



Reproductive Evaluation Report
Cincinnati Zoo and Botanical Garden
Center for Conservation and Research of Endangered Wildlife
In Collaboration with BORA and the Sabah Wildlife Department
Tabin Wildlife Reserve, Sabah, Malaysia
March 22, 2012

Conducted by: Dr. Terri Roth

| Species | Sex | Name | Age (years) |
|---------------------------------|------------|-------------|----------------------|
| <i>Dicerorhinus sumatrensis</i> | female | Puntung | Unknown (est. 10-12) |

Reproductive History:

Female rhino Puntung was captured in Dec. 2011 and transported to the BORA rhino center located within the Tabin Wildlife Reserve. Her age was unknown but estimated to be about 10-12 years. There were no signs of other rhinos in the same general area of the reserve and her chances of finding a mate and breeding naturally were thought to be extremely low. It is believed that she has never had a calf.

Rectal Ultrasound Exam:

The female rhino was examined using a portable Sonosite Titan ultrasound machine while the female was voluntarily standing inside a chute being fed fruit. She was not locked in the chute but stood fairly well for the exam that lasted 17 minutes. Penetration depth of the probe was altered during the exam from 4.7 – 10 cm. The depth setting used for each image below is noted in the right hand corner of the image. (For those less familiar with ultrasonography, structures tend to look larger in images taken at shallower depths (4.7 vs. 10).)

Vagina

No significant pathology was noted in the vagina but it was viewed only briefly. Vaginal palpation was not performed during this exam because the female was not sedated and Dr. Thomas Hildebrandt had already confirmed the hymen was not intact during a previous exam.

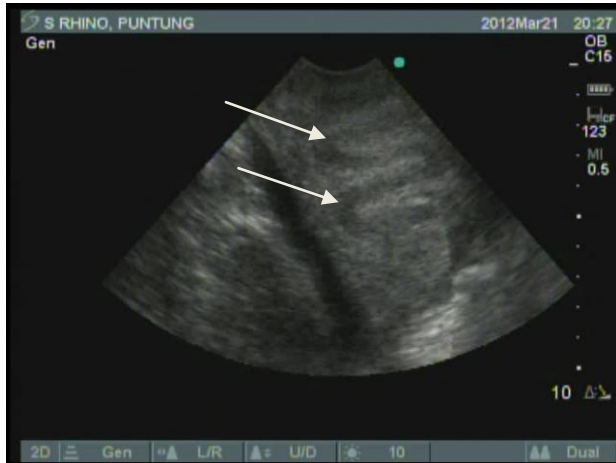
Bladder

The bladder appeared normal but did contain a large amount of sediment (arrow).

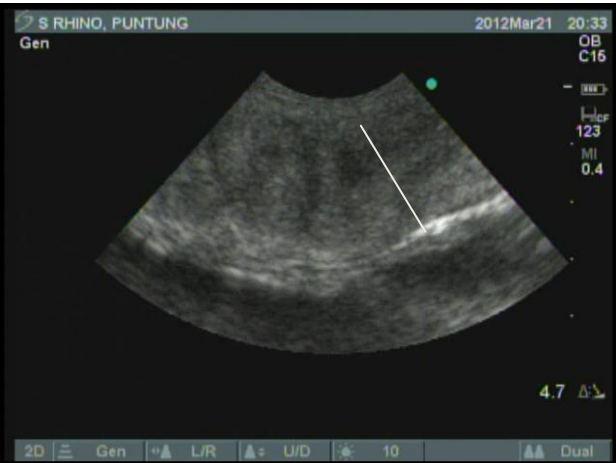


Cervix

The cervix appeared normal with no significant pathology. Tissue folds are present within the rhino cervix and these were obvious and appeared normal and clean in Puntung.



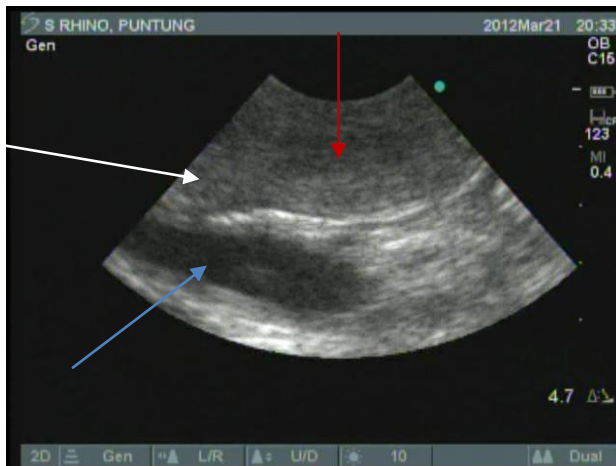
Cervix positioned vertically (arrows point to two tissue folds).



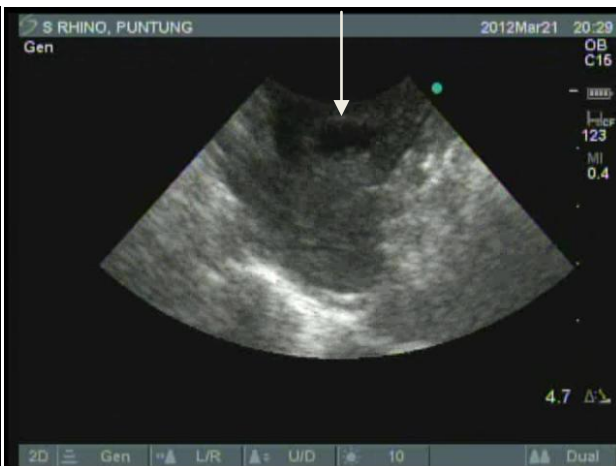
Cervix positioned horizontally (left of line) leading into uterine body (right of line).

Uterus

Uterus contained multiple small <0.5 cm cysts in various locations of the uterine body, near the bifurcation and in the uterine horns. During this exam, two cysts were detected that were more significant than the rest. One appeared to be at the caudal end of a uterine horn closer to the bifurcation and the other appeared to be in the tip of the right uterine horn. Although an exact measurement was not taken, both cysts appeared to be no bigger than 1.0 cm in diameter at their largest dimension.



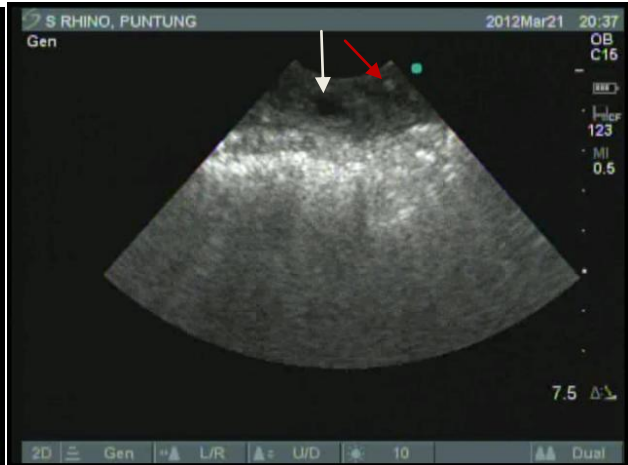
End tip of cervix (white arrow) leading into uterine body (red arrow) at the edge of the bladder (blue arrow).



Cyst (~1 cm) noted near uterine bifurcation.



Small cysts in the uterus near the bifurcation.



Cyst (~1 cm; white arrow) in tip of right horn just next to the edge of the ovary (red arrow).

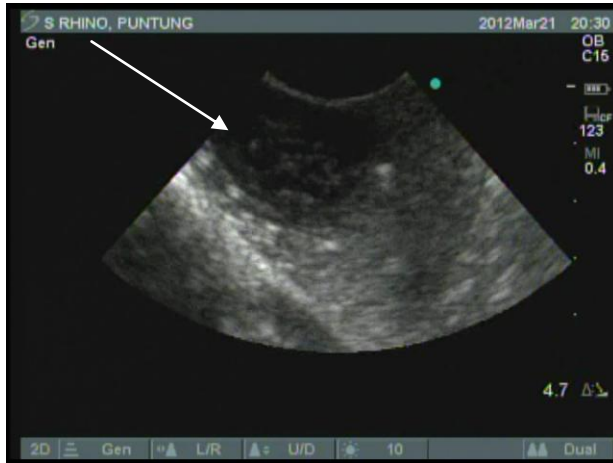
Ovaries

Both ovaries appear to be functioning normally.

The left ovary contained a large, anovulatory, luteinizing follicle (approx. 2.5 x 2.5 cm) resulting from the most recent estrus. A similar structure on the right ovary was observed by Dr. Hildebrandt during the February exam. The formation of these large, anovulatory follicles has been reported previously and is normal for reproductively active female Sumatran rhinos that are not paired with a male for mating, and therefore do not ovulate. The only known negative effect of these follicles is an irregular cycle length because the amount of progesterone produced and the period of progesterone production can be variable.

The right ovary contained a few small follicles and one of moderate size. I was hoping this follicle was the new follicle of the next cycle and would be larger when Dr. Hildebrandt conducted an exam the following week. However, when Sumatran rhinos develop anovulatory, luteinized follicles (like the one on the left ovary) progesterone production can be variable, and as a result, the rhino's cycle length is more variable. Therefore, it is not surprising that it did not continue to grow.

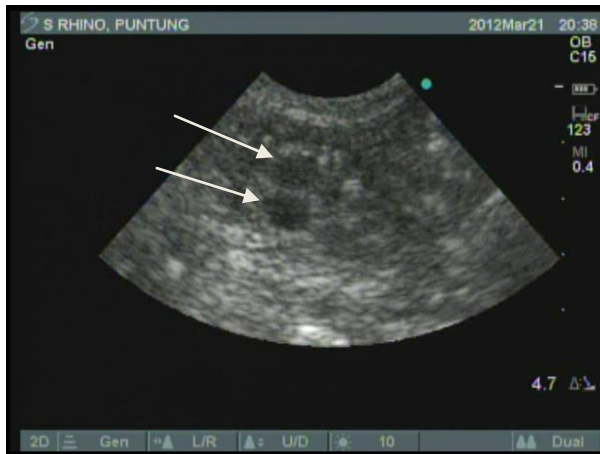
The bright echogenic (white) spots observed on the ovaries have also been observed on the ovaries of many other female Sumatran rhinos including the fertile, proven female, Emi, and her daughter, Suci, when Suci was still immature. Therefore, they do not appear to be abnormal or detrimental to the reproductive potential of a female Sumatran rhino.



Large anovulatory, luteinizing follicle on left ovary (arrow).



Measurement of large, anovulatory follicle on left ovary.



Two small follicles on right ovary.



Medium sized follicle on right ovary (arrow) and two of several echogenic spots (circle) noted on both ovaries.

Summary:

Puntung contains multiple, small uterine cysts. The development of similar pathology is often observed in mares over the age of nine. Although two larger cysts were observed during this exam, they were still relatively small at just ~1 cm in diameter. In horses, these small cysts are noted but generally are not considered a serious concern. Instead, cysts ranging in size from 2-5 cm and in critical locations are of greater concern. Such large cysts in the tips of the horns can block embryo transport, and if located near the bifurcation can impede implantation. However, in some cases, embryos can still implant and develop in the mare's uterus despite the presence of larger cysts. There is still much debate among equine veterinarians about how much these cysts impact fertility. In many cases, the biggest obstacle they present is difficulty in diagnosing early pregnancy because the early embryo looks a lot like a cyst. This is more of an inconvenience than a fertility problem.

It is unfortunate that Puntung already has developed uterine cysts. However, I was relieved at the appearance of her tract during the exam because the pathology did not appear too serious yet. Compared to several female rhinos at Sungai Dusun who had multiple, large tumors (up to 13 cm) and cysts (up to 5.5 cm), Puntung still looks like she is in the early stages of developing pathology and could still be fertile.

Recommendations:

My recommendation is to try to breed Puntung naturally as soon as possible (before the pathology worsens) to see if she can conceive and carry a pregnancy to term. I am optimistic that she will be able to carry a pregnancy if she conceives. Based on our experience with Emi and Ratu, we know that Sumatran rhinos often do not conceive following natural mating so it may take 10 or more successful copulations before Puntung does become pregnant. Therefore, my greatest reservation about this recommendation is my concern about Puntung's ability to defend herself during the courtship ritual of chasing and sparring that typically occurs between males and females prior to copulation. Hopefully, Tam will prove to be a docile breeding partner, but the risk to Puntung will need to be managed very carefully. Artificial insemination could provide an alternative, safer method for breeding Puntung if natural mating cannot be conducted without significant risk to Puntung.

Because damage can sometimes be caused inadvertently during efforts to remove cysts, and because most cysts return within 6-12 months of being removed, I would not recommend invasive treatments at this time. However, if the pathology becomes much more severe or if Puntung does not conceive after 10-15 matings, more aggressive treatments may be warranted.