Rhinoceros Taxon Advisory Group and White Rhinoceros SSP – Hypovitaminosis A in Rhinoceros and Elephants

Approved by the AZA Animal Health Committee and Veterinary Scientific Advisory Group
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We have become aware of a substantial number of cases of hypovitaminosis A (low vitamin A) in rhinoceros (white, black, and Greater one-horned documented) under human care. These cases have been linked to unforeseen and poorly understood changes in the vitamin A ingredient from several manufactured diets. Animals are showing clinical signs that would be associated with low A, such as deep cracks in the hoof or horn that are lingering longer than usual. This issue has likely been occurring for over a year, hence vitamin A stores in the body of the animals may be depleted, resulting in markedly low levels of vitamin A in serum (<40 ug/L or ng/ml).

Pregnant and lactating animals, as well as any animals with compromised immune systems, appear to be more susceptible due to increased need for vitamin A in the body. Over 40 institutions have contacted Dr. Katie Sullivan, Rhino Nutrition TAG advisor, regarding ongoing cracking issues, lack of wound healing, or pregnancy / lactation concerns, and low values after emails were sent to Institutional Representatives for the AZA Rhino TAG and the Rhino Research Council in August and October 2023. Dr. Sullivan has been investigating and substantiating this issue since summer 2022. Analysis of the diets in question show adequate vitamin A is present in these diets, but bloodwork from animals ingesting these diets show low vitamin A levels (from below detection limits of 5 ng/ml through about 40 ng/ml). This indicates that the feed vitamin A has limited absorption in our animals. The concern is only with African and Asian elephants and rhinos as we have not seen evidence of issues in other tested species.

The Rhino TAG has been working with the manufacturer and the sources of vitamin A at the plant making elephant and rhino feed have now been switched to the single source confirmed to work, and this new feed is currently being distributed in late 2023. Recently tested vit A levels in rhinoceros and elephants show an improvement in the vitamin A levels when fed the diet with the changed vitamin A source as of spring 2024. It will likely take time before serum vitamin A levels return to normal (closer to 60 ug/L or higher - see expected ranges below). We will continue to follow, retest and share results with the zoo community in the months to come.

In the meantime, we recommend immediately evaluating the vitamin A status of your rhinoceros and elephants, especially pregnant and lactating females and if any clinical signs are noted, as vitamin A is critical for growth, reproduction, and immunity.

The lab that is recommended to use for testing serum vitamin A in rhinoceros is Cornell Veterinary Diagnostic Lab for $33.50 / sample. By using this lab, we hope to better standardize the results, and this lab has been extremely reliable. Dr. Sullivan performed quality control repeat rhino samples and standard testing to ensure valid results from Cornell for this assay. Please specify to the lab that it is a rhino sample, so they know how to handle it properly and prepare for expected low levels. A royal blue top tube or red top may be used for collection, but please avoid long term light exposure if possible. Please contact Dr. Sullivan with any questions on lab choice and testing. Not every lab runs vitamins accurately on rhinoceros, even larger well-known labs.

Expected “normal” ranges*

	Serum Vitamin A (retinol; ng/mL)
White Rhinos	60 – 100
Black Rhinos	40 – 80

*Please note these are based on average values in multiple literature sources from animals under human care and multiple years of data (Sullivan and Valdes 2020). These values appear validated by recent data shared from non-compromised animals in the population during the last 6 months (n=12; Avg 55 ± 6 ng/ml).

In the unfortunate event that a rhino dies at your facility, it is recommended that you submit whole tissue (i.e., liver) for Vitamin A testing as well. This tissue testing is currently only available at Michigan State University’s Veterinary Diagnostic Lab (https://cvm.msu.edu/vdl). However, please use Cornell for any serum testing.

Please contact Dr. Sullivan for details on Vitamin A supplementation for your rhinos, especially for pregnant females with low values. Vitamin A can be dangerous to feed as a supplement and can be toxic if given in too high a dose, so caution and the involvement of your veterinary / nutrition team are recommended.

Thank you for working as a community on this issue. We invite you to participate with Dr. Sullivan’s continued efforts by contributing your data to strengthen the pool of results, which will then be shared anonymously with rhino institutions.

Please feel free to contact any of us with questions on this ongoing rhinoceros nutrition and health issue.

Thanks all,

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