The Use of Livestock Guarding Dogs in Portugal

by
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Introduction

Conflicts with wolves that result from depredation on livestock are not new and different strategies have been used to deal with them. Historically people aimed to reduce conflicts by exterminating the predator. In Portugal, human persecution led to Iberian wolf, *Canis lupus signatus,* extinction in 80% of the country, particularly since the 1970s (Petrucci-Fonseca 1990). Alternatively and simultaneously to wolf persecution, original and effective non-lethal methods of livestock protection have also been developed. These methods reflect an ancient knowledge that resulted from a long coexistence between wolves and livestock. The most widespread is the presence of a shepherd accompanied by livestock guarding dogs (LGDs). Nevertheless, in Portugal the use of good LGDs and the knowledge on how to raise them is being lost and non-efficient dogs, namely small-medium sized hunting or mongrel dogs and dogs not raised in a correct manner are generally used. Since the wolf became protected in 1988, the inefficient protection of most livestock has led to increased depredation and conflicts.

Fig. 1: Juvenile female *Cão de Castro Laboreiro* alert to the presence of strangers near the flock on a mountain pasture. (Photo: Raquel Simões)

Predation on livestock

Due to the scarcity of wild ungulates, wolf diet is based on livestock leading to considerable damages. On a national level, annual damages to livestock reach a total of 1,000-1,500 goats or sheep and 250-300 cattle or horses (data supplied by the Institute for Nature Conservation – ICN). Confirmed wolf damages are compensated by the ICN according to the current market value. Compensation has presently reached a total annual amount of 600,000 € (729,000 U$) (ICN). Wolves prey on the domestic species available. This availability depends not only on the abundance of the species but also on the ease of capture by the predator. In wolf range there are around 347,000 sheep, 123,000 goats, 131,000 cattle and 28,800 horses. Roe deer, *Capreolus capreolus,* densities are low to moderate and red deer, *Cervus elaphus*, is only locally common in the North-eastern part of the country. Despite being very abundant the wild boar, *Sus scrofa*, is a difficult prey for the wolf. In *Alvão* Natural Park and adjacent mountains (North), the wolf diet is essentially based on goat (70%) and wild boar (14%) (Carreira & Petrucci-Fonseca 2000). However, in the most Northern mountains in *Peneda-Gerês* National Park, where cattle and horses are free-grazed, wolves prey mainly on goats (37%), horses (27%), especially young, and cattle (19%) (Álvares et al. 2000). In the Centre of the country wolves feed mainly on cattle (33%) and goats (23%), and to a lesser extent on horses/ donkeys (9%), sheep (7%) and wild boar (7%) (Quaresma 2002). Outside the wolf distribution range, stray dogs are also responsible for damages on livestock (Ribeiro & Petrucci-Fonseca 1998). In these areas, the use of livestock protection measures has decreased since wolf disappearance and attacks by dogs usually result in multiple killing or maiming of livestock.

Implementation of the LGD project

To help reduce this constant conflict Grupo Lobo has developed an

action plan that aims to recover the use of LGDs and evaluate its use as an efficient livestock protection method to contribute to wolf conservation. At the same time it also aims to contribute to the conservation of the Portuguese breeds of LGDs, some of them also endangered, like the *Cão de Castro Laboreiro* (Figure 1) or the short-haired variety of the *Cão da Serra da Estrela* (Figure 2).

Although initially defined in 1988 this action plan only began in 1996. Since then a series of consecutive funds enabled the continuation and expansion of the project. Besides its experimental basis, the project also promoted a series of studies on LGD behaviour, genetics and morphology. These studies have been performed by several undergraduate, master and doctoral students. Behaviour studies have been developed to increase the knowledge about LGD behavioural development and the process of socialization that are the basis for efficient LGD. Besides considerations about the origin and relationship between breeds, inbreeding analysis and biometric studies are also very useful for breed management and conservation. Other methods of livestock protection are also being tested and implemented as well as the gathering of information on methods traditionally used.

Fig. 2: Adult female *Cão da Serra da Estrela* of the short-hair variety integrated into a sheep flock on the plains in the Northeast of Portugal. (Photo: Silvia Ribeiro)

The project operates in 4 phases. The first consists in the selection of livestock producers (based on the number of damages, the existence of conditions to receive a dog and the willingness to participate, which is evaluated during a personal interview) and of the litters and dogs available (based on the characteristics and working ability of the parents and on the behaviour/health/morphology of the pups).

In the second phase the pup is integrated into the flock and in the third phase dog's behavioural and physical development is monitored until it reaches adulthood (18-24 months of age). During monthly visits the dogs are physically examined and their behaviour is evaluated. This evaluation is based on observations of the dog during the grazing period of the flock or while with the livestock in the barns and complemented with inquiries to the livestock producer.

In the last phase the evaluation of the dog's efficiency is performed. This is done according to three criteria: 1) reduction in damages; 2) behaviour of the dog; and 3) satisfaction of the owner. The behaviour is evaluated according to the model proposed for LGDs by Coppinger & Coppinger (1980) that defines three components: 1) attentiveness; 2) trustworthiness; 3) protectiveness. Attentiveness is evaluated according to the methodology defined by Coppinger et al. (1983).

Veterinary care and food are provided until the dog reaches adulthood. To guarantee the correct education and welfare of the dog, and consequently its efficiency, an agreement is signed with the livestock producers establishing the rules to be followed regarding dog ownership, education, health care, feeding, breeding and legal responsibility. Dogs that died were replaced, if their death did not result from a fault of the livestock producer. To improve the knowledge of livestock producers about LGD breeds, education and behaviour, a leaflet was produced and given to participating and other interested livestock producers. A second leaflet was also produced concerning basic veterinary care, feeding and breeding of LGD as well as general legal aspects regarding dog ownership.

Project intervention area

The project is being developed mainly in the mountainous areas of the North and Centre of Portugal, including the Districts of *Vila Real*, *Viseu* and *Guarda*. In these regions livestock production has a big economic importance, human density is low and distributed through small villages. Geography is very diverse and can change from plateaus to steep valleys with altitudes that can reach 1,400 meters. Due

Fig. 3: Juvenile male *Cão da Serra da Estrela* of the short-hair variety near the corral where its flock is confined during the night.
(Photo: Raquel Simões)

to the frequent fires, vegetation cover consists mainly of bushes that can sometimes attain considerable heights (Figure 1). Pine, *Pinus sp.*, eucalyptus, *Eucalyptus sp.,* or oak, *Quercus sp.,* woods are still found. Precipitation is medium to high, occasionally with snow, and temperatures are low in winter. Goats are the most common livestock species. Previous studies found a density of 2.6 wolves/100 km² in the North (Carreira & Petrucci-Fonseca 2000) and of 3.4 wolves/100 km² in the Centre of the country (Alexandre et al. 2000).

Some dogs have also been introduced in flocks in the eastern parts of the Centre and North of the country, in the Districts of *Castelo Branco* and *Bragança*, respectively. These are less mountainous regions located outside or at the border of the wolf distribution area. In these areas the climate is drier and warmer and sheep are more abundant. Plantations of olive, *Olea europaea,* and cork trees, *Quercus suber,* and occasionally eucalyptus are common (Figure 2). Stray dogs are present although their abundance can vary considerably between years and time of the year.

Husbandry systems

Livestock production focuses mainly on meat and occasionally also on milk production. Flocks can vary from 10 to 700 animals - although bigger communal flocks can occur, with a mean number of 180, and are typically herded by one, and occasionally, two shepherds. In mountainous areas flocks are guarded during the day and confined during the night in stables located close to villages. Although some flocks of sheep can be kept unguarded in fenced pastures, this is rare and is usually only for some hours of the day. In the flatter and warmer regions flocks are usually confined into light and mobile corrals for the night, during the summer, protected by dogs (Figure 3). Scaring devices like plastic bags or old clothes are occasionally hung close to the corral. Flocks are accompanied by an average of 2-3 dogs, although this number can range from 0-10 dogs, depending on the size of the flock. These dogs are usually small mongrel/hunting dogs or dogs raised incorrectly that are not effective. The reasons why small dogs are used are not known, but it may be related with the wolf decrease and the cross-breeding of the existing LGDs with smaller hunting dogs and their consequent and progressive replacement with smaller and hunting type or mongrel dogs.

Livestock mortality

Prophylactic veterinary care for livestock is not very common and mortality due to disease can be very high, especially among young animals. During 2004, according to the data gathered through an inquiry to participating livestock producers, in 22 flocks an average of 54 animals died per flock, ranging from 2 to 260 animals, mainly due to diseases. This corresponds to a mortality rate of 15%, 88% of which were young animals. An overall juvenile mortality rate of 28% was registered, reaching 63% of the yearly kid or lamb production in some flocks and an economic loss of 13,750 €. Wolf damages are comparatively low and correspond to an average of 26% of the overall livestock mortality. In flocks with high mortality wolf damages can be as low as 8% of the total mortality.

LGDs

Since 1997 a total of 97 dogs, 48 males and 49 females have been integrated into 63 flocks. These dogs are mainly from the *Cão de Castro Laboreiro* (n = 44) and the short-haired variety of *Cão da Serra da Estrela* breeds (n = 32), although 11 belong to the

Fig. 4: Fig. 4. Adult female *Rafeiro* do *Alentejo* integrated into a sheep flock on the Eastern plains in the Centre of Portugal. (Photo: Silvia Ribeiro)

long-haired variety of the *Cão da Serra da Estrela* and 10 to the *Rafeiro do Alentejo* breeds (Figure 4). The dogs were selected from litters after weaning and were mainly integrated into the flocks at the age of 7-13 weeks, although 27 were integrated at an older age, at 14-25 weeks of age. Most of the older puppies were descendent from working dogs and were born in the midst of livestock and others were offered by dog breeders (Figure 5).

Pups were integrated into sheep, goat or mixed flocks that range in size from 30-400 animals, with a mean number of 175 animals. After integration, pups were always kept with the livestock. This was also recommended for adult dogs to prevent wandering and other potential problems or accidents (Figure 6). Usually only one dog was integrated per flock although in 9 and 6 flocks, respectively, one or two additional pups were later integrated to increase protection and also to form breeding pairs. This enabled the production of 57 new pups that were integrated into flocks, 38 of which were monitored by the project.

Behaviour and efficiency of LGD

Of all the adult dogs, 92% were evaluated as excellent or good in attentive behaviour, 98% in trustworthy behaviour and 90% in protective behaviour. It is interesting to note that 8 of the 10 dogs that were integrated later into flocks and survived until adulthood, are considered excellent or good. Of those, 5 dogs were descendents from guard/companion dogs and 3 from working dogs and were born among livestock. Of all the dogs that were born among livestock and later integrated, the adults are considered excellent and the juveniles good and exhibiting adequate behaviours. Three dogs were transferred to other flocks due to non-compliance of the livestock producers with the guidelines initially established regarding LGD raising and education. Four adult and juvenile dogs were also transferred due to inadequate behaviours towards livestock (inattentiveness and untrustworthiness) and recovered/improved. One dog was transferred due to excessive aggressiveness toward strange livestock leading to attacks to neighbouring flocks, seriously injuring three animals. Three dogs were excluded, one because of reduced attentiveness to the flock and two because of untrustworthy behaviour. Lack of protection was only registered in the case of attacks by stray dogs. This situation happened in two flocks and can be explained by the fact that LGDs became habituated to the presence of familiar stray dogs, since they were previously observed chasing dogs from the flock. Regular monthly monitoring of 19 dogs during the grazing period after they were integrated into the flock revealed that before 6 months of age pups exhibit an unstable behaviour. Before that age interactions with livestock (e.g. investigatory behaviours) are frequent, especially play behaviour that steadily increases until 6 months and then abruptly decreases. After 5-6 months of age pups progressively increased their distance from shepherds and reduce their distance to the flock (staying most of the time at less than 5 meters). Pups exhibit a progressive independence from the shepherds and an increased orientation towards the flock. Agonistic behaviour has only been observed from livestock to dogs, except for adult dogs that protected their food from livestock and the above mentioned dogs that exhibited untrustworthy behaviour.

Data on the efficiency and behaviour of 40 dogs was also gathered during personal interviews with livestock producers. The effect on damage was analysed by comparing yearly livestock losses to predation before and after the dogs' integration. According to the obtained data, after the integration of the dogs damages decreased in 75% of the cases, did not change in 7.5% while 17.5% of the livestock produc-

Fig. 5: Litter of *Cão de* Castro *Laboreiro* that was born in the stable among a goat flock. (Photo: Silvia Ribeiro)

Fig. 6: Adult male *Cão da Serra da Estrela* of the short-hair variety confined in the stable with its flock. (Photo: Silvia Ribeiro)

ers said they increased or did not know. Dogs were always considered responsible for the observed damage reduction that ranged from 13-100%. Interestingly, in some cases where the amount of damage did not change or even increased, dogs were also considered responsible for reducing potential damages (taking into account the depredation in neighbouring flocks). In fact, annual predation rate is dependent on many factors that influence predator density and availability of prey and can change significantly from one year to the next (Ribeiro & Petrucci-Fonseca 2004). The mean number of animals killed before and after the dogs' integration was 8 and 5, respectively. In terms of performance 90% of the adult dogs were classified by livestock producers as being excellent or good, only 3 were considered sufficient and none was considered bad. Regarding the behavioural components, livestock producers evaluated 80% of the dogs as excellent-good in attentiveness, as well as 98% in trustworthiness and 92% in protectiveness.

Nearly 23% of the pups injured young animals in the flock and one killed a kid goat during play behaviour. After they have grown up no other incidents have been recorded and dogs are left together with lambing goats/ewes without causing problems. During pursuit of strange animals most dogs did not go farther than 500 meters from the flock and returned within 5-30 minutes, although some could go away for longer periods and distances.

On 10 occasions dogs were observed to face wolves that attacked the flocks, but only one dog was slightly injured on the shoulder. Most dogs barked at (83%) and barked/pursued (65%) dogs that approached the flock, while 43% attacked and 23% wounded other dogs. Most dogs were not considered to be aggressive towards strange people that approached the flock. They usually barked at (90%) and approached/followed (23%) the stranger until he went away from the flock. Only two females and one male were considered to be more aggressive: two tried to attack a person that entered the stable where the dog was with the livestock and the other tried to attack a person that passed through the flock. In both cases no injuries resulted. Regarding strange domestic animals that approach the flock (cattle and other flocks) 73% of the dogs barked and 48% also pursued them away from the flock. Encounters with other livestock were less frequent for the remaining dogs. One dog attacked and seriously injured three animals from other flocks (see above). Nearly 83% of the dogs were observed chasing wildlife (mainly foxes, *Vulpes vulpes*, but also rabbits, *Oryctolagus cuniculus,* and wild boar) but only on three occasions were foxes or rabbits killed. Contrary to chasing foxes, that usually lasted for 15-20 minutes (but could be longer), chases to rabbits did not last long and did not result in active hunting behaviour, but were elicited when a rabbit suddenly ran past a dog.

Mortality of LGDs

During the last 7.5 years a total of 25 dogs died, corresponding to a mortality rate of 26%. This rate is higher before the age of 24 months, with 68% of all deaths occurring during this period. After two years of age, mortality was reduced to 0.7 dogs per year. No significant differences were found between male and female mortality. The main causes of mortality (including also dogs that disappeared or were ex-

cluded because of disease) were disease (44%) (e.g. leishamniosis, leptospirosis, hip dysplasia) and accidents (56%). Two dogs (1 adult and 1 pup) were killed by wolves and 5 (4 adults and 1 pup) disappeared while accompanying the flock. Four dogs died after eating illegal poisoned baits (meant for predators) and one was shot by hunters (unintentionally).

Costs of using LGDs

The price of a LGD pup can vary widely, from 250 € to 500 €, depending on the parents and the breed. These costs include first vaccinations, microchips and registry in the Portuguese Kennel Club. An estimate of the annual maintenance expenses (including medium quality food, vaccinations and parasite treatment) can vary from 170 € to 300 €, if an estimate of the expenses with occasional veterinary care is also included. Expenses in the first year are mainly due to the dogs' acquisition and in the following years to feeding expenses. To be cost-effective, in the first two years after being integrated a LGD must cause a reduction in the damages of at least 600 €. In practical terms, it means the dog should prevent the killing of 5-9 (depending on the expenditure value considered) adult animals of the flock in its first year of life and of 2-4 in the following years, considering the mean current market value of adult goat/sheep. In the studied flocks where predation rate was medium to high, the use of LGD was very profitable and the amount saved in damages could reach 3,000 €. This was not true in those cases where predation was low (less than 5 animals per year) or no reduction in the number of damages was observed. In many cases the expenses with the dogs were paid off after two years. When predation is an episodic event the constant presence of a LGD can be compensatory, because livestock producers can have significant damages in only 1 or 2 attacks for a period of several years. We should also consider the fact that most livestock producers spend little money on dog food (using less expensive food or leftovers), thus greatly reducing maintenance expenses. Another important aspect to take into account in this analysis is the high mortality rate of LGD in the first two years of life. This will reduce their economic efficiency, since it means acquiring and raising another pup. Providing pups at reduced (or no) cost and supporting part (or all) of the occasional veterinary expenses with the dogs are important to reduce the costs associated with the use of LGDs, thus making them cost effective even when predation rates are low.

Problems and recommendations

The lack of compliance of livestock producers with the guidelines for LGD integration and education was the major cause for inattentive behaviour. This stresses the need for monitoring the social conditions where LGDs are raised. On the other hand reduced socialization with people made it difficult to catch and examine the dogs when necessary. This was more common in some litters and with pups that were integrated later. Untrustworthy behaviour of pups, due to excessive play, occasionally caused serious injuries or the death of very young animals, so special attention should be taken during the first lambing season. These situations should be promptly solved by reprehending the dog immediately after it happens or, in more serious cases, by separating it from the animals that elicit the behaviour until the dog "grows out of it". Nevertheless, in most cases livestock producers were very tolerant to these situations since they would be compensated by the future benefits in using the dog. In some cases LGDs can attack hunting dogs that approach the flock or chase vehicles. These behaviours should be prevented and controlled by the shepherd during the dog's development to avoid reinforcing them. Cases of inappropriate behaviour can sometimes be corrected or improved by changing the dog to a different environment (flock). Monitoring the social environment in which the dog is raised is crucial for developing its potential effectiveness. This should be done during the socialization period but it is also important to control the raising conditions until the dog reaches maturity. Another problem is the fact that males often stray when females (from villages or other flocks) are in heat, thus leaving the flock unprotected. To avoid potential accidents males should be restrained during a couple of weeks. The initial selection of the livestock producers to participate in the project also proved to be very important. Selecting the most motivated livestock producers (and not necessarily those with higher damages) made it easier to successfully raise efficient LGDs. This greatly contributed to overcome the initial distrust regarding the use of LGDs from the project and increased the willingness of other livestock producers to start using them after recognizing the working abilities of the dogs that were integrated.

Impacts of the project

One important impact has been the increased tolerance towards the wolf. The support given by the pro-

ject in what concerns LGDs and the payment of damages are referred by some livestock producers as the main causes that prevent the use of illegal lethal methods to reduce predation. Another impact was the overall increase in concern by livestock producers regarding the welfare of the dogs integrated in the project. There was also a higher regard for these dogs in comparison to others, due to their performance and contribution to flock protection. One factor that contributed to the acceptance of the project and the acknowledgment of the importance of using good LGDs has been the reputation achieved by some of the dogs integrated in the project. One of the most important means of diffusion of the use of LGDs has been the transfer of information between livestock producers. This is evident in the more than 40 requests for dogs by new livestock producers, in the last few years.

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