Reintroduction failure of captive-bred oribi (Ourebia ourebi)

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Oribi (Ourebia ourebi) are listed as endangered and one of the options to increase their numbers and populations is to breed them in captivity and subsequently reintroduce them into suitable habitat. A captive breeding facility for oribi in KwaZulu-Natal, South Africa, had been used to reintroduce captive-bred oribi on to the neighbouring agricultural/game farm for the previous 10 years. However, the success of these reintroductions was unknown. Consequently the aim of this study was to monitor the success of the reintroduction of captive-bred oribi. As in previous years, 10 captive-bred oribi were released by the owners of the facility onto the neighbouring farm. Using radio-telemetry and mortality sensors, the survivorship of the reintroduced oribi was monitored, and the factors involved in a successful or failed reintroduction attempt identified. Within two months of release, seven of the 10 oribi were dead. The causes of mortality varied, but predation by natural predators and humans was a major factor. Consequently no further reintroductions on to this property were advised. Several factors of concern were raised and need to be addressed in future captive breeding, reintroduction and management of oribi.

Key words: captive-bred oribi, conservation, monitoring, Ourebia ourebi, reintroduction.

INTRODUCTION

Oribi (Ourebia ourebi) are sparsely distributed across the African continent from Senegal to South Africa (East 1999). They are a relatively small antelope and specialist grazers with specific habitat requirements, and so are confined to grasslands that can provide high quality grazing as well as cover (Everett 1991). The mating system of oribi varies from monogamy in South Africa to polygyny in East Africa (Oliver et al. 1978; Rowe-Rowe et al. 1992; Arcese 1994; Adamczak & Dunbar 2007). Within South Africa, oribi are most common in KwaZulu-Natal (KZN) (Adamczak 1999; East 1999). In an oribi census in 2004, there were an estimated 2480 oribi in KZN with 75% on private land and 25% in protected areas (A.N. Marchant, pers. comm.). Its distribution in South Africa has been greatly reduced as a result of the conversion of natural grasslands to agriculture (Grey 2006). The population has declined further with the primary reason described as poaching with dogs (Rowe-Rowe 1988; Marchant 1991, 2000; Friedmann 2008). Populations have gone locally extinct or declined rapidly (Coverdale et al. 2007). Consequently, oribi are classified on the regional South African IUCN Red List as Endangered (EN C2a(ii)) (Friedmann & Daly 2004). The Oribi Working Group was established in 2000 to oversee the protection and management of oribi remaining on private land and to identify ways to restore oribi populations, such as captive breeding with reintroduction (Rushworth et al. 2003, Coverdale et al. 2007).

Few records of oribi in captivity exist and there are few oribi in zoological gardens worldwide (Grey-Ross, unpubl. data). Poor breeding success (42% of 45 captive-bred oribi died within a year of their birth) and high mortality of captive oribi (67% of 18 wild-caught oribi died) are characteristic of this species in South African Zoos (Grey-Ross unpubl. data). Obviously their husbandry is not well understood.

One of the few successful oribi breeding efforts in South Africa was initiated in the early 1990s at Fountainhill Estates, a private farm in KZN. Over a 10 year period prior to this study about 50 captive-bred oribi were released, but no breeding or release records were kept and no monitoring of released animals was done (Taeuber, pers. comm.)

In general, thorough post-release monitoring is neglected in reintroduction programmes, and reintroduction failures are rarely reported (Griffith et al. 1989; Beck et al. 1994; Sarrazin & Barbault 1996; Kleiman 1997; Fischer & Lindenmayer 2000; Seddon et al. 2007). In particular, the reintroduction
of captive-born antelope is poorly documented in terms of procedures used and outcomes (Dunham et al. 1993).

Consequently, in 2004 a post-release monitoring programme was initiated to assess the outcome of the reintroduction of captive-bred oribi from the private breeding facility on Fountainhill Estates. This followed the protocol that had been previously used (Taeuber, pers. comm.), with no changes to the husbandry, and no pre-release preparations with the exception of radio-collaring oribi for monitoring purposes. The primary objective of the first-year post-release monitoring was to identify the factors involved in either a successful or failed reintroduction attempt. It was envisaged that these results would influence the protocol for the husbandry, reintroduction and management of oribi at this and other facilities in the future.

METHODS

Fountainhill Estates is a private commercial farm and nature reserve near Wartburg, KZN (29°27'02.5"S; 30°32'42.3"E) of approximately 3000 ha with 1600 ha maintained in its natural state and conserved for wildlife. Most of the property (with the exception of a section along a cliff edge) is secured by a 2-m high game fence enhanced by electrified strands. The property is bordered by sugarcane farms. The area consists of a mix of Eastern Valley Bushveld, KZN Hinterland Thornveld and Ngongoni Veld (Mucina & Rutherford 2006). Other mammal species present naturally or introduced include zebra (Equus burchelli), blesbok (Damaliscus pygargus), reedbuck (Redunca arundinum), impala (Aepyceros melampus), nyala (Tragelaphus angasii), greater kudu (T. strepsiceros), bushbuck (T. scriptus), giraffe (Giraffa camelopardalis), caracal (Caracal caracal), black-backed jackal (Canis mesomelas) and leopard (Panthera pardus).

The breeding facility on Fountainhill Estates contained nine individual pens situated in close proximity to an inhabited farmhouse. At the time of this study, the enclosures varied in size from 1–3 ha, and also varied in vegetation type and cover, varying from 100% pasture grass to a mix of grass and shrubs less than a metre in height. They also varied in numbers of oribi in each. Detailed records were not kept on breeding, births, deaths, and release of oribi up to 2004. There was little documentation of how many original founders there were or their origin. No genetic considerations were made for these captive oribi in that matings were haphazard and not planned to avoid possible inbreeding affects. Every morning the oribi were fed a commercial game pellet supplement coated with a deworming agent. For the release in this study, 10 of the 22 oribi resident in the captive breeding facility were chosen for reintroduction.

Oribi were captured pre-release using chemical darting or net capture by a professional game capture team and a veterinarian on 5 April 2004. Seven were darted and immobilized using the drug M-99 (Novartis, 1 mg per male, 1.2 mg per female). A short-term tranquillizer, Haloperidol (Kyron Laboratories, 5 mg per animal) was given immediately. Drug volumes were based on average oribi body mass (Smithers 1983). The reversal drug M50-50 was administered to each animal (Novartis, 2 mg per male, 2.4 mg per female) within three minutes of immobilization. Three oribi were caught with nets and then injected with Haloperidol as above.

Each oribi was then sexed, weighed and measured. Individuals were then fitted with an identification ear-tag and a radio-collar (Sirtrack, NZ, weight of collar <5% of total body mass). Radio-collars had a battery-powered transmitter (lifespan two years), and a mortality sensor that signalled if the animal was still for more than 6 h. Oribi were placed in individual plywood holding crates (144 l × 44 w × 123 h cm) with sliding doors at both ends and ventilation holes, and transported to the nearby grassland habitat where previous captive-bred oribi had been released. Oribi were released at two predetermined release sites within 3 h after capture. Five animals were released at each location with established pairs (based on observations) in each group. No supplementary feeding was provided after the release.

During the first month after release, collared oribi were located every 2–3 days using radio-telemetry. This was done from a vehicle until the animal was within 100 m and then tracking continued by foot. The location of the animal was obtained using a Global Positioning System (GPS) (Garmin eTrex personal navigator). In addition, date, time, weather conditions, habitat type, and activities of the oribi were recorded. Locations were plotted in ArcView (Environmental Systems Research Institute, Redlands, California) and distances moved calculated using the measuring estimation tool. Distances moved were calculated by measuring straight lines from each observation to the next. If the radio-transmitter mortality sensor was acti-
vated, the position of the signal was tracked and the reason for sensor activation and cause of death investigated and recorded. After the first month, frequency of post-release monitoring was reduced to weekly locations, and then after three months to monthly locations for a year to determine survival and location.

RESULTS

All 10 animals (four males and six females) were adults although their exact ages were undetermined. According to the veterinarian, all individuals were in good body condition prior to release (based on previous experience and thorough examination while tranquillized).

Deaths of reintroduced oribi occurred rapidly after release and for a variety of causes (Table 1). Within one week of release (exact dates listed in Table 1), the first death occurred: a male (ID 900) that had no visible signs of trauma, and a necropsy performed by a veterinarian could not confirm a cause of death but suggested toxins (Tatham, pers. comm.). Three weeks after release, a male (ID 300) was found with a broken leg possibly from getting caught in a fence. Veterinary intervention was requested and the animal was placed back in captivity with a strapped leg that healed. It was assumed that death would have occurred without medical attention. The same day, the first female death (ID 400) was recorded. Bite marks and feeding pattern suggested caracal predation (D.T. Rowe-Rowe, pers. obs.). Five days later, the fourth death occurred: a female (ID 700) that had moved from Fountainhill to a neighbouring property three days earlier was killed by poachers. Using telemetry, the skin and collar were found in an informal rural settlement on the outside of the southern boundary of Fountainhill. The next day the fifth death occurred: a female (ID 259) was poached and its remains found at a farm worker settlement outside the eastern boundary of Fountainhill. Seven days later the sixth death (a male, ID 800) occurred. The cause of death was unknown because its remains were spread out and had been scavenged, making it unclear as to whether it was killed by a predator, or whether it died naturally and then was scavenged. Another female (ID 600) was found dead 39 days after release and the cause of death was unknown. However, inadequate nutrition is suspected because it had moved into thick vegetative areas along a stream, which lacked suitable grazing (Grey-Ross, pers. obs.). Another female jumped through two game fences to return to her original enclosure where she remained. Soon after, the collar of male (ID 500) was found without any clues to his demise. Most of the reintroduced oribi died not far from where they were released and survived less than three months post-release in the wild (Table 1). As of May 2005, only one of the original ten animals was still in the ‘wild’. This female (ID 200) moved from the release site but eventually established herself close to the captive breeding facility. This female paired up with an uncollared male oribi.

The reintroduced oribi moved an average of 4520 m before their deaths (Table 1), although some moved more than 6000 m from their release site before their death. The mean distance from release site to mortality site was 1832 m (Table 1). Home ranges were not defined as the animals did

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Date</th>
<th>Cause of death</th>
<th>Survival time after release</th>
<th>Total distance from release site (m)</th>
<th>Distance from release site to site of death (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>900</td>
<td>12 Apr 2004</td>
<td>Unknown</td>
<td>6 days</td>
<td>1087</td>
<td>1087</td>
</tr>
<tr>
<td>300</td>
<td>23 Apr 2004</td>
<td>Broken Leg</td>
<td>17 days</td>
<td>7192</td>
<td>2853</td>
</tr>
<tr>
<td>400</td>
<td>23 Apr 2004</td>
<td>Caracal predation</td>
<td>17 days</td>
<td>6124</td>
<td>2062</td>
</tr>
<tr>
<td>700</td>
<td>28 Apr 2004</td>
<td>Poaching</td>
<td>22 days</td>
<td>3699</td>
<td>3043</td>
</tr>
<tr>
<td>259</td>
<td>29 Apr 2004</td>
<td>Poaching</td>
<td>23 days</td>
<td>3420</td>
<td>3317</td>
</tr>
<tr>
<td>800</td>
<td>05 May 2004</td>
<td>Predation</td>
<td>29 days</td>
<td>2247</td>
<td>1273</td>
</tr>
<tr>
<td>600</td>
<td>15 May 2004</td>
<td>Unknown</td>
<td>39 days</td>
<td>7857</td>
<td>338</td>
</tr>
<tr>
<td>100</td>
<td>13 Sep 2004</td>
<td>Cold weather</td>
<td>160 days</td>
<td>6272</td>
<td>1213</td>
</tr>
<tr>
<td>500</td>
<td>7 Jan 2005</td>
<td>Unknown</td>
<td>8 months</td>
<td>5173</td>
<td>1271</td>
</tr>
<tr>
<td>200</td>
<td>N/a</td>
<td>Still alive (July 2006)</td>
<td>N/a</td>
<td>2128</td>
<td>1866</td>
</tr>
</tbody>
</table>

Mean ± SE 4519.9 ± 737.12 1832.3 ± 308.50

*This value was obtained by measuring a straight line from location fix to location fix.
not settle and because of the high number of deaths there were few locality fixes. Movement data shows that the oribi dispersed almost immediately upon release and did not stay in the vicinity of the release sites or in groups (Table 1). As a consequence of the results from the initial release, no further releases on Fountainhill were conducted.

**DISCUSSION**

This reintroduction of captive-bred oribi was unsuccessful, as shown by the post-release monitoring programme and the apparent lack of success of the previous releases over 10 years, emphasizing the need for monitoring reintroductions, especially of captive bred animals. Any further reintroduction attempts of captive-bred oribi onto the property were halted. Poaching and natural predation were the main causes of death of the reintroduced oribi. These are also the primary causes of death amongst wild oribi (A.N. Marchant, pers. comm.; Friedmann 2008).

One of the aims of the study was to provide a baseline onto which improvements could be made. Before the release of the captive-bred oribi, several concerns were identified that could have potentially affected the successful outcome of this reintroduction. One concern was the relative tameness of the captive oribi. Captive-bred animals may be at a higher risk of predation upon release (Griffin et al. 2000, 2001). The captive oribi were fed supplemental pellets daily, and so were positively reinforced to humans. In addition, reintroduction candidates need to be able to ‘acquire and process food’ in preparation for their release (Kleiman 1997). Previously, all captive oribi were not supplemented with food after release or weaned off it, so the same procedure was followed. Post-release supplementary feeding should be considered in future if animals are fed supplementary food prior to release.

The mating system of oribi varies from monogamy in South Africa to polygyny in East Africa (Adamczak & Dunbar 2007). Multi-male and multi-female groups (0–39% of groups) have also been observed (Arcese et al. 1995). In the present study, established pairs were released to try and address social factors. The release was a ‘hard’ release and the oribi dispersed, sometimes into unsuitable habitat, and did not remain in their groups. The suitable oribi grassland habitat on Fountainhill was limited in size and surrounded by sugarcane farms and informal settlements which was another concern as this was a potential source of poaching activity (Grey-Ross, pers. obs.). Consequently in this fragmented and isolated area, there was reduced safe dispersal of animals into other secure areas. Releasing animals into the core of their historical range has been suggested as another criterion for successful reintroduction (Griffith et al. 1989; Kleiman 1997) and Fountainhill did not fit that prerequisite (Grey-Ross, pers. obs.). The oribi were adept at moving through various styles of fencing, including game fences and electrified fences. Therefore, they are not easily restricted to a particular property.

In future captive-bred oribi reintroductions, husbandry and breeding strategies of oribi in captivity must be scrutinized prior to release/reintroduction, as these are important and were not managed or controlled for in the present study. There was no knowledge of the ages of the oribi released, but all were adult and had been in captivity for several years. Genetic management of all captive oribi in the form of a studbook should be implemented. Studbooks are necessary as a tool for keeping adequate records and tracking a species in captivity (Ballou & Foose 1997; Shoemaker & Flesness 1997). Basic husbandry of oribi, such as dietary requirements, enclosure size and design, and social interactions also need to be re-examined and tested for maximum efficacy to increase the success rate of future breeding programmes. Matthews et al. (2005) also emphasize the need to assess the suitability of release animals. Despite these recommendations to improve captive breeding of oribi, there is some evidence to suggest it may not be viable as most zoological institutions with captive oribi show poor survival and little breeding success (Grey-Ross, unpubl. data). The present study has highlighted that options other than captive breeding and reintroduction of oribi are required. One of these options is to translocate wild oribi from one area to another as is documented elsewhere (Grey 2006; Grey-Ross et al. 2009).

In conclusion, despite that the reintroduction of captive-bred oribi was not successful in this study, it does not mean that the captive breeding and reintroduction is not an option in oribi conservation. However, as mentioned various factors that possibly affect reintroduction of captive-bred oribi should be assessed. There should also be well-managed, scientific captive programmes and input from antelope breeding specialists and reintroduction specialists. Monitoring of this species using radio-telemetry should be considered for any
movement of the species, whether it be future reintroductions or translocations.

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REFERENCES


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