Short Communication

Feeding trials on captive black rhinoceros *Diceros bicornis minor* in the Eastern Cape, South Africa

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Three black rhinoceroses were translocated from Natal to the Eastern Cape. Food acceptability trials were undertaken because many plants eaten by black rhinoceroses in Natal do not occur in the Eastern Cape. Such information is valuable to ensure that translocated rhinoceroses are kept healthy prior to release which may help decrease post-release mortalities. Twelve tree and shrub species were used in the trial — mean mass (wet) of ingested food was about 38 kg/day/rhinoceros. Most woody plants were eaten but not succulents. Animals were in good health when released. It is suggested that, while in bomas, black rhinoceroses be given at least 40–45 kg/day of food comprising a wide range of indigenous plants.

Drie swart renosters vanuit Natal is in die Oos-Kaap hervestig. Voedselvoorkeurproewe is onderneem weens die feit dat baie plante wat deur swart renosters in Natal gevreet word, nie in die Oos-Kaap voorkom nie. Sulke inligting is waardevol om te verseker dat die verplaasde renosters gesond bly tydens aanhouding en om mortaliteite na vrylating te help verminder. Twaalf boom- en struikspesies is in die proef ingesluit en die gemiddelde massa van voedselinname was ongeveer 38 kg/dag/renoster. Houterige plante is gevreet terwyl vetplante nie gevreet is nie. Die renosters is in goeie gesondheid vrygelaat. Daar word voorgestel dat swart renosters ten minste 40–45 kg/dag gevoer word bestaande uit 'n breë spektrum inheemse plante terwyl hulle in aanhouding is.

Keywords: Black rhinoceros, feeding trials, translocated, Eastern Cape

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The Andries Vosloo Kudu Reserve/Sam Knott Nature Reserve complex (AVKR/SKNR) in the eastern Cape has received translocated black rhinoceroses *Diceros bicornis minor* (Linnaeus 1758) as part of the national conservation plan for this species (Brooks 1988).

Black rhinoceroses in Natal feed on a range of browse (Emslie & Adcock 1993) which does not occur in the eastern Cape (pers. obs.). Animals are therefore confronted with unknown food plants to which their gut microflora are not adapted. This problem is not unique and similar food availability differences exist during other translocation exercises in South Africa. Translocated rhinos are held in receiving bomas prior to release thus providing a chance to introduce animals to 'new' plants.

The aim of this study was, therefore, to determine how best, and which plants in the eastern Cape, to feed translocated rhinos in future. Given the threatened status of black rhinos in Africa (Brooks 1993), this procedure will contribute towards ensuring that translocated rhinos attain good condition before release. It is thus argued that animals in good condition at release, and having sampled some local plant foods, will have an increased chance of survival.

The AVKR/SKNR complex is approximately 35 km northeast of Grahamstown (33° 8' S, 26° 39' E). Dominant vegetation is xeric succulent thicket, a suborder of subtropical transitional thicket (Everard 1987), which encompasses Acocks's (1988) Fish River Scrub of the valley bushveld. It is a low (2 to 2,5 m), relatively sparse thicket with larger trees reaching 5 m (Everard 1987). Black rhinoceroses were common in this area in the past (Skead 1987).

One sub-adult male and two adult female black rhinoceroses were kept in separate bomas for three weeks. During a six-day acclimatization period a variety of shrub and tree species were given *ad libitum* including plants selected for the feeding trials. Fresh lucerne and water were available *ad libitum* throughout the boma period.

For the trial, twelve plant species were placed in three groups; a thorny group (*Acacia karroo, Azima tetracantha, Grewia robusta, Maytenus capitata*), other woody plants (*Euclea undulata, Ozoroa mucronata, Pappea capensis, Schotia afra*) and succulents (*Aloe ferox, Euphorbia bothae, E. triangularis, Portulacaria afra*). Each group was separately tested in a three-day trial. Food was weighed to the nearest 200 g on a Salter 50-kg balance and each species randomly allocated a corner of the boma. Animals were fed twice daily and each morning and afternoon food remains were collected and reweighed. Food acceptability was estimated by ranking the total wet mass of food ingested over each three-day trial. Evapo-transpiration was measured by weighing plant samples before and after each feeding period. Excluding the succulent plants, evapo-transpiration was relatively low and ranged from 3 to 10% (Table 1).

We decided *a priori* that if the animals refused to feed the trial would be cancelled. For this reason the succulent feeding trial was cancelled after the first morning feeding period. Also, the sub-adult male was taken off the woody diet after two days. The rhinoceroses were released in good condition after boma confinement and one gave birth in the wild.

Fresh lucerne was available *ad libitum* but was eaten by one animal only. Individual acceptability of the plants was similar for all three trials (Spearman's rank correlation; rs = 0,8; p = 0,1) and the amount of food presented did not differ from an even distribution (Wilcoxon signed rank test; n = 4; Z = 0,18; p = 0,86). Consequently, data from all three animals were combined.

Excluding the succulents, which were avoided by all three animals (Table 1), the rhinoceroses ate an average of 37,8 ± 9,0 kg wet weight/day of thorny and woody plants (n = 14 days). This comprised an average of 41,0 ± 9,0 kg thorny and 32,0 ± 5,9 kg woody plants. By comparison Emslie & Adcock (1993) recorded that a captive black rhino, ate an average of

Table 1 Overall amount of different plant species eaten by three captive black rhinoceroses during the three day feeding trial. Evapo-transpiration recorded for each plant is also indicated

Plant species	N	% of total eaten	Kg eaten	% Evapo-transpiration	Kg day^{-1}	*SD*
Thorny (3 days)						
Azima tetracantha	18	62,2	155,4	10,3	16,1	3,8
Maytenus capitata	18	54,2	73,0	3,0	7,8	2,3
Acacia karroo	18	52,3	110,4	8,0	11,2	3,4
Grewia robusta	18	43,9	55,9	3,1	5,9	3,2
Woody (3 days)						
Pappea capensis	10	65,9	81,8	5,1	15,7	4,5
Euclea undulata	10	40,3	42,8	9,0	7,6	5,5
Schotia afra	10	33,4	29,2	9,5	4,4	2,2
Ozoroa mucronata	10	28,2	27,4	5,7	4,3	1,9
Succulent (1 day)						
Euphorbia bothae	1	6,1	6,8	0,3	1,6	0,4
E. triangularis	1	10,3	5,4	0,7		
Aloe ferox	1	8,0	5,6	0,3	1,4	1,7
Portulacaria afra	1	7,6	6,5	0,8		

28,2 kg of food per day, similar to the 30 kg/day recorded by Hillman (1982; *op. cit.*).

A. tetracantha, P. capensis, M. capitata and *A. karroo* represented the largest mass of individual plant species eaten and over the three days exceeded 50% of the total amount given (Table 1) . *G. robusta* and *E. undulata* were also eaten readily but less than the previous four species (Table 1). *Euclea undulata* was rejected by wild rhinoceroses in Zululand as were *Maytenus* spp. (Emslie & Adcock 1993).

Although only twelve plant species were used in this study, the results are clear; all species offered, except succulents, were eaten. Of the twelve plant species, nine do not occur (including three of the four succulents) or occur infrequently in the Zululand reserve and hence were unfamiliar to the rhinoceroses. However, the rhinoceroses appeared to quickly accept some of these 'new' foods.

In Hluhluwe Umfolozi Park, black rhinoceroses feed mainly on *Spriostachys africana* and a wide range of *Acacia* species (Emslie & Adcock 1993). The importance of *Acacias* in the diet of black rhinoceroses, has been well documented (Goddard 1968; Loutit, Louw & Seely 1987; Emslie & Adcock 1990, 1993) and large amounts of *A. karroo* were eaten in this trial. However, *A. karroo* is the only *Acacia* in the eastern Cape.

Tree euphorbias (*Euphorbia* spp.) are eaten by *D. b. michaeli* (Goddard 1968; Hall-Martin, Erasmus & Botha 1982) and *D. b. bicornis* (Loutit, Louse & Seely 1987) and are occasionally pushed over by black rhinoceroses in AVKR/SKNR (pers. obs.). But these plants are usually eaten during dry seasons, implying that they are used as a source of water (Goddard 1968). Since the rhinoceroses in the present study had water provided *ad libitum*, it may have been unnecessary for them to eat succulents, particularly since *Euphorbias* are scarce in Zululand Reserves, the source area for the rhinoceroses.

Ample water may only partly explain the rejection of *Portulacaria afra* which is eaten in relatively large amounts by black rhinoceroses (*D. b. michaeli*) during the dry season in Addo Elephant National Park (Hall-Martin *et al.* 1982). *P. afra* is the dominant in xeric succulent thicket and important for many wild and domestic browsers (Aucamp 1979; Aucamp & Tainton 1984) and there seems no reason why *P. afra* was not eaten in the trials. *P. afra* is uncommon in Zululand and its rejection in these trials may have been simply that it was unknown to the animals. Further studies are required to determine the extent to which released black rhinoceroses eat this plant.

It is possible that insufficient time was given for the animals to familiarize themselves with the succulents. Also, presentation of succulents only, rather than a mixture of food types, may have biased the results. However, evaluation of all combinations of the twelve species was impracticable.

Conclusions

When introducing black rhinoceroses to areas where much of the browse may be unknown, the catholic diet of this species (Goddard 1968; Emslie & Adcock 1993) must be exploited. A wide range of food species, including about 40–45 kg wet weight of plants that the rhinoceroses will eat, should be presented daily. Potential new foods should be introduced regularly and repeatedly and checked daily for evidence of browsing. Given the rejection of *P. afra* in these trials, introducing captive rhinoceroses to local, potential foods during the boma period may be important in the post-release survival of translocated rhinoceroses.

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