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IN SEARCH OF SOLUTIONS FOR SUSTAINABLE WILDLIFE MANAGEMENT IN KENYA

THE WILDLIFE RESEARCHER

CONTENTS

A race against time to save a critically endangered species

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The black rhinoceros (*Diceros bicornis*) is critically endangered. Its population has declined by an estimated 97.6% since 1960 reaching a low of 2,410 globally in 1995 mainly as a result of poaching and loss of habitat. By the end of 2010, there were about 4,800 black rhinos in the wild.

There are four subspecies of the black rhinoceros namely *Diceros bicornis bicornis*, *Diceros bicornis longipes*, *Diceros bicornis michaeli* and *Diceros bicornis minor.* The subspecies *Diceros bicornis michaeli* also known as the eastern black rhinoceros has its current stronghold in Kenya which holds approximately 85% of the total wild population. Smaller but growing numbers of this subspecies also occur in northern Tanzania following an introduction from South Africa.

Previously, the subspecies occurred in South Sudan, Ethiopia and Somalia through Kenya into northern-central Tanzania and Rwanda but has been extirpated in most of its former ranges. The Kenyan population estimated at 600 individuals is found in private sanctuaries, conservancies and protected areas.

It was a matter of great concern when death of black rhinos was reported in May 2010 at Pyramid Sanctuary within the Ol Jogi conservancy in Laikipia. The conservancy is a fenced area which consists of a fenced sanctuary and a ranch.

Concerted efforts were made to diagnose the problem and institute appropriate disease management strategies. By the time the disease outbreak was contained, nine rhinos had died from what was confirmed to be clostridial enterotoxaemia. Males and females as well as young and old animals were affected in different parts of the sanctuary. Incidentally, there were no mortalities recorded in the ranch.

Affected rhinos presented severe abdominal pain manifested by struggling and rolling on the ground, laboured breathing and death within 3-12 hours after signs of sickness were observed. Post-mortem examination revealed good body conditions with no obvious external lesions. The main gross lesions in all the rhinos that died were in the gastro-intestinal tract (GIT). The small and large intestines were diffusely congested, oedematous and filled with haemorrhagic fluid. The caecum in particular had large oedematous swellings. The mesenteric lymph nodes were enlarged and congested. A tentative diagnosis of clostridial enterotoxaemia, salmonellosis and toxicosis was made based on this picture.

Samples were collected at post mortem and submitted to referral laboratories for confirmatory diagnosis. Sections of the heart, lung, liver, spleen, kidney, small and large intestines, mesenteric lymph nodes and brain were preserved in 10% buffered formalin for histopathological analysis. Intestinal contents from sections of the GIT and tissue samples from the brain, liver and kidneys were also collected in cool boxes with ice packs for bacteriological culture and toxicological analysis. These samples were submitted to the University of Nairobi Veterinary School, the Government Chemist, Onderstepoort Veterinary Institute and IDEXX Laboratories in South Africa as well as the Central Veterinary Research Laboratory (CVRL) in the United Arab Emirates.

Toxicology samples tested negative for commonly used pesticides such as organophosphates, organochlorines,

carbamates and arsenic. Microscopically, the most characteristic lesion was severe necrotising-haemorrhagic enteritis. Numerous gram-positive rod-shaped bacterial colonies characteristic of clostridium species were occasionally seen in the intestinal mucosa. *Clostridium perfringens* type A was isolated from the stomach contents. *C. perfringens* type A was postulated as the aetiological agent.

Fig. 18 & 19: Gross pathological changes in a black rhino that died suddenly showing congestion and haemorrhages in the intestines

Fig. 20: Gross pathological changes in the caecum of a black rhino that died suddenly, showing oedematous swellings on the mucosa

Clostridium perfringens is responsible for different diseases such as gas gangrene, food poisoning and diarrhoea in humans as well as for enterotoxaemia and haemorrhagic gastroenteritis in many domestic and wild animals. The bacterium is ubiquitous in the environment and foods. It forms part of the normal gut flora in man and animals.

Enterotoxaemia describes a disease caused by absorption of toxins produced by the growth of *C. perfringens* biotypes. There are five biotypes of the bacteria based on the differential production of these lethal toxins namely A, B, C, D and E. All types of *Clostridial perfringens* cause profound enterotoxaemia with sudden death as the principal manifestation. The disease is rarely reported in free ranging wildlife but is not uncommon in domestic animals that experience sudden change in diet. To our knowledge, this was the first reported case of clostridial enterotoxemia in free ranging wildlife in Kenya.

Being normal GIT flora, the factors that trigger the proliferation of *Clostridium* species leading to the development of the disease are not well understood. Nevertheless, it is presumed that some alteration in the normal GIT environment permits excessive multiplication of the bacteria which produce the toxins capable of causing intestinal damage and systemic effects such as shock. The sanctuary experienced a devastating drought in 2009 which drastically reduced

the populations of grazer species. It was estimated that over 600 Impalas and 400 buffaloes representing over 95% of each of these species died. The sanctuary later received above normal rainfall during the long rains of April 2010 leading to rapid overgrowth of foliage. It is presumed that these changes resulted in unusual amounts of green plants in the digestive system of the rhinos. These highly digestible plants with high amounts of proteins and carbohydrates and little fibre possibly together with other predisposing factors that were not identified played a role in changing the normal gut environment in the rhinos triggering the proliferation of *C. perfringens*.

After the death of the fifth rhino, to avert further losses, the remaining breeding females and one calf were moved from Pyramid Sanctuary to the ranch. This was aimed at reducing exposure of the animals to the yet unknown trigger factors leading to the mortalities. Two calves whose mothers had died were moved to a 1 hectare enclosed boma within Pyramid while two bulls were left on site.

All the 10 animals were covered with an intramuscular injection of the long acting antibiotic Duplocillin LA® consisting of 150,000 IU of Procaine penicillin and 150,000 IU of Benzathine penicillin per ml. Each rhino was also immunized with 5ml of the multivalent bacterin-toxoid ULTRABAC® 7 that contains killed standardized cultures of various *Clostridium* species for protection against different Clostridial infections. Two of the rhinos died soon after these interventions. It was presumed that the two were already affected by the time they were captured and treated and the stress of capture and relocation may have exacerbated the condition.

Fig. 21: An Immobilized rhino being processed for relocation from Pyramid Sanctuary to the Ranch side of Ol Jogi Conservancy

Vaccination is a common practice in disease management in domestic animals and humans but is rarely used in wildlife. Most vaccines are untested in wildlife and their delivery is beset by logistical, financial and animal welfare considerations. In this case, it was a race against time because the animals at Pyramid sanctuary were at risk of complete extirpation. The animals were thereafter monitored closely to assess response to the treatment. These management interventions successfully arrested further mortalities.

Species introduction: The case of Grevy's zebra in Tsavo ecosystem

Ngoru Bernard[13]

Although Grevy's zebra (*Equus grevyi*) are found mainly in Kenya and Ethiopia with 95% (2,375) of the global population being in Kenya, historically, Grevy's zebras are not known to live south of the equator. The south-most population well known to many in Kenya is the Laikipia population which lives near the equator. However, in 1964, the first group of 22 Grevy's zebra was translocated from Isiolo, in Samburu district to Aruba area in Tsavo East National Park. In 1977 another group of 30 individuals was translocated from the same place in Samburu to the north western side of Tsavo West National Park (Fig. 22). This is the only Grevy's zebra population that occurs south of the equator and it is estimated to be 50 individuals.

Recent aerial censuses of large mammals in the Tsavo ecosystem counted several Grevy's zebra. In 2008, 11 Grevy's zebra were recorded with 9 individuals in Tsavo east south of Galana River, one individual north of Galana and one individual in Taita ranches. During the 2011 aerial censuses of large mammals, 47 Grevy's zebra were recorded with 29 in the Tsavo east north of Galana, 3 south of Galana and 15 in Taita ranches (Fig. 22). Although in 1977 30 individuals were introduced in Tsavo West, none was sighted in this area during the two censuses.

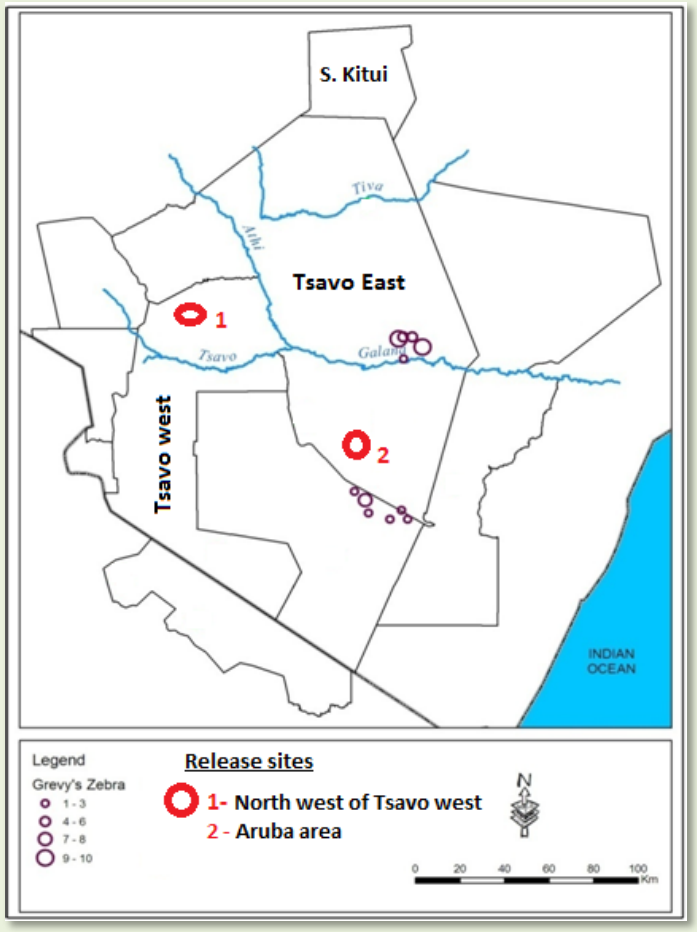

Fig. 22: Distribution of Grevy's Zebras in Tsavo conservation area, February 2011

Fig. 23: Grevy's Zebras in Tsavo

In 2010, just before the aerial count, Alex Mwanzo an MSc student at Kenyatta University undertook a MSc study on the populations in Tsavo east & adjacent ranches titled '*Distribution and Habitat association of Grevy's zebra in south-eastern Kenya'.* The study observed an interesting distribution almost similar to the 2011 aerial census. A total of 50 Grevy's were counted with 95% of the sightings made outside the park in Taita Ranch, Rukinga and Kenya Meat Commission (KMC) Ranching Company land. Four groups were observed with 16 individuals in Taita ranch, 12 individuals in KMC ranch, 14 individuals in Tsavo East South of Galana River and 8 individuals in Rukinga ranch.

All the sighted animals looked healthy. However, one suspected hybrid with common zebra was observed. This is not unique to Tsavo as similar hybrids have been observed in Ol Pejeta conservancy. This study did not record any sighting of the species in Tsavo West although in a 2008 on-ground survey, sighting was made of one adult male in a herd of common zebras.

The main objective of introducing the Grevy's zebra in the Tsavo ecosystem was to enhance their conservation and management. The species has undergone a significant decline in numbers from an estimated 15,000 individuals in the late 1970s to a present-day estimate of 2,500 individuals distributed north of the equator.

Introduction was expected to enhance not only their numbers but also their distribution. This translocation was intended to move the species from insecure community land by then in Samburu, due to rampant poaching in unprotected areas.

Incidentally, though introduced inside the park, most of them as the censuses indicate have dispersed outside the protected area into community land where bush meat, poaching, charcoal burning and competition with livestock for resources such as water and grass is a major threat to the species.

Since most Grevy's zebra reside outside protected areas, it is imperative that local communities living within the area are involved actively in the management of the species. To achieve this, KWS hopes to engage them through education and awareness programs, research and monitoring activities, community policing and eco-tourism initiatives. This initiative is well-captured in the Grevy's zebra conservation strategy. However, it is scientifically imperative to investigate habitat preferences for the Grevy's zebra within the Tsavo ecosystem. This would further advise management options for maintaining population within the protected area.

Hybridization between the common zebra (*Equus burchelli*) and the Grevy's zebra has been an issue of concern to the management. Quite often 'hybridization' involves the mating of a male Grevy's zebra with a female common zebra to produce a morphologically superior animal than both parents. The question of why it is not the reverse may be explained by the differences in mating behavior and size differences between the two species where the Grevy's zebra is larger than the Burchell's zebra. The occurrence of this phenomenon in Tsavo is confirmed as several individuals

have been spotted. This triggers off thoughts of Darwin's '*survival of the fittest*' perspective on the evolution of species. However, the viability of the offspring is a question of discussion. Further, how these hybrids associate with either of the two species is an issue of behavioural study. In view of their morphological superiority, they may dominate in groups of both species.

In view of the various censuses, population estimates in Tsavo ecosystem appear to have decreased from the introduced total of 52 to the highest estimate of 50 individuals. Although the censuses may not be definite, any other probable inference would be that there is no increase in numbers. It is in this context that the current Tsavo management plan considers the population as ecologically not viable. The plan proposes establishment and maintenance of a viable population firstly by undertaking a comprehensive population and genetics study, and secondly by establishment of a Grevy's zebra site committee in Tsavo. These would provide management options to ensure continued survival of the Grevy's zebras without compromising the ecological integrity of the Burchell's zebra.

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