



Determination of feedstuffs nutritional composition and diet nutritional quality in the National Zoological Gardens of South Africa: case of black rhinoceros *Diceros bicornis*

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Animal Sciences
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Why was this study done?



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We empower people

The feeds consist largely of ingredients from human menus



The principle of feeding :

-“if it looks good and the animals eat it, it must be okay”

-“if the quantity is small , the animal will not be full.”



Lack of data on nutritional contents of feedstuffs fed to animals in the zoo



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How animals were fed some years ago?

- Documentation on the natural history of the animal,
- records from other captive management facilities, or
- use of the domestic animal as a model



Research design



Data Collection based on husbandry techniques

Nutrition Advisory Group. *Fact Sheet 010*
(Bernard & Dempsey, 1999)



Literature survey of nutrients composition

Medical Research Council (MRC) Food
composition Tables (FCT)
(Kruger, *et al.* 1998) and Internet search

Chemical and statistical analysis.

Chemical analysis: Proximate analyses
AOAC (2000)



Tables of feedstuffs nutrients composition

using International Network of feed Information Centres (INFIC)
(Harris, *et al.*, 1967)



Evaluation of Diets sheets using Zootrition™ programme

(Wildlife Conservation Society, 1999)





Diet evaluation of black rhinoceros

Diceros bicornis



Feeding status: Browser, non ruminant

Natural feedstuffs:

Esmilie and Adcock, 1994;
Dierenfeld, ES du Toit, R
and Braselton, E 1995





TABLE 1: NZG black rhinoceros diet sheet

	Food item	Quantity	Frequency
Black rhino	Apples, green	0.75 kg	Tuesday and Friday
	Embamin TE	20 ml	Weekly
	Boskos cubes	10 kg	Daily
	Game block lick		Ad libitum
	Browse: <i>Rhus lancea</i>	11 kg	Daily
	Horse cubes	5 kg	Daily
	Leafy vegetables : spinach	1.5 kg	Monday & Thursday
	Lucerne	7.5 kg	Daily



Results



Table 2: Black rhinoceros *Diceros bicornis* diet as a percentage of recommendation of black rhinoceros in maintenance(Nijboer & Janssen, 2003)

Nutrient	Diet % of recommendation	Nutrient	Recommended (%)
<u>Crude protein</u>	157.90	<u>Ash/ mineral</u>	
<u>Vitamin</u>		Calcium	171.22
Vit A	1.24	Phosphorus	70.49
Vit D2	0.00	Sodium	12.25
Vit D3	0.00	Iron	0.22
Vit E	0.04	Zinc	40.03
		Magnesium	8.11
		Potassium	34.41
		Copper	46.56
		Selenium	713.21



Sources of protein



<u>Feed</u>	<u>Description</u>	Protein percentage	<u>Contribution %</u>
Apples average	Raw	1.18	0.01
Spinach(MRC)	whole	26.73	0.29
Lucerne (NZG)	Dry season	17.81	31.37
Horse cubes	Concentrated horse feed	12.00	13.39
Boskos (game pellets)	Grazing supplement)	10.00	22.31
Karee	Leaves	11.70	32.63
	Total diet protein content:	12.63	



Minerals



Ca

feed	Ca %	contribution %
Apples average	0.01	0.0
Spinach	1.17	0.3
Lucerne	0.86	38.3
Horse cubes	0.44	12.0
Boskos		49.4

Based on 67.78% of dietary ingredients. Total: 0.51

Mg

Apples average	0.02	1.9
Spinach	0.77	98.2

Based on 1.87 % of dietary ingredients. Total:



Vitamins

Vit E

<u>Feed</u>	<u>Source</u>	<u>Quantity</u>	<u>Unit</u>	<u>Contribution %</u>
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Apples average		16.0 mg/kg		81.50
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Spinach (MRC)		3.0 mg/kg		18.50
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Based on 1.87% of
dietary ingredients.

Total:

0.02 mg/kg





Health: based on the diet, NZG's black rhino has the same problem as all captive rhino all over the world : hypomagnesaemia, enterolithiasis, etc.

Management: NZG needs to permanently monitor diet evaluation and analysis of nutritional content of feedstuffs; to improve the methods of diet formulation; to adopt the Zootrition™ program; and to obtain the services of a clinical nutritionist.

Research: Establish a data base of nutrient composition of browses and create a platform of exchange on nutritional ecology in zoos



Thank you

