Short Communication

FREE RANGING LIVESTOCK, WOLVES AND DAMAGE PREVENTION METHODS: NOT AN EASY PUZZLE

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In human-dominated landscapes, multiple ecological, social, cultural and economic factors influence human-wolf relationships (Llaneza et al., 2012). Many governments enforce, support and implement practices to mitigate conflicts between wolves and farmers by adopting compensation systems for livestock losses (Agarwala et al., 2010; Maheshwari et al., 2014), promoting damage prevention methods such as fences or guard dogs (Salvatori and Mertens, 2012; Kaczensky et al., 2013), and permitting lethal control of wolves (Linnell et al., 2005). However, empirical evidence on the efficacy of each of these actions is limited or even contradictory (Agarwala et al., 2010; Wielgus and Peebles, 2014). In order to mitigate conflicts properly we need to understand their causes, which sometimes can be complex (Chapron and López-Bao, 2014). An increase in our knowledge of the factors affecting the conflict in a given area should contribute to mitigate it more effectively.

Free-ranging livestock practices are common in the northwest of the Iberian Peninsula (López-Bao et al., 2013; Álvares and Blanco, 2014). As a consequence of subsidies for cattle production from the EU, numbers of free-ranging (beef) cattle in areas with wolves and cattle losses to wolf predation have shown an increasing trend during the last decades (Álvares and Blanco, 2014). For instance, in Castilla y León, which has more than 50% of the Iberian wolf population, the number

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Fig. 1. The farmer and the wolf. One of the wolves was live-trapped within the collaborating farm and the farmer was invited to attend its release with GPS collar fitted.

of sheep and goats affected by wolf attacks increased by 10% from 1,434 in 2005 to 1,579 in 2012, whereas the number of cattle affected by wolf attacks increased 4-fold from 131 in 2005 to 543 in 2012 (Junta de Castilla y León, 2013).

In Pontevedra province, the main livestock husbandry practice includes extensive cattle grazing. In addition, upland heathlands are occupied by free-ranging horses feeding on low-quality forage and forming small herds that roam unattended and breed freely in communal lands year-round (López-Bao et al., 2013). Therefore, mountains are permanently occupied by hundreds of dispersed cattle and horses with their respective calves and foals, being extremely vulnerable to wolf attacks. Livestock constitutes the main food resource for wolves in the area, where wild ungulates occur at low densities (López-Bao et al., 2013). Although cattle and horses are similar in body size and husbandry practices, wolf predation on cattle and horses has different socio-economic impacts (López-Bao et al., 2013). While cattle constitute an important source of income for families, free-ranging ponies currently have low economic value. In fact, some farmers admit that they raise ponies because they think that wolf predation on foals reduces the impact on calves, which are much more valuable (authors' unpublished data). Compensation for wolf damages is greater for cattle (EUR 218-1,635) than horses (EUR 158-792, depending on age and breed) (Xunta de Galicia, 2011). In this scenario, the protection of cattle, and particularly calves, which are more prone to wolf predation (Álvares, 2011; Dondina et al., 2015), seems a priority for mitigating conflicts.

Shepherds, livestock guarding dogs and fences are the most commonly used methods to prevent wolf attacks (Reinhardt et al., 2012). The efficacy of these methods varies widely among regions, depending on husbandry methods and livestock species (Breitenmoser et al., 2005; Reinhardt et al., 2012; Salvatori and Mertens, 2012). Prevention of damage in extensive grazing systems presents a particular challenge due to the scattered distribution of livestock and the extensive area to protect (hundreds of hectares). In these circumstances, methods such as the use of livestock guarding dogs may be less efficient than, for instance, when protecting sheep herds (Breitenmoser et al., 2005; Rigg et al., 2011). The cost-effectiveness of free-ranging livestock is based on the low investment required. Husbandry practices implying an "extra" investment of time, money or effort, are often rejected by farmers, even if such investment is expected to reduce wolf damages. Therefore, it is of great interest to test methods that could minimize wolf predation without requiring substantial investment.

Extensive livestock farming systems are arguably the least suitable to achieve a low-conflict coexistence with large carnivores. However, unless there are major changes in agricultural and environmental policies (e.g. promoting husbandry practices such as surveillance or protection of calves against wolf predation in order to compensate the loss in competitiveness with respect to the same extensive livestock systems located in areas without wolves), this is likely to remain the dominant system we have to deal with to mitigate conflicts.

A prerequisite to detect and solve problems in a system is to understand how the system works. For this reason, in summer 2013, we began a multidisciplinary pilot project to study the relationships among livestock, wolves, wolf predation, and damage prevention methods in Pontevedra, Galicia. This project, entitled "Asistencia técnica para el seguimiento de manadas, realización de ensayos y evaluación de daños provocados por el lobo en explotaciones ganaderas de Galicia", Ref: TEC0003570, was contracted by Tecnologías y Servicios Agrarios, S.A. (TRAGSATEC) and financed

by the Spanish Ministry of Agriculture, Food and the Environment (MAGRAMA). It had two different objectives:

1) To evaluate the impact of wolves on livestock. We equipped five wolves with GPS collars to study wolf predation (Fig. 1). The main aim was to obtain information about wolf predation on livestock in this particular husbandry system. This information will allow us to know the real impact of wolf predation on livestock and to detect problems that could affect the level of conflict (e.g. detectability of prey remains). In addition, we equipped 44 foals with collars to study the causes of foal mortality.

2) To test livestock damage prevention methods for free-ranging cattle in a farm suffering recurrent wolf attacks. We designed and tested a system to protect calves with minimum extra labour for the farmer, based on the installation of an enclosure to keep calves protected with "selective" gates allowing only the dams to pass through (Fig. 2). Using this system, cattle roam freely and nurse their calves in enclosures safe from wolf predation (Fig. 3). In line with the recommendations of the EU Platform on Coexistence between People and Large Carnivores regarding techniques and solutions for mitigating so-called material conflicts, the Spanish Ministry of Agriculture, Food and the Environment recently opened a specific work-line for protected species

Fig. 2. Selective gate. Adult cattle can see over the gate (made of opaque materials) and therefore what is beyond it. They easily learn to push the gate to exit freely. In contrast, small calves cannot see what is beyond the gate and so do not dare to push it, remaining inside the enclosure.

Fig. 3. Calves remain safe from wolf attacks inside the enclosure while their mothers graze.

focused on prevention measures, including this type of enclosure as a recommendation for reducing wolf damage. We aimed to evaluate the efficacy of this system to prevent wolf predation on calves and to quantify the investment needed to implement this method, i.e. the extra investment needed for cows to learn to use the selective gates without the help of the farmer.

For detailed information on this type of enclosure visit the official web site of the Ministry at: http://www.magrama.gob.es/es/biodiversidad/temas/conservacion-de-especies/ce_silvestres_resolucion_lobo_bovino_tcm7-358441.pdf

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