

First Time Breeding of Captive Sulawesi Knobbed Hornbills (*Aceros cassidix*) at St. Augustine Alligator Farm Zoological Park

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The St. Augustine Alligator Farm Zoological Park acquired a female Sulawesi knobbed hornbill (*Aceros cassidix*) in late 2008, and after successfully introducing her to the resident male, the park began setting up an on-exhibit breeding situation for the 2009 season. Several steps were taken to encourage breeding, including: research of species courtship and breeding requirements, diet alternations to condition the birds for breeding, and supplying an adequate cavity nest.

Because this species had never been bred at the zoo before, additional information was gathered about how and when these birds breed. Wild Knobbed hornbills had been observed breeding during the mid to late summer in their native range of Sulawesi (Kinnarird, 61), but the Florida climate of St. Augustine meant that similar weather conditions of temperature and rain occurred earlier in the year, around February or March. So as to not miss the ideal breeding time, it was decided to set up the birds at the very beginning of 2009.

Courtship behavior and nesting requirements were the next two objectives explored. Using behavioral observation data provided by EAZA Hornbill Management and Husbandry Guidelines, staff was able to conduct casual observation of the pair (Galama, W., King, C., Brouwer, K., 59-61). The observed behaviors included allo-preening, allo-feeding, quiet vocalizations to one another, and “shoving” or “pushing” of the male by the female when perched side by side. These behaviors were observed immediately upon introductions, and suggested that the birds had bonded and would attempt to breed.

Next, alterations were made to meet breeding requirements. Sulawesi knobbed hornbills, like other hornbills, are cavity nesters. Females will seal themselves into the selected cavity with mud, feces, and food. Only after the female is sealed in will she lay and incubate eggs, and will even spend several weeks after the eggs have hatched in the cavity feeding and caring for the chicks. During the females’ seclusion, she is entirely dependent on the male for food, so a quality diet and a strong pair bond are required for breeding success. To prepare for this, hopper mice were added to the previous diet for additional protein and as a gift-giving opportunity for the male at the beginning of January 2009. Providing valuable food items for gift-giving helps establish the necessary pair-bond. Also, because of the nest sealing behavior of these birds, their diet was made stickier with the addition of ripe bananas and soaked softbill pellet. A small bowl of wet clay was also offered on exhibit for sealing purposes (Galama, W., King, C., Brouwer, K., 49).

The final step was the addition of a suitable nesting cavity. Several options suggested by the EAZA Hornbill Management and Husbandry Guidelines were explored, including cement cylinders, modified box style nest cavities, and barrels or wine casks. The final decision was to use a modified wine cask as the nesting cavity. Compared to the other options, the wine barrel was easier to modify, the appropriate size for the exhibit space, and readily available since a suitable cask was already on property. The barrel used was a wine barrel measuring 55 cm in diameter and 86 cm tall. An oblong entry hole, dimensions 25 cm long by 14 cm across, was cut into the barrel with a jigsaw 55 cm up from the bottom of the barrel. The boards of the barrel were 2 cm thick, so the edges of the opening were roughed up with a hand saw to help the hornbills apply sealing material. A small observation door measuring 20cm by 20cm was cut into the back of the barrel for keeper observation purposes. The barrel was filled 2/3 full with dry pine shavings and was installed on a ledge on-exhibit approximately 2.5 meters off the ground with

a level plywood roof secured on top of the barrel to shelter it from the elements. Lastly, a perch was added next to the barrel's entrance to facilitate entry into the nest and feeding of the female by the male.

After the barrel was placed in the exhibit, funding was obtained for an infra-red camera which was mounted on the barrel roof, allowing staff an overhead view of the inside of the nest barrel available for viewing 24 hours a day. This camera was inexpensive (approximately \$100) and easily installed because it was added as an additional feed line on the pre-existing security camera network. This camera proved valuable as it allowed staff to monitor several aspects of the females' seclusion, including: the females' condition in the nest barrel, how much, how often, and of what variety the male was feeding the female, when an egg was laid, when the egg hatched, and the progress of the resulting chick. The frequency of feedings for the female was an initial concern because this was an inexperienced first-time pair. Also, there can never be too much information gathered on the actions and success of a breeding pair of secretive birds.

Overall, this project was a success resulting in the hatch and fledge of a single Sulawesi knobbed hornbill chick. From this breeding experience, several observations can be made. First, the diet alterations seemed to increase bonding behavior between the birds, and the addition of sticky material stimulated sealing behavior in both the male and the female. For the barrel, the size of the cask, the nesting material within, and the location of the barrel were adequate. However, a more substantial and angled roof to better shelter the barrel from rain should be added, and a lower entry hole should be cut so the female and young chick have easier access to the male outside. Lastly, the infra-red camera proved an invaluable tool for data collecting, but will also need some modifications. Because the camera was installed directly into the roof of the barrel and was sheltered by an arrangement of plywood and heavy rocks and after the barrel was put on the exhibit, the female became nervous when she visited the nest barrel and spent several weeks pecking at the camera lens in the ceiling. Because of this, the camera became damaged towards the end of the season. A more substantial housing and installation prior to the breeding season should allow the birds more time to adjust to its presence in the barrel and should solve this problem. Also, the camera was part of the security system and meant keepers only had limited access for viewing purposes. Hopefully, an additional or separate server may allow more "open" viewing access for keepers in the future.

Kinnaird, M.F., O'Brien, T. G. 1999. Breeding ecology of the Sulawesi Red-Knobbed Hornbill *Aceros cassidix*. Ibis. Volume 141, Issue 1: 60-69. British Ornithologists' Union,

Galama, W., King, C., Brouwer, K.. 2002. EAZA Hornbill Management and Husbandry Guidelines. 1st Edition. The EAZA Hornbill TAG, Amsterdam, The Netherlands