

Short Communication

Livestock loss by the spotted hyena (*Crocuta crocuta*) in and around a waste dumping site in Northern Ethiopia

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Human-carnivore conflict is one of the leading constraints to biodiversity conservation efforts. We investigated livestock depredation in two sub districts (Debre-Genet and Debre Tsehay) that were located nearby a waste dump and in two sub districts (Worki-Amba and Dabanow) that were located far from the waste dump. We hypothesized that livestock depredation would be higher in villages located close to waste dumping place where hyenas are more abundant at night than in villages that are located at relatively far places. Structured interview was used for randomly selected 277 respondents from four sub-districts [Debre-Genet (n=30), Debre-Tsehay (n=31), Worki-Amba (n=140) and Dabanow (n=76)]. A total of 158 (57%) respondents claimed livestock depredation and a total of 535 livestock were lost over the years 2009-2013. In total, livestock depredation was higher in Worki-Amba and Dabanow sub-districts (67% n=360) than in Debre-Genet and Debre Tsehay sub-districts (33% n=175). However, in intensity livestock depredation was higher in the vicinity of waste dump than in sub-districts that were far from the waste dumping site. The findings demonstrate that livestock depredation was higher in the villages that were located close to the waste dumping site. This might be due to the availability of human organic waste in the waste dump.

Key words: Spotted hyena, livestock, depredation, waste dump.

INTRODUCTION

Livestock depredation (Thirgood et al., 2005; Nyahongo, 2007; Dickman, 2008; Kaswamila, 2009) and crop damages (Sitati et al., 2003; Nyahongo, 2007; Kaswamila, 2009) leads to human-carnivore conflict. Human-carnivore conflict is one of the leading constraints

to biodiversity conservation efforts (Nyahongo, 2007; Kent, 2011; Lyamuya et al., 2013). Competition between wildlife and people for space and food resources leads to conflict (Thirgood et al., 2005; Dickman, 2008).

The spotted hyena is classified as Lower Risk and total

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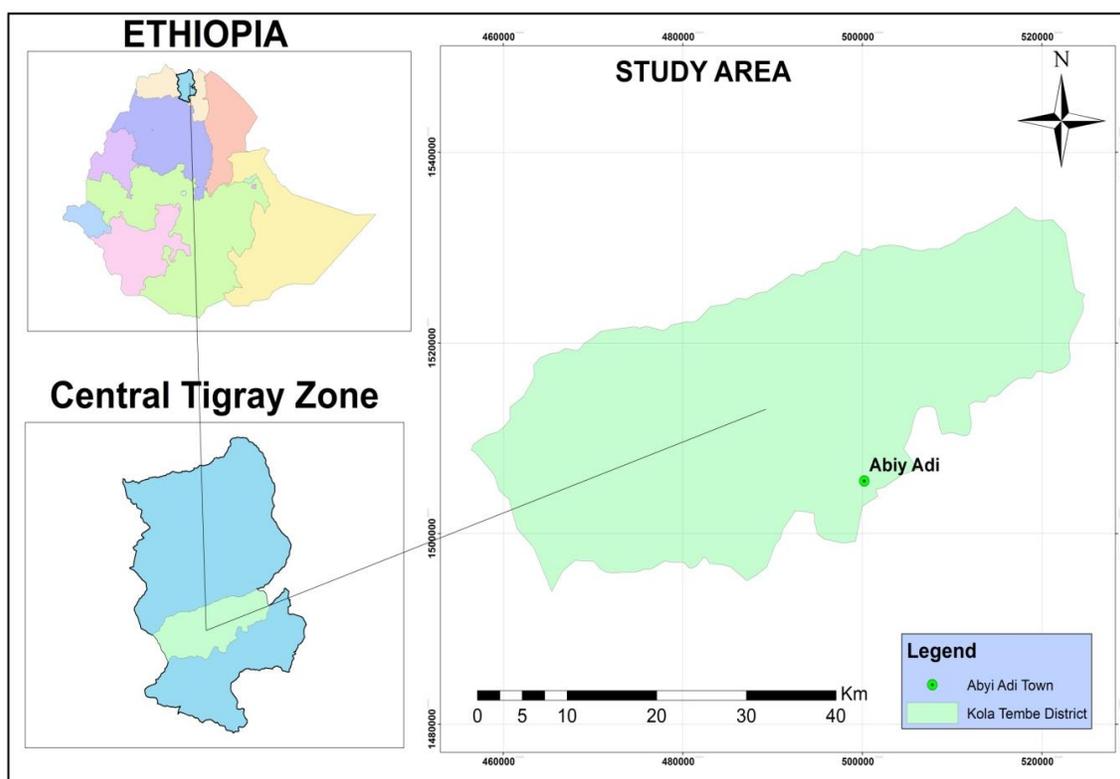


Figure 1. Map of Ethiopia showing Tigray regional state and map of Kola Temben district showing the location of Abiy Adi district.

world population size is estimated between 27,000 and 47,000 individuals (Mills and Hofer, 1998). Spotted hyenas are large (45-80 kg) carnivores that occur throughout sub-Saharan Africa (Mills, 1990; Frank et al., 1995; Mills and Harvey, 2001). They show many behaviors that help survive in proximity to humans (Woodroffe, 2000; Sunquist and Sunquist, 2001; Boydston et al., 2003). They breed at any time of the year (Van Meter et al., 2009) and inhabit very wide historical range with relatively stable populations (Kolowski and Holekamp, 2009). The nocturnal and opportunistic foraging behavior makes spotted hyena adaptable to anthropogenic environments (Mills and Hofer, 1998).

In Ethiopia spotted hyena depend largely on anthropogenic food (Gade, 2006; Abay et al., 2011; Yirga et al., 2012) due to the depletion of the natural prey base. Spotted hyenas are reported to be found near open refuse pit during times of food scarcity which might lead to increased livestock depredation in the nearby villages (Kolowski and Holekamp, 2006). We hypothesized that livestock depredation would be higher in villages located close to waste dumping place where hyenas are more abundant at night than in villages that are located at relatively far places. The aim of the study was to investigate livestock depredation at various distance from a waste dump.

Study area

The study was conducted in Kola Temben district in four sub-districts. The first was Debre-Genet sub-district located approximately 5 km from the waste dumping site of Abiy-Adi town. Debre-Genet has a total of 409 households and 4867 livestock, respectively and is located at 1500 m.a.s.l. The second was Debre-Tsehay sub-district located approximately 6 km from the waste dumping site. Debre-Tsehay sub-district has 422 households and 16,561 livestock, respectively and is located at 1700 m.a.s.l. The third was Worki-Amba sub-district located approximately 18 km from the waste dumping site.

Worki-Amba sub-district has 1,907 households and 13,358 livestock, respectively and is located between 1500-1600 m.a.s.l. The last was Dabanow sub-district located approximately 22 km from the waste dumping site. Dabanow sub-district has 1,035 households and 18,164 livestock, respectively and is located at 1650 m.a.s.l (Figure 1). The rainfall is characterized by one main rainy season between June and September and small rain between March and May. The average annual rainfall is 532 mm and the mean minimum temperature ranges from 12.9 to 14.2°C, with the mean maximum being between 26.7 to 32.6°C. The vegetation of the

Table 1. Estimated economic loss over the last five years (n=277) caused by spotted hyena around waste dumping (Debre-Genet, and Debre-Tsehay) and locations away from the waste dumping site (Worki-Amba and Dabanow) districts in northern Ethiopia in 2013.

Species	Debre-Genet and Debre-Tsehay		Worki-Amba and Dabanow		Estimated economic loss	
	Stock	Depredation	Stock	Depredation	Debre-Genet and Debre-Tsehay	Worki-Amba band Dabanow
Sheep	359	54	1258	93	37,800	65,100
Goat	736	80	2166	154	64,000	123,200
Cattle	211	5	701	41	18,335	150,347
Donkey	68	30	198	64	38,010	81,088
Dog	55	6	142	8	0	0
Cat	28	0	95	0	0	0
Poultry	248	0	298	0	0	0
Total	1705	175	4855	360	158,145	419,735

study area is dominated by *Acacia abisynica* and *Acacia etbaica* trees (Bureau of Agricultural and Natural Resources development, unpublished data). Chronic food insecurity characterizes the study districts, and the farmers depend on subsistence agriculture. The main crops cultivated in the area are sorghum (*Sorghum halepense*), teff (*Eragrostis tef*), maize (*Zea mays*), finger millet (*Eleusine coracana*), wheat (*Triticum*) and legumes (*Fabaceae*). In addition livestock farming is also a common practice especially cattle and goats. Abyi Adi town has one waste dumping site which is located approximately 1 km south west of the town, and has an area of 150 x 100 m.

METHODOLOGY

A total of 277 respondents from four sub-districts (Debre-Genet (n=30), Debre-Tsehay (n=31), Worki-Amba (n=140) and Dabanow (n=76) were randomly selected for a structured interview. For random selection, households were listed and sample respondents were drawn from the list. Debre-Genet and Debre Tsehay sub-districts were located nearby the waste dumping site (< 6 km) whereas Worki-Amba and Dabanow were located relatively at far distance from the waste dumping site (>=18) and were selected with the help of extension workers of the area. Structured interview was used as data gathering instrument. And socio demographic characteristics of respondents, livestock owned, livestock lost, sex, age, depredation in time and palace was recorded. To estimate average costs of livestock lost, average current market price was collected from local livestock traders.

RESULTS AND DISCUSSION

Livestock and economic losses

A total of 158 (57%) respondents claimed livestock depredation and a total of 535 livestock were lost over the years 2009-2013. In total, livestock depredation was higher in Worki-Amba and Dabanow sub-districts (67%

n=360) than in Debre-Genet and Debre Tsehay sub-districts (33 % n=175). However, in intensity livestock depredation was higher in the vicinity of waste dump than in sub-districts that were far from the waste dumping site (Table 1). The average annual livestock depredation in Debre-Genet and Debre Tsehay sub districts was 35 and in Worki-Amba and Dabanow sub-districts was 72. The average annual depredations per stock were approximately 2% and 1.5% in Debre-Genet and Debre -Tsehay as well as in Worki-Amba and Dabanow sub districts, respectively.

Approximately US\$ 30,415 was lost: US\$ 8323 in Debre-Genet and Debre –Tsehay sub districts and US\$ 22,091 in Worki-Amba and Dabanow sub districts. The average annual livestock losses per households were approximately US\$ 27 and US\$ 21 in Debre-Genet and Debre-Tsehay as well as in Worki-Amba and Dabanow sub districts, respectively.

Livestock depredation by the spotted hyena was relatively high in intensity in the villages that were located close to waste dumping site. This might be linked with the presence of spotted hyena in the waste dumps attracted by human organic waste. Spotted hyenas are known to concentrate around urban waste dumps at night in northern Ethiopia due to the presence of human organic waste.

Spotted hyena abundance was significantly higher at the garbage dumps than in other open urban areas at night in northern Ethiopia (Yirga et al., unpublished data). The relative higher abundance of spotted hyena in around waste dumping areas might lead to relatively higher livestock depredation in the villages around. In human-dominated landscapes carrying capacity for predators is associated with abundance and availability of human organic waste (Boitani and Powell, 2012).

Human-spotted hyena conflict is a common problem across Africa (Ogada et al., 2003; Patterson et al., 2004; Kolowski and Holekamp, 2006; Holmern et al., 2007).

However, the problem is worse in other countries of Africa than Ethiopia where depredation of livestock by spotted hyenas is tolerable and is relatively low (Abay et al., 2011; Yirga et al., 2013). Livestock depredation is remarkably higher in other parts of Africa (Holmern et al., 2007; Kissui, 2008), however, even small livestock depredation in the study area could be considerable since food insecurity and poverty is severe in the area.

In conclusion livestock depredation was high in intensity in the villages that were located close to the waste dumps than in villages located further away from the waste dumps. This might be linked with the availability of scabengable food that attract spotted hyena to the waste dups.

Conflict of interests

The author(s) have not declared any conflict of interests.

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