

AZA UNGULATE TAGs MIXED-SPECIES MANUAL UPDATE

ANDREW ALBA

DISNEY'S ANIMAL KINGDOM®



Katie Jones

WHY CREATE THIS MIXED-SPECIES MANUAL?

- Guide for setting up and managing successful ungulate mixes
 - Help maximize space use
 - Increase holding capacity
 - Improve sustainability of populations
 - Provide enrichment for animals
 - Create more dynamic guest experience, educational messaging



Bronx Zoo

WHAT ALREADY EXISTS?

1. 1997/1998 Mixed Antelope Exhibits Survey
2. 2005 Pig, Peccary, and Hippo TAG Mixed Species Brochure
3. Cervid Mixed-Species Table that was included in the 2014 Cervid RCP
 - All currently available online at azaungulates.org
 - Information from these surveys will also be incorporated into the new manual!
4. Gabriele Hammer's 2001 Dissertation: "Mixed species exhibits involving mammals: stock report and problems"
 - Data from European zoos
 - Hoping to include this 180+ page table as an appendix for further reference



Jacksonville Zoo

GATHERING MORE INFORMATION



- Used a survey to gather information across six ungulate TAGs
 - Successful mixes
 - Unsuccessful mixes
 - Lots of detail!
 - Species composition, exhibit characteristics, management, challenges, tips for success, changes over time
 - Historical and current information

THE RESPONSES ARE IN!

- Thank you to everyone who submitted survey responses and photos!
- Thank you to those who reviewed their institution's exhibit profiles!

THE STATS

- More than **650 exhibits** from **131 institutions!**
 - 361 current exhibits
 - 234 historical exhibits
 - 71 unsuccessful exhibits



North Carolina Zoo

WHAT WE STILL NEED FROM YOU!

- Comprehensive draft of exhibit profiles for all institutions sent out for review on March 10, 2017
 - Find your institution alphabetically
 - Review for accuracy, **not** exhibit updates since survey submission
 - Already received 19 responses
 - Several bounce backs... If you did not receive the email, please let me know!!
- Please submit any final revisions via email to Andrew.X.Alba.-ND@Disney.com by April 10, 2017

WHAT WILL THE FINAL MANUAL LOOK LIKE?

1. Preface
 - A. Background Information
 - B. How to use this Manual
2. Tables of Successful Mixes
3. Successful Exhibit Profiles
4. Table of Unsuccessful Mixed-Species Groups
5. Unsuccessful Exhibit Profiles
6. Categorized list including details about what makes ungulate mixed-species exhibits particularly unique, popular with guests, or successful



Disney's Animal Kingdom Lodge

THE TABLES

1. Table of Successful Mixed Ungulate Groups
2. Successful Groups of Ungulates Mixed with Non-Ungulates (Sorted by Ungulates)
3. Successful Groups of Ungulates Mixed with Non-Ungulates (Sorted by Non-Ungulates)
4. Table of Unsuccessful Mixed-Species Groups

A. View with caution!

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Ungulate Species	Ungulate Species Mixes (Current and Historic)	Institutions
Antelope and Giraffe		
Aridland Antelope and Gazelles		
Addax (<i>Addax nasomaculatus</i>)	Antelope, Roan (<i>Hippotragus equinus</i>)	Buffalo Zoo; Fossil Rim Wildlife Center; Safari West
	Antelope, Sable (<i>Hippotragus niger</i>)	Fossil Rim Wildlife Center; Fossil Rim Wildlife Center
	Ass, African Wild (<i>Equus africanus</i>)	Dallas Zoo*; Disney's Animal Kingdom*
	Blackbuck (<i>Antelope cervicapra</i>)	Fossil Rim Wildlife Center
	Bongo, Eastern (Mountain) (<i>Tragelaphus eurycerus isaaci</i>)	Minnesota Zoo; Safari West; Wildlife Safari
	Bontebok (<i>Damaliscus pygargus</i>)	Disney's Animal Kingdom; Fossil Rim Wildlife Center*; Safari West
	Cattle, Ankole (Watusi) (<i>Bos taurus</i>)	Disney's Animal Kingdom; Wildlife Safari
	Deer, Axis (<i>Axis axis</i>)	Fossil Rim Wildlife Center
	Deer, Fallow (<i>Dama dama</i>)	Fossil Rim Wildlife Center; Fossil Rim Wildlife Center
	Deer, Red (<i>Cervus elaphus</i>)	Fossil Rim Wildlife Center
	Deer, White-tailed (<i>Odocoileus virginianus</i>)	Fossil Rim Wildlife Center; Fossil Rim Wildlife Center
	Eland, Common (<i>Taurotragus oryx</i>)	Busch Gardens*; Fresno Chaffee Zoo; Wildlife Safari
	Gazelle, Addra (<i>Dama</i>) (<i>Nanger dama</i>)	Dallas Zoo; Fossil Rim Wildlife Center; San Diego Zoo Safari Park

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Ungulate Species	Non-Ungulate Species Mixes (Current and Historic)	Institutions
Antelope and Giraffe		
Aridland Antelope and Gazelles		
Addax (<i>Addax nasomaculatus</i>)	Crane, African Crowned (<i>Boleleia sp.</i>)	Lee Richardson Zoo
	Crane, Blue (Stanley) (<i>Anthropoides paradiseus</i>)	Lee Richardson Zoo
	Crane, Demoiselle (<i>Grus virgo</i>)	Lee Richardson Zoo
	Crane, Grey Crowned (<i>Boleleia regularum</i>)	Blank Park Zoo; Disney's Animal Kingdom; Omaha's Henry Doorly Zoo & Aquarium*; Saint Louis Zoo*
	Guineafowl (<i>sp.</i>)	Minnesota Zoo
	Goose, Spur-winged (<i>Plectropterus gambensis</i>)	Disney's Animal Kingdom
	Hornbill, Abyssinian Ground (<i>Bucorvus abyssinicus</i>)	Saint Louis Zoo
	Hornbill, Southern Ground (<i>Bucorvus leadbeateri</i>)	Saint Louis Zoo
	Ostrich, Common (<i>Struthio camelus</i>)	Busch Gardens; Dallas Zoo; Disney's Animal Kingdom; Fossil Rim Wildlife Center; Fossil Rim Wildlife Center; Fresno Chaffee Zoo; Kansas City Zoo; Minnesota Zoo

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Non-Ungulate Species (Current and Historic)	Ungulate Species	Institutions
Birds		
Barbet, Brown-breasted (<i>Lybius melanopterus</i>)	Dik-dik, Gunther's (<i>Madoqua guentheri</i>)	Kansas City Zoo
	Dik-dik, Kirk's (<i>Madoqua kirkii</i>)	Kansas City Zoo
Barbet, Crested (<i>Trachyphonus vaillantii</i>)	Dik-dik, Gunther's (<i>Madoqua guentheri</i>)	Kansas City Zoo
	Dik-dik, Kirk's (<i>Madoqua kirkii</i>)	Kansas City Zoo
Bird-of-Paradise, Lesser (<i>Paradisaea minor</i>)	Chevron, Malay (<i>Tragulus kanchil</i>)	Columbus Zoo
Birds (variety of species)	Dik-dik, Gunther's (<i>Madoqua guentheri</i>)	Caldwell Zoo
	Hippopotamus, Pygmy (<i>Choeropsis liberiensis</i>)	Brookfield Zoo
Bishop, Orange (<i>Euplectes franciscanus</i>)	Dik-dik, Gunther's (<i>Madoqua guentheri</i>)	Kansas City Zoo
Bishop, Red (<i>Euplectes orix orix</i>)	Klipspringer (<i>Oreotragus oreotragus</i>)	Staten Island Zoo
Bluebird, Fairy (<i>Irena puella</i>)	Dik-dik, Gunther's (<i>Madoqua guentheri</i>)	Kansas City Zoo
Bulbul, Common (<i>Pycnonotus barbatulus</i>)	Dik-dik, Gunther's (<i>Madoqua guentheri</i>)	Kansas City Zoo
	Dik-dik, Kirk's (<i>Madoqua kirkii</i>)	Kansas City Zoo
Bustard, Buff-crested (<i>Eupodotis gindiana</i>)	Klipspringer (<i>Oreotragus oreotragus</i>)	Staten Island Zoo
Bustard, Kori (<i>Ardeotis kori</i>)	Dik-dik, Gunther's (<i>Madoqua guentheri</i>)	Cameron Park Zoo
	Dik-dik, Kirk's (<i>Madoqua kirkii</i>)	Phoenix Zoo
	Gazelle, Addra (<i>Dama</i>) (<i>Nanger dama</i>)	Phoenix Zoo
	Gazelle, Grant's (<i>Nanger granti</i>)	North Carolina Zoo
	Gazelle, Thomson's (<i>Eudorcas thomsonii</i>)	North Carolina Zoo
	Gemsbok (<i>Oryx gazella</i>)	North Carolina Zoo
	Gerenuk (<i>Litocranius walleri</i>)	Denver Zoological

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Please review this table with caution and be sure to reference specific profiles for each unsuccessful group (see links). Several mixes were deemed unsuccessful based on individual animal temperaments or specific exhibit limitations, rather than incompatibility of species. For each exhibit, the table only includes the species that were specifically noted as being responsible for the group's failure. Exhibits with no interspecies issues have been omitted from the table, but can be found in the next section (Unsuccessful Exhibit Profiles).

Ungulate Species	Species Mixes (Unsuccessful)	Institutions
Addax (<i>Addax nasomaculatus</i>)	Bontebok (<i>Damaliscus pygargus</i>)	Dallas Zoo
Alpaca (<i>Vicugna pacos</i>)	Capybara (<i>Hydrochoerus hydrochaeris</i>)	Millwaukee County Zoo
Anoa, Lowland (<i>Bubalus depressicornis</i>)	Otter, Asian Small-clawed (<i>Amblonyx cinereus</i>)	Point Defiance Zoo
Antelope, Royal (<i>Neotragus pygmaeus</i>)	Duiker, Blue (<i>Philantomba monticola</i>)	Brookfield Zoo
Antelope, Sable (<i>Hippotragus niger</i>)	Duiker, Red-flanked (<i>Cephalophus rufiflatus</i>)	Los Angeles Zoo
Ass, African Wild (<i>Equus africanus</i>)	Gazelle, Grant's (<i>Nanger granti</i>)	Lincoln Park Zoo
	Gazelle, Addra (<i>Dama</i>) (<i>Nanger dama</i>)	Dallas Zoo*
Babirusa, North Sulawesi (<i>Babirusa celebensis</i>)	Crane, Sarus (<i>Grus antigone</i>)	Los Angeles Zoo
Banteng (<i>Bos javanicus</i>)	Gibbon, White-handed (<i>Hyllobates lar</i>)	Toronto Zoo
Bharal (<i>Pseudois nayaur</i>)	Bharal (<i>Pseudois nayaur</i>)	The Wilds
Bharal (<i>Pseudois nayaur</i>)	Banteng (<i>Bos javanicus</i>)	The Wilds
Bison, American (<i>Bison bison</i>)	Deer, Sika (<i>Cervus nippon</i>)	The Wilds*
	Oryx, East African (Beisa) (<i>Oryx beisa</i>)	The Wilds*
	Elk, American (<i>Cervus canadensis</i>)	Caldwell Zoo
	Peccary, Collared (<i>Pecari tajacu</i>)	Detroit Zoo

THE EXHIBIT PROFILES

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Disney's Animal Kingdom, Orlando, FL – Current Exhibit

Current Species:

Asiatic Water Buffalo (*Bubalus arnee*) (0.3)
Blackbuck (*Antelope cervicapra*) (5.8)
Eld's Deer (*Rucervus eldii*) (1.2)
Bar-headed Goose (*Anser indicus*) (5.5)
Javan Green Peafowl (*Pavo muticus*) (1.2)
Ruddy Shelduck (*Tadorna ferruginea*) (1.1)
Sarus Crane (*Grus antigone*) (1.1)

Group has been successfully mixed for 17 years (since 1998, current as of 2015).

Exhibit Size: 1 acre-3 acres

General Management Notes:

- Some different ungulate specimens (new youngsters or addition of new male) have been in this group, but the core group of species has been together since park opening in 1998.
- The sarus cranes, though different specimens, have been here since 1998.
- The waterfowl have only been in this exhibit for about 10 years.
- Mostly all were adults when introduced though the water buffalo were juveniles.
- All animals are shifted in at night.
- We have an issue with parasite loads.

Changes/Accommodations Needed:

- The exhibit was designed and built to eliminate sight lines which necessitated hills and berms that the ungulates had to walk up and down to shift to the barns. This has allowed erosion to occur as well as older animals have difficulty on the steeper inclines.
- The exhibit is one long run and should have been built with a separation (temporary/hidden, etc.) that could be used when introducing new animals or separating aggressive ones.

Reproductive Management/Breeding History:

- We have only ever had either 1 adult breeding male with several females or multiple young males (non-breeding) or castrated and/or vasectomized males.
- There was no need to separate males except by surplus multiple young male offspring.
- Females gave birth on exhibit or were held in the barn area for calving.
- Both species of ungulates bred, except the banteng.
- Current male blackbuck are castrated.



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AZA Ungulate TAGs
Mixed-species Manual 2016

Management Challenges:

- Dealing with the aggressiveness of the male Eld's deer when in rut, not only aggression towards other animals but also towards keepers (safety issue) is a challenge.

Items Contributing to Group's Success:

- The breeding success was due to experienced husbandry and ability to shift animals.
- Truthfully, for many husbandry and visibility reasons, it is not very successful.

Group/Exhibit Changes Over Time:

- Historically, we had additional Eld's deer females.
- In the past we exhibited 1.1 banteng. As they aged the slope of the exhibit made it difficult to climb and descend the hill. When they passed we substituted the water buffalo.
 - Banteng (*Bos javanicus*) (1.1)
 - Blackbuck (*Antelope cervicapra*) (5.8)
 - Eld's Deer (*Rucervus eldii*) (1.2)
 - Bar-headed Goose (*Anser indicus*) (5.5)
 - Javan Green Peafowl (*Pavo muticus*) (1.2)
 - Ruddy Shelduck (*Tadorna ferruginea*) (1.1)
 - Sarus Crane (*Grus antigone*) (1.1)



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Minnesota Zoological Garden, Apple Valley, MN – Historical Exhibit

Species:

Grant's Gazelle (*Nanger granti*) (1.5)
Grevy's Zebra (*Equus grevyi*) (1.4)
Reticulated Giraffe (*Giraffa camelopardalis reticulata*) (2.0)
White-bearded Wildebeest (*Connochaetes taurinus*) (8.0)
Common Ostrich (*Struthio camelus*) (0.2)

Group was successfully mixed for 1 summer only.

Exhibit Size: 3 acres-8 acres

General Management Notes:

- Wildebeest were yearlings.
- This was a seasonal exhibit (summer only, May-September).
- Zebra were held on exhibit overnight during Fourth of July week. Stray fireworks from neighbors caused problems in holding.
- We limit the gazelle group to just one adult male.
- This is a large exhibit with multiple escape features.
- Animals love the sand pits.
- Hotwire was used to keep animals from hiding in back corners.
- Giraffe were pretty good at removing all the small trees in the exhibit.

Reproductive Management/Breeding History:

- No breeding was attempted.

Management Challenges:

- Grant's gazelle were difficult to bring into holding at night and were managed on exhibit for the summer.

Reasons Exhibit No Longer Exists/Houses Ungulates:

- Seasonal exhibit

Group/Exhibit Changes Over Time:

- None



Tony Fisher



Tony Fisher

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Toronto Zoo, Toronto, Ontario, Canada – Unsuccessful Exhibit

Species:

Sulawesi Babirusa (*Babirusa celebensis*) (1.0)
White-handed Gibbon (*Hylobates lar*) (1.1)

Exhibit Size: 5,000-10,000 sq ft

General Management Notes:

- This is an indoor exhibit with climbing structures for the gibbons and a variety of live plants (including a large *Ficus benjamina* tree).
- There is natural substrate, and a pool/moat is along one side.
- Gibbon are a pair of older gibbons, late 30s at the time; babirusa was 4 years old.
- "Babirusa-proof" islands were created at the base of the gibbon climbing structures to protect some of the existing vegetation prior to the introduction. The two species had separate off-exhibit holding areas.
- 1.0 gibbon would swipe at babirusa from above, and on one occasion, scratched or bit him. It was a minor cut but it bled a lot, causing visitors to panic. The babirusa was also stressed by the incident, running away as the gibbon chased him around the exhibit. After that they were separated. They had lived together for a few months, with mostly curiosity from the male gibbon.

Reproductive Management/Breeding History:

- Gibbons are older non-reproductive animals, and the babirusa was a lone male.

Items Contributing to Group's Failure:

- Gibbons lived alone for many years
- There was not space for babirusa away from climbing structure
- Gibbon antagonistic behavior toward babirusa

NEXT STEPS

- Final review of your exhibit profiles due by April 10, 2017
- We will collect exhibit updates at a future date
- Final roll out in May!



Brent Huffman

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QUESTIONS?



Como Zoo