COMPARISON OF AN UNMANAGED POPULATION OF PELZELN'S GAZELLE (*GAZELLA DORCAS PELZELNI*) TO AN INTENSIVELY MANAGED POPULATION AT AL WABRA WILDLIFE PRESERVATION (AWWP), QATAR

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Summary

At AWWP a managed and an unmanaged group of Pelzeln's gazelle is kept. In a retrospective study (2003 - 2007), 274 post mortem reports and stock list records were analysed in terms of differences between these 2 groups. There was only a slight difference in overall mortality, whereas the causes of death differed. From this point of view, less intensive management could also be a possibility to keep gazelles in captivity.

Introduction

Pelzeln's gazelle *(Gazella dorcas pelzelni)* is a subspecies of Dorcas gazelle *(Gazella dorcas)*. They can be found in the Horn of Africa, are adapted to a desert habitat, and can presumably subsist with a minimum of water getting the moisture they need from the plants they eat. Depending on food conditions, they travel in pairs or groups consisting of 1 male, several females and their young (YOM-TOV et al., 1995). Pelzeln's gazelles are considered vulnerable (IUCN, 2008), mainly because of habitat loss and hunting by humans.

At AWWP, 2 groups of Pelzeln's gazelle are kept. The extent of management measures implemented in these groups differs widely. About 20 animals live in the managed group. The keepers have a good overview of the pen; observing and catching sick or injured animals is easy. To reduce injuries, the number of males is regulated and the breeding male in each group is changed regularly to maintain genetic diversity. Surplus males live in a special pen together with males from other species. In the unmanaged" group, more than 130 animals live together in a large enclosure. It is more difficult to observe individual animals, to identify, and to catch the unmanaged animals. The animals have the possibility to avoid the keepers and withdraw from each other, which should, in theory, reduce the stress they are exposed to. However, males are only taken out of this group in the case of severe problems with continuous fighting; the larger number of males present in this group might therefore represent an important source of additional, interspecific stress.

The aim of the study was to evaluate possible differences between these 2 groups in terms of breeding rates, overall and newborn mortality, and causes of death, in order to decide whether the intensive management regime yielded significant benefits.

Methods

The 2 groups of Pelzeln's gazelles differ in many important aspects of their management (table 1). In both groups, animals are dewormed twice a year by application of Fenbendazole powder (ORYSTOR 4 % AMV®, Biobtivet Tierarzneimittel GmbH & Co, Germany) continuously for 1 week, and newborns are treated once by an oral dose of a Multivitamin (BIOWEYXIN®, Veyx GmbH, Schwarzenborn, Germany) supplement.
Based on the stock list records and autopsy reports we collated data from the beginning of 2003 to the end of 2007 in a retrospective study. In total, we considered 274 post mortem reports, 243 from the unmanaged group and only 31 from the managed group. Animals were divided into 3 age categories (neonates < 11 days, juveniles 11 - 365 days, adults > 365 days). In addition, we collected 5 pooled fecal samples to evaluate the parasite load in these 2 groups, thrice (December 07, January 08, February 08), which were analysed by a conventional flotation method (TAYLOR et al., 2007).

Table 1: Management parameters for the two different groups of Pelzeln's gazelles (Gazella dorcas pelzelni).

	Managed	**Unmanaged**
Pen size	2,000 m²	41,000 m²
Shelter	3 shelters made of solid brick walls + roof + partition	2 shelters made of solid brick walls + roof + partition natural vegetation
Fence	solid brick wall up to 1.20 m + 1 m mesh	mesh, 2.2 m high
Vegetation	2 trees for shade (*Acacia* ssp.)	natural vegetation, *Acacia* spp., *Ziziphus spina cristis*, few grasses
Number of feeding troughs	7	5 (large concrete troughs 3 x 0.3 x 0.2 m) + smaller bowls
Number of water troughs	2 (bowls)	2 (troughs 1.5 x 0.6 x 0.4 m)

Results

The results are summarised in table 2, which illustrates the developments of the 2 populations over time. The number of the animals in the managed population increased after a nadir in 2004 (14) until 2007 (25). It is obvious that the number of males is controlled. The unmanaged population was constant from 2003 to 2007 (always about 150 animals), but the ratio of males to females clearly changed (increasing proportion of females). The breeding rate (births per number of non-newborn females alive during the year) was remarkably constant, with only a peak in reproduction in the unmanaged population in 2003. Overall yearly mortality varied between 21 and 39 % and did not differ systematically between the groups; when considering all animals that were alive and died throughout the entire investigation period, 60 % of the managed and 68 % of the unmanaged group died (table 3). Of all deaths, neonate deaths represented 31 % in the unmanaged but only 16 % in the managed group (table 4). Neonate mortality was higher over the years in the unmanaged group (table 2).

Table 2: Population parameters for the managed (m) and the unmanaged (um) groups of Pelzeln's gazelles (Gazella dorcas pelzelni).

Parameter		2003	2004	2005	2006	2007
Total in number of animals	m	18	14	18	17	25
	um	134	154	154	153	149
Males in number of animals	m	8	8	6	3	8
	um	83	85	84	74	64
Females in number of animals	m	10	6	12	14	17
	um	51	69	70	79	85
Breeding rate[1] in newborns per female	m	0.5	1.0	1.1	0.8	1.3
	um	2.0	1.5	1.2	1.1	1.0
Overall mortality[2] in percent	m	38.9	21.4	38.9	29.4	36.0
	um	28.4	37.0	38.3	32.0	29.5
Newborn mortality[3] in percent	m	0.0	0.0	0.0	12.5	28.6
	um	23.5	31.0	24.1	27.3	31.6

[1]newborns per non-newborn females those were alive during the year.

[2]number of animals that died during a year in percent of all animals alive during that year.

[3]number of animals that died at an age under 11 days during a year in percent of all births in that year.

Table 3: Mortality parameters in percent for the 2 different groups of Pelzeln's gazelles (Gazella dorcas pelzelni) in the whole investigated period.

	Managed	Unmanaged
Overall mortality[1]	59.6	68.2
Lung infection[2]	29.0	22.0
Trauma[2]	25.8	14.7
Maternal neglect[2]	16.1	19.2
Kidney disease[2]	9.7	2.9
Predation[2]	0	9.8
Enteritis[2]	0	5.7
Other causes[2]	19.4	25.7

[1]number of animals that died in percent of all animals that died 2003 - 2007.

[2]number of animals that died because of the mentioned reason in percent of all animals that died 2003 - 2007.

Interestingly, a high neonate mortality only occurred during the last year in the managed group, when the total number of animals was highest. In both populations, there were no differences in the mortality between juveniles and adults (table 4).

The proportion of unclear post-mortem diagnoses decreased from 40 % of all necropsy reports in 2003 to 11 % in 2007, indicating an improvement of in-house pathology at AWWP. Lung infections, trauma and kidney pathology occurred at higher proportions in the managed group, whereas maternal neglect, predation and enteritis occurred more in the unmanaged group (table 3). Lung infections

particularly affected the juvenile age category (< 1 year) in both groups, whereas trauma occurred at higher proportions in neonates and juveniles of the managed group (table 4).
All faecal samples from the managed group were negative for parasites; in contrast, only 3 of the 15 faecal samples from the unmanaged group were negative; the others contained various amounts of *Nematodirus* and *Haemonchus* spp. and *Coccidia* spp. Endoparasite infestation was never mentioned explicitly as contributing to death in any necropsy report from the unmanaged group.

Table 4: Mortality parameters in percent for the managed (m) and the unmanaged (um) groups of Pelzeln's gazelles (Gazella dorcas pelzelni) according to age categories.

		< 11days	11 - 365 days	> 365 days
Mortality[1]	m	16.2	41.9	41.9
	um	31.7	33.3	35.0
Lung infection[2]	m	20.0	53.8	7.7
	um	0.0	45.7	18.8
Trauma[2]	m	20.0	23.1	30.8
	um	2.6	6.2	32.9

[1]number of animals that died at a certain age in percent of all animals that died 2003 - 2007.

[2]number of animals that died because of the mentioned reason at a certain age in percent of all animals that died at that age.

Discussion

The results document patterns that could be expected in such a comparison: The more intensively managed group has less parasites, lower neonatal mortality, but appears to suffer more from infectious diseases (indicated by the prevalence of lung and kidney diseases), and experiences more losses associated with trauma. The unmanaged group, in contrast, is less controlled in terms of parasites (the documented enteritis could be linked to this), and experiences more predation (due to the difficulty of maintaining a predator-proof fence of these large areas).
Both populations maintained relatively stable population numbers and could represent populations at their carrying capacity. Active harvesting of animals was minimal (4 animals from the managed and 1 animal from the unmanaged group). The fact that in the managed population, neonate mortality increased in the last year when the total number of animal was highest, and that number of animals and overall mortality was constant in the unmanaged group support this suspicion. Similarly, it had been found in gerenuk (*Litocranius walleri*, HAMMER et al., 2008) and lesser kudu (*Tragelaphus imberbis*, BESSELMANN et al., 2008) that population pressure might be an important factor contributing to newborn mortality. Assuming that these 2 populations were maintaining more or less stable populations, then the approach of having a larger, unmanaged population appears feasible in the light of the only slightly elevated overall mortality (table 3) and the fact that such a large population will be less susceptible to a complete wipeout due to a catastrophic event like an epidemic.
From an ethical point of view, neither approach can be supported based on these results. Ideally, no captive population should be self-limiting by means of diseases, but should be continually expanding and being harvested. The difference in the mortality structure according to age class (table 4) could be used as an argument that within the unmanaged group, mortality patterns were more similar to what is expected in the wild, with particularly high neonate mortality. Similarly, in the wild, death due to trauma

at a very young age – which is due to intraspecific aggression at this stage – is unlikely to occur, but was observed in the managed group (table 4); this could be an indication that the proportion of males was too high in this population. In moose (*Alces alces*), a difference in the frequency of intraspecific trauma between North American and European facilities was linked to larger enclosure sizes in the North American captive population (CLAUSS et al., 2002). Intraspecific trauma should always be considered as an indication of too high stocking rates which should be reduced – either by removing animals or by giving them more (structured) space.
In conclusion, in the context of the options available at AWWP, the current study does not indicate that the intensive management offers distinct advantages. Maintaining a stable population appeared well possible with the unmanaged approach. Especially if combined with intensive harvesting (in the form of culling or translocation), this approach appears feasible for the propagation of a gazelle species.

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