

A RETROSPECTIVE ANALYSIS OF NECROPSY REPORTS AND STOCK-DATA OF THE SOEMMERRING'S GAZELLE (*GAZELLA SOEMMERRINGII*) AT AL WABRA WILDLIFE PRESERVATION (AWWP), QATAR

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Summary

*The Soemmerring's gazelle (*Nanger soemmerringii*) is a small antelope, which is only kept in a few zoos worldwide. Therefore, only little information is available on their husbandry requirements and the diseases occurring in this species. At Al Wabra Wildlife Preservation, a large herd has been kept for many years. It was the aim of this study to analyse the population development of this gazelle at Al Wabra Wildlife Preservation and to evaluate causes of death. In adult animals, trauma, either due to intraspecific aggression or running into fences was the main cause of death, followed by pneumonia and enteritis, whereas in sub-adult individuals infectious diseases were the main cause of death. Newborn mortality was highly correlated to the population size (and thus population density) and reached a maximum of 52 % when population size was at its highest. These findings demonstrate that newborns are very susceptible to crowding phenomena. Due to a strict population management by birth control and translocation of animals, newborn mortality was reduced to 17 %. Therefore, we recommend a strict population management by either translocation or harvesting surplus offspring to minimise newborn losses and maximise rearing success. This will finally help to increase animal welfare in captive hoof stock.*

Introduction

The Soemmerring's gazelle (*Nanger soemmerringii*) is a small antelope restricted to the Horn of Africa where it inhabits semi-arid savannas and hilly country. It is classified as "vulnerable" by the IUCN with a still decreasing number of animals (HECKEL et al., 2008). The major threats to this species are uncontrolled hunting and habitat loss. According to the botanical composition of its diet, the Soemmerring's gazelle can be classified as intermediate feeder (GAGNON and CHEW, 2000), that browses on a range of plant species. Of the 3 described subspecies, *N. s. soemmerringii* is kept in a few North American zoos, whereas *N. s. berberana* is only kept at Al Wabra Wildlife Preservation, Qatar. Reports on husbandry of Soemmerring's gazelles in zoos are rare and little is known about diseases occurring in captivity. Therefore, the aim of this study was to evaluate the causes of death occurring in that species and its population development at the Al Wabra Wildlife Preservation.

Material and methods

In this investigation, 267 necropsy reports and the stock list data of the Soemmerring's gazelles at the Al Wabra Wildlife Preservation from 2003 to 2008 were analysed. Causes of death were investigated over the years and compared between sexes and between newborns, juveniles and adults. Finally,

results were analysed taking demographic data (sex ratio, birth rates, fertility rates, mortality rates) into consideration, and standard statistical tests were performed to analyse the significance of the correlations (significance level was set to 0.05).

Results

Newborn mortality - mostly due to maternal neglect - was the main cause of death (56 % of all diagnoses). Traumatic injuries (intraspecific aggression, “running into fence”) were observed in 17 %, followed by pneumonia (9 %), enteritis (4 %), and nephritis (3 %), while 12 % of the animals were culled. Deaths due to other diseases like severe constipation, birth complications, chronic diseases, diseases of the central nervous system, or general infections were only casually diagnosed (together 27 %) and in 15 % of all cases no cause of death could be determined (figure 1). Infectious diseases were most important in “sub-adult” animals (age at death between ten days and one year) of which 30 % died of pneumonia and 21 % of enteritis, whereas in adults (age at death more than one year), pneumonia was the cause of death in 15 % and enteritis only in 7 %. In contrast, 37 % of the adult individuals but only 27 % of the sub-adults died as a result of a trauma (figure 2). There were only minor differences in the observed causes of death between the sexes. After a continuous increase of the mortality of enteritis from 0.8 % to 2 % between 2003 and 2006 this cause of death was not observed in 2007 and 2008. Mortality rates of other diseases were constant over the years.

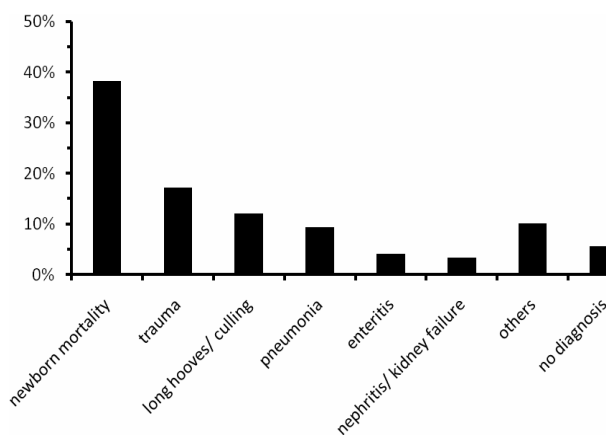


Figure 1: Distribution of the causes of death in a population of Soemmerring's gazelles from 2003 to 2008.

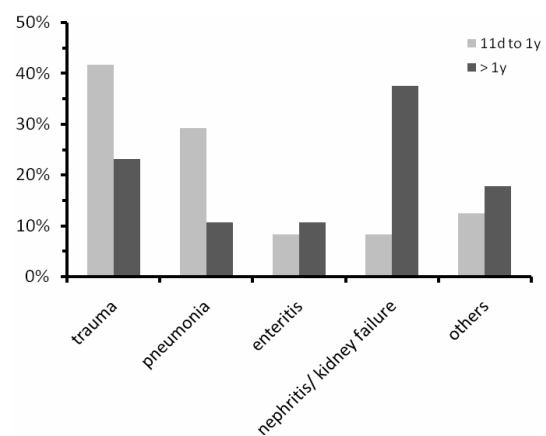


Figure 2: Distribution of the causes of death for “sub-adults” (10 d to 1 y of age) and adults (> 1 y of age). Culling was not taken into consideration.

Long hooves and hoof deformation were frequently observed within the herd. Instead of a consistent treatment by claw cutting, a strict culling regime was performed by harvesting affected animals. In 2003 and 2004 4 % and in 2005 and 2006 still 1.5 % of the animals (especially males) were culled and hoof deformations was only observed twice in 2008 after the culling program was completed.

Because of the very high number of Soemmerring's gazelles at Al Wabra in 2003, some of the females were grouped as an all-female herd and their male offspring was culled in the following year to reduce the population size. The number of animals stagnated the next years and decreased slightly in 2006 (figure 3). In 2007 two thirds of the animals (91 in total) were removed from the herd and transported to another facility resulting in a total amount of 60 animals at the end of the year.

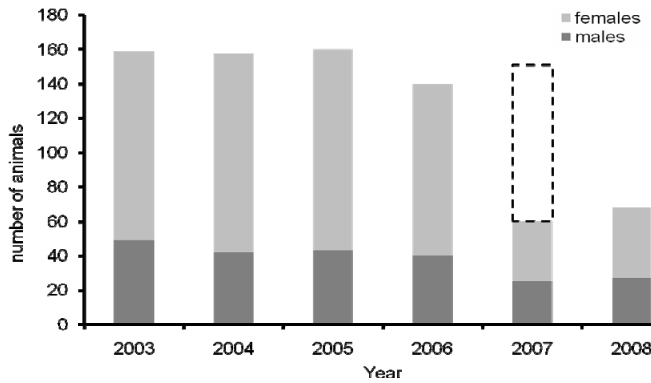


Figure 3: Number of animals in the herd as of December the 31st for males and females. The dashed line shows the number of animals that were translocated in 2007.

The annual mortality rate decreased from 35 % in 2003 to 17 % in 2008 with a peak in 2006 (the population also decreased notably). Total mortality was a strong function of the newborn mortality which made up 41 % of the overall mortality between 2003 and 2006, but decreased to 27 % in 2008 (figure 4). The correlation was positive and significant (PCC = 0.938; $p = 0.019$). Newborn mortality was positively correlated to population size (expressed as proportion of the maximum number of animals ever alive in 1 year) (PCC = 0.909; $p = 0.012$; figure 5). Finally, newborn mortality reached a low in 2008, after two thirds of the animals were removed from Al Wabra Wildlife Preservation in 2007. Correlations between the mortality rates of the diseases and the sex ratio of the population could not be ruled out.

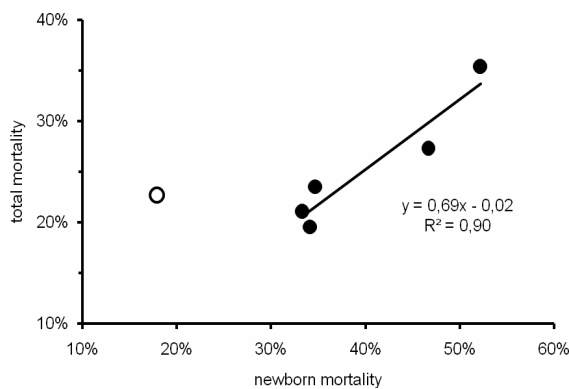


Figure 4: Correlation of the total mortality with the newborn mortality (PCC=0.938; $p=0.019$) between 2003 and 2007. The open circle mark the year 2008, after two thirds of the population had been translocated.

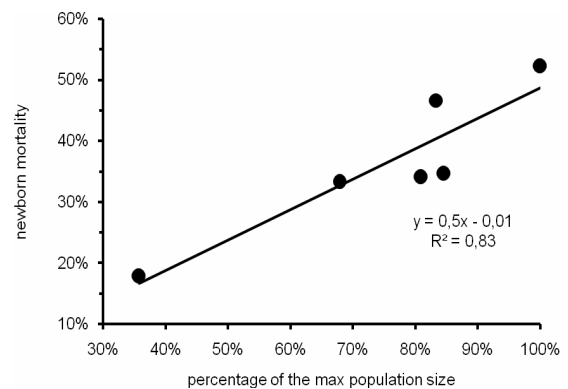


Figure 5: Correlation of newborn mortality to the population size, which was expressed as a proportion of the maximum number of animals ever alive in one year.

Discussion

Gazelles are very nervous animals which require a careful and gentle handling to avoid panic escapes and running into fences. Additionally, injuries due to intraspecific aggression occur regularly. Thus, trauma and resulting infections are often the main causes of death in adult gazelles in captivity. HAMMER et al. (2008) reported that trauma due to jumping into fences is a very important cause of death in a captive group of gerenuk (*Litocranius walleri*) but death due to intraspecific fighting was only observed once. In the adult Soemmerring's gazelles, trauma was the main cause of death and injuries due to fighting were frequently observed. This higher incidence of "deadly fights" in comparison with gerenuks is likely because the social Soemmerring's gazelles were kept in larger herds and even in all-male groups, where fighting is frequent and deaths occur on occasion. In contrast, the solitary gerenuk can only be kept in pairs or small breeding groups with only one adult male, as the males are very aggressive towards each other. Thus, fatal fighting is very unlikely in gerenuk particularly because females are hornless.

In sub-adults infectious diseases (pneumonia, enteritis, nephritis) were the cause of death in around 60 % of the animals but only in 25 % of the adult individuals, supporting that acute infections especially affect young animals. Therefore, vaccination programs and a reduction of the population density (by culling or creation of new enclosures) can be performed, to reduce losses among sub-adults.

After a strict culling programme on animals with deformed claws was carried out, the incidence of claw malformation in young animals decreased significantly since 2006 indicating that claw deformities in Soemmerring's gazelles have a hereditary component. Thus, culling is an effective method to control claw problems and was successfully performed at Al Wabra Wildlife Preservation.

The population of Soemmerring's gazelles at the Al Wabra Wildlife Preservation was not strictly managed before 2003 resulting in a high population number and a high stocking density in the breeding enclosures. The population was still prospering even though total mortality (35 %) and especially newborn mortality (52 %) were extremely high. To decrease the number of animals, several females were separated in an all-female herd and their male offspring was culled in the following year. Even though birth rate decreased slightly the next years, the population size stagnated due to the decreased mortality rate. The overall mortality was a strong function of the newborn mortality between 2003 and 2006, when population size was on or even above its carrying capacity. With an increasing overall mortality, newborn mortality increased simultaneously, resulting in very high losses in 2003 and 2006 (around 50 %). After two thirds of the population were translocated, newborn mortality fell to a low of 18 %. The newborn mortality was also significantly positively correlated to the percentage of the population size which was expressed as a proportion of the maximum number of animals ever alive in one year. Both findings demonstrate impressively that newborns are very susceptible to crowding phenomena. This pattern was also observed in a captive population of the lesser kudu *Tragelaphus imberbis* (BESSELMANN et al., 2008).

Our findings support the relevance of crowding phenomena occurring in herds of wild hoof stock. Especially the newborn mortality will increase drastically as population density increases and can finally result in a population crash. Therefore, we recommend a strict population management to keep the population below its carrying capacity. This was successfully performed at the Al Wabra Wildlife Preservation resulting in very low newborn mortality rates, a low incidence of enteritis, and a decreasing overall mortality. Population management can be carried out by either translocating, or harvesting surplus offspring. This will reduce social stress and resulting intraspecific aggression, minimise infectious diseases especially in sub-adults, and maximise rearing success, and will finally help to increase animal welfare in captive hoof stock.

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References

- BESSELMANN D, SCHAUB D, WENKER C, VÖLLM J, ROBERT N, SCHELLING C, STEINMETZ H, CLAUSS M (2008): Juvenile mortality in captive lesser kudu (*Tragelaphus imberbis*) at Basle Zoo and its relation to nutrition and husbandry. *J Zoo Wildl Med* **39**, 86 - 91.
- GAGNON M, CHEW AE (2000): Dietary preferences in extant African Bovidae. *Journal of Mammalogy* **81**, 490 - 511.
- HAMMER C, STUTZ K, DEB A, ARIF A, TAHA A, CLAUSS M, HAMMER S (2008): Medical management and pathology of captive gerenuk (*Litocranius walleri*) at Al Wabra Wildlife Preservation (AAWP) from 2001 to 2006. *Proc EAZWV* **7**, 349 - 351.
- HECKEL JO, WILHELMI F, KAARIYE XY, RAYALEH HA, AMIR OG, KÜNZEL T (2008): *Nanger soemmerringii*. In: IUCN 2008. 2008 IUCN Red List of Threatened Species. Downloaded on 09th February 2009.