

## TOTAL PARENTERAL NUTRITION AND INTENSIVE NEONATAL CARE IN A BLACK RHINOCEROS (*Diceros bicornis*) CALF

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Total parenteral nutrition (TPN) has been used in the nutritional support of domestic<sup>4,5,7</sup> and exotic neonatal hoofstock. These techniques and intensive neonatal veterinary care were applied to the nutrition and management of a black rhinoceros calf born at the St. Louis Zoological Park.

A female black rhinoceros calf (*Diceros bicornis*) developed significant hypoglycemia (blood glucose 30 mg/dL) and hypothermia (36°C) within 48 hours of birth, and refused to nurse. Normal gestation of the black rhinoceros is 15 months, but low birth weight (see Table 1) and elongated hoof slippers suggested prematurity in this calf. Clinical symptoms included poor sucking response and general lassitude; neonatal sepsis was suspected. Despite the aggressive use of intravenous potassium penicillin (Penicillin G Potassium, Squibb and Sons, Princeton, New Jersey 08540) and amikacin (Amiglyde, Fort Dodge Laboratories, Fort Dodge, Iowa 50501), IV maternal plasma, IV and IP fluids and glucose, the calf continued to deteriorate. On Day 5 a peripheral catheter was pulled and a central catheter was placed via a jugular cutdown.

Six hours after the surgical procedure, the calf developed acute pulmonary edema that responded to the IV administration of furosemide (Lasix, Hoechst-Roussel Agri-Vet, Somerville, New Jersey 08876) and prednisolone sodium succinate (Solu-Delta-Cortef, Upjohn, Kalamazoo, Michigan 49001). The following day (Day 6), the calf's hematocrit, platelet count and white blood cell count dropped precipitously, suggesting disseminated intravascular coagulation (DIC). After major and minor cross matches, the calf apparently responded to the IV transfusion of 1 liter of maternal whole blood (PCV rose from 11.5% to 28%). However, blood gas evaluation revealed increasing hypoxia and hypercarbia. Positive end pressure ventilation (PEEP) via an endotracheal tube was required to improve ventilation and blood gas status. On Day 8, the animal became increasingly unresponsive to the ventilatory therapy and it died that evening.

Necropsy revealed stiff, noncompliant lungs with severe pneumonia, pleuritis, fibrinous pericarditis, bacterial leptomeningitis, and multiple gastric ulcers. Hemorrhage around the spinal cord and base of the brain was presumed to be secondary to the ventilatory therapy. A hemolytic *E. coli* was cultured from multiple organ systems.

Nutritional support during Days 2-4 had included enteral gavage feedings with a canned milk (Pet Milk, Pet Inc., St. Louis Missouri 63102), an electrolyte solution (Pedialyte, Ross Laboratories, Columbus, Ohio 43216), accompanied by sucralfate (Carafate Tablets, Marion Laboratories, Kansas City, Missouri 64137). A commercial rhinoceros milk replacer (Rhinoceros Milk Replacer, Purina Mills, St. Louis, Missouri 63166)

that had previously been used to raise a premature black rhinoceros calf was obtained. However, the calf's condition deteriorated and gavage was discontinued before the formula could be added to the diet. After the placement of the jugular catheter, total parenteral nutrition (TPN) was administered using 1580 ml daily of the following formula:

TPN FORMULA:

50% glucose . . . . . 400ml  
 (TechAmerica, Kansas City, MO 64190)  
 Amino Acid solution . . . . . 400ml  
 (Free-Amine, Kendall-McGaw, Irvine, CA 92417)  
 Fat emulsion . . . . . 200ml  
 (Intralipid, Travenol, Deerfield, IL 60015)

Supplementation with potassium and magnesium countered hypokalemia and prevented hypomagnesemia.

The formula delivered approximately 125 Kcal/kg daily and was based on the energy requirements of neonatal foals. The amino acid requirements of large exotic animals are not well established, but again were based on those for foals. The protein requirements were based on those for calves, estimated at 3.75 gm protein/kg/day (0.6 gm nitrogen/kg/day).<sup>3</sup> The use of fat emulsions in TPN for exotic patients has not been well documented, but limited and preliminary experience indicates that fat emulsions may be appropriate and safely administered to these animals, eg, hyperlipidemia was not observed in this case. Although this rhinoceros calf died of complications from its sepsis before long-term TPN was achieved, this form of supplemental nutrition offers a valuable resource in the support of the exotic neonatal patient.

TABLE 1

Black Rhinoceros Calf Birthweights

N. American ave (n=10) . . . . .	36 kg
Previous ave at St. Louis (n=3) . . . . .	41 kg
Calf in this report . . . . .	30 kg
Premature calf at London Zoo <sup>5</sup> . . . . .	17 kg

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