

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

January 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.	Puntung	Female	SWD 003
3.	Iman	Female	SWD 004

1. Introduction

The month of January 2017 was wetter than previous months with rain on almost daily basis and several times, more than once a day. Rain was observed on 23 out of 31 days, mostly occurring in the evening (65%), between 1230 – 1500h.

The total rainfall for January 2017 is 583 mm and ranged from 1 – 113 mm per day (Ladang Tungku, KL – Kepong, Rainfall Data). The weekly total exceeded 120 mm of rain, highest within the first week of January (Figure 1).

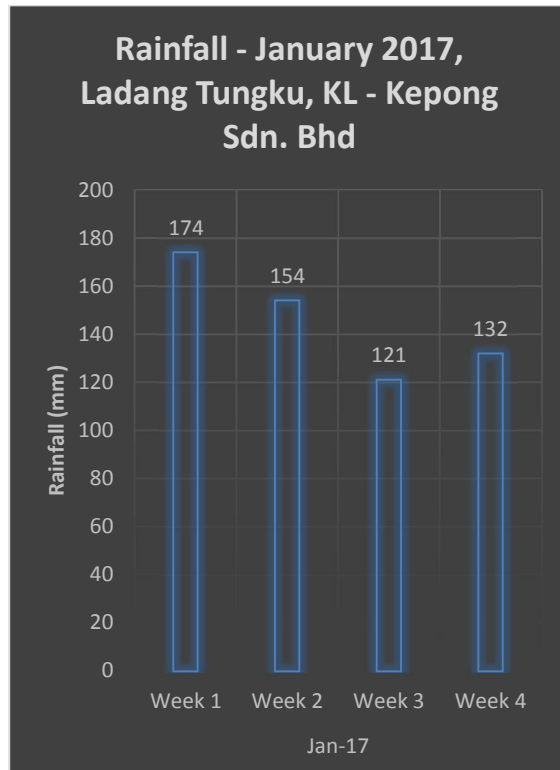


Figure 1. Weekly rainfall total (mm) for January 2017.

The main Lipad River did rise by 1 – 2 meters, on several occasions throughout the month of January 2017, mostly in the evening. (Plate 1).



Plate 1. Lipad River rising after a short heavy downpour

Although the wet season is excellent for food plants, the problems were always associated to the bad road condition and accessibility.

On days when the rainfall was extreme, water supply was disrupted at the intake pipes near the Lipad River. Usual cases were the due to blockage by leaves and branches or the water intake was dislodged by floating tree trunks or rocks. Repairs and clean ups were more regular during very heavy downpours (Plate 2).



Plate 2. Replacing the filter at the water intake point

Similarly, the fence post across streams or water paths were also affected. These also needed some reinforcement to prevent collapse of the fence.

The health and condition of the rhinos remained good. Feed intake and behavior was normal, with Iman vocalizing all the time, Puntung with her stubbornness and Kretam, always punctual for his daily feedings. The vaginal discharge was only observed once and without any bleeding from her uterus.

The staff meeting was held at least once weekly to plan for work in Tabin and to resolve problems associated with

management of rhinos and maintenance of the facilities. The keepers were also briefed on the current status of BORA.

A brief visit by the Director of Kenyir Research Intitute, Universiti Malaysia Terengganu occurred on the 18 – 19th January 2017. The main discussion include research potential and propagation of rhino food plants especially the *Ficus* species.

2. Husbandry

2.1 Animal Management

Generally, the body score of the rhinos are between 3.0 – 3.5. They are in good health with normal variation in body weights. On a few occasions, Iman had a small amount of vaginal discharge but none were tinge with blood. The hoof chipping in Kretam and Puntung are responding well to the treatment and does not pose a problem to the rhinos.

As usual, Puntung's behavior comes in various different guises, especially coming back for her morning and afternoon feeding. Many times, she would come back very late, with keepers having to usher her out of her wallow. Some of the common reasons for her preference to the wallows are: (i) too many biting flies or sand flies (ii) too hot or too wet weather condition (iii) nearing estrus or (iv) interaction across the fence.

However, the wet weather also caused the wallow to be very watery and diluted. One of the signs that the wallow is not conducive to the rhinos is the presence of urine. This was observed in Puntung's wallow very recently (Plate 3). Subsequently, the wallow was drained and the urine removed.



Plate 3. Two urine spots observed in Puntung's wallow

Kretam, on the other hand comes back earlier than feeding time, and sometimes unlock the gate to his night stall and positioned himself inside the chute. Once he was late coming in, due to a biting fly or a wasp that whizz across his head. He sprayed urine but it failed to deter the insect and he fled into the forest.

Iman came back on time and mainly to defecate in her night stall. The night stall is her permanent "toilet". The door of her night stall is always kept open to allow her in. This also allows the keepers to check for vaginal discharge or blood near her feces.

During the wet month, Iman reconstruct a wallow that was shut down by keepers in 2016, as it was too close to a fence. In the last week of January 2017, Iman started removing all debris and wood that were placed inside it by the keepers to deter her from using the wallow. Once the pieces of wood and log were removed, using her horns and forelimbs, she reactivated the wallow and subsequently used it for a short while (Plate 4).



Plate 4. Iman diligently reactivating a wallow in her paddock

Puntung was seen to have a 1.6 cm follicle on the 2nd January 2017 which was observed to luteinize on the 5th January 2017. The interaction occurred on the 11th and 13th and did not correlate with the ultrasonography and progesterone profile.

2.2 Body Weight

The electronic weighing scale (TruTest®) was used to weigh the rhinos in Tabin. The two load bars were placed in the chute or along the passageway inside the night stall. The rhinos were coaxed or baited using fruits. Except for Iman, the rhinos were weighed twice monthly, usually two weeks apart. Due to her inconsistent body weight, Iman was weighed every week. It is a routine that each rhino is washed thoroughly to remove the mud cakes before the weighing.

Sometimes, the mud were left on Iman as she gets very uncomfortable and uncooperative during the procedures. The rhinos were weighed twice before taking the average.

There were slight fluctuations in their body weights but generally, stable over the last two months. There were no abrupt change in their diet or supplementations. Kretam and Puntung increased slightly in their body weight by 8 kg and 4 kg respectively. However, Iman’s body weight dropped by 10 kilograms (Figure 2).

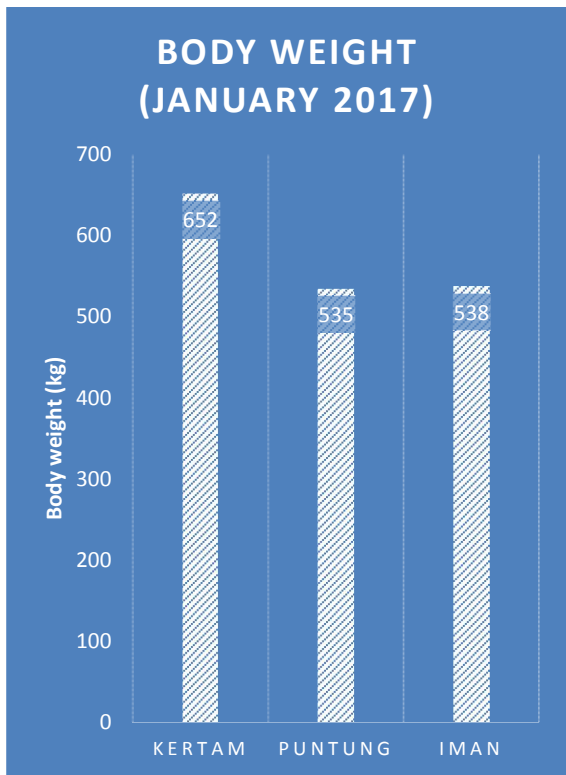


Figure 2. The body weights of all the rhinos (January 2017)

Iman’s four body weight measurements, in January 2017, averaged 539.5 kg, as compared to 549.5 kg in December 2016. Although the weight fluctuated, it is within the normal limits. The plan with Iman is to stabilize her weight at around 530 – 540 kg (Figure 3).

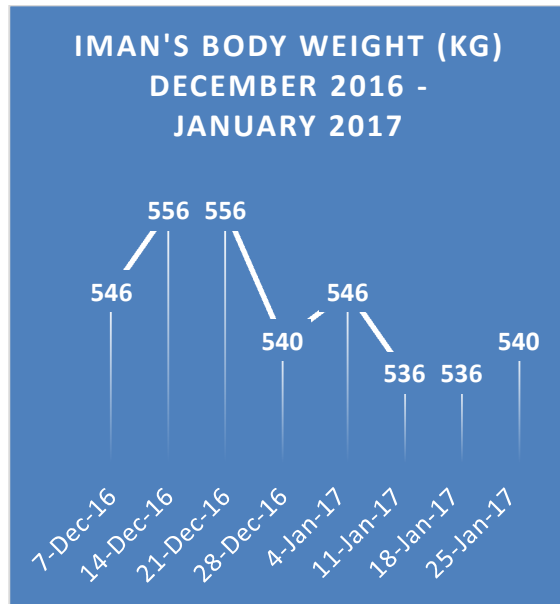


Figure 3. Body weight (kg) of Iman

2.3 Animal Health

Generally, all the rhinos are in excellent condition. The wet weather did provide abundant, lush food for the rhinos. Minor injuries such as chipping of the hoof will require more time to recover. As for Iman, she did not show any bleeding nor was there any discharge in the night stall. On one occasion, a whitish discharge was seen in her wallow. The fluctuations in body weight is within the normal range for the rhinos in Tabin.

The routine health screening was carried out on the 16th January 2017. Apart from one water tank with high coliform count, the other checks did not reveal any new treats or impending diseases in the rhinos or keepers. However, the cleanliness of the surroundings around the rhino enclosures were always maintained. Minor repairs and maintenance were carried out in – house by BORA staff.

The Voluntary Feed Intake (VFI) for all the rhinos were within normal range. The percentage of browse eaten as compared to the amount fed, is more than previous month. This could have been accounted for by the better browse during the wetter season. As expected, Puntung did not always come back for both feeding times (five breakfast and once dinner).

2.3.1 *Kretam*

a. Hoof chipping

The treatment for his hoof problem (chipping) is still continued using Stockholm tar on the affected area. This will keep the chipped area dry and promote its healing. Subsequently, 10 grams of oral biotin supplement (Hoofmaker TM®) is given on a daily basis.

2.3.2 *Puntung*

a. Biting flies

The rainy season does impact the population of biting flies and sand flies around the paddocks. The numbers increased significantly. The sand flies mainly hovers around the ears of the rhinos and irritate them especially while they are in the chute for feeding. The Tabanids does cause pain when it bites the rhinos. This happens while they were being fed inside the chute. At least 3 – 4 species of biting flies were noted on the rhinos (Plate 4a and b).



Plate 4a and b. The two different species of biting flies on Puntung

b. Reproductive tract pathology

Ultrasound and blood collection were carried out on Puntung 2 – 3 times a week, followed by blood for P4 profiling.

During the ultrasonography exam, her pathologies were visible and had increased in number and size over the years.

Apart from her unilocular and multilocular cysts, there were two masses (fibrous tissues) observed in the uterus. The cysts vary from a few millimeters to 2.0 cm. A fluid filled 0.5 cm cavity was also seen in the cervix. (Plate 5a and 5b).



Plate 5a. Several cysts were observed in the uterus and 5b. A small 0.5 cm cyst located in the cervix

Some cysts were also located close to the right and left ovaries.

2.3.3. Iman

a. Vaginal discharge

The vaginal discharge was only observed on the 24th January 2017. The mucous discharge was clear to whitish and about 20 mls in volume. No blood was seen in or around the

discharge. The discharge was detected by keepers on their routine checks on the wallow (Plate 6).



Plate 6. The clear – whitish vaginal discharge in the wallow (.....)

This reduced vaginal discharge and improved body condition resulted from the vaccination with Improvac® (Gonadotrophin Releasing Factor) administered on the 14th November 2016. Based on previous experience with Improvac, her next vaccination should be in March 2017 and not every six months as recommended.

A treatment regime (**Appendix 1**) was prepared for Iman in case the discharge becomes more serious

b. Reproductive tract pathology

As her overall condition is much better, scanning would be done more regularly. Once she had accustom to the scanning, blood would also be taken for progesterone profiling. The recent ultrasonic images from Iman still showed the uterine masses (leiomyoma) in the uterine body and uterine horns, numerous cysts, fluids, fibrosis and hydrosalpinx.

However, fluids in the uterus and cervix is very significantly reduced as compared to before (Plate 7).

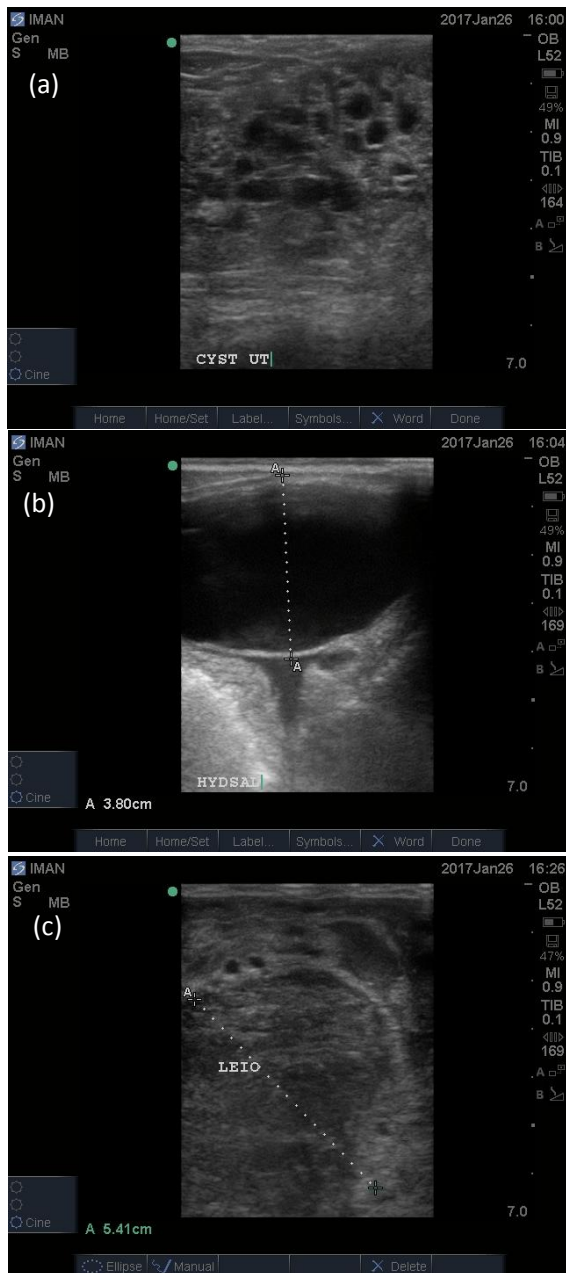


Plate 7. The various pathologies as seen during the ultrasound exam of Iman. (a) Numerous cysts in the uterus (b) Hydrosalpinx in the right oviduct and (c) A large leiomyoma in the uterus

3. Feed and feeding

Reduced appetite is an important indicator or prequel to a disease or problem.

Although, in Iman, reduce vocalization is the best indicator of an emerging problem associated with her bloody discharge. Simultaneously, her appetite will start to reduce or ceased completely.

Water is provided ad libitum for the rhinos during hand – feeding. Inside the paddocks, the rhinos get their supply of water from streams, puddles or even from wallows.

The availability of browse is abundant and of good quality. Some of the browse, especially the *Nangka* (*Artocarpus heterophyllus*) were obtained from the plantation. This also helps to maintain the tree and prevent them from growing too tall. The total amount of browse collected for January 2017 is 5831 kilograms, some (35 – 50%) of which are hung in the paddock or night stalls after the evening feeding. The rhinos does consumed a small amount from the food that is hung out for them. The average consumption of the “hung” foliage by Kretam, Puntung and Iman were 10 kg, 7 kg and 6 kg respectively.

3.1 Voluntary Feed Intake (VFI)

The VFI is also used to gauge the general health of all the rhinoceros in Tabin. However, other factors including environmental (hot days versus cool days; dry versus wet season), biological (estrus, pain) or physiological (pathology, stress) have to be considered before making a diagnosis.

The total amount of browse offered (hand – fed and hung in the paddocks) to the rhinos ranged from 1545.5 kg (Puntung) to 1852 kg (Iman) and 1983.5 kg (Kretam). The percentage eaten by Kretam, Puntung and Iman were 74.2, 73.6 and 57.6 respectively (Figure 4).

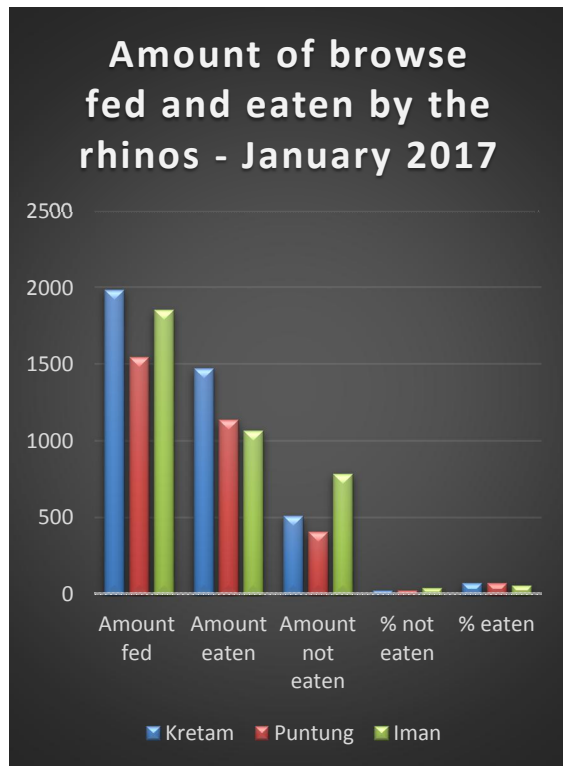


Figure 4. The amount of browse fed to the rhinos and eaten by each individual

Iman, being pickier with her browse would always require a bigger volume of foliage. Similarly, the amount of left overs during her “hand feeding” was much more as compared to the other rhinos.

The VFI for Kertam, Puntung and Iman ranged from 31 – 42.5 kg ($\mu= 35.8$ kg), 17 – 39 kg ($\mu= 29.8$ kg) and 29.5 – 31 kg ($\mu= 28$ kg) respectively.

Puntung’s feeding behavior remained unchanged. It was also observed that, irrespective of the side the food was offered, she would move the browse to her right jaw.

The rhinos were also supplemented each day with horse pellets (Gold coin®). These were dampened and soften with water and fed as boluses or wrapped in Maitap/Bangkal (*Neonauclea spp*) leaves.

Kretam and Iman received 500 grams of horse pellets daily while Puntung was given 400 grams. Fruits, mainly ripe banana were also fed daily to the rhinos. Each rhino gets five kilograms in the morning. Sometimes these were changed to papaya when in season. Pumpkins were also fed to the rhinos as a supplement. Kretam and Iman were given 500 grams each while Puntung gets 400 grams. The skin were removed prior to feeding.

The number of species collected every day varies from 9 – 16 species (average 12.1 species). The most common species fed daily included the Nangka (*Artocarpus heterophyllus*), Kelawit berbulu (*Uncaria spp*), Akar Sambang (*Merremia spp*) and a few *Ficus spp*.

Both Kretam and Iman came back for all the feeding sessions (morning and afternoon). As expected, punting did not come back for six days for her morning feeding and once for her evening feed.

3.2 Rhino Food Plantation (RFP)

The number of Nangka trees planted were in excess of 800. This does not include the 300 more, in polybags in RFP. Currently, the plan is to increase the number of Grade 1 food plants (eaten by all rhinos in large quantity) in the plantation.

The three species that will be rapidly propagated for 2017 included Mas Cotek (*Ficus deltooidus*), Tambirok and Ara Ajinomoto (*Ficus spp*). A total of 100 saplings each were set as the target for 2017. All the plants will be marcotted from the parent tree, stem - cut or dug out from the site. Rhino composts were added to the soil prior to planting (Plate 8).



Plate 8. (a) Davidson cutting the stems of *Nangka air paya* to plant and (b) Ronald adding rhino compost to a pit prior to planting a sapling

At the moment, there are adequate seedlings from the Nangka (*Artocarpus heterophyllus*) plants. Kemansi (*A. altilis*) and Tarap (*A. odoratissimus*) will be gradually increased in the RFP. These two species need to be planted inside the RFP as both the long – tailed (*Macaca fascicularis*) and the pig –

tailed macaque (*M. nemestrina*) favored their shoots.

While constructing a drainage in the RFP, a small spring water source was found close to the *Nangka* trees. This was one of the reasons the area was becoming water logged. The rainy season also added more water, causing newly planted plants to yellow and die.

4. Biosecurity and health monitoring

The wet month of January 2017, presented many challenges, both with maintaining the facilities as well as the rhino health. The constantly wetter months provided an excellent opportunity for mosses, mildews, fungus and bacteria to proliferate.

During the rainy period, it is difficult to maintain the concentration of disinfectant inside the tyre bath. There were many days when rainfall was several times a day. The heavy rain also brings in soil and grit into the tyre bath. A side earth drain was dug to reduce the flow of soil into it.

The paddocks and exercise yard had many more puddles and areas that were waterlogged became deeper and more difficult for the rhinos to walk back to the night stall. Sand bags were used to minimize these problems.

Greater emphasis were also given to ensure floors and drain were kept clean. Sampling of soil, water, floor swabs and feed samples were carried out on the 16th January 2017. In addition, blood, urine, and feces from the three rhinos were also taken for health screening (Plate 9).



Plate 9 (a) Scrubbing the floor of the night stall and (b) Hasan sampling the mud

These samples were sent to the Kepayan Veterinary Diagnostic Laboratory in Kota Kinabalu before mid-day on the 16th January 2017. Serum samples were also collected and analyzed at the Pathology and Clinical Laboratory (M) Sdn. Bhd in Sandakan.

4.1. Hematology

Blood was only collected from Puntung in EDTA tube, from the digital plexus of the hind limb. The sample was analyzed at the Kepayan Veterinary Diagnostic Laboratory in Kota Kinabalu. Blood was not collected from Kretam as he was back very late for his evening feeding.

The blood parameters were within the normal values for the Sumatran rhinos in

Tabin. Hemoparasites were not detected in the blood samples. Serum iron was lower (24.1 UMOL/L or 134.5 UG/DL) as compared to those in 2016 (32.7 UMOL/L). Similarly, the liver function test (61 IU/L) was also within the normal range of 53 – 80 IU/L (Table 1).

Table 1. Complete blood count (CBC) for Puntung (SWD 003)

Date/Parameters	Laboratory Results
16/1/2017	Puntung
Hemoparasites	Nil
RBC (X10 ¹² /L)	5.75
WBC (1000/UL)	8.25
Hb (G/DL)	12.6
PCV (%)	41
Seg. Neutrophils (%)	66
Eosinophils (%)	4
Lymphocytes (%)	22
Monocytes (%)	7
Basophils (%)	1
SGOT (AST)(IU/L)	61
SGPT (ALT)(IU/L)	14
Serum Iron (UMOL/L)	24.1

4.2 Bacteriology

The 20 floor swabs from the night stalls of Puntung, Kretam and Iman had few *Bacillus sp* and *Proteus sp*.

There were few *E. coli* in both the tyre bath. This is mainly due to the frequent rain and water coming in from the slopes into the tyre bath that is situated at a lower gradient.

The 17 soil samples were negative for *Bukholderia pseudomallei*. Similarly, the mud from the wallows were negative for pathogens. The water from the sumps had few *E. coli*.

All water samples from the 13 tanks had coliform counts ranging from 10 – 1590 cfu/ml. The *E. coli* colonies were found in tanks 5, 6 (a and b), 7, 8 and 11. The highest *E. coli* count was in tank 6 which consisted of two tanks (Table 2).

Table 2. The total bacterial, coliform and *E. coli* counts in 13 water tanks (cfu/ml) for January 2017.

Tank	Total bacteria	Total coliform	<i>E. coli</i>
1	70	0	0
2	500	30	0
3	1200	80	0
4	1400	120	0
5	1200	120	30
6	7000	1600	1590
7	320	10	40
8	1000	50	20
9	360	50	0
10	430	0	0
11	500	60	10
12	400	0	0
13	200	0	0

The water tank 6 (a and b) were immediately chlorinated using a 1% chlorine solution at a rate of 1L/10000 liters water. This was carried out at night to ensure the minimum contact time of 30 minutes to kill the pathogens. The water from these tanks were only used the following day.

It was also observed that the lid of the water tank was sometimes not secured properly and the Pig – tailed macaques (*Macaca nemestrina*) do open them to have access to water. As an example, the lid of the main tank from Lipad River was found open and had to be replaced back to ensure macaques cannot open them (Plate 10).



Plate 10. Yap Keng Chee replacing the lid tightly back on the main tank

Moderate *E. coli* were isolated from the urine and feces of the rhinos.

4.3 Parasitology

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

4.4 Routine prophylaxis

Routine liming was carried out around the rhino facilities especially areas with high prevalence of fecal contamination including sumps and dung piles. All disinfecting were done under the supervision of the head keeper. The liming was not carried out inside the night stalls or areas that are too close to the rhinos.

5. Reproductive assessments

Routine ultrasonography was carried out on Puntung twice weekly. Subsequently, blood was withdrawn from her for progesterone profiles. These data were correlated with the interactions between Puntung and Kretam.

Previously, the suggestion of estrus in late December 2016 (30 – 31st December 2016) was inaccurate when it was correlated with

ultrasound images and P4 profiles on the 2 – 5 January 2017.

5.1 Hormone profile

5.1.1 Puntung

Based on the progesterone profile, the values were 0.16 ng/ml on the 2nd January 2017 and lowest (<0.15 ng/ml) on the 3rd January 2017 before increasing to 0.17 ng/ml on the 5th January 2017.

However, the behavioral estrus was observed on the 30th and 31st December 2016, four days before the baseline level of P4 on the 3rd January 2017. Two more interactions were seen on the 11th and 13th January 2017 (Figure 5).

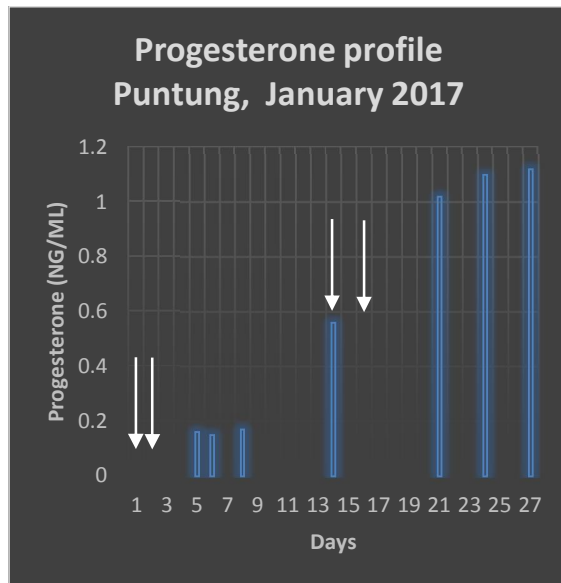


Figure 5. The progesterone levels (ng/ml) for January 2017. Arrows indicate interactions between Puntung and Kretam

5.2 Ultrasonography

5.2.1 Puntung

On 2nd January 2017, she was observed to have a 1.6 cm diameter on her left ovary.

However, the follicle was luteinizing on 5th January 2017, three days later and measured 1.7 cm (Plate 10).



Plate 10. (a) The follicle seen on the 2nd January 2017 and (b) the luteinizing follicle on the 5th January 2017

Since then there were no follicles observed on both ovaries, during the ultrasonography examinations done on her.

What was visible on the 26th January 2017, were two large corpus luteums and the 1.0 cm diameter, receding luteinized follicle (Plate 11).



Plate 11. (a) The luteinizing follicle and corpus luteum on 26th January 2017

5.3 Behavioral estrus

Puntung and Kretam were observed to be interacting on either side of the fence on four occasions. First interaction occurred on the evening of the 11th January 2017. This occurred near Puntung's night stall. Similarly, on the 13th January 2017, Kretam was observed to seek out Puntung near her night stall.

The most prominent interaction occurred on the evening of 23th January and the early morning of 24th January 2017. Puntung was vocalizing a lot and Kretam was observed to seek her across the fence (Plate 12, Plate 13).



Plate 12. Kretam spraying urine and seeking Puntung



Plate 13. Signs along the fence of Kretam's paddock adjacent to Puntung

However the above behavior does not correlate to the ultrasound images or the progesterone profiles that were obtained during the regular scanning and serum analysis.

6. Electric fencing

The voltage of all the fences ranged from 8.9 – 10.2 kV throughout the month. The RIF, RQF and RFP recorded 8.9 – 10.2, 8.9 – 9.6 and 9.0– 9.5 kV respectively. The fence were checked regularly.

The main problems with maintaining the electric fence were broken branches and lianas, dropping on to the fence. Regular checks especially after a heavy downpour were carried out to ascertain the functioning of the electric fence.

In areas with water run – offs, the fence post were frequently weakened and at times tilted towards the inside or outside of the fence. These were seen in the RFP, where several of the chain – link fence post were tilting. Repairs consisted of installing large wooden brace – post against the fence post and securing them to the ground (Plate 14).



Plate14. James installing a brace against a tilting post in the Rhino Food Plantation

In some parts of the fence, especially at RIF, the black shade netting were damaged (torn) horizontally. The cause of this is most likely, the poor quality of the netting and exposure to sun and rain (Plate 15).



Plate 15. The torn black shade netting at RIF that affected some parts of the fence

These netting is crucial as it provided a visual barrier to the rhinos and prevent them from any escape attempt. The torn netting were subsequently replaced with new nets by the keepers (Plate 16).



Plate 16. Wilson and Samat replacing the torn black shade netting from the fence in RIF

Similarly, disruption of the power on the electric fence were also due to the branches and vines dropping on to the fence. These could be seen almost on a daily basis and cleared by the keepers (Plate17)



Plate 17. Branches and vines on top of the fence after a heavy downpour

7. Other activities

7.1 Drainage for water run – offs in Rhino Food Plantation

Many areas inside the RFP becomes waterlogged during the heavy downpours. Many rhino food plants around water logged areas were observed wilting and dying. Water in these locations were drained out by digging small canals along affected routes (Plate 18).



Plate 18. Draining water from affected areas in the Rhino Food Plantation

7.2 Removal of electric wires and posts between RIF and RQF

Ever since the irreparable damage to the old generator that supplies both the RQF and the RIF, the electric line between the two facilities were left as it is.

It was then decided that they should be removed and kept securely to prevent theft of the galvanized iron (GI) posts and the three – core wires. It took BORA staff two days to dismantle the wires and dig out the 45 post and concrete cement block (Plate 19 a - c).



Plate 19. Removing the electric wires from the post (a), rolling the wires (b) and (c) removing the GI post

7.3 Visit by the Director, Kenyir Research Institute, Universiti Malaysia Terengganu (UMT)

The visit by the Director, Dato' Prof. Mohd Tajuddin Abdullah and Dr. Jamilah Mohd Salim, a lecturer on Forest Ecology and Plant Biodiversity occurred on the 18 – 19, January 2017.

Discussions ranged from the rhinos to their food plants and preferences. BORA's interest was to understand how rhinos select the food plants. UMT was also interested on the propagation and establishment of the Rhino Food Plantation, especially the various *Ficus* species. The staff from UMT were also given the privilege to plant a tree in the plantation (Plate 20).



Plate 20. Dato' Mohd Tajuddin planting Ara belimbing (*F. caulocarpa*)

7.4 Repair and maintenance of BORA generators in Tabin

Both the generators often encounter minor problems that resulted in them not being able to supply electricity to the respective facilities. Apart from repairs, these generators would frequently require servicing. These were done in – house by BORA (Plate 21).



Plate 21. James Sandiyang repairing the generators in RQF (a) and RIF (b)

7.5 Repair and clearing debris in the gutter of Puntung's night stall

Almost all gutters were clogged up with leaves, branches and dirt. The gutters needed to be clean to prevent further problem of breaks and leakages (Plate 22).



Plate 22. Joseph removing the gutter to clean while Alvin (above) uses a rake to remove leaves from another end

7.6 Drainage along tyre bath in RIF

The heavy rainfall affects almost all the management process at the facilities, from clogged drains, overflowing gutters and muddy wash offs into the tyre bath. This dilutes the disinfectants that were used to kill pathogens from the wheels of vehicles coming into the facilities.

A side earth drain was constructed to divert the mud and rain water away from the tyre bath (Plate 23).



Plate 23. James and Wilson digging the earth drain

7.7 Sandbags to fill up deep ditches in paddocks

More than 50 sandbags were bought to fill up the deep ditches in all three paddocks. The worst was in Kretam's enclosure at the entrance to the exercise yard. The vehicle could only load about 25 sandbags per each shipment (Plate 24).



Plate 24. James removing the sandbags from the vehicle.

7.8 Monitoring of progress at the Borneo Rhino Sanctuary (BRS) facility

As per previous reporting, there were no work carried on the ground. The list of

current issues to be resolved with the BRS were provided to the Sabah Wildlife Department. The main problems include the removal of all the remnants of construction materials from the paddocks; ensuring the flow of current on the hot – wires around the perimeter fence and the repairs of the agreed slopes inside the night stalls.

Visits were also carried out by BORA staff to monitor the sites and do small clearing up of the road from tree fells (Plate 25).



Plate 25. BORA staff removing the log and branches across the road to the new BRS facility.

SEVERITY (1 – 4) OF THE BLOODY VAGINAL DISCHARGE (UTERUS) AND TREATMENT IN SUMATRAN RHINOCEROS

DICERORHINUS SUMATRENSIS (IDENTITY: IMAN)

Severity	Description/clinical signs	Tx	Drugs	Duration	Con	Dosage	Freq	Route	Note	
Category 1	Fresh blood of more than 50 mls expelled during or after defecation, mostly while animal is standing in the night stall	vV	Duphalyte®(amino acids, vit)	3 days		1000 mls		iv	Depend on the dehydration status or animal condition	
	Strong smell of blood in the night stall	vV	Sodium chloride	3 days	0.90%	2500 mls		iv	Depend on the dehydration status or animal condition	
	Blood clot or frank blood from uterus mixed in urine (with or without mucous), some splatted on wall	vV	Dextose	3 days	5%	2500 mls		iv	Depend on the dehydration status or animal condition	
	Fresh blood ooze out from vagina and splattered on to rump with tail, while rhino is standing or on sternum	vV	Tren® (Tranexamic acid)	30 days	250mg	5-10 tabs	tid	po	Depend on severity. reduce to bid	
	The hair on tail is matted with blood	vV	Decan® (Dexamethasone)	3 days	2mg	3 ml	sid	iv	Alternate days	
		vV	Dexasone® (Dexamethasone)	4 days	2mg	10 tabs	tid	po		
	Anaemic Pale mucous membrane Pale whitish foot pad and skin	v	Flunixin® (Flunixin meglumin)	3-5 days	50mg	20 mls	sid	im		
		v	Marbovitryl® (Marbofloxacin)	3 days	250mg	30 mls	sid	im		
	Animal inappetance or off feed	vV	Mineral block	14 days			2 tbs	bid	po	Better with just NaCl block
		vV	Multivitamins(Biolife®)	7 days			2 tabs	sid	po	
	No vocalization	vV	Sangobion®	7 days			2-3 tabs	sid	po	Monitor RBC, platelets and serum iron level
		vV	Vitamin K®	21 days	10mg		2 amp	sid	po	
	Inactive, lethargic, weak, lie down a lot or trembling	vV	Neorocobal® (Vit B12)	14 days			1 tab	sid	po	
		v	Norcutin® (Norethisterone)	5 days	5mg	6 tabs	bid	po		
		vV	Improvac® (GnRF)		200µg	3 mls	sid	sc	Once in 4-5 month	
			Rasitol® (Furosemide)	8 days	40mg	2 tabs	sid	po	Treatment for pharyngeal edema due to Tren if observed	

Category 2	Small volume of blood mixed with mucous	vV	Tren® (Tranexamic acid)	30 days	250mg	5-10 tabs	tid	po	Depend on severity. Reduce to bid if better
	Discharge pinkish coloration	vV	Multivitamins(Biolife®)	7 days		2 tabs	sid	po	
	Small amount of fresh blood (few mls) during defecation	vV	Sangobion®	7 days		2-3 tabs	sid	po	Monitor serum iron level every 3 days
	Less vocalization	vV	Vitamin K®	14 days	10mg	20mg	sid	po	
	Reduced appetite								
Slightly inactive	vV	Dexasone® (Dexamethasone)	4 days	2mg	10 tabs	tid	po		
Category 3	Small amount of blood in discharge or pinkish discharge	vV	Tren® (Tranexamic acid)	5 days	250mg	5 tab	bid	po	If worsen to Category 2, change treatment
	Appetite normal								
	Vocalization normal								
Category 4	Mucous yellowish or whitish								No treatment; Monitor
	Appetite normal								
	Vocalization normal								

Note: Tx: Treatment
 iv: intravenous
 im: intramuscular
 po: oral
 tid: three times daily
 bid: twice daily
 sid: once daily
 con: concentration

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