Short Communication

# THE INNOVATIVE USE OF LGDs TO REDUCE ILLEGAL POISONING

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## 1. Introduction

The Mediterranean region has a long history of poisoning that goes as far back as the 5th century B.C., when the use of toxic plants to control wolves (*Canis lupus*) and other species that could damage game and livestock was described in ancient Greece (Longe, 2005). This practice evolved and spread over time and came to have a high negative impact on human health and biodiversity, becoming one of the most prevalent non-natural causes of death of many endangered species (e.g. Guitart et al., 2010b, Álvares, 2003; Villafuerte et al., 1994). Currently, the use of poison is explicitly forbidden in Europe by the Birds Directive (79/409/EC, Article 8) and the Habitats Directive (92/43/EC, Article 15). Nevertheless, illegal poisoning remains a reality and toxic substances remain available, both legal and illegally (e.g. Martínez-Haro, 2008; Salvatori and Linnell, 2005).

A single poisoned bait or carcass left in the field can lead to numerous, indiscriminate victims and represents an extremely serious threat to domestic animals, wild species and humans (e.g. Berny et al., 2010; Guitart et al., 2010a; Guitart et al., 2010b). One example regarding large carnivores reports the killing of 29 wolves and one lynx (*Lynx* sp.) in Canada, from a single poisoned deer carcass (Mech, 1970). In October 2003, in central Portugal, a single event resulted in the poisoning of 33 griffon vultures (*Gyps fulvus*), three black vultures (*Aegypius monachus*) and three red kites (*Milvus milvus*), of which 24 were found dead and the others received treatment at the Wildlife Recovery Center (Centro de Recuperação da Animais Selvagens - CRAS) in Castelo Branco, managed by Quercus (Fig. 1).

Furthermore, some compounds can be preserved in the baited carcasses for several months, increasing the risk of killing more animals (e.g. Allen et al.,

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**Fig. 1.** Poisoned wolf and black vulture, in 2004 and 2003 respectively, in Idanha-a-Nova municipality in Portugal.

1996). Secondary poisoning has also been confirmed in many species, from raptors to mammals (e.g. Antoniou et al., 1996; Berny et al., 1997), also with implications for public health, since humans may be at risk of secondary toxicity after consuming poisoned animals. This highlights the need to not only stop the illegal use of poison but also to detect and remove poisoned baits and carcasses that are deployed in the environment to prevent them entering the food chain.

Despite the devastating impact of poison, the lack of reliable data and research makes it very difficult to stop this illegal practice. For example, according to information collected within the Progama Antídoto-Portugal[1], between 2000 and 2010 a total of 288 poisoning cases were registered in Portugal, resulting in the death of 1,367 animals. Still, only 116 of those episodes were reported to the authorities. Furthermore, in many cases the poisoned animals are not detected or sent to rehabilitation centres, and thus do not enter official databases. It is estimated that only 6% of wild animals killed by poison are detected (Cano et al., 2008).

The use of poison in rural regions is usually associated with the economic activities of those areas, namely livestock breeding and hunting (e.g. Álvares, 2003; Villafuerte et al., 1994). However past efforts to address illegal poisoning in Europe have had little or no focus on promoting the engagement of rural groups towards its eradication. The result was weak social knowledge of the impact that this practice has on both biodiversity and public health. In order to tackle illegal poisoning by implementing an innovative strategy based on a participatory approach, a project was developed between 2010 and 2014 focused on gathering a deeper understanding of motivations behind the use of poison and on an active social involvement to fight this illegal practice. The LIFE Project "Innovative actions against illegal poisoning in EU Mediterranean pilot areas" was implemented with the objective of demonstrating and spreading procedures and practices that contribute to halt the loss of biodiversity due to the illegal use of poison in the European Union (EU) and to improve the conservation status of the species most affected. The Project was coordinated by Fundación Gypaetus (Spain) and involved three other environmental NGOs and the Natural History Museum of Crete. It was implemented in eight pilot areas in Portugal, Spain and Greece that represent important Mediterranean habitats, contain affected species and predators, and where conflicting rural uses and reasons which motivate the illegal use of poisoned baits are present (Figs. 1, 2). A set of tools and actions were deployed and monitored, counting on the active and voluntary participation of the target groups, which enhanced their involvement in the deterrence efforts and implementation of awareness raising campaigns, through a shared responsibility in the fight against illegal poison.

## 2. Study area

In Portugal, one of the study areas where Project actions were coordinated by Quercus included the Tejo International Natural Park, located in Castelo Branco and Idanha-a-Nova municipalities, along the border with Spain (Fig. 2). This is a very important area for bird conservation including several endangered eagles and vultures, according to the Portuguese Red Book of Vertebrates (Cabral et al., 2005), namely: imperial eagle (*Aquila adalberti*), black vulture, red kite, Egyptian vulture (*Neophron pernocterus*), golden eagle (*Aquila chrysaetos*), and Bonelli's eagle (*Aquila fasciata*).

The landscape is characterized by agricultural and pasture lands, in medium to large private proprieties. The average farm size was 15 ha in the northern part of the study area and 50 ha in the south, with the larger farms up to 3,000 ha. There were around 980 livestock farms, with sheep farming representing 80% of livestock production in the area, followed by cows

[1] Programa Antídoto-Portugal (Antidote Programme) is a platform created in 2004, joining private entities and public authorities in a common effort to fight against the illegal use of poisons and contribute to a better knowledge of the consequences this practice has on wildlife: www.antidoto-portugal.org.

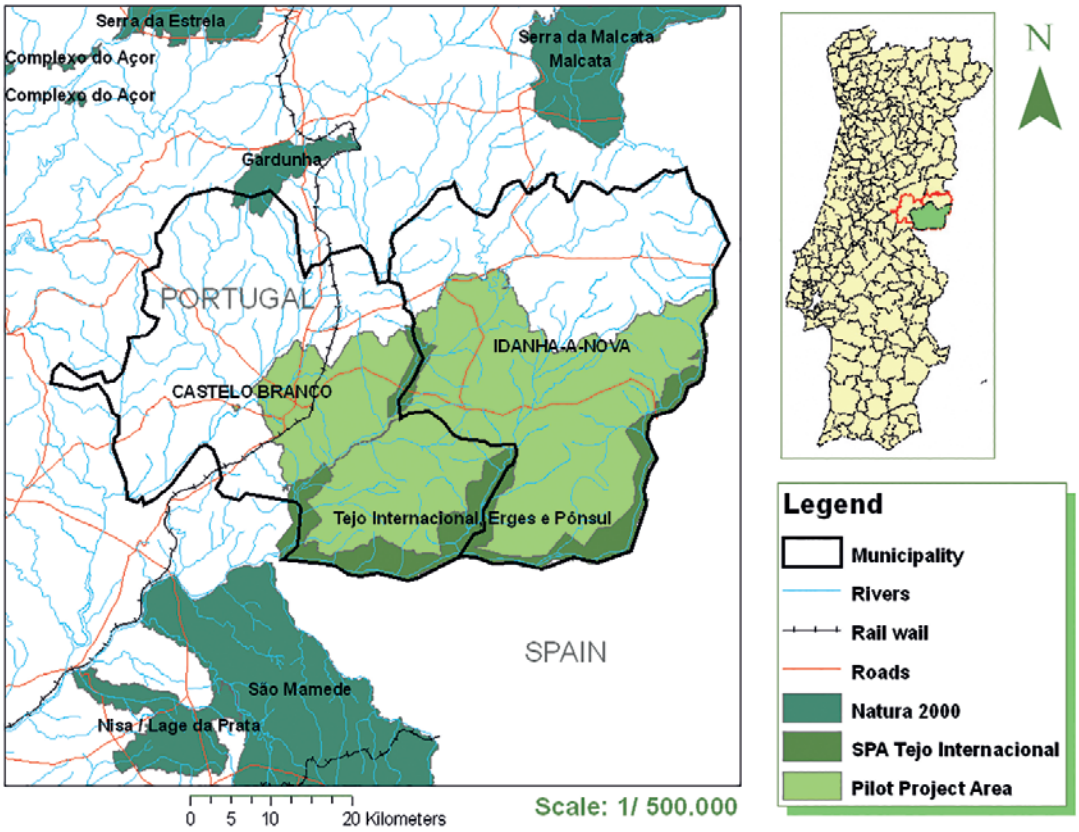


**Fig. 2.** Locations of the study area, one of the pilot project areas in Portugal, of the Special Protection Area of the Tejo Internacional, and other areas of the Natura 2000 network.

(INE, 2011). Livestock is extensively grazed year-round with no damage prevention measures in place. Flocks are not shepherded and the use of livestock guarding dogs (LGDs) is not common, while damage prevention was traditionally based on illegal predator control with the use of poison baits and carcasses. Large predators, like the wolf, are not established in the area, although dispersers may occur. In fact a dispersing wolf was poisoned in 2004 in Idanha-a-Nova (Fig. 1). Feral/stray dogs and smaller predators (e.g. red foxes, *Vulpes vulpes,* and Egyptian mongoose, *Herpestes ichneumon*) are frequent throughout the area and can cause considerable damage to newborn and young livestock. These are not compensated by the authorities, leading farmers to resort to illegal control measures such as snaring and, most often, poisoning.

## 3. Methods

### 3.1. Pre-assessment and tool definition

An initial baseline survey of each pilot area enabled us to confirm that the use of poison was commonly associated with areas with small game species (of hunting interest) and extensive livestock breeding areas, which are more vulnerable to predator attacks. The 1,200 inquiries made in the pilot areas also revealed that the illegal use of poison was a socially condemned practice. Nevertheless, it was rarely reported to authorities, even by those that were victims of it. After this initial pre-assessment, the most appropriate tools were identified for each target group: hunters, livestock breeders and municipal authorities. Concerning livestock breeders, a specific list of tools was proposed and applied according to the particular needs of each breeder and the ecological characteristics of each farm (Fig. 3, Table 1).

**Fig. 3.** Development of innovative capture techniques for feral/stray dogs with large cage-traps to minimize predation and avoid illegal poisoning.

**Table 1.** Tools proposed in the framework of the livestock breeders' network.

| Measures proposed to members of the livestock breeders' network | |
|---|---|
| **Control of feral/stray animals** | Technical meetings |
| | Meetings with livestock breeders and environmental officers to coordinate efforts to control feral/stray animals |
| | Dissemination of live traps to relevant authorities for capturing feral/stray animals |
| | Development of innovative capture techniques for feral/stray dogs |
| **Damage prevention measures** | Donation of livestock guarding dogs |
| | Microchiping of livestock guarding dogs |
| | Implementation of electric fences |
| | Installation of raven deterrents |
| **Technical advice** | Advisory on farm risk assessment, proposal of anti-predation measures and addressing conflicts with the hunting sector |
| | Mediation to solve conflicts with the hunting sector |
| | Availability of the European Canine Team in suspected cases of poisoning |
| | Support in administrative issues |
| | Free emergency telephone line |
| **Legal consulting** | Legal consulting for livestock breeders on poisoning related cases |
| **Awareness raising** | Distribution of information materials (e.g. leaflets, flyers) and organizations of workshops, seminars, etc. |

Delivering livestock guarding dogs (LGDs) to protect livestock was the most widespread tool in all the pilot areas in the three countries involved, since there was a big interest from livestock breeders.

### 3.2. Networking

The Project evolved around the concept of fighting the loss of biodiversity caused by illegal poisoning through a social approach, and the work focused on the rural activity sectors commonly linked to this illegal practise, namely livestock breeding and hunting, as well as local administrations (municipalities) who are the public officials closest to the citizens. Specific tools and actions were implemented within three newly-created networks:

**i.** European network of livestock breeders against illegal poisoning;

**ii.** European network of municipalities against illegal poisoning;

**iii.** European network of hunters against illegal poisoning.

These networks gathered a total of 402 stakeholders from the eight pilot areas in Portugal, Spain and Greece, who shared the will to achieve a poison-free environment. Through these networks, locals can participate and incorporate their needs, perceptions and interests in rural space management as well being informed about the costs of biodiversity loss and the benefits of actions against illegal poisoned baits. A total of 58 municipalities and 120 hunting areas from the three countries were involved in the networks. The livestock breeders' network gathered a total of 224 famers, of which 62 were from Portugal. To achieve this, meetings with individual livestock breeders and associations were held, where the Project's goals and the Network's foreseen actions were explained. Adhesion to the network was not always easy to achieve, mainly due to lack of trust in the Project goals and its viability, as well as in the staff, and the lack of interest to commit to the Project, and of having extra work. To overcome these obstacles, we used livestock breeders and association's representatives as crucial interlocutors for the Project to those who were more reluctant.

### 3.3. Monitoring actions

The use of poison was monitored with field inspections by the European Canine Team (ECT), the monitoring of bioindicator species and constant contact and flow of information with stakeholders and official environmental bodies. The ECT, integrating a dog trainer and six to ten dogs trained to detect poisoned baits and carcasses, conducted 303 field inspections from 2011 to 2014, detecting 126 baits and

**Fig. 4.** A dog from the canine team finds a poisoned red fox.


**Fig. 5.** Tagging of a griffon vulture as part of the biomonitoring program.

205 carcasses (Fig. 4). These where collected by the official authorities and samples sent for laboratory analysis to confirm the presence of poison.

A total of 246 scavenger birds and raptors, species that are particularly sensitive to poison due to their feeding behaviour, were tagged with radio and GPS-GSM transmitters (Fig. 5).

## 4. Results

### 4.1. Implementing the use of LGDs

Five LGDs (two males and three females), four Trasmontano Mastiffs and one Estrela Mountain Dog, were donated in 2013-2014 to 4 livestock breeders in Castelo Branco and Idanha-a-Nova Municipalities

**Table 2.** Number of damage events to livestock and number of reports of stray dogs on farms of livestock breeders that received LGDs from the Project.

| Municipality | Dog Breed | Sex | No. and breed of livestock | Damage to livestock* | | Presence of feral/stray dogs | |
|---|---|---|---|---|---|---|---|
| | | | | Before dog | After dog | Before dog | After dog |
| Idanha-a-Nova | Estrela Mountain Dog | F | 148 Merino da Beira Baixa sheep | 37 | 1 | 17 | 2 |
| Idanha-a-Nova | Transmontano Mastiff | M | 62 Merino da Beira Baixa sheep | 11 | 0 | 9 | 0 |
| Idanha-a-Nova | Transmontano Mastiff | F | 21 Angus cows | 3 | 0 | 4 | 1 |
| Idanha-a-Nova | Transmontano Mastiff | F | 23 Mirandesa cows | 5 | 0 | 11 | 4 |
| Castelo Branco | Transmontano Mastiff | M | 87 Merino da Beira Baixa sheep | 21 | 2 | 28 | 0 |
| | | | **Total** | **77** | **3** | **69** | **7** |

* Including damage caused by feral dogs, red foxes and Egyptian mongooses.

(Table 2). Two male Transmontano Mastiffs from different litters were donated to the same sheep farmer but placed with different flocks. Dogs were placed in sheep flocks and cattle herds, extensively grazed year-round in medium to large sized farms, averaging 30 ha. In some cases farmers already had a LGD which was not well bonded to the livestock. The beneficiaries signed agreements to join the Project and the livestock breeders' network.

LGD pups were descendants from working stock, placed with new livestock at 2-3 months of age (9 to 11 weeks) and always kept with it to allow the establishment of a strong social bond to foster their success when adults (Fig. 6). Donated pups were microchiped, vaccinated and dewormed.

### 4.2. Assessing damage and poisoning cases

Results suggest that the presence of LGDs was very effective at reducing depredation, with an observed average reduction in reported damage events of 96.1% when comparing numbers before and immediately after dogs were deployed (Table 2). LGDs had a very rapid effect in reducing damage, since even juvenile dogs reduced, and in some cases eliminated,

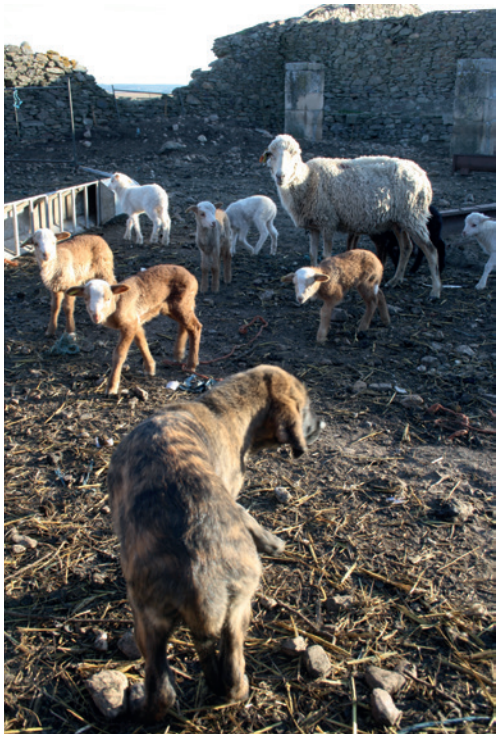

**Fig. 6.** Delivery of an Estrela Mountain Dog pup to a farmer in Idanha-a-Nova and its first contact with the new flock.

damage caused by mesopredators such as Egyptian mongooses and red foxes. They could even prevent attacks by raptors, since during the project seven livestock breeders belonging to the network mentioned damage caused by golden eagles and vultures (griffon and black), mainly to newborn lambs.

The presence of feral/stray dogs (based on livestock breeders' reported sightings) was also reduced at almost 90% of farms after LGDs were placed. The capture of feral/stray dogs at the farms of breeders belonging to the network also contributed to this result[2]. In fact the number of sightings of feral/stray dogs by livestock breeders of the network was reduced from a yearly average of 46.5 before the Project (372 sightings from 2003 to 2010, inclusively) to an average of 1.75 during the project (7 sightings from 2011 to 2014, inclusively).

During the Project, 28 poisoning cases were detected in the study area, but only one was directly motivated by predator control to reduce damage to livestock and thus linked to livestock breeders, and none was registered on farms of livestock breeders belonging to the network. The number of cases significantly decreased as the Project developed, with most of the poisoning cases recorded in the first years, while in 2014, the last year, only one case was detected in the study area.

### 4.3. Farmers' satisfaction

Farmers were satisfied with their dogs but also with the fact that the Project had contributed to control the problem of poison baits, also used by hunters, which had resulted in the death of many of their farm dogs. Additionally, they stated that, apart from the LGDs donated, the feral/stray animal trapping actions implemented by the Project made a significant contribution to reducing damage to livestock. LGDs played an important role in the direct protection of livestock, but also in detecting and confirming the presence of feral dogs, after which traps were placed on the farm to catch them. This was accomplished by close coordination between the Project staff, network members and authorities, enabling a more efficient control of feral dogs present on member farms, thus helping to solve problems of livestock breeders caused by feral dogs.

The legal and technical support provided to individual farmers and also to farmer associations also extended to bureaucratic issues, namely involving the support provided to enable farmers' access to environment/agriculture subsidies. This helped to build trust which is fundamental to implement such actions and tackle such a secretive practice as illegal poisoning. With this objective, one German Shepherd Dog was also donated for household protection to a shepherd whose guard dog had been poisoned by hunters.

## 5. Conclusions

The results confirm the success of the strategy implemented that considered a social-based approach and focused on concrete needs and expectations of the stakeholders, effectively reducing the usual motives behind the illegal use of poison, namely by livestock breeders, i.e. illegal predator control aimed at reducing damage to livestock.

The reduction of predation-related problems was achieved via technical advice and through the implementation of damage prevention measures, namely LGDs, which have proven to be very effective against medium-sized predators, but also against feral/stray dogs when two or more LGDs were used, as well as the presence of vultures, and the consequent reduction in the illegal use of poison motivated by damage control. Breeders considered LGDs to be one of the most effective tools to prevent predation and consequently to reduce the use of poison by livestock breeders.

To our knowledge, this is the first time LGDs have been used as a damage prevention tool in the scope of a wider strategy to fight the illegal use of poison, in the scope of conservation efforts directed mostly at endangered raptors and not at large carnivores, as is usually the case worldwide. Nevertheless, the benefits for lager carnivores, namely the lynx or wolf, are evident since they enable the reduction in illegal use of poison, foster a network of livestock breeders involved in the appropriate use of LGDs and promote their use by disseminating puppies descended from working LGD breeding lines. This project has also provided a good opportunity to introduce the use of LGDs in important areas for large carnivores in advance of their expected return.

Also, one of the most innovative actions, a partnership of networks committed to fighting the illegal

[2] These dogs were delivered to the authorities and sent to the local dog shelter, where the veterinarian confirmed if the owners could be identified (e.g. registered microchip), in which case they were contacted to retrieve them and to account for any damage done by the dogs. If the owner was not identified the dogs were kept in the shelter pending adoption.

use of poison, as well as all technical support provided to members, contributed to fostering trust between stakeholders and Project staff which is crucial for success of the actions and the future of the networking process. This was confirmed by the increasing social involvement in the fight against illegal poisoning, with several cases being reported to Project staff within the pilot areas, and with members of the networks presenting themselves as witnesses in legal cases. The networks rely on personal and trust-based relationships and for this reason continuous and close collaboration with the members, and the delivery of solutions to the main problems faced, are essential to reach the proposed goals. Public dissemination of Project results and recognition of the effectiveness of measures encouraged other stakeholders to join the networks.

This LIFE Project provided an extraordinary opportunity to test the effectiveness of a new approach and new tools aimed at the eradication of illegal use of poison, which allow autonomy for the different groups involved in the control of poisoned baits, but the deep social character of this subject made clear that it is vital to continue to build on the work initiated.

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