



Short communication

Guanaco (*Lama guanicoe*) mortality by entanglement in wire fencesAndrés Rey^{a,*}, Andrés J. Novaro^{a,b}, María L. Guichón^c^a Instituto de Investigaciones de la Biodiversidad y Medio Ambiente (INIBIOMA) CONICET-UNComa, Epulafquen 30 Casa 2, (8371) Junín de los Andes, Neuquén, Argentina^b Patagonian and Andean Steppe Program, Wildlife Conservation Society, Curruhué 395 Casa 2, (8371) Junín de los Andes, Neuquén, Argentina^c Departamento de Ciencias Básicas, Universidad Nacional de Luján, Rutas 5 y 6, (6700) Luján, Buenos Aires, Argentina

ARTICLE INFO

Article history:

Received 28 October 2011

Received in revised form 10 May 2012

Accepted 10 May 2012

Keywords:

Barrier-effect

Livestock ranch

Ungulate

Wire-fence design

ABSTRACT

Wire fences are widely used in rangelands around the world and may have a negative impact on wildlife that varies among species and habitats. The guanaco (*Lama guanicoe*) is the largest Patagonian ungulate and though entanglement in wire fences is frequently reported, its impact on guanaco populations has not been previously evaluated. We estimated annual mortality rate of wild guanacos due to entanglement in wire fences and evaluated whether the frequency of entanglement was age-dependent in the two wire-fence designs traditionally used in Patagonian sheep ranches. We found that annual yearling mortality on fences (5.53%) was higher than adult mortality (0.84%) and was more frequent in ovine (93 cm high) than bovine (113 cm) fences. Most guanacos died entangled by their legs in the highest wire when trying to jump over the fence. Our results suggest that guanacos are more likely to die due to fence entanglement than ungulates studied in other regions. Indirect effects of wire fences should also be considered as they may act as semi-permeable barriers for guanaco populations. We suggest removal of unnecessary wire fences and replacement by guanaco-friendly fences, like high-tensile electric fences that may reduce mortality and barrier-effect on guanaco populations.

© 2012 Elsevier GmbH. All rights reserved.

Introduction

Wire fences are widely used to restrict animal movement (Harrington & Conover 2006; Hayward & Kerley 2009; Hobbs et al. 2008). Holding or excluding animals using wire fences can contribute to the management, protection and conservation of habitats (i.e. wetlands, pastures, forests) (Doupé et al. 2010; Golluscio et al. 1998; Husheer et al. 2003), animals (i.e. livestock, threatened species) (Hayward & Kerley 2009; Ikuta & Blumstein 2003; Islam et al. 2010) and particular habitat resources (i.e. crops, native grasslands) (Gonzales & Clements 2010; Gordon 2009; Hobbs et al. 2008). However, when wire fences are built for productive purposes ignoring wildlife requirements, they may become a serious threat to wildlife, mainly ungulates (Gordon 2009; Islam et al. 2010) and birds (Drewitt & Langston 2008; Wolfe et al. 2007).

Wire fences used for livestock usually limit wild ungulate access to vital resources (Mbaiwa & Mbaiwa 2006; Loarie et al. 2009), fragment their habitats (Hobbs et al. 2008), and restrict their movements as they respond to variable environmental conditions (Islam et al. 2010) and along migratory routes (Bolger et al. 2008; Fox et al. 2009). Wire fences that are unfriendly toward wild ungulates can also provoke injuries and death during crossing attempts (Harrington & Conover 2006; Paige 2008). Although fence

location and design to allow or prevent movement of wild ungulates have been evaluated (Karhu & Anderson 2006; Knight et al. 1997; VerCauteren et al. 2007), few studies have estimated ungulate mortality during fence crossing or have described forms of entanglement (Harrington & Conover 2006).

The guanaco (*Lama guanicoe*) is a monomorphic South American native ungulate that reached 30–50 million individuals (Raedeke 1979) but its abundance and distribution have drastically declined since Europeans arrived to this continent (Baldi et al. 2010; González et al. 2006). Nowadays, more than 70% of the 500,000–1,000,000 remnant guanacos inhabit Argentinean Patagonia, mainly in private lands where extensive sheep husbandry has been the main productive activity since the XIX century (Baldi et al. 2010). Patagonia extends over >500,000 km² of arid land (INDEC 2002) and wire fences for livestock divide 25 to 100-km² ranch sections used for sheep grazing (Baldi et al. 2001; Guevara et al. 2009), reaching >164,000 km of wire fences. Although adult guanacos can jump over 2 m-high fences (Montes et al. 2006), entangled guanacos in wire fences are reported (Baldi et al. 2010; Bank et al. 2002; Raedeke 1979). However, the relative importance of mortality due to entanglement remains largely unknown and the belief that wire fences pose no threat to guanacos is still widespread in Patagonia (Baldi et al. 2001). Therefore, we estimated annual mortality rate of guanacos due to entanglement in wire fences and evaluated whether the frequency of entanglement varied according to fence design and guanaco age. We also described the most common forms of guanaco entanglement and suggest

* Corresponding author.

E-mail address: fitzrey@gmail.com (A. Rey).

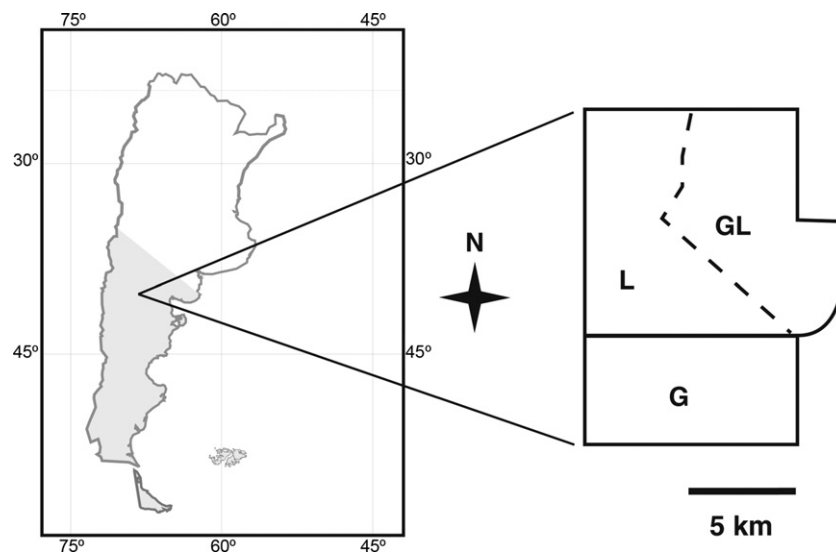


Fig. 1. Location of our study site within Cabeza de Vaca ranch located in Argentinean Patagonia and the three 5000–5500 ha surveyed sections (G, L, and GL) showing bovine (solid line) and ovine (dotted line) wire fences.

modifications aimed at reducing mortality associated with wire fences.

Methods

We carried out this work in Cabeza de Vaca ranch (40°S, 66°W), a traditional sheep ranch located in Río Negro province, Patagonia, Argentina (Fig. 1). The region is characterised by a relatively flat topography at 400–500 m asl and an open shrub steppe with tall and low shrubs, grasses and abundant bare soil, locally called ‘monte’ desert (Guevara et al. 2009; Paruelo et al. 1998a). Mean annual temperature is 12 °C and mean annual precipitation is 200 mm (Paruelo et al. 1998b).

From October 2005 to June 2007 we recorded bimonthly, except in winter, all guanaco carcasses entangled on bovine (65 km) and ovine (13 km) wire fences that divided three 5000–5500-ha contiguous sections (G, L and GL) of the ranch (Fig. 1). Bovine fences have seven wires that reach 113 cm in height, whereas ovine fences have five wires 93 cm high. For each entangled carcass we recorded: (1) relative age, yearling (≤ 1 year old) and adult (> 1 year old) according to body size (de Lamo 1995); (2) sex, through observation of genitals in fresh carcasses or suspensor structures of male genitalia in adult hip bones (Raedeke, 1978 cited in Saba et al. 1995); (3) type of fence, bovine or ovine, and height of each wire; and (4) entanglement form, by identifying which body part (front legs, hind legs or other part) was caught in which wire. We removed old carcasses to avoid double recording. We evaluated if the frequency of entanglement differed between the highest wire and the lower wires of the fence using a χ^2 test with Yates’ correction. We tested if the frequency of entanglement of young and adult guanacos was independent of fence design, i.e. bovine or ovine fence, using χ^2 independence test with Yates’ correction (Zar 1996).

We estimated annual mortality rate due to entanglement as the total number of carcasses found between June 2006 and June 2007 over the estimated guanaco abundance in this period. We estimated guanaco abundance bimonthly, except in winter, in G, L, and GL sections through five to eight pedestrian 6–9-km long line transects per section (Buckland et al. 2001; Rey 2010). We recorded the number of yearlings and adults in all guanaco groups (using 12 × 60 Nikon binoculars and 20–60 × 80 Shilba telescope), their distance from the observer (using laser rangefinder Bushnell Yardage Pro 1000 ± 1 m), and their angle from the line transect (using a hand

compass). We estimated guanaco abundance using DISTANCE version 5.0 release 2 (Buckland et al. 2001; Thomas et al. 2006) and extrapolated average densities estimated in G and L for missing surveys in section GL. We used the observed yearling × adult^{−1} ratio to estimate relative abundance of each age category and estimate annual mortality per age class. We estimated annual mortality rates of adult and yearling guanacos as the accumulated frequencies of carcasses recorded during the year over the mean adult abundance and yearling abundance at the end of the 2006–2007 breeding season (March), respectively. Mean and standard errors are reported, unless otherwise stated.

Results

From December 2005 to June 2007 we recorded a total of 124 guanaco carcasses entangled in wire fences that yielded an annual entanglement frequency of 1.0 per km of fence (yearlings: 0.4 per km; adults: 0.5 per km). We recorded similar entanglement frequency between fences design, 1.7 carcasses per km of ovine fence ($n = 22$ carcasses) and 1.6 carcasses per km of bovine fence ($n = 102$). Most guanacos were entangled by their front or hind legs (97 out of 111), indicating failed jumping attempts. We identified the sex of 78 carcasses, which showed a balanced sex ratio (1M:1.05F). Deaths of guanacos were most frequently due to entanglement in the highest wire (80 out of 111; $\chi^2_{0.05(2)} = 10.41$; $p < 0.01$). Entanglement of young and adult guanacos was dependent on fence design ($\chi^2_{0.05(2)} = 12.77$; $p < 0.001$), being more frequent for adults in bovine fences and for yearlings in ovine fences (Table 1).

From June 2006 to June 2007, we estimated an annual guanaco mortality rate due to fence entanglement of 1.6% (59 carcasses; 3698 ± 211 live guanacos). Annual mortality rate was 5.5% in

Table 1

Yearling and adult frequency of entanglement on bovine (65 km) and ovine (13 km) wire fences from December 2005 to June 2007 in Cabeza de Vaca ranch, Patagonia, Argentina.

	Ovine fence		Bovine fence		Total
	Yearlings	Adults	Yearlings	Adults	
Male	4	1	5	28	38
Female	2	3	6	29	40
Unsexed	12		27	7	46
Total	18	4	38	64	124

Download English Version:

<https://daneshyari.com/en/article/4400020>

Download Persian Version:

<https://daneshyari.com/article/4400020>

[Daneshyari.com](https://daneshyari.com)