

IMPORTATION AND INTRODUCTION OF 1.10 WHITE RHINO

(*CERATOTHERIUM SIMUM SIMUM*)

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In December of 2017, White Oak Conservation Foundation imported a group of 1.10 southern white rhinos (*Ceratotherium simum simum*) from South Africa (S.A.). This import stands as one of the largest groups of white rhinos to a single institution in the United States. White Oak had recently imported groups of southern white rhinos from S.A. in 2014 and 2015. The most recently imported rhinos came from 4 different facilities in S.A. Some of the rhinos were introduced and housed together before shipment to the U.S., while others had never been put together. The imported group will be divided into two separate herds; one joining an existing herd at White Oak and another becoming a new breeding herd in a mixed species enclosure with Roan antelope (*Hippotragus equinus*). This additional group of rhinos has provided challenges to those caring for them; challenges that were anticipated and some that were not. Importing this large number involved and continues to involve, many introductions between the new rhinos, and conditioning of the rhinos to their new enclosures. Standing sedations were performed on the majority of the individuals to conduct blood draws, ear notches, tuberculosis tests, and vaccinations. Some individuals could be conditioned in a short period of time to prevent a necessity for sedation. While a significant amount of time was not spent with each individual, some were more habituated to human contact, allowing keepers and veterinary staff to complete quarantine exams without sedation.

Introductions of the rhinos to one another have begun according to their placement plan within White Oak facilities. While none of the new individuals have been introduced to White Oak rhinos, five will join an existing herd as soon as the last standing sedation is complete. The imported rhinos will play a large role in White Oak's approach to expanded rhino management and sustainable populations.

Currently, the newly imported rhinos, along with the rest of White Oak's white rhino population are part of a genetic study. This study compares DNA of all White Oak rhinos and hopefully other captive U.S. populations to determine relatedness. This will allow for breeding recommendations based on actual DNA evidence instead of assumed relatedness.

***CLOSTRIDIUM*: ACUTE DEATH AND RESPONSE IN SOUTHERN WHITE RHINOCEROS (*CERATOTHERIUM SIMUM SIMUM*)**

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Between January and April 2016, White Oak Conservation Foundation experienced the unexpected deaths of three female southern white rhinoceros (*Ceratotherium simum simum*) ranging in age from 3 to 10 years old. In all three cases, no apparent clinical signs of illness were seen prior to death. The first female, a 10 year old with a 43-day-old calf, was seen eating 45 minutes before death. While waiting for diagnostics to determine cause of death in the three rhinos, the rhino herd was placed under quarantine and 24-hour monitoring. As the origin of the deaths was still unknown, it was decided to modify the environment. The herd was kept in corrals while the 7-acre enclosure was restructured, to include wallows filled and dug in new locations, and new grass planted. *Clostridium perfringens* enterotoxemia was determined to be the most likely cause of the rhino deaths.

Clostridium perfringens, a Gram-positive, anaerobic bacteria, is typically a component of the normal gut microbiome in rhinos. *Clostridium perfringens* becomes problematic when a toxigenic strain is introduced into a population or other health or environmental stressors provide a favorable growth environment, resulting in the production of potent toxins¹. The deaths prompted the development of a new vaccination protocol for the southern white rhinos, and eventually all rhinos housed at White Oak. A *Clostridium perfringens* type A genotype was determined to be prevalent in the three rhinos. In order to get broad coverage, vaccination with *Clostridium perfringens* Type A, C, and D toxoids was initiated in response to the deaths. All white rhinos were vaccinated subcutaneously with *C. perfringens* type A (right antebrachium) and types C/D (left antebrachium) toxoid vaccines. Titers were quantified for each rhino before the first vaccines and after the booster vaccinations, approximately 6 weeks later. The quarantine was lifted shortly after all vaccinations were completed. Operating under quarantine restrictions with a small keeper team was challenging, but veterinary, keeper and facility maintenance teams worked together to adapt management techniques and facilities and learned much from the response process.

References

1. McGuirk, Sheila M., DVM, PhD. Managing Clostridial Diseases in Cattle. University of Wisconsin, School of Veterinary Medicine, 2015 Linden Drive, Madison, WI 53706

TREATMENT FOR EPILEPSY IN ONE EASTERN BLACK RHINO (*DICEROS BICORNIS MICHAELI*) AT POTTER PARK ZOO

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The purpose of this presentation is to share the experiences we as a staff at the Potter Park Zoo went through in the discovery, diagnosis, and treatment of epilepsy in Jello, an 8-year-old male Eastern Black Rhino. From the time of his arrival in June 2011, to the time of his death in 2015, the staff at Potter Park Zoo spent countless hours providing Jello the very best care to help manage his condition. After discovering some odd behavior, which we soon confirmed were pre-seizure activities, on the morning of June 4th, 2012, Jello quickly progressed into full on seizures that occurred hourly for approximately 9 hours that day. Potter Park Zoo staff did their best to help him through these seizures as well as trying to document a few episodes to share and seek guidance for what he was going through. The vet and keeper staff then created a management plan for medication and husbandry to treat this condition. For keeper staff, the daily preparation of meds, including creating numerous methods of hiding and administering meds, could take up to four hours for the three time a day medication routine. With much trial and error, multiple medications, many different dosages, and consistent blood testing to measure the medicinal concentration, we found a regimen that allowed Jello to live a full and complete life until the day he passed. There were good days and bad days but we learned from each one and moved forward to create a positive, safe environment for him to live. With much research in the years since first dealing with this illness and talking to many rhino experts worldwide, we have found that seizures in rhinos and specifically long-term management of seizures are a rare occurrence and are something that should be shared in the rhino keeper community.

EFFECTS OF SWARD STRUCTURE ON THE GRAZING BEHAVIOUR OF CAPTIVE SOUTHERN WHITE RHINOCEROS (*CERATOTHERIUM SIMUM SIMUM*)

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Zoological collections strive to provide natural diets which can be difficult to achieve in grazing African megafauna such as White rhinoceros (*Ceratotherium simum simum*) for whom grazing must be replicated to meet both nutritional and behavioural requirements. As sward (grass) length increases throughout the year it naturally becomes denser, allowing species that graze longer sward to take advantage of greater instantaneous intake rates. However, as sward density increases, so does concentration of cell wall components, making the grass tougher to process and reducing diet quality. It has been suggested that sward length and the digestive constraints it can offer should have less effect on hindgut fermenters in comparison to ruminants. Ruminant grazing strategies are thought to be governed by slow digestion rate due to the time needed for rumination. This results in ruminants often being found to favour shorter, higher quality sward. Additionally, ruminant dentition does not favour the handling of the tougher stems of longer sward. In this respect, hindgut fermenters with double sets of incisors, such as equids, may have an advantage. However, not all hindgut fermenters share this dentition - White rhinoceros only have molars and pre-molars. To examine the effects of sward structure on the grazing behaviour of captive White rhinoceros, a preliminary investigation was undertaken at Knowsley Safari. The selection rate of short, medium and long length sward and maintenance of grazing lawns over a 20.5-hectare reserve indicated that incidence of white rhino grazing on short sward was significantly higher than incidence of white rhino grazing on medium or long length sward ($Z= 8.83$, $p= <0.03$). These results suggest that the subjects benefitted from the higher nutritional quality of the short sward rather than the higher instantaneous intake rate offered by

Clostridium: Acute Death and
Response in Southern White
Rhinoceros

(Ceratotherium simum simum)

Clarice Brewer, Lead Rhino Specialist

White Oak Conservation Foundation

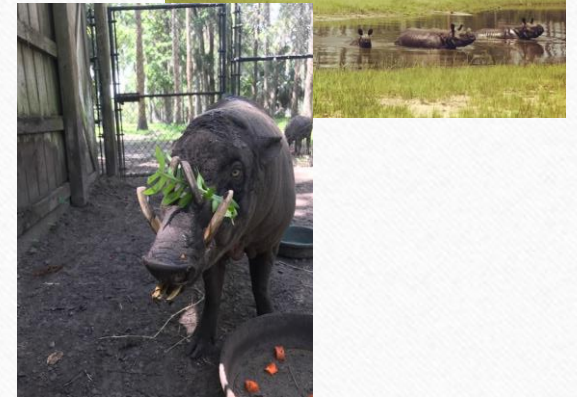
Southern White Rhinoceros at White Oak Conservation Foundation

- Currently house many Southern White Rhinoceros
 - Time of Clostridium outbreak, had 9.16 Southern White Rhinos

- Along with

- 2.6 Greater One Horned Rhinoceros
- 1.3 Southern Black Rhinoceros

- Team also takes care of Grevy's Zebra breeding herd, Somali Wild Ass breeding herd, Babirusa breeding group and bachelor groups of mixed species antelope, gazelle and cervid



First Case: January 6, 2016

- 10 year old female
- Found dead at 4:30 pm
 - Had been seen eating hay at 3:30 pm
- 43 day old calf at side
 - Pulled to hand raise
- No gross abnormalities on necropsy
- Suspected enterotoxemia
- Samples sent out for culture later returned with significant *Clostridium perfringens* Type A growth on the ileum

- *Clostridium perfringens*, a Gram-positive, anaerobic bacteria, is typically a component of the normal gut microbiome in rhinos. *Clostridium perfringens* becomes problematic when a toxigenic strain is introduced into a population or other health or environmental stressors provide a favorable growth environment and lead to the production of potent toxins.¹

1. McGuirk, Sheila M., DVM, PhD. Managing Clostridial Diseases in Cattle. University of Wisconsin, School of Veterinary Medicine, 2015
Linden Drive, Madison, WI 53706

Second Case: March 21, 2016

- 9 year old female
- Found in early morning (most likely died early evening prior)
- 52 day old calf at side
 - Pulled immediately to hand raise
- No definitive cause for death found on necropsy
 - Suspected enterotoxemia with sepsis and shock
 - Samples sent out for culture later revealed *clostridium perfringens* Type A, supporting suspected death of acute systemic shock due to clostridial enterotoxemia

Meetings with rhino team, veterinary staff

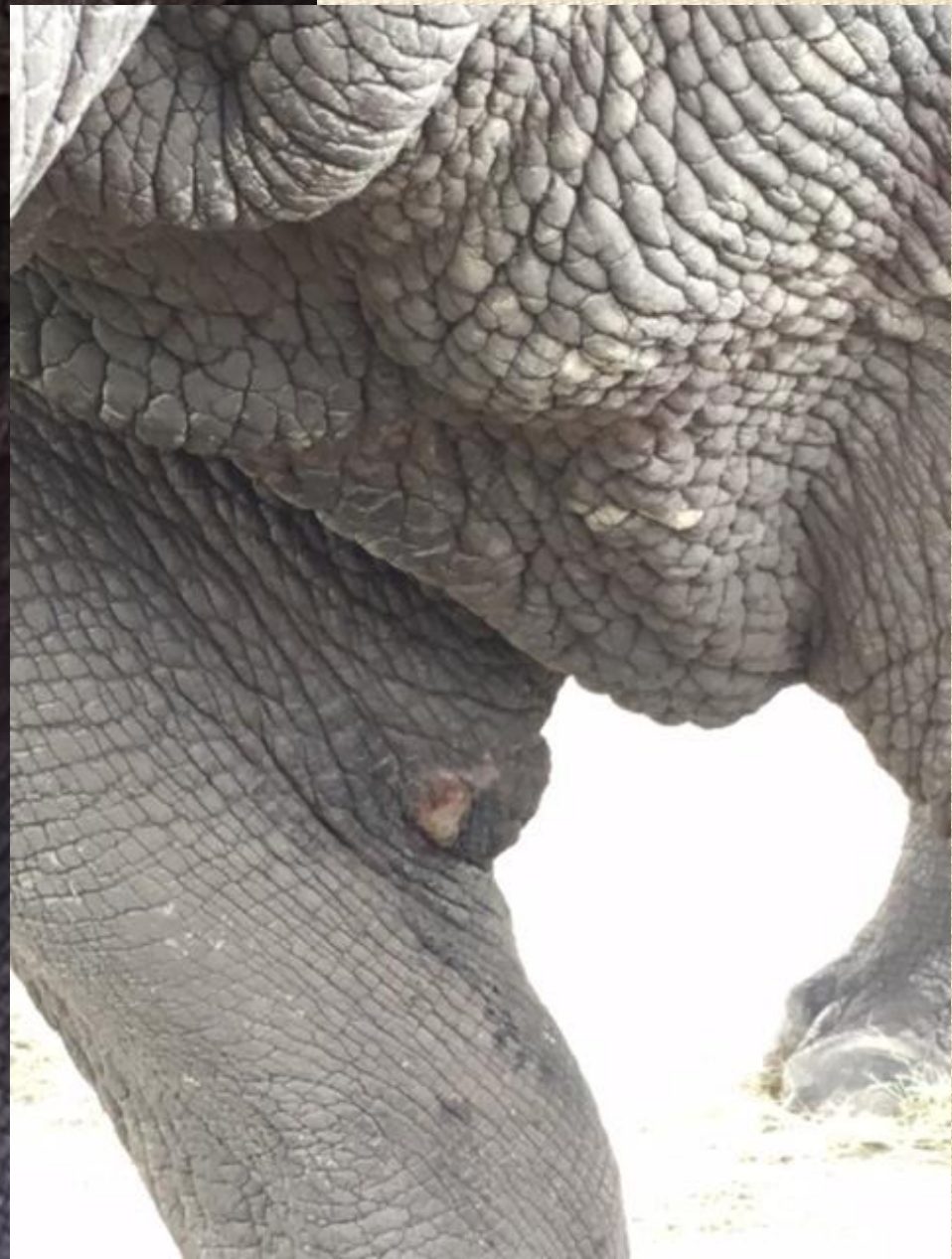
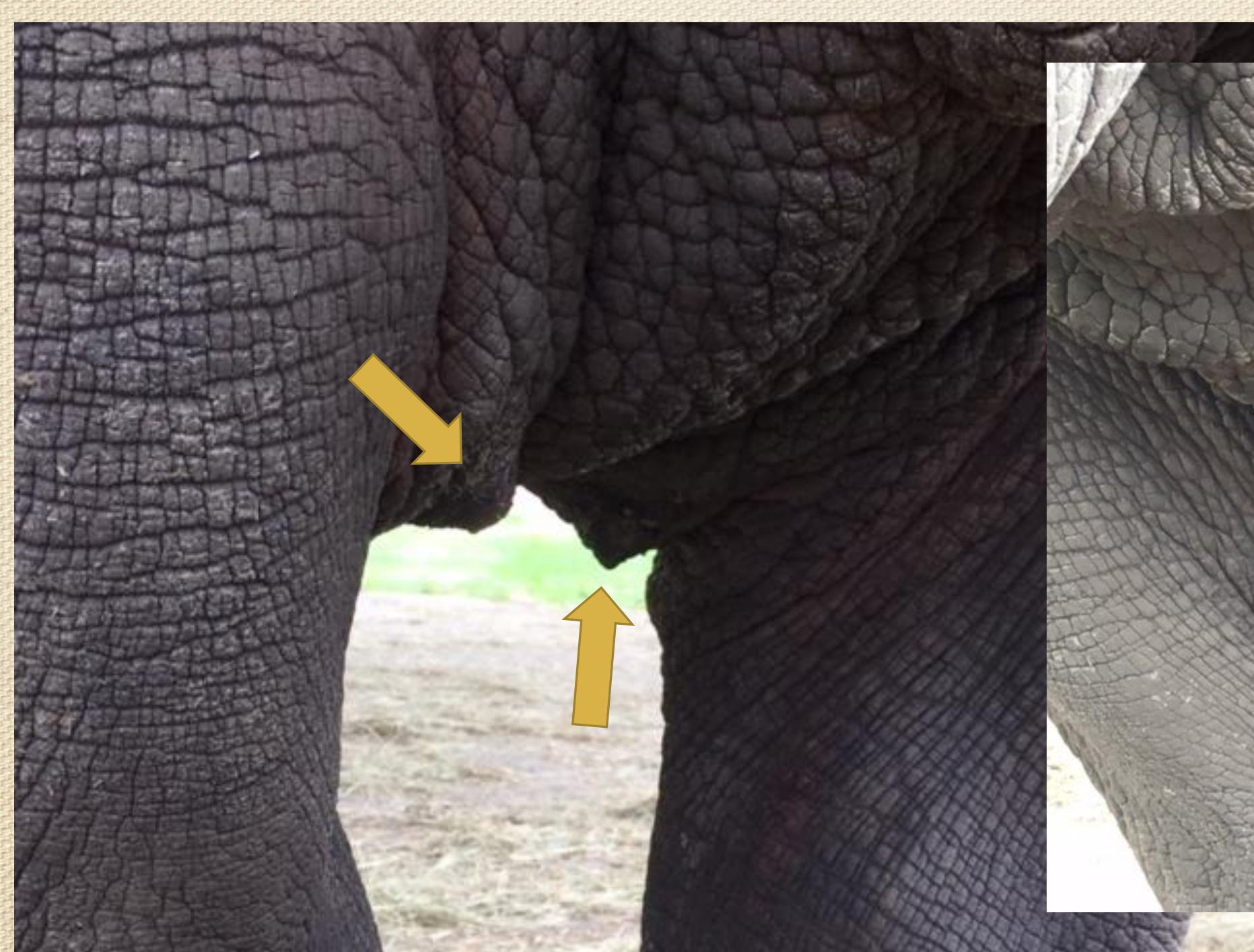
- Parallels between the two deaths discussed
- Eliminating food, water, vegetation sources as a source of toxin
- Unanimous decision to vaccinate
- Both cows with calves
 - Calves within 10 days of age at time of dams death
- All returned negative for any known toxins
- Vaccinate for Clostridium A (found in first case) and Clostridium C/D (commonly found in livestock)

Clostridium Vaccinations

- Vaccines used:
 - Clostridium perfringens types C&D toxoid, Professional Biological Company, 2 ml
 - Clostridium perfringens type A toxoid, Novartis, 2 ml
- Vaccines never administered at White Oak before, plan to vaccinate small group and monitor for adverse reactions
 - Initially vaccinated 3.0 Southern White Rhinoceros housed together in bachelor group
 - Clostridium perfringens types C&D toxoid administered inside of left antebrachium (SQ in left “armpit”)
 - Clostridium perfringens type A toxoid administered inside of right antebrachium (SQ in right “armpit”)
- Blood collected prior to vaccinations to later be sent out for antibody response to vaccine
- After several days, no vaccine reactions seen
 - ALL white rhinoceros (later all rhinoceros species) on property were vaccinated with clostridium vaccines







- Majority of the rhinos developed some sort of vaccine reaction, much more frequently to the Clostridium A than C/D vaccine
- Some abscessed while other rhinos had hot, raised swellings, but never ruptured an abscess
- Abscesses were treated with dilute betadine solution and SWAT to keep insects away



Third Case: March 30, 2016

- 3 year old female
- Found early morning (most likely died late night/early morning)
- Definitive cause of acute death not found on necropsy
 - Suspected shock and enterotoxemia
- Samples sent out for culture later revealed *clostridium perfringens* Type A on many sections of the GI tract, with many *clostridium perfringens* isolated from cecum, colon, jejunum and ileum

Quarantine

- After the third white rhino death, a quarantine was immediately placed on the herd where all three deaths occurred
- All 7 rhinos kept in corrals until further notice (ended up being just shy of 5 months)
- Around the clock monitoring was started for the white rhino herds
 - Keepers from all areas helped out with 4am-12 noon shifts!
 - Thought that if unable to treat, would at least have quicker access to the deceased rhino for more definitive necropsy results



Enclosure Modifications

- Entire enclosure tilled and turned over
- Sprigged with hybrid Bermuda grass
 - Heavily irrigated to stimulate growth in Florida conditions
- All natural wallows filled in
- Ditches relocated
- New man-made wallow with water valve installed

Meanwhile...



Vaccine Boosters

- Clostridium vaccines were boosted in all rhinos one month after initial vaccines administered
- Collected blood prior to any vaccines, before giving booster vaccine and one month after boosters to gauge antibody response

Titer Results

- Used ELISA (enzyme-linked immunosorbent assay) to test for antibody reaction to *Clostridium perfringens* alpha-toxin
 - Able to do “in-house” thanks to South-East Zoo Alliance for Reproduction & Conservation (SEZARC)!
- Only one individual failed to have an antibody response
 - Was unable to collect blood on that individual one month after booster, inconclusive results
- Overall, positive antibody results to *Clostridium* vaccines

Today

- Clostridium vaccines are part of the annual vaccinations for all rhinos housed at White Oak
- Difficult at times, diagnosis of exclusion





Questions?

If you think of any questions later:
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Thank you IRKA and White Oak!

