



DIET OF THE SPOTTED HYENA (CUROCUTA CUROCUTA) IN SOUTHERN TIGRAY, NORTHERN ETHIOPIA

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Abstract: The diet of spotted hyenas (*Curocuta curocuta*) was studied in Endrta Woreda, southern Tigray, Ethiopia from September to December 2009. Hyena scats were collected throughout the study period from all areas and the samples were washed and hairs were extracted. Hair was analyzed on form, length and color with the naked eye as well as on a scale patterns using a microscope at 10 X magnifications and was compared with a prey species hair reference collection. Faecal analysis revealed that the diet of the spotted hyena contains only prey item of domestic livestock. Frequencies of prey remains of donkey, sheep, goat and cattle were highest with sheep being by far the most common prey species. Household survey of livestock depredation of spotted hyenas revealed that a total of 364 spotted hyena attacks were reported of which donkeys were significantly more likely to be reported as lost to hyena predation, representing 31.87%, followed by goats (14.56%) and sheep (10.71%). It seems most likely that carnivores deepened entirely on domestic prey species for their dietary requirements. Detailed information on the population size and density of spotted hyena is needed to give a better picture of the status of this carnivore species in Tigray, northern Ethiopia and to help resolve conflicts with livestock. Further investigations into the seasonal variation of predation are recommended.

Keywords: Diet, Depredation, Spotted hyena, Scat

INTRODUCTION

Ethiopia is one of the few countries in the world that possesses a unique and characteristic fauna and flora with a high level of endemic species (World Conservation Monitoring Center, 1991). Nevertheless, the challenges facing the conservation of Ethiopian wildlife today are becoming increasingly formidable. Since the general level of agricultural productivity is low, increase in food production depended on

increasing the area under cultivation and grazing. Usually, these expansions are at the expense of wildlife resources leading to the loss of both flora and fauna together with their habitats (Leykun, 2000).

Human-spotted hyena conflict involves both humans and hyenas. As a result, we need to have a comprehensive understanding of the issues at stake. In order to obtain the necessary information fully, assessing a situation is appropriate to consider the

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causes of conflict from different perspectives (Hill *et al.*, 2002). Hyenas feed on a wide array of prey (Cooper *et al.*, 1999) and frequently interact with other predators and scavengers at kills (Kruuk, 1972). The diets of carnivores, in conjunction with their predatory habits, frequently bring them into conflicts with humans. Such conflict has resulted in persecution by humans that has been sufficient to cause population decline, range contraction and in some cases extinction (Woodrofe, 2001).

In Tigray, the problem of depredation of domestic animals is primarily caused by the spotted hyena, and, as a consequence, there is an intense persecution of these animals on the part of livestock owning people. They primarily kill and scavenge mammalian herbivores. They kill and scavenge domestic stock, mainly cattle, sheep, goats, donkeys, horses, dogs, and poultry (Nugse, Pers. Comm.). Spotted hyenas are nocturnal hunters, possibly because of their improved night vision compared with their prey (Bertram, 1979). They occur in habitats ranging from arid lands to open grassland to savanna and even forest (Kruuk, 1972; Mills, 1984; Sillero-Zubiri & Gottelli, 1992), suggesting that irrespective of where a prey animal lives it is at risk of spotted hyena predation. Spotted hyenas are generally thought to eat prey of medium to large body size (Mills & Harvey, 2001).

The techniques used to study the diets of carnivores can be divided into three: 1) direct observation of feeding, foraging and hunting (Schaller, 1972; Murie, 1985;); 2) feeding site surveys, including examination of prey or carrion remains (Mech, 1966; Green *et al.*, 1997; Smith *et al.*, 2003); and 3) analysis of post ingestion samples from stomach content (Taylor, 1964; Cuesta *et al.*, 1991), faeces (Putman, 1984; Kohn and Wayne, 1997). Scat analysis, which is based mainly

on identification of mammalian hairs, is a valuable supplement to the conventional techniques used in mammal surveys and that it can provide useful information on the diet of predators. More species can sometimes be detected, field collection is rapid and the scats can be stored and processed at a convenient time and the costs are low.

Carnivores in Tigray, regional state of Ethiopia, consists of mongoose, wildcat, jackal, honey badger, serval cat, spotted hyena, golden cat, etc. However, no scientific studies have been done on the diets of spotted hyenas in the region. There is therefore considerable need to investigate the diets of spotted hyena in the region. Direct observations are difficult, as spotted hyenas are typically active at night and use areas less accessible to humans. Radio tracking would have been too expensive and time consuming. As the primary goal was to investigate the actual diets of spotted hyena in the entire study area, very intensive sample collection was done. Consequently, the collection and analysis of large sample of scats was therefore selected as the most convenient and unobtrusive method, supplemented with questioner surveys.

STUDY AREA

The study was conducted in Enderta woreda which is found in Tigray regional state of Ethiopia. The Woreda is situated 770kms away from Addis Ababa, the capital city of Ethiopia. It is located at an altitude of about 2020m. The average annual rainfall of the area is 530 mm. with maximum and minimum temperatures of 26.52 and 11.92 °C respectively. The rain fall of the area is bimodal with the small rain (short rain season) occurring between January to April, and main rain (long rain season) which occurs from June to August. The area is dominated

by Eucalyptus (*Eucalyptus camaldulensis*) and cactus (*Opuntia ficus indica*).

METHODS

Collection of hyena scats

Hyena scats were collected throughout the study period from all areas surveyed. Scat samples were put in plastic with details of collection time, location and characteristics of the substrate from which the scat was collected. Precaution was taken to ensure that there was no cross sample contamination. During the study period, a total of 1200 putative hyena scats were collected from the entire study area.

Identification of scat in laboratory

The procedure described here was adapted from Ramakrishean *et al.*, (1999). After collection of the faeces the samples were washed with water and hairs were extracted. These hairs were washed in acetone and then dehydrated in ethanol and dried

on filter paper. Hair was analyzed on form, length and color with the naked eye as well as on a scale patterns using a microscope at 10X magnification. The hairs were compared with a prey species hair reference collection. This reference hair collection was hairs from the species of livestock and the potential wild animals that live in and around the study area.

Questioner survey

Scat analysis was supplemented with household survey. To assess livestock depredation of the spotted hyena a questioner survey was conducted among 1100 households in the study area. Information on stock number and domestic prey species lost to spotted hyena depredation from 2005-2009 has been collected.

RESULTS

It seems most likely that no domestic prey species are free from the threat of spotted hyena predation. Fecal analysis in the study

Table 1 diets of the spotted hyena in Endrta Woreda, southern Tigray, Ethiopia in 2009 based on analysis of 1200 scats expressed as the number of prey items observed and their relative frequency of occurrence

Prey species	Count	Relative frequency
Sheep	259	21.58
Horse	200	16.67
Donkey	173	14.42
Cattle	137	11.42
Goat	115	9.58
Dog	100	8.33
Human	66	5.5
Mule	49	4.08
Poultry	24	2
Camel	20	1.67
Cat	8	0.67
Unidentified	42	3.5
Hairless samples	7	0.58
Total	1200	100

site revealed that about 82 % of the samples contained donkey, sheep, cattle, horse, goat and dog (Table 1). Although spotted hyenas do prey on humans in modern times, such incidences are rare. However, 5.5 % of faecal analysis contained human hairs. Faecal analysis revealed that the diet of the spotted hyena contains only prey item of domestic livestock. No prey item of wild-life was found in the faeces. Frequencies of prey remains of donkey, sheep, goat and cattle were highest, with sheep being by far the most common prey species.

The collection and analysis of large sample of scats was supplemented with questioner surveys to collect data on livestock depredation of spotted hyenas and revealed that a total of 364 spotted hyena attacks were reported of which donkeys were significantly more likely to be reported as lost to hyena predation, representing 31.87%, followed by goats (14.56%) and sheep (10.71%) (Table 2).

DISCUSSION

Spotted hyenas seem to consume exclusively domestic prey species in Tigray. Fecal analysis in the study site as had been expected revealed that about 82 % of the samples contained donkey, sheep, cattle, horse, goat and dog (Table 1). This reflects the decline of wild prey species that shifted spotted hyenas to prey and scavenge on domestic prey species to satisfy their dietary requirements. Spotted hyenas are common in many parts of Ethiopia but prey population appears generally lower. This phenomenon is evident in many places of Tigray. Scat analysis indicated that the diet of the spotted hyena contains only prey item of domestic livestock. In a survey taken in seven different villages outside the Serengeti National Park in Tanzania in 2007, spotted hyenas accounted for 97.7% of livestock losses to predators (Holzapfel, 2007).

Table 2 Livestock depredation of the spotted hyena from 2005-2009 in a total of 1100 surveyed households in Endrta Woreda, southern Tigray, Ethiopia in 2009

Species	Stock	Depredation	Percentage
Donkeys	1089	116	31.87
Goats	439	53	14.56
Sheep	247	39	10.71
Cows	1010	37	10.17
Bulls	343	28	7.69
Poultry	2726	27	7.42
Dogs	578	21	5.77
Oxen	1537	21	5.77
Calves	129	12	3.3
Mules	90	6	1.65
Horses	10	3	0.82
Camels	133	1	0.27
Cats	677	0	0
Total	9008	364	100

The response from households in cases of depredation has been to try to eradicate all the hyenas that subsist in the area, whether or not they are responsible for the depredation. The degree with which spotted hyenas impact livestock varies from place to place and has the greatest impact on livestock compared to other carnivores. Studies elsewhere have shown that tolerance of predators by local communities usually depends on the extent of predation on their livestock (Rasmussen, 1999; Patterson *et al.*, 2004; Woodroffe *et al.*, 2005; Kolowski & Holekamp, 2006; Holmern *et al.*, 2007). In the present study 364 domestic prey species were lost due to hyena depredation (Table 2). Predators are responsible for the loss of up to 3% of annual domestic stocks (Jackson & Nowell, 1996).

Spotted hyenas do not exhibit a significant preference for any prey species. This indicated that domestic species are at risk of spotted hyena predation irrespective of their size. They are generally thought to eat prey of medium to large body size (Mills & Harvey, 2001). Its morphology and behavioural opportunism allow it to capture anything it can overpower; from springhares to giraffes (Cooper, 1990). It is opportunistic predator hunting whichever species is locally most abundant (Cooper *et al.*, 1999). It can digest all organic components in bones. Any inorganic material is excreted with the faeces, which consist almost entirely of a white powder with few hairs. Hyenas utilize almost every part of their prey except for horns and rumen, and scavenge often. (Kruuk, 1972). A single spotted hyena can eat at least 14.5 kg of meat per meal (Kruuk, 1972). They can consume a third of its weight at a single meal (Kruuk, 1972) and accepts every kind of organic matter. The non-specific nature of spotted hyena predation undoubtedly contributes

to its relatively secure conservation status (Hyaena Specialist Group, 2004).

Hyenas are widely feared in Tigray, where they have been known to occasionally attack people at night. Although spotted hyenas do prey on humans in modern times, such incidences are rare. However, 5.5 % of faecal analysis in the present study contained human hairs. Hyenas are known to have preyed on humans in prehistory: human hair has been found in fossilized hyena dung dating back 195,000 to 257,000 years (Jennifer, 2009).

Ten human attacks were reported in the study area with in a year. However, I suspect that the presence of such numerous human hairs (5.5 %) in the scats analyzed might be originated from garbage dumps in which spotted hyenas are known to feed on. Although meat may be preferred, a hungry animal will also swallow hide, hooves, hair, teeth, and bone. When a community collects and removes garbage in trucks, hyenas move from the streets to the designated garbage dumps on the outskirts of Mekelle capital city of Tigray. In doing so, they may encounter human hairs associated. Many other areas have also provided hyenas with a scavenger role. For example, hyenas have nightly access to garbage left in the streets of Kiha and Aynalem, small towns near to the study site. Even small rural clusters of people can be counted on for a reliable flow of unwanted organic material that hyenas remove. In the countryside, domestic animals that die are left by the spotted hyena. It is therefore difficult to conclude all the scat results are from predation of livestock. Some may be due to scavenging in and around the study area. Hyenas can travel over vast distances and Kolowski *et al.* (2007) showed that hyena from the Maasai Mara travel in average 12.4 km per night. Length of travel is

thought to be dependent on home range size and prey availability.

In conclusion, it seems most likely that carnivores deepened entirely on domestic prey species for their dietary requirements as wild prey species has drastically declined in the past decades. Faecal analysis has proved to be a useful method to reveal diet of spotted hyena in the study area. Detailed information on the distribution and density of spotted hyena is needed to give a better picture of the status of this carnivore species in Tigray and to help resolve conflicts with livestock. Further investigations into the seasonal variation of predation are recommended.

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BIOGRAPHY

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