

**Captive Management of Sumatran  
rhinoceros (*Dicerorhinus sumatrensis*)  
Tabin Wildlife Reserve**

**August 2018**

**Paddock Staff**

1. Wilson Kuntil (Head Keeper)
2. Justine Segunting (Rhino Keeper - RIF)
3. Maslin Mohiddin (Rhino Keeper – RQF)
4. Samat Gubin (Rhino Keeper – RIF)
5. Ronald Jummy (Rhino Keeper - RQF)
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\* RQF: Rhino Quarantine Facility  
RIF : Rhino Interim Facility  
RFP : Rhino Food Plantation

**Sumatran Rhinoceros**

No.	Animal ID	Sex	Accession No
1.	Kretam	Male	SWD 002
2.	Iman	Female	SWD 004

**1. Husbandry**

**1.1 Animal Management**

August 2018 started with frequent rainfall in the first week followed by a long dry weather. It rained heavy towards the end of the month. The total rainfall and rain-day for August is 230 mm and 10 days respectively.

Most of the activities in August is focused on preparation to move the two rhinos and four staffs to the new Borneo Rhino Sanctuary (BRS), about 2 km away. Crate training started towards the end of July, with gradual closure of the rear gate of the crate in mid-August. The other crate preparations included securing the support belts, wooden holders and thick grass bedding. The new enclosures, water tanks and food store at BRS were thoroughly washed. The night - stall were lined with rubber mats. All automatic water troughs

were also cleaned and refilled with water. Two chutes were constructed for the rhinos.

The paddocks were rid of metals left over by the contractors. To note, that, even to date, we still uncover rusty metal parts, mostly nails from the paddocks. The voltage on the electric fence was between 6.9 - 7.9 kV.

*Ficus* and *Artocarpus* saplings were planted within the facility. Mud wallows were dug out at strategic locations inside two paddocks and filled up with water (Plate 1).



Plate 1. Keepers digging a mud wallow for Kretam

The food source for the two rhinos were still available in abundance throughout the month. A small amount (20%), mostly Nangka (*A. heterophyllus*) were harvested from the Rhino Food Plantation.

The health and body condition of Kretam was maintain at optimum level. His overall body weight is maintained. However, Iman dropped in body weight significantly, although her other parameters remained normal. The vaginal discharge was still observed several times daily. She is being treated for the weight loss.

A new wallow constructed by Kretam became dry after a few weeks due to the dry spell in mid - August. This forced him to reused his old wallow. Iman’s only wallow is maintained throughout the month (draining and adding water as required).

The common problem is the hooves (cracks and chippings) which are all healed or

almost healing. However, the open pyometra with Iman still persist and is monitored daily. No scanning was carried out in August 2018. The response from Kretam towards Iman's feces indicated indirectly that she is cycling.

## 1.2 Body Weight

The weighing was done using TruTest® electronic weighing scale. Kretam was weighed, once in the middle of the month and once at the end of the month. Iman was weighed once a week to allow close monitoring of her body condition to avoid potential bleeding whenever she becomes overweight. In August 2018, Iman's bodyweight dropped significantly from 512 kg at the beginning of the month to 489 kg towards the end (Figure 1).

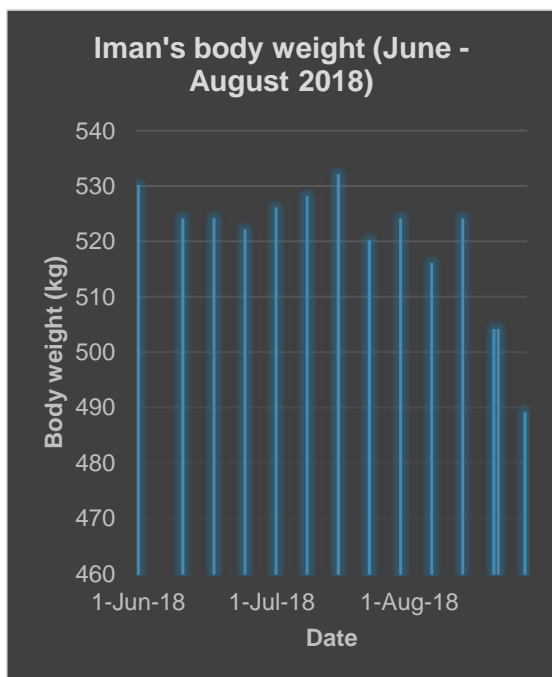


Figure 1. Iman's bodyweight (June – August 2018), showing the drop in her bodyweight

The attributing factors ranged from her leiomyoma (discomfort), reduction in concentrates (in June due to overweight) and hot weather.

Additional concentrates (Gold Coin®, horse pellets) is being offered to Iman

towards the end of August 2018. The effect should be apparent is two weeks. Her appetite and behaviors are normal.

Kretam's bodyweight dropped slightly as compared to previous months. This coincides with the plan to maintain his weight at between 660 – 670 kilograms (Figure 2).

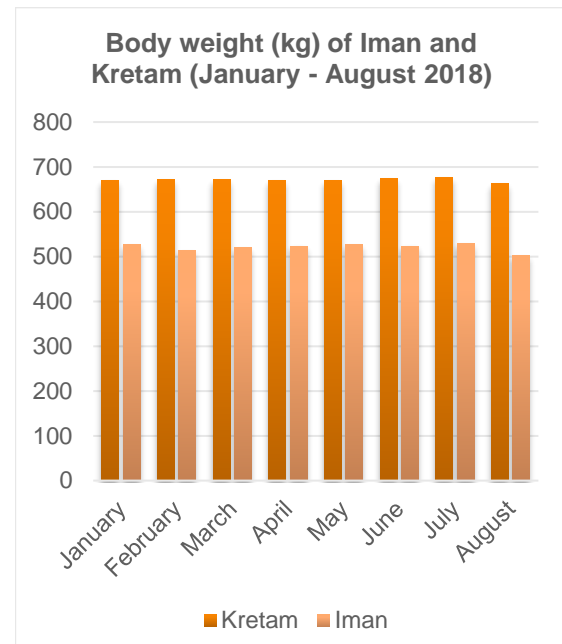


Figure 2. The bodyweights of Kretam and Iman in 2018

It was anticipated that when the rhinos were moved to the Borneo Rhino Sanctuary (BRS) on the 4<sup>th</sup> September 2018, the general health and body weight will be negatively affected.

## 2. Animal Health

The body scores of Kretam was maintained at around 3.0 and Iman at 2.5 (modified from Body Condition Scoring for Horses, Henneke et al., 1981). In general, the main chronic issues with Kretam and Iman were minor. Chippings (occasionally cracks) of the hooves does occur due to the small overused paddocks. Kretam's posterior horn with the depression has been resolved.

The major chronic problem is the leiomyomata and the mucous discharge, representing an open pyometra.

Both the rhinos were provided with a minimum amount of browse, daily. Iman was fed 18 kg of foliage, with an additional browse (10 – 14 kg) hung out for night feeding. Kretam was offered 36 kg, with a similar amount of browse hung in the paddock.

Abrasions, minor lacerations and hoof lesions (cracks and chippings) are sometimes observed but often, do not require treatment but were monitored daily until it is resolved.

Kretam was observed to mount a small earth outcrop inside the paddock on a few occasions. This is in response to the placement of feces from Iman, each morning (Plate 2).



Plate 2. Kretam mounting an earth mound in his paddock

The routine monthly sampling for health and environmental checks for pathogens, were carried out for both rhinos and their surroundings. The samples were collected on the 14<sup>th</sup> August 2018 (Tuesday) and submitted to the Veterinary Diagnostic Laboratory, JPHPT and Public Health Laboratory in Kepyayan, Kota Kinabalu on the 15<sup>th</sup> August 2018, before noon.

The samples included soil from around the night - falls, mud from wallows, water from the tanks, floor swabs, horse pellets, feces, urine and blood. All these samples except blood, were analyzed for bacterial contamination, particularly *E.coli*,

*Salmonella sp* and *Bukholderia psedomalleie*.

Blood sample for complete blood count, was taken from the digital plexus of the hind limb (Plate 3).



Plate 3. Alvin sampling blood in EDTA tube, from Kretam

## 2.1 *Kretam*

### a. Deformity of posterior horn

The central depression that was filled up with black silicon in early May 2018 was removed and much of the horn matrix had regrown. The other depressions will be assessed and, if necessary, filled with similar materials.

### b. Hoof cracks and chippings

Kretam's hooves have a high tendency to get chipped or cracked, a frequent problem due to limited and reused wallows. These "old" wallows contained more rocks than mud or clay. The rhino would scrape the hard wall and floor of the wallow. It was observed that the hind feet are more prone compared to the front.

The lesions on the hooves would be cleaned with water and brush. This is followed with 2.5% formaldehyde and Stockholm coal tar. The topical treatment is carried out twice daily, with the animal inside the chute (Plate 4).



Plate 4. Samat, the rhino keeper applying Stockholm tar on the hoof

The rhino is also supplemented with biotin and methionine (20 grams Hoofmaker TRM®), once daily in the afternoon.

## 2.2 *Iman*

### a. Hoof cracks and chippings

Similarly, Iman has several hoof cracks. The causes were similar but worse as she has only one wallow inside a very small paddock. A one – centimeter crack was seen on the 3<sup>rd</sup> digit of the right hind leg (Plate 5).



Plate 5. The crack on the medial surface of the 3<sup>rd</sup> digit of the right hind limb

The twice, daily treatment includes thorough cleaning of the hooves affected, followed by 2.5% formaldehyde swabs and Stockholm coal tar. Biotin supplement (20 grams Hoofmaker TRM® powder) was reconstituted with water to form a bolus and fed to the rhino.

### b. Reproductive tract pathologies

The leiomyoma and the concurrent pyometra is manifested as mucopurulent discharge, ranging from clear, pinkish, yellowish to white or milky. Ultrasonography of the cervix showed a loosely fit annular fold. The discharge from the vagina are seen several times daily, particularly after or during defecation or urination. Similarly, the discharge is observed when Iman lies down in the night – stall or wallow (Plate 6).

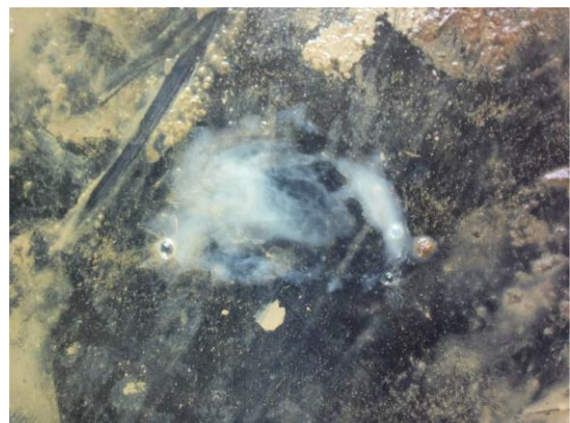


Plate 6. The variation of muco – purulent discharges observed in the night – stall, ranging from pink to white.

### 3. Feed and feeding

The food plants were gathered from the surrounding Tabin road, KL – Kepong (Sabah) plantation and to a lesser extent, Ladang Permai. About 20 % of the forage, used for hand – feeding comes from the Rhino Food Plantation.

Ara manga (*F. annulata*) and Ara Gatal berbulu (*F. francisci*) were also collected from the Rhino Quarantine Facility, where they were in surplus. Ranking in terms of preference differ from both rhinos. Kretam preferred Nangka air bukit (*F. fistulosa*) as to Iman preferring Nangka air pasir (*Ficus spp*). Ara Kapal (*Ficus montana*), Ara Epal (*F. tricocarpa*) and Kelawit (*Uncaria spp*) were given in limited amounts (1 kg) to the rhinos as it has large amount of branches as compared to leaves. The forage that were hung out for supper included mostly nangka (*Artocarpus hetrophyllus*), Maitap (*Neonauclea spp*) and Putih Sebelah (*Leucosyke capitellata*). These were secured onto trees in the paddock (Plate 7).



Plate 7. Samat tying the bunches for supper

All forage was weighed before feeding to the rhinos. This also includes those that were hung out for them. The balance was deducted to get the total consumed (Plate 8).



Plate 8. A keeper weighing the forage prior to feeding the rhino

The common fruits fed to Kretam and Iman included banana, papaya, jack fruit, mango and pumpkin (Plate 9).



Plate 9. Local mango in season at the Lahad Datu market

This was done either before the forage or halfway through. This is to avoid pieces of the soft fruits being lodged in between the teeth and cause decay, callus and other related problems.

Kretam is very selective with the forage given and prefers them dry without being soaked in water or supplements. Iman, on the other hand, will take in both forms. Certain species of forage including Earth fig (*F. uncinata*) and Kelawit berbulu (*Uncaria spp*) has to be soaked in water or

mineral mix (Stresspak®), when fed to Iman (Plate 10).



Plate 10. Forage soaked in mineral – vitamin mix before being fed to Iman

### 3.1 Forages

The total amount collected for the two rhinos in August 2018 is 3448 kilograms. Of this 61.4% (2117 kg), was eaten by the two rhinos. Of this, Kretam consumed 63.4% and the balance was eaten by Iman. Iman's forage intake was limited to about 22 kilograms each day.

Thirty six percent of the total forage collected was hung out for the rhinos. 52% was allocated for Kretam and 48% for Iman. Of this, the total consumed by both rhinos is only 39%. Forages that were hung out for the rhinos had more branches and longer stems for easier securing by ropes.

The total amount of forage offered and consumed by the rhinos varies each month but is within the normal range (Figure 2).

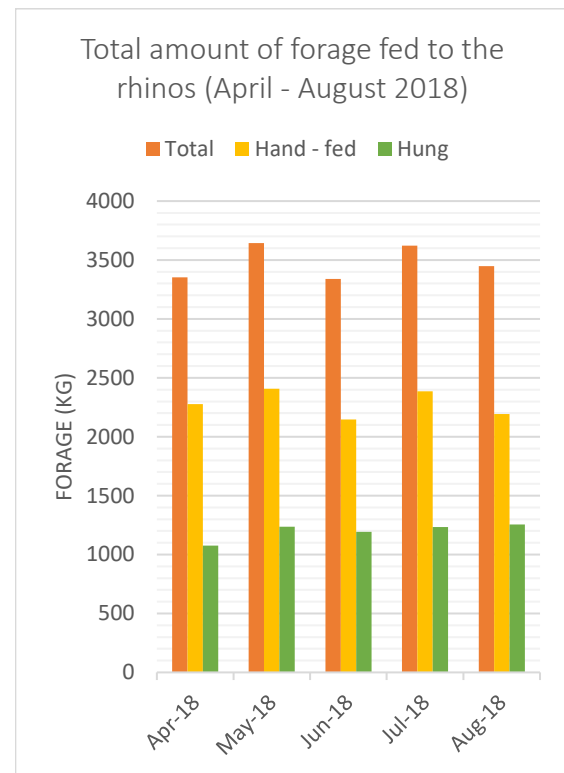


Figure 2. The foliage offered to Kretam and Iman for the months April – August 2018

### 3.2 Voluntary Feed Intake (VFI)

In August 2018, Iman came back for all her feedings (31 days), while Kretam only came back for 28 morning and 28 evening feed. Thus, the feed intake for Kretam in August 2018 (total consumed 1064 kg) is less than for the month of July 2018 (total consumed 1106 kg). The daily consumption from hand – feeding ranged between 18 – 19 kg and 18 – 42 kg for Iman and Kretam respectively.

Iman was fed 9 – 10 kilograms of foliage per feeding (18 – 20 kg per day), consisting of 18 species of plants, mostly figs. Her appetite remains excellent and feed intake, consistent. Iman consumed about 35.7% (215 kg) of the foliage hung out for her in August 2018. Her total feed intake is 774 kg, 1.5 kg less than in July 2018.

In August 2018, Kretam consumed 1343 kg (60% of the total forage offered) as compared to 1402 kg in July 2018.

His average daily feed intake consists of 34.3 kg from hand – feeding and 9.9 kg from the foliage hung out inside the paddock. (Figure 3).

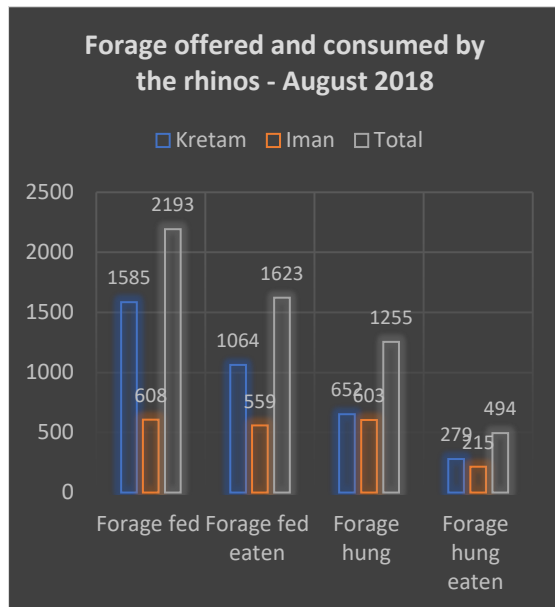


Figure 3. Total forage offered and consumed by the rhinos in August 2018

Fruits constitute 15.9 % (337 kg) of the total diet of the two rhinos. Most fruits are available throughout the year (*Musa acuminata*, *Carica papaya*, *Mangifera indica* and *Artocarpus heterophyllus*) and a few including *Artocarpus integer* and *Mangifera foetida* are seasonal (Figure 4).

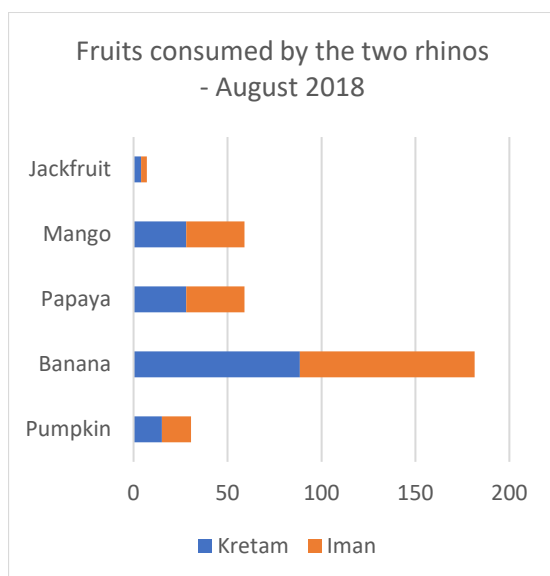


Figure 4. The variety of fruits consumed by Kretam and Iman in August 2018

Half of the fruits were fed in the morning and the remaining in the afternoon or evening.

Horse pellets (Gold Coin ®) were given as supplements. Kretam receives 300 grams each day. Iman gets 200 grams daily but was increased to 400 grams at the end of August 2018 to boost her body weight. These were mixed with water and soften before feeding the rhinos. In addition, the mineral and vitamin supplements (Stressvitam®) were added to the drinking water and to the water to rinse some foliage prior to feeding the rhinos.

Clean drinking water was offered inside a container and offered, intermittently during hand feeding. The water was also made available inside their paddocks. About 8 to 10 gallons of water were consumed by the rhinos while inside the chute.

#### 4. Biosecurity/health monitoring

For an effective biosecurity measures to be effective, they must be strictly adhered to and constantly monitored. These included entrance protocols (vehicles and personnel, and visitors), food preparations, prophylaxis, staff protocols and animal protocols. Stress factors must be maintained at the minimum, to ensure the rhinos are not immune compromised at all times. Food and water are key elements that could provide access to pathogens entering the rhinoceros.

Samples from various water tanks were checked for pathogens. These were used daily for drinking (both rhinos and human beings) and washing the enclosures. These were analyzed once a month for bacterial contamination. Soil samples, floor swabs, water samples from water tanks, urine and feces from the rhinos were also analyzed for pathogens. The water from 13 tanks were tested for total coliform counts and presence of *E.coli*. Blood sample was taken from Kretam for a complete blood count. Samples from the vaginal discharge was

taken for bacterial isolation and sensitivity tests.

Staff were also reminded to adhere to good hygiene (washing hands after work) and best husbandry practice. In addition, the floor inside the night stall and all drains are thoroughly scrubbed twice a day.

#### 4.1 Hematology

Blood was collected into EDTA tube from the digital plexus, for a complete blood count (CBC). Kretam's CBC was compared with his previous results (Table 1).

Table 1. The complete blood count for Kretam in July and August 2018.

Parameters	Animal (Kretam)	
	16 July	14 Aug
Hemoparasites	Nil	Nil
RBC (X10 <sup>12</sup> /L)	7.4	5.8
WBC (1000/UL)	5.1	10.1
Hb (G/DL)	15.6	13.6
PCV (%)	55	45
Seg. Neutrophils (%)	52	67
Eosinophils (%)	14	20
Lymphocytes (%)	34	11
Monocytes (%)	0	2
Basophils (%)	0	0
MCV (FL)	NA	NA
Platelets (G/L)	NA	NA
MPV (FL)	NA	NA
MCH (PG)	NA	NA
MCHC (G/L)	NA	NA

The complete blood count showed variables are within normal limits. However, there is an elevation in WBC (segmented neutrophils), reflecting some possible stressors.

#### 4.2 Bacteriology

Floor swabs 2, 5, 7, 8, 9, 11 – 16 and 19 was positive for *Bacillus spp.* Swabs 3, 4, 10, 17 and 20 was positive for *Dermaococcus nishinomiyaensis/Kytococcus sedentarius*.

The 17 soil samples taken from various locations surrounding and inside the rhino enclosures were negative for *Bukholderia pseudomallei*. The four samples from the wallows were also negative for *Bukholderia pseudomallei*.

*Enterobacter cloacae complex* was isolated from the two tyre baths. Water from the sumps were negative for pathogens.

The water samples taken from 15 tanks at the RIF, RQF and main storage tanks had a total bacterial count ranging from 181 – 1970 cfu/ml. The total coliform count ranged from 40 – 890 cfu/ml. Most of the water tanks had a low *E.coli* count ranging from 0 – 10 cfu/ml, with tank 9, having 240 cfu/ml. (Table 2).

Table 2. The total bacterial, coliform and *E.coli* counts in 15 water tanks (cfu/ml) for the month of August 2018.

Tank	Total bacteria	Total coliform	<i>E.coli</i>
1	181	40	10
2	593	407	0
3	879	760	0
4	570	338	0
5	422	350	0
6	480	34	0
7	470	438	10
8	500	470	10
9	850	320	240
10	410	350	0
11	710	50	0
12	1940	770	0
13	1100	520	0
14	1970	890	0
15	1800	470	0

There were no *Salmonella sp* isolated from the water samples.

The monthly fluctuations in bacterial and *E.coli* counts is related to the natural water source from the Lipad River and its tributaries. The high bacterial counts are related to the heavy rainfall and wash down from the soil.



Sample from the vaginal discharge was positive for *Streptococcus agalactiae*. The drug of choice was Amoxycillin, Gentamycin and Penicillin G (Table 3).

morning. Kretam was seen to mount a small earth outcrop on the 15<sup>th</sup>, (morning) 17<sup>th</sup> (evening) and twice on the 25<sup>th</sup> (morning and evening) August 2018.

Table 3. The antibiotic sensitivity test from the vaginal discharge

No.	Antibiotic	Sensitivity
1.	Amoxycillin 25mcg	Sensitive
2.	Gentamycin 30mcg	Sensitive
3.	Norfloxacin 10 mcg	Resistant
4.	Sulphonamide 300mcg	Resistant
5.	Erythromycin 15mcg	Intermediate
6.	Neomycin 30mcg	Resistant
7.	Penicillin G 10iu	Sensitive
8.	Vancomycin 30ug	Resistant

There were no pathogens isolated from the urine and feces of both rhinos.

#### 4.3 Parasitology

The fecal samples from both rhinos were negative for endoparasites and parasitic egg count.

#### 4.4 Routine prophylaxis

Routine liming (application of calcium/magnesium – rich materials) was carried out mostly around the rhino dung piles (composting area) located outside the enclosure. Liming were also carried out around the wet ground and sumps. The tyre baths were monitored and maintained with proper disinfectants and concentration

### 5. Reproductive assessments

Iman was not scanned in August 2018 due to her slight bleeding from the uterine pathology.

The routine placement of Iman's feces in Puntung's paddock was done each