

1+1=6: Successful Rearing and Introduction Techniques Implemented to Build a Family Group of Southern Ground Hornbills through Double Clutching



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Southern Ground Hornbills generally lay 2 eggs per clutch with about 4-5 days between lay dates. From the 2017 Breeding and Transfer Plan: “Although females produce two eggs per clutch, only one chick is raised and the second chick dies from lack of care and starvation.” Additionally: “Parent rearing is strongly recommended, as social learning within the family group is considered critically important for behavioral development. If hand rearing is practiced (e.g., for rescue of the second egg), then reintroduction of the hand-reared chick back into the breeding group should be considered.”



Sire
Studbook #185
DOB: 19 Jan. 2003

Parent-reared @ Tracy Aviary. Came to Dallas from White Oak where he was paired, but did not produce any chicks. Transferred to Dallas in early March 2017 and introduced to #66 in mid-April.



Dam
Studbook #66
DOB: 11 Feb. 1990 +/- 5 years

Came to Dallas in November 2015 from Busch Gardens. Had 11 chicks at Busch (parent and hand-reared), 3 @ Dallas with another male and 4 chicks with #185. Her incubation period is 37-38 days and she averages 5 days between laying eggs. In 2016, with another male, 3 chicks hatched but all died within several days despite supplemental feedings. This female has a very old and severe beak injury in which her lower mandible is a couple inches shorter than her upper. This injury prevents her from being able to feed small food items to her chicks. Due to this impairment, past rearing difficulties and the importance of this pair to the SSP, the decision was made to hand-rear her first two chicks in 2017 with a goal of socializing and then introducing them back to the parents as early as possible since this species has such a complex social structure.

Chick Growth



Hatch Day



Day 4 & 8



Day 12



Day 13 & 18

The chick hatches out with its eyes closed and pale skin. At about day 3 or 4, the skin turns a dark purple, black in color.



Day 21



Day 31 & 26



Day 39 & 44

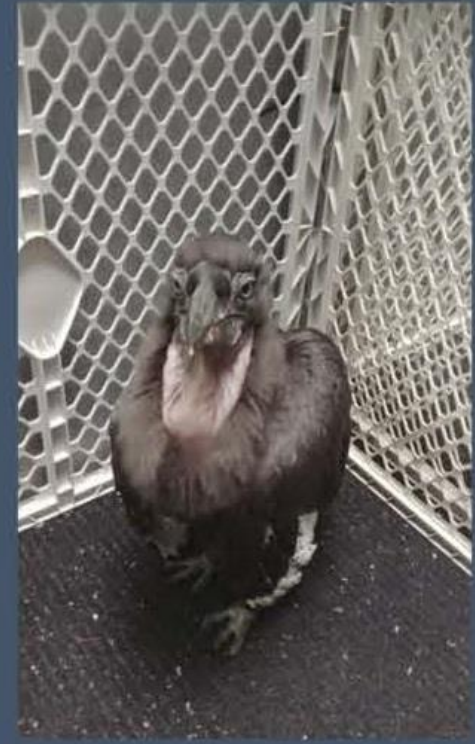
At about three weeks of age, pin feathers are coming in and at about 1 ½ months, the chick is almost fully feathered.

Developmental Milestones:

- Day 12 – eye slits
- Day 16 – eyes open
- Day 15-20 – can self-regulate body temperature
- Day 64 – self-feeding
- Day 86 – fledge



Living Separate Lives



The first two chicks were kept separate from one another physically and visually based on recommendations from Mabula's rearing protocol: "Keep only one chick per brooder as they show aggression towards each other and even if they cannot grab each other the other chick's presence may be stressful. These chicks exhibit a phenomenon known as passive siblicide as opposed to active siblicide in which the younger bird would have been actively attacked and killed." According to other literature passive siblicide is defined as when the younger chick has been starved for food and dies without any direct attack from the sibling. First attempt to introduce chicks to one another made on day 45/40 in brooder (aggressive). Tried again at day 68/63 when in playpens and had visual access and were more mobile.

Socialization Cage Design

Lid hinged at back of box. Can clip open during chick transfers.

Chicks elevated to adult height

Bowls filled with soapy water to repel ants.



Clips to hold securely to fence. Clips covered in Vaseline to keep ants away from chicks.

Small mesh (1" x 1/2") vinyl coated wire to keep safe from adults

3"x5" feeding holes cut into mesh at adult height.

Goal: To socialize hand-reared chicks to the parents starting at a very early age to hopefully be able to introduce them to the parents to form a family group. Brainstormed with team how we wanted to introduce the chicks to the parents. We came up with the following cage design.

Socialization Cage Dimensions



The 3" x 5" feeding slot was based on the size of the parent's beak. We wanted to allow for food passage from the parent to the chick, but did not want the slot large enough for the parent to fully open their beak and potentially injure the chicks.

Temperature and Placement Considerations



Thermometer

Choose the socialization cage location carefully in regards to direct sunshine. The Dallas Zoo hand-rearing protocols decrease the brooder temperature one degree per day from the incubation temperature. Therefore, a 2-day old chick is housed in a 98 degree brooder, 3 day old chick in 97 degrees and so on assuming the chick is reacting well to the temperature drops. Since the chicks can not self-regulate their body temperature for the first two weeks of life, the socialization cage should be at or very near the brooder temperature. Fortunately for us these chicks hatched in July when the outside temperatures are very warm. No further heat supplementation was necessary.



Camera



Magic
Protector
Wand

The chicks were placed outside in the socialization cage for 5 minutes starting at day 2 of life. The time outside was increased by 5 minutes per day, weather permitting. The sire was first given access to chick #1 on day 31 (the 3"x5" feeding slot was opened). Some negative interactions observed at first (minor feather plucking), but later chicks began begging and sire began bringing food to cage.

Howdy Cage



3"x5" Feeding Hole



When the chicks were too large for the socialization cage, we built a pen in the upper portion of the parent's yard to continue with their socialization. What we wanted to see prior to a full introduction: eating well on own, mobile (ability to get away from a potentially aggressive parent), and positive interactions between parents and chicks (begging, feeding).



Full-Introduction Day


Introduction day: withheld food a little later than normal to hopefully make their first interaction a positive one with begging/feeding. Several keepers were in the yard to separate birds if we needed to. The sire immediately came over to feed the chicks. Started with thirty minutes of direct observation and then separated for day. Continued with ever increasing daily introductions until the chicks were fully incorporated into the family group.

Meanwhile...

When Chick #1 and #2 were 46 and 41 days old, Chick #3 hatched...



Now that we had chicks to represent this pair genetically, we decided to parent-rear the second clutch chicks. Of course the hen still has a severe beak injury which prevents her from being able to feed small food items to her chicks. We knew we would need to give the chicks numerous supplemental feedings at the nest to help them thrive, but this would be a lot of disturbance to the nesting hen. We, therefore, designed a nest box that allowed for greater keeper safety and minimal hen disturbance during intensive supplemental hand-feedings at the nest box.

A woman with dark hair pulled back, wearing a light green short-sleeved polo shirt with a "DALLAS ZOO" patch on the left chest, stands in a laboratory. She is gesturing with her right hand. Behind her are several rows of yellow incubators on a wooden counter. The background shows large windows with a grid pattern.

An inside look at hand-rearing our first-ever Southern ground hornbill chicks.

Nest Box Design

Secret Spy
Camera



Materials:

- $\frac{3}{4}$ " Plywood Top, Sides, and Drawer Bottom
- $\frac{1}{2}$ " HDPE Box Bottom
- $\frac{3}{4}$ " HDPE Drawer Runner and Slides
- Fabric Covered Drawer Bottom
- Two coats of Thompson's Water Seal to Outside of Box



Front View



Drawer



Side View

Why the redesigned box: keeper safety and less stressful for the hen (minimal disturbance). Often the hen would stay in the box during the chick feedings. We would slowly pull the chicks out a few inches with the drawer, feed them and then push the drawer slowly back in.

Nest Box Dimensions



Going Forward: Recommend increasing the size of the side door to 12" x 12" to accommodate easier removal of older chicks. Also, leave a small gap between the top of the drawer and the side wall to allow for the expansion of the wood with rain and humidity.



We were hopeful when we began rearing the third and fourth chicks that the parents would start feeding the chicks once their eyes opened. That didn't happen. We were hopeful that when the chicks could begin to pick up food items on their own (about 1 ½ months) that then the parents would be able to feed the chicks. That didn't happen. We ended up doing a full hand-rearing of these chicks at the nest box. I think that because we had such a unique situation with two much more animated and older chicks in the upper portion of the yard who kept the attention of the parents, that they had "given up" trying to feed the younger chicks on a regular basis. The sire would bring small amounts of food to the nest, but not enough to rear the chicks on.

Playpen (36" x 36")



At this time the two older chicks were getting most of the parent's attention. To make the chicks more visible to the parents we built a wooden playpen just outside the nest box. We began placing the chicks in the playpen in afternoons at day 50/46 and placed them back in the box overnight (now moving into autumn with cooler night time temps). When the chicks could see the parents more easily, they begged more loudly and the parents did come to feed more often. The youngest two chicks went out with the first two siblings at day 72/68 – no negative interactions.

Sweet Success!



In three short months two hand-reared southern ground hornbill chicks were socialized and then introduced to the parents. Two more chicks were parent reared (with supplemental hand-feedings) in an innovatively designed nest box that allowed for enhanced keeper safety and minimal disturbance to the hen. The youngest chicks fledged into the family group with no complications.