

## Summary of the Master thesis of Anne-Sophie Blanc:

An advanced method to assess the diet using scats of free-ranging cheetahs (*Acinonyx jubatus*) living on Namibian farmland

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### Background

Namibia hosts the worldwide largest free-ranging cheetah population (Marker-Kraus et al. 1996) with 95% of this population roaming outside of protected areas on commercial farmland (Morsbach 1987, Marker-Kraus & Schumann 1998). Commercial livestock farming and trophy hunting have a large economic importance in Namibia and generate substantial income (Marker-Kraus et al. 1996, Barnes et al. 2001). Cheetahs mainly feed on abundant game species, but they sometimes also kill livestock (Marker et al. 2003, Wachter et al. 2006). This has led to conflicts between farmers and cheetahs with the consequence that farmers might eliminate specific 'problem animals' but also eliminate cheetahs indiscriminately and preventively (Marker-Kraus et al. 1996).

The sensitisation of the farmers is a crucial point in the conservation of the Namibian cheetah. It is thus important to give farmers reliable scientific data about the cheetah's diet composition, to help them to better evaluate their economic losses. This kind of approach might lead to a reassessment of the farmers' perceptions towards cheetahs.

This Master thesis took place within the Cheetah Research Project of the Leibniz Institute for Zoo and Wildlife Research (IZW) in Berlin, Germany, which studies the population biology of free-ranging cheetahs on Namibian farmland since 2002.

### **Determination of diet with scat analysis**

Because of the cryptic behaviour of the cheetah and the dense bush on Namibian farmland, it is difficult to get direct information about the diet of this species. Indirect methods such as scat analysis can be used to examine the diet composition of this species.

Scat analysis has often been used to determine the prey species consumed by carnivores (Floyd et al. 1978, Maehr et al. 1990, Ciucci et al. 1996). The frequency of occurrence of prey species in scats, however, should not be used directly to calculate the proportion each prey species contributes to the diet because smaller animals have a higher surface-to-volume (hair-to-meat) ratio than larger animals. Thus, when carnivores consume a small prey animal, they excrete more faeces than when they consume the same amount of a large prey animal because in small prey animals the amount of indigestible matter such as hair is larger than in larger prey animals (Mech, 1970). Mech (1970) therefore concluded that the frequency of occurrence of prey species in scats over-represents the smaller prey animals in terms of mass compared to the larger prey animals. Subsequent feeding trials confirmed this hypothesis and correction factors considering the different body masses of prey animal were established to determine the diet composition for, among others, wolves (*Canis lupus*) (Floyd et al. 1978, Traves 1983, Weaver 1993, Ruehe et al. 2003, Jethva & Jhala 2004), cougar (*Felis concolor*) (Ackerman et al. 1984) and cheetahs (*Acinonyx jubatus*) (Marker et al. 2003).

### **Feeding trials**

In this study a new comprehensive series of feeding trials on cheetahs at AfriCat was conducted to derive a precise correction factor to determine the diet composition of Namibian cheetahs. Trials in this study included for the first time the entire range of prey species known to be killed by cheetahs, i.e. prey species ranging from small species like ground squirrels and mice up to adult kudu. Thirteen captive cheetahs divided into five groups were used for the feeding trials. Larger (smaller) carcasses were given to the larger (smaller) cheetah groups to roughly simulate natural conditions concerning the abilities of cheetahs to kill a specific prey size. Prey carcasses were weighed to an accuracy of 0.1 kg and given intact to the cheetahs if possible. About ten minutes after the last cheetah had finished eating, the rest of the carcass and all remainders were collected and weighed again.

Cheetahs produced hard, soft or liquid faeces which were all collected in small plastic bags and weighed on an electronic scale to an accuracy of 2 grams. Since the correction factor to be determined in this study was supposed to be applicable to scats collected in the field, the scats collected during these feeding trials were divided in collectable and non-collectable scats according to their consistency (Floyd et al. 1978, Weaver 1993, Ruehe et al. 2003, Marker et al. 2003). Hard and soft scats were considered as collectable in the field, liquid scats as non-collectable.

The correction factor was determined as described in previous studies (Floyd et al. 1978, Weaver 1993). For each feeding trial, prey mass consumed (kg) per collectable scat was calculated and then the best mathematical relationship between this parameter and the presented prey body mass (kg) was determined. We found a strong relationship between the prey mass presented and the mass consumed per faeces. This means, the heavier the presented carcass was, the more kilograms were eaten to produce one faeces. This relationship was mathematically best described by an increasing, non-linear function. Previous studies conducting feeding trials to determine correction factors for wolves (*Canis lupus*) (Floyd et al. 1978, Traves 1983, Weaver 1993, Ruehe et al. 2003, Jethva & Jhala 2004), cougar (*Felis concolor*) (Ackerman et al. 1984) and cheetahs (Marker et al. 2003), all determined a linear relationship between presented prey body mass and prey mass consumed per collectable scat. This difference compared to the presented study might be due to the smaller range of prey sizes used in these studies.

The correction factor established from the feeding trials was applied to a sample set of 65 scats. These scats were collected on Namibian farmland and their hair contents analysed by the members of the Cheetah Research Project (Jauernig 2005, Wachter et al. 2006). Hair samples contained in the scats belonged to 10 different prey species ranging from mice to kudu (Wachter et al. 2006). The analysis revealed that livestock species made up only about 5% of the cheetah's diet, whereas hartebeest was the most important prey species. Hartebeest is a valuable trophy species and this result is important to the farmers being involved in the trophy hunting business. However, cheetahs are unlikely to specifically prey on calves or juveniles that would have become the best trophies later in life, but might select them at random or select the weaker ones or the ones suffering from a disease. Thus, the dialogue between farmers and scientists is crucial to get information on carcasses likely to have been killed by cheetahs to discuss prey selection tactics of cheetahs.

Since the determination of the diet composition with the method of the frequency of occurrence is inaccurate due to different digestibility of different prey sizes, it is necessary to apply a correction factor that accounts for this factor. Such information could help to reduce the farmer-cheetah conflict and help to establish new conservation strategies.

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