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## A PILOT STUDY ON THE EFFECTS OF A LOW-STARCH DIET ON INSULIN RESISTANCE IN TWO CAPTIVE BLACK RHINOCEROS (*Diceros bicornis*) AT THE CLEVELAND METROPARKS ZOO

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### Abstract

Black rhinoceros captive breeding programs are not self-sustaining due to metabolic disorders (including hemolytic anemia, necrolytic dermatopathy, iron storage disorder, and rhabdomyolysis) not usually seen in free-ranging populations.<sup>1</sup> Researchers hypothesize that these diseases are due to obesity-mediated chronic inflammation that contributes to iron overload, insulin resistance, and hypophosphatemia. Preliminary data from ongoing projects at Cleveland Metroparks Zoo (CMZ) indicate measurable differences between potential markers of insulin resistance and inflammation in captive versus free-ranging black rhinos. Original rhino diets were formulated at CMZ based on the Rhino SSP Husbandry Manual and National Research Council domestic horse diet recommendations.<sup>2</sup> Similar to domestic horses, rhinos are hind-gut fermenters, and low-starch diets help manage insulin resistance in horses.<sup>4</sup> Working within the parameters of the previously established diets, we replaced high-starch grain pellets (Mazuri® ADF#16) with low-starch (25% less starch) grain pellets (Mazuri® 5V05).<sup>3</sup> Total quantities (with similar caloric content) of the diet remained unaltered. All animals were weighed regularly. We collected baseline blood samples prior to the diet change and continued collecting samples bi-weekly. Serum samples were analyzed for potential markers of insulin resistance (serum insulin and glucose) using enzyme-linked immunosorbent assays (ELISAs) previously validated at the CMZ endocrinology lab for use with black rhino serum. Preliminary data indicate declining averages in both insulin and glucose serum concentrations in both rhinos as compared to past averages. These declines may indicate an increase in insulin sensitivity and one step towards decreasing the incidence of metabolic disorders in black rhinos.

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### LITERATURE

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