

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

**November 2017**

**Paddock Staff**

1. Wilson Kuntil (Head Keeper)
2. Justine Segunting (Rhino Keeper - RIF)
3. Marikus Suyat (Rhino Keeper – RIF)
4. Samat Gubin (Rhino Keeper – RIF)
5. Ronald Jummy (Rhino Keeper - RQF)
6. Joseph Stimon (Rhino Keeper - RIF)
7. Rasaman Jaya (Rhino Keeper - RQF)

\* 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**

The wet season impacted the behavior, husbandry and biosecurity of the rhinos in Tabin. Rainfall was observed on more than 20 days in November 2017, surpassing the frequency and volume in October 2017. The direct impact was on the condition inside the paddocks, including the wallows. The wallows become very watery and potentially, the mud would flow out and get drained away around the wallow. Eventually, these overflows would render the wallow unattractive to the rhino.

In Kretam's case, the wallow is situated along a dry stream. The heavy rainfall caused the stream to be engorged and fill up the wallow. This too would discourage the rhino to use or reuse the wallow. In both scenarios, heavy rainfall negatively affects the livelihood of the rhinos in Tabin. The

limited size of the paddock limits the availability of good wallows. The deprivation of good wallow to the rhinos, would certainly cause undue stress and exposed them to diseases.

One of the causes of bleeding observed in Iman is physical exertions including climbing or descending excessive slopes. Similarly, the condition of the wallow, deepened by the heavy rain will have the same impact on her (Plate 1).



Plate 1. Iman's wallow in the background (arrow). She would dig and churn more mud when the wallow is filled with rain water

Iman was vaccinated with Improvac® as a routine measure to curb the severe bleeding from her leiomyomata. This was carried out every four months instead of six months as prescribed for boar and horses. As indicated previously, the frequency and intensity of the bloody vaginal discharge were observed during the fourth month after each vaccination.

The other management issues included a laceration on Iman's forehead caused by her rubbing on the automatic drinker inside her night stall. This was resolved by slotting a block of heavy piece of wood against the drinker.

Kretam is recovering from his hooves' cracks with continued daily treatment and oral supplementation. The bad condition of his paddock slows down the healing process.

The rhino browse is lush and plenty during the rainy season. Many of the browse were also collected from the Rhino Food Plantation as a means to regenerate new shoots and young leaves (Plate 2).



Plate 2. Rasaman pruning the browse from a fig plant

## 1.2 Body Weight

Weighing was carried out twice a month, using a TruTest® electronic weighing scale. Kretam and Iman averaged 659.5 and 550.4 kilograms respectively. The highest weight recorded for Kretam is 665.5 kg in February 2017 and Iman recorded her highest of 560 kg in November 2017. Throughout the year, the bodyweights of the rhinos were maintained with minor fluctuations (Figure 1).

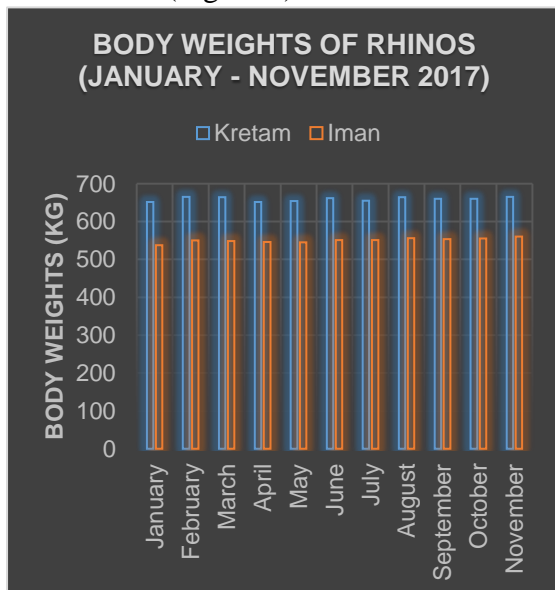


Figure 1. Bodyweights of Kretam and Iman (January – November 2017)

## 1.3 Animal Health

The body scores of the two rhinoceros were maintained at around  $\geq 2.5$ . As seen in October 2017, the conditions of the paddocks were getting worse. We have to close down one of Iman's paddock as it was becoming too steep and her trails were very deep.

Iman had a bloody vaginal discharge on two occasions in November 2017, prior to her Improvac® vaccination. However, the discharge was small in amount and classed as Category 3. All other parameters were normal.

Soil sampling around the night stalls, floor swabs of the night stalls, blood sample, urine samples, fecal samples and water from water tanks were done on the 13<sup>th</sup> November 2017. The samples were transported at 2.00 am on the 14<sup>th</sup> November 2017 from Tabin Wildlife Reserve to the Veterinary Diagnostic Laboratory and Public Health Laboratory in Kepyayan, Kota Kinabalu. Most of the bacteriological analysis will take between 1 – 3 days. The coliform counts require a week for the results.

### 1.3.1 Kretam

#### a. Fungal infection of posterior horn

The posterior horn, although showing signs of regeneration have not recovered fully. The treatment using the antifungal Terbinafine (Lamisil®) was discontinued in October 2017. The lesion was treated with povidone after it was scrubbed clean and let to dry. The oral Hoofmaker TRM® administered to treat hoof cracks, had a positive effect the growth of the horn matrix.

However, some of the deep grooves/holes within the horn matrix was seen to hinder the regeneration process (Plate 2).

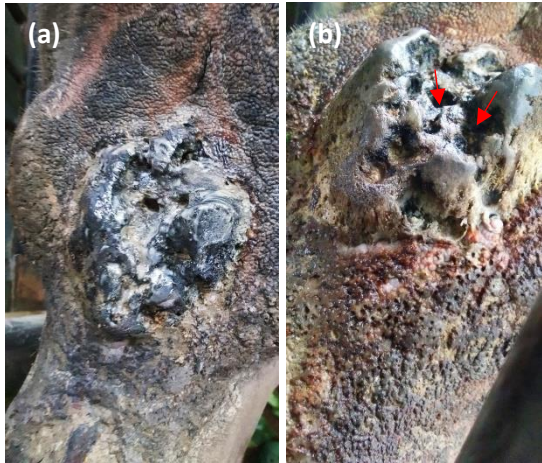


Plate 2. The posterior horn in October (a) and November 2017 (b) Arrow showing the grooves.

### b. Hoof cracks

The chronic problem of hoof problem is still visible despite the prolong treatment and biotin supplementation. However, the condition had improved significantly with growth of the horny wall. The cracks were still visible and more distal to the coronary band (Plate 3).



Plate 3. The hoof cracks on the hind legs of Kretam. Notice the new hoof matrix (pale colour)

Kretam still receives the supplement of biotin and methionine (Hoofmaker TRM®), once daily in the afternoon (20 grams). The hooves were treated with antiseptics, 2% formalin and Stockholm coal tar. Rubber mats are necessary inside the night stall and the chute.

### 2.3.2. Iman

#### a. Vaginal discharge

The bloody vaginal discharge observed was on the 2<sup>nd</sup> and 3<sup>rd</sup> November 2017, six days prior to the Improvac® vaccination. The discharge was observed inside her mud wallow during the morning checks by the keeper. It was dark red, with some blood clots, estimated 10 – 20 mls in volume (Plate 4).



Plate 4. The bloody vaginal discharge found in her wallow

This Grade 3 vaginal discharge was treated using Tranexamic acid (Tren®), orally at a dosage of 1.25gram, twice daily. The problem was resolved within the week.

It is also important to note that other physical exertions (including touching the electric fence and climbing up steep trenches) could also cause the bleeding.

The very bad condition of her paddock, with continuous rainfall, created deep trenches and mud pools along her path to the night stall (Plate 5).



Plate 5. The long, winding and deep trenches that Iman had to struggle to get to the night stall for her morning and evening feedings

To try and reduce the potential trauma to her reproductive pathologies, a new entrance was created from the night stall to her paddock. Simultaneously, repairs and filling up the ditches and muddy areas with sand and ¼ inch gravel were carried out in front of her old entrance which was temporarily closed.

The new entrance/exit was drier and flatter. It was also closer to her new mud wallow. However, with time and bad weather (November 2017 – February 2018), the new trail, to and from her wallow will also be eroded quite rapidly (Plate 6).



Plate 6. Iman exiting from her new entrance towards her mud wallow

### c. Reproductive tract pathology

Although the GnRH analogue (Improvac®) lessens the ovarian activity and hence reduces the intensity and severity of the discharges, other traumatic factors can result in the bleeding.

She was scanned once in November 2017. The same pathologies were observed which included leiomyomas of varying sizes, endometrial cysts (multi and unilocular), hydrosalpinx in the right oviduct, fluids within the uterus and uterine horns, increased vascularization of the ovaries and edema of the cervix. Despite these pathologies and vaccination, Iman still produces follicles in both her ovaries.

### c. Edema

The site of (Improvac®) the subcutaneous injection produces severe edema irrespective of location. The edema is sometime treated with warm compress. The recent site was at the pelvic fold. The swelling will subside after about 8 weeks (Plate 7).

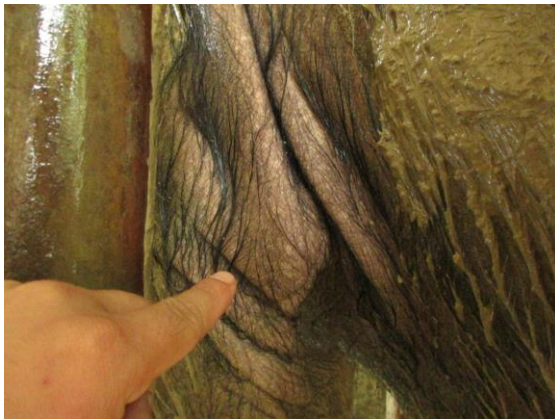


Plate 7. The edema a day after the Improvac® injection, subcutaneously

### Feed and feeding

The rainfall in November 2017 was observed for more than 3 weeks resulting in constant lush vegetation in Tabin. This was also seen in the Rhino Food Plantation (Plate 8).



Plate 8. Harvesting rhino food from the cultivated *Ficus francisi*

The rhinos were fed an average of 17 species of foliage per day. A large amount consisted of various *Ficus spp* and Jackfruit leaves (*Artocarpus heterophyllus*) that were

harvested from the RFP. In November 2017, more browse (>30%) was obtained from the RFP due to the rapid growth rate with constant rainfall. More than 50% of the food plants consisted of *Ficus* species. The other common species collected includes Putih Sebelah (*Leucosyke capitellata*), Maitap (*Neonauclea*), Nangka (*Artocarpus heterophyllus*), Sadaman (*Macaranga spp*), Merimia, Kemansi, Binuang (*Octomeles sumatrana*), Ludai (*Balakata baccatum*) and *Uncaria sp*.

In November 2017, the total amount of browse collected for Kretam and Iman is 3783.5 kilograms. Of this, 62.4% were consumed by the two rhinos, mostly hand fed by the keepers.

The amount of browse that was hand fed to Kretam and Iman were 1642 and 1133 kg respectively. The amount consumed for both rhinos averaged 72.9%. Similarly, the browse hung out for Kretam and Iman totaled 1008.5 kg of which 35% were eaten (Figure 2).

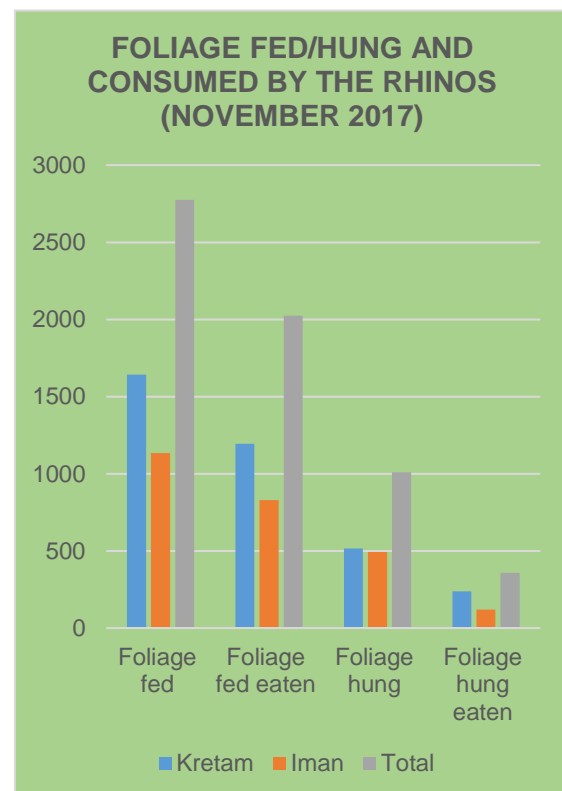


Figure 2. The amount of browse that were hand fed/hung and consumed by the rhinos

The amount of rhino food plants harvested (June – November 2017) from Tabin Wildlife Reserve, Rhino Food Plantation, Permai plantation and KL – Kepong plantations totaled 23,077.5 kg (SD: 245 kg). The average amount of browse eaten during the same period was 14, 466 kg.

### 3.1 Voluntary Feed Intake (VFI)

The total foliage consumed by the rhinos varies depending on the frequencies of them returning for the morning and evening feedings. Kretam did not return for a one evening feeding in November 2017. It was always associated whenever he mounts a log in his paddock. Iman did not come back on one feeding period. The range in foliage offered from June to November 2017 is 3854 – 3783.5 kg (average = 3846 kg). Similarly, the average amount of foliage consumed is 2411 kg (Figure 3).

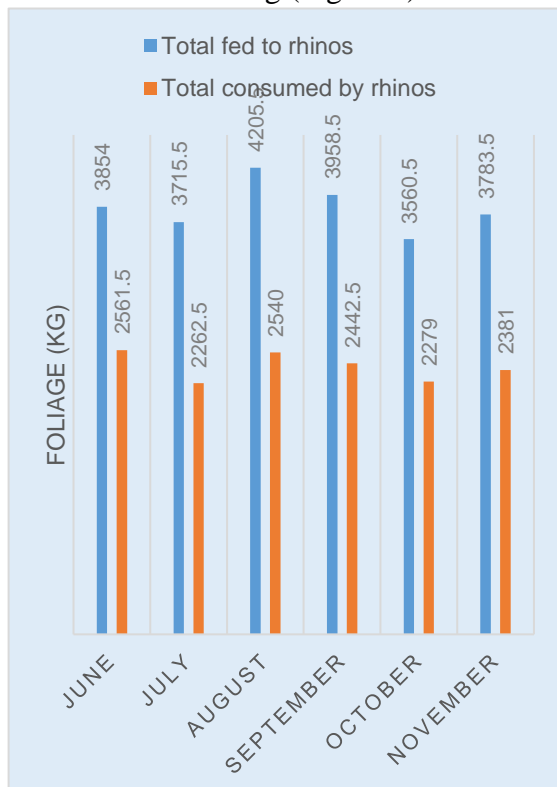


Figure 3. Total amount of foliage fed and consumed by the rhinos in June – November 2017

In November 2017, the amount of foliage uneaten by the rhinos totaled 1402.5 kg. Of this amount, 53.6% was from those hand

fed to the rhinos. Forty six percent were left over from those hung out for the rhinos.

The amount of browse offered to Kretam and Iman averaged 55 kg and 38 kg respectively. Of this, the maximum amount eaten by Kretam and Iman were 52 kg and 27 kg respectively.

A total of 11 - 23 species were fed to the rhinos daily (morning and evening). On the average, the rhinos get 17 species of browse daily. After harvest, the browse was weighed, selected, washed and stock under the shade.

Apart from the foliage, Iman get 200 grams while Kretam gets 500 grams of equine pellets (Gold coin®) daily. Ripe banana (155 kg each per month) were provided as part of their daily diet. Small amount of skinned pumpkins (500 – 1000 grams) and papaya ( 1 – 2 kg daily) were also provided as a supplement. Depending on fruit season, they will also be fed mangoes and tangkol fruits (*Ficus racemosa*) when it is in fruiting.

### 4. Biosecurity/health monitoring

The biosecurity is maintained as a routine to control and prevent spread of any diseases in managing the rhinos. Apart from monitoring the feed and feed intake, other measures are in place to ensure there is no introduction of potential diseases from outside the center.

Various samples including water used for drinking and washings, soil samples and floor swabs were collected on the 12<sup>th</sup> November 2017 (Sunday). Blood was also collected from Kretam for a complete blood count. In addition, urine and fecal samples were also analyzed for pathogens and endoparasites. These were submitted to the Veterinary Diagnostic Laboratory and the Veterinary Public Health Laboratory, in Kepyayan, Kota Kinabalu the following morning. The samples were mainly for isolation of pathogenic bacteria and general health checks of the rhinoceros. The water

from 15 tanks were tested for total coliform counts as half of these tanks were for human consumption.

#### 4.1 Hematology

Blood was only collected from Kretam in EDTA tube for a complete blood count. Iman's temperament and post Improvac® vaccination were reasons as to why blood was not collected from her for now.

The values for Kretam were compared with his previous values in October 2017 and were within normal range for the Sumatran rhinoceros (Table 1).

Table 1. Blood parameters for Kretam

Parameters	Animal Kretam	
	22 Oct	12 Nov
Hemoparasites	neg	neg
RBC (X10 <sup>12</sup> /L)	5.98	5.9
WBC (1000/UL)	8.63	8.31
Hb (G/DL)	14.2	13.6
PCV (%)	44	45
Seg. Neutrophils (%)	63	78
Eosinophils (%)	15	13
Lymphocytes (%)	18	5
Monocytes (%)	3	1
Basophils (%)	1	3

#### 4.2 Bacteriology

Of the 20 floor swabs from the night stalls, most had few *Bacillus sp.* Swabs 3 and 16 had few *E. coli*, *Bacillus spp* and *Aerococcus viridans*. *Pseudomonas alcaligenes* were isolated in the two tyre baths. The samples from the sumps had few *Aeromonas hydrophila*.

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

There was abundant *E. coli* in the feces of Iman but moderate in Kretam. The urine was negative for bacterial growth.

The water samples taken from 15 tanks at the RIF, RQF and main storage tanks had a high bacterial count of 446 – 6450 cfu/ml.

There were no *Salmonella sp* isolated from the water samples. All water tanks had coliform counts (cfu/ml) but *E.coli* was present only in Tanks 5, 8, 10, 11 and 15 (Table 2).

Table 2. The total bacterial, coliform and *E.coli* counts in 15 water tanks (cfu/ml) for the month of November 2017.

Tank	Total bacteria	Total coliform	<i>E.coli</i>
1	2780	30	0
2	2950	30	0
3	2750	80	0
4	2600	60	0
5	2120	930	130
6	2000	20	0
7	2100	150	0
8	6450	1050	30
9	446	0	0
10	903	30	30
11	5000	550	10
12	524	240	0
13	543	0	0
14	683	110	0
15	2000	940	20

The monthly fluctuations in bacterial and *E.coli* counts were mainly due to the water source (river, rain and elephants), especially with the frequent rainfall in November 2017.

#### 4.3 Parasitology

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

#### **4.4 Routine prophylaxis**

Routine liming was carried out mostly around the rhino dung piles outside the enclosure and the sumps for water run – offs from the night stalls. Liming was also carried out when required around the staff quarters.

### **5. Reproductive assessments**

#### **5.1 Kretam**

Kretam was observed to mount the log in his paddock on the 19<sup>th</sup> November 2017.

#### **5.2 Iman**

Iman was only ultrasound on one occasion (8<sup>th</sup> November 2017) to try and reduce stress on her and her pathology. Follicles were observed on her right ovary measuring 0.8 and 1.2 cm diameter. The left ovary had a 1.0 follicle.