

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

November 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
BRS : Borneo Rhino Sanctuary

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 month of November 2018 is more wet with 20/30 days of rain with rainfall ranging from 2 - 52 mm per day. The total rainfall for November 2018 is 280 mm, with most occurring in the afternoon.

The frequent rainfall helps maintain a constant supply of lush forage for the rhinos from the forest, plantations and RFP. However, simultaneously, the heavy rain disrupts many of the field work including collection of food plants (climbing trees), driving through bad roads, and managing the rhinos inside the paddocks. The rain also caused more erosion of soil inside the paddocks, exposing more of the construction materials including rusty nails, metal parts and corrugated bricks. The heavy rainfall also caused the mud wallow to be unsuitable for the rhinos. The metal

detector provided by the Sabah Wildlife Department (SWD) was useful in locating metals underneath the ground. However, after the base connector of the equipment was damaged, detecting the metal pieces inside the paddock had to be done with the use of a “cangkul”. This is laborious and ineffective.

The rhinos were still adapting to their new enclosures and occasionally not returning for their morning and or evening feedings. Iman had to be moved to a smaller enclosure to conditioned her to return to the night stall for her daily feedings.

The Laran (*Neolamarkia cadamba*) fruit inside the reserve is in season and collected daily to feed the rhinos. Similarly, both rhinos would spend more time inside their paddocks searching and feeding on these fruits.

Generally, the health issues with the two rhinos were associated with low body weights and traumatic injuries. The severe loss in body weight was seen in Iman, starting in September 2018, where it gradually dropped to under 500kg. This was also correlated to the lower voluntary feed intake (VFI), possibly due to the pain from the leiomyomas or inability to absorbed nutrients as a result of liver damage.

Kretam’s dropped in body weight is not significant. This is as a result of him being more active within a large paddock and occasionally not returning for ‘hand - feeding’.

The more serious problem with the two rhinos is frequent cuts and punctures from construction materials (rusty nail, metal pieces, sardine cans and corrugated cements/bricks) that were left in the paddocks by the previous contractors. Despite daily searching, more of such materials kept surfacing in the paddocks, and close to the night – stalls, particularly during the rainy season (Plate 1).



Plate 1. The amount of rusty metals (nails, rods and cut galvanized pipes), left over by the contractors. These were collected on a daily basis by the keepers.

These rusty metals had caused lacerations and punctures and could lead to toxemia or septicemia and death if unchecked. The injuries were sometimes unseen underneath the feet and caused sudden swelling, pain and limping.

Subsequently, due to the pain, the rhinos would remain in mud wallow, refusing to return for feeding. Parenteral use of steroids (oral) and antibiotics (intramuscular injections) had to be initiated.

Hooves cracks and chippings were also the result of the construction materials that were not removed by the contractors.

The open pyometra still persist and is monitored daily. No treatment was initiated.

1.2 Body Weight

The weighing was done using TruTest® electronic weighing scale. Kretam was weighed twice a month, 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. Iman's weight is currently still below normal (520 - 530 kg) but gradually increasing. Kretam averaged 652 kg (Figure 1).

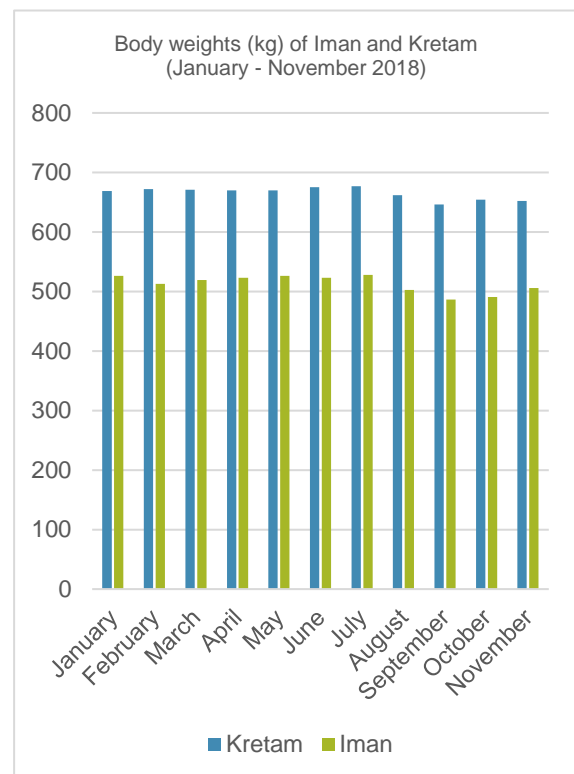


Figure 1. The fluctuations in body weight of the two rhinos in Tabin

The fluctuations in Kretam's body weight is due to increase in activities in the paddock and not coming back for either morning or evening feedings.

Iman's body weight dropped significantly in September 2018 as a result of reduced voluntary feed intake. This was associated with pain from the leiomyomata in addition to the malabsorption. Her weight was lowest at 480 kg on 14th October 2018. In November 2018, her weight increased to 510 kg (Figure 2).

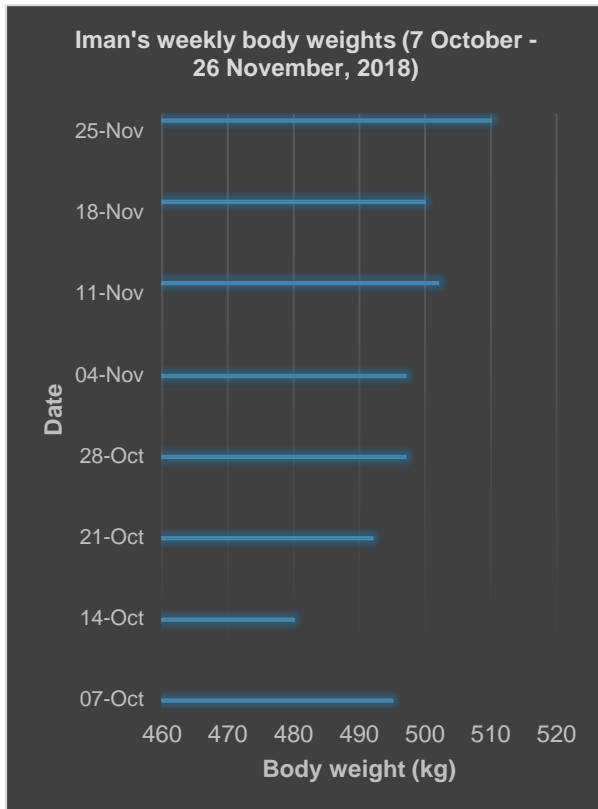


Figure 2. Iman's bodyweight showing the gradual increase in October and November 2018

2. Animal Health

The body scores of Kretam was maintained at around 2.5 and Iman at 2.0 (modified from Body Condition Scoring for Horses, Henneke et al., 1981).

In general, the main chronic issues with Kretam are the recurrent laceration on the feet and erosion of the posterior horn. The occasional hoof cracks were also related to the traumatic injuries inside the paddock. All the four feet were thoroughly checked daily inside the night – stall.

Iman's problem of losing body weight is a major chronic health issue. The existing pyometra presents a chronic clinical manifestation as a result of the uterine pathologies including leiomyomata.

Injuries due to sharp metal pieces from the building materials does impact her gait and mobility. Some of the lacerations were deep and could aggravate and cause septicemia and death.

The routine monthly sampling for health and environmental checks were carried out for both rhinos and their surroundings on the 18th November 2018 (Sunday) and submitted to the Veterinary Diagnostic Laboratory, JPHPT and Public Health Laboratory in Kepayan, Kota Kinabalu on the 19th, before noon.

The samples included soil, mud from wallows, water, floor swabs, horse pellets (Gold Coin®), feces, urine and blood. All these samples except blood, were analyzed for bacterial contamination, particularly *E.coli*, *Salmonella sp* and *Bukholderia pseudomalleie*.

2.1 Kretam

a. Deformity of posterior horn

The central depressions that was filled up with black silicon in early May 2018 did not resolve the problem completely. Several more depressions were seen on the horn matrix which gets filled up with mud or dirt. These were washed and scrubbed prior to treatment with anti-fungal - antiseptics. The treatment was done twice a day, during the morning and evening feedings. However, effort is being carried out to find the best filler to try and close the depressions but allows the vertical growth of the horn matrix.

The soft horn matrix was easily eroded with water and mud. The numerous depressions provide a foci for bacterial propagation and were treated twice daily (Plate 2)



Plate 2. The corrugated posterior horn with numerous depressions (above). A keeper treating the posterior horn with Dermaprid cream® after removal of the mud and debris.

b. Lacerations

Lacerations are a very common injury due to the various sharp metal objects (mostly rusty) inside the paddock. These ranged from nails, screws, sardine cans, iron rods, cut pipes and corrugated cement blocks and bricks.

The wound ranged from punctures, blunt traumas and deep lacerations that cuts through the epidermis. (Plate 3).



Plate 3. The deep cut (2.5 cm) observed on Kretam's hind feet (arrow) was caused by a rusty sardine can

The daily treatment consisted of cleaning the wound and application of povidone (Septidine®) twice daily in the morning and afternoon. Subsequently, the excess skin was cut ad removed to allow for proper healing.

2.2 Iman

a. Lacerations

As with Kretam, Iman had on several occasions, deep lacerations and punctures on her feet caused by nails, metal pieces and corrugated bricks (Plate 4).

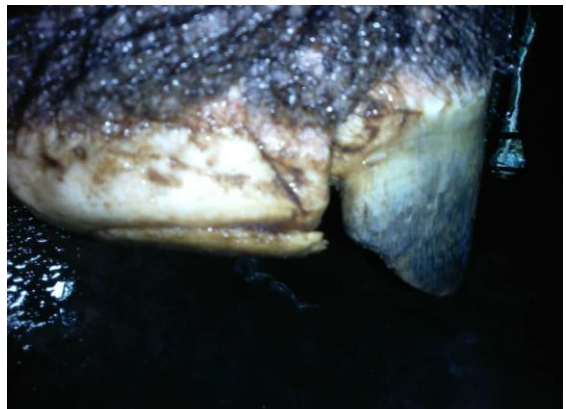


Plate 4. The deep lacerations seen on the right hind feet of Iman.

The recent injuries caused an ascending infection and lameness. The swelling also caused oedema to other adjacent parts of the affected leg (Plate 5).

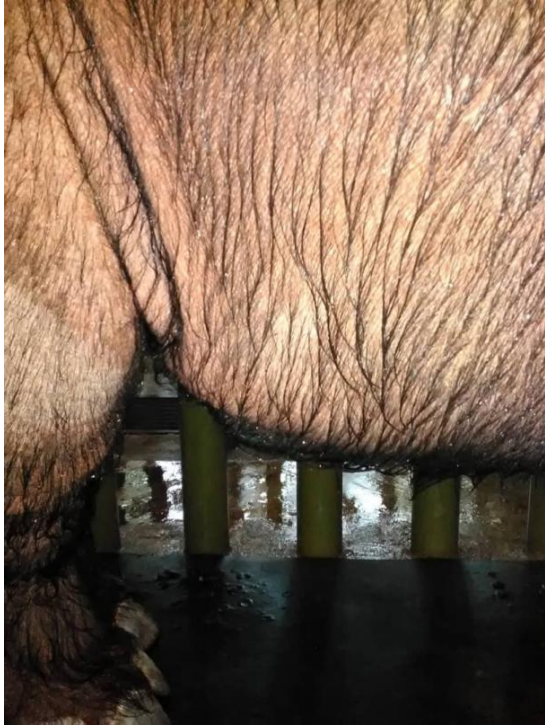


Plate 5. The oedema was observed on the right abdomen and knee of Iman as a result of an ascending infection from the foot pad.

The daily treatment includes thorough cleaning of the lacerations affected and application of povidone

b. Weight loss - wasting disease

Iman was enclosed into a smaller paddock (concrete wall) to try and get her to consumed more hand – fed browse by ensuring her to come back twice daily. Two wallows were constructed for her to use (Plate 6).



Plate 6. Iman inside the new wallow

The amount of browse was collected separately for her in the morning. Her maximum daily browse intake was 26.5 kg, almost 5 kg lower than her usual consumption in August 2018. She also gets more variety of fruits daily.

She was also supplemented with more concentrates (horse pellets) and fish oil (Plate 7).

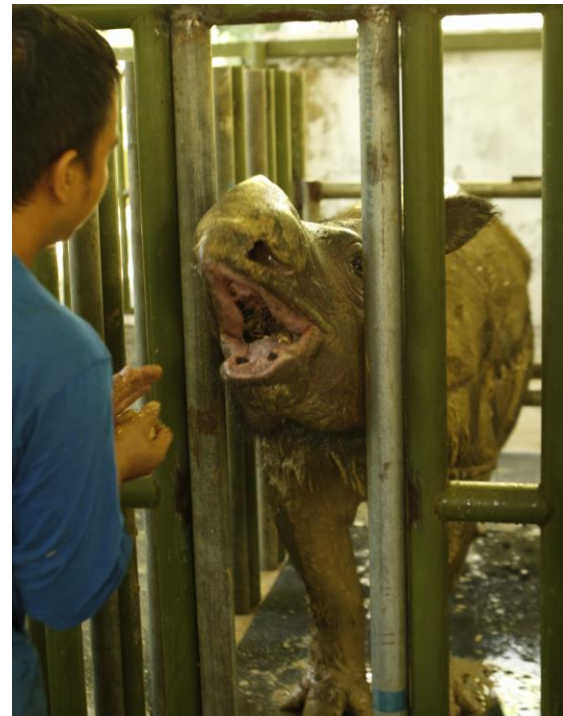


Plate 7. Ronald feeding the horse pellets to Iman

Her body weights had showed a gradual increase to 510 kg in November 2018, an increase of 30 kilograms from her lowest, in September 2018. However, the objective is to increase her body weight to between 520 – 530 kilograms.

b. Reproductive tract pathologies

The vaginal discharge in November 2018 consisted only of clear – whitish mucous, ranging from 20 – 50 mls. These were mostly seen inside the wallow as she lies on her sternal.

The normal discharge from her are clear, whitish and white. This do not require treatment but were monitored daily.

Ultrasonography was not carried out in November 2018 due to her injuries and the efforts to encourage her to feed. The ultrasound exams usually distracted her from her hand – feedings.

3. Feed and feeding

The amount of browse available is adequate especially with the rainy season. The forage collection routine consisted of two shifts. Fresh browse was collected from the RFP and RQF, first thing in the morning for hand – feeding Iman. This is followed by a second collection to supply both rhinos, which included browse to be hung up for the night feeding (Plate 8).

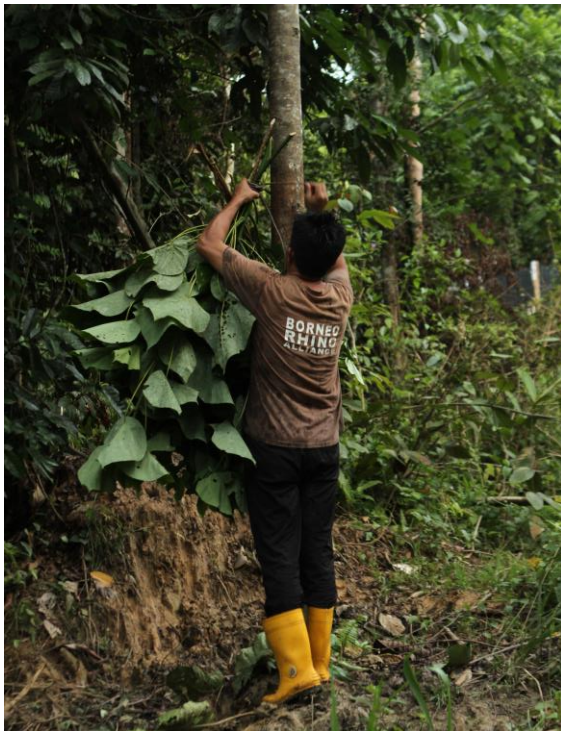


Plate 8. Samat Gubin hanging foliage for Kretam

These also include the Binuang (*Octomeles sumatrana*), Ara manga (*F. annulata*) and *Neonauclea spp* and Pulai (*Alstonia specilata*). Nangka air (*F. lepicarpa*) and Bendera halus (*F. uncinata*) were usually hand fed to the rhinos.

The rhinos were also fed fruits (banana, papaya, jack fruit, mango and pumpkins) prior to the foliage. This is to avoid pieces

of the soft fruits to lodge in between the teeth and cause decay and other related problems.

3.1 Forages

In November 2018, the total amount collected for the two rhinos is 3598 kilograms. Of this 56% (2028 kg), was allocated for Kretam and the balance was fed to Iman. The total amount of browse collected was lower than in October 2018 but about 100 kg higher than the annual average. Of the total, about 33% was hung out for the rhinos to eat (Figure 3).

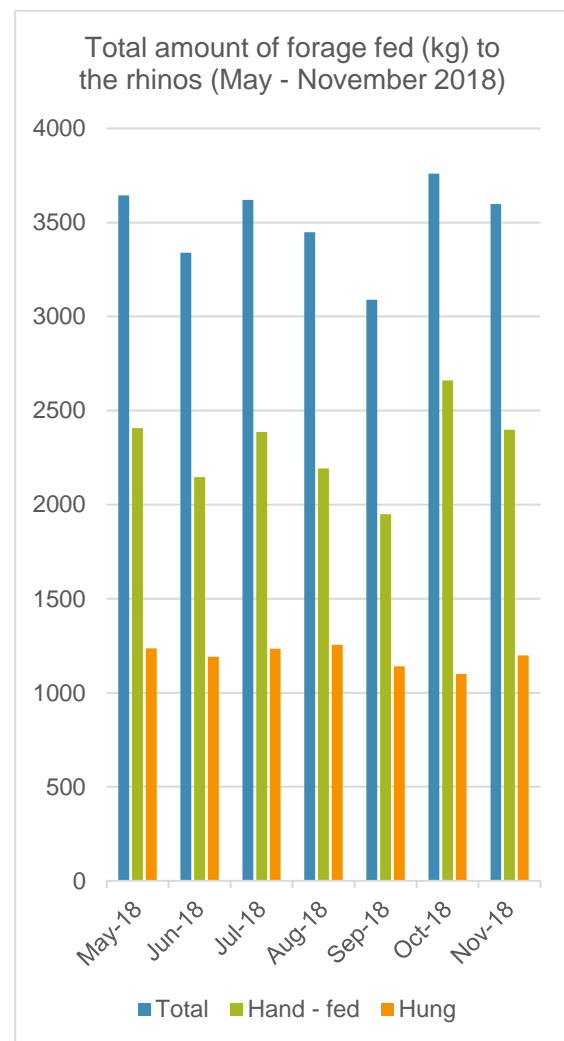


Figure 3. The total amount of forage collected and fed to the rhinos

The total amount consumed by both rhinos are 1788.5 kg or 50%. Of this amount, 66% was eaten by Kretam and the rest by Iman.

3.2 Voluntary Feed Intake (VFI)

The feed intake (hand – fed) of Iman and Kretam were maintained to a daily minimum of about 22 and 36 kg respectively. In November 2018, Iman did not come back 8 feedings, while Kretam only came back for 26 morning and 29 evening feeds.

Iman was fed 9 – 13.5 kilograms of foliage per feeding (18 – 26.5 kg per day), consisting an average of 17 species (13 – 22 species) of plants, mostly figs. Her appetite remains average and feed intake, varies. Iman only consumed about 8% (46 kg) of the foliage hung out for her in November 2018. Her total feed intake is 616.5 kg, similar to previous month. The amount would have increased had she returned for feeding on all the mornings and evenings.

Kretam consumed 1172 kg of forage in November 2018. Of this, 177.5 kg represented the forage that was hung out at night (Figure 4).

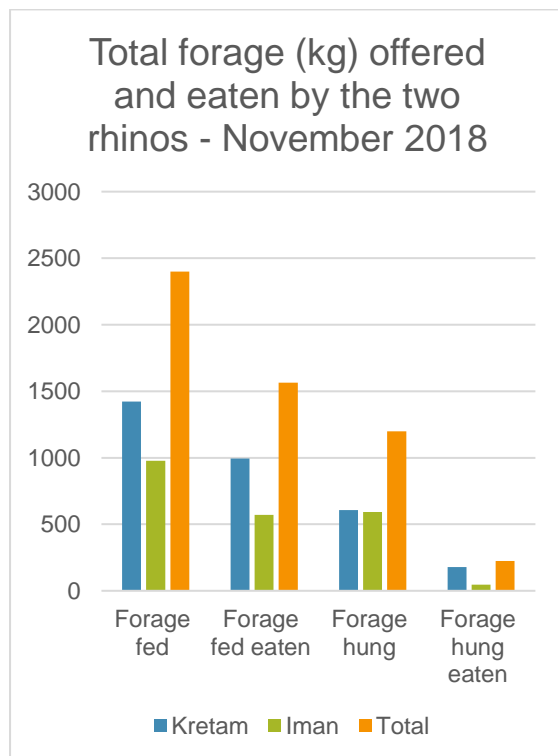


Figure 4. The total amount of forage fed and eaten by the two rhinos

Fruits constitute 15% % 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 are seasonal (*Artocarpus integer*, *Mangifera foetida*). 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 29.5 kg each month and Iman gets 68.8 kg. 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 the water to rinse some foliage prior to feeding the rhinos.

4. Biosecurity/health monitoring

Samples from the drinking water and from various water tanks were checked for pathogens. Soil samples, floor swabs, water samples from water tanks, urine and feces from the rhinos were also analyzed for pathogens. The water from 5 tanks were tested for total coliform counts and presence of *E.coli* as some of these tanks were for human consumption.

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 (November 2018).

Parameters	Animal (Kretam)
	18 Nov
Hemoparasites	Nil
RBC (X10 ¹² /L)	4.3
WBC (1000/UL)	11.8
Hb (G/DL)	NE
PCV (%)	42
Seg. Neutrophils (%)	31

Eosinophils (%)	41
Lymphocytes (%)	16
Monocytes (%)	12
Basophils (%)	0
MCV (FL)	NA
Platelets (G/L)	NA
MPV (FL)	NA
MCH (PG)	NA
MCHC (G/L)	NA

The complete blood count showed variables are within normal limits. There is a slight elevation in WBC.

4.2 Bacteriology

All the 22 floor swabs were positive for bacteria. 17 swabs were positive for *Staphylococcus sp.* Swabs 4, 11, 12, 14 and 22 were positive for *Bacillus spp.* Swab 17 was positive for *Proteus sp.*

The 18 soil samples taken from various locations surrounding and inside the rhino enclosures were negative for *Bukholderia pseudomallei*. The two samples from the wallows were also negative for *Bukholderia pseudomallei*.

There were no bacteria isolated from the tyre bath. Water from the sumps were positive for *Kocuria rosea*.

The water samples taken from the five tanks at BRS had a total bacterial count ranging from 110 – 520 cfu/ml. Total coliform count only ranged from 0 – 150 cfu/ml. The *E.coli* count was low ranging from 0 – 30 cfu/ml. There was no *Salmonella* isolated from the samples (Table 2).

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

Tank	Total bacteria	Total coliform	<i>E.coli</i>
1	400	150	30
2	520	90	10
3	226	80	10
4	110	0	0
5	320	0	0

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.

High bacterial count was observed in the horse pellets but no coliform bacteria isolated.

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