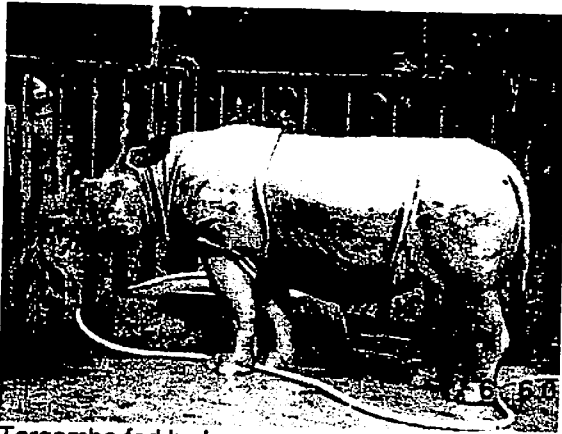
Date : 05 March 2002  
Time : 14 : 40 : 47  
ID : Bina  
(Sumatran Rhino)

Store : 000/122  
FOCUS : 1234  
ELLIPSE :

+	: 2.79 cm <sup>2</sup>
C	: 6.22 cm
S	: 1.46 cm
L	: 2.52 cm

**CORPUS LUTEUM (Right Ovary)**

SECOND SUCCESSFUL MATING  
(11 June 2002)



Torgamba fed by keeper



Mounting at the gate



Mounting and erection



Assisted by keeper



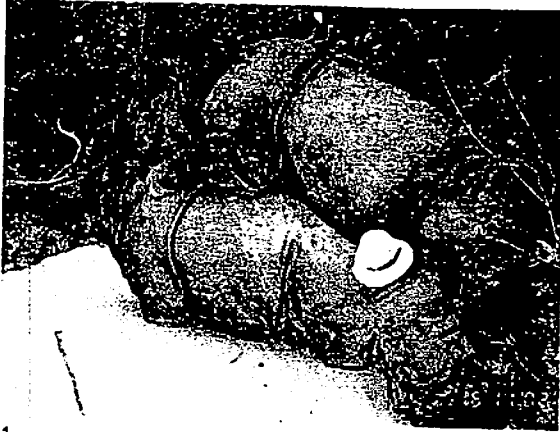
Assisted intromission



Intromission problem

*All photographs by Dedi Candra*

MATING IN WALLOW  
(11 June 2002)



1



2



3



4



5



6

1-4, 6 by Dedi Candra; 5 by Marcellus Adi

THIRD SUCCESSFUL MATING  
(1 September 2002)



1. Chin rest



2. Climbing



3. Climbing



4. Mounting



5. Assisted intromission



6. Intromission

*Photo 1 - 4 by Sumadi; 5 - 6 by Marcellus Adi*

FOURTH SUCCESSFUL MATING  
(19 October 2002)

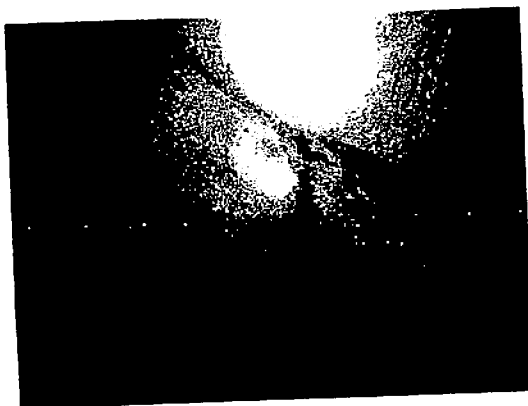
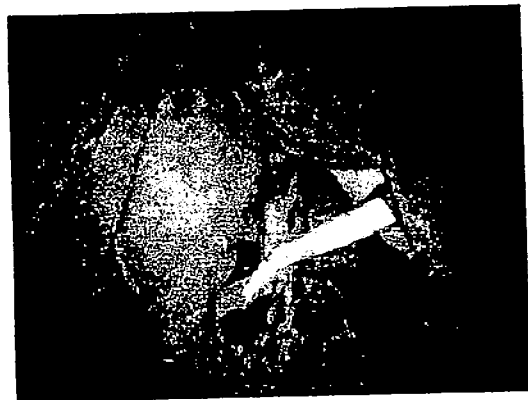


All photographs by Dedi Candra

In the evening

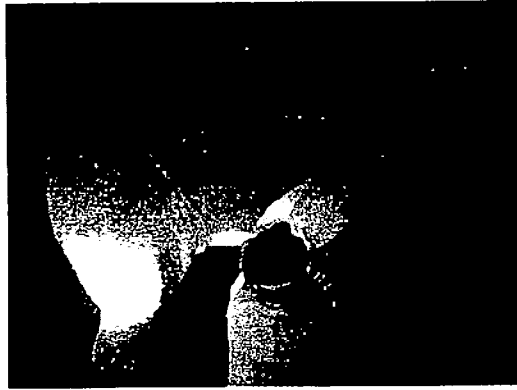
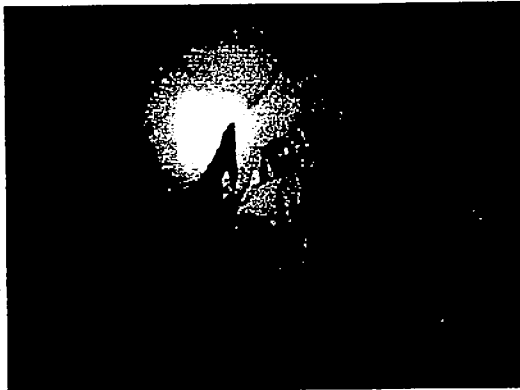


In the night

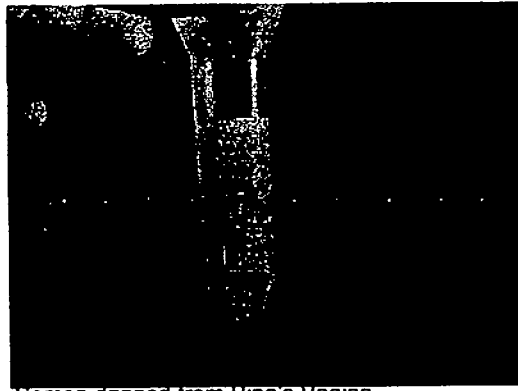
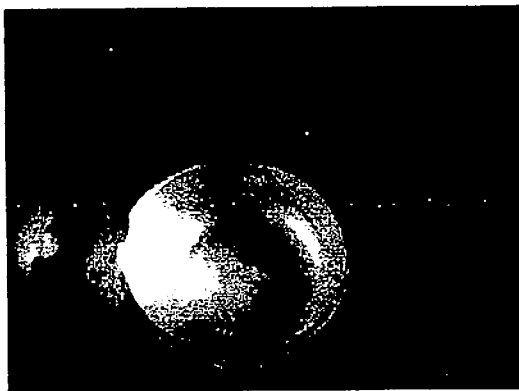


All photographs by Dedi Candra

FIFTH SUCCESSFUL MATING  
(11 November 2002)



*All photographs above by Surono, below by Dedi Candra*



*Semen dripped from Bina's Vagina*