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Short Note

Effectiveness of electric fences as a means to prevent Iberian lynx (*Lynx pardinus*) predation on lambs

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Abstract

To mitigate the conflict derived from Iberian lynx (*Lynx pardinus*) predation on livestock, a prevention and compensation program has been implemented to compensate farmers for poultry and lambs killed by Iberian lynx. Although the majority of the attacks were carried out on poultry, the predation of lambs in extensive flocks leads to greater economic losses. The effectiveness of portable electric fences in preventing predation by Iberian lynx on lambs in such flocks was evaluated. Electric fences were installed around two flocks of sheep suffering from attacks by Iberian lynx. Before the experiment, both flocks grazed without any surveillance during the day. At night, sheep with a single lamb were left to roam freely or spent the night in a poorly constructed enclosure. Sheep with two lambs remained with their lambs without any type of protection. After the electrified enclosures were put in place, sheep with lambs were moved inside at night. No attacks were detected inside the electric fences. During the daytime, four attacks on lambs grazing without surveillance were recorded. Despite the initial success of this experiment, more study is still needed to test the long-term effectiveness of this preventive tool as a means of minimizing the conflict between Iberian lynx and humans at a broader scale.

Predation by carnivores on livestock and subsequent retaliatory persecution are conservation concerns the world over (Bagchi and Mishra, 2006), and many carnivore conservation measures target to prevent this type of conflict (Treves and Karanth, 2003). Compensation schemes have been established in many wild felid conservation programs that aim to mitigate the losses suffered by herders (Loveridge et al., 2010). Although compensation is a necessary and effective measure in the short term, preventing predation is probably a better strategy in the long-term (Garrote et al., 2013).

To mitigate the conflict arising from predation by the critically endangered Iberian lynx (*Lynx pardinus*; IUCN, 2011) on livestock, a prevention and compensation program was implemented in order to compensate farmers for the poultry and lambs killed by this felid (Garrote et al., 2013). Although the majority of attacks were carried out on poultry, greater economic losses were caused by predation on lambs in extensive flocks. The goal of this study was to evaluate the effectiveness of portable electric fences in avoiding Iberian lynx predation on lambs in extensive flocks. The work was conducted under the auspices of the Iberian lynx conservation LIFE project in Andalusia (see Simón et al., 2012).

The study was conducted on two flocks of sheep whose lambs had been predated by Iberian lynx since 2011. Both flocks were located on private estates at the eastern limit of this felid's known range in the Sierra Morena (SE Spain; Simón et al., 2012). This mountainous area is covered by well-preserved Mediterranean forests and scrubland and large game reserves are the main land use. Each flock is composed of about 500 head of sheep and produces between 420 and 500 lambs per year. Although both flocks graze in the Iberian lynx distribution area by day without surveillance, prior to our testing husbandry practices differed during the night. In flock 1, sheep without lambs and most of those with just a single lamb were left to graze freely. Occasionally, ewes with one lamb spent the night in a small enclosure close to the shepherd's house. Sheep with two lambs were tied up with their lambs in an area between 10 and 500 m from the shepherd's house without any other type of protection. In flock 2, ewes with a single lamb spent the night in a small enclosure close to the shepherd's house, whereas those with two lambs were tied up with their lambs in the outer part of the enclosure. In both cases, the pens where sheep were enclosed at night had no more than one meter-high fence and were poorly constructed. The mating season is controlled in both flocks to obtain two different lambing periods: half of the flock gives birth in December-January (winter births) and the other half in March-April (spring births), and Iberian lynx attacks in previous years were concentrated during these two periods.

Between December 2012 and May 2014 (including both lambing seasons) we registered all attacks on the studied flocks. We considered only attacks that could be unambiguously attributed to Iberian lynx by footprints, scats, photographs or by distinctive marks left on uneaten animals (Garrote et al., 2013). In early March 2013 (before the spring lambing season), a portable electric enclosure with a total perimeter of 75 m and 106-cm high fence was placed around each flock. The fence consisted of a braided plastic rope that was live over its entire length. In order to increase the height of the fence, two 4-cm wide conductor strips were placed over the mesh giving a total height of 160 cm (Fig. 1). A generator with a battery recharged by solar panels was included in each enclosure. Enclosures were fixed in position. In flock 1, all sheep with lambs (irrespective of their number) were moved inside the electric enclosure at night. In flock 2, sheep with one lamb continued using the traditional enclosure, while those with two lambs were moved inside the electric fence at night. This trial scheme was maintained for three months until the youngest lamb was 1.5 months old. During the 2013 winter lambing season, both flocks suffered from attacks by Iberian lynx. Ten of such events, involving 10 lambs, took place during the day when sheep were grazing freely, whereas 7 events

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took place at night, both in the free and tied-up flocks, involving 13 lambs. After the installation of the electric fences (spring lambing season in 2013, winter and spring lambing season in 2014), no attacks by Iberian lynx or other carnivores occurred inside the fences. In flock 2, one week after the installation of the electric fence we found it partially broken down with Iberian lynx hairs entangled, a likely indication of a predation attempt during which the electric discharge might have dissuaded the lynx from killing a lamb. During the daytime, however, we recorded four attacks on lambs grazing without surveillance.

Despite the impossibility of unambiguously determining the factors leading to the lack of attacks at night detected during the study, it is likely that two factors in particular were of importance: flock protection at night and the dissuasive ability of the electrified enclosure. Local shepherds participated in the design of the enclosures and the choice of materials. They believed in the effectiveness of this prevention method and agreed to enclose their lambs at night. This way of managing livestock is known to reduce felid attacks on livestock (Scognamillo et al., 2002). Even so, enclosing animals is not always enough to prevent felid predation (see Saenz and Carrillo, 2002), and in the past the owner of flock 1 lost lambs to predation inside a non-electrified enclosure. Given that Iberian lynxes have been seen to jump over fences of up to 2-m high, 1.6 m is not by any means an insuperable height for them. Like other felid species (Schiaffino et al., 2002; Scognamillo et al., 2002), Iberian lynx frequently pass through mesh fences that control cattle movements. Lynx can usually penetrate a lightweight mesh and, given the similarity of the electrified fence to the standard fence, the lynx may have tried to pass through instead of jumping over, thereby suffering the electric shock that dissuaded them from entering again. This would seem to explain why electric fences are effective in avoiding predation on livestock in other felid species (see Scognamillo et al., 2002).

Electrified fences are easy to set up in the field and are cost-effective anti-predator deterrents. Despite the initial success we reported in this preliminary testing, further study on the effectiveness of preventive tools in minimizing the conflict between Iberian lynx and humans are clearly needed. Moreover, the problem of daytime predation has still not been resolved. In these cases, farmers should be encouraged to become involved in managing human-wildlife conflicts, above all by improving their own herding and vigilance practices, by building better herding facilities and by adopting more reliable herding procedures (see Wang and Mcdonald, 2006). Managers, researchers and farmers must work together in the planning and implementation of appropriate and effective programs and actions aimed at resolving this conflict, as this collaboration could further enhance farmers willingness to coexist with large carnivores.

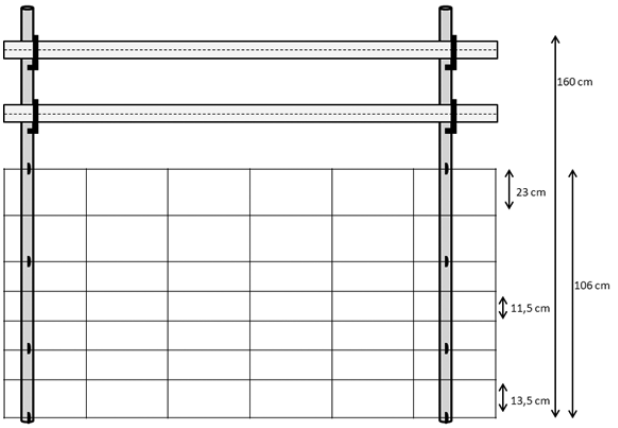

Figure 1 – Technical drawing of the fence structure.

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