

HEALTH STATUS OF ZOO ANIMALS IN SANA'A AND TAI'ZZ, REPUBLIC OF YEMEN

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Summary

There are currently two government zoos in Yemen that both hold local wild-caught species. These zoos are very important, given that Yemen is home to a large number of valuable species that have become rare across the peninsula. The success of several regional breeding projects is now in need of, or reliant on, Yemen's support. The health status of Yemen's zoo animals is reported here. Most of the animals were in a good condition and had reasonable diets and housing but overstocking, poor handling and lack of preventative medicine compromised their welfare.

Introduction

The Republic of Yemen is home to a wide range of Arabian fauna (Harrison, 1962, 1968, 1972; Harrison and Bates, 1991; Al-Jumaily, 1998) by virtue of its undisturbed, diverse and vast natural habitats. It is the least studied in the Arabian peninsula, particularly since the reuniting of South Yemen (The People's Democratic Republic of Yemen) and North Yemen (The Yemen Arab Republic) in 1990. There is therefore limited data on population trends, however all species of wild ungulates and large carnivores are said to be declining in number (Mallon and Kingswood, 2001; CBSG, 2001). The Queen of Sheba's gazelle (*G. a. bilkis*) was unique to Yemen and has not been seen for the last 50 years. It is now classified by the IUCN as extinct and there are none held in captivity. The Saudi gazelle (*G. d. saudiya*), the Arabian oryx (*Oryx leucoryx*) and the cheetah (*A. j. venaticus*) have also become extinct from Yemen in the past 50 years (Gasperetti *et al.*, 1985; Obadi, 1993; CBSG, 2001). The Arabian leopard (*P. p. nimr*) is critically endangered with five populations remaining, two of which are in Yemen. The heavy hunting culture, widespread availability of firearms, and the destruction of natural habitat will lead to the rapid loss of further species.

The Environment Protection Law (1995) states that the hunting of wildlife is only permitted under certain circumstances and that the majority of Yemeni fauna is legally protected. However, there is doubt as to whether the locals are aware of these laws. Local wild animals are hunted in Yemen for food, protection of livestock, traditional sport and trade. For example, Arabian leopards were killed to protect livestock and the fat and skin were sold for medicinal purposes. It has now become more profitable to live-trap leopards and sell them to dealers (CBSG, 2002). More dramatically, there are large-scale annual hunts for ibex (*C. i. nubiana*) during which individual hunters claim to have shot dozens of ibex (Showler, 1996). The concept of a zoo as a business has been attractive to only a few Yemenis. Internationally, the zoos have repeatedly received bad press concerning animal welfare. Subsequent to the closing of a small private zoo in Sana'a in 2002, there are now two official zoos, both run by the government and it has become illegal for individuals to start up a zoo business. It has been recognized by their Environment Protection Authority that a captive population of endangered wildlife is a critical component of a conservation programme and that zoos serve to preserve species as well as educate and entertain the public. There is great interest in developing a breeding center for Arabian leopards and protected areas for wild ungulates and with regional co-operation this should be achieved in the not too distant future.

The Environment Protection Authority, Sana'a, invited the Environment and Protected Areas Authority, Sharjah, United Arab Emirates, to conduct a veterinary assessment of their two zoos in 2001. The aim of the project was two-fold, firstly, to assess the health status of the zoo animals and secondly, to strengthen the co-operation between the two governments for wildlife conservation efforts. The health status of the zoo animals is reported here with emphasis on the larger carnivores and ungulates held in both zoos, which are of most importance to the Yemeni's.

Methods

During six working visits between February and July 2001, all the animals held on display at Sana'a and Tai'zz zoo were examined. Both zoos held predominantly wild-caught local species as well as large numbers of African lions and a few African gazelles. Emphasis was placed on the assessment of the larger carnivores (lion, leopard, caracal, hyaena, wolf and jackal) and the ungulates (Mountain gazelle, Thomson's gazelle, Soemmering's gazelle, wildgoat, domestic goat, zebra, donkey).

Ungulates and small carnivores (red fox, small spotted genet, white-tailed mongoose, honey badger) were caught by hand. The leopards and some of the lions were immobilized using ketamine/xylazine and

tiletamine/zolazepam, respectively. Blood was drawn from all the leopards and several lions for biochemistry and serology. Fresh faecal samples were collected from all the cages and those individuals that were caught were sampled directly. Medical disorders were broadly classified as traumatic, infective, nutritional or other. Management practice, diet preparation and housing was observed in each zoo.

Results

The zoo grounds were in a good condition and the enclosures were well built. Table 1. summarises the health findings. The carnivore cages (except the lion enclosures at Sana'a zoo) were concrete with viewing bars facing the public. The public barriers were at one metre distance from the cages. Ten carnivores had fractured canines from stress-induced biting of cage-bars. There was no cage furniture. One lion was suffering from ingrowing claws. The lion enclosures at Sana'a zoo were large and divided into a small concrete indoor den and a large outdoor natural rock and sand area. The even-toed ungulates were housed on sand and had a small indoor den bedded with straw. Three gazelles were suffering from interdigital necrobacillosis. Two gazelles had limb fractures from running into the fence. The odd-toed ungulates were housed on concrete in small pens. Overgrown hooves were found in 17 ungulates. The reptiles at Tai'zz were held in large groups in concrete pits. Raptors were held in large groups in aviaries. There were four old, small, temporary cages, which housed single hyaenas or caracal and were considered most unsuitable.

The carnivores were housed singly or in pairs except for half the leopards at Tai'zz zoo. These leopards were housed in a group of two males and four females. Fighting behaviour was observed amongst the males and they were found to have skin lacerations, punctures and corneal ulcers. Two further leopards were found, one with a fracture to its distal tail and one with a fracture to its digit. Both these injuries were likely to have been caused by the remotely operated cage doors.

Table1. The aetiological distribution of health disorders found in the carnivores and ungulates .

		Carnivores (n=79)	Ungulates (n=30)
Traumatic	Injury - inflicted by cage mate	19.0%	0.0%
	Injury - self-inflicted or stress-induced	12.7%	6.7%
Infective	Endo- and/or ectoparasites	36.7%	73.3%
	Viral/ bacterial/ protozoan	6.3%	36.7%
Nutritional	Overweight - inappropriate diet	8.9%	0.0%
	Underweight - inappropriate diet	0.0%	13.3%
	Malnourished - due to hand-raising	5.1%	N/A
Other	Foot disorder - inappropriate flooring	2.5%	56.7%

Most of the zoo animals were in a good body condition. Seven leopards were overweight with two being severely obese. Four of the ungulates were obviously underweight. Most of the canids had poor coats due to ectoparasite infection (*Sarcoptes* sp.). 27 carnivores and ungulates held at Tai'zz were infested with fleas (*Ctenocephalides* sp.). Only one hyaena was found to harbour ticks (*Rhipicephalus* sp.). Fleas were found in abundance in the feral dog and cat communities as well as on the riding horses and display goats at both zoos. Serology of 16 adult leopards and 4 lions showed no evidence of exposure to FIV or FeLV and only two lions showed a low antibody titre to FCoV.

Ungulates were fed on sorghum and maize straw and the gazelle species were also given tomatoes. Raptors were fed on fresh poultry. Reptiles were fed on freshly caught lizards although none appeared to have eaten since arrival in captivity. The carnivores were fed on fresh poultry and meat, which included sheep, goat, donkey, beef and camel. They were fed more than necessary and diarrhoea was common. Slaughter and meat preparation was done daily. A large endoparasite burden was found in the lions (*Toxascaris* sp.), leopards (*Toxascaris* sp.) and gazelles (*Trichostrongylus* sp., *Trichuris* sp.). *Eimeria* spp. were found in low numbers in leopards and gazelles.

Both zoos have bred leopards but neither has attempted mother-rearing. The zoo keepers are aware that cubs will be killed by their dam due to stress and the practice is to remove cubs from the dam at birth for hand-raising. All three cubs born at Sana'a zoo had died during hand-raising. At Tai'zz, bitches are synchronized to whelp at the time of cubbing and are used to provide milk for the cubs. Five cubs have been raised using this method and all have turned out to be calm and playful display animals, in contrast to the wild-caught leopards. Unfortunately, all these cubs have been produced by inbreeding.

Discussion

The wildlife collections held at Sana'a and Tai'zz zoo were biased to carnivores presumably because that is what interests the public. The quality of the nutrition and housing provided for the animals at the zoos were in part reflected by the good general condition of the animals.

Most of the endemic carnivores of Yemen were present in the zoo collections with the exception of the smaller ones, namely, the Blanford fox (*V. cana*), the sand fox (*V. rueppellii*), the wildcat (*F. silvestris*) and the sandcat (*F. margarita*). The carnivores were exposed to high levels of stress and this has led to a high incidence of injuries, which can be reduced by correction of stocking density. The breeding and hand-raising of leopards in Tai'zz has been successful in producing calm display animals. These animals are however unsuitable for breeding because they are inbred and hand-raised. Efforts should now be made to modify the leopard cages to allow mother-rearing. These animals are valuable founders for the Arabian leopard breeding programme.

The zoos had a very interesting reptile collection but there was a lack of knowledge regarding the husbandry of these animals.

Both zoos undervalued the local ungulates and there were relatively few in captivity. The ungulate camps had inappropriate substrate, which led to a high incidence of overgrown hooves and hoof infections. The treatment of ungulates for parasites would significantly improve their condition but would also incur substantial costs. Surprisingly, the Nubian ibex, regarded locally as hunting game, was not even part of the zoo collections. Furthermore, the wildgoat (*C. aegagrus*) held at Sana'a zoo, of which the species identification needs to be confirmed, has not been reported to occur in the Arabian peninsula except for a small population in the UAE mountains (Harrison, 1968). It is therefore of great importance for Yemen to preserve these species by means of protected areas management and captive breeding.

Yemen has a great deal to contribute to wildlife conservation across Arabia. It is therefore essential that regional support for their two zoos continues, in order for Yemen to establish sound captive populations and enhance public awareness of local wildlife.

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Figure 1. Two Arabian leopard cubs were raised at Tai'zz zoo on bitch milk by using a bitch synchronized to whelp at the time of cubbing.

Figure 2. One female lion suffered from 7 in-growing claws and was severely lame.

Figure 3. *Toxascaris leonina* eggs were found in the faeces of most lions and leopards at both zoos.

Figure 4. A soft-tissue injury of the distal limb of a jackal caused by remotely operated cage doors. This injury was managed incorrectly and resulted in ischaemic necrosis of the pes.