

**CHARACTERISTICS AND MANAGEMENT OF THE
SCIMITAR-HORNED ORYX (*ORYX DAMMAH*) IN TEXAS**

Thesis

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ABSTRACT

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Little is known about the ecology of the scimitar-horned oryx (*Oryx dammah*) in Texas or elsewhere in the United States, even though it is a common exotic antelope in Texas. The scimitar-horned oryx is an important species in Texas not only because of its economic and aesthetic value, but also because Texas herds may be essential in the propagation of this endangered species. The scimitar-horned oryx is a sub-desert animal, and primarily a grazer. It can withstand temperature extremes along with arid environments, and, is therefore well suited to survive in regions throughout Texas. Private ranches in Texas provide a unique opportunity for the recovery of this species along with gathering vital information on maintaining and managing a viable herd. The largest herd of scimitar-horned oryx with genetically known origins is located in Texas at the Selah, Bamberger Ranch Preserve. This ranch is part of the Species Survival Program. Vital information on behavior and food habits has been obtained by observing this herd. More information about the species is imperative for the survival and perpetuation of this species.

INTRODUCTION

The scimitar-horned oryx (*Oryx dammah*) is one of the most common exotic antelopes in Texas, however, little is known about their ecology and behavior. It is listed as an endangered species in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Appendix I. The International Union for Conservation of Nature and Natural Resources (IUCN) Red Book lists it as Extinct in the wild (American Zoological and Aquarium Association 2001). These animals exist on ranches and in zoos and wildlife parks throughout Texas.

Description

The scimitar-horned oryx first was described by Cretzschmar in 1827 (Ultimate Ungulates 2001). It belongs in the class Mammalia, order Artiodactyla, family Bovidae and in the subfamily Hippotraginae. It is one of the 5 species of *Oryx*. The scimitar-horned oryx, often referred to as the saber-horned oryx, is a sub-desert animal named for its characteristic scimitar-shaped horns. It is a large white oryx with a chestnut chest and neck and may have roan-colored side streaks. They have a vertical brown stripe through the eye that fades with age. A unique color pattern of the scimitar-horned oryx is a thin, brown, rectangular patch on the bridge of the nose. Other oryx species have a color patch shaped like a triangle on the nose (Mungall and Sheffield 1994). Adult males have darker horns and nose patches than females. Their horns average 102 cm in length at maturity. The size of the spread at the tips ranges from 13 cm to more than 61 cm. Trophy horns can reach 96 to 127 cm in length. The horns of males are thicker at the base, with a circumference of 10 to 23 cm. Thicker horns and tightly stacked rings at the

base may signify an older animal. They may also wear down or break their horns when fighting. Females usually have longer horns than males, but they are smaller in circumference and have a sharp point at the tip. (Mungall and Sheffield 1994).

The body size of an adult male ranges from 136 to 213 kg. The female is smaller at 90 to 136 kg (Mungall 2001). The scimitar-horned oryx stands about 122 cm tall at the shoulder. *O. dammah* has hump-like shoulders, a thick neck, and broad hooves to navigate in sand (Mungall and Sheffield 1994). Males reach a mature size at 3.5 years. Longevity can extend to 20 years (Mitchell 2000).

Breeding occurs year-round, but can be triggered by a torrential rain. Males reach sexual maturity at 18 months and females from 11 to 25 months (Mitchell 2000, Grzimek 1990). Gestation lasts for 8 to 8.5 months and twins are rare. The weight at birth varies from 9 to 15 kg (Grzimek 1990). Females will usually have their first offspring at 2 years-of-age (Mungall 2001).

Scimitar-horned oryx occur in social groups of 15 to 40 females and their young. A dominant male leads the herd (Newby 1988). A social hierarchy exists among males and females. Male dominance is established by horn-to-horn conflict (Mitchell 2000). The size of the herd is dependent upon environmental factors including season, distribution, and food availability (Newby 1988).

Geographic Distribution

The scimitar-horned oryx is a sub-desert animal that formerly inhabited the Sahara and Sahel regions of North Africa from the Nile to the Atlantic Ocean (FWS 1991). The northern range extends from Morocco and the Western Sahara to Egypt and from Senegal to Sudan in the south (FWS 1991). They once inhabited the ecotone

between savannah woodlands and true desert to the north and south of the Sahara (Newby 1988). As early as the 1850s, the species was extirpated in Egypt and Senegal. A continuous decline in distribution and abundance followed in other African countries. During the 1960s, nomadism decreased in the tribes in Africa, which led to permanent farms. This cultural change in land use by the tribes began limiting wildlife habitat, which restricted the scimitar-horned oryx to marginal habitat. In the late 1970s, the estimated population of scimitar-horned oryx was about 6,000 individuals, but by the mid 1980s, only a few hundred remained, mainly in Chad (FWS 1991). There have been no reported sightings of the scimitar-horned oryx in the wild since the late 1980s; consequently, they are believed to be extinct in the wild (AZA 2001).

Habitat

The climate in the region once inhabited by the *O. dammah* is very dry and arid. Annual rain varies from 10 to 61 cm in the Sahel. Temperatures can reach 49° C in the shade and drop 20 to 30 degrees at night (Mungall & Sheffield 1994). *O. dammah* is a grazer that uses the grasslands and scrublands on the northern and southern fringes of the Sahara Desert. The species is nomadic and ventures into the Sahel region during the dry season and inhabits the true desert during the wet season (AZA 2001).

The scimitar-horned oryx has flourished in Texas for a number of reasons. Texas has a comparable climate to Northern Africa at the same latitude (Mungall 2001). Vegetation consumed in Texas depends on the climate, forage available, topography, and water availability. Depending on its habitat, the scimitar-horned oryx can alter its selectivity of grasses in order to maintain adequate nutrition (Merkord 1987).

Endangered Status

The scimitar-horned oryx is currently listed under CITES, Appendix I, and the IUCN Red Book lists it as Extinct in the wild (AZA 2001). This drastic decrease in population and current extinction in the wild were primarily caused by habitat loss from overgrazing as the native people changed from a nomadic to an agrarian life style. Desertification and natural drought were also contributing factors (Nowak 1999). The scimitar-horned oryx was also a prized sport trophy and the meat and hide were valuable to local tribes. The hide of the species is high quality and used for making many items from rope to storage sacks (Newby 1988).

A Species Survival Plan has been established for the scimitar-horned oryx. It is believed that most of the founder bloodlines of *O. dammah* originated from captures in Chad in 1963 and 1966. Since then, the scimitar-horned oryx has flourished in captivity (Bertram 1988). Currently, at least 23 zoological parks throughout North America have over 350 oryx. Worldwide, there are at least 1,250 in managed zoos and private facilities. In addition, there are over 2,000 on Texas ranches (AZA 2001). It is one of the species referred to as a super exotic. It is the second most common antelope in captivity (Nowak 1999). This Species Survival Plan is the only one with a private ranch participating in the program. The Selah, Bamberger Ranch Preserve near Johnson City, Texas has over 29 founder bloodlines. The breeding of this herd is dictated by the American Zoological and Aquarium Association. A Studbook Keeper (Alan Rost) coordinates selective breedings to increase the genetic variability of the species. Because

of this ranch, the genetic variability of the species is now considered normal (Nowak 1999).

There are major problems in the Species Survival Plan and reintroduction of *O. dammah* into the wild. Finding genetic stock was one of the initial problems. For successful restoration in the native land, genetic diversity had to be developed with maintenance of the original characteristics of the species. Surplus animals were also a considerable problem. Animals deemed as surplus had no use in breeding programs and took valuable space in husbandry facilities and ranches. The lack of space in zoos was a major problem for developing breeding programs. The willingness of private ranchers to donate land, time, and money to help with survival projects has been pivotal in perpetuating many species including the scimitar-horned oryx. Because male scimitar-horned oryx tend to be aggressive, many facilities also had problems preventing injury and death to males. This has skewed male demographics in herds (AZA 2001).

There was also difficulty enforcing legal protection for scimitar-horned oryx in remote areas of Africa. When suitable habitat was identified, methods for the protection of this animal from hunting and habitat destruction must be implemented or the efforts will be in vain. Outside interests also pressured governments for excessive hunting within the concerned regions (FWS 1991). When animals are released into National Parks or other protected areas, they can sustain a viable population (Bertram 1988). One successful reintroduction occurred in Bou-Hedma National Park in Tunisia in 1985-86 with the release of 10 captive-bred scimitar-horned oryx, 5 males and 5 females. By 1997, the herd had increased to 81 individuals (AZA 2001). Few reserves or parks exist in the desert area and one crucial one is the Ouadi Rime-Ouadi Achim Faunal Reserve

that consists of 77,950 km in Chad. This reserve is located in the heart of the scimitar-horned oryx's original distribution and if managed properly, it could serve as a suitable reintroduction area for *O. dammah* (Newby 1988).

Private ranches provide a unique opportunity for the recovery of this species until release sites can be found in Africa. On these ranches, animals remain relatively wild and self-sufficient without being restricted to small pens. This environment decreases the likelihood of animals becoming domesticated. These ranches play a pivotal role in the perpetuation of this species. The recovery plan's objective is that scimitar-horned oryx raised in captivity are destined for restoration projects. However, not all animals have been used in restoration because of the lack of secure sites.

Objectives

The objective of this project was to compile information on the scimitar-horned oryx in general, and more specifically in Texas. Information pertaining to distribution, diet, habitat utilization, reproduction, behavior, management, and population size was gathered on *O. dammah* in Texas. The scimitar-horned oryx is found in high numbers throughout Texas and is an important sport-hunting animal for the state. Private ranches in Texas provide a unique opportunity for the recovery of the species along with opportunities for gathering vital information on maintaining and managing a viable herd. Information and examples of management of the scimitar-horned oryx is not available in the literature and is therefore important information to gather. There are large numbers of these animals in Texas so it is important to record this information for continued management of the species. Information about diet, behavior, and management is needed for individuals interested in having this animal on their land.

There is a captive herd of scimitar-horned oryx in Texas that is in coordination with the Species Survival Plan for the species. Selah, Bamberger Ranch Preserve helped develop a controlled breeding program with the help of the Studbook Keeper. The main objective of this project was to compile management and husbandry techniques used on this captive herd in Blanco County. Detailed information on the management of this herd is important not only for perpetuation of this species, but also for utilization of other cooperative breeding programs.

Knowledge of management techniques is fundamental to sustaining populations of the animal in captivity and producing excess animals with known genetic pedigree and heterogeneity for restoring populations to the wild. Compiling current knowledge of *O. dammah* in Texas can serve as a handbook for individuals to gain information about the species and the resources the animal requires. This information is important to individuals who are interested in placing this animal on their land.

METHODS

Methods used in my study consisted of a vast literature search of all information available on the scimitar-horned oryx. Information on *O. dammah* in Texas is limited to a few selected studies conducted on a captive herd in Texas and detailed information of management is not available. I spent several semesters gathering literature from a variety of sources and contacted Texas Parks and Wildlife Department and the Exotic Wildlife Association for information. Several other semesters were dedicated to gathering management techniques that were utilized by ranch managers for maintaining the scimitar-horned oryx on their land. This information was obtained through personal interviews of individuals with direct involvement in the management of *O. dammah*. I was able to visit two ranches and observe their scimitar-horned oryx and I interviewed other ranches by phone.

The main objective was to obtain information from Selah, Bamberger Ranch Preserve. I visited Selah three times a month for several months to gather information on management of the animals along with viewing the facilities and taking pictures of the herds. I was driven around the pastures where the animals were kept and was able to observe the animals exhibiting their single file migrating pattern during observations. Each visit lasted three hours and I visited a total of seven times. A total of 30 hours was spent compiling data from Selah. Several hours were spent driving to and from the preserve for each visit. Considerable time was spent compiling information on the Selah herd in Blanco County including age distribution and gender of the majority of the herd. This was done by searching through filing cabinets and records and also by interviewing Mr. Bamberger. A population model for the entire herd was not possible because only a

listing of the 84 individuals included in the Species Survival Studbook were available. Records of other surplus animals were not available. Average age for males and females was determined for the 84 individuals along with age ranges. Information on management techniques and handling was also gathered from this ranch along with a diagram of the facilities built. Selah is part of the Species Survival Plan for this species so detailed information on the captive-breeding program along with restoration plans was obtained.

I also gathered information on the scimitar-horned oryx through personal observations of a herd in Bastrop County. I was able to visit Double D Ranch in Bastrop County and gather information on management techniques used by the ranch along with viewing the animals. I joined the ranch manager (Mr. Gary Rose) on several mornings to ride with him while he disbursed supplemental feed to animals. During these visits, I was placed in blinds where the scimitar-horned oryx had been spotted and spent many hours waiting for the animals to show up. I was often moved to different blinds before being able to observe a herd of *O. dammah*. I conducted herd observations six times and the duration depended on whether or not I saw the animals. Occasionally I was there for three to four hours and did not see *O. dammah*. I spent a total of 24 hours on the ranch observing the herds and interviewing the ranch manager. During observations, I determined the composition of the herd including the total number of animals and hybrids, along with calves and pregnant females. Sex of individuals was difficult and only an estimate of male and female was determined. The scimitar-horned oryx had segregated themselves into two distinct herds and each time I observed them they were relatively the same. I was fortunate enough to view one of the larger herds on the first

day I visited, but it took several more visits before I was able to view the other herds. Field time also consisted of walking through brush to sneak up on herds of scimitar-horned oryx to observe them. These animals wandered constantly and were difficult to locate on the ranch. Entire mornings were spent driving the ranch trying to locate or catch a glimpse of the animals. It took a lot of time and patients driving around and waiting in blinds to observe and record information on these animals.

I conducted phone interviews with two other successful ranches to gather management techniques along with characteristics and behavior of their herds. They were asked a series of questions (Table 1) and these questions, along with information gathered from Selah and Double D Ranch, were used to determine common management practices utilized for the scimitar-horned oryx in Texas. These herds are discussed in detail within the report.

Table 1. Questionnaire used to determine herd characteristics and management used for *O. dammah* in Texas.

Number of scimitar-horned oryx on land.	Significant mortality?
How were the herds composed and were they mixed herds?	Was supplemental feed utilized, if so when?
What county is the ranch located?	Did interactions with other species occur?
High/low fence?	Reproduction, when did they calve?
What forage was utilized?	How many acres were they kept?
Hybridization?	Problems with predators?

I also conducted a survey of ranches in Texas to develop a distribution of the scimitar-horned oryx throughout counties in Texas during summer and fall 2002. Considerable time was spent contacting ranches and performing this survey. Three hours a day, three days a week were spent trying to contact ranches. A total of 80 hours was spent conducting this survey. One of the most challenging parts of this project was obtaining a list of ranches, along with phone numbers, that had herds of scimitar-horned oryx on them to survey. No public records exist listing species located on private ranches so obtaining this information was difficult. Ranches surveyed were found by word of mouth from ranch managers who knew people with *O. dammah* on their land along with information obtained from the Exotic Wildlife Association. Ranches also were located using the internet. A total of 58 ranches, wildlife parks, and zoos were contacted during the survey and they were asked a variety of questions (Table 2). A number of ranches contacted had sold their *O. dammah* and were purchasing other exotic animals. This was a long and very time-consuming part of the project. From this information I was able to establish a distribution of the scimitar-horned oryx in Texas counties along with their location throughout different ecoregions. Of the 58 ranches contacted, 43 responded to the survey. Contact with each ranch was attempted several times before considering a ranch as not responding.

Additional research conducted on the scimitar-horned oryx in Texas and utilized in this project included a study on food habits conducted by Patricia Merkord, and a behavior study conducted by Elizabeth Mitchell, both done at Selah in Blanco County, Texas.

Table 2. Questionnaire used to develop a distribution of *O. dammah* in Texas in summer 2002.

Name of Ranch	County	Number of <i>O. dammah</i>	Acreage	Veg. Preference

Study Area

Information included in this report was mainly conducted in the Edwards Plateau Ecological Region of Texas. Information was also gathered from the Blackland Prairie and the Gulf Coast Prairies and Marshes. Primary research occurred in the Edwards Plateau Ecological Region at Selah near Johnson City, Texas. Food habits and behavioral studies conducted at Selah have contributed vital information to this report on the species in Texas. Detailed management information was collected from Selah along with other private ranches located in the Blackland Prairie and the Gulf Coast Prairies and Marshes.

Selah, Bamberger Ranch Preserve

The major research on the scimitar-horned oryx was conducted at Selah, Bamberger Ranch Preserve near Johnson City, Texas located in Blanco County. Selah is located about 5 km south of Johnson City, Texas at the headwaters of Miller Creek in the eastern part of the Edwards Plateau Land Resource Area. Range conditions are fair to good with an upward trend in recent years. Ash juniper (*Juniperus ashei*) is a predominant woody invader on the ranch and requires constant brush management. The

pasture inhabited by the scimitar-horned oryx consists of a mixed open grassland with interspersed thickets dominated by live oaks (*Quercus virginiana*).

Climate.--The area has a humid, sub-tropical climate with hot summers and mild winters. Mean annual rainfall in the area is 87.6 cm with greatest amounts in May and September. July is usually the driest month. Freezing temperatures occur two out of five nights during winter and cold periods are short. The lowest recorded temperature was -21° C and the highest 43° C. Substantial snowfall is rare and generally melts as it falls. The mean relative humidity at noon is 58% in January, 56% in April, 45% in July, and 53% in October. The primary winds are southerly from April to September and northerly from October to March. The mean length of the growing season, a freeze-free period, is 234 days.

RESULTS

Behavior

Adaptations.--The scimitar-horned oryx is a nomadic desert antelope. In their native habitat, movements follow rains. Because the *O. dammah* can regulate body temperature and tolerate an extreme range of temperatures, the species spends the hottest time of the day in the shade. If no shade is found, the scimitar-horned oryx can raise body temperature to avoid sweating and loss of vital moisture. Body temperature can be raised to 47° C without perspiring (Grzimek 1990). This cooling system works by a rete mirabile where arteries that carry blood to the brain from the heart branch into fine blood vessels that are cooled down about 5.5° C by venous blood flow from the nasal cavity. The blood is cooled before reaching the brain, which prevents damage to this vital organ. The color of their coat is also a thermoregulatory mechanism because it helps to reflect the sun's rays (Grzimek 1990).

Activity Pattern.--A behavior study (Mitchell 2000) conducted from January to December of 1999 at Selah on captive animals showed that the peak grazing time for this herd occurred in morning and afternoon. The behavior of *O. dammah* in Texas was found to be comparable to behavior exhibited in their native habitat with one exception. The herd exhibited considerably more social behavior around 0700h than considered normal. The scimitar-horned oryx stood around and waited for pellets, often engaging in low-intensity aggression. This behavior was thought to be the result of the supplemental food pellets that were distributed at this time. The scimitar-horned oryx rested during midday high temperatures. These animals usually sought shade under large bushes or trees. The daily activity budget was as follows: 42.8% grazing, 20.6% standing, 24.8%

lying, 9.1% walking, 0.8% in non-social activities, and 2% in social activities. Males spent more time in aggressive behavior than females, and higher-ranking males spent considerably more time in aggressive behavior than lower ranking males. The higher-ranking males had higher frequencies of courtship behavior. Eleven percent (1 of 9) mortality occurred during this study period on the selected animals that were included in this study. Scimitar-horned oryx were more active on a daily basis during winter months because of the probable necessity to generate heat to keep warm.

Vocalization.--Vocalization is common within the scimitar-horned oryx herd (Gill and Cave-Browne 1988). The frequency of calls is highest by calves and decreases slowly through the juvenile stage into adulthood. Females in estrus are very vocal, along with bulls that cannot herd females. Females can recognize their calves by individual call. Animals call for a variety of reasons, including arousal of some kind, separation, and herding. The larynx of dominant male and female *O. dammah* have been observed to swell when they become leaders of the herd. As a result, they became more vocal in behavior. The throat enlarges with age and ranking and will remain enlarged unless a drop in ranking occurs.

Herd Composition and behavior.--The size of the herd is dependent upon environmental factors including season, distribution, and food availability (Newby 1988). Scimitar-horned oryx are usually found in groups of 15 to 40 individuals, but if solitary animals are seen, they are more likely to be males. In their native habitat during the wet season, 1,000 animals or more congregate in one area (Nowak 1999). The scimitar-horned oryx is a gregarious animal with a male and female hierarchy. Dominance in males in the Bamberger herd did not remain stable over time, and it did not correspond to

age. The female hierarchy however, did remain stable over time and corresponded to age (Mitchell 2000). Most fights did not result in bloodshed. The dominant male usually supplanted lower ranking males with low-intensity aggression including stares, pursuit marches, and erect postures. Many variables can affect the ranking of males within the herd. Damaged or irregular shaped horns can result in a lower ranking within the hierarchy (Gill and Cave-Browne 1988).

A behavioral study (Bertram 1988) conducted on the reintroduced herd in Tunisia showed that the dominant male was larger and more impressive than other bulls. He used his horns to thrash vegetation and hook down browse. He also initiated more interactions than all other animals. The hierarchies for the five males and five females remained stable for 18 months. Females did not interact with each other as frequently as males, but the hierarchy remained intact. The lowest ranking male had a severely twisted horn. This deformity may have affected his sparring abilities.

Positions in the hierarchy may also contribute to the growth and size of individuals. The alpha bull is usually considerably taller and appears older than the other males. Also, the lowest ranking females are smaller and appear like yearlings. In the Tunisia herd, animals synchronized their movements of resting and feeding and commonly sat in an outward-facing circle, which is characteristic of wild oryx (Bertram 1988).

Movements.--The scimitar-horned oryx is very nomadic and follows the rains in their native habitat. Most herds consist of a mixture of bulls and cows. A cow usually leads the herd with the alpha bull at the rear. If the cow deviates from the route, the alpha bull will run to the front and shift the herd back into line (Grzimek 1990). Dominant

bulls exhibit unusual behavior by forcing other bulls to remain with the herd. It is thought that keeping bulls in the herd provides better protection for the herd and the dominant bull's offspring (Beacham and Beetz 1998).

Sparring and Fighting.--The scimitar-horned oryx in Tunisia has adapted a ritual tournament to determine the hierarchy within the herd. Several animals form a circle and run around in varying strides interspersed with sprints and jumps. Animals participating in the circle will occasionally clash horns in a way that does not inflict harm. This behavior continues as animals calm down, and the clashing of horns somehow determines who dominates whom. This ritual seems to prevent severe damage that can occur when dominance is being decided (Beacham and Beetz 1998).

Reproduction

Captive female scimitar-horned oryx reach puberty at 11 months of age (Durrant 1983). Females in estrus display pink, swollen vulvas, are more vocal, eat less, and increase the amount of physical contact with bulls and other cows (Gill and Cave-Browne 1988). An estrous cycle is 21 to 22 days and peak estrous lasts about 24 h. It is thought to resemble the cycle of a domestic cow (Durrant 1983, Nowak 1999). Courtship between male and female scimitar-horned oryx usually includes circling, with the male demonstrating laufsley (raising his foreleg near hindlegs of females). The female remains still during mounts. This allows the male to use his forefeet to hold the female while achieving full intromission (Gill and Cave-Browne 1988). Gestation lasts about 250 days. The female will separate herself from the herd to give birth, which normally takes 2 to 8 h, and will rejoin afterwards (Mitchell 2000). Females give birth to a single calf at nine-month intervals. A postpartum estrous follows in a few days. Calves

normally weigh from 9 to 15 kg at birth, typically have no markings, and are a yellowish-brown in color (Nowak 1999, Grzimek 1990). The calf's nose is snub shaped until the sixth week (Gill and Cave-Brown 1988). The dominant male remains close to the female in order to mate with her during postpartum estrus; this ensures that all offspring are his (Mitchell 2000).

Male and female scimitar-horned oryx at Selah are born with nubbins, and within one month, horn growth attains a length of 10 to 13 cm. There is no difference in male and female horns after six years other than male horns are thicker at the base (Bamberger pers. comm. 2001). Calves born in captivity were observed nibbling soil within a few days of birth and ate supplemental food and grass at three weeks-of-age. Suckling occurred several times a day and lasted about 30 to 120 seconds. The calves were weaned at an age between 5 to 10 months (Gill and Cave-Browne 1988). Inbreeding of the scimitar-horned oryx could increase juvenile mortality. Males in captivity reach sexual maturity at about one year old, but social maturity and size is not reached until the age of three (Mitchell 2000).

Food Habits

Native Habitat.--The scimitar-horned oryx is primarily a grazer in their native habitat. They migrate seasonally in search of suitable food. During the wet season (July-September), scimitar-horned oryx feed on freshly sprouted annuals. These also make up the bulk of their diet through winter (November-February). The region dries up during the hot season (March-June) and scimitar-horned oryx feed on green perennials, specifically *Panicum turgidum*. Pods of *Acacia tortillis* are highly sought after (Newby 1988). Gillet (1966) observed scimitar-horned oryx in the Chad Republic using fast

growing grasses with over 50% water content. Important grasses included *Cenchrus biflorus*, *Echinochloa colona*, *Chloris virgata*, and *Schoenfeldi sp.* *Indigofera viscosa* and *Boerhavia repens*, a legume, with high water content were also utilized. The scimitar-horned oryx preferred the wild oat (*Dentonia forskalaei*) in drier periods. The grass is often referred to as “oryx grass” by locals (Gillet 1966).

The scimitar-horned oryx migrate seasonally and may travel over 600 km yearly (Newby 1988). Scimitar-horned oryx drink when water is readily available, but have the ability to select and eat plants with high water content, which enables them to go months without free water when adequate forage is available (Mungall & Sheffield 1994). Grazing in the morning and evening also allows them to acquire more moisture from plants (Mungall 2001). The wild melon (*Colocythis vulgaris*) is very important to the oryx, and its presence affects the distribution of herds (Newby 1988).

Food Habits in Texas.--A food habits study (Merkord 1987) of the scimitar-horned oryx was conducted at Selah in Blanco County, Texas in 1987. It showed that the scimitar-horned oryx is a selective grazer with grasses and some forbs being major components of their diet. This project determined preference by dividing the relative frequency of the plant by the availability factor that was determined by quadrat sampling. They preferred the fruits, leaves, shoots and stems of plants. Because Texas is not their native habitat, forage type, availability, topography, and water accessibility could influence the species grazed. Grass composed 99% of their diet. Selective foraging by the scimitar-horned oryx is dependent upon availability of grasses within different seasons. The most preferred grass in Blanco County during spring was sideoats gramma (*Bouteloua curtipendula*), followed by silver bluestem (*Bothriochloa laguroides*), bushy

bluestem (*Andropogon glomeratus*) and little bluestem (*Schizochyrium scoparium*). Indiangrass (*Sorghastrum nutans*), hairy gramma (*Bouteloua hirsuta*), kleingrass (*Paspalum coloratum*), lindheimer muhly (*Muhlenbergia lindheimeri*), Texas wintergrass (*Stipia leucotricha*), and Texas gramma (*Bouteloua rigidiseta*) were the top 10 grasses used. Forb use included burrlover (*Medicago polymorpha*), one-seed croton (*Croton monoanthogynus*), prairie verbena (*Vervena bipinnatifida*), and lemon horsemint (*Monarda citriodora*). One-seed croton was the only important forb. Browse used by the scimitar-horned oryx included Texas persimmon (*Diospyros texana*), and grape species (*Vitis sp.*). However, browse species were unimportant in the diet.

The greatest variety of plant species was available during summer. The most used grasses during this period were Indiangrass, bushy bluestem, silver bluestem, sideoats gramma, little bluestem, and hairy gramma. Forbs in the diet included sticktight (*Bidens frondosa*), bighead evax (*Evax prolifera*), silverleaf nightshade, Chalkhill woollywhite (*Hymenopapus tenuifolius*), one-seed croton, hoarhound (*Marrubium vulgare*), and plantain (*Plantago lanceolata*) (Merkord 1987).

There were fewer plant species available during fall than in spring and summer. Sideoats gramma, hairy gramma, bushy bluestem, and silver bluestem were selected grasses. Live oak (*Quercus virginiana*) and hackberry (*Celtis sp.*) were insignificant browse species in the diet (Merkord 1987).

During winter, the diet of the scimitar-horned oryx consisted mainly of grasses including hairy gramma, Texas gramma, curlymesquite (*Hilaria berlanderi*), Indiangrass, silver bluestem and bushy bluestem. Browse was more common during this period and included Spanish oak (*Quercus texana*) and live oak (Merkord 1987).

The oryx was observed to decrease their grazing on a particular plant species when its availability decreased. They selected other plant species until the preferred one became more available. It is not known if the oryx prefers a specific growth stage for foraging, but conclusions can be drawn by looking at the preferred plant species during each season. Sideoats gramma was the preferred species during spring when the new shoots of this species occur. Bushy bluestem was most preferred during summer when its new shoots appear. In fall, sideoats gramma and bushy bluestem were selected most often as plants possessed mature leaves and reproductive structures. During winter, the oryx showed a preference for hairy gramma when the plants tissues were dry. Because scimitar-horned oryx in this study were restricted by fences and were not free roaming, their availability of forage species was limited. From this study, it is evident that the scimitar-horned oryx can alter its feeding habits in accordance to availability, and season to obtain its required nutrients (Merkord 1987).

Scimitar-horned oryx have been observed eating a variety of vegetation including yaupon (*Ilex vomitoria*), wild grapes, blackbrush (*Acacia rigidula*), and guajillo (*Acacia berlandieri*), along with native grasses in different regions of Texas. Ranches throughout Texas use supplemental feed in winter usually consisting of buck and doe feed or horse and mule feed. Frequency of feeding is dependent upon the ranch and habitat quality.

Disease

The possibility exists for exotic animals to transmit pathogens to native wildlife and other captive exotics within the same pasture (Mungall & Sheffield 1994). It is illegal to transport a scimitar-horned oryx from their native habitat into the United States,

but because they are considered extinct in the wild, there is little possibility of this occurring. The scimitar-horned oryx in Texas originated from local zoos.

The potential does exist for exotics to become susceptible to diseases of native animals. *Haemonchus contortus*, the “barberpole worm”, is a parasitic nematode that afflicts *O. dammah*. Oryx have no natural resistance to this parasite because of a lack of exposure. Infection levels that devastate scimitar-horned oryx are lower than in other ungulate species. The pathogenicity of the parasite leaves little time for treatment. Levels of 40,000 *Haemonchus* will kill a scimitar-horned oryx. This parasite usually strikes healthy animals during warm months. This parasite can remain dormant in the stomach during winter and multiply in the spring. *Haemonchus* can be effectively controlled with the drug Ivermectin (Merck Sharpe & Dohme Research Laboratories) if done before 1 April. The best defense against infections includes controlling or maintaining adequate stocking numbers to avoid overcrowding and providing adequate nutrition for animals (Mungall & Sheffield 1994).

Scimitar-horned oryx in Texas

The scimitar-horned oryx exists in Texas for many reasons, including rehabilitation of genetic variability, education, hunting, and aesthetic value. The majority of the animals in Texas are used in trophy hunting.

In Texas, scimitar-horned oryx can withstand a range of temperatures including freezing winters and blazing summers. The only thing they cannot tolerate are wet northers. Substantial die offs occur if the weather remains wet and below freezing for more than a few days (Bamberger pers. comm. 2001).

Distribution in Texas.--The scimitar-horned oryx is distributed throughout Texas from east to west and north to south. They are found on private ranches, zoos, and wildlife parks in a variety of ecoregions and vegetational types. The first record of the species in Texas was two males and eight females that were brought to the San Antonio Zoo in 1967. The first census estimate for *O. dammah* occurred in 1979 with 32 individuals reported. By 1984, a census estimate of exotics in Texas was 177. This number rose considerably to 577 in 1988 (Mungall & Sheffield 1994). The last official census estimate conducted in 1994 - 1995 reported 1,106 scimitar-horned oryx on 67 ranches. This report did not indicate that any scimitar-horned oryx were free-ranging in Texas (Traweek 1995).

In summer 2002, I conducted a survey to develop a current distribution of scimitar-horned oryx in Texas. *O. dammah* are currently found in 31 counties in Texas (Fig. 1). Records for scimitar-horned oryx are from the Rolling Plains, Blackland Prairie, Piney Woods, Edwards Plateau, Gulf Coast Prairies and Marshes, Llano Uplift, Oak Woods and Prairies, South Texas Brush Country, and TransPecos Ecological Regions (Fig. 2). The only ecoregion in Texas without scimitar-horned oryx is the High Plains. An estimated 1,717 scimitar-horned oryx are located on ranches in Texas. The majority of scimitar-horned oryx occur in the Edwards Plateau region because most private exotic game ranches are located in this region and not because of the specific vegetation and climate of the region (Mungall and Sheffield 1994). The scimitar-horned oryx is not a free-ranging animal and all appear confined by fences. The numbers and distribution of the scimitar-horned oryx did not provide a complete count of all the animals in Texas.

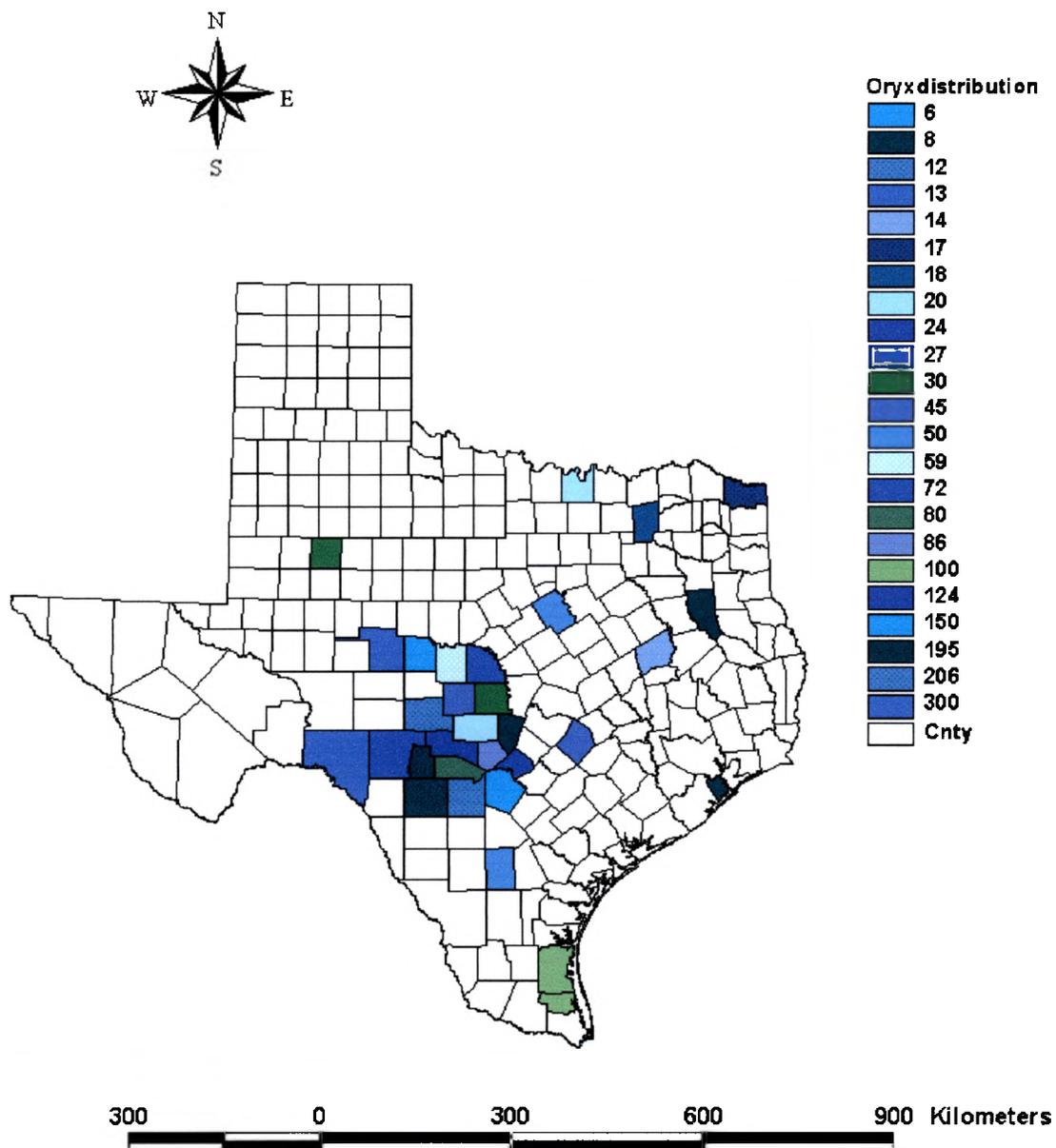


Figure 1. Distribution of *O. dammah* in counties of Texas during summer 2002.

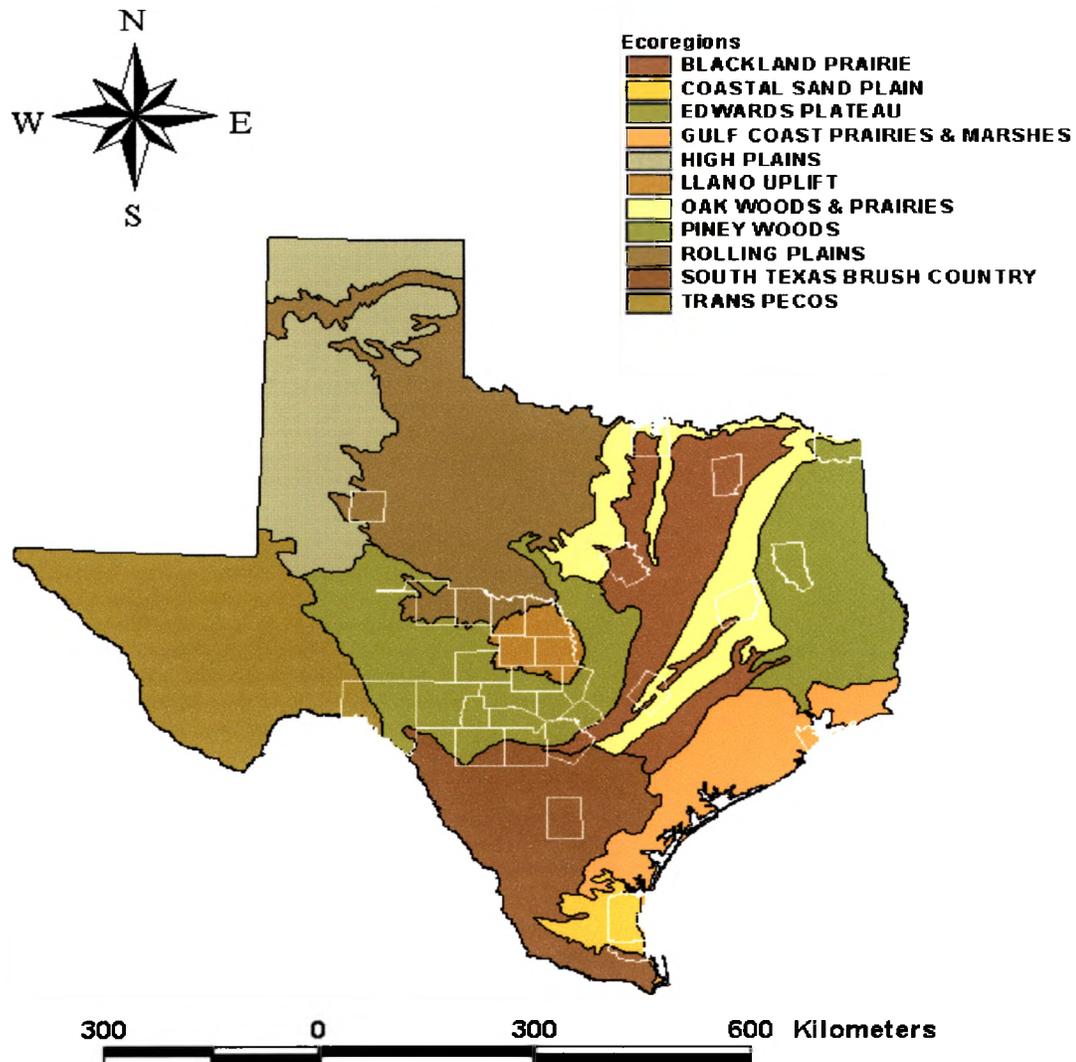


Figure 2. Counties within ecoregions of Texas containing *O. dammah* in summer 2002.

The information is only representative of the ranches I contacted and the willingness of ranch owners to respond to my questions.

Competition.--The possibility does exist for *O. dammah* to compete with native grazers, specifically cattle and sheep; however, most grazers in Texas are livestock and managed accordingly. The scimitar-horned oryx does have the ability to shift feeding habits to gain adequate nutrition, but it is highly unlikely they will consume enough browse to compete with native browsers including white-tailed deer (*Odocoileus virginianus*). If scimitar-horned oryx are stocked on ranches with other exotics, there is the possibility of competition between grazers.

Hunting.--The majority of ranches with scimitar-horned oryx offer hunting opportunities. Both the male and female have impressive horns that make beautiful trophies. There are no restrictions that dictate the season or number of animals that can be taken when hunting exotics in Texas, so harvest is at the discretion of the landowner. Hunting can be a legitimate method of population control for *O. dammah* on private ranches. The cost for hunting a scimitar-horned oryx ranges from \$1,000 to over \$10,000. The price depends upon the location of the ranch, the facilities provided, and the quality of the animal.

Hybridization.--The scimitar-horned oryx has hybridized with several species including addax (*Addax nasomaculatus*), beisa oryx (*O. gazella beisa*), and the Arabian oryx (*O. leucoryx*) on several ranches in Texas (Mungall & Sheffeild 1994). The addax hybrid resembles the addax in its markings. The hybrid between the scimitar-horned oryx and beisa oryx has horns of the scimitar-horned oryx and markings favor the beisa

oryx. The Arabian oryx cross has straight horns. Oryx species should be kept separately to avoid hybridization and maintenance species integrity.

Management examples of the scimitar-horned oryx in Texas

Common Management Practices.--The scimitar-horned oryx is a species that is relatively easy to manage for and the majority of them in Texas are managed for hunting purposes. Common management practices utilized by owners of *O. dammah* include fencing to contain animals. The main limiting factor for the scimitar-horned oryx is acreage. They are nomadic animals and require ample space to wander. If acreage is limited, adequate forage species must be available to *O. dammah*. Some form of cover should be available for cover. Most ranches utilize supplemental feed in winter months and may become necessary in summer months depending on rainfall and drought conditions. Separating the scimitar-horned oryx from other oryx species is necessary and is utilized to prevent hybridization. If species do cross, it will decrease the quality of the animal and therefore the price for hunting purposes.

Handling facilities are rare and only exist under intensive management conditions as seen at Selah. Most ranches do not separate male and female scimitar-horned oryx and utilize selective hunting as population control. Selective harvesting is a commonly utilized practice and only these animals are killed. Water is not a necessity and providing it in pastures is at the owner's discretion. Containing and managing scimitar-horned oryx on ranches entails relatively little management and if provided with the proper resources, the animal will reproduce and thrive in Texas.

Bamberger Herd, Blanco County.--Selah, Bamberger Ranch Preserve in Blanco County is the only private ranch in Texas that cooperates with the AZA and the Species

Survival Program for the scimitar-horned oryx. Mr. Bamberger set aside an initial 260 ha on his property for establishing a herd in 1983. The AZA provided 24 animals gathered from around the world. An additional seven animals were added as needed. The goal of this project was to establish and maintain a minimum of 90% of the species genetic variability. Establishing a population of 400 individuals was thought to provide enough genetic variability for a minimum viable population for 150 years. In 1996, this goal was decreased to 300 individuals with a specific genetic heterogeneity. Additional acreage added to the area increased the size to 320 ha.

Animals on the ranch were ear tagged and tattooed upon arrival or birth. Males were segregated into a bachelor herd to control breeding. The number of animals in the bachelor herd fluctuated yearly as young male calves were weaned from their mother and placed into the bachelor herd. Males remain in the bachelor herd until the SSP studbook keeper/SSP coordinator indicated that they were for breeding. Males chosen for breeding were introduced into a breeding group of females in August or September. A breeding period of about four months ensued. Males were placed back into the bachelor group by December or January. All breeding females were returned into one herd after separation from the main herd. Breeding females were supplied with a limited amount of pelleted supplement. The calves were found within a few hours of birth, captured by hand, gender determined, tattooed, tagged, and released. New born calves were monitored daily by driven patrols. This breeding was timed to produce a summer calving season.

As the herd grew in size and the genetic profile for the herd changed, some animals were declared as surplus and sold to ranches. Some males were never used as breeders and always remained in the bachelor herd. Some males were used for breeding

only once, and others were used three to four years in a row. Males experienced aggression when sorting females and breeding males into groups in the fall. Aggression also occurred when breeding males were re-introduced into the bachelor herd.

The mortality rate at the ranch over the past two decades has been about 8.64%. This mortality rate is minimal and occurred because of a variety of factors. In 1984, two animals were lost in a snowfall of 30 cm. An incubator was built for the female, but she did not survive. The male died standing up. The scimitar-horned oryx is not tolerant of wet northers but can tolerate cold and dry weather. As a result of this mortality, bails of hay are stacked into a wall to provide a wind break when cold fronts with minor snowfall are forecasted. During one calving season, 11.4 cm of rain fell, and two calves drowned. Two animals were lost because of fighting. Old age has been the main cause of mortality. One calf fell into an armadillo hole and fire ants killed it. Substantial mortality occurred in 1995 because of deaths in older age classes of females. There were concerns for 40 aging females in the herd that had never been bred. Veterinarians were consulted and the possibility of infertility became a concern. Four breeding groups of females were set up so genetic information would not be lost. Problems were experienced once birthing took place, and mortality was higher than in the last 15 years combined. One female died giving birth, and one left her calf. Eight to nine animals died. This experiment was deemed not scientific enough to prove that complications and infertility could result from an aging female who had never been bred. The AZA designed another study to test the validity of this hypothesis. They had slightly better results but the second highest death rate occurred on the ranch. Conclusions from this

experiment exhibit the need to breed scimitar-horned oryx in order to prevent infertility and mortality.

The ranch produced the 300 scimitar-horned oryx needed for the conservation plan and consequently produced more animals than other ranches. Currently, every animal on the ranch was born there. There are about 120 scimitar-horned oryx on the ranch, and 84 of them are listed in the SSP studbook for breeding and management and as surplus. The scimitar-horned oryx on the ranch are now an aging population and the majority have been declared a surplus, but they are still viable. The surplus may be sold to hunting ranches or private owners to help them improve the genetics of their herds. Selling surplus animals has generated income for maintaining the scimitar-horned oryx the past seven to eight years on the ranch. Mr. Bamberger has left the AZA, but his ranch remains in compliance with the original plan for the herd. This ranch is the only place collectors can get genetically known stock. There is currently no coordinated breeding taking place. A few selective breedings have occurred at the ranch in the last few years only to prevent infertility.

Several facilities were built to accommodate the scimitar-horned oryx on the ranch. A series of tanks were constructed by damming hillside streams to provide water in each paddock. High quality fencing was used to build paddocks around a central handling area with a custom built circular sifter at the center (Fig. 3). This design allows individuals to be restrained and sorted into pre-selected social groupings. The animals are worked only for medical purposes and then they are enticed with food through the specially designed pens. They are also worked through chutes to move them to different

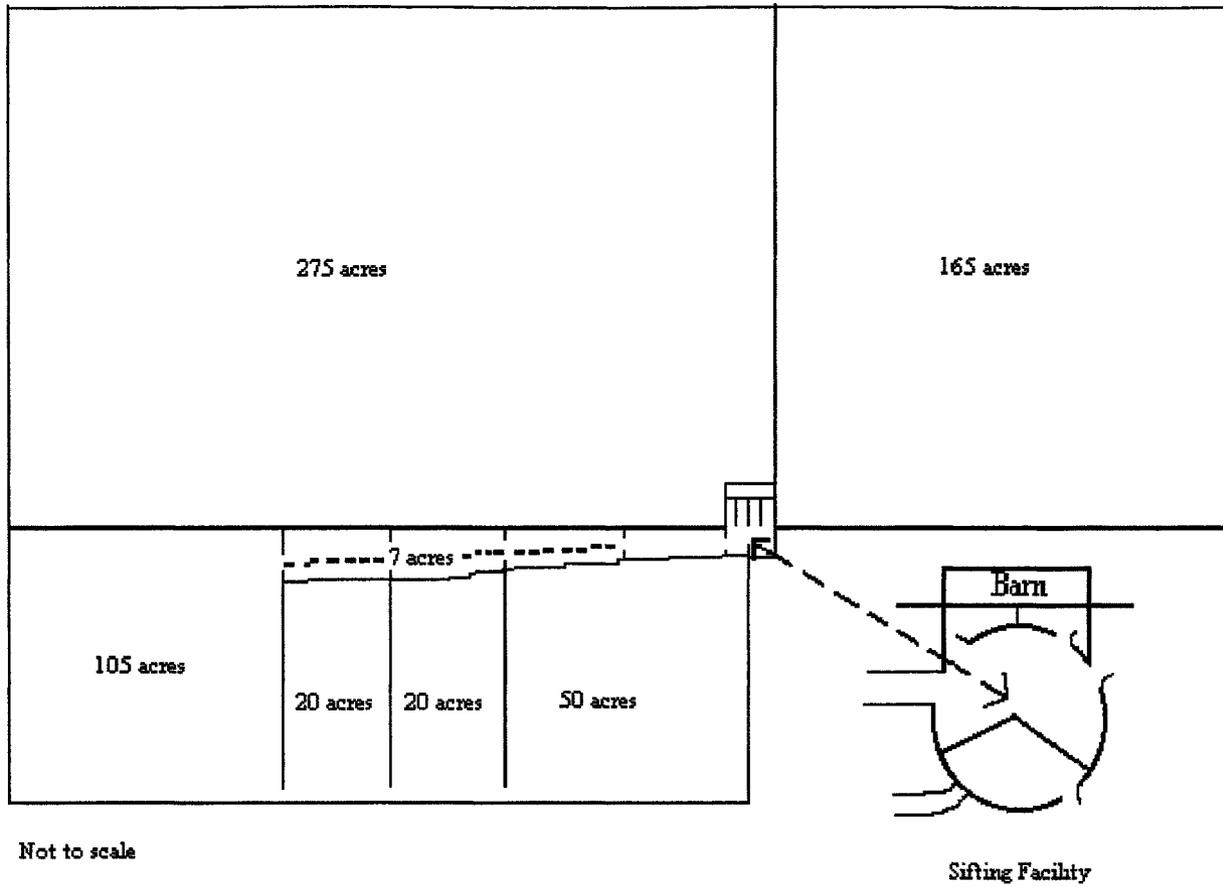


Figure 3. Diagram of *O. dammah* handling area at Selah in Blanco County, Texas.

ranches. They are caught at six to 12 hours old to tag the ear and tattoo the ear. They are worked after four or five years if tags fall off. Animals are run through the pens to verify their number and give them another tag. The scimitar-horned oryx is a dangerous animal to handle because of the saber-shaped horns, so precautions are necessary. If transportation is required, the horns are sometimes wrapped with a split garden hose and then taped. This prevents damage to handlers along with preventing damage to the animals' horns. Handlers should also avoid clothing or jewelry that can get hooked by the long horns.

Improvements on the ranch for the scimitar-horned oryx cost around \$125,000 for the fences, pens, and water troughs. The animals brought to the ranch from zoos or other facilities slowly adapted to the semi-wild environment. These animals were used to being fed regularly, so they were slowly weaned off pelleted food. This was done by decreasing the amount of feed and providing more alfalfa and natural grasses. Colored strips were put on fences to prevent the animals from running into or through them.

No interactions with livestock occurred with scimitars-horned oryx on the ranch because they are kept separately. A scimitar-horned oryx did kill a white-tailed deer during winter because it got too close during feeding. The scimitar-horned oryx is said to be the only antelope that can defend itself against a lion (Bamberger pers. comm. 2001).

The cost for hunting the scimitar-horned oryx varies widely within the marketplace. It is typically dictated by the land size, the area, the housing provided and the amount of time spent hunting. The ranch sells juveniles to dealers as hunting stock for \$1,000. Breeding stock three to four years old sells for about \$1,500 to \$2,000.

Females bred with good horns sell for \$2,000, and ones with mediocre horns sell for \$1,250. The scimitar-horned oryx is not hunted on Selah.

The total composition of the herd is not known, but the individual animals listed in the studbook as managed or surplus can be analyzed. A total of 84 animals are currently listed in the studbook; 31 are males, and 53 are females (Table 2). The average age of the 84 animals is 8.7 years (SD = 3.24, range 4 to 16 years). If analyzed by gender, the average age for males is 6.8 years (SD = 2.57, range 4 to 13 years) (Fig. 4) Females average 9.8 years (SD = 3.12, range 4 to 16 years) (Fig. 5). Twenty-five of these individuals are listed as surplus. The oldest animal at the ranch was a female born in February 1979, but she recently died in January 2002 at an age of 22 years, 11 months. From this analysis, the average age for females is higher than males and females compose the majority of the herd.

Table 3. List of *O. dammah* at Selah in Species Survival Plan studbook in 2002. The bold signifies surplus animals.

Gender	Birth Date	Gender	Birth Date	Gender	Birth Date
Female	5 April 1986	Female	29 June 1989	Female	16 April 1990
Female	15 April 1987	Female	12 July 1989	Female	17 April 1990
Female	10 April 1988	Female	5 April 1990	Female	20 April 1990
Female	20 April 1988	Female	5 April 1990	Male	25 April 1990
Female	8 May 1988	Female	8 April 1990	Female	19 April 1991
Female	26 June 1988	Female	11 April 1990	Male	25 April 1991
Female	5 June 1989	Female	13 April 1990	Female	29 April 1991

Table 3. Continued.

Gender	Birth Date	Gender	Birth Date	Gender	Birth Date
Female	6 May 1991	Male	6 July 1995	Female	21 April 1992
Female	11 May 1991	Male	15 June 1996	Female	30 April 1992
Male	28 March 1992	Female	19 June 1996	Female	30 April 1992
Female	1 April 1992	Male	25 June 1996	Female	24 April 1993
Male	26 April 1992	Male	29 June 1996	Female	27 April 1993
Female	29 April 1992	Female	2 July 1996	Male	5 May 1993
Female	4 May 1992	Male	12 May 1997	Male	13 June 1996
Female	10 May 1992	Male	17 May 1997	Male	12 May 1997
Male	22 May 1992	Female	20 May 1997	Male	17 May 1997
Female	25 May 1992	Male	25 May 1997	Male	17 May 1997
Female	23 April 1993	Female	25 May 1997	Male	17 May 1997
Female	7 May 1993	Male	2 June 1997	Male	23 May 1997
Male	11 May 1994	Female	4 June 1997	Male	23 May 1997
Male	13 May 1994	Female	4 June 1997	Male	29 May 1997
Female	23 May 1994	Male	25 Aug 1997	Female	29 May 1997
Female	25 May 1994	Male	26 Aug 1997	Female	2 June 1997
Female	27 May 1994	Male	21 May 1998	Male	4 June 1997
Female	31 May 1994	Female	25 May 1989	Female	4 June 1997
Female	3 June 1994	Male	25 May 1989	Female	8 June 1997
Female	24 May 1995	Female	27 April 1990	Male	6 July 1997
Female	3 June 1995	Male	15 May 1991	Female	13 October 1997

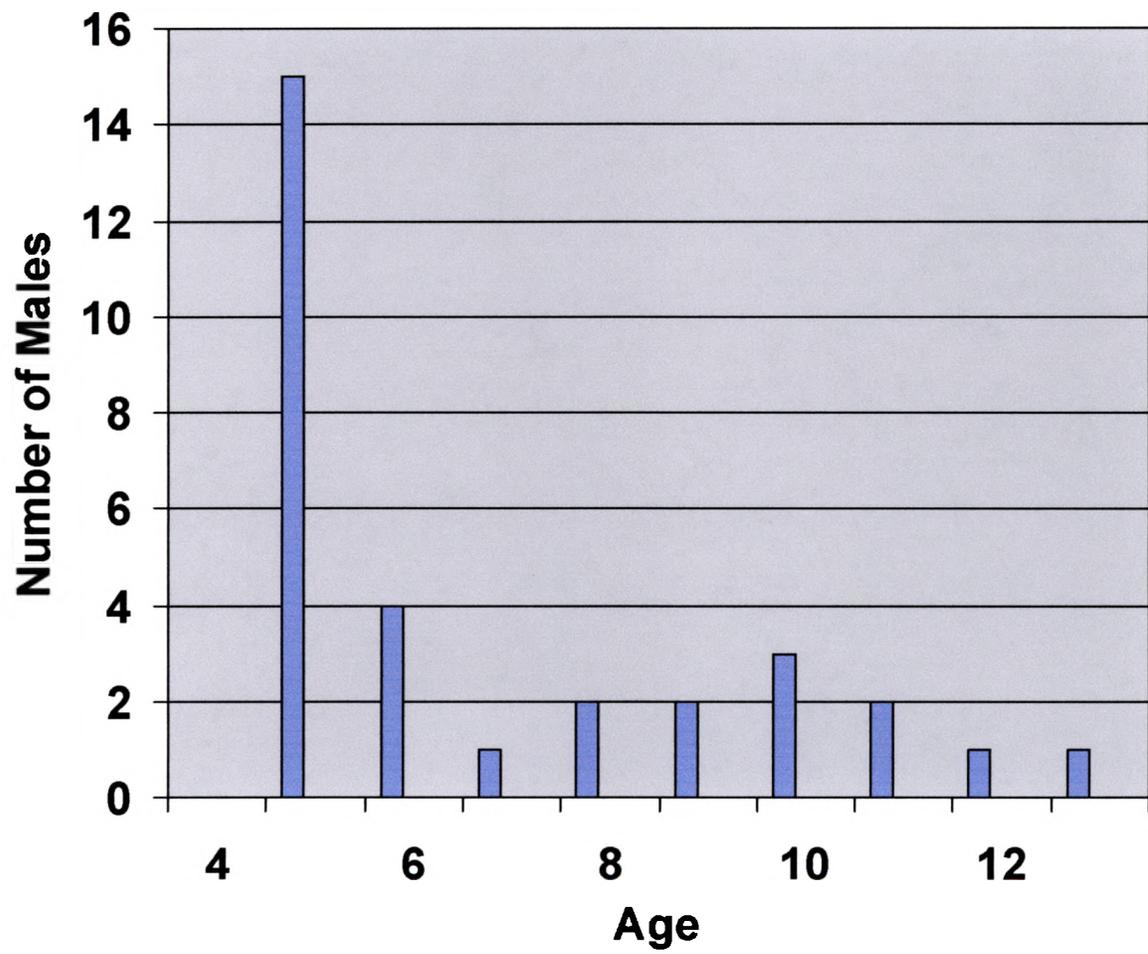


Figure 4. Age distribution of male *O. dammah* at Selah in 2002

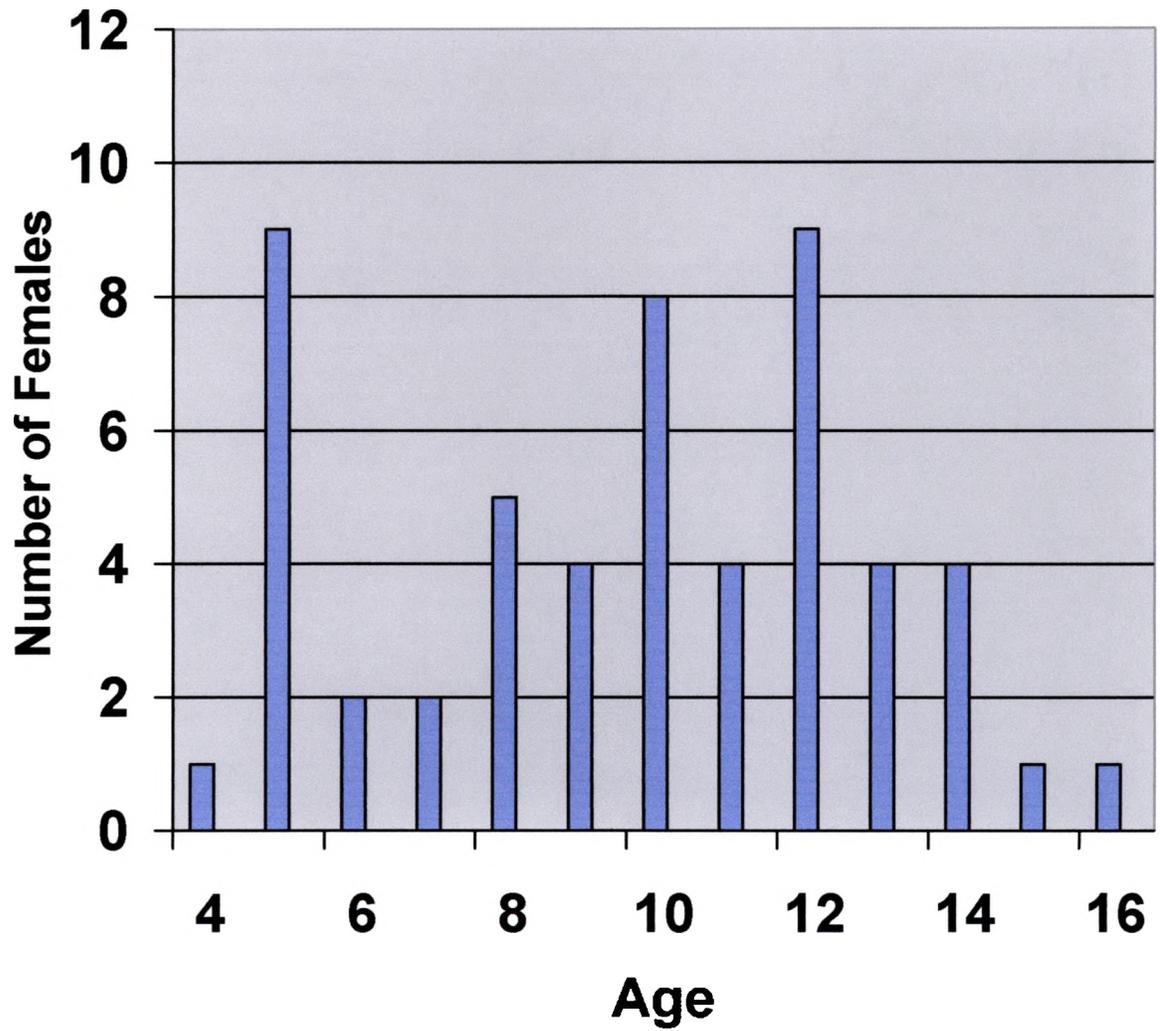


Figure 5. Age distribution of female *O. dammah* at Selah in 2002.

The scimitar-horned oryx is representative of problems that Species Survival Programs face throughout the world. Goals for genetic variability for the species were reached and maintained, but suitable habitat has not been located to reintroduce the species back into its native environment. Now, the herd that developed for the purpose of restoration is aging and the genetic stock could be lost permanently.

Double D Ranch.--The Double D Ranch in Rosanky, Texas is owned by Mr. Don Duncan and managed by Gary Rose (in the Oak Woods and Prairies Ecoregion of Texas in Bastrop County). It is home to a number of exotic and native game animals that are utilized for hunting. The ranch has about 45 scimitar-horned oryx that are kept on 1,417 ha surrounded by a 2.5 m fence. The herd was started in about 1975-76. Hybridation has occurred between the scimitar-horned oryx and beisa oryx on the ranch. Personnel on the ranch are now trying to filter out the hybrid animals.

The scimitar-horned oryx had segregated themselves into distinct groups. The main group composed of 27 to 28 animals was lead by an albino-nosed male. Four hybrids existed within this group along with two calves and a pregnant female. The second herd, composed of about 15 animals, mainly females, was lead by a female. There was one small bull in this group and one hybrid. One lone eight-year old bull roamed the acreage. The last group was composed of three young sexually immature bulls one to two years old. The herds remained relatively the same throughout the two months I observed them. The fact that these animals formed distinct herds showed that the scimitar-horned oryx will segregate into herds in captivity. The animals wandered constantly and were never observed in the same area twice.

The diet of scimitar-horned oryx on the ranch consists mainly of coastal bermuda (*Cynodon dactylon*). Some scimitar-horned oryx have been observed browsing on yaupon (*Ilex vomitoria*).

Scimitar-horned oryx are in mixed herds and breeding does occur on the ranch. Mating usually begins in March and calving is observed in January. An 8.5 month gestation is observed.

Management for scimitar-horned oryx on the ranch consists of feeding a 20% buck and doe, full-o-pep Quero, 4 mm size pellet on Mondays, Wednesdays, and Fridays at about 0900 h. The animals are wormed in the spring. Mortality of scimitar-horned oryx on the ranch occurs when it is cold and wet. No direct competition is evident between scimitar-horned oryx and other species on the ranch. They can wander up to 16 km per day. When wandering, a female leads the herd and a male brings up the rear. There are two to three bulls harvested per year with prices for the animals ranging from \$3,500 to \$5,000 for bulls, depending on the quality of the horns. The animals to be harvested are carefully selected.

Indianhead Ranch.--Indianhead Ranch is located in Val Verde County near Del Rio, Texas in the Edwards Plateau Region. The ranch is owned by Mr. Laurent Delagrange. The herd on the ranch contains about 300 scimitar-horned oryx on 4,050 ha. The ranch has a 2.5 m high fence on three sides with the fourth side is contained by extreme land contours. The scimitar-horned oryx eat mainly green forage, including native grasses, blackbrush acacia and guajillo. In winter, the animals are fed supplementally with a high protein pellet. Addax live on the ranch, but there has been no hybridization of this species with the scimitar-horned oryx. The main predator on the

ranch is believed to be the bobcat, but there is no evident to substantiate mortality due to this cat. Scimitar-horned oryx live in scattered herds and cycle like mares. The male waits for the female to drop the calf and return to the herd. The scimitar-horned oryx breed throughout the year. This has resulted in a rapid growth of the herd on the ranch. Ten to 12 animals are annually harvested on the ranch by guided hunts.

Yturria Ranch.--Yturria Ranch is located in Kennedy and Willacy County near Ramondville, Texas in the Gulf Prairies and Marshes Region. The ranch is owned by Mr. Danny Butler. A herd of over 100 scimitar-horned oryx live on 4,656 ha without a high fence. In July 2002, the scimitar-horned oryx were in one large herd. The herd will break up into smaller herds during the hunting season. On the ranch, scimitar-horned oryx primarily eat native grasses and are provided with mineral blocks, superblocks, and molasses. They have been observed using salt blocks provided for cattle. Some scimitar-horned oryx eat horse and mule feed provided for different species on the ranch.

No hybridization has occurred on the ranch because other oryx species are kept in separate pastures. No interactions have been observed with other ungulate species on the ranch.

Females calve throughout the year with birth concentrated in spring. The herd is growing rapidly. The species is very successful on the ranch and no significant mortality exists. Mortality is mainly associated with wet, cold weather that persists for more than a few days. About 10 animals are harvested yearly, including males and females. Females are lower in price than males. The ranch does not hunt during June, July, or August because of the heat.

Terrain on the ranch consists of sand dunes and clay loams. The oryx seem to prefer the sand dune area.

Other Confined Herds.--There are four organizations in Texas that are coordinated with the Species Survival Program and have animals listed in the studbook. The major participant is Selah, Bamberger Ranch Preserve, along with Fossil Rim in Glen Rose, the San Antonio Zoo, and the Dallas Zoo. The San Antonio Zoo currently has four females and two males at the zoo, but they are of unknown genetic origin. They are, therefore, not recommended for breeding. These animals live in a small fenced area and are fed bermuda hay and pellets. They are very hardy animals and are easily managed. Because they require large facilities, they are being phased out of the zoo.

The studbook lists 18 scimitar-horned oryx located at Fossil Rim, 10 managed females and eight managed males, and one female is listed as surplus. The studbook also lists scimitar-horned oryx at the Dallas Zoo. It lists one male and six females as surplus animals.

CONCLUSION

The scimitar-horned oryx is a versatile species that can adapt to a variety of habitats. It is found throughout a wide range of vegetation and topography in Texas and requires little in the way of management. It is primarily a grazer, but it can use forbs and even browse when necessary. Standing water is not critical if adequate vegetation is available. Cover does not seem to be critical, except to provide shade from hot and cold extremes. Because they are grazers, the potential exists for competition with native wildlife and domestic animals for food.

The existence of scimitar-horned oryx in Texas is mainly due to the hunting industry. The species survival has greatly benefited from exotic hunting establishments. This oryx is a great trophy animal, and both the male and female have magnificent saber-shaped horns that are much sought after trophies. Because of this, animals are protected and raised for several years before reaching trophy size. During this time, the animals are allowed to breed, producing sizable herds on several ranches in Texas. Without a doubt, there are more scimitar-horned oryx on ranches in Texas living a semi-wild existence than animals in the wild in Africa. The meat is also of high quality. Scimitar-horned oryx are easily contained by fences because they are not jumpers, but they can be dangerous to handle because of the long, thin horns. There are no legal restrictions on harvesting the species, so landowners permit hunting throughout the year. Perpetuating the species in Texas has ensured the continued existence of this species.

Studies of the behavior and food habits of *O. dammah* raised on ranches in Texas have shown that this species can be favorably reintroduced into its native habitat. The scimitar-horned oryx is quite capable of establishing and maintaining a viable population

in the wild without controlled breeding practices. Educational programs directed toward native people in the area would greatly benefit reintroduction efforts. Involving local people in conservation efforts could also provide protection and promote coexistence of native people and the scimitar-horned oryx.

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