CREW ReView

Fall 2014

Lindner Center for Conservation and Research of Endangered Wildlife • Cincinnati Zoo & Botanical Garden

Scientists for the Future

Roth's Remarks

Dr. Terri L. Roth
VP of Conservation & Science and Director of CREW

CREW scientists are more likely to talk about their research projects, the plants and animals with which they work and recent scientific breakthroughs than the young scientists working with them, but we do take seriously our role as educators and mentors of the next generation of wildlife scientists. There are far more challenges facing endangered plants and animals than there are scientists and conservationists to tackle them, and today more than ever, we need as many creative, bright minds engaged in the effort to find solutions that will secure the future for our natural world. Although CREW is an integral part of the Cincinnati Zoo & Botanical Garden and not a registered academic facility, close ties with the University of Cincinnati's Department of Biological Sciences and Ohio State University's College of Veterinary Medicine have made it possible for graduate students to work on CREW-related projects and for veterinary students to gain experience in wildlife research. Perhaps most valuable is CREW's post-doctoral trainee program which has served as a launching pad for many Ph.D. graduates that have proceeded to establish their own successful research programs at various zoos and universities worldwide. Our centerfold article in this CREW ReView provides more detail about our training programs and how they are supported by private gifts, corporations and grants. If you are inspired by what you read and wish to help sponsor one of these conservation research training opportunities, please contact CREW's Development Manager, Allison Gibbs at: (513) 487-3327.

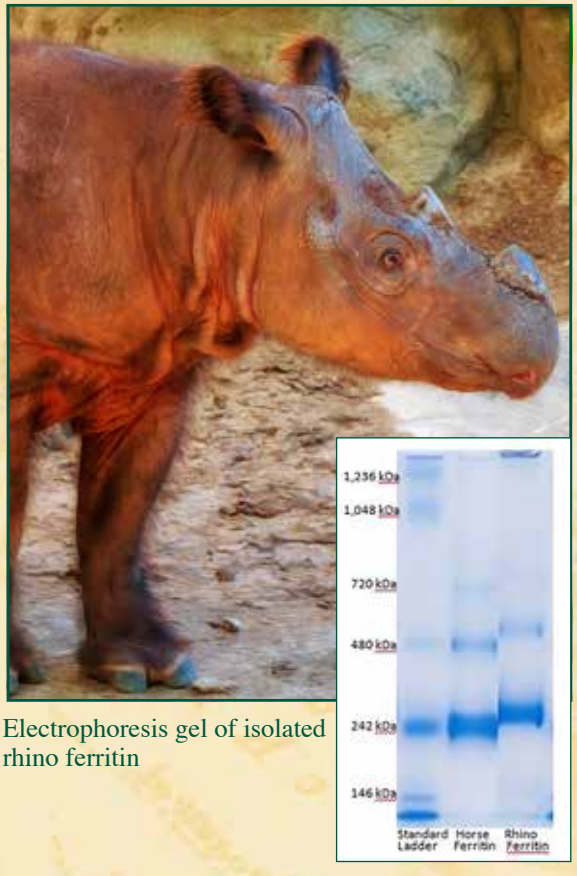
Can Progesterone Predict Pregnancy in Red Pandas?


Bailey's cub "Lin"

Scientists at CREW are studying the reproduction of red pandas and have diagnosed pregnancies via trans-abdominal ultrasound. However, performing diagnostic ultrasound imaging requires animal training, a costly ultrasound machine (and a trained ultrasonographer to use it), and is not easily performed on less agreeable individuals. The development of a pregnancy test based on fecal analysis would allow non-invasive pregnancy detection in any female and also could be applied to wild individuals. In addition to performing regular ultrasounds on the Cincinnati Zoo's red pandas (Bailey and Idgie), CREW scientists are measuring fecal hormone metabolites, such as progesterone (P4), to assess their usefulness as indicators of pregnancy. Bailey had cubs in 2012 and 2013, and both pregnancies were diagnosed via ultrasound. As expected, fecal hormone metabolite analysis showed that her P4 concentrations increased after breeding and remained elevated until she gave birth. The other female, Idgie, was observed breeding but no pregnancies were detected. Fecal P4 analysis revealed that her P4 was actually higher than Bailey's in both years, even though she was not pregnant. These data support the theory of pseudo-pregnancy in red pandas, which has been suggested for years but not yet proven. Although P4 is generally considered to be the "pregnancy hormone" and can be used to infer pregnancy status in many species, these results indicate that P4 levels alone cannot be used to diagnose pregnancy in red pandas.

A Study to Honor Suci

The loss of our female Sumatran rhino "Suci" to iron storage disease was a devastating blow to the Cincinnati Zoo's Sumatran rhino breeding program. Iron storage disease is an insidious disease affecting many wildlife species, ranging from marine mammals to birds, that are maintained in zoos. In addition to Sumatran rhinos, black rhinos are susceptible to the disease, whereas white rhinos and Indian rhinos remain largely unaffected. The disease is extremely challenging because we do not know how to prevent it, diagnose it or treat it. The only known cure for the disease is frequent, large volume phlebotomies (blood collection) but nobody knows how much blood to draw or how often it must be removed to keep a rhino healthy, and it is difficult to perform phlebotomies without anesthesia. The best method for monitoring iron storage disease is to measure serum concentrations of ferritin, a protein involved in iron transport and storage, but ferritin can be species-specific, so an assay for humans or horses may not work accurately in rhinos. Such was the case with our Sumatran rhinos. However, thanks to a dear family committed to helping rhinos that wanted to make a gift in honor of Suci, CREW has embarked on a new study to develop an assay specific for measuring rhino ferritin. The first step – isolating the rhino ferritin protein – is complete, and our goal is to have a functional assay by next summer. Our hope is that the assay will be used to monitor iron storage status in many rhinos throughout North American zoos to ensure the disease is detected before the rhino becomes sick. (*This project was made possible by the generous donation of Mr. and Mrs. Jeremy S. Hilton and Family.*)



Electrophoresis gel of isolated rhino ferritin

Rhino *Signature* Project Updates

CREW's CryoBioBank Contributes to Baby Rhino Birth a Decade after Father's Death

Buffalo Zoo AI calf with CREW's traveling CryoBioBank

CREW has a history of achieving world's first breakthroughs in the application of assisted reproduction to rhinos and arguably houses the most valuable sperm bank (CryoBioBank) in the world for captive rhinos. To date, four Indian rhino calves have been produced from artificial insemination (AI) procedures using frozen-thawed sperm from CREW's CryoBioBank. This past summer, the Buffalo Zoo welcomed a 144-pound bundle of baby rhino joy that was a decade in the making for CREW scientists and a male Indian rhino named Jimmy. The female rhino Tashi at the Buffalo Zoo previously conceived and successfully gave birth through natural breeding in 2005 and 2008. AI was requested because her current mate had not yet reached sexual maturity and Tashi would have to wait several years to breed again. The Buffalo Zoo and Indian rhino Species Survival Plan (SSP) decided it would be best to attempt AI to produce a pregnancy and help preserve Tashi's reproductive lifespan in the long-term. Given the list of male Indian rhino sperm samples in CREW's CryoBioBank, the SSP approved a match between Tashi and Jimmy, a male that passed away in 2004 having never contributed to the population in his lifetime. After the first AI procedure conducted on Tashi, she conceived and successfully gave birth 466 days later to a healthy female calf. Buffalo Zoo's rhino calf is living proof that CREW's efforts can facilitate the long-term storage of important genetic information and the reintroduction of those genes back into the population long after the animal has passed.

CREW Works to Enhance Fertility in African White Rhinos

The African white rhino remains the most popular rhino species held in US zoos. Although captive breeding has been successful and a sufficient number of calves are being produced to consistently maintain the population, the proportion of breeding recommendations resulting in offspring is quite low. It is estimated that <30% of all wild born and <20% of captive born African white rhinos have reproduced in captivity. These numbers reflect a major impediment to achieving a sustainable captive breeding program for this species. A primary reason for the low reproductive rate is that a vast majority of females display long periods of acyclicity. Significant progress has been made in initiating reproductive activity in acyclic white rhinos in Europe using exogenous hormones. However, many drugs used overseas are not commercially available in the US. Therefore, it became necessary to develop novel hormone protocols using US drugs to similarly promote a resumption in reproductive activity for acyclic white rhinos. CREW scientists in partnership with several North American zoos embarked on a preliminary exogenous hormone trial in which four acyclic female white rhinos were treated. Females responded by growing preovulatory follicles, but did not stand for breeding by a male and required an additional hormone to ovulate. This initial hormone protocol may be adequate should artificial insemination be performed, but CREW scientists and partner zoos are working to develop an alternative hormone protocol that will result in natural mating so that more individual rhinos and institutions will benefit. By enhancing the fertility of captive African white rhinos, CREW is helping the SSP ensure the sustainability of this rhino population.