CHAPTER 3

THE ARABIAN ORYX

Taxonomy

The Arabian oryx *Oryx leucoryx* is a member of the subfamily Hippotraginae of the family Bovidae of the order Artiodactyla (Skinner & Smithers 1990; Harrison & Bates 1991; Grubb 1993). The subfamily Hippotraginae contains three living genera. They are *Hippotragus*, *Addax* and *Oryx* (Gentry 1978; Grubb 1993). Within these genera six species are found, five of which occur on the African continent. All the members of the subfamily Hippotraginae are large, horse-like antelopes (Stanley-Price 1989). The most striking characteristic of this subfamily is that both the sexes have horns, which are long and either swing backwards from the head in a curve, or are straight. Distinctive facial patterns also occur in all the members of this subfamily (Roberts 1951; Skinner & Smithers 1990).

The sable antelope *Hippotragus niger* (Harris, 1838) and the roan antelope *Hippotragus equinus* (Desmarest, 1804) inhabit mixed woodland-grassland habitats in central, southern, and partially also into western Africa, while the addax *Addax nasomaculatus* (Blainville 1816) occurs in the Sahara desert (Stanley-Price 1989).

There are three species recognised within the genus *Oryx* (Grubb 1993). The distribution of the genus shows that it is historically associated with arid areas (Figure 6). In southern Africa, the gemsbok *Oryx gazella gazella* (Linnaeus, 1758) occurs in the Kalahari system. Towards eastern Africa, the beisa oryx *Oryx gazella beisa* is found in the arid areas of Somalia, while the fringe-eared oryx *Oryx gazella callotis* is found in an area adjacent to that of the beisa oryx, which is separated by the Tana River of Kenya. *Oryx gazella gallarum* is found in the Sudan and Ethiopia while *Oryx gazella annectens* occurs in Kenya and Somalia (Ansell 1972). In North Africa, the scimitar-horned oryx *Oryx damah* (Cretzschmar, 1827) is found in the Sahara desert (Stanley-Price 1989). The Arabian oryx *Oryx leucoryx* (Pallas, 1777) is the smallest of the *Oryx* species known to science, and the only one to occur outside the African continent (Stewart 1963; Loyd 1964; Harrison & Bates 1991).

Historical distribution and decline

The Arabian oryx formerly occurred throughout the desert regions of the Arabian Peninsula.

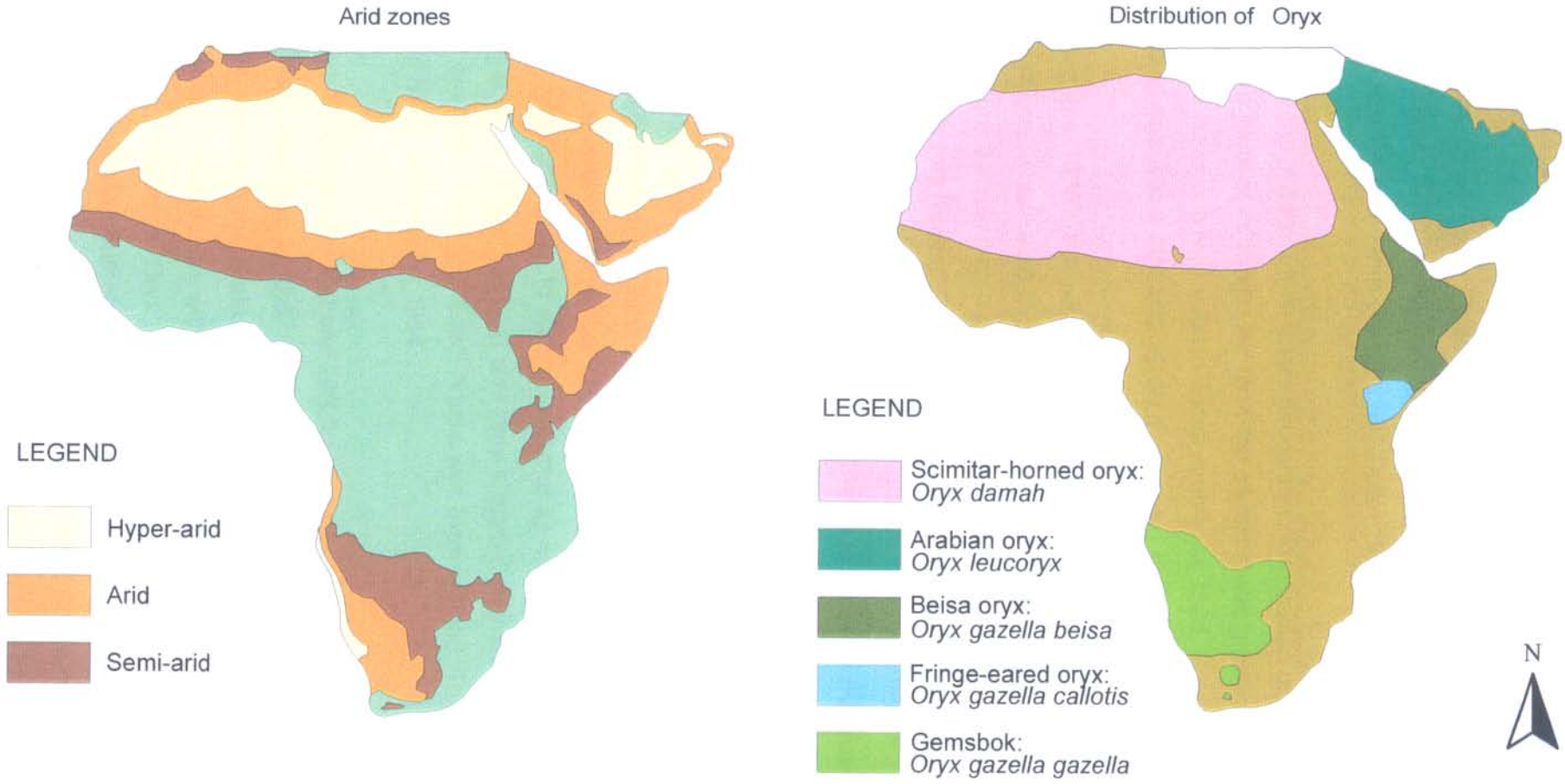


Figure 6: The distribution of the arid zones in Africa and Arabia (Unesco 1979) and the historical distribution of the genus *Oryx* in Africa and Arabia (Stanley-Price 1989).

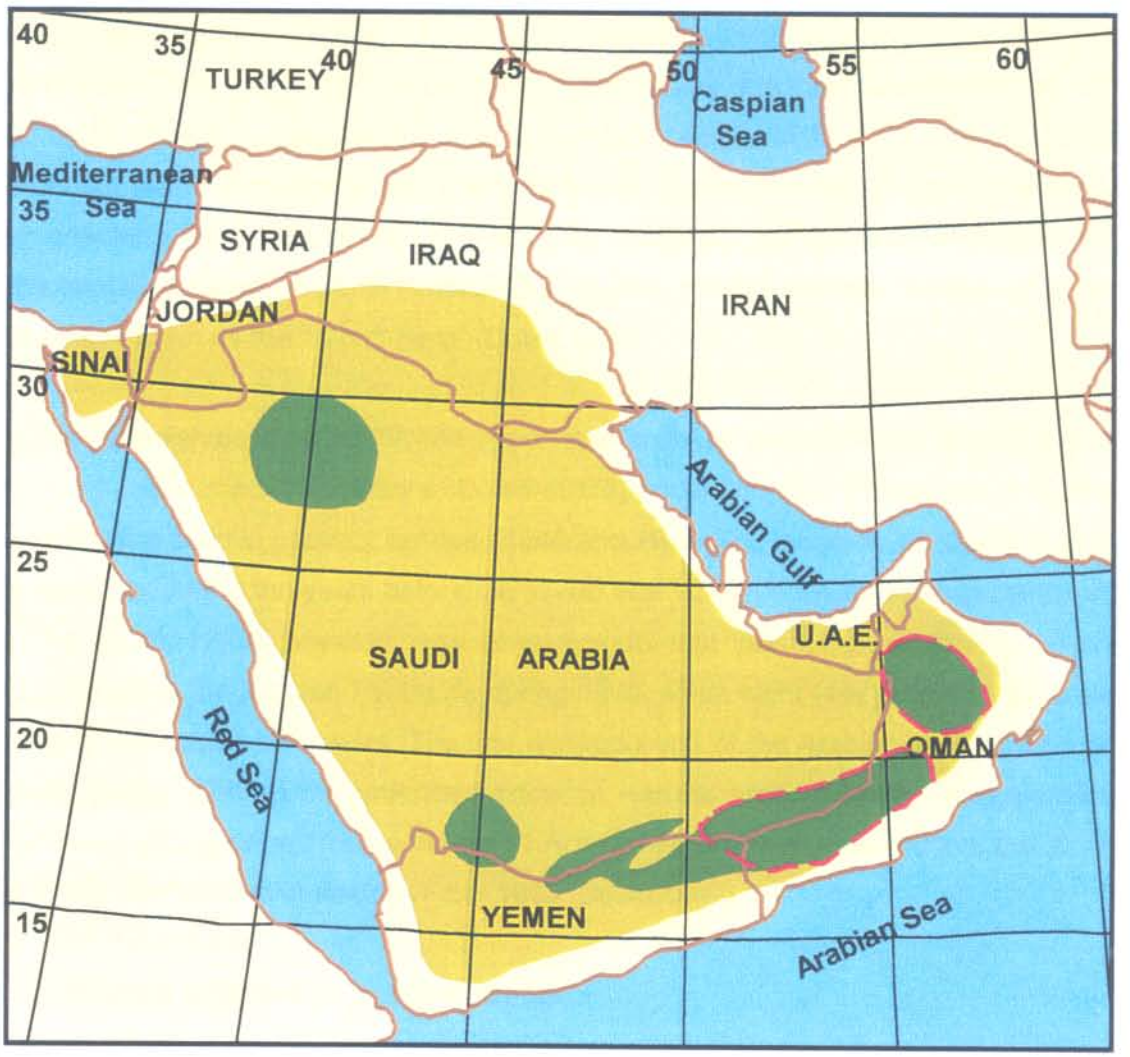
The precise limits of its former northern range are not known (Harrison & Bates 1991). During the 1800's the Arabian oryx was still found over virtually the whole Arabian Peninsula, Sinai, Lower Palestine, Trans-Jordania and much of Iraq (Turkowski & Mohney 1971; Dolan 1975). It is doubtful whether the Arabian oryx ever occurred east of the Euphrates River into Iran (Talbot 1960; Dolan 1975; Harrison & Bates 1991).

Towards the middle of the nineteenth century, the Arabian oryx began to disappear from the northern parts of its range. By 1914 the situation was grave and only a few Arabian oryxes seem to have survived outside Saudi Arabia. In 1926, Colonel Cheesman noted that the Arabian oryx was a rare and rapidly diminishing species (Carruthers 1935).

During the 1930's the remaining Arabian oryxes in Saudi Arabia were divided into two populations, which were kept in their respective areas approximately 1100 km apart. These populations were in the Great Nafud in the north, and in the 'Rub al Khali basin in the south of Saudi Arabia (Figure 7). The ad-Dahna sand belt connects these two areas. Historically, this sand belt probably served as a migration route between the northern and southern Arabian oryx populations. The 'Rub al Khali was probably the main, and last stronghold of the Arabian oryx (Carruthers 1935).

In Jordan, a few animals survived until about 1930, but they were already being exterminated rapidly then (Dolan 1975). After World War II, the Arabian oryx numbers decreased drastically due to the automatic weapons and four-wheel-drive vehicles which entered the Arabian Peninsula (Loyd 1964). In the early 1950's for example, the pressure on the oryx had increased to such a level that as many as 300 vehicles were used in a single hunting foray (Dolan 1975). It was only a matter of time before the oryx population in the northern Nafud desert of Saudi Arabia was exterminated. The last set of oryx tracks in the Great Nafud was seen in 1954.

During 1960, between 100 and 200 Arabian oryxes remained in the 'Rub al Khali Basin, but little hope remained for their continued survival in the wild (Talbot 1960). As a result of the drastic decline in the Arabian oryx numbers, the Fauna and Flora Preservation Society of England, in conjunction with the International Union for Conservation of Nature (IUCN) launched "Operation Oryx" during 1962. This operation took place in the then Aden Protectorate (now southern Yemen) during 1962, and entailed capturing two males and a female Arabian oryx from the wild (Grimwood 1962; Shepherd 1966). In cooperation with the Zoological Societies of London and Arizona, and the then World Wildlife Fund (now called



LEGEND

Recorded historical limits of former distribution

Distribution circa 1945

Distribution in 1902: (known limits)

Figure 7: The historical distribution of the Arabian oryx in the Arabian Peninsula (Stewart 1963)

the World Wide Fund for Nature) and the Shikar-Safari Club, the three Arabian oryxes were shipped to the Phoenix Zoological Gardens in the United States of America. This group was supplemented with a female Arabian oryx from the Zoological Society of London, a female Arabian oryx from the private collection of the ruler of Kuwait, and two pairs of Arabian oryx from the late King Faisal of Saudi Arabia. This nucleus of nine animals became what was subsequently known as the "World Herd" (Dolan 1987).

Before the establishment of the "World Herd" little success was achieved in keeping the Arabian oryx under captive conditions. Dolan (1975) could find only 13 records of Arabian oryx calves being born in captivity between 1848 and 1946. The longevity of captive Arabian oryxes was poor during the years before the World War II, with a mean life expectancy of 5 years. The "World Herd", however, was so successful that the first group of Arabian oryx started to return to the Arabian Peninsula during 1978, when eight (sex ratio 1:1) were sent to Jordan over a period of 2 years. The first reintroduction of the Arabian oryx into the wild took place during 1982 in the unfenced Jiddat al Harasis area of Oman (Jungius 1982; Stanley Price 1986). During 1983, a further 31 Arabian oryxes were released into the 22 km² fenced Shaumari Reserve in Jordan (Fitter 1982; Dolan 1987).

Captive breeding programme in Saudi Arabia

Wildlife is an integral part of the Arabian culture. It is therefore natural that, when the Saudi Arabian Government became aware of the trend of overutilisation of its wildlife, it initiated several measures to rectify the situation. The National Commission for Wildlife Conservation and Development (NCWCD) was created in 1986, and was given the mandate to restore the Kingdom's natural heritage. In its endeavours to fulfil its mandate, the National Commission for Wildlife Conservation and Development has adopted a two-pronged approach. The first was to prepare a national systems plan, which identified areas worthy of protection according to a predetermined set of criteria. Secondly, the National Commission for Wildlife Conservation and Development initiated a captive-breeding programme of endangered native wildlife, with the purpose of providing animals for reintroduction into the protected areas (Joubert 1994).

The late King Khaled made part of his private farm and the game on it available for the captive-breeding programme of wildlife in Saudi Arabia. In 1987, the King Khaled Wildlife Research Centre was established on the farm. In 1986 a piece of land was also obtained near Taif for the captive breeding of the houbara bustard *Chlamydotis undulata macqueenii*.

The facilities erected there were named the National Wildlife Research Centre. At both the King Khaled Wildlife Research Centre and the National Wildlife Research Centre the most modern veterinary and animal husbandry equipment and expertise are being used (Joubert 1994).

A national strategy for captive breeding was adopted next. This strategy acknowledges the need for the captive-breeding programme to be based on sound scientific principles. The strictest veterinary quarantine measures are enforced within and around the facilities of both these breeding centres to prevent the spread of diseases between the animals within the centres, and to exclude possible infection from outside. It was decided to separate the breeding programme of the various endangered wildlife types. The breeding of the four native types of gazelle became the responsibility of the King Khaled Wildlife Research Centre. The 56 Arabian oryxes on the late King Khaled's farm at Thumamah were translocated to the National Wildlife Research Centre in 1986. Subsequently, this centre has focussed mainly on the captive breeding of the Arabian oryx and some avifauna, especially the houbara bustard (Joubert 1994).

Shortly after their arrival at the National Wildlife Research Centre in 1986, a tuberculosis outbreak reduced the Arabian oryx founder population (A-generation) from 56 to 37 animals (Greth, Sunnucks, Vassart & Stanley 1992). Subsequently, an antibiotic treatment of all the Arabian oryxes at the National Wildlife Research Centre was undertaken for a period of 9 months during 1987 (Flammand, Delhomme & Ancrenaz 1994; Greth, Flamand & Delhomme 1994). Since 1988, none of the bacteriological cultures taken from the oryxes that died at the National Wildlife Research Centre have shown any evidence of tuberculosis infection (Seddon, Ancrenaz, Ostrowski & Magin 1995). In addition, the following husbandry techniques were adopted to prevent the release of tuberculosis-infected oryxes into the protected areas.

Calves born into the infected herd are removed from their mothers directly after birth, and are reared by hand, to reduce the risk of horizontal tuberculosis infection (Flamand *et al.* 1994). These oryx calves are kept in small groups of up to four animals to prevent widespread infection if one of these animals were infected with the disease. The calves (B-generation) born from the infected herd are tested regularly for tuberculosis from the age of 2.5 months (Joubert 1994). When these tests are negative, the animals are considered as part of the "filter herd", the members of which join the breeding nucleus on reaching adulthood. These B-generation oryx represents the main herd for oryx production at the

National Wildlife Research Centre (Seddon *et al.* 1995). Calves produced from the breeding nucleus are called the C-generation, and are reared by their own mothers. They are free of tuberculosis.

The whole captive herd is tested periodically for tuberculosis (Ancrenaz, Ostrowski & Delhomme 1995a). Animals are only considered for reintroduction into the protected areas after two consecutive negative tuberculosis test results. In addition, all captive Arabian oryxes at the National Wildlife Research Centre are vaccinated annually against foot-and-mouth disease, rabies, pasteurellosis and rinderpest (Greth & Schwede 1993; Ancrenaz *et al.* 1995a).

The Arabian oryx captive breeding programme of the National Commission for Wildlife Conservation and Development has been so successful that from a founder herd of 37 animals, the national herd now numbers more than 400 individuals (Joubert 1994). In 1990, a first group of 17 Arabian oryxes was released into the fenced Mahazat as Sayd Protected Area near Taif. Since then, this original group has been reinforced with oryxes from several neighbouring countries, including Qatar and Bahrain. At present this population numbers approximately 340 animals (Seddon 2000).

The genetic management of the captive breeding programme at the National Wildlife Research Centre aims to maintain at least 90% of the genetic variation in the original population over a period of 200 years, and to produce animals that are genetically fit enough to survive in the wild. Missing or underrepresented genetic lineages are added by reintroducing wildborn animals caught in the Mahazat As Sayd Protected Area (Ancrenaz *et al.* 1995a).

The reintroduction of animals

Species become endangered through a population decline that can be attributed to various factors, including extensive poaching and habitat loss (Green & Rothstein 1998). Any attempt to re-establish a species in an area which it had previously occupied, is futile unless the factors causing its initial decline are properly addressed.

Different terms have been used to define the re-establishment of a species in an area formerly occupied by that species. These include reintroduction (IUCN 1987; Griffith, Scott,

Carpenter & Reed 1989) and repatriation (Dodd & Siegell 1990; Novellie & Knight 1994). The terminology that is used here is in accordance with that of the IUCN (1987).

The reintroduction of organisms can be defined as the release of a plant or animal species into an area in which it was indigenous before its extermination by man or a natural catastrophe (IUCN 1987). Reintroductions should therefore only take place when the original causes of extinction have been removed, and where the habitat requirements of the species are satisfied (IUCN 1987; Griffith *et al.* 1989). Reintroduction is a powerful technique in conservation, especially in view of the increasing rate of species extinction and the impending reduction in overall biological diversity (Griffith *et al.* 1989). It can be used to increase the number of individuals, genetic variability and gene flow, and to redistribute populations to areas of optimal habitats (Franzmann 1988; Gripps 1991; Caughley 1994). Many reintroductions have been attempted in the world to date but the success rates have not always been acceptably high (Novellie & Knight 1994). This is so despite the fact that the procedures for a systematic reintroduction effort are clearly documented (Anderegg, Frey & Muller 1983; Jungius 1985; IUCN 1987). The following four phases (IUCN 1987) have been recognised as being essential in any reintroduction process and include most of the suggested procedures:

- A feasibility study to indicate the likelihood of a successful reintroduction
- The preparation stages where the release area is identified, animal sources are identified and logistical arrangements for the capture and transport of the animals are made
- The release phase
- A post release monitoring phase

Selection of Arabian oryxes for reintroduction

Sixty-six Arabian oryxes were selected for reintroduction into the 'Uruq Bani Ma'arid Protected Area during 1995 and 1996. This included four B-generation oryxes at a ratio of 1 female per male, 55 C-generation oryxes at a ratio of 1.12 females per male from the National Wildlife Research Centre, and seven free-ranging Arabian oryxes at a ratio of six females per male, from the Mahazat as Sayd Protected Area.

The choice of animals for reintroduction was based on two criteria. Firstly, the selected oryxes should contain a homogeneous genetic component of the founder population (A-

generation) to avoid a genetic bottleneck, and secondly the selected animals should not be related directly to each other to decrease potential inbreeding (Ancrenaz, Delhomme, Anagariyah & Khoja 1994).

Two pairs of half-siblings were selected for release, however, as their genetic contribution could increase the genetic representation of the founder population (Ancrenaz *et al.* 1994). The four B-generation oryxes, which were all hand-reared, were included in the selection to diversify the age structure of the reintroduced population and to increase the genetic diversity of the population (Ancrenaz *et al.* 1994). Cytogenetic studies of the captive Arabian oryx population at the National Wildlife Research Centre revealed the presence of a chromosomal Robertsonian translocation, resulting from the fusion of chromosomes 17 and 19. This translocation is usually not expressed phenotypically, but a reduced fecundity in heterozygotes with this translocation has been recorded in cattle (Cribiu, Asmodé, Durant, Greth & Anagariyah 1990). None of the Arabian oryx with this chromosomal translocation was selected for reintroduction into the 'Uruq Bani Ma'arid Protected Area, following a meeting of the International Wild Arabian Oryx Advisory Panel in London, during 1990 (Vassart, Granjon, Greth, Asmodé & Cribiu 1991; Greth & Schwede 1993).

Translocation of the Arabian oryx

Because of their nervous disposition and aggressiveness, it is particularly difficult to transport members of the family Hippotraginae. High mortalities have been experienced in attempting to do so. Hofmeyr (1974) reported that immobilisation with etorphine was the safest way to transport the roan antelope *Hippotragus equinus*. More than 70 roan antelopes have subsequently been kept immobilised with etorphine for up to 5 hours while being airlifted.

During the translocation of the Arabian oryx that took place from the National Wildlife Research Centre to the Mahazat As Sayd Protected Area in 1992, the Arabian oryxes were kept under deep anaesthesia. It then became apparent that long-term anaesthesia on the Arabian oryx could only be performed safely for 5 to 6 hours (Ancrenaz 1994). Long-term anaesthesia was therefore not a desired technique for the translocation of the Arabian oryx from the National Wildlife Research Centre to the 'Uruq Bani Ma'arid Protected Area, a transfer which normally takes 9 hours to complete. It was therefore decided to use a combination of boma-training and long-term tranquillisers (neuroleptics) instead. Groups of four animals of similar age and size were placed in pre-transportation enclosures, 3 months

before translocation. These enclosures consisted of an indoor pen of 5 x 3 m with wooden walls and a roof of shade cloth, and an outdoor pen of 6 x 10 m that was fenced with chain-link wire mesh. The outdoor pens were connected to an off-loading ramp, which was 2.5 m wide and 3 m long. The ramp was connected to a corridor that decreased in a funnel shape to a width of 1 m and a length of 8 m. The walls of the corridor were constructed from wire-mesh fencing that was covered with a tarpaulin. The mass crates, which were to be used for transportation, were made of wood, while the floors were covered with rubber mats. The crates were 2.5 m long x 2 m wide x 2 m high and could accommodate five Arabian oryxes each (Ancrenaz, Ostrowski, Delhomme & Greth 1995b).

During the first 6 weeks of the boma-training, each group of oryx was enclosed in the indoor pen for increasing periods of time ranging from 2 to 24 hours. Progressively, the Arabian oryx became accustomed to being moved into the corridor and the crates. Each group of oryx was driven around the National Wildlife Research Centre twice a week for periods varying between 30 minutes and 2 hours. After each drive the animals were released into the pre-transportation enclosures. A week before the translocation, each group of Arabian oryx was enclosed in the mass crates overnight on every second day (Ancrenaz *et al.* 1995b).

A long-term tranquilliser is a neuroleptic for which a single dose gives a therapeutically effective tissue concentration of drugs for at least a week (Lingjaerde 1973). The prolonged effect is achieved through one of four ways (Ebedes 1993):

- The slow release of the active ingredient from the injection site
- The slow but sustained absorption of the active ingredients or metabolites into the bloodstream
- The slow metabolism of the active drug in the tissues
- The slow elimination of the drug or its metabolites from the tissues and the bloodstream

Trilafon, which is a derivative of phenothiazine, is one such long-term neuroleptic. In South Africa, this neuroleptic has been used successfully on the roan antelope during a journey of 32 hours (Morkel 1992) duration, and it was selected for use on the Arabian oryxes. The Arabian oryxes were therefore injected intra-muscularly with 2.5 to 3.0 mg Trilafon per kg body weight 3 days before their translocation. The first signs of tranquillisation were observed 24 hours after injection. This rendered the animals subdued, while they remained

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standing and their flight distances decreased. The animals were, however, still able to run away when approached. The best state of tranquillisation was achieved between 3 and 4 days after the injection of Trilafon and its effects lasted for 24 to 36 hours (Ancrenaz *et al.* 1995b).

The tranquillised Arabian oryxes were enclosed in mass crates, each large enough to take five animals, and transported to within 150 km from the 'Uruq Bani Ma'arid Protected Area with a Hercules C-130 transport aircraft. From there the animals were transported to the protected area by road. The animals were relatively insensitive to stressful situations and did not develop any obvious or latent pathological problems following the 9-hour transportation (Ancrenaz *et al.* 1995b).

Upon arrival in the 'Uruq Bani Ma'arid Protected Area, the Arabian oryxes were off-loaded into temporary holding pens of 4.8 x 10 m each. The number of animals per pen varied. Water was provided *ad libitum* from the start, but dry alfalfa and hay was only provided as feed on the following morning. During their time in the temporary pens, 57 of the Arabian oryxes were fitted with radio-collars from either Telonics (n=38) or AVM (n=19), with an expected battery-life of 2.5 to 3 years each. All the radio-collars worked on the 164 MHz frequency. Numbered collars only were fitted on seven of the Arabian oryxes. The two calves that were reintroduced with their mothers were not collared. The Arabian oryxes were released from the temporary holding pens into a 4 ha enclosure, 5 days after arrival at their destination (Ancrenaz *et al.* 1995b). This enclosure was divided into two areas of 2 ha each. Alfalfa and hay were again supplied on a daily basis and water was available *ad libitum*. The Arabian oryxes were then given time to orientate themselves in the enclosures and to get used to eating the natural vegetation present in their environment.

Over the 2-year study period six releases of oryxes took place. The first was officiated by HRH Prince Sultan Bin Abdulaziz on 28 March 1995. During this release, the Arabian oryxes were driven out of the enclosure with vehicles. In the five subsequent releases, the oryxes were fed close to the release gates in the days preceding the release. On the day of release the alfalfa was placed outside the enclosure, opposite the gate. After an hour, the gates were opened. This meant that the normal feeding time of each morning was delayed by approximately an hour, whereafter the animals were left to leave the enclosure at their own pace and will. The animals were not immediately followed by vehicle, but were left to investigate the area without any disturbance. The oryxes were, however, located during the same afternoon with the aid of an aircraft (Bothma & Strauss 1995). The provision of food

and water at the release site ceased on the day on which the oryxes were released into the 'Uruq Bani Ma'arid Protected Area.

The combination of boma training and the use of long-acting tranquillisers proved successful. During the 9-hour transportation by both road and air the animals were relatively insensitive to stressful situations and did not develop any obvious pathological problems (Ancrenaz *et al.* 1995b).