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Studies on vitamin E supplementation in a black rhinoceros (*Diceros bicornis*)

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LOW circulating vitamin E levels have been reported in captive black rhinoceroses with values frequently below 0.2 µg/ml plasma (Brush and Anderson 1986, Dierenfeld and others 1988, Ghembremeskel and others 1988). Wild black rhinoceroses in Zimbabwe have been found to have much higher levels, up to 2.9 µg/ml (Dierenfeld and others 1988, Ghembremeskel and others 1988), although the limits of the normal range have not been fully established. It should be borne in mind that in domestic animals blood levels of vitamin E directly reflect intake, and in wild animals intake may vary widely from area to area and from season to season. It has been suggested that low plasma vitamin E levels may be a factor in the aetiology of the haemolytic anaemia that is the single commonest cause of death in this species in captivity (Miller and others 1986). The difference in plasma vitamin E levels between the wild and captive animals that have been studied is presumed to have a dietary basis but the nature of this is unknown. The present authors report on experiences in vitamin E supplementation to one rhinoceros.

Supplementation trials were carried out over a 14-month period on a 17-year-old male black rhinoceros kept at Regent's Park. Blood samples were taken at approximately four week intervals from the medial carpal vein without sedation and collected into EDTA and heparin tubes. Plasma was separated from the heparinised samples, frozen for storage, and then sent for α-tocopherol assay by high performance liquid chromatography at the Central Veterinary Laboratory, MAFF, Weybridge (Brush and Anderson 1986). Routine haematology was carried out on EDTA samples by the Department of Haematology, Zoological Society of London, courtesy of Dr Christine Hawkey.

The plasma α-tocopherol concentration of this animal on its arrival in December, 1987 from Whipsnade Park Zoo was less than 0.1 µg/ml. Its diet consisted of vegetables, concentrates and forage. Vitamin E was supplemented at a rate of approximately 12,500 iu per day (equiv-

alent to about 12.5 iu/kg bodyweight per day) for a period of eight months by providing α-tocopherol acetate - rich pellets (Special Diet Services, Witham, Essex). No significant increase in plasma vitamin E level was observed during this period.

Following this the α-tocopherol acetate supplement was exchanged for a supplement of 12,500 iu per day α-tocopherol as the alcohol (Hoffman La Roche) in a vegetable oil vehicle. There was no consistent rise in plasma levels while on this supplement for six months. The initial plasma level was 0.2 µg/ml and after six months it was measured at 0.14 µg/ml. No haematological abnormalities were detected at any point in the 14 month trial.

These results suggest that there are difficulties in raising plasma α-tocopherol levels using these oral supplements even at high concentrations in the diet. There are many possible explanations as to why this should be so. For example, black rhinoceroses may have an extraordinarily high dietary requirement for the vitamin, or they may break it down or be unable to absorb or utilise it (Patton 1989) in the forms offered here. Perhaps the most likely explanation is failure of absorption. Compromised absorption has been reported, for example, in children suffering from chronic cholestatic hepatobiliary diseases (Sokol and others 1987), and considerable variation in bioavailability of different preparations of vitamin E have been reported in sheep and cattle (Hidioglou and others 1988a, 1988a,b).

The black rhinoceros is a highly endangered species whose conservation is likely to depend in the long run on its management in zoos and ranches. It is important that this aspect of its nutrition receives further attention.

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Abstracts

Feline cowpox virus infection

COWPOX was first reported in a cat in 1977; since then its incidence has increased so that the domestic cat is now the most commonly recognised host of cowpox virus in Great Britain. This review of the condition considers the virus and its epidemiology, the pathogenesis of the disease, its clinical signs, diagnosis and treatment and the risks of the virus spreading from cats to people.

BENNETT, M., GASKELL, C. J., BAXBY, D., GASKELL, R. M., KELLY, D. F. & NAIDOO, J. (1990) *Journal of Small Animal Practice* 31, 167

Mucinous skin vesiculation in a hypothyroid dog

AN overweight St Bernard dog with bilateral entropion, blepharoptosis, and multiple, non-inflammatory papular and vesicular lesions on its head was found to be hypothyroid. A histological evaluation of skin biopsies confirmed the diagnosis of mucinous vesiculation. The skin and eyelid abnormalities all resolved when the dog was given supplements of thyroid hormone.

MILLER, W. H. & BUERGER, R. G. (1990) *Journal of the American Veterinary Medical Association* 196, 757

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