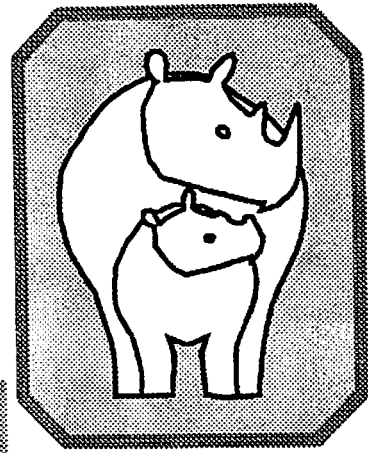
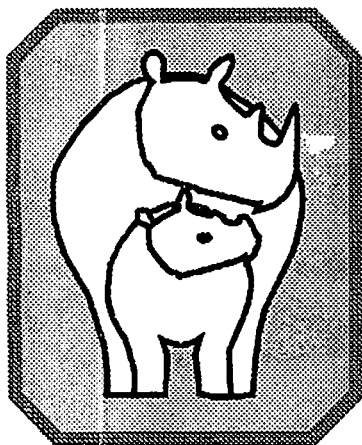


**S**umatran  
**R**hino  
**S**anctuary



Way Kambas National Park

**CURATOR'S REPORT 1998**



**S**uaka  
**R**hino  
**S**umatera

**Taman Nasional Way Kambas**

*DIRECTORATE GENERAL OF FOREST PROTECTION AND NATURE CONSERVATION,  
INTERNATIONAL RHINO FOUNDATION,  
TAMAN SAFARI INDONESIA,  
YAYASAN MITRA RHINO.*

**S**umatran  
**R**hino  
**S**anctuary

**Way Kambas National Park**



**S**uaka  
**R**hino  
**S**umatera

**Taman Nasional Way Kambas**

# **CURATOR'S REPORT 1998**

**(February 1998 - December 1998)**

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.

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**DIRECTORATE GENERAL OF FOREST PROTECTION AND NATURE CONSERVATION,  
INTERNATIONAL RHINO FOUNDATION,  
TAMAN SAFARI INDONESIA,  
YAYASAN MITRA RHINO.**

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**THE SUMATRAN RHINO SANCTUARY FIELD STAFF:**

Animal Curator: Marcellus Adi C.T.R.

Maintenance: Sumadi

Keepers:

1. Dede Nurdin
2. Memet Mukri
3. Rakimin
4. Rois Subadri
5. Sugiono
6. Sukandi
7. Lamijo
8. Yuhadi

House Keepers: Suratno

Cooker: Cecep Syarifudin

Guards:

1. Agripa Tumade
2. Asnawi Andalas

Driver: Surono

Veterinary Technician  
(additional): Sharmy Prastiti (from Taman Safari Indonesia)

Part 1

**FOOD and WEIGHT TABLES**

## FEBRUARY 1998

### FOOD AND WEIGHT (in Kg)

Date	♀ BINA		♀ DUSUN		♂ TORGAMBA	
	Food taken	Weight	Food taken	Weight	Food taken	Weight
1	15	-	12	-	22.5	-
2	13	-	11	-	22	-
3	17	-	10	-	19	-
4	19	-	13	-	17.5	-
5	24	-	16.5	-	14	-
6	39.5	-	15	-	14.5	-
7	30.5	-	16.5	-	13	-
8	29	-	18	-	13.5	-
9	35	-	19	-	13.5	-
10	28	-	25	-	14.5	-
11	21	-	21.5	-	13.5	-
12	35	-	25	-	19	-
13	34	-	23	-	15	-
14	33	-	17	-	12.5	-
15	41	-	22	-	12.5	-
16	31	-	19	-	13	-
17	31	-	20	-	12.5	-
18	30	-	18	-	12	-
19	41	-	35	-	13.5	-
20	39	-	38	-	14	-
21	46	-	26	-	14.5	-
22	34	-	17	-	12	-
23	32	-	22	-	11	635
24	36	525	26	-	29	-
25	28	-	20	497	11	-
26	37	-	21	-	20	-
27	30	-	39	-	14.5	-
28	39	-	34	-	20	-
Mean	31.00	525	21.41	497	15.48	635

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

LEAVES: jackfruit, ficus, pulai (local name), and various forest trees and lianas (collected in the NP).  
FRUITS: banana, pineapple, carrot, papaya, sweet potato.

*Notes: (1) An electronic scale was installed 23 February. All animals will be weighed weekly.  
(2) The SRS aims to provide about 1/3 of the food requirement from outside (browse collected by the keepers, and leaves, fruits, roots and vegetables bought locally). The other 2/3 should be browsed from the vegetation in the paddocks. Torgamba is on target, but Dusun is reluctant to forage in the paddock. Next month the amount of food provided to Dusun will be reduced gradually to stimulate foraging in the paddock. Bina has been kept in the yard for most of the days with all food provided.*

## MARCH 1998

### FOOD AND WEIGHT (in Kg) -

Date	♀ BINA		♀ DUSUN		♂ TORGAMBA	
	Food taken	Weight	Food taken	Weight	Food taken	Weight
1	40.5		27		13.5	
2	16		25		15.7	
3	21		29		11.5	635.5
4	34	536.5	32		13	
5	35		34	520.5	14	
6	40		37		16.5	
7	20		35		19	
8	25		47		13	
9	41		38		11.5	
10	37		37		21	663
11	26	561.5	36		15	
12	40		28	527.5	15.5	
13	36		28		20	
14	32		26		28.5	
15	26		25		19.5	
16	34		20		27.5	
17	10		26		26	
18	6		34		16	
19	8		26		11	638.5
20	-		30	519.5	11	
21	6		29		14	
22	6		27		21	
23	6		23		11	
24	6		18		18	
25	6		27		12	
26	6		33		17.5	
27	6		19		18	
28	6		16	514.5	16.5	641
29	6		24		17	
30	11	529.5	18		20	
31	6		21		17	
<b>Mean</b>	<b>19.95</b>	<b>542.5</b>	<b>28.23</b>	<b>520.5</b>	<b>16.80</b>	<b>644.5</b>

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

**LEAVES:** (1) Collected in villages and outside SRS (in the NP): jackfruit (*Artocarpus heterophylla*), various *ficus sp*, various forest trees and lianas in local name (pulai, torop, kasapan, akar jinten, akar merah). (2) Forage by rhinos in the paddock : Torgamba ( 22 species), Bina (16 species), Dusun (8 species); scientific names will be indentified in Herbarium Bogoriense LIPI Bogor. **FRUITS:** bananas, carrot, sweet potato.

*Note: Since Bina was released again into the paddock, she only eats 6 kg food, only fruits.*

## APRIL 1998

### FOOD AND WEIGHT (in Kg)

Date	♀ BINA			♀ DUSUN			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits		Browse	Fruits	
1	-	6		16	6		7	6	
2	-	6		12	6		12	5	
3	-	6		14	6		12	6	
4	-	6		25	6		20	5	636.5
5	-	6		26	6		18	5	
6	10	6		24	6	514.0	20	6	
7	-	6		19	6		16	5	
8	16	6		20	6		18	6	
9	-	6		15	6		16	1.5	
10	20	6		18	6		8	6	
11	-	5		16	6		11	5	628.0
12	20	6		18	6		12	5	
13	4	6		16	6	510.0	7	6	
14	15	6	535.0	18	6		8	6	
15	15	6		18	6		10	6	
16	-	4		19	6		16.5	4	
17	12	7	559.0	17	6	503.0	15	6	628.0
18	6	8		18	6		13	8	634.5
19	8	8	548.0	15	6		8	7.5	
20	10	6		22	6	518.0	7	6	
21	10	7		15	6		5	6	
22	10	7		17	6		20	5	
23	8	6		15	7		15	6	
24	-	7		17	7		7	7	
25	13	7		20	7		12	7	644.0
26	10.5	8	567.0	13	9		15	7	
27	7	8		15.5	9		18	7	
28	21	7		21	7	505.5	21	7	639.5
29	15.5	7	568.0	10	7		19	7	
30	23.5	7		20	7		18	6	
Mean	12.73	6.43	555.40	17.65	6.40	510.10	13.48	5.87	635.08



## MAY 1998

### FOOD AND WEIGHT (in Kg)

Date	♀ BINA			♀ DUSUN			♂ TORGAMBA		
	Browse	Fruits	Weight	Browse	Fruits	Weight	Browse	Fruits	Weight
1	21	7		28.5	7	490	23.5	6	635.5
2	19	9	571	24.5	7		18	6	
3	7	7		21	7		18.5	8	
4	19	9		21	8	495.5	31.5	8	624.5
5	15.3	8	560	30	8		8	8	
6	23.5	8		25	8		8.5	9	
7	18	7		31	7	528	13.5	8	633
8	17	7	571	17	7		10	8	
9	18.5	7		23	7		13.5	7	
10	33	7		20	7	532	11.5	7	650
11	20	7	579	21.5	7		9	7	
12	18.6	7		24.5	7		9	4	
13	16.1	7		22	7	522.5	15	4	656.5
14	24.4	6.5	571	23.5	6.5		19	7	
15	27.7	7		29	8		24.5	7	
16	25.2	7		23	8	531	26.5	7	668
17	4	7	585	17	8		11	7	
18	13	7		17	8		20	8	
19	18	7		24	8	511	14	7	650
20	24.6	8	576	23	8		22	8	
21	14	8		22.5	8		11	8	
22	8.1	8		22	8	501	18	8	653.5
23	14	7	602	13	8		13.5	8	
24	17.8	8		24	8		16.5	7	
25	12	7		18.5	8	510.5	7	7	678.5
26	23	7	588	22	8		11	7	
27	21.5	7		24	8		14	7	
28	17	6		20	6	490	17	7	645
29	19.5	7	585.5	20	9		26	8	
30	27	8		24	9		15	8	
31	22	8		26	8	503	24	8	645.5
Mean	18.67	7.34	578.85	22.63	7.63	510.41	16.11	7.23	649.09

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

##### BROWSE:

Collected in villages and outside SRS (in the NP): jackfruit (*Artocarpus heterophylla*), various *ficus* sp, various forest trees and lianas in local name (*pulai*, *torop*, *kasapan*, *akar jinten*, *akar merah*, *waru*, *kenongc*, *keputihan* and *kenc*). FRUITS: bananas, carrot, sweet potato, *duku* and pineapple.

## JUNE 1998

### FOOD AND WEIGHT (in Kg)

Date	♀ BINA			♀ DUSUN			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits		Browse	Fruits	
1	21.5	7	610	20	8		19	8	
2	21.5	8		19	7		23	8	
3	24	8		14	8	500	15	8	641
4	25.5	8	615.5	26	8		28	8	
5	17.5	7		19	8		33	7	
6	24	7		16	8	506	21	7	660
7	22	7	605.5	17	7		16	6	
8	23.5	7		25	8		20	7	
9	24.2	7		15	9	504.5	20	9	681.5
10	25.8	7	596	20	8		21.5	7	
11	17.5	8		27.5	8		18.5	8	
12	27.2	8		17	8	501	20.5	8	650
13	14.5	8	595.5	18.5	8		26	8	
14	17.5	8		21	8		25.5	8	
15	19	8		22	8	529	15	8	662.5
16	27.5	8	627.5	19	9		24	8	
17	18.8	8		20	8		24.5	8	
18	26.7	8		16	8	521	28	9.5	667.5
19	23.5	12	604	24.5	6		26	11	
20	13.5	6		20	8		14	6	
21	21.5	7		16.5	8	523	19	6	648.5
22	23.5	7	597.5	21	8		23	7	
23	24	7		26.5	8		13	7	
24	12.3	7		13	8	506.5	24	7	663.5
25	18	7	595	18.5	8		18.5	7	
26	19.5	8		19.5	8		22	7	
27	18	8		27	11.5	497	16	8	651
28	34.5	8	610	16	8		22	8	
29	14.5	11		20	9		16.5	8	
30	12	8		17	8	526	20	8	651.5
Mean	21.10	7.77	605.65	19.72	8.08	511.40	21.08	7.68	657.70

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

Collected in villages and outside SRS (in the NP): jackfruit (*Artocarpus heterophylla*), various *ficus sp.*, various forest trees and lianas in local name (*pulai, torop, kasapan, akar jinten, akar merah, waru, kenongo, keputihan* and *keno*).

FRUITS: banana, carrot, sweet potato, pineapple.

## JULY 1998

### FOOD AND WEIGHT (in Kg)

Date	♀ BINA			♀ DUSUN			♂ TORGAMBA		
	Browse	Fruits	Weight	Browse	Fruits	Weight	Browse	Fruits	Weight
1	26	8	606.	14	8		22.5	8	
2	22	8		15	9		26.5	8	
3	22.5	8		16	8	517.5	20	8	655.5
4	23	8	606.5	16	8		26	9	
5	27.5	8		18	8		27	8	
6	18.5	7		15.5	8	525	25	8	645.5
7	18	7	606.5	17	8		25	7	
8	24.5	8		17	8		24.5	8	
9	16.8	8		12	8	500.5	35.5	8	661.5
10	21.8	8	601.5	15.5	8		26.5	8	
11	21.3	8		18.5	8		21	8	
12	20.8	8		14	8	497.5	22	8	660.5
13	22.1	8	581	16	8		23.5	8	
14	21.7	8		15.5	8		26	8	
15	11.3	8		19.5	8	500	24.5	8	667
16	17	8	594.5	16	8		19	8	
17	20.5	9		23	8		25	9	
18	14.5	9		16.5	8	487.5	20	9	642
19	19	8	600	18.5	9		24	8	
20	20.5	7		21	8		24.5	7	
21	16	5		27.5	9	495.5	21.5	6	653.5
22	11	9	591.5	22	9		26.5	9	
23	20	9		18	9		22	9	
24	21	9		17	9	489.5	24.5	9	664
25	12.5	8	606.5	19.5	9		31	8	
26	20.5	8		15.5	8		24	8	
27	35	8		19	8	492	13	8	645.5
28	27.5	8	614	16	8		28	8	
29	29.5	8		15	8		20	7	
30	27	6		16	6	491.5	22	6	646.5
31	24	8	607	17	8		27	8	
Mean	21.07	7.90	601.36	17.32	8.16	499.65	24.11	7.97	654.15

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

**BROWSE:** Collected in villages and outside SRS (in the NP): jackfruit (*Artocarpus heterophylla*), various *ficus sp*, various forest trees and lianas in local name (*pulai, torop, kasapan, akar jiten, akar merah, akar mencret, waru, keputihan, and keno*). Collected specials for Dusun from Ragunan Zoo: Kol Banda (*Pissonia alba*). **FRUITS:** banana, carrot, sweet potato, pineapple.

## AUGUST 1998

### FOOD AND WEIGHT (in Kg)

Date	♀ BINA			♀ DUSUN			♂ TORGAMBA		
	Browse	Fruits	Weight	Browse	Fruits	Weight	Browse	Fruits	Weight
1	33	8		14	8		18	8	
2	27.5	8		16	8	531	34.5	8	648.5
3	21.8	8	600.5	15	8		17	8	
4	32.2	8		15	8		22.5	9	
5	20.2	8		24	8	533	25	8	663.5
6	20.1	8	603.5	22	8		23.5	8	
7	30.7	8		20	8		28	8	
8	16.8	8		22	8	527	27	8	656.5
9	31.6	7	602.5	19	8		30	8	
10	17.7	7		17	8		30.5	8	
11	35.6	7		6	8	528.5	32	7	666.5
12	15.3	8	605	16	6		24.5	7	
13	22.9	8		12	9		26	8	
14	23.5	10		21	8	525.5	43	8	649
15	46	8	620.5	25	8		45.5	8	
16	39.5	11		16	8		15	8	
17	45.9	10		17	8	515.5	60	8	648.5
18	25.5	9	609.5	28	8		26	8	
19	41	9		23	8		32	8	
20	23.5	9		18.5	8	529.5	28	8	661
21	34.5	8	630.5	18	8		48	8	
22	23	8		14.5	8		21	7	
23	28.3	9		18.5	8	514.5	25	8	661.5
24	21.7	9	618.5	14.5	8		23.5	8	
25	41.5	9		25	8		43	8	
26	38	9		15	8	528.5	34	8	648.5
27	28.5	9	616.5	15	8		35.5	8	
28	29.5	8		21.5	8		25.5	7	
29	22	8		20.5	8	515	39.5	8	646.5
30	21.5	8	616.5	13	8		29.5	8	
31	20.4	8		25	8		34	8	
Mean	28.36	8.39	612.35	18.29	7.97	524.80	30.53	7.90	655.00

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

**BROWSE:** Collected in villages and outside SRS: jackfruit (*Artocarpus heterophylla*), various *ficus sp*, various forest trees and lianas in local name: 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.

## SEPTEMBER 1998

### FOOD AND WEIGHT (in Kg)

Date	♀ BINA			♀ DUSUN			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits		Browse	Fruits	
1	23.1	8		25	8	529	34	8	648
2	28.8	7	624	24	8		35.5	8	
3	31.7	8		22	8		22.5	8	
4	18.7	8		17	8	517	25	8	656
5	59.6	8	626.5	18	8		23	8	
6	40	8		18	7		21.5	7	
7	35	8		24	8	524.5	26	7	-
8	38	8	633	18	8		30	10	
9	26.6	8		17	8		45.5	8	
10	41	8		18	8	501	39	8	681
11	14.8	8	633.5	20	8		25	8	
12	27	7		17	8		36	7	
13	24.2	7		21	8	514	34	7	666.5
14	31	8	608.5	25	8		33.5	7	
15	22.6	6		24	7		24	6	
16	19.5	9		24	10	515	33	8	673
17	28.1	10	610	16	10		38	7	
18	33	11		15.5	11		31	8	
19	28.3	10		11	10	512	42	10	662
20	25.1	10	620	16.5	10		38.7	10	
21	23.5	8		10	10		21	8	
22	20	8		11	10	510	18.5	8	665
23	23.5	8	619	19	10		23	8	
24	26.5	8		16	10		36	8	
25	22.5	7		14.5	7	519	33	7	663.5
26	28.5	9	617	19	10		30.5	8	
27	30	9		14	10		30.5	8	
28	25.5	-		12	10	519	31	-	-
29	30	8	-	16	10		32	8	
30	27.2	8		17	10		30.5	8	
Mean	28.44	8.21	621.28	17.98	8.87	516.05	30.77	7.90	664.38

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

**BROWSE:** Collected in villages and outside SRS: jackfruit (*Artocarpus heterophylla*), various *ficus sp.*, various forest trees and lianas in local name: 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:** bananas, carrot, sweet potato, pineapple and papaya.

# OCTOBER 1998

## FOOD AND WEIGHT (in Kg)

Date	♀ BINA			♀ DUSUN			♂ TORGAMBA		
	Browse	Fruits	Weight	Browse	Fruits	Weight	Browse	Fruits	Weight
1	23.2	7		22	10	521.5	36.5	7	656
2	10	6	619.5	13	7		29	7	
3	28.5	7.5		13	10		30.5	9	
4	39	6		18	10	525	34	8	656
5	54.5	7	615.5	21	10		31	8	
6	42.2	7		17	9		41	6	
7	23.2	7		17	9	511.5	29	7	657
8	38.3	7	605.5	18	9		38.5	7	
9	45	7		19	10		35.5	8	
10	31.4	7		18	10	517	18.5	8	686
11	25.8	7	618.5	17	8.5		22	7	
12	44	8		13	7		32	7	
13	32.5	11.5		17	9	522	28.5	11	670
14	26.8	12	615	19	11		25.5	11	
15	31	12		21	10		36	10	
16	26.2	8		15	10	522	24	12	670
17	37.5	10	614	20.5	10		30	10	
18	30.5	12		18	12		39	12	
19	27	12		22	12	516	24.5	12	
20	28.2	12	624	20	12		41.5	12	
21	33.5	12		19	12		39.5	12	
22	28	12		15	11	517	31.5	12	681
23	33	12	623.5	19	12		40.5	12	
24	25.6	12		19	12		35.5	12	
25	28.5	12		18.5	12	525	39.5	12	674
26	25	12	622.5	13	12		26	12	
27	16	12		18	12		44	12	
28	29.6	12		21	12	522	29.5	12	680
29	29.6	12	632	25	12		30.5	12	
30	35.8	12		26	12		27	12	
31	25.7	12		14	12	536	32.5	12	684.5
Mean	30.8	9.9	619.0	18.3	10.5	521.4	32.3	10.0	671.5

## NOVEMBER 1998

### FOOD AND WEIGHT (in Kg)

Date	♀ BINA			♀ DUSUN			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits		Browse	Fruits	
1	23	12	628.5	21	12		27.5	11.5	
2	32.5	10		20	11		29	12	
3	24	9		14	10	527.5	32	8	676
4	33	8	623	24	9		31	8	
5	33	7.5		23.5	10		40	8.5	
6	34	7		14.5	10	516.5	27	7	692
7	34.1	8	616.5	22	9		33.6	9	
8	38.6	8		23	10		33.1	8	
9	42.1	8		14.5	10	526	42.6	8	-
10	32.1	8	640	25.5	10		32.6	8	
11	37	8		23.5	10		48.5	8	
12	24.4	8		12.5	10	525.5	34.5	8	696
13	30.5	8	632.5	26	10		42.5	8	
14	35.2	8		25.5	7		48.5	8	
15	40	8		21.5	8	517	39	7	671
16	29.5	8	625.5	20	10		34.5	8	
17	21	8		22.5	10		35.5	8	
18	23	8		18	10	536	34	8	693
19	32.5	8	628	22.5	10		21.5	8	
20	33	8		21.5	10		36.5	7	
21	24	8		18	9	534	30	8	681.5
22	29.5	8	623.5	21.5	10		28	8	
23	14	8		23.5	10		26.5	13	
24	47.5	8		26	10	529	38	8	677
25	51.5	8	629	24	10		42.5	9	
26	37.5	8		30.5	9		36.5	8	
27	41	8		19	9	537	39.5	8	-
28	40	8	626.5	15.5	10		36	8	
29	18.5	8		22	10		37	8	
30	44	8		20.5	8	539	13.5	8	681.5
Mean	32.7	8.2	627.3	21.2	9.7	528.8	34.4	8.4	683.5

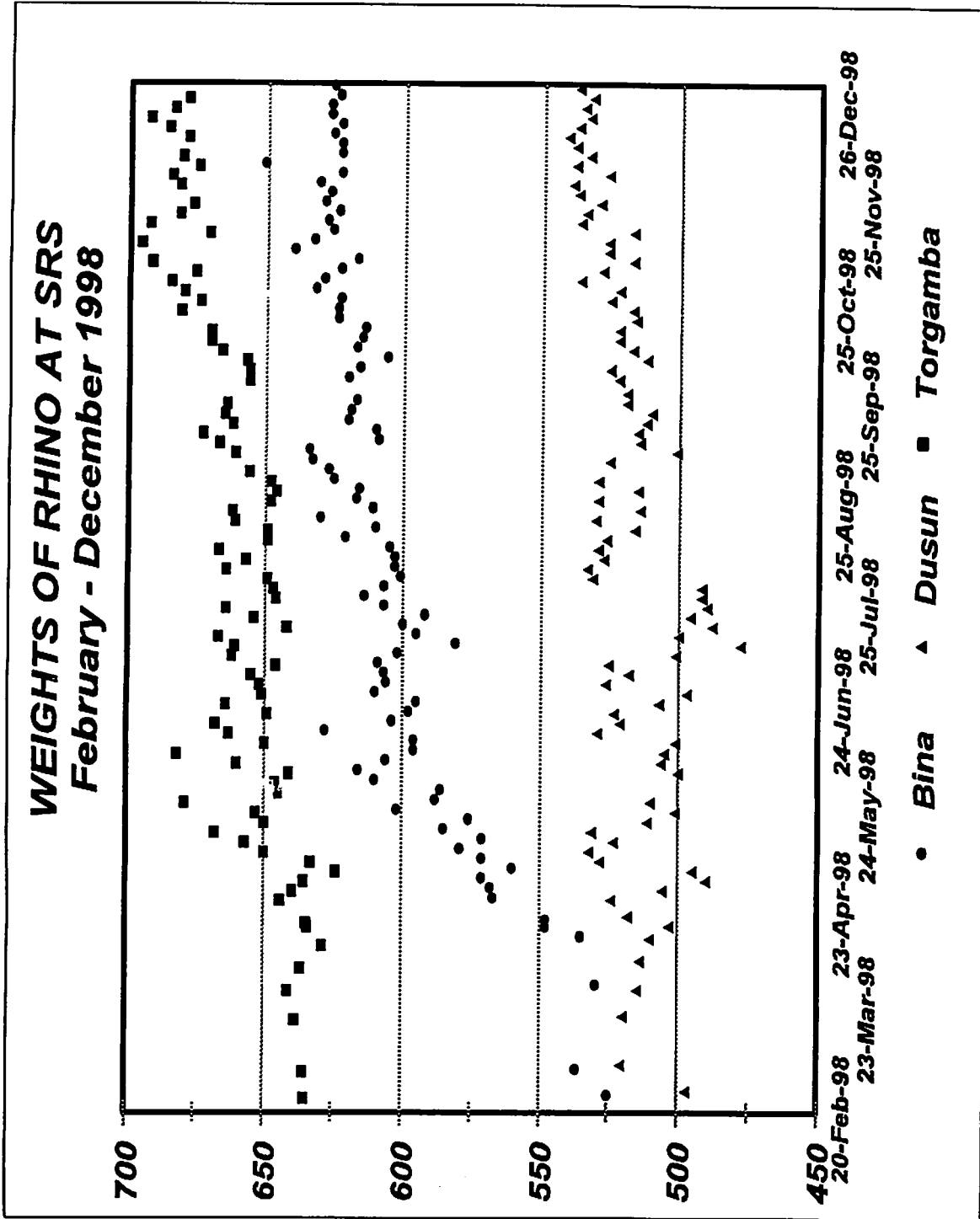
**PRINCIPAL FOOD ITEMS (in order of importance):** BROWSE: Collected in villages and outside SRS: jackfruit (*Artocarpus heterophylla*), various *ficus sp*, various forest trees and lianas in local name: pulai (*Alstonia scholaris*), waru (*Mallotus mollucanus*), mahang hijau (*Macaranga triloba*), akar 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, roseapple, pumpkin, mango.

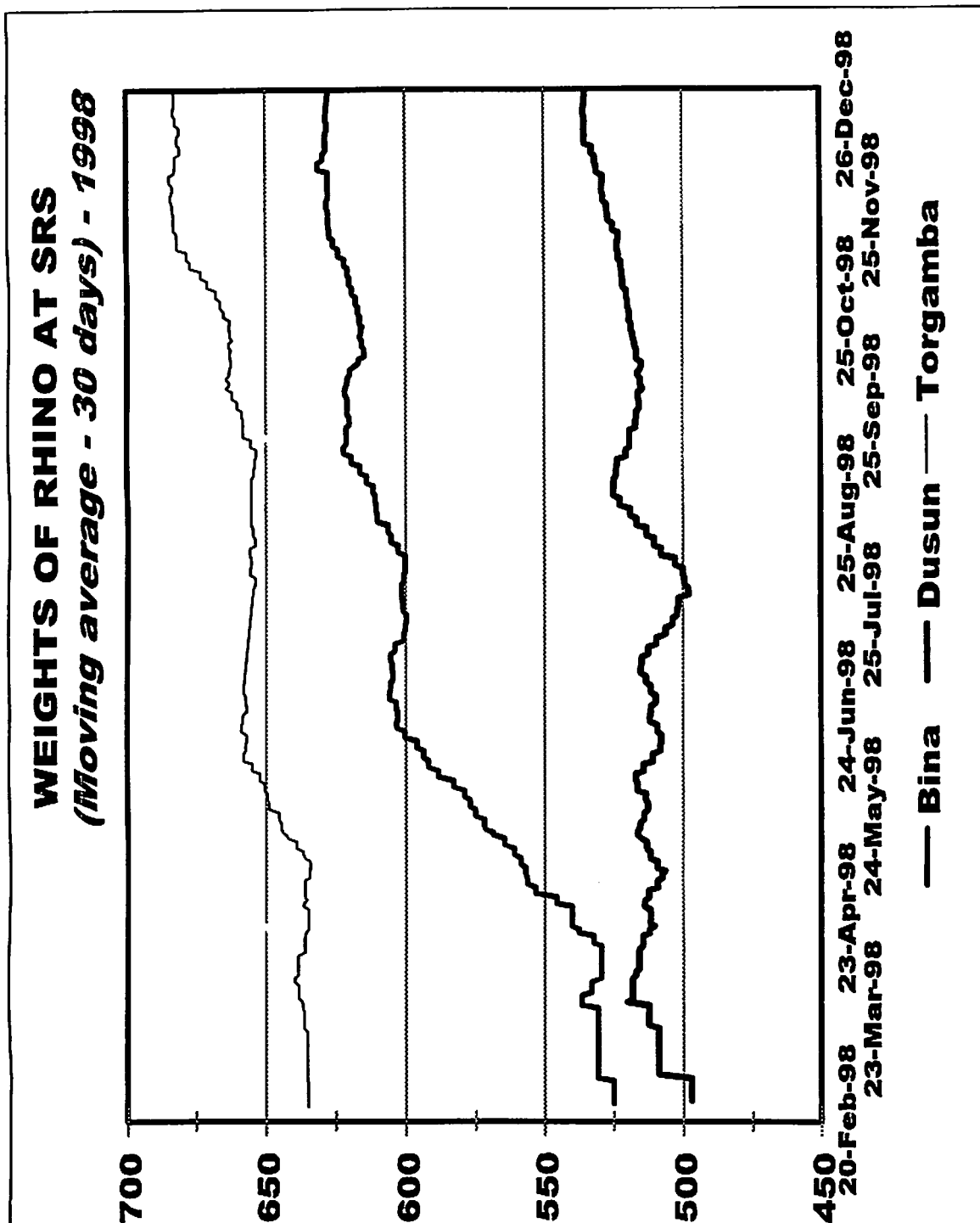
## DECEMBER 1998

### FOOD AND WEIGHT (in Kg)

Date	♀ BINA			♀ DUSUN			♂ TORGAMBA		
	Food taken		Weight	Food taken		Weight	Food taken		Weight
	Browse	Fruits		Browse	Fruits		Browse	Fruits	
1	30	7	631	19.5	9		52	7	
2	35.8	8		18.5	10		36	8	
3	23	8		21.5	10	526	36.5	8	685
4	31.9	8	623	18	10		27.4	8	
5	31.7	8		21	10		27	8	
6	60.4	8		24.5	10	538	49	8	675
7	49	8	650.5	21	10		49	8	
8	52	8		24	10		46.5	8	
9	54.5	8		28.5	10	533	54.5	8	681
10	45.5	8	623	19.5	10		45.5	8	
11	47	8		30	10		47	8	
12	39	8		23	10	538	39	8	-
13	49.4	8	623	26.5	10		49.5	8	
14	37.5	8		25.5	10		37.4	8	
15	11.5	8		22	8	541	27.5	7	679
16	53	8	626	20.5	10		42.5	7	
17	35.4	8		30	10		44.5	8	
18	48.5	8		21.5	10	537	37	8	685.5
19	39.5	7	623	34.5	10		39.5	8	
20	34.4	8		27.5	10		39.5	8	
21	28	8		21	10	533	27	8	692.5
22	31.3	8	639.5	24.5	10		33	8	
23	46	8		27.5	10		22.5	8	
24	51.2	8		24.5	10	535	49.5	8	684
25	52	8	626.5	28	10		35.5	8	
26	61	8		29	10		45.5	8	
27	51	8		26	10	532	36.5	8	678.5
28	58.5	8	623.5	28.5	10		30	8	
29	43.5	8		24	10		4.5	8	
30	63	8		36	10	537	0	8	-
31	42	8	626	35.5	10		0	13	
Mean	43.1	7.9	628.6	25.2	9.9	535.0	35.8	8.1	682.6







Part 2

**GENERAL OBSERVATIONS  
and  
TREATMENT RECORDS**

## FEBRUARY 1998

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>EVENTS AND ACTIVITY</b>		
<ul style="list-style-type: none"> <li>- Arrived at SRS on January 10</li> <li>- Tail partly amputated on 23 January because of necrosis caused by telemetry bandage.</li> <li>- Temporarily released into the paddock in January, but kept in the yard since 2 February to facilitate healing of the tail wound.</li> <li>- Expected to be released in the paddock mid-March</li> </ul>	<ul style="list-style-type: none"> <li>- Arrived at SRS on 10 January</li> <li>- Tail partly amputated on 21 January because of necrosis caused by telemetry bandage.</li> <li>- Released into the paddock during the day since 13 January.</li> <li>- Stays out in the paddock day and night since 13 February.</li> <li>- Wallows in the paddock and return several times per day to the yard for food.</li> <li>- Does not move far from the yard and is reluctant to forage in the paddock, except for gandaria fruits (kind of small forest mango).</li> </ul>	<ul style="list-style-type: none"> <li>- Arrived at SRS on 8 January</li> <li>- Released into the paddock during the day since 12 January.</li> <li>- Stays out in the paddock day and night since 3 February.</li> <li>- Has-readjusted very well to the life in the natural environment, and browses on a variety of species.</li> <li>- The paddock is actively explored, and wallows are made.</li> </ul>
<b>MEDICATION and SPECIAL TREATMENTS</b>		
<p><b>TAIL WOUND :</b> <i>Topical:</i></p> <ul style="list-style-type: none"> <li>- Perokside (H<sub>2</sub>O<sub>2</sub>)</li> <li>- Betadine</li> <li>- SWAT/Gusanex</li> <li>- Vit A &amp; D Ointment</li> <li>- Yunan Paiyao powder</li> </ul> <p><i>Injection:</i></p> <ul style="list-style-type: none"> <li>- Amoxicillin</li> <li>- Dellamidon</li> <li>- Hematopan</li> <li>- Biosalamine</li> </ul> <p><i>Oral:</i></p> <ul style="list-style-type: none"> <li>- Duphatrim</li> <li>- Banamine powder</li> <li>- Ascorbec tablet</li> <li>- B complex</li> </ul> <p>The tail wound healed comparatively slow, but is expected to be completely closed and hardened mid March.</p>	<p><b>TAIL WOUND :</b> <i>Topical:</i></p> <ul style="list-style-type: none"> <li>- Perokside (H<sub>2</sub>O<sub>2</sub>)</li> <li>- Betadine</li> <li>- SWAT/Gusanex</li> <li>- Antibiotic salp</li> <li>- Bicorcimina LA</li> </ul> <p><i>Oral:</i></p> <ul style="list-style-type: none"> <li>- Duphatrim</li> <li>- Banamine powder</li> <li>- Ascorbec tablet</li> <li>- B complex</li> </ul> <p>The tail wound healed quickly and completely.</p>	<ul style="list-style-type: none"> <li>- Tick spray treatment on 17 February using <i>frontline</i> (fipronil), once per 4 weeks.</li> <li>- putrid smell from the excessive loose keratine at the base of the horns. Treated with a mix of antibiotic cream and Gusanex (fly repellent) and removal of loose tissue.</li> </ul>
<b>REPRODUCTION</b>		
Signs of heat on 11 -13 February - vulva reddish, swollen, and a clear discharge.	No signs of heat.	Full erection on penis stimulation.
<p><b>Note:</b> End of March the central area will be prepared and all animals will be allowed to use the central area on a weekly rotation to allow them to get familiar with the smells and signs of the other occupants of the SRS.</p>		

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>MISCELLANEOUS</b>		
<ul style="list-style-type: none"> <li>- During the initial release in the paddock, Bina made a wallow, slept in the paddock, and foraged extensively.</li> <li>- During the first month Bina was easily excited by people and sounds, especially by the sound of falling timber. She is still slightly nervous even in the yard.</li> <li>- Bina's appetite decreases if the food provided is not varied frequently.</li> <li>- When released again into the paddock after the tail wound has healed, the lower three wires will not be powered.</li> </ul>	<ul style="list-style-type: none"> <li>- Dusun only walks in the forest in the daylight.</li> <li>- All electric wires in Dusun's paddock are powered, except those near the yard. She usually avoids the fence, but quite often appears to be testing the fence with the head. She only shows a mild response when shocked.</li> </ul>	<ul style="list-style-type: none"> <li>- Just after the first release into the paddock Torgamba once touched the electric wire, with very low power (0.7 KV). Since then he has stayed clear of the fence, though often walking along the fence.</li> <li>- Currently the power is off on the three lower wires. When the sector resistors are available, a low voltage will be applied on the lower wires.</li> </ul>

## MARCH 1998

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>EVENTS AND ACTIVITY</b>		
<ul style="list-style-type: none"> <li>- Released again into the paddock at 16 March, but did not return to the yard after that, except one time on 30 March.</li> <li>- Bina's keepers (2 persons) can stay with her during the day, give her little amount of fruits, and do routine body health check up.</li> <li>- The keepers also try to attract her with fruits to walk along with them and bring her back to yard, but still fail.</li> <li>- Just at the forest edge closest to her yard, she always return to the forest.</li> </ul>	<ul style="list-style-type: none"> <li>- Dusun still does not move far from the yard but has started to forage in the paddock, and additional leaves and fruits are now provided outside yards.</li> <li>- Started to forage in the paddock by reduced amount of leaves provided, and induce her to forage forest trees and lianas from her paddock.</li> </ul>	
<b>MEDICATION and SPECIAL TREATMENTS</b>		
<p><b>TAIL WOUND :</b>  <i>Topical:</i> Perokside (H<sub>2</sub>O<sub>2</sub>), Beta-dine, Gusanex, Vit A &amp; D Ointment, Yunan Paiyao powde.  <i>Oral:</i> Ascorbec tablet, B complex tablet.</p> <p>The tail wound healed completely by 16 March 1998.</p>	<p><b>VULVA WOUND (see note):</b>  <i>Topical:</i> Perokside (H<sub>2</sub>O<sub>2</sub>), Betadine, Antibiotic ointment  <i>Oral:</i> Banamine Powder, Ascorbec, Amoxicilin, B complex</p> <p>The Vulva wound healed completely within 2 1/2 weeks.</p>	<ul style="list-style-type: none"> <li>- Tick spray treatment on 21 March using <i>frontline</i> (fipronil).</li> </ul>
<b>REPRODUCTION</b>		
<p>Signs of heat on 9 - 10 March - vulva reddish, swollen, dilatation, rapid contraction and produce a clear and very thick consistency discharge.</p>	<p>No signs of heat.</p>	<p>Full erection on penis stimulation.</p>
<p><i>Note: Two small wounds found close by vulva of Dusun, perhaps stabbed by broken piece of wood in the wallow. It made a puncture and contains a small number of larva (very early stage).</i></p>		
<b>MISCELLANEOUS</b>		
<ul style="list-style-type: none"> <li>- After release on 16 March into the paddock, Bina made a wallow, slept in the paddock, and foraged extensively.</li> <li>- Bina is still easily excited by people and sounds of falling or broken timber, except for the sounds of her keepers.</li> <li>- Bina's appetite appears to be increasing in the paddock and eat all fruits which gave by keepers.</li> </ul>	<ul style="list-style-type: none"> <li>- Dusun still only walks in the forest in the daylight.</li> <li>- Temporarily released into the paddock but mostly kept in the yard since 4 March to facilitate healing of the vulva wound.</li> <li>- Stays out in the paddock day and night again since 20 March.</li> </ul>	

## APRIL 1998

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>EVENTS AND ACTIVITY</b>		
<ul style="list-style-type: none"> <li>- Since released into the paddock at 16 March, keepers give only fruits to attract her back to the yard.</li> <li>- Browse also gave by keepers but not everyday. This was done for let Bina become more wild, and get the natural browse from her paddock.</li> <li>- Since 23 April keepers gave her browse intensively.</li> </ul>	<ul style="list-style-type: none"> <li>- Dusun still does not move far from the yard and only forage in the paddock very little.</li> <li>- Force her to forage in the paddock by reduced amount of food make Dusun loss weight a little.</li> </ul>	
<b>MEDICATION and SPECIAL TREATMENTS</b>		
<ul style="list-style-type: none"> <li>- Conjunctivitis on both eyes. Treating with ZnSO<sub>4</sub>. Looks better but change very slow. Treated still continuous.</li> </ul>	<ul style="list-style-type: none"> <li>- Conjunctivitis on both eyes. Treating with ZnSO<sub>4</sub>. Looks better but change very slow. Treated still continuous.</li> <li>- Found wound on stomach skin, probably stabbed by broken wood. Treated with, H<sub>2</sub>O<sub>2</sub>, Betadine and Swat Ointment (fly repellent). Healed on 3 weeks.</li> </ul>	<p>Found little white spot on right eyes on 28 April . Probably stabbed by broken wood. Treated with : ZnSO<sub>4</sub> and Gentamicin Sulfate Ointment. Healed on 2 weeks.</p>
<b>REPRODUCTION</b>		
<ul style="list-style-type: none"> <li>- Signs of heat on 4-5 April and 26-27 April; vulva reddish, swollen, dilatation, rapid contraction, but no found any discharge. Bina stood silent and opened hind leg when we push down her back.</li> <li>- She went to center area at 4 and 27 April. She defecated at 27 April closed to her gate in a dung pool where Dusun also defecate at 26 April</li> </ul>	<ul style="list-style-type: none"> <li>- No signs of heat</li> <li>- She went to center area at 26 April and defecate closed to her gate.</li> </ul>	<ul style="list-style-type: none"> <li>- Full erection on penis stimulation</li> <li>- Torgamba went to center area at 17, 19, 21, 23, 25 and 27 April 1998. Defecate at 27 April in the same place with Bina and Dusun also defecate. He defecated after sniff on Bina's faeces.</li> </ul>
<b>MISCELLANEOUS</b>		
<ul style="list-style-type: none"> <li>- Bina has been foraging extensively in the paddock</li> <li>- Bina is not easily excited by broken timber, but some time run when hear something, but stop in a minute when the keepers calls.</li> </ul>	<ul style="list-style-type: none"> <li>- Dusun still does not like walks far from the yard or wallow</li> <li>- Since intensively feed by keepers, she is not willing foraged in the forest anymore</li> </ul>	

## MAY 1998

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>EVENTS AND ACTIVITY</b>		
<ul style="list-style-type: none"> <li>- More easy to invite Bina back to the yard and she is not so afraid and nervous.</li> <li>- Weighing can do both in the yard or in the center area.</li> </ul>	<ul style="list-style-type: none"> <li>- Dusun still does not move far from the yard and only forage in the paddock very little.</li> <li>- Keepers still try to force her more walks and move more deep to the forest.</li> <li>- It seems more active will make Dusun more forage</li> <li>- But Dusun still avoids forage herself in the forest, more like feed by keepers.</li> </ul>	
<b>MEDICATION and SPECIAL TREATMENTS</b>		
<ul style="list-style-type: none"> <li>- Conjunctivitis on both eyes, which is get before came to SRS. It is treating with ZnSO<sub>4</sub>. Looks better but change very slowly.</li> </ul>	<ul style="list-style-type: none"> <li>- Conjunctivitis on both eyes, which is get before came to SRS. It is treating with ZnSO<sub>4</sub>. Looks better but change very slowly.</li> <li>- Parasite control Program with Eqvalan (Ivermectin) as an athelmintic and boticide at 4 May.</li> </ul>	<ul style="list-style-type: none"> <li>- Found a little white spot on right eyes and quiet much clear discharge on 28 April. Probably stabbed by broken wood. It is treating by ZnSO<sub>4</sub> and Gentamicin Sulfate Ointment. There is better condition and almost completed heal.</li> <li>- Parasite control Program with Eqvalan (Ivermectin) as an athelmintic and boticide at 5 May.</li> </ul>
<b>REPRODUCTION</b>		
<ul style="list-style-type: none"> <li>- Signs of heat on 18-19 May: a reddish vulva, swollen, dilatation, rapid contraction, with clear discharge.</li> <li>- Met Torgamba behind the gate since 17 May. And continue at 18, 19, 21, 22, 24, 26 and 30 May. Always looks afraid and run in the beginning, but become more receive Torgamba day by day.</li> </ul>	<ul style="list-style-type: none"> <li>- Signs of heat on 15-17 May: a reddish vulva, swollen, dilatation, with clear discharge.</li> <li>- Never gone to center area along May, because did not like to walk more deep into the forest.</li> </ul>	<ul style="list-style-type: none"> <li>- Meet Bina behind the gate at 17, 18, 19, 21, 22, 24, 26 and 30 May. There was an interest to see Bina, but sometime Torgamba seems avoids her, despite she may in a heat at 18-19 May.</li> </ul>
<b>MISCELLANEOUS</b>		
<ul style="list-style-type: none"> <li>- Bina still forages extensively in the paddock.</li> <li>- Bina is not easily excited by people and sounds of falling or broken timber anymore.</li> </ul>	<ul style="list-style-type: none"> <li>- Dusun still does not like walks far from the yard or wallow.</li> <li>- She seems willing to walk more deep to the forest but still often go back again to wallow or yard.</li> </ul>	



## JUNE 1998

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>EVENTS AND ACTIVITY</b>		
<ul style="list-style-type: none"> <li>- Since introduce with Torgamba on 11 June, more active close to central area.</li> </ul>	<ul style="list-style-type: none"> <li>- Dusun still avoids forage herself in the forest, more like feed by keepers.</li> <li>- Dusun more active now and walk deeper to the forest and go to Central area</li> <li>- Angry and aggressive when meet Torgamba behind the gate by attacked the gate.</li> </ul>	<ul style="list-style-type: none"> <li>- Seems want to see Bina but not so willing to do reproductions activities</li> <li>- When met Dusun, first time Torgamba does not looks angry and aggressive, but after Dusun start attack and snort loudly, he also angry and aggressive and also attack and hit the gate.</li> </ul>
<b>MEDICATION and SPECIAL TREATMENTS</b>		
<ul style="list-style-type: none"> <li>- Conjunctivitis on both eyes, which is get before came to SRS. It is treating with ZnSO<sub>4</sub>. Looks better but change very slowly.</li> <li>- Parasite control Program with Eqvalan (Ivermectin) as an athelmintic and boticide at 6 June.</li> </ul>	<ul style="list-style-type: none"> <li>- Conjunctivitis on both eyes, which is get before came to SRS. It is treating with ZnSO<sub>4</sub>. Looks better but change very slowly.</li> </ul>	<ul style="list-style-type: none"> <li>- A little white spot on right eyes was healed at 3 June.</li> <li>- But found again a little white spot on left eyes and quiet much clear discharge on 23 June. It is treating by ZnSO<sub>4</sub> and Gentamicin Sulfate Ointment. There is better condition and almost completed heal.</li> </ul>
<b>REPRODUCTION</b>		
<ul style="list-style-type: none"> <li>- Signs of heat on 18-19 June: a reddish vulva, swollen, dilatation, rapid contraction, with clear discharge.</li> <li>- There was some courtship behaviour when met Torgamba at 17 - 21 June 1998. Almost mating whit Torgamba at 18 June evening.</li> <li>- More aggressive than Torgamba to do sexual activities, even very acceptable be mounted but very poor response from Torgamba except at 18 June.</li> </ul>	<ul style="list-style-type: none"> <li>- Signs of heat on 15-17 June: a reddish vulva, swollen, dilatation, but no clear discharge.</li> </ul>	<ul style="list-style-type: none"> <li>- Meet Bina in the central since 11 - 21 June at least 1 hours per day. Almost mating with Bina at 18 June.</li> <li>- Has not so interest when met with Bina, except horn- to horn pushing and others courtship behavior, but when Bina ready to be mounted, Torgamba did not show enough response to do sex with Bina.</li> <li>- There were some signs that Torgamba try to mount Bina, but only one that positive (18 June), but no more good try.</li> </ul>
<b>MISCELLANEOUS</b>		
<ul style="list-style-type: none"> <li>- Bina still forages extensively in the paddock.</li> </ul>	<ul style="list-style-type: none"> <li>- Dusun still does not like walks far from the yard or wallow, except drive by the keepers.</li> </ul>	

## JULY 1998

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>EVENTS AND ACTIVITY</b>		
<ul style="list-style-type: none"> <li>- Always after met Torgamba in central area for mating, more active close to central area, and sometimes ignoring food.</li> </ul>	<ul style="list-style-type: none"> <li>- Dusun started forage herself in the forest specially for leaves she like, i.e: <i>kasapan</i> and <i>kol banda</i>.</li> <li>- Dusun more active now and walk deeper to the forest and go to Central area.</li> </ul>	<ul style="list-style-type: none"> <li>- After separated with Bina seems not so willing to do reproductions activities.</li> </ul>
<b>MEDICATION and SPECIAL TREATMENTS</b>		
<ul style="list-style-type: none"> <li>- Conjunctivitis on both eyes, which is get before came to SRS. It is treating with ZnSO<sub>4</sub>. Looks better but change very slowly.</li> </ul>	<ul style="list-style-type: none"> <li>- Conjunctivitis on both eyes, which is get before came to SRS. It is treating with ZnSO<sub>4</sub>. Looks better but change very slowly.</li> </ul>	<ul style="list-style-type: none"> <li>- A little white spot on left was started at 23 June was healed completely at 15 July</li> </ul>
<b>REPRODUCTION</b>		
<ul style="list-style-type: none"> <li>- Signs of heat on 17-18 and 28-29 July: a reddish vulva, swollen, dilatation, rapid contraction, with clear discharge.</li> <li>- There was some courtship behavior when met Torgamba at 17-19 July (20 + 10 hrs) and 27-29 (40 + 10 hrs) but no mating.</li> <li>- Bina is more aggressive than Torgamba to do sexual activities, but received very poor response from Torgamba.</li> </ul>	<ul style="list-style-type: none"> <li>- No signs of heat on July.</li> </ul>	<ul style="list-style-type: none"> <li>- Again not so interest to do mating with Bina, except horn to horn pushing and others courtship behavior, but when Bina ready to be mounted, Torgamba did not show good response to do sex with Bina.</li> </ul>
<b>MISCELLANEOUS</b>		
<ul style="list-style-type: none"> <li>- Weight of Bina seems stabilize now at around 600 kg.</li> </ul>	<ul style="list-style-type: none"> <li>- Weight of Dusun still on slightly high fluctuation from 490 - 525 kg.</li> </ul>	<ul style="list-style-type: none"> <li>- Weight of Torgamba seems stabilize at 650 kg.</li> </ul>

## AUGUST 1998

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>EVENTS AND ACTIVITY</b>		
<ul style="list-style-type: none"> <li>- After met Torgamba in central area for mating, still more active close to central area, and sometimes ignoring food.</li> </ul>	<ul style="list-style-type: none"> <li>- Dusun more active now and walk deeper to the forest and go to Central area. She also sleeps deep in the forest, not too closed to yard anymore.</li> </ul>	
<b>MEDICATION and SPECIAL TREATMENTS</b>		
<p><b>Conjunctivitis on both eyes,</b></p> <ul style="list-style-type: none"> <li>- which is get before came to SRS. It is treating everyday with ZnSO<sub>4</sub> base on experience from Surabaya Zoo. In Surabaya Zoo ZnSO<sub>4</sub> could heal the conjunctivitis of both eyes of Male sumatran rhino <i>Rokan</i> and Female <i>Wiwien</i> but needed very long time (in couples month).</li> <li>- Bina left eyes looks brighter now where the clouded spot become disappear.</li> <li>- Bina right eyes still looks more clouded than the left eyes, but from the outside circle it become brighter.</li> </ul> <p><b>Vulva wounds</b></p> <ul style="list-style-type: none"> <li>- Detected a wound with an 0.5 cm wide hole in upper side of vulva wall at 14 Aug. It looked no infection yet, but the mucosa around the hole become dark.</li> <li>- And another one later in lower side of Vulva at 21 Aug, but smaller than the first.</li> <li>- Possibly stabbed by broken wood.</li> <li>- Treated with Perokside, betadine and SWAT (fly repellent).</li> <li>- Bina was keep in the yard for heal it completely, but released to the forest at 17 Aug because she was in estrus. In that time, the hole was closed but the dark area still there.</li> <li>- The first wound was healed completely at 24 Aug, and the second at 28 Aug.</li> </ul>	<p><b>Conjunctivitis on both eyes,</b></p> <ul style="list-style-type: none"> <li>- which is get before came to SRS. Also treated with ZnSO<sub>4</sub></li> <li>- Dusun left eyes also looks brighter, but the clouded spot are worse than Bina. This eyes also sometimes produce a discharge. Usually come in the morning but not everyday.</li> <li>- Starting treat the left eyes with Eye Terramycin ointment at 30 August for prevent or healed the possibilities of infection.</li> <li>- Dusun right eyes for the first time have no respond where something move in front of her right eyes, but in early August the reaction of eyelid was appear. This eyes also looks more clouded than the left eyes.</li> </ul>	<p><b>Possibilities of Infection on eyes.</b></p> <ul style="list-style-type: none"> <li>- Eyes discharge sometimes appear from the left eyes of Torgamba. Usually come in the evening.</li> <li>- Starting treat the left eyes with Eye Terramycin ointment at 30 August for prevent or healed the possibilities of infection.</li> </ul> <p><b>Hind leg wound</b></p> <ul style="list-style-type: none"> <li>- 1 cm laceration was found at 18 August in right side of base right hoof of Torgamba's right hind leg. Possibly hit the hard wood or root of tree when made a hind leg ground scratch after urinate.</li> <li>- It was treated with perokside, betadine and SWAT (fly repellent). It was healed at 27 August.</li> </ul>
<b>REPRODUCTION</b>		

- Signs of heat on 17-18 August: a reddish vulva, swollen, dilatation, rapid contraction, with clear discharge. The discharge were from 16 - 19 August.	- No signs of heat on August.	- Again there was no good respond from Torgamba for mating with Bina.
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#### MISCELLANEOUS

##### 11 August 1998,

One of the keeper, Lamijo. saw a wild rhino was browsing close to SRS area. It was about 10 meters from the fencing post number 770. The foot print of the rhino was measured and a plaster cast was made. The size of foot print 23-24 cm wide. After 20 minutes, some of keepers try to follow and found and its confirmed that the rhino is male. The size of body looks similar with Torgamba.

##### 22 August 1998,

Dusun met Bina in central area but behind the gate at about 10 o'clock in the morning. Dusun looks so mad and attack the gate many times. Bina only shake her head but sometimes looks afraid. Bina sometime was turned and run but come back again. After about 30 minutes Dusun was driven away by the keeper to avoid injuries because she attacked the gate many times.

## SEPTEMBER 1998

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>EVENTS AND ACTIVITY</b>		
<ul style="list-style-type: none"> <li>- After met Torgamba in central area for mating (6 - 8 Sept.), more active close to central area, and even sleep in the gate to central area since 9 until 15 September.</li> </ul>		
<b>MEDICATION and SPECIAL TREATMENTS</b>		
<p><b>Conjunctivitis on both eyes,</b></p> <ul style="list-style-type: none"> <li>- Still treated with ZnSO<sub>4</sub>. The clouded spot on both eyes disappear little by little.</li> </ul>	<p><b>Conjunctivitis on both eyes,</b></p> <ul style="list-style-type: none"> <li>- Still treated with ZnSO<sub>4</sub>, not so much improvement.</li> <li>- Dusun right eyes still have respond.</li> </ul> <p><b>Eye discharge</b></p> <ul style="list-style-type: none"> <li>- Treat the left eyes which was produce discharge with Eye Terramycin ointment at 30 August until 3 September.</li> <li>- No more discharge on left eyes.</li> </ul>	<p><b>Eye discharge.</b></p> <ul style="list-style-type: none"> <li>- Eyes discharge sometimes appear from the left eyes of Torgamba. Usually come in the evening.</li> <li>- Treat the left eyes with Eye Terramycin ointment at 30 August-1 September. Discharge was disappear but come again at 8 September. Treatment with Terramycin ointment again for 5 days (9 - 14 September). The discharge was disappeared.</li> <li>- Eyes discharge appeared again at 28 September. Treated with Terramycin for 5 days.</li> </ul>
<b>REPRODUCTION</b>		
<ul style="list-style-type: none"> <li>- Signs of heat: a reddish, swollen, dilatation, and rapid contraction were observed at 6 - 10 September. An estrus clear discharge was observed at around 6 September 1998 evening (the detail in page 23)</li> <li>- An expected next estrus that should be appeared at 27 - 30 September was not looked clearly. The vulva was reddish and little swollen but no discharge was observed.</li> <li>- They also did not looked so interest to do courtship (see the detail on page 25).</li> </ul>	<ul style="list-style-type: none"> <li>- No signs of heat.</li> </ul>	<ul style="list-style-type: none"> <li>- Again there was no good respond from Torgamba for mating with Bina. Both on 6-10 September and 26-29 September meeting.</li> </ul>

## OCTOBER 1998

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>EVENTS AND ACTIVITY</b>		
<ul style="list-style-type: none"> <li>- Kept in the central area at 4 - 6 October for observed during weakness because the possibilities of digestion sickness and urinary tract disorder.</li> <li>- Daily activities observation was started since 28 October (see Appendix 1).</li> </ul>	<ul style="list-style-type: none"> <li>- Daily Activities observation was started since 29 October (see Appendix 1).</li> </ul>	<ul style="list-style-type: none"> <li>- Daily activities observation was started since 28 October (see Appendix 1).</li> </ul>
<b>MEDICATION and SPECIAL TREATMENTS</b>		
<p><b>Conjunctivitis on both eyes,</b></p> <ul style="list-style-type: none"> <li>- Still treated with ZnSO<sub>4</sub>. The clouded spot on both eyes disappear little by little.</li> </ul> <p><b>Digestion sickness and urinary tract disorder</b></p> <ul style="list-style-type: none"> <li>- signs of constipate and possibilities of urinary tract disorder was found at 4 October 1998. Bina looked weak, motionless, lot of vocalize, clear discharge from vulva and moving up her tail like willing to defecate or urinate but nothing out. She behaved unusual.</li> <li>- Treated with Tympasol ® for prevent digestion disorder, pull out some faeces for help defecating and 5 kg of cucumber for help urinating.</li> <li>- After urinating in the night (21:45 am) the signs of weakness and vocalizing were gone.</li> <li>- During sickness Bina still eat much.</li> </ul> <p><b>Vulva lesions</b></p> <ul style="list-style-type: none"> <li>- About 3 mm lesion on vulva of Bina was found three times (10, 14 and 21 October). Maybe stabbed by broken wood.</li> <li>- Treated by Perokside (H<sub>2</sub>O<sub>2</sub>) and Betadine. All were healed within 3-5 days.</li> </ul>	<p><b>Conjunctivitis on both eyes,</b></p> <ul style="list-style-type: none"> <li>- Still treated with ZnSO<sub>4</sub>, not so much improvement.</li> <li>- Dusun right eyes still have respond.</li> <li>- Discharge from left eyes appeared at 18 October, and treated with Terramycin ® eye ointment but no respond for 3 days. Treated again but used Garamycin ® eye ointment start on 25 October, and have good respond until healed at 31 October.</li> </ul>	

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>REPRODUCTION</b>		
<p>- Estrus signs was observed at 19 October but unclear. Only detected a redness and slightly swollen of vulva. No estrus discharge was observed. During met with Torgamba at 18 - 21 October, mostly resting in wallow. It made difficult to observed the estrus discharge.</p>	<p>- No signs of heat.</p>	<p>- During met with Bina at 18 - 21 October, still not so aggressive to do courtship and no try of mounting.</p>
<b>MISCELLANEOUS</b>		
<p>- At 18 October we put some wild rhino faces in central area which order to RPU. Only small amount and put around dung pile. This was give reaction from Bina after she smell on it. She looked nervous, lot of snorting, and smelling the air and sometime run. It seemed that this is a female faces.</p>		<p>- The same faces which is Bina was smell have no reaction from Torgamba at all. He even did not smell or try to examine it.</p>

## NOVEMBER 1998

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>EVENTS AND ACTIVITY</b>		
<ul style="list-style-type: none"> <li>- Kept in the central area together with Torgamba at 3 -11 and 21-28 November for observed during estrus period</li> <li>- Daily activities pattern attached on graphics</li> </ul>	<ul style="list-style-type: none"> <li>- Daily activities pattern attached on graphics.</li> </ul>	<ul style="list-style-type: none"> <li>- Kept in the central area together with Bina at 3 -11 and 21-28 November for observed during estrus period of Bina</li> <li>- Daily activities pattern attached on graphics.</li> </ul>
<b>MEDICATION and SPECIAL TREATMENTS</b>		
<p><b>Conjunctivitis on both eyes,</b></p> <ul style="list-style-type: none"> <li>- Still treated with ZnSO<sub>4</sub>. The clouded spot on both eyes disappear little by little.</li> </ul>	<p><b>Conjunctivitis on both eyes,</b></p> <ul style="list-style-type: none"> <li>- Still treated with ZnSO<sub>4</sub>, not so much improvement.</li> <li>- Dusun right eyes still have respond.</li> <li>- Discharge from left eyes appeared at 8 November, and treated with Garamycin ® eye ointment and healed at 11 November</li> </ul>	<p><b>Eye Discharge</b></p> <ul style="list-style-type: none"> <li>- Discharge from right eyes appeared at 6 November, and treated with Teramycin ® eye ointment and healed at 10 November</li> </ul> <p><b>Scratch during courtship</b></p> <ul style="list-style-type: none"> <li>- Some scratch was found after hard courtship with Bina but no wound. Treated with betadine.</li> </ul>
<b>REPRODUCTION</b>		
<ul style="list-style-type: none"> <li>- Estrus signs was observed at 5 - 6 November but unclear. Only detected a redness and slightly swollen of vulva. No estrus discharge was observed. During met with Torgamba at 3 - 11 November, Bina showed high interest to do courtship even made some scratch on Torgamba body (see the detail below)</li> <li>- After separated with Torgamba at 11 November, Bina was observed approaching central area only one time at 12 November 9:01 AM</li> <li>- Together with Torgamba again at 21-28 November and the intensive courtship was occur at 21-22 November. The estrus sign was difficult to detect, but Bina stood and silent when Torgamba mounted her 5 times at 22 November (see the detail below).</li> </ul>	<ul style="list-style-type: none"> <li>- No signs of heat.</li> </ul>	<ul style="list-style-type: none"> <li>- During met with Bina at 3 - 11 October, still not so aggressive to do courtship and no try of mounting (see the detail).</li> <li>- After separated with Bina at 11 November, Torgamba was observed approaching central area on:               <ul style="list-style-type: none"> <li>- 12 Nov. 9:13 AM</li> <li>- 13 Nov. 13:20 AM</li> <li>- 15 Nov. 9:20 AM</li> </ul> </li> <li>- At 22 November, Torgamba mounted Bina 5 times: 16:47, 18:39, 19:27, 20:10 and 20:30, but no intromission. It was seen very clear on last 2 mount that his penis can not reach Bina's vulva and only slip between Bina's hip. The last mount spent 16 minutes and Torgamba was ejaculated</li> </ul>



**DECEMBER 1998**

17

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>EVENTS AND ACTIVITY</b>		
<ul style="list-style-type: none"> <li>- Kept in the central area together with Torgamba at 6 - 15 December and 25 December 1998 - 1 January 1999 for observed during estrus period. But because Torgamba was sick at 30 December they were be separated.</li> <li>- Daily activities pattern attached on graphics</li> </ul>	<ul style="list-style-type: none"> <li>- Daily activities pattern attached on graphics.</li> </ul>	<ul style="list-style-type: none"> <li>- Kept in the central area together with Torgamba at 6 - 15 December and 25 December 1998 - 1 January 1999 for observed during Bina estrus period. But because Torgamba was sick at 30 December they were be separated.</li> <li>- Daily activities pattern attached on graphics.</li> </ul>
<b>MEDICATION and SPECIAL TREATMENTS</b>		
<p><b>Conjunctivitis on both eyes,</b></p> <ul style="list-style-type: none"> <li>- Still treated with ZnSO<sub>4</sub>. The clouded spot on both eyes disappear little by little.</li> <li>- At 19 Dec the left eyes (better one) was beco</li> </ul> <p>me fully clouded and have little bit inflammation. It could be hit by something hard or insect bite. Treated with Garamycin eye ointment and Zn SO<sub>4</sub>. It was healed after one week.</p>	<p><b>Conjunctivitis on both eyes,</b></p> <ul style="list-style-type: none"> <li>- Still treated with ZnSO<sub>4</sub>, very little improvement.</li> <li>- Dusun right eyes still have respond.</li> <li>- No discharge appeared from eyes</li> </ul>	<p><b>Eye Discharge</b></p> <ul style="list-style-type: none"> <li>- No discharge from eyes</li> <li><b>Pus discharge from skin behind the front horn</b></li> <li>- Pus discharge and mix with blood was observed appeared from skin behind the front horn at 7 Dec. More pus was appeared after hard courtship with Bina. But there was no open wound, so it's difficult to located. Found a very small hole later on and treated with Peroxide, Betadine and Antibiotic ointment. Because it was difficult to treated medicine in the head.</li> <li>- The pus disappear at 20 Dec, but appear again at 25 Dec.</li> <li>- Treated again with same medicine plus Amoxicillin tablet per oral. But then the stomach problem was come</li> </ul> <p><b>Stomach Disorder</b></p> <ul style="list-style-type: none"> <li>- At 29 Dec afternoon, it was found that Torgamba looks weak, walking so slow, and resist eat fruit except papaya. Usually he will angry if we did not give him fruits quickly. He also ate leaves much less then as always.</li> <li>- Detail report on page 40.</li> </ul>

♀ BINA	♀ DUSUN	♂ TORGAMBA
<b>REPRODUCTION</b>		
<ul style="list-style-type: none"> <li>- No estrus signs was observed during meeting with Torgamba at 6 - 15 December. But she was standing heat and ready to be mated at 12 - 13 December.</li> <li>- Courtship and mounting by Torgamba were observed almost along the 12 December night until 13 December morning.</li> <li>- The second period at December 1998-January 1999 should be on 30 Dec - 3 January 1999. In this period Bina was stay with Torgamba only until 30 Dec. We separated them because Torgamba was sick.</li> <li>- No serious courtship was observed during the second period</li> <li>- At 1 and 2 January it was seen that the vulva was redness and swollen. But no discharge was observed.</li> </ul>	<ul style="list-style-type: none"> <li>- No signs of heat.</li> </ul>	<ul style="list-style-type: none"> <li>- During met with Bina at 6 - 15 December, Torgamba was very aggressive to mate along the 12 Dec night.</li> <li>- Mounting with erection penis was observed at:               <ul style="list-style-type: none"> <li>- 12 Dec: 20:15, 21:08, 22:04 and 23:02</li> </ul> </li> <li>- No intromission was observed. The penis again could reach Bina's vulva but can not go in, and only go in between Bina's hip.</li> <li>- The second period of Bina estrus at December 1998-January 1999 should be on 30 Dec - 3 January 1999. In this period Bina was stay with Torgamba only until 30 Dec. We separated them because Torgamba was sick.</li> <li>- No serious courtship was observed during the second period</li> </ul>

### Torgamba's stomach disorder

#### December 28, 1998

**16:00** Very small amount of pus discharge still found come out from under skin between anterior and posterior horn. Beside treated with topical medicine (peroxide, betadine and skin antibiotic ointment) which is already applied since 25 December, it was also treated with Amoxycillin<sup>R</sup> 500 mg 2 tabs per oral.  
Food eaten: Leaves 30 kg, sweet potato 2 kg, carrot 2 kg, water melon 2 kg, papaya 2 kg. Total 38 kg.

**Activities:** Normal.

#### December 29, 1998

**Morning:** Did not want to enter the stall, but forage as usual in the forest very much and also did not resist feed by keeper.

**Medicine:** Amoxycillin<sup>R</sup> 500 mg 2 tabs per oral.

**Afternoon:** So much sleep and wallowing and it is more than usual.

**16:00:** Walked to central area but looks very slow and weak, not so active as usual. Keeper gave fruits but he resist except papaya. It was so strange. Also did not want feed leaves by keeper. But he still walked in the forest and brake some trees and eat little wild leaves a little. Again, more spend time in a wallow.

**Medicine:** Amoxycillin<sup>R</sup> 500 mg 2 tabs per oral

**Temperature:** 36.5 °C

**20:00:** Report to Mr. Jansen Manansang. Got an advise to monitor and stop the Amoxycillin because it could be make a queasy feeling at stomach.

**Night:** Together with Bina in the central area. No courtship but little bit kiss and nose touch. Wallowing together. Forage very little. Appetite so less. Looks weak when walking. Too much sleep.

Medicine: Becarbon<sup>R</sup> (norit) 40 tablet 250 mg per oral, for prevent digestion problem if there was a possibility of disorder.

December 30, 1998

*Morning:* Woke up at 07.00, walked to his paddock. Forage little bit and sleep wherever he like, again and again until afternoon. It is also unusual because he usually only sleep in the his regular place. Still refused feed leaves by keeper and fruits except papaya. Too much sleep and looks very weak. Eat papaya while laying.

*Afternoon/  
evening:* Still behave like in the morning. Keeper collect fresh leaves around and feed him. Little bit eat and almost eat while laying. The eye cornea and mucosa membrane become pale. Bought bananas and Torgamba eat it, also for applied per oral medicine.  
12:00: Asked help from Mr. Sriyanto from Sumatran Tiger Project to called Mr. Jansen to say that Torgamba become weaker, and please send at medical team immediately.

Medicine:

Biosalamine<sup>R</sup> 20 ml i.m, Hematopan<sup>R</sup> 20 ml i.m, for increase stamina and vitality, Dupahtrim<sup>R</sup> 1 tube per oral, a broad spectrum antibacterial.

Temperature: 35.5<sup>o</sup> C (measured after out from wallow)

*Note:* It was difficult when applied injection to Torgamba because he still feel hurt and run little bit; react like not ill.

*Night:* Still too much sleep. Sometime walked and forage but very little. Still eat papaya and banana.

*Note:* Since this night, he can not walked far. Sleep and wallowing in the forest area about 25 m from the perimeter road close to base camp. Keepers was staying 24 hours in the forest close to him for guarding and monitoring, and sometime persuade to eat and prepare with some fresh leaves, papaya and banana.

*Midnight:* Become more weak; totally refuse fruits (even papaya and banana). Treated with Tympasol<sup>R</sup> 100 ml per oral, for the possibility of stomach disorder.

December 31, 1998

*Morning:* No progress.

*Afternoon:* Appetite little bit increase than in the midnight and morning. Eat some fresh leaves. Started eat papaya and banana again.

Temperature: 36.1<sup>o</sup> C

16:00 Called Mr. Jansen again because the medical team did not come yet.

*Night:* Medicine: Magalat<sup>R</sup> 10 tab per oral; for presumably stomach disorder and tympani. No progress, still like afternoon.

January 1, 1999

*After  
midnight:* Good progress of appetite, but still looks weak.

Medicine: Dupahtrim<sup>R</sup> 1 tube per oral  
Neurofort<sup>R</sup> 10 dagree

*Morning:* Defecation with small amount, soft consistency and dark.

*Afternoon:* Eat ficus leaves ± 5 kg, and banana 7 kg.  
Good progress of activities.

Temperature: 35.6<sup>o</sup> C

January 2, 1999

Good progress on activities and appetite more than a day before. More walked far even to the central area. But still like more forage than feed by keeper.

Temperature: 34.6<sup>o</sup> C (after woke up from wallow)

Food eaten: ± 5 kg leaves, banana 6 kg, papaya 2.5 kg

Medicine: Dupahtrim<sup>R</sup> 1 tube per oral  
Neurofort<sup>R</sup> 18 dagree  
Magalat<sup>R</sup> 8 tab per oral

January 3, 1999

Better progress on activities and appetite more than a day before. More walked far and stay in the front of Bina's gate in the central area. Normal defecation with much more amount and harder consistency. More receive feed by keeper.

Temperature: 36.3° C

Food eaten: ± 11 kg leaves, banana 5 kg, papaya 4 kg

Medicine: Dupahtrim<sup>R</sup> 1 tube per oral  
Neurofort<sup>R</sup> 18 degree

January 4, 1999

Activities normal and more aggressive. Entered the stall in 8:00 o'clock. No more sign of pus from the skin around the horn.

Temperature: 36.3° C (after woke up from wallow)

Food eaten: ± 27 kg leaves, banana 3 kg, papaya 2 kg, carrot 3 kg. Total 35 kg.

Medicine: Neurofort<sup>R</sup> 15 degree

January 5, 1999

Entered the stall in 7:30 o'clock. Activities: normal.

Weighing: 662.5 kg (note: last weighing at 27 December 1998: 678.5 kg)

Part 3

**COURTSHIP BEHAVIOUR  
PROTOCOLS**

# MAY 1998

## REPORT ON BINA-TORGAMBA INTERACTION in MAY 1998

Time	Bina	Torgamba
<b>1 17-May-98, Center</b>		
14:50		enter center
14:55		Spray Urine (while walk and eat around)
14:55		Snort
15:03		Spray Urine (always with hind foot scratch on the ground)
15:05		Spray Urine
15:07		Spray Urine
15:10		Spray Urine
15:14		2 x snort
15:35		approach Bina gate & feeded by keeper
15:40-:15		Spray urinate close to Bina's gate, walked around, eating around 25 m from B gate, sometime walk a while and eat again
16:17-:20	Approach gate, when stop and feed by keeper vulva was reddish and swollen, stood silent and opened hind leg when push down her back	
16:21	stop and feed again by Keeper, 5 m from gate	approach Bina gate
16:23	look T, loud snort and suddenly turn and run	look B and suddenly turn and run
16:25	Snort after Torgamba 1 x, while run away	Snort 2 x while walk away
16:30		enter paddock
<b>2 18-May-98: center</b>		
10:30	check on vulva signs: reddish, and swollen, no discharge;	
11:02	enter center	
11:05 - :15	smell and lick in all leaves where T urine, lot of salivas	
11:23	eating in T gate, smell around the gate	
11:45	going around center and eat	Approach gate
11:50	walk to T gate	eating, 3 x spray urine & ground foot scratch when smell B, browse bump and break by horn, seems angry
11:55	50 m see T, snort, and run	see B and very loud snort 2 x, looks angry, urine 2 x, walk around gate, browse bump
11:56	snort while run	snort 3 x, urine 5 x, ground scratch, browse bump, chase the keeper
12:05	try to come again to T gate but stop 30 m from gate, snort 2 x, and run again	still walk around gate, snort 3 x, avoid food, urine 2 x, angry to keeper
12:15	back to paddock	walk around gate, snort sometime, browse bump, still angry to keeper

Time	Bina	Torgamba
3	19-May-98: Center	
10:02	vulva swelling, red, quiet much clear discharge	
14:27		enter center
14:34	approach gate, feed by keeper	saltlick
14:35	still feed 10 m from gate	walk to B gate
14:36	still feed 10 m from gate	urine, scratch & marks
14:37	start loud snort	response snort
14:37 - 14:39	run after T snort, but stop 50 m from gate, stand and snort response 3 x	snort 4 x while walking around 20 m from B gate
14:40	walk away while snort 3 x	still walk around and snort response 3 x
14:42	no sound	approach B gate, smell, and start walk away to his gate
14:47		back to paddock
4	21-May-98: Center	
9:47		enter
10:05	approach gate and feed by keeper 5 m from gate	walking around, and eat close to gate (20 m)
10:07-10:15	start snort	response snort
	run for a while, but stop just after 5 m, snort 7 x	snort 10 x
	walk away for 10 m	
10:20	feed by keeper	walk and approach B gate
10:29		smell in B gate
10:31	call snort	response snort
10:35	3 x snort (20 m from gate), walk away	response snort but become softer, while walking around (10 m from gate), urine & marks
10:37	snort, about 50 m from gate	response softer snort
10:39	snort, quiet far	response very soft snort
10:40	walk away	walk away & back to his gate
11:02		enter paddock
13:05	approach gate	
13:06	gate opened, but start snort loudly and looks nervous when enter center	
13:07	smell on around dung place in front her gate, and pup also little bit	
13:08	snort again	
13:10	smell and lick each T's urine, while walking to saltlick	
13:15	saltlick for 1 minute	
13:17	walk to T gate while smell and lick T urine, lot of saliva	
13:22	smell in T gate	
13:24	walk away and go back to her gate	

Time	Bina	Torgamba
13:27-17:00	feed by keeper in the gate, going around, sometime run when hear broken wood, but generally tame	
17:02	enter paddock	
<b>5 22-May-98: Center</b>		
11:47	Enter center	
11:50	smell and lick T urine	
12:00-'15	walk around to salt lick, smell and lick each T urine	
12:18	made a dung in forest area (25 m from Dusun fence, and 30 m from Bina's road to saltlick)	
12:25	approach T gate for a second and walk fast back to her gate	
12:27	turn to forest, suddenly run	
13:00	willing back to her paddock, but gate was closed	
13:05	still run some time, looks nervous	
13:15	feed by keeper in front of gate	
13:30	back to her paddock	
14:40		enter
14:42		walk to saltlick, spray urine & ground scratch, bump on browse
14:45		in saltlick, lick for a minute, snort on keeper, looks angry
14:47		spray urine & scratch, snort 2 x, in a road to B gate
14:48		smell around, looks angry.
14:50		smell and lick leaves (seems a mark of B)
14:51		spray urine and tumble tree close to B gate, still looks angry
14:55		going around
15:20 - '40		going around 2 circle, sometime stop for eat, stop in B gate 3 x, smell and looking around.
15:50		back to paddock
<b>6 24-May-98: Center</b>		
16:02		enter
16:04		walk to saltlick, urine spray and ground scratch in a way to saltlick
16:06		in saltlick, feed by keeper, saltlick very little
16:08		walk to B gate
16:10		10 m from B gate, feed by keeper
16:20	approach gate, stop on 50 m from gate, feed by keeper	
16:21	start loud snort 1 x	snort response but softer
16:22	snort 3 x (still loud)	snort response soft, while feed by keeper
16:25	snort softer 2 x	no response



Time	Bina	Torgamba
16:28	run away, snort loud 1 x	Move and crack down a wood branch
16:29	Snort loud but stop run	snort soft
16:30-:35		going around and feed
16:36	approach the gate, stare at T	2 m from gate
	snort softer 2 x	response 1 x
16:37	getting close to gate (1 m)	getting close 0.5 m
	voices 2 x	no response
16:38	run but stop after 5 m, turn around and stare at T, and suddenly run	moving around and looks avoid B
16:45		back to his paddock
<b>7 26-May-98: Center</b>		
8:40		feed by keeper in his gate to center
8:43	enter	
8:50	approach T gate, snort loud while walk 2 x	snort 2 x
8:51	stop 10 m to T gate, snort 5 x	snort softer 4 x
8:54	Feed by keeper, suddenly run, stop 15 m, look to T, turn around and walk to forest	still feed by keeper, looks avoid B
9:05	sniff and smell around	
9:10	saltlick	
9:15	feed by keeper in saltlick	
9:17	walk to her gate	
9:21	back to paddock	
<b>8 30-May-98: Center</b>		
14:32	enter	
14:40	smell on T urine and suddenly run, but stop after keeper calls	
14:43	feed by keepers	approach his gate
14:45	move to T gate with keeper	feed by keeper in the gate
14:48	wach T 10 m from gate, snort and run, and stop by keeper calls at 20 m	response snort while eat
14:51	approach T gate again and slowly move closer,	
14:52	stop at 2 m from T, snort soft and make a voice	stop eat and wach B
14:53	seems afraid but still looking at T	turn around, walk little bit and back again to see B
14:54	voice, turn around and run	Ground scraeth and urine spray
14:55	snort loud while run, keeper call but no stop	no response, feed by keeper
16:02	feed by keeper in saltlick	
16:07	walk again, going around little while, and goes to her gate	
16:14	enter her paddock	

## JUNE 1998

### Mounting events during courtship behaviour of Bina and Torgamba in June 1998

No	Date	Time	Activities
1	6/18/98	15:28-15:30	Bina (B) was stood silent, T (Torgamba) face in the B bottom and sniffing B. T rub his horn to B hind leg from her back, and then put his chin in B rump. T mount and put his front leg on B back only for couple seconds, and then down because B moving and make steps forward. B turn and horn to horn (HH)
		18:22-18:24	HH pushing for a half minutes, T move and B backing into T and do SH (SH)
		18:52-18:53	HH pushing, B put her chin on T neck, move little bit, mounting T in front for couple seconds. B down and HH pushing again, T walk away.
		19:04-19:05	HH pushing, T move forward, B move her bottom to T, B SH, T seemed like to Mount but it did not happened. T walk away.
		19:29-19:30	T follow B, B stop and SH, T mount again only for couple seconds, but down again, and walk away.
		21:09-21:10	T mount B again after lift up B hind leg, but only for a half minutes
		21:17-21:40	After HH pushing, B lick face and neck of T, T push B on neck, B turn her body and SH. T push his horn between B hind legs, B move forward little bit, and T put his chin in B back. Start mounting at 21:19. Try to put his body higher, and every times move forward, with move his head up and down, pushing his stomach to B back, and flatus many times. Both of them move forward little by little. The penis outs first time at 21:24. Seems difficult for T to get comfort position to make penetration, so always try to move his body forward and higher. Penis never get full erection. At 21:40 T move and move his leg to go left and right to get better position because he was
		22:45	T mount B again only for couple second and get down
		23:03	T mount B again only for couple second and get down
		2	6/19/98
2:50	T mount B again only for couple second and going down; always after HH pushing, and B always backing into T, stood and silent.		
14:30-8:20	These are the time (14 X -14:30, 14:38, 15:00, 15:11, 15:36, 15:40, 16:10, 16:13, 16:33, 17:15, 17:17, 18:01, 18:11, and 18:20) when Bina present her back (Silent heat) for T mount, but only at 15:40 T try to mount, only for		
3	6/21/98	13:41, 14:04, 14:30, 14:35, and 14:55	Also the time (5 X) after HH pushing when Bina SH for T, but no mounting.
4	6/22/98	14:24	Bina still SH for T.

## AUGUST 1998

### Details of Courtship Behavior between Bina and Torgamba (16-19 August 1998)

#### August 16, 1998

01:45 Keeper was detected vaginal discharge of Bina, but we still need to keep her in the yards for monitoring and give medication on vulva wound, which was found two days day before (see report on medication in page 3). Keeper also was doubt to decide whether the discharge came from the wound or estrus discharge.

#### August 17, 1998

13:30 Vaginal discharge was detected again by keeper and it was certainly that the discharge is estrus discharge.

14:15 Bina (B) released from the yard and went to her wallow.

14:35 Torgamba's gate opened by keeper and he walk to the central area. Bina's paddock gate also opened to let Torgamba come into.

14:42 Torgamba (T) walked into Bina's paddock.

14:45 B was in the wallow, and suddenly wake up and snort many times. T was approaching. B became calm, and they did horn to horn pushing (HH) and mouth touching.

14:49 Still HH, and B started to walk away. T followed.

15:10 B looked ran and T chase her. B was run to the central area.

15:50 B was in the central area, and because T's gate was not closed yet, she come into T's paddock. T still in the B's paddock and start wallowing in her wallow.

16:25 B back to the central area. T still wallowing in B's paddock.

16:35 T drove by keeper back to central area.

16:40 They met in the central area and start to HH and for 5 minutes.

16:46 B turned her body and give her back to T (silent heat:SH), but no response from T. B walked away and T followed.

16:50 HH again for 2 minutes. B turned and walk away.

16:55 HH again for 3 minutes, B turned and SH, but no response from T. HH again for a half minute and B SH again, but T walk away. B walk to different direction. They start to browsed them self.

17:12 Met again, and HH but no SH from B. Walk away in different direction but separated not to far.

17:20 HH again, and B SH for a seconds, T walked to B face, and HH again. B walked away T follow. But separate after 1 minutes walk.

17:30 HH again and B walked away.

18:04 B tumbling a tree, T approached and eat together.

18:34 B slept. T still walked around and eat.

18:42 B woke up, and T was in her side. Starting HH and B SH, but no responded from T. T walked away.

18:45 B and T was saltlicking together.

18:54 HH and B walk away, T followed but separate after 1 minute. T was eating when B walked away.

18:57 B slept again. T was still eating.

19:05 B woke up and approach T. Eating together.

19:20 HH and B SH for T, but no response. HH again for 2 minutes, but T walked away, B followed.

19:22 HH again and B walked away.

20:01 T slept.

20:05 B slept.

20:25 T woke up and walked to where B slept. T laid down and slept beside B.

22:30 Woke up together and walked to around observation post. Feed by keepers.

22:46 T walked away, browse in the forest.

23:14 B walked and slept 10 meters from observation post.

23:40 T approach B and slept beside B.

#### August 18, 1998

00:23 B wake up, and T woke up too.

00:26 HH for a couple seconds, B walked away and T followed. Separate after 1 minutes.

01:40 Bina was eating when T approached. HH and B SH again, but T walked away. B also walked away.

02:00 Feed together by keepers.

02:18 T walked away.  
02:25 T slept.  
02:40 B slept.  
04:15 T woke up and browsed.  
06:15 B woke up and browsed.  
09:05 B feed by keeper.  
09:06 T approached, and B ran away while snorting. T snort softer.  
09:15 HH but no SH from B. Separate and walked away.  
09:30 B slept. T walking to the wallow.  
09:33 T wallowing.  
10:45 HH and B SH, but no response from T. HH again for 3 times with separate a couple seconds between those time, but no SH from B.  
11:15 Wallowing together.  
11:50 B woke up and walk along the fence, touched the fence accidentally and run away.  
12:35 B and T browsed separated.  
15:30 B feed by keeper in observation post. T approached and feed.  
15:55 Separate and no more contact between them until night.  
20:21 B slept in front of T gate. T still forage.  
21:15 Vaginal discharge from Bina was seen while she slept.  
21:45 T approach B, and slept beside her.  
22:15 Woke up together and T walked to saltlick, B followed.  
22:18 Saltlicking together. No contact.

**August 19, 1998**

00:15 HH and B SH, but T walked away, B followed.  
00:45 HH again but B walked away.  
01:10 Both were slept in front of T gate.  
02:40 Woke up together.  
03:10 Feed by keeper in observation post. After that no more contact until 6 o'clock.  
06:05 HH in saltlick area two times. And walked separated. No more contact. Until drove back to their paddock.  
14:25 T enter his paddock.  
15:10 B enter her paddock.

## SEPTEMBER 1998

### Detail of Courtship Behavior between Bina and Torgamba on September 6 - 10.

#### September 6, 1998

- 08:00 Keeper was detected redness dilatation of Bina's vulva.
- 09:30 The gate of Bina (B) and Torgamba (T) to central area were opened. Torgamba still in the yards.
- 10:30 T leaved his yards and driven by keeper to central area.
- 10:40 T enter the central area. Walk to saltlick area, but came into the forest and walk along the fence to B's paddock.
- 11:03 T enter B's yard. Walk straight to B's wallow.
- 11:15 B was wallowing when T approaching. Suddenly B snorted loudly, woke up and run.
- 11:16 T get into B's wallow and wallowing.
- 11:20 B enter the central area.
- 11:25 B urinated with spray. Walking around and forage little bit.
- 11:27 B urinated with spray.
- 11:28 B saltlick.
- 11:30 B urinated with spray.
- 11:35 B saltlick again.
- 11:38 B walked to the Torgamba gate.
- 11:42 B saltlick 2 minutes. And walk around
- 11:55 B saltlick again one minute and going around.
- 12:05 B walked to T gate.
- 12:15 B stood and walked around T gate, and sniff around.
- 12:17 B stil walking around the gate and seems want to enter T's paddock.
- 12:25 B back to saltlick area and saltlick again.
- 12:30 B walked to T's gate again, and stayed there, and walked sometime.
- 12:35 B stand on hind leg and climbed T gate for some seconds.
- 13:00 B walked to inside the forest and sprayed urine. Torgamba was just enter the center area from B paddock.
- 13:01 T snorted and response by B many times.
- 13:10 T approach B, start to face-to face stared and horn-to-horn pushing (HH).
- 13:12 B lick T face, T push B neck, and B move away.
- 13:14 HH again for 1 minute
- 13:15 B walked and follw by T. T move other direction after couple seconds. B defecated.
- 13:18 T approach B again and HH, licking and kissing with open mouth again. T move away and B followed.
- 13:25 B stop, but T was move away. B followed T.
- 13:26 HH again. B walked away. T followed B. B stop and turn, and HH again for 3 minutes.
- 13:30 B walked away. T followed B.
- 13:33 HH again for some seconds, and T walked away. T sprayed urine and almost sprayed to B. B run little bit. They walked on separated direction.
- 13:40 B followed T walking to the wallow.
- 13:41 Wallowing together.
- 13:50 Woke up together.
- 13:52 Walked together to saltlick area.
- 13:55 Saltlick together.
- 14:01 B walked away and spray urine.
- 14:03 B drink the water.
- 14:05 T finished saltlick, and drink water. B was walking to forage.
- 14:10 B still feeding when T approach. B move away and walked to the wallow. T followed.
- 14:20 B wallowing and T follow.
- 15:30 B woke up and walked to T gate.
- 15:32 T woke up and also walked to his gate.
- 15:35 In the front of T gate, HH again and B chin rest in T back. B mis-mount T from the front. B went down, and T run little bit.
- 15:55 B and T was separate, but T followed B after one minute.

- 16:00 HH again and B turn and standing heat (SH) for couple seconds, but T move away. B chase T and HH again for couple seconds and T move away.
- 16:05 Saltlick together.
- 16:19 B walked and stay in T gate.
- 16:23 B feed by keeper, and T approach. Feed also by keeper.
- 16:55 HH and licking each other. B rest chin in T back, but T move away, B followed.
- 16:56 HH again and B turn to SH. T stop and put his head between B hind-legs but move away after some seconds.
- 17:00 They moved separate.
- 17:05 B approach T and HH. B move away. T walked and sleep in front of his gate. B approach T again and rub his body to T. T woke up.
- 17:06 They moved separate.
- 17:32 They met in saltlick area and saltlick together.
- 17:35 B walked away.
- 17:40 B approach saltlick area again and saltlick together.
- 17:50 T walked to wallow and B followed.
- 17:53 Wallowing together.
- 17:57 B woke up and walked into the forest and sprayed urine.
- 18:01 B came back to wallow and wallowing.
- 18:26 Woke up together and went to the T gate. T followed B.
- 18:30 Both feed by keeper.
- 18:40 T sleep in the front on his gate, and B follow sleep beside T.
- 18:55 Estrus vaginal discharge of B was observed.
- 19:12 T suddenly woke up and full erection of his penis was observed. T rub his head to B back while B still sleeping. B suddenly woke up, snorting while running.
- 19:17 B approach T gate again while T still standing. HH for some seconds but B move away.
- 19:20 B came back to T gate and sleep. T also sleep beside B.
- 19:42 B woke up and walked to saltlick area. T followed.
- 19:45 Saltlicking together.
- 19:46 HH and lick each other for 3 minutes, and move separate.
- 20:00 Both was observed forage them self separate.
- 20:20 They met in close to the wallow and HH for a couple seconds and T move away.
- 20:21 T walked to wallow and started wallowing. B was foraging in the forest.
- 20:55 Both was observed wallowing together.

### September 7, 1998

- 00:22 They woke up almost together and walked to the saltlick area. T follow B.
- 01:22 B approached observation post and feed by keeper.
- 01:24 T and B saltlick together.
- 01:30 B walked away.
- 01:56 B defecated.
- 02:40 It's observed that T approached B in forest and starting HH. But T move away soon.
- 03:00 B and T were feed together by keeper around observation post.
- 03:05 Saltlick together and B walked away. T walked to wallow.
- 03:35 B walked around observation post and sprayed urine.
- 04:10 B started sleep close to observation post.
- 04:26 B woke up and walk along the fence, went to wallow.
- 04:27 B wallow together with T.
- 05:01 Woke up together and walked along the fence to T gate. B followed T.
- 05:37 HH in front of T gate for 3 minutes. B walked away
- 06:02 It was observed that B sprayed urine.
- 06:08 B approach T when T was feeding by keeper. B kissing T back
- 06:10 HH for some seconds but B move back, turn and walked away.
- 06:19 B sprayed urine.
- 06:32 Met again around observation post and HH, but T move back and walked away.
- 06:34 HH again for a seconds and walked away separated.
- 06:41 B approach T and kissing the body of T. HH again and T move away to saltlick. B followed.
- 06:45 Saltlick together.
- 07:02 B walked to T gate, T followed.
- 07:15 In front of T gate, feed together.

- 08:05 HH again for some seconds and move back together and walked away separately.  
 08:16 Walked around and sometime forage separately.  
 09:30 T walked to the wallow, and wallowing.  
 09:35 B wallowed too.  
 11:00 B woke up, and walked to saltlick area.  
 11:05 T woke up to and also walked to saltlick.  
 11:10 T approach saltlick, when B still saltlicking, then B snort softly and walked away.  
 11:35 Both separate quiet far and forage.  
 14:03 Met in front of T gate and feed by keeper.  
 14:08 HH, licking and kissing for 3 minutes, then B walked away. No more contact.  
 15:15 B sprayed urine.  
 16:34 B sprayed urine.  
 18:55 B was sleeping in front of T gate when T approached.  
 18:57 T started sleep beside B.  
 21:00 B woke up and started eating.  
 21:02 T also woke up and started eating. No court-ship behaviour.  
 21:45 HH for 5 minutes, and B mis-mount to Head of T, T silent and B down and walked away. T follow.  
 21:55 B walked to wallow and started wallowing.  
 21:58 T also wallowing together.  
 23:56 It was observed that they met in saltlick area and do HH for couple seconds. But T moved away.

#### September 8, 1998

- 00:33 It's observed that B was saltlicking when T approached and saltlick also, but no mutual contact.  
 03:10 It's observed that they met in around observation post and HH.  
 03:12 B SH and T sniff on B genitalia region for some seconds but then moved away. No more contact after this.  
 14:30 B and T gate was opened.  
 14:42 T was enter his paddock. B still walking around and forage sometime.  
 14:50 B was driven by keeper to enter her paddock.  
 15:25 B enter her paddock.  
 16:30 It's observed that B sleep in front of her gate to central area.

#### September 9, 1998

- 07:35 B was found just woke up in the front of central area. B vulva still swelling and dilatation. It's difficult to driven her to the yards. She only walked to her wallow and back again to the gate to the central area after wallowing.

#### September 10, 1998

B vulva still swelling and dilatation. Also active in around the gate to the central area.

#### Detail of Courtship Behavior between Bina and Torgamba at September 26 - 29.

##### September 26, 1998

- 07:30 Torgamba (T) entered the central area. Walked to Saltlick area and saltlicking.  
 08:22 After saltlick, forage and feed by keeper, T walked to Bina's paddock. Bina (B) was wallowing.  
 08:50 After walked with sometime snorting and spraying urine, met with Bina in B's wallow. B also snorted and suddenly run.  
 09:05 After separated, T walked and forage in B's paddock. B was forage also around T, and start to walked to central area. T followed.  
 09:12 Both were enter central area. But walked separate after that.  
 09:25 They met again and do head to head (HH) pushing (usually including horn to horn pushing, kissing and licking face) for one minute and B walked away.  
 09:40 Met again, do HH and B walked away.  
 10:40 T approached B when B was foraging, and do HH, T licked B face, HH again for 2 minutes and T walked away.  
 12:02 After forage, B started to walk to wallow and start wallowing.  
 12:07 T approach wallow, B snorted, stand for a while but allow T to enter the wallow. They wallowed together.  
 12:23 T woke up from wallow and walk into the forest.

- 13:30 B woke up from wallow.
- 13:30 They met and start HH for some seconds and T walked away.
- 13:36 HH again and T walked away. B followed.
- 13:43 HH again and B licked T face. After HH for 2 minutes, T walked away.
- 13:46 HH again, kissing and licking for 5 minutes, T walked away. B followed.
- 13:54 HH again for 1 minutes, and T walked away.
- 14:09 T started wallow.
- 14:15 B also wallowed.
- 14:21 T woke up and foraged.
- 15:16 T wallowed again.
- 15:24 T woke up and start saltlick
- 15:25 B also woke up and foraged.
- 15:55 T approach B and HH for 1 minutes. B walked away.
- 16:07 T approach B, but B walked away.
- 16:12 Again T approach B, but B walked away.
- 16:55 Again T approach B, but B walked away.
- 17:06 Again T approach B. but B walked away. No more contact until next day.

#### September 27, 1998

- 02:36 B was wallowing when T approach wallow. B stand and walked away. But back again to wallow and wallowing together. They have been wallowed until 05:25. But no more contact after woke up.
- 10:40 HH for couple seconds but B walked away.
- 18:16 HH for couple seconds but T walked away.
- 18:24 HH for couple seconds but T walked away.
- 21:32 HH again, for 1 minute but B walked away. No more contact.
- 23:05 It was observed that they sleep together side by side.

#### September 28, 1998

- 04:30 It was observed that they wallowed together.
- 13:16 They met and do HH for 2 minutes. Kissing and licking. They was kiss each other on head to back position.
- 13:25 HH again for 1 minute and B walked away. T followed.
- 13:31 HH again and T walked away.
- 15:16 HH again, kissing and licking each other, T waked away after 2 minutes. B followed.
- 15:26 HH again quite intense. B was do chin-rest and miss-mount on T back from aside. T looked mad, and walked away.
- 15:33 HH again, but after some seconds, B looked afraid and suddenly run, T chase her for couple seconds and stop. B stop also and approach T again.
- 15:36 HH again, but T walked away again. No contact anymore until next day.

#### September 29, 1998

- 07:37 HH for one minute and B walked away.
- 07:43 HH for one minute and B walked away.
- 11:01 HH for 2 minutes, kissing and pushing slightly hard. But T walked away. B followed. But separate after some seconds. No more contact until T driven to his paddock.
- 13:06 T entered his paddock.
- 13:47 B entered her paddock.



## OCTOBER 1998

### Courtship behavior between Bina and Torgamba at 18 - 21 October 1998

#### October 18, 1998

- 08:15 Torgamba (T) entered the central area  
 08:21 walked to Bina's paddock, entered and walk inside Bina's paddock along the fence  
 09:10 Bina (B) was walking to central area. They did not meet but there was some snorting between them  
 09:14 B entered central area. T still walked around in B paddock but not too far from the gate  
 09:18 B smell on wild rhino faces and become nervous. Sprayed urine.  
 09:20 B feed by keeper for 5 minutes, still look nervous  
 09:28 B forage in the forest, spray urine 2 times, still looked nervous  
 09:39 B suddenly run (no reason)  
 09:41 T walked out from B paddock, met B close to gate, and started horn to horn pushing (HH) for 3 minutes  
 09:44 Separated for a second and started HH, lot of kissing on face and neck each other.  
 09:52 Still HH and seems harder. They did while moving and walked. Many times B was pushing harder than T.  
 10:06 B suddenly move back away, run little bit and T chase B. B suddenly turn around and they HH very hard.  
 10:09 T turn back and move away, B chase and pushing T on the head and body.  
 10:11 While HH, B laid down and continue HH.  
 10:14 B wake up, turn around while make a little jump, and HH again. B look very exciting. HH again and T pus'. very hard.  
 10:15 T move away, B followed and push T back, but no respond from T.  
 10:17 They walked separate  
 10:26 B saltlicking, T forage in the forest  
 10:31 Both were feed by keeper  
 11:02 B walked to wallow, T follow, wallowing together  
 13:15 B woke up and walked around  
 13:21 T woke up and approach B, and HH again. Kissing each other but no hard pushing  
 13:36 Separated and B went to saltlick. T look forage.  
 13:45 Both were saltlick together. There was some contact but no HH.  
 14:01 Torgamba walked entered his paddock and did not want back to central area until 17:00  
 14:54 B also entered her paddock

#### October 19, 1998

- 07:48 T entered central area  
 07:49 T feed by keeper  
 08:07 T walked around and sprayed urine many times  
 08:30 Entered B's paddock and again walked along the fence. They did not meet.  
 08:50 B entered central area  
 09:05 B feed by keeper  
 09:21 B forage in the forest  
 10:01 T entered central area, walked straight to wallow  
 10:04 T wallowing  
 10:25 B approaching, snort each other, met and do HH for some seconds, and B entered wallow  
 10:26 wallowing together  
 12:39 T wake up and stand silent. Penis unsheathed. B still wallowing.  
 12:41 T walked out from wallow and start walk around  
 12:45 B also woke up and start foraged. It was observed that B's vulva was swollen and redness.  
 12:54 Met in the forest and HH for 2 minutes. T move away. B walked separate.  
 13:30 Foraged separate  
 13:38 Both feed by keeper  
 13:44 HH close to the gate, and B run for a while. T chase for a minute and stop.  
 14:02 HH again and B run while vocalize for 5 minutes because T chasing.

- 14:10 They walked separated
- 14:31 Met again and HH for couple seconds and separate again
- 15:21 Met again in saltlick area and HH for couple seconds and separate again
- 15:24 T wallowing. B feed by keeper
- 15:27 B also wallowing
- 16:24 woke up together and HH for 2 minutes. T move away. B follow.
- 16:28 HH again with some kissing each other, pushing slightly hard for 5 minutes. T move away.
- 16:35 B foraged
- 16:40 HH for 2 minutes. T move away.
- 16:42 B feed by keeper
- 17:00 Walked for a while and sprayed urin
- 17:02 B feed by keeper again.
- 17:05 T approach and reed by keeper together close to the gate of T
- 17:15 B foraged. T separated and walked away. No more contact.
- 18:36 Observed that B and T HH in close to the saltlick area quiet hard. T move away after 2 minutes
- 18:40 HH again, B mis-mount T, T move away.
- 18:42 HH again and still hard push, B move around while still push T.
- 18:43 Still HH until 18:52. T move away. B follow.
- 18:53 B feed by keeper. T foraged.
- 19:14 After feed by keeper, B walked to around post.
- 19:23 B sleep close to the post. T still far from B.
- 20:10 After wake up, B went to the gate and feed by keeper. T follow and feed by keeper too.
- 20:40 B defecated. T still feed by keeper.
- 20:54 B start wallowed
- 21:00 T also wallowed

#### October 20, 1998

- 01:40 B woke up from wallow and feed by keeper. T still wallowed.
- 01:42 Walk to wallow and wallowing again
- 01:45 T woke up and v alked to saltlick.
- 02:11 T foraged
- 02:32 T wallowed again.
- 05:43 B woke up and feed by keeper
- 05:45 T woke up and walked around and foraged
- 07:36 B wallowed
- 07:50 T feed by keeper. No more contact until evening. Foraged and walked separated. Sometime wallowing together.
- 19:07 First contact. While B still lay down in wallow, do HH. Kissing and rub each other.
- 19:10 Still HH. B stood in the wallow. T push B out from wallow.
- 19:16 Do HH outside the wallow for 3 minutes. B turn around 1 time and HH again
- 19:32 Stop HH while T move away. And started foraged. B only stand silent. No more contact until next day.

#### October 21, 1998

- 07:10 Both were feed together by keeper.
- 07:19 HH for couple seconds during feeding.
- 09:05 It's observed that they do HH for 2 minutes in saltlick area. T move away. B followed.
- 09:11 HH again for a minute. But T move away. No more contact after that.
- 12:01 T entered his paddock
- 12:25 B entered her paddock.

# NOVEMBER 1998

## Courtship behavior between Bina and Torgamba at 3 -11 November 1998

### November 3, 1998

- 08:15 Met in central area and do head to head pushing, horn to horn and kissing each other (HH) until 8:23. The courtship looked hard and intense and Bina more aggressive but she left Torgamba first.
- 08:23 Bina (B) walked away and Torgamba (T) followed
- 08:25 HH again and but T walked away after 1 minute
- 08:32 B and T walked together
- 08:42 HH again quiet hard until 9:46 and T walked away
- 09:17 HH in saltlick area very hard
- 09:24 saltlick with sometime HH, and B climb the saltlick well and walk on it for 1 minute
- 09:27 saltlick with sometime HH, and B climb saltlick well again and stay on that for 2 minute
- 09:32 HH in saltlick area, and B Standing-heat (SH) for some seconds for T but no responded
- 09:34 HH for some seconds and B SH again. T ignored it
- 09:38 After HH for 2 minutes B give her back and SH for almost 1 minute. When T move little bit, she always give her back. T put his chin in B back for some seconds but no mounting. T walked away after 1 minute.
- 09:42 After walked together B walked separated. No more contact until 13:48
- 13:48 HH for 2 minute, but B walked away after that. T followed B but walked separate after some seconds. No more courtship until next day

### November 4, 1998

- 07:47 HH when both were feed by keepers for 1 minute. Not so hard.
- 07:51 HH again and B SH for a half minute. T looked interest and put his head between B hind legs but no mounting. B walked away and started feed again.
- 08:44 HH again for some seconds and separated again. No more courtship until next day.

### November 5, 1998

- 12:47 B's vulva looked redness and swollen and its observed until dark
- 12:42 HH for some seconds but not intense. B walked away
- 17:57 HH again and harder but T always walked away first. HH happened many times until 18:31 while they walked together along the fence. And B always followed T.
- 18:04 After HH and T turn around, B push T back and looked biting. T run little bit.
- 18:08 While walking, T stop for a seconds, and suddenly B mount T, and T run little bit.
- 08:10 B looked aggressive to mount T and sometime push very hard and biting T body. T always run a little
- 08:12 Again B try top mount T and also lift up T hind legs
- 08:31 They walked separated. No more courtship until 8 November.
- 08:35 B's vulva looked so redness and swollen

### November 6, 1998

- 07:10 B's vulva still looked slightly red but not swollen

### November 8, 1998

- 07:07 Horn to horn pushing a little for some seconds when feed by keepers in front of T gate

November 9, 1998

- 07:53 Horn to horn pushing for some seconds when feed by keepers in front of T gate  
 17:40 Horn to horn pushing again for some seconds while foraging in the forest

**Courtship behavior between Bina and Torgamba on 21 -22 November 1998**November 21, 1998

- 08:05 Bina (B) entered central area and directly walk to Torgamba (T) gate. Met in central area around Torgamba's gate and do head to head pushing, horn to horn and kissing each other (HH) only for 2 minutes.  
 08:12 T reach the central gate and B was there. The gate opened and they do head to head pushing, horn to horn and kissing each other (HH) only for 2 minutes. And Bina walked into T's paddock. T followed.  
 08:41 Difficult to followed them, but it was heard that Bina was running and T's chasing. There was a lot of snorted between them.  
 08:53 Again it was seen that B run and T chase.  
 09:43 Found that T was wallowing. No signs of B.  
 13:30 Found that they were stay together but in a distance (5 meter). B was satanding but T was eating.  
 13:31 T walked approached B, B made a voice, run a little and stop after 10 meter and silent. T followed and approach again, but B ran again and stop after 5 meter. These activities was seen many times but sometime B ran and stop quiet far.  
 15:05 It was seen in a few seconds that B was running and T chasing.  
 16:00 Again B was running and T chasing. It was raining and become dark.  
 23:06 Both were entered the central area together but separated after 2 minutes.

November 22, 1998

- 00:32 It was seen that B run again  
 08:00 HH for a few seconds during feed by keeper.  
 10:44 HH again for few seconds but not so hard.  
 16:06 They start walked together and some time HH for 2 minutes but T walked away.  
 16:09 HH again but quiet hard for 10 minutes and B stood silent and give ger back many times.  
 16:23 Walked together and some time B stood silent and give her back but T pass it and B followed.  
 16:46 It was seen not so far from central gate, B stood silent and T sniff on B genitalia. Note: It was rainy and the observer stayed in the gate.  
 16:47 T put his chin in B's back and started mounting. Penis unsheathed but no erection yet. T tried to get better position and B looked nervous. After 5 minutes B suddenly make a loud voice and run, and T chasing her. There was a lot of voices and snort.  
 17:06 It was seen a few seconds that T chase B again.  
 17:46 Again not so far from central gate it's seen that T try again to mount but wrong position (mis-mount)  
 18:36 T start to pushing B and B gave her back again.  
 18:39 T mounted and try to make better position. Penis unsheathed  
 18:41 B made a voice. T's penis unsheathed longer and still to lift up his body.  
 18:45 B made many voices. T's penis getting erect.  
 18:52 It seems that the position still not comfort and T suddenly get down and B run, T was not chased.  
 19:27 After walked together and B stop, T put his head between B's hind leg and sniffing on B's genitalia. B stood silent.  
 19:28 T started mounted again and B move little bit. While getting better position, T's penis unsheathed and getting erect just for 5 minutes.  
 19:32 T's penis was full erection and started to moving up to reach B's vulva.  
 19:34 T was moved his body down to put his penis in a right place but never reach the vulva. B made a voice many times.  
 19:37 B suddenly run, T did not chased but snorting loud.

- 19:42 Together again for eating in the gate and feed by keeper.
- 19:50 B started to sleep in front of gate and T followed and stood silent beside B.
- 19:54 T started to sleep beside B.
- 20:05 B still sleeping when T wake up and stood silent. T's penis unsheathed.
- 20:09 T put his chin on B's back and try to mount, B suddenly wake up, snorting and run. T walked and followed B. B stop after 5 meters.
- 20:10 B gave her back and T put his chin again in B's back. He also sniffing on B's genital. T also put his head between B leg and looked lift up B's hind leg.
- 20:12 T mounted. Penis looked fully erect. The top of penis try to reach a vulva many times but always fail.
- 20:15 T looked start to move his back forward and backward but the penis still hanging.
- 20:16 B run again, but T not chased
- 20:20 Together again in front of central gate. T started to sleep first and B followed after 1 minute.
- 20:28 T woke up first and sniffing to B genitalia when B still sleep. Penis unsheathed.
- 20:29 B woke up and stood silent. T try to lift up B's hind leg.
- 20:30 T started to mount. B move little by little and T followed while his front leg still in B's back.
- 20:32 Penis getting erect and move up and down.
- 20:33 The top of penis try to reach B's vulva but always fail.
- 20:35 T's still try to made an intromission. B's made a voice many times. B's move forward little by little.
- 20:36 No intromission but T's move his back forward and started to move forward and backward. B's made voices many times but still silent.
- 20:40 It was seen that the penis still in between of B's hip.
- 20:45 Three times of liquid squirt was heard one time of them also seen. After that it some of the top part of T's penis was so red and hanging down. T still stay on B's back.
- 20:46 B suddenly run and T was thrown down and just lay down for one minute without any move.
- 20:48 T woke up and stood silent for 5 minute. Looked so tired.
- 20:55 B approach T and T started to walked.
- 20:57 Both approaching the gate and feed by keeper. No more intense contact and courtship after this.

## Courtship behavior between Bina and Torgamba at 21-22 November 1998

November 21, 1998

- 08:05 Bina (B) entered central area and directly walk to Torgamba (T) gate. Met in central area around Torgamba's gate and do head to head pushing, horn to horn and kissing each other (HH) only for 2 minutes.
- 08:12 T reach the central gate and B was there. The gate opened and they do head to head pushing, horn to horn and kissing each other (HH) only for 2 minutes. And Bina walked into T's paddock. T followed.
- 08:41 Difficult to followed them, but it was heard that Bina was running and T's chasing. There was a lot of snorted between them.
- 08:53 Again it was seen that B run and T chase.
- 09:43 Found that T was wallowing. No signs of B.
- 13:30 Found that they were stay together but in a distance (5 meter). B was satanding but T was eating.
- 13:31 T walked approached B, B made a voice, run a little and stop after 10 meter and silent. T followed and approach again, but B ran again and stop after 5 meter. These activities was seen many times but sometime B ran and stop quiet far.
- 15:05 It was seen in a few seconds that B was running and T chasing.
- 16:00 Again B was running and T chasing. It was raining and become dark.
- 23:06 Both were entered the central area together but separated after 2 minutes.

November 22, 1998

- 00:32 It was seen that B run again
- 08:00 HH for a few seconds during feed by keeper.
- 10:44 HH again for few seconds but not so hard.
- 16:06 They start walke ↓ together and some time HH for 2 minutes but T walked away.
- 16:09 HH again but quiet hard for 10 minutes and B stood silent and give ger back many times.
- 16:23 Walked together and some time B stood silent and give her back but T pass it and B followed.
- 16:46 It was seen not so far from central gate, B stood silent and T sniff on B genitalia. Note: It was rainy and the observer stayed in the gate.
- 16:47 T put his chin in B's back and started mounting. Penis unsheathed but no erection yet. T tried to get better position and B looked nervous. After 5 minutes B suddenly make a loud voice and run, and T chasing her. There was a lot of voices and snort.
- 17:06 It was seen a few seconds that T chase B again.
- 17:46 Again not so far from central gate it's seen that T try again to mount but wrong position (mis-mount)
- 18:36 T start to pushing B and B gave her back again.
- 18:39 T mounted and try to make better position. Penis unsheathed
- 18:41 B made a voice. T's penis unsheathed longer and still to lift up his body.
- 18:45 B made many voices. T's penis getting erect.
- 18:52 It seems that the position still not comfort and T suddenly get down and B run, T was not chased.
- 19:27 After walked together and B stop, T put his head between B's hind leg and sniffing on B's genitalia. B stood silent.
- 19:28 T started mounted again and B move little bit. While getting better position, T's penis unsheathed and getting erect just for 5 minutes.
- 19:32 T's penis was full erection and started to moving up to reach B's vulva.
- 19:34 T was moved his body down to put his penis in a right place but never reach the vulva. B made a voice many times.
- 19:37 B suddenly run, T did not chased but snorting loud.
- 19:42 Together again for eating in the gate and feed by keeper.
- 19:50 B started to sleep in front of gate and T followed and stood silent beside B.
- 19:54 T started to sleep beside B.
- 20:05 B still sleeping when T wake up and stood silent. T's penis unsheathed.
- 20:09 T put his chin and B's back and try to mount, B suddenly wake up, snorting and run. T walked and followed B. B stop after 5 meters.
- 20:10 B gave her back and T put his chin again in B's back. He also sniffing on B's genital. T also put his head between B leg and looked lift up B's hind leg.

- 20:12 T mounted. Penis looked fully erect. The top of penis try to reach a vulva many times but always fail.
- 20:15 T looked start to move his back forward and backward but the penis still hanging.
- 20:16 B run again, but T not chased
- 20:20 Together again in front of central gate. T started to sleep first and B followed after 1 minute.
- 20:28 T woke up first and sniffing to B genitalia when B still sleep. Penis unsheathed.
- 20:29 B woke up and stood silent. T try to lift up B's hind leg.
- 20:30 T started to mount. B move little by little and T followed while his front leg still in B's back.
- 20:32 Penis getting erect and move up and down.
- 20:33 The top of penis try to reach B's vulva but always fail.
- 20:35 T's still try to made an intromission. B's made a voice many times. B's move forward little by little.
- 20:36 No intromission but T's move his back forward and started to move forward and backward. B's made voices many times but still silent.
- 20:40 It was seen that the penis still in between of B's hip.
- 20:45 Three times of liquid squirt was heard one time of them also seen. After that it some of the top part of T's penis was so red and hanging down. T still stay on B's back.
- 20:46 B suddenly run and T was thrown down and just lay down for one minute without any move.
- 20:48 T woke up and stood silent for 5 minute. Looked so tired.
- 20:55 B approach T and T started to walked.
- 20:57 Both approaching the gate and feed by keeper. No more intense contact and courtship after this.

## DECEMBER 1998

### Courtship behavior between Bina and Torgamba at 6 -15 December 1998

#### December 6, 1998

- 08:16 Bina (B) met Torgamba (T) at central area and straightly head to head pushing, horn to horn (HH), and licking face each other for 4 minutes. B snorted and walked away after that. T walked other direction.
- 09:29 Nose touched for a second and T walked away.
- 09:37 T followed B walked along, B turn and stop but T avoid it.
- 15:16 HH quiet hard, kiss and lick until 15:37, then B was voicing and walked away. No more courtship until 8 December.

#### December 8, 1998

- 08:39 B liked to do courtship but T always avoid. It occur many time until 9:09. Some HH was observed but no intensiveness.
- 16:18 HH aggressively for 10 minutes with some seconds avoidance, but T avoid more often then B.
- 16:47 HH very hard
- 16:48 B mounting T for a couple seconds while T walked. B going down and T avoid
- 16:51 Some serial HH were observed until 17:12 but no intensively court were seen. No more courtship until 11 December.

#### December 11, 1998

- 08:36 In T's paddock. Started courtship after T following B for 10 minutes. HH quiet hard until 08:45 with some avoidance by T.
- 08:47 B avoid and walked away. No more contact until next day.

#### December 12, 1998

- 13:00 HH for some seconds. Both were walked separated after that.
- 17:41 HH for some seconds again and then separated. Rain started to come.
- 20:15 HH soft but with sometime aggressive licking for 1 minutes and B start to give her back and silent. T chin rest. T mounted. Penis unsheathed.
- 20:17 Penis erected. T move his body up and down.
- 20:21 Bad position. T down.
- 20:23 T mounted B again. Penis unsheathed after 2 minutes.
- 20:26 Both were move their body for getting better position. T move his body up and down.
- 20:28 T's penis getting more unsheathed but not erection yet
- 20:31 B suddenly make a loud voice and run. T snorted loud but not chasing.
- 20:40 HH again for 1 minutes
- 20:41 B standing heat and T did chin-rest. And started mount after some seconds
- 20:55 It was looked like bad position, T down him-self. T run for a while and turn. Penis unsheathed long.
- 21:08 HH again and B straightly standing-heat. T chin rest and started mount B. Penis unsheathed.
- 21:09 Move their body for getting good position. Penis erected.
- 21:11 Penis move up and down to reach vulva but can not stop right at the vulva. B was make a lot of voice
- 21:15 T started to move forward his back and the penis go in between B's hip. B still voicing many times
- 21:20 T start to move his back forward-backward. B looked nervous and make voicing a lot.
- 21:32 B suddenly make a loud voice and run, T chase and looked very angry, hit some small tree and continues chasing B. B continues run for  $\pm$  10 minutes
- 21:57 After HH for 2 minutes, B standing heat again and T mounted. But B only stand for 1 minute and walked. T down and follow very close and always push B's back. They went inside the forest.
- 22:04 after 1 minute HH, B standing heat again T straightly mounted. Penis unsheathed quickly.
- 22:06 Penis erected. T move his back iower for make good position for penis reach a vulva.
- 22:15 Penis move up and down but still can not get through.



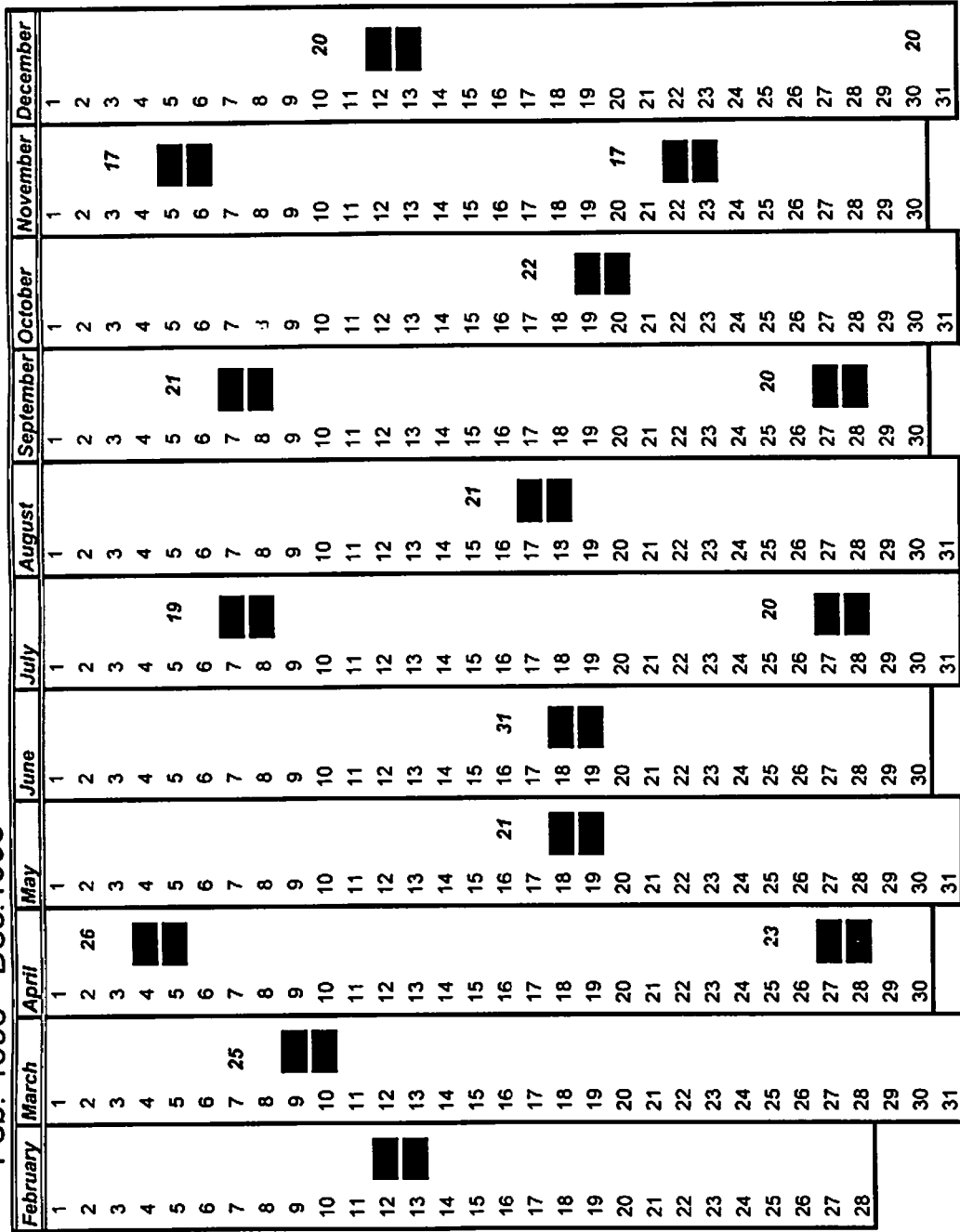
- 22:18 Penis suddenly become unerect. But T still mounted. B silent.  
22:20 Penis still unerect but they not move anyway.  
22:21 Penis erected again and T try again to reach good position for his penis.  
22:24 T move her back forward while penis go in Bina's hip  
22:25 B suddenly run and make a voice loud. T snorted soft but no chasing.  
23:02 HH and B again ready to be mounted. T mount straightly and looked that get the erected penis. (It was inside the forest. Difficult to see).  
23:15 It was heard that B make a voice many time.  
23:17 It was heard that Bina run. But no chasing.  
23:59 Both were in the wallowing. T mounted B when B still lay down. B suddenly run. No chasing.

December 13, 1998

- 01:08 Close to saltlick area. T mounted B again. B was standing heat. It was not so clear to see.  
01:12 So many voice from Bina  
01:14 It was seen that Bina run.  
02:15, The times when voices of Bina and noise of courtship was heard. Also it looked that when  
02:47, walked together T stick closely and seems very aggressive to mounted. No serious  
03:22, courtship were observed after that. It was rain all night long.  
04:10.

Bina's estrous cycle

Feb. 1998 - Dec. 1998



Minimum 17 days    Average of 15    21.5 days  
 Maximum 31 days

Part 4

**ACTIVITY PATTERNS**

