

## MORTALITY PATTERNS AND HUSBANDRY MANAGEMENT IN IDMI (*GAZELLA GAZELLA*) AND YEMENI (*GAZELLA GAZELLA CORA*) GAZELLES AT AL WABRA WILDLIFE PRESERVATION, QATAR

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### Summary

*At Al Wabra Wildlife Preservation, mountain gazelles (*Gazella gazella*) have been kept very successfully. The Idmi (*Gazella gazella*) as well as the Yemeni gazelle (*Gazella gazella cora*) population grew constantly, whereas the mortality stayed almost on the same level or even decreased. In a retrospective study, causes of death were evaluated based on the necropsy reports from 227 Idmi and 82 Yemeni gazelles, which died during the period from 2001 to 2008. In both subspecies pneumonia, trauma and neglect were found as the main causes of death. Pneumonia occurred most often in juveniles. Most animals which died due to trauma were juveniles (77 %) in Idmi but adults (64 %) in Yemeni gazelles. Variations in mortality over the years reflected animal management.*

### Introduction

In the wild the mountain gazelle (*Gazella gazella*) is widely but unevenly distributed across the Arabian Peninsula. On the IUCN Red List it is classified as “vulnerable” with a decreasing population trend (IUCN RED LIST OF THREATENED SPECIES, 2009). Idmi (*Gazella gazella*) and Yemeni (*Gazella gazella cora*) are 2 very closely related subspecies. In the literature no obvious differences in behaviour and biology are described. Yemeni gazelles can be found especially in Yemen and in the south of Saudi Arabia, Idmi gazelles in the west of Saudi Arabia, Oman, UAE, and in Israel. Mountain gazelles live in different social units. The female herds count up to 16 adult females with their offspring. The young males older than 6 months build their own herds with up to 40 individuals. From the 3<sup>rd</sup> year onwards some of the males live territorial. Mountain gazelles are mixed feeders. In the wild 1 or in some regions 2 calving seasons can be observed. In some regions, in the vicinity of agricultural areas with presumably more dietary resources available, mating also takes place year round (MENDELSSOHN et al., 1995). In captivity newborns are constantly delivered throughout the whole year (PIENING SCHULER et al., 2009).

At Al Wabra Wildlife Preservation (AWWP) mountain gazelles have been bred very successfully. The aim of this study was to evaluate the main causes of death of Idmi and Yemeni gazelles in AWWP during the time period from 2001 to 2008 according to their frequency, and to detect potential variation in mortality over the years and between sexes and age groups.

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## Material and methods

At AWWP Idmi and Yemeni gazelles are kept in groups consisting of 1 adult male and up to 10 females with their offspring. To enhance genetic variability the breeding males are exchanged on a regular base (every 1 or 2 years). The holding conditions consist either of 1 enclosure equipped with several shelters, vegetation and a hill as sight barrier, or 2 - 3 smaller enclosures in sequence, furnished in the same way. Since 2004 young males are removed from the groups when they are about 4 - 5 months old, whereas before that time sometimes more than 1 adult male lived in a breeding group. As soon as more than 10 mature females live in 1 group, the group is split. Until 2003 all females were used for breeding.

To limit breeding in 2004 of space reasons gender-segregated groups were established. In 2006 about half of the population of Yemeni gazelles were shipped to another facility. Therefore more space for the remaining animals was available. Before 2006 groups of Idmi gazelles had sometimes temporarily grown up to 25 to 30 individuals.

From 2007 on newborns were treated on their 2<sup>nd</sup> day of life with oral multi vitamins (Bio-Weyxin® 700K, VEYX, Schwarzenborn, Germany), in contrast to the previous years when this medication was applied on their 1<sup>st</sup> day of life.

In 2008 all females were used for breeding again with the aim to increase the number of Idmi gazelles to produce meat for the carnivores kept at AWWP.

227 Idmi gazelles and 82 Yemeni gazelles died in the time from 2001 to 2008. A necropsy was done after a standard protocol in all dead gazelles. All findings of the necropsy reports were evaluated according to their frequency. If 2 diagnoses were made during the post mortem as a potential cause of death, both diagnoses were included in the evaluation. The causes of death were investigated over the years and compared between age classes (newborn (< 11 days), juvenile (11 days – 2 years), adults (> 2 years) and between sexes. Furthermore, based on the stock list data the development of the population over the years was evaluated. Additionally the main causes of death in Idmi and Yemeni gazelles were compared with those found for Pelzeln's (*Gazella dorcas pelzelni*) (WESPI et al., 2009), Speke's (*Gazella spekei*) (SCHENK et al., 2009) and Soemmerring gazelles (Nanger soemmerringii) (MÜLLER et al., 2009).

## Results

Populations of Idmi and Yemeni gazelles increased continuously from 2001 to 2008, whereas mortality either stagnated or decreased in the same time period (Fig. 1 and 2). A total of 31 Yemeni gazelles were moved to another facility in 2006, which resulted in declined of the population in 2007 and a decrease of the mortality.

In both gazelle species the predominant causes of death were pneumonia (24 % in Idmi and 27 % in Yemeni), trauma (20 % in Idmi and 16 % in Yemeni) and maternal neglect (16 % in Idmi and 17 % in Yemeni) (Figs. 3 and 4). Among the rarer causes of death were gastrointestinal disorders (6 % in Idmi and 9 % in Yemeni), kidney diseases (4 % in Idmi and 2 % in Yemeni) and liver diseases (4 % in Idmi and 3 % in Yemeni). In 9 % (Idmi) and 11 % (Yemeni) other causes of death like septicaemia, polyarthritis, and peritonitis were reported. In 17 % (Idmi) and 15 % (Yemeni) no diagnosis was possible either due to autolysation of the carcasses or due to the fact that necropsy and bacteriology findings did not lead to a clear diagnosis. The proportion of unclear diagnoses decreased continuously over the years between 2001 and 2008, indicating an improvement in pathology in AWWP.

Gastrointestinal, liver and kidney diseases were more often seen in adults (together 33 % in Idmi and 22 % in Yemeni) than in juveniles (10 % in Idmi and 9 % in Yemeni). In neonates maternal neglect

was the most important cause of death (65 % in Idmi and 70 % in Yemeni). Most animals which died due to trauma were juveniles (77 %) in Idmi but adults (64 %) in Yemeni gazelles. In Yemeni males and females were equally affected, whereas in Idmi traumatic injuries occurred more often in males (62 %). The other causes of death showed only minor differences between sexes.

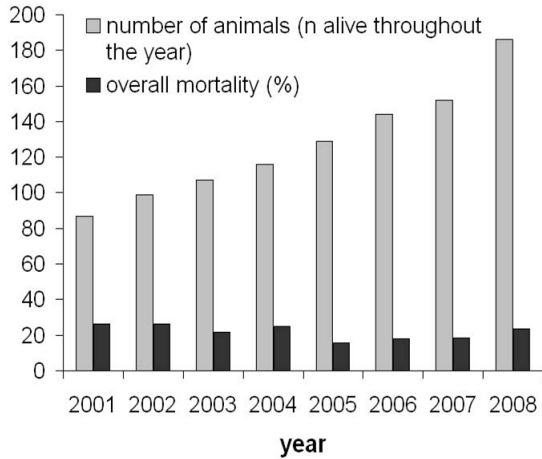


Figure 1: Population development and overall mortality in Idmi gazelles.

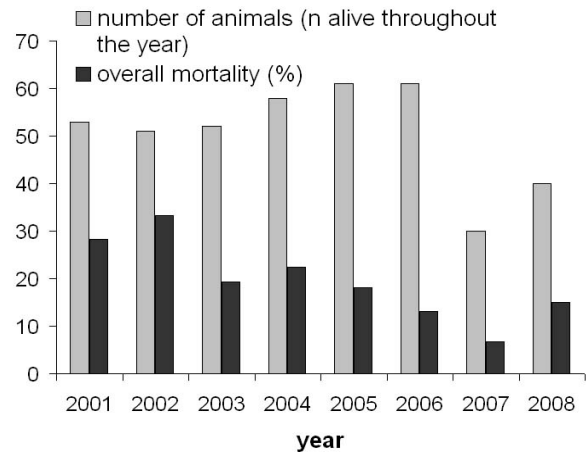


Figure 2: Population development and overall mortality in Yemeni gazelles.

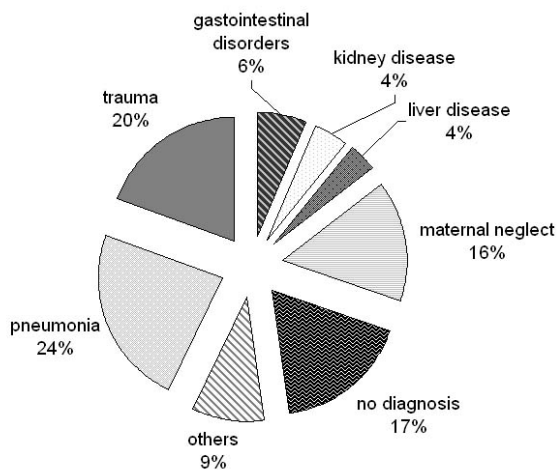


Figure 3: Causes of death in Idmi gazelles.

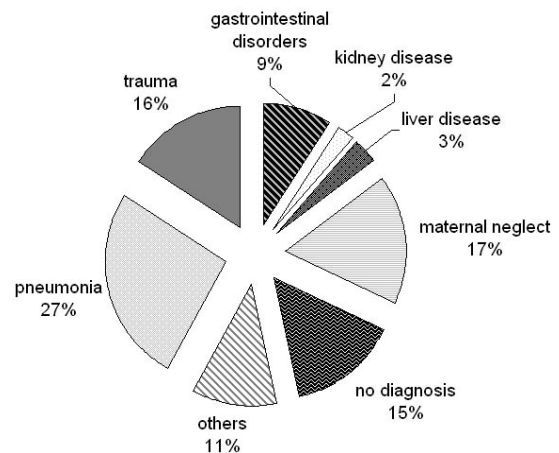


Figure 4: Causes of death in Yemeni gazelles.

Juveniles suffered from pneumonia more often than adults. Pneumonia was the cause of death in 18 % of the adult and in 36 % of the juvenile Idmi and in 14 % of the adult and 56 % of the juvenile Yemeni gazelles. In the Years 2005 and 2006 the overall and the newborn mortality in Idmi gazelles was lower than it was in all other years (Fig. 5). In Yemeni a similar trend could be observed (Fig. 6).

Because of the small population size of Yemeni gazelles, evaluating the development of a single cause of death over the years is meaningful only in Idmi gazelles. The number of cases of pneumonia

increased more or less continuously with an outlier peak in 2003 (Fig. 7). The incidence of trauma increased from 2 in 2001 to 10 in 2004. It stayed on a high level in 2005 and 2006. In 2007 it was on a quite low level with only 4 cases, but increased again in 2008 (Fig. 8).

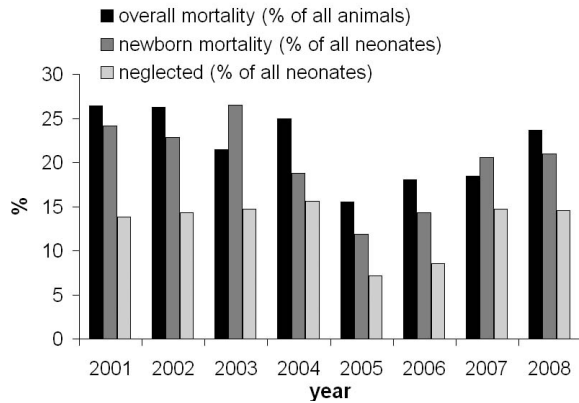


Figure 5: Mortality in Idmi gazelles over the years.

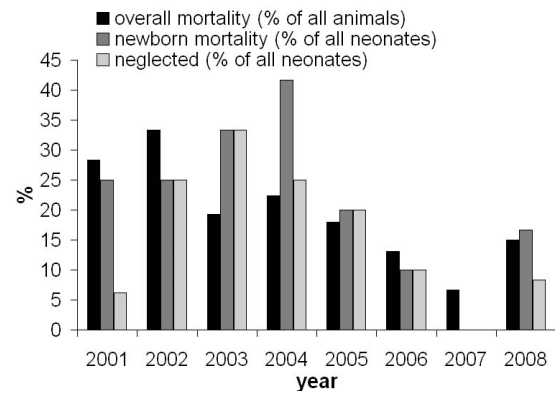


Figure 6: Mortality in Yemeni gazelles over the years.



Figure 7: Number of Idmi gazelles that died due to pneumonia over the years.

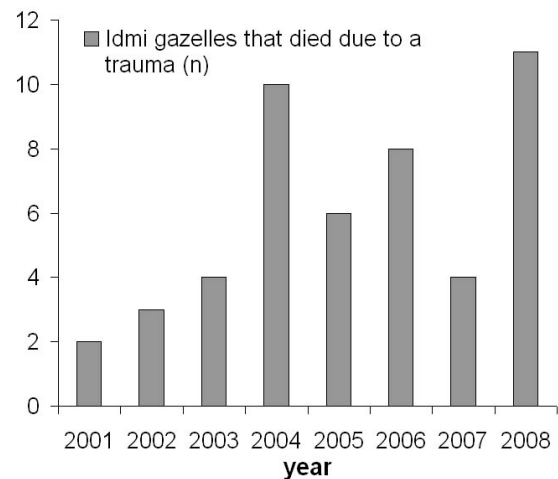


Figure 8: Number of Idmi gazelles that died due to a trauma over the years.

## Discussion

Causes of death were similar in both populations due to the close relation and the mostly identical management of the 2 subspecies. The small data set of Yemeni gazelles made an interpretation of a single cause of death over the years not very meaningful. Therefore most of the following interpretations only bear on Idmi gazelles.

Until 2003 all females were used for breeding. Due to space reasons gender-segregated groups were established to limit breeding in 2004. If the incidence of traumas in Idmi gazelles was followed over the years as shown in Fig. 8, it can be seen, that in 2004 the number of animals which died due to a trauma was noticeable high, particularly in males. This might be a consequence of the new gender-

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segregated groups. The new group constellations did probably lead to more social stress and therefore more traumas due to fights. Unfortunately traumas due to fighting could not be separated from traumas due to jumping into fences or other accidents, because fights were observed only seldom and in many cases the reason for the injuries could not be ascertained with the autopsy report. In 2005 and 2006, the number of traumas was still high, but lower than in 2004, and the overall mortality was very low in Idmi and Yemeni gazelles, in spite of the increasing number of animals (see figure 5 and 6). This shows that after a certain time to settle in, the social stress in the males- and the females-groups decreases and that the chance of survival of newborns is good in smaller breeding groups with only 1 adult male.

However in 2008 the number of traumas was higher than before and this time more than half of the concerned animals were females. It might be a consequence of the use of all females for breeding again and the resulting stress due to transportations and new group constellations. In 1 case the trauma was specifically reported as an accident during transportation. To decide whether this high incidence was only a temporarily phenomenon or not further data from future years needs to be collected. The fact that in Idmi traumas occurred mainly in juveniles but in Yemeni's in adults might be explained with the higher number of animals in the Idmi population and therefore larger breeding groups, so that more young animals were affected.

The very low mortality in Yemeni's in 2007 could be explained by less crowding effects due to the reduction of population in 2006, so that more space for the remaining animals was available. Groups were split up to create smaller breeding groups. However this dramatic reduction in mortality in this year also is a good example that in other years, crowding effects most likely contributed to the observed mortality.

According to MEIER et al. (2009), newborn treatment can decrease the incidence of bacterial infections but might lead to an increasing number of maternal neglect. That is also the reason why newborn treatment was switched to the 2<sup>nd</sup> day in 2007 – so that the mother-infant bond would be stronger before human interruption occurred. But according to the data on newborn mortality this change did not show any clear effect.

Figure 7 shows the incidence of pneumonia in Idmi gazelles from 2001 to 2008. An increasing trend can be recognised. Maybe pneumonia is correlated to the size of population. Respiratory diseases were also an important problem in other species at AWWP in the last couple of years. In March and April 2004 an outbreak of a highly fatal pleuropneumonia spread among the populations of wild goats (*Capra aegagrus*), Nubian ibex (*Capra ibex nubiana*) and gerenuk (*Litocranius walleri*). As responsible infectious agent *Mycoplasma capricolum subsp. capripneumoniae* was found and therefore the disease could be identified as contagious caprine pleuropneumonia (CCPP). In January 2006 there was another outbreak of respiratory disease among the Beira antelope (*Dorcatragus megalotis*) in AWWP. The gross post mortem lesions suggested mycoplasma again, but the common antibiotic treatment did not resolve the situation and PCR investigations did not detect mycoplasma consistently (HAMMER et al., 2007). But according to gross necropsy findings and the distribution of pneumonia over the years (there were no peaks in 2004 and 2006) Idmi and Yemeni gazelles did not seem to have been affected by these outbreaks.

The comparison with Soemmering (MÜLLER et al., 2009), Speke's (SCHENK et al., 2009) and Pelzel's gazelles (WESPI et al., 2009) showed that main causes of death are similar in all these species. In all 3 species maternal neglect, pneumonia and trauma were the main causes of death. However, in Soemmering gazelles, pneumonia seemed to be a smaller problem than in the other species whereas newborn mortality mostly due to maternal neglect was remarkably high. In Soemmering, Pelzel's and Yemeni gazelles, trauma was the main cause of death, whereas in Idmi and Speke's gazelles pneumonia was more frequent. If only animals between 10 days and 1 year were considered, pneumonia was most frequent in all species. In animals older than 1 year traumas were the main cause of death

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in Soemmering's, Pelzeln's and Yemeni gazelles whereas in Speke's and Idmi gazelles pneumonia was most important in this age class too. Differences in the relevance of pneumonia between species can be interpreted in 2 different ways; either, as a particular susceptibility of these species to infectious lung diseases, or as a comparatively positive situation in terms of management that leads to a lower proportion of trauma-related deaths and hence to a higher overall proportion of pneumonia. In conclusion management measures that decrease crowding effects such as the creation of breeding groups with only 1 adult male, allow an increasing of the population while mortality and especially newborn mortality can be kept on a low level. On the other hand, changes in the group constellations might lead initially to a higher mortality and especially to an increased incidence of traumas.

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