

Keepers engage in research project to enrich foraging behaviour of NZG's black rhino

By Robynn Ingle-Moller, NZG Environmental Enrichment Coordinator

The black rhino (*Diceros bicornis*) once roamed most of sub-Saharan Africa, but today is on the verge of extinction due to poaching fuelled by commercial demand.

Black rhinos prefer dense wooded areas with shrubs and plenty of water, but not closed canopy forests and completely open land. The black rhino has a pointed upper lip, while its white relative has a squared lip. The difference in lip shape is related to the animals' diets.

Black rhinos are browsers that get most of their sustenance from eating trees and bushes. With their distinctive muzzle shape they browse on shrubs, eating fruits, leaves and flowers. They use their lips to pluck leaves and fruit from the branches and are also known to use the horn to dig up roots.

White rhinos graze on grasses, walking with their enormous heads and squared lips lowered to the ground.

After picking up some stereotypic foraging behaviour in the NZG's captive black rhino male, a research team consisting of Prof Antoinette Kotze, Head of the NZG Research Department, Robynn Ingle-Moller, the NZG's Environmental Enrichment Coordinator, Tambo Mulaudzi, Curator: Antelope Section and keepers J Mokgalaka, E M Pitse and L K Nengovhela set up experiments to encourage foraging behaviour and activities typical of black rhinos in the wild.

The SPIDER framework, a research tool used for animals in captivity, indicated that the way in which male rhino are being managed in captivity does not suit them behaviourally. The NZG research team encouraged new foraging activities and eliminated stereotypic behaviour by introducing elements of novelty to the rhino enclosure.

To ensure the optimal feeding care of black rhinos, unpredictable temporal and spatial feeding needs to be administered in such a way that the animal has to work for the food. This introduces an element of novelty similar to what the animal is confronted with in the wild.



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"We attempted to enhance foraging behaviour by increasing the usage of enclosure space and eliminating the stereotypic behaviour of going straight to the feeding trough every time our black rhino male's night quarters are opened," says Robynn.

Novel materials and methods

The black rhino enclosure was demarcated into three zones of relatively equal size. In order to introduce novelty, the team moved the normal food quota 10m away from the feeding trough in four directions in metal feeding slabs. To increase the usage of space they suspended branches of karee (*Rhus lancea*) from chains at three points along the sides of the enclosure.

They recorded behavioural data by using an ethogram that relate to feeding exclusively. The behaviours analysed were searching for food, finding food, sniffing food, eating food, playing with food and ignoring food.

For baseline data they used the same ethogram, but without manipulating the presentation of the food. The normal food quota was presented at the feeding trough while browse was thrown into the enclosure on the western side.

The enrichment data from the dataset were treated separately from the baseline data. The team compared the frequencies of feeding behaviour between the enrichment programme and the baseline study. They did the same with the different zones to see if different trends were evident in enrichment and baseline.

Results

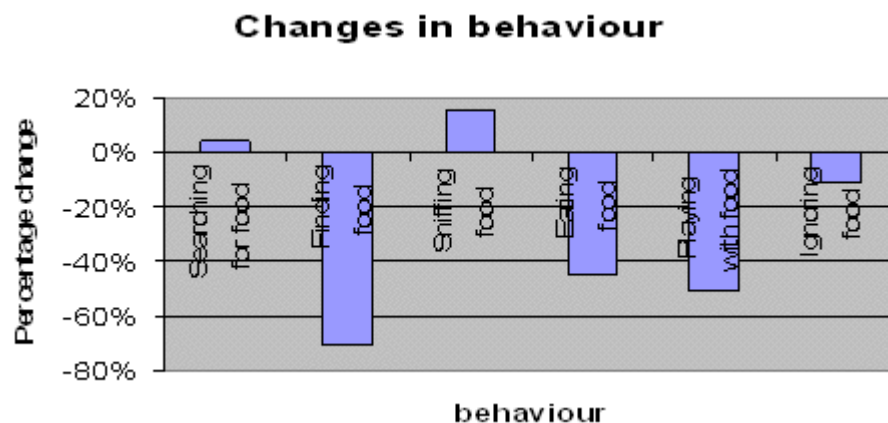
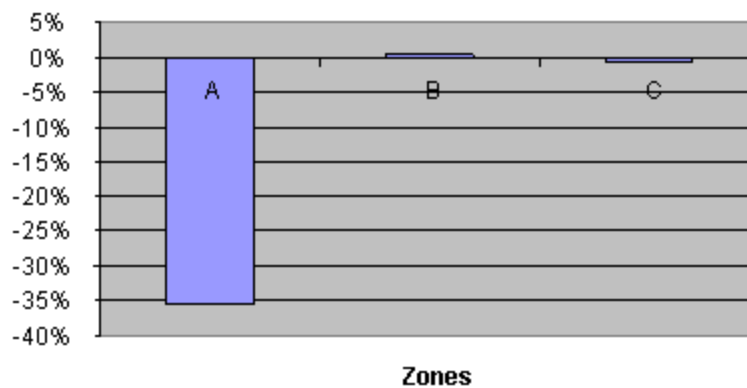


Fig. 1. Change in foraging behaviour after enrichment

Change in enclosure space usage



Sniffing and searching for food behaviour increased by 15.6% and 4 % respectively while finding food, eating food, playing with food and ignoring food decreased by 71% , 44.9%, 51% and 11% respectively (Fig. 1).

The use of zone A and zone C was reduced by 35.4% and 0.72% respectively while the use of zone B increased by 0.36% (Fig. 2).

Imitating browsing behaviour in the wild

Increasing the behaviour of food search by 4% reduced the stereotypic movement from the night room straight to the feeding trough, where food would normally be placed. Baseline data and initial observation indicated that every day after the enclosure had been cleaned and the night room was opened, the rhino would march straight to where the food had been placed.

With the poor eyesight of the rhino, having a structure other than the enclosure "furniture" that he is used to in his space, triggered charging behaviour, curiosity and alertness. The rhino was not sure whether the new heaps in his enclosure were actually food. He would charge at a heap not knowing what it was and kick at it with his front legs. He would then eat, but not too comfortably.

When the food was suspended from the metal bars on the sides of the enclosure, the vibrating sound of the bars when the animal pulled the branches seemed to excite him.

Continuous eating was drastically reduced. Under previous circumstances the animal would eat continuously for a longer period and rest for a longer period. "During enrichment we noticed that he fed for shorter bouts and engaged in other activities like sniffing, charging at the food and marking territory, the result of being taken out of his comfort zone," says Robynn.

Previously, ignoring and playing with food at the feeding station occurred more frequently because the station had become a comfort zone. The team found that these two behaviours declined as a result of the novelty element that was introduced. If the rhino was not eating he would engage in activities other than just standing next to the food ignoring it or playing with it.

In addition, the enrichment programme definitely increased the usage of space in the enclosure.

Beneficiaries

The project had two sets of beneficiaries, the black rhino and its keepers. During the experiments where the browse was suspended from the sides of the enclosure, the animal had the opportunity to browse at a height similar to that of rhinos in the wild instead of grazing leaves from the ground. We noticed the rhino stretching to reach the browse above his head.

Curiosity and alertness were brought into play by the element of novelty when feeding away from the normal trough. The team also observed the rhino marking the traditional feeding trough when food was not served there.

With its scientific approach, the project has taught the keepers some of the basic elements of scientific research. Giving them full ownership of the project has raised their interest in and enthusiasm for scientific research activities.

The findings of the project have been incorporated in the animal management plan to ensure continuity and the welfare of the animal.

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