

RAISING RHINOS

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2015 was a successful year for rhino's at Taronga Western Plains Zoo, having 3 different species of rhino born within the same year. They were Dafari, a black rhino born 20th April; Raja, a greater one-horned rhino (GOHR) born 25th October; and Kamari, a southern white rhino 19th December. Dafari was the 12th calf born as part of our successful Black Rhino breeding program and Rajah was the first GOHR born in the Australasian region. Having the ability to build a relationship with rhino calves from an early age enables keepers to undertake specialised husbandry requirements with as little stress to the animals as possible such as blood collection, foot care and ongoing medical treatments, if and when required. The most important relationship to consider is also that of keeper and calf's mother. We know that a calf will replicate the behaviour/energy given off from its mother. If the mother is calm, then the calf will be calm. Having and maintaining that rapport/relationship with the female before and throughout her entire pregnancy will only benefit your relationship with the calf. At Taronga Western Plains Zoo we have built a "Creep" into one of our yards that allows the calf to enter an area while mum is feeding on the outside. This creep is big enough to allow keepers to be in the same area with the calf and if/when the calf approaches, small amounts of tactile rubs can be given. Portable scales can be placed in this same area so regular weights of the calf can also be taken within its first few weeks. The 11th April 2017 saw the birth of our 13th black rhino calf, and the ability to use the creep once again. This calf is a 3rd generation black rhino and a tribute to our breeding program and facilities.

HUMAN MEDICAL SYNDROMES AS MODELS FOR MALADIES AFFECTING RHINOCEROSSES AND OTHER ENDANGERED ANIMALS

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Much of modern medicine is based on animal experimentation, so lessons learned from human studies should equitably contribute back to the health and welfare of our animals. This presentation considers two examples pertinent to rhinoceroses: one demonstrates tangible benefits of this approach, while the other warns of potential hazards in its disregard.

Several decades ago, *hemolytic anemia* was the dominant cause of death among captive African black rhinoceroses. A virtually identical human syndrome is caused by impaired ability of red blood cells (RBCs) to neutralize ambient oxidants.¹ Our comparative studies of RBC metabolism suggested strategies for treatment and/or prevention of hemolytic anemia based on phosphate stimulation of RBC adenosine triphosphate (ATP),² the primary fuel for essential metabolic reactions that is inherently low (2-5%) in rhino RBCs.³ In three separate instances, this tactic successfully interdicted active hemolytic crises and led to adoption of routine phosphate supplementation for black rhinos in U.S. captivity. Hemolytic anemia has been a rarity ever since, but recent episodes in rhinos with low serum phosphate suggest that success may have brewed complacency regarding the importance of dietary phosphate supplements.

Unfortunately, human medical experience has been largely ignored in regard to another problem jeopardizing *all* browser rhinoceroses, tapirs and many other species of exotic wildlife when displaced from natural environments in which they evolved. *Iron storage disease (ISD)* is a progressive multi-system disorder, typically devoid of clinical signs until affected organs falter or fail. Iron in excess is invariably deleterious to biological systems because it catalytically generates highly toxic, hydroxyl free radicals and reactive oxygen species to which rhinoceroses are particularly vulnerable.⁴ Progressive ISD was responsible for recent collapse of the U.S. captive breeding program for Sumatran rhinoceroses, a tragedy that could have been prevented by early application of procedures that have long been standards of practice for millions of humans with ISD. Organ pathology and significant life-span shortening in these patients can be avoided by periodically removing small aliquots of venous blood; this slight anemia mobilizes iron stores to make new hemoglobin, thus averting iron accumulation.

Repetitive phlebotomy protocols applicable to rhinoceroses and tapirs have been proposed⁵⁻⁷ and effectively applied, particularly by colleagues at Disney Animal Kingdom.^{8,9} Despite its effectiveness, few rhino-holding institutions have adopted this procedure because of the time and expense required to train and treat animals that appear entirely healthy until an organ dysfunction becomes overt and irreversible. This reluctance might diminish if cost/effective analyses considered the following: Sustainability of animal populations can be predicted by computer programs that assess factors affecting birth/death ratios. Shifts as little as $\pm 2-6\%$ may be capable of altering this tipping point as predicted by the IUCN for certain rhinoceros populations in 2017. Based on vast experience with human ISD subjects, introduction of phlebotomy programs for susceptible species could expand captive lifespans $>25-40\%$. For African black and Sumatran rhinoceroses, this would be equivalent to two or three more breeding cycles, favorably shifting their tipping points and ensuring enhanced quality of lives devoid of the inevitable morbidity of chronic iron toxicity.

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PRINCESS AND THE PEA: THE CHALLENGE OF MAKING AN OLD RHINO COMFORTABLE

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At Utah's Hogle Zoo we have a southern white rhinoceros, Princess, who has a multitude of problems that we have had to find creative solutions for managing. My talk will share each of her problems from least concern to greatest concern, and each of our corresponding solutions.

1) Mouth problems

- a. Possible tooth issue? Discussion of symptoms with video.
- b. Train wide "open" attempt to train for mouth x-ray, and the difficulties of finding a source.
- c. Monitoring weight and amount of dropped food.
- d. Adding feeding stations to a mostly sand exhibit for better intake without the sand.

2) Eye Problems – cataracts in both eyes, and severe allergies that present mid-summer through the end of fall.

- a. Showcase chin station training for the ophthalmologist