LIFE CONNECT CARPATHIANS

Enhancing landscape connectivity for brown bear and wolf through a regional network of NATURA 2000 sites in Romania

A HUMAN-WILDLIFE CONFLICT MITIGATION TOOLKIT

Compiled as part of the:
EU LIFE+ project, Enhancing Landscape Connectivity for Brown Bear and Wolf through a Regional Network of NATURA 2000 Sites in Romania, LIFE Connect Carpathians LIFE12 NAT/UK/001068

Gareth Goldthorpe: March, 2017

A RESOURCE PACK FOR ADDRESSING HUMAN-WILDLIFE CONFLICT IN THE ROMANIAN CARPATHIANS

Credit Lizzie Duthie/FFI

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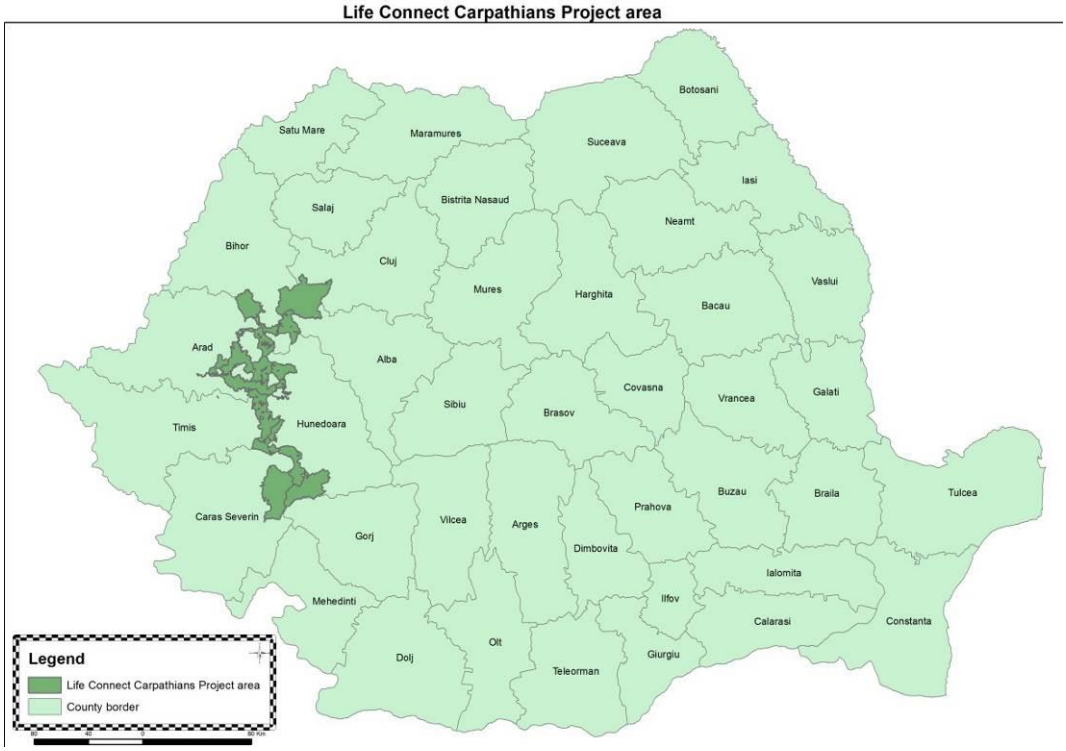
FAUNA & FLORA INTERNATIONAL

How to use this manual

Background

The EU LIFE+ NATURE project, "Enhancing landscape connectivity for bear and wolf through a regional network of NATURA 2000 sites in Romania, LIFE Connect Carpathians LIFE12 NAT/UK/001068", addresses threats to connectivity within a landscape corridor that is critically important for the conservation of priority species, the European bear and wolf. Passing through a network of 17 Natura 2000 sites, the Zarand landscape corridor (Map 1) is increasingly fragmented and there remains only one key route through which bears, wolves and other wildlife can move between the Western and Southern Carpathians.



Map 1: EU LIFE+ NATURE project site within Romania

The Romanian Carpathian Mountains are an important biodiversity reservoir providing habitat for bears, wolves and Eurasian lynx and supports their dispersal across Central and Western Europe and, in project terms, can be divided into three key areas. These are Core zones, where populations of large carnivores persist; Recolonization zones, where conditions favour the return of large carnivores; and Corridor zones, where the movement of large carnivores can be facilitated. However, the region is undergoing rapid economic transition; land-use change towards more intensive agricultural and forestry practices and infrastructure developments are fragmenting the landscape, reducing ecosystem connectivity and biodiversity values. There is only one narrow habitat corridor suitable for ensuring connectivity, the Zarand Landscape Corridor, and efforts need to focus on: ensuring the functionality of the corridor and effectiveness of the Natura 2000 network; securing habitats critical to the maintenance of connectivity; addressing human-wildlife conflict and negative attitudes towards large carnivores and Natura 2000 sites, and; ensuring that the

planning and management of forestry, hunting and other land/resource uses are sympathetic to the conservation management of priority species. Ensuring this process is the main goal of the project and is being addressed in several key ways, including the securing and restoration of critical habitat and landscape features, addressing direct threats such as human-wildlife conflict and poaching, the development of species action plans and building the awareness and advocacy of the local population and other stakeholders for the conservation of the bear and wolf and Natura 2000 sites in the corridor.

This manual is designed to form the basis for the mitigation of human-wildlife conflict in the project area and is based on the findings of a preliminary investigation carried out in 2015-16, the key objectives of which were to:

- gain an overall understanding of human-carnivore conflict (HCC) in the project area
- gather baseline data from which project/mitigation impact can be measured
- begin forming positive relations with farmers

This was achieved through the implementation of a semi-structured interview survey of relevant interest groups in the area, including: Livestock owners/managers, shepherds/herders, crop farmers, bee-keepers and orchard owners.

Through this survey, we sought to answer the following questions:

- What is the nature of the livestock farming industry in the project area?
- What is the extent and intensity of the conflict with wild animals?
- What is the actual impact of the conflict and is it bearable?
- What livestock management/animal husbandry techniques are currently used by the shepherds to mitigate conflict?

A summary of the findings can be found in the first section of this manual but refer to the subsequent report for full details[1].

This manual is meant, primarily, as a tool for the project team to address HWC but contains stand-alone sections that can be disseminated to local authorities and to livestock and crop owners.

In this way, **Section 1** (*A resource pack for addressing human-wildlife conflict in the Romanian Carpathians*) is aimed at those within the local and regional authorities and provides general information on human-wildlife conflict, describes the project's findings and how, with direct relation to the situation in the project area, the issue should be addressed.

Section 2 (A Practical Guide to protecting your livestock and crops from wild animals) has been developed for distribution amongst the rural population, those directly affected by HWC, and provides advice on specific ways in which they can protect their property from the three species primarily involved (wolves, bears and wild boar) as well as providing information on the project's response team and how to claim compensation in the event of damage caused by wildlife.

[1] An Assessment of Human-Wildlife Conflict within the Zarand Landscape, carried out as part of the EU LIFE+ project, Enhancing Landscape Connectivity for Brown Bear and Wolf through a Regional Network of NATURA 2000 Sites in Romania, LIFE Connect Carpathians LIFE12 NAT/UK/001068

Section 3 (*Improving the efficacy of Livestock Guarding Dogs*) is mainly for the use of the project but can be disseminated to any interested parties. It describes a series of trials and monitoring programmes, used elsewhere, to improve the efficacy of the regions' main method for protecting livestock, Livestock Guarding Dogs. These trials and studies are all relatively low-cost and require the minimal of training for those taking part.

Section 4 (*Best Practices for Raising and Maintaining Effective Livestock Guarding Dogs*) is for general distribution to the livestock farming community and contains invaluable information on what makes a good LGD, how to select the right pups for the job and how to properly raise them as effective guarding dogs.

The modular nature of this manual also means it can be relatively easily updated and is, therefore, a living document that requires regular review in the context of the project, and beyond. It also means that upgrading this from a project-focused document to a more regional or even national document will be possible. Supplementary materials (such as leaflets and trial designs can be developed directly from the text (examples of which are provided in the appendices).

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SECTION 1: GUIDELINES & RECOMMENDATIONS ON HOW TO ADDRESS HUMAN-WILDLIFE CONFLICT IN THE CARPATHIANS

GUIDELINES & RECOMMENDATIONS ON HOW TO ADDRESS HUMAN-WILDLIFE CONFLICT IN THE CARPATHIANS

Gareth Goldthorpe: April 2016

FAUNA & FLORA INTERNATIONAL

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INTRODUCTION

WHAT IS HUMAN-WILDLIFE CONFLICT

As human populations around the world grow our demands on land and resources intensify. Often this means a loss of available habitat for wildlife and a decrease in the availability of resources (food, water, shelter, even access to mates can become an issue). In other-words, the interface between man and wildlife is becoming increasingly apparent and conflict is inevitable. In its simplest form, this can manifest itself through wildlife using crops and livestock to fill the gap in their own, natural resources. In its most extreme form, it can result in the injury or death of humans and wildlife.

In recent years, human-wildlife conflict (HWC) has become increasingly recognised as an important conservation issue. It refers to any situation where the economic, primarily agricultural, interests of human communities are threatened by the actual or perceived actions of wildlife. It is primarily associated with agricultural practises and includes both livestock and crop farming. It presents itself in a wide-array of countries and settings around the world and involves a plethora of wildlife species. Human-carnivore conflict (HCC) deals with a specific kind of HWC involving livestock and large carnivores.

WHY IS IT IMPORTANT?

An important reason for its relatively recent recognition as a conservation issue is an increase in its occurrence. As the global community increases in size and extent, the demand for food and other resource also grows. The traditional solution to meeting this increased demand is to increase production and the traditional way to increase production is to increase the bulk of crops grown, or the number of livestock bred. This approach, obviously, requires more land to be turned over to agriculture and, because we live within a finite space, less land available for wildlife.

On the other hand, as environmental and wildlife protection laws become more prevalent and more effective, the numbers of animals are increasing and their ranges expanding (or, more accurately, returning to their previous state). This can be seen most dramatically in Western Europe where many species of large carnivores, their numbers reduced to almost nothing in the 19th and 20th centuries, are now benefiting from increased protection efforts over the past 30 years or so and are returning to areas of the continent where they have been absent for many decades.

Unfortunately, in many cases, the result is conflict between man and beast for space and resources. So, apart from underpinning a primary conservation issue, the loss of natural habitat, HWC is a conservation issue because one of its consequences is the indirect loss of respect for biodiversity amongst human communities and a direct loss of individual animals (or breeding units) through retaliatory killing and, quite often, prescribed management culls.

The purpose of this document is threefold; it attempts to:

- put the local HWC issue into the broader, international context
- provide guidance for the management of the Carpathian Large Carnivore Project and advice to relevant authorities on how to address human-carnivore conflict

- give those experiencing HWC some practical guidance on how they can better protect their livestock and/or crops from wildlife

SUMMARY OF BASELINE SURVEY FINDINGS

As part of the EU LIFE+ NATURE project, "Enhancing landscape connectivity for bear and wolf through a regional network of NATURA 2000 sites in Romania, LIFE Connect Carpathians LIFE12 NAT/UK/001068", a study of human-wildlife conflict in the project was carried out in 2015. The key objectives of the study were to:

- gain an overall understanding of HWC in the project area
- gather baseline data from which project/mitigation impact can be measured
- begin forming positive relations with farmers

This was achieved through the implementation of a semi-structured interview survey of relevant interest groups in the area, including: Livestock owners/managers, shepherds/herders, crop farmers, bee-keepers and orchard owners. As significant overlap between these groups was predicted, a single data sheet incorporating all forms of agriculture was prepared.

AGRICULTURE IN THE PROJECT AREA

The primary source of income in the study area is agriculture and almost all involved have both livestock and crops. Most livestock owners follow a transhumance regime with winter pastures at their home-village. Pastures tend to be small, around 55ha, and crops more so, usually around 3ha. There is equal division between those that own and lease their land.

Sheep (with goats) are the most abundant livestock though many also keep a small number of cattle and pigs. Important products include meat, milk and cheese and nearly everyone also grows hay, potatoes and corn, whilst many also own fruit trees, particularly plum or apple. Most sell some of their produce and almost half sell their products from home but both prices and demand are considered low.

The main problem experienced by more than half of the households surveyed is wild animals followed, distantly, by disease.

HUMAN-WILDLIFE CONFLICT IN THE PROJECT AREA

Attacks on livestock, mostly sheep, tend to be carried out by wolves, mostly in the summer pastures, and typically result in the (annual) loss of around 1.8% of stock. Wolves are as likely to attack at the fold in the early hours of the night as they are at the pastures in the late afternoon with the latter typically occurring within 500m of a forest. Wild boars are mainly responsible for attacks on crops, targeting hay and corn, and almost exclusively at night.

Both people and dogs are almost always present during HWC events and they typically respond by shouting/barking and chasing; rarely does this result in contact with the animal.

There seems to be some correlation between the number of active farms in the summer pastures and the number of reported attacks by wild animals. Most households feel that problems with wild animals are getting more common.

CURRENT LEVELS OF PROTECTION

Nearly all households use at least four methods for protecting their stock/crop. The most common combination is *livestock guarding dogs, guarding the flock at night, avoiding risky areas at pastures and (non-electric) fencing*. The general feeling is that these methods are effective. Only five households use only one preventative method and three of these experience above average levels of attacks by wild boar. These individuals may benefit from intervention by the project.

Households have an average of seven dogs and most of these are mixed breed. Most think their dogs are good and, generally, they are either traded from other shepherds or bred at the farm. There seems to still be a good level of knowledge on the best way to raise livestock guarding dogs with most owners citing the importance of raising the dogs as part of the flock and feeding them well.

Most farmers do not report HWC, primarily because they do not know who to report it to or because there was little or no damage.

KNOWLEDGE, ATTITUDES & PERCEPTIONS TOWARDS WILD ANIMALS

Around the same time as the HCC baseline survey, a "Knowledge, Attitudes & Perceptions" (KAP) survey was also carried out in the project area. During the survey 602 households, across 47 local communities, were asked to fill in a questionnaire consisting of 39 questions grouped into five subject areas:

- Knowledge about animals, including large carnivores;
- Attitudes toward animals, including large carnivores;
- Sources of information about animals, including large carnivores;
- "Direct" experience with animals;
- Socio-demographic aspects.

Whilst the sampling overlap between the two surveys was only partial (of the three sites covered in the HWC baseline survey, only two are represented in the KAP survey and, of these, one (of six) village from Site 2 (the Drocea Codru Moma corridor) and nine (of 19) from Site 3 (Apuseni-Bihor) are also included in the KAP survey), this does allow us to make some educated assumptions on how the farmers taking part in the HCC baseline survey feel about the need to coexist with wildlife.

Generally, people are aware that large carnivores live in their area and their knowledge about them seems relatively good, though more than half expressed interest learning more. Potential ways of raising awareness amongst the rural population favoured television and radio, forestry workers and hunters.

Bears and wolves are perceived equally negatively, wild boar less so and bears are feared slightly more than wolves. However, wild boars are perceived more often as negatively impacting household economies by damaging crops but guarding against them (for example, by night watches) is costly and demanding. Whilst not as frequently voiced, there are similar concerns about bears damaging orchards and wolves killing livestock.

Ultimately, there seems to be a general willingness to accept damage by wildlife if sufficient compensation for damage is provided. Without easy access to such payments, the favoured

response to HWC is removal of the animals either, in the case of the bear, by translocation or, in the case of both wolves and wild boar, through lethal control.

SITUATION ANALYSIS WITH RECOMMENDATIONS

Generally, then, it appears that farmers in the project area make reasonable efforts to protect their livestock and crops from wild animals and that the rural population is willing to tolerate a degree of damage if compensation is available. Currently, compensation is available but is rarely used because the process in unclear and, often, results in no actual payment. There are indications that this may be a deliberate ploy, at the municipal level, to avoid making payments. Given the general lack of state funds given-over to agricultural compensation and the current political climate in the country, it is highly unlikely that thus compensation scheme can be relied upon to mitigate the negative impacts, felt by the rural community, of living in proximity to large mammals.

Recommendation: explore the potential for developing private or community based insurance schemes (see below); work with shepherd groups and government to improve compensation system

Livestock guarding dogs (LGDs) are ubiquitous in the area and, as in many countries in the region, are a key resource in protecting livestock from predators. Whilst there does seem to be a general recognition of the need to socialise the dogs with the stock at an early age, the continued loss of livestock to wolves may indicate that this initial period of "training" is not being carried out as systematically as it should be.

Key behaviours for effective LGDs are attentiveness, trustworthiness and protectiveness and while the latter two can be difficult to measure, the first is open to scrutiny. One option for this includes the use of GPS collars on both flocks and LGDs to provide spatial data that can be directly related to the attentiveness of dogs (and may also provide evidence as to whether some dogs are killing wildlife to supplement bad diets). Such telemetry studies can, of course, be resource intensive and so an alternative approach is to carry out direct observations of a sample of dogs to build profiles of typical behaviours expressed. Protocols for this approach can be found in the accompanying manual; *Improving the Effectiveness of Livestock Guarding Dogs*.

Recommendation: design and implement appropriate methodologies for assessing the level of expression of suitable behaviours amongst the current population of LGDs

If a tendency for ineffective or unruly LGDs is found, improving the attentiveness of grown dogs can be problematic, requiring patience and consistency in its approach (some techniques which may be helpful are described in the manual accompanying this document (see above). An alternative approach that can be implemented by a third party is a "LGD puppy distribution programme" involving selected farms that have been trained in proper socialisation techniques and have committed to properly maintaining the dogs. A plan for such a programme is available.

Recommendation: trial the use of carefully sourced dogs with well-trained and committed livestock owners/shepherds

The more dogs guarding a flock the better, particularly when wolves are the problem as they have a natural tendency to avoid "other packs". However, there is an upper limit to the

number of dogs any household should take on and this is defined by the number it can adequately care for. In addition, some producers, in North America, have found that packs of more than five dogs become more interested in socialising with each other than in guarding livestock. Ultimately, an 'optimal' number of 'well-trained' guarding dogs, from proven bloodlines, adapted to flock size and attentive to livestock, is preferred over a large, uncontrolled number of dogs.

Furthermore, livestock guarding dogs present a contentious issue, with factions of both the hunting and conservation communities citing concerns over the use of such dogs. One common concern over such dogs (which are typically large and aggressive animals) that is expressed by both hunters and conservationists, is that they are disruptive to wildlife; this can be a result of dogs that are not attentive to their flock or that are not properly cared for (i.e. fed). Recent improvements in the relevant legislation, however, have made clear moves to favour the needs of livestock farmers, laying down clear guidelines on the number and type of dogs that are permitted in lowland, hill and mountain environments. Permitted numbers of dogs are tied to the size of the flock to be protected and seem to be in-line with optimal numbers defined elsewhere. This new legislation now needs to be well-communicated to the relevant stakeholders and, taken together with the above recommendations) used as an opportunity to improve the current stock of LGDs.

Recommendation: formulate the relevant legislation in a meaningful way and disseminate to the rural community & trial novel guardian animals (such as donkeys) or different breeds of dogs

In addition to LGDs, fencing around crops and corrals are widely used and must provide some protection to crops and livestock. However, it is notable that electric fencing is very rarely applied. In the right circumstances, electric fencing can be a very efficient way to protect stock and crops. In the context of the project area, while summer pastures tend to be relatively small, they are still large enough to preclude day-time fencing. However, the night-time corals could be vastly improved through the addition of basic electric fencing.

Perhaps of more relevance, however, would be the use of electric fencing in protecting crops from wild boar and orchards and apiaries from bears.

Recommendation: trial the use of electric fencing at farms that suffer excessive damage from wild boar and/or bears

There is currently no systematic collection of HWC data and no support to farmers for protecting their crops and/or livestock. This is a basic requirement for moving towards the coexistence of humans with wildlife, particularly large carnivores. Monitoring the trends in HWC, both in areas where mitigation methods are being trialled and where such trials are absent, is vital for understanding how the conflict responds to interventions as well as for building a better knowledge-base of the phenomenon at both local (i.e. project sites) and national (i.e. extrapolation of several project sites) scale. The goal of such monitoring is to develop national –level policies for the mitigation of HWC.

Recommendation: establish a HWC Response Team (see below)

Whilst there is a relatively high standard of general knowledge about wildlife, negative attitudes towards large carnivores is still prevalent. People have expressed an interest in learning more about the environment and additional, focused awareness may help to

increase the tolerance of the public towards carnivores. Perhaps predictably, television and radio have been identified as the favoured mediums for learning.

Recommendation: design a public awareness raising programme around television and radio

HWC RESPONSE TEAM: MONITORING, SUPPORT AND EXPERIMENTATION

Our understanding of HWC in the project area is only just beginning and to be able to manage it, it is important to continue collecting data in a systematic monitoring programme. Analysis of event data using, for example, GIS-based approaches, can identify chronically affected farms and clustering of HWC as well as elucidating factors apparently predisposing farms or localities to predation. This allows mitigation efforts to be planned and targeted effectively while also providing recommendations for livestock herders to avoid high-risk areas. In the shorter-term, monitoring will also be required to evaluate the effectiveness of mitigation trials.

A tried and tested way to achieve this monitoring is with the formation of the HCC Response Team (HWC-RT). This team represents the point at which both the project and local authorities interact with those experiencing HWC at first hand. As such, the HWC-RT has several roles to play, primary among which are:

1. Monitoring HWC in the target area by collecting data on specific conflict events
2. Providing support to complainants by advising them on methods for protecting their flock
3. Carrying out research into ways that protection methods can be improved as well as the feasibility of potential new methods
4. Promoting conservation and wildlife protection wherever possible

Ultimately, the goal of the HWC-RT is to increase the tolerance of livestock owners towards large carnivores specifically and the concept of biodiversity conservation generally.

NATIONAL LEVEL APPROACHES

HWC COMPENSATION SCHEMES AND PRIVATE INSURANCE

Schemes that are designed to compensate farmers for damage to their property by wild animals can be effective at reducing anger amongst farming communities and, therefore, the persecution of wildlife. An important part of such a compensation scheme is the external verification of each claim, or kill. Unfortunately, this is usually the most difficult part of the process as spoor can disappear quickly in the field and, even where signs persist, identifying species can be difficult with anything less than DNA analysis.

Beyond the difficulties of simply verifying a depredation event, there are several fundamental issues with schemes designed for compensating livestock or crops lost to wild animals. For example, large carnivores tend to roam over large areas that inevitably encompass a range of land tenure arrangements and resource ownership rights and this can often lead to complex payment allocations and distribution.

Even where all these issues can be accounted for, there is still a risk of problem leakage (where the conflict is simply transferred from one place to another) and moral hazard (where farmers reduce their effort to protect livestock to get depredation compensation).

Moral hazard is particularly important as it discourages farmers from actively protecting their livestock. It can be countered by attaching some criteria, such as implementing protection measures, to compensation but then this, of course, requires support and monitoring by a third party.

An alternative to purely state or NGO funded compensation is private insurance. This is less prone to problems as it covers all causes of livestock loss and so reduces the temptation for livestock owners to wrongly attribute deaths to predators (though fraudulent claims can still be a problem). However, there are problems here too, particularly as their commercial nature and the need for participants to pay a premium for cover can result in low levels of local buy-in.

Often, the rural communities most affected by HWC and, therefore, in most need of support, are too poor to pay into such a scheme. The inability of commercial insurance schemes to differentiate between high and low risk clients leads to the implementation of averaged policies which are inaccessible to the poorest, low risk individuals.

For this reason, the first thing to be done when considering insurance as a tool for mitigating HCC is to determine the “Willingness to Pay” within the target group. In the end, for private insurance to be a viable option it may be necessary to develop a sustainable mechanism for subsidising the cost of premiums.

Unfortunately, reliable measures of the success of compensation or insurance schemes have not yet been developed. When they are, they should include baseline surveys of both the attitudes and perceptions of local communities as well as of ecological and density assessments of key wildlife populations. A third useful variable would be the number of individuals killed through retribution killing, however this is often very hard to gauge as it often involves communities violating wildlife protection laws.

Whether we are talking about compensation schemes or insurance policies a quick turnaround on payments is important if participants are to feel truly compensated for their loss and, of course, the funds and distribution mechanisms must be sustained over long periods of time.

Ultimately, badly implemented compensation schemes can result in frustration and disappointment amongst the communities they were set-up to help and this will, of course, result in bad feelings towards conservation. Ironically, even when a compensation scheme is properly implemented and works well the subsequent financial gains bestowed upon the participants can have negative conservation impacts as farmers increase their stock or where community members previously dissuaded form keeping livestock suddenly see this as a financially attractive industry.

Ultimately, compensation can increase tolerance whilst failing to reduce conflict and, where not implemented correctly, can increase the frustration felt by those communities it is meant to help.

LETHAL CONTROL, TRANSLOCATION AND HAZING

Not all individuals in carnivore populations are equally involved in conflicts and a small number of "problem individuals" can be responsible for much of the damage being caused. The removal of individual livestock-killing predators or wolf packs can therefore be an effective way to reduce or stop predation if done very selectively and as soon as possible after an incident. Lethal control may play an important role in avoiding the spread of livestock depredation through some carnivore populations. However, it can be very difficult to achieve and the effects may be short-lived as new animals move into vacated territories.

In general, wolf populations can withstand human-caused mortality of up to 35% per year and there is evidence of both wolf and wild boar reproductive rates increasing in response to heavy hunting pressure. This provides considerable leeway for permitting lethal control without posing a threat to conservation objective whilst also demonstrating that lethal control of population numbers has little long-term benefit.

Over-emphasis of a link between hunting and tackling HCC should, however, be avoided, as it can lead to a situation in which not only livestock owners and hunters but also the public come to view lethal control as the default position. While manipulating population density through hunter harvest might form part of a multifaceted carnivore management strategy (but see above) and may set the background to render other, more selective interventions feasible, many studies have concluded that there is no clear, consistent link between carnivore numbers and levels of damage and/or conflict *per se*, probably because more important roles are played by other factors. These include: deficiencies in husbandry such as a lack of human attendance, guard animals or other preventive measures and improper disposal of livestock carcasses; landscape features; proximity of forest cover or shrub cover in calving/lambing pastures; relative availability of natural food sources; some aspects of carnivore behavioural ecology such as extreme food selection and surplus killing; as well as social and political perspectives. Furthermore, whilst lethal control can have some benefit in appeasing rural communities, the costs involved and the general lack of efficacy at addressing specific HWC issues, lethal control is a more expensive option than many of the non-lethal alternatives.

Translocation of problem animals (or packs) is another approach but, due to several factors which frequently lead to failure, as well as the expense and difficulty of the procedure, the capture, translocation and re-release of persistent livestock killers, it is not generally considered to be an effective strategy for addressing HWC involving relatively abundant species (such as wild boar and wolves).

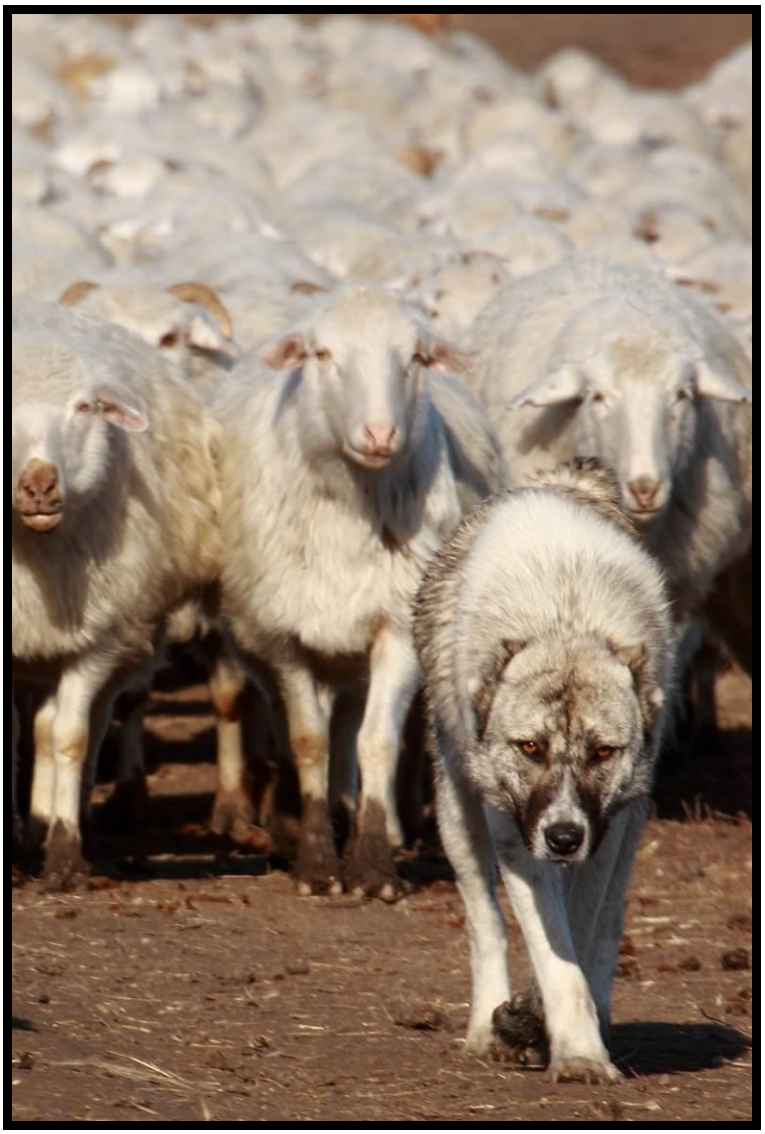
All efforts must be made to minimise the chances of capturing a non-offending animal. Initial removal attempts should be made at the site of a reported depredation event. If this is not possible, care should be taken to identify the problem animal. This may be accomplished through examination of kills, camera trapping and possibly tracking from the site of depredation events. Removal of problem animals should be carried out by qualified staff or with the oversight of officials.

Before attempting to live-capture an animal, the options for its disposition should be clear. This will determine which removal technique might be employed. Options include translocation and re-release, euthanasia or placement in an appropriate (e.g. EAZA accredited) captive facility. Sale to private individuals, commercial interests or to private or

non-accredited zoos or other captive facilities is not recommended and is, anyway, not permitted under Romanian law.

SECTION2: A PRACTICAL GUIDE TO PROTECTING YOUR LIVESTOCK AND CROPS FROM WILD ANIMALS

A PRACTICAL GUIDE TO PROTECTING YOUR LIVESTOCK AND CROPS FROM WILD ANIMALS



Gareth Goldthorpe: April 2016

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INTRODUCTION

As demand for land and resources increases, wildlife habitat is lost, and conflict between people and wildlife, through crop raiding and livestock predation, is the unfortunate result. Human-wildlife conflict is a problem for rural communities everywhere: in Africa lions, leopards and cheetahs readily take livestock whilst the elephant in Asia raids crops and damages property. In Europe, east and west, both the wolf and wild boar are historically viewed as problem animals.

What is often forgotten, however, is that in most cases wild animals switch to domestic animals and crops for food when their habitats become degraded and natural prey scarce. Both, of course, are as a direct result of our actions. What is needed is a way for humans and wildlife to co-exist.

The LIFE Connect Carpathians Project (LCC) is trying to find that solution in the Carpathian Mountains and in 2015 we carried out a survey to determine the nature of HWC here. Some of the key findings include:

- Attacks on sheep tend to be carried out by wolves in the summer pastures
- This happens either at night, at the fold, or in the late afternoon at the pastures
- Attacks at the pastures typically occur within 500m of the forest.
- Wild boars are mainly responsible for damaging crops
- They favour hay and corn, and always come at night
- The more protection methods used, the less likely that livestock and crops will be taken
- Compensation is available but most peoples do not report HWC because they do not know who to report it to

Based on these findings, LCC are helping to reduce the number of livestock lost whilst increasing tolerance towards the animals that occur naturally in this landscape. We are working to find ways to do this that, as much as possible, avoid the need to lethally control the wildlife as this is only a short-term solution. Where animals, or even populations, are removed, animals from neighbouring areas will simply move in to replace them. Indeed, with some species, such as wild boar, it has been shown that extensive culling programmes can trigger increased breeding in the population resulting in higher numbers in an area than before culling was carried out. Besides, as is becoming increasingly clear, large mammals generally and large carnivores in particular, have an important role to play and to attempt to get rid of them completely merely weakens the environment in which we live.

As we work to understand the nature of your wildlife issues, we will refine and develop the approaches for addressing them so that we can ensure that HWC can be mitigated in ways that are most practical for you.

Part of the solution is to set up a team of people dedicated to investigating any HWC event that is reported to them. This team represents the point at which we (the project), the local authorities and you, can interact and, as such, the team several roles to play:

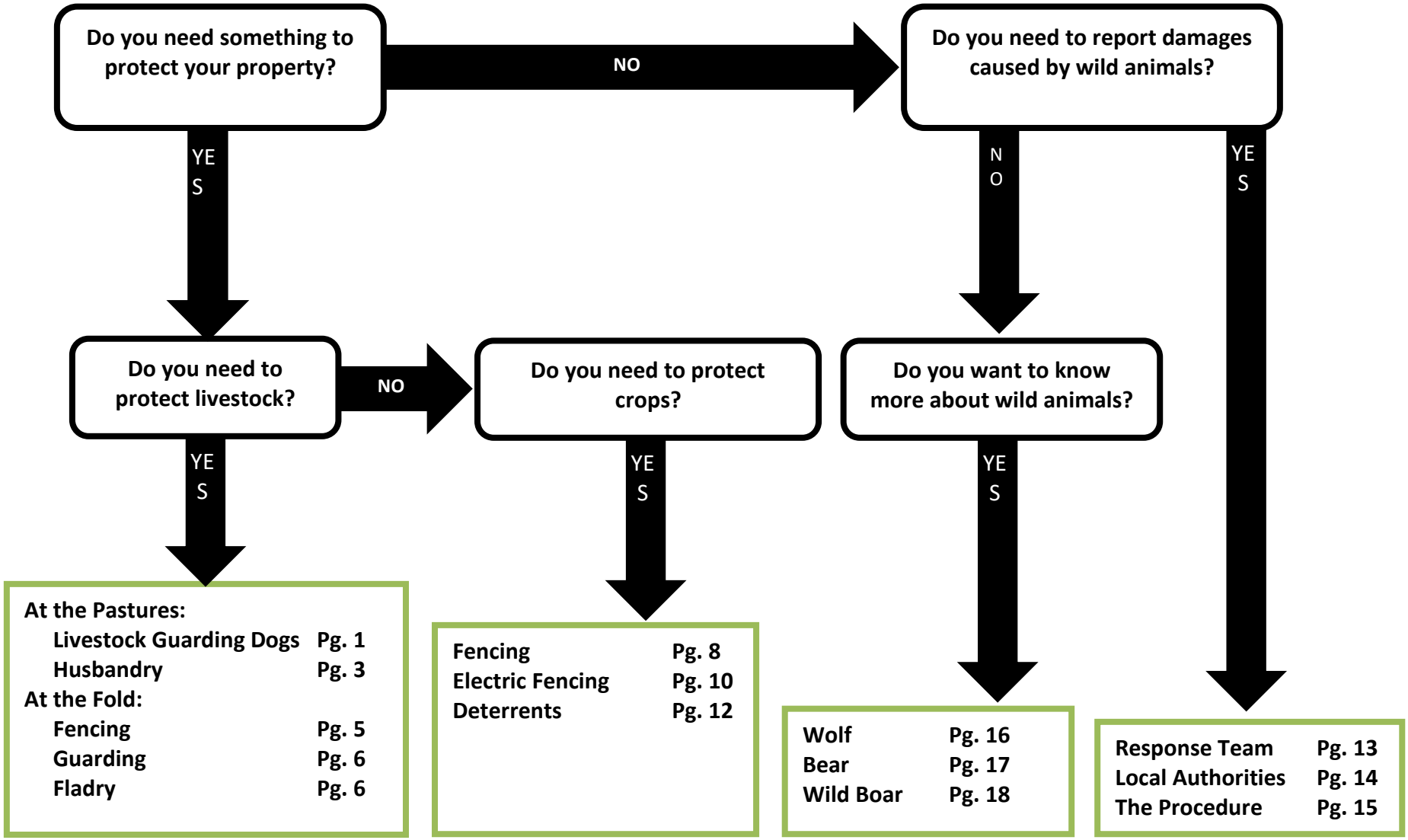
1. Monitoring HWC in the target area by collecting data on specific conflict events
2. Providing support to complainants by advising them on methods for protecting crops and livestock

3. Carrying out research into ways that current protection methods can be improved and new methods established
4. Promoting conservation and wildlife protection

This guide is designed to act as a first point of information and support to you and provides some basic and practical ways in which you can enhance the ways in which you protect your property from wildlife. Use the chart on the next page to identify how the guide can help your issue.

If you want further information about any of the methods mentioned here, or you are interested in being involved in any trails carried out by the project, then please contact LIFE Connect Carpathians at office@connectcarpathians.ro, Tel 0254.262.355., or contact person Radu POPA – 0786.256.431; radu.popa@zarand.org.

DECISION-MAKING TOOL



PROTECTING LIVESTOCK: AT THE PASTURES

LIVESTOCK GUARDING DOGS

The use of livestock guarding dogs (LGDs) has proven to be one of the best methods to limit losses of livestock to a variety of predators in many different situations worldwide. Livestock guarding dogs require both instincts (genetics) and learned behaviour, so achieving good LGDs is a combination of choosing the right pups and raising them in the correct way. Pups which do not have the right genes will not succeed regardless of how they are raised, but also dogs not reared properly cannot be retrained later. To make a good livestock guardian, a dog must be trustworthy, attentive and protective:

Trustworthy - it must become part of the flock without disturbing/harming it
Attentive - it must stay with the flock as much as possible, day & night
Protective - it should bark at novel objects, advancing & showing dominance

Raising and training

The main elements to raising good livestock guarding dogs that are trustworthy and attentive are:

- choosing the right type of dog
- socialising it with livestock them and
- correcting unwanted behaviour

Protectiveness will take care of itself as this is an instinctive behaviour that does not need to be taught, but some dogs are more protective than others.

To ensure that a LGD stays with the flock as much as possible, it should become part of the flock from an early age. Domestic dogs have a so-called 'critical period', between about 4 and 14 weeks of age, during which they can form strong social bonds not only with other dogs but also with other species, including livestock. This process is facilitated by LGDs having only weakly developed predatory instincts, which helps livestock accept the dogs among them.

This means that you should raise pups in the corrals with your livestock starting from the beginning of that critical period when they are four or five weeks old. Promptly scold the pups if they stray from the corral and return them there. Handling the pups should be kept to a minimum and they must not be treated as pets. In other words, it should not seek human attention but; on the other hand, they must be trained to come when called (so it can be readily handled for health checks etc.). It is also very important to provide the pups with sufficient nutrition if they are to grow to be strong and effective guardians. When old enough, the pups should accompany the livestock to the pastures but they must be constantly monitored to avoid any negative behaviour, such as biting or chasing the stock, from developing. Any dogs that persist in such behaviour should be removed.

Solving common problems

In a long-term study of more than 1,000 dogs of various Old World breeds and crossbreeds used on livestock farms in over 30 different states of the USA, it was

found that 65–75% of dogs turn out to be good or excellent. Nevertheless, there are a variety of problems that can occur during the process of raising and training. Some of the commonest concerns are described below, with suggestions on how to alleviate them.

Inattentive - During hot and humid weather dogs may leave to seek shade or water; regularly brushing, or even shearing, dogs, giving plenty of water, can reduce this. Make sure that you provide LGDs with their basic needs, including sufficient food.

Neutering may decrease roaming. Neutered dogs also tend to eat less food and remain healthier while remaining effective guardians.

Escaping & chasing can be impeded by attaching a weight (30x35cm and up to a quarter of the weight of the dog) to the dog's collar using a chain of a metre or more in length.

Seriously inattentive dogs tend to be those treated as pets or allowed to develop social relations with pet dogs.

Untrustworthy - Most pups and young dogs will attempt to play with livestock (chasing, biting, mounting and wool-pulling) and this can result in injury or even death. Such behaviour can usually be corrected with patient training, but, if stalking-type behaviour is observed, the dog should be replaced.

Whenever a dog is seen harassing stock it should be reprimanded immediately. Chasing can be reduced by lowering the dog's calorie intake, such as with a two-week diet of cooked oats.

If the problem persists, a 'dangle stick' attached to a chain on the dog's collar and hanging 8–10 cm above the ground should slow it down. Another measure would be to put a basket muzzle on the dog to stop it biting.

Not protective enough - Be patient in allowing a young dog sufficient time to develop the confidence to confront large predators.

Having the company of other dogs tends to give LGDs more courage. One dog per 100 sheep is often given as a rule of thumb.

Some dogs might not be aggressive towards predators but are very vigilant and so can still be useful in barking to alert other LGDs.

Most protectiveness problems are associated with poor attentiveness.

Aggressive to humans - As a precautionary measure you should put up warning signs at the boundary and entrance to your property to alert people to the presence of LGDs. LGDs are likely to react more negatively to strangers when the owner is not present.

Intact males can become more aggressive as they mature and bitches when they are in heat or lactating.

Those which remain excessively aggressive after neutering, even without provocation, should be replaced unless they can be contained in a secure area and very carefully managed.

In terms of your legal rights in the use of LGDs, recent changes in the law have gone a long way to improving the situation for livestock owners. The number and type of dog you can use now reflects the size of your flock and now, more than ever, is the time to ensure you have the best-suited dogs for your needs.

If you want advice or support for raising effective LGDs from pups there is a detailed guide to the method, as well as advice on how to maintain livestock guarding dogs throughout their life, which you can get from LIFE Connect Carpathians at office@connectcarpathians.ro, Tel 0254.262.355., or contact person Radu POPA – 0786.256.431; radu.popa@zarand.org.

HUSBANDRY AND HUMAN VIGILANCE

The primary goal of increased human vigilance is to reduce livestock-predator interactions and livestock losses. Secondary goals include quickly finding sick, injured or dead livestock; preserving the evidence of a livestock loss to help investigators determine the cause of death or injury; monitoring livestock movement and range conditions; and learning more about livestock-predator interactions.

Traditional animal husbandry practices with documented success at limiting losses to predators include, confinement of livestock at night and during the lambing season and herders attending flocks throughout the day and night. Historically, shepherds who remain with the sheep flock during the day can help reduce predation and the presence of predators near livestock.

Livestock husbandry practices in Romania rely on daytime shepherding, but it is maybe that more vigilance is required to minimise predation of sheep by wolves, particularly in the afternoon and at dusk when flocks are in the pasture. In general, livestock losses to wolves often occur when the shepherd is unaware that there is a wolf pack nearby. Knowing what wolf activity is occurring in the area, for example by increasing human presence and/or vigilance, is essential to better protect the herds.

Increasing human presence allows better monitoring of livestock and wolf activity and may be one of the best ways to deter wolves. Practices vary from place to place, but the principle is that wolves tend to stay away from areas with regular or frequent human presence, and when herders or riders respond quickly to undesirable wolf behaviour, such as approaching or chasing livestock, the wolves are likely to feel threatened and thus avoid contact with shepherds.

Flocking is an instinctive defensive behaviour of ungulates threatened by pack-hunting predators such as wolves, as it is much more difficult and risky for wolves to isolate an animal from a herd than to pursue individual animals dispersed across the landscape. Herding and stewardship methods can play a role in discouraging wolf attacks on livestock, for example by avoiding flocks splitting.

Proper disposal of livestock carcasses can contribute to keeping predators away from herds/flocks. Leaving the carcasses of dead livestock on the pastures can encourage scavenging; carcasses increase the amount of food available to carnivores and may help to artificially raise their density. Moreover, carnivores that feed on carcasses will learn that livestock is a source of food and that potential prey is in the area.

Proactive measures cannot always be implemented quickly or effectively enough to prevent livestock losses. In such cases, and usually as a last resort, moving livestock to an alternative grazing site can be the best solution. This may only have to be done temporarily, for instance, to avoid conflicts with wolves that have young pups to feed or to avoid having vulnerable young livestock near wolves.

Key Points

- Increase flock vigilance during daytime, particularly in the afternoon and at dusk, when the flocks are in the pasture, and during the lambing season.
- Avoid grazing livestock in areas that are particularly prone to attacks by wolves; most wolf attacks at the summer pastures occur within 500m of the forest edge. Avoid having your flock stay this close to the forest will reduce their vulnerability to attack. If grazing must be carried out here, try to do so in the middle of the day, when wolves are less active or ensure your dog's stay between the flock and the forest edge. Alternatively, you could try setting up temporary fladry lines between the flock and the forest (see page 7)
- Herders can boost their effectiveness by working with livestock guarding dogs that can alert them to the presence of wolves and other predators and assist in deterring or repelling attacks.
- A simple way of improving current husbandry is not to divide flocks at the time they are most vulnerable. Do not leave small groups of sheep without dogs, always use night corrals, use other deterrents in the pastures.
- Similarly, you can decrease the vulnerability of smaller flocks by grazing sheep with those of your neighbours; this may also increase the number of dogs and shepherds available to watch over the flocks.
- Wolves are expected to stay away from areas with regular or frequent human presence. Herders can patrol pastures at dusk, when wolves tend to be most active, checking for signs of unusual agitation in the livestock, howling and other signs that wolves are present such as tracks, scat and hair snagged in fences.
- An additional benefit of increased human vigilance is the early detection of kills; minimise wolf presence in pastures by removing and properly disposing of carcasses. Burying them is insufficient: they would be found and dug up.

PROTECTING LIVESTOCK: AT THE FOLD

Confinement is one of the simplest, most effective ways to reduce predation by wild canids. Keeping sheep in corrals significantly reduces losses and the practice of **lambing in sheds** protects young livestock when they are most vulnerable to predation. The method is not very convenient for large, open-range operations, but in general fences are particularly successful at night and represent a cost-effective mitigation tool for protecting livestock from predators at local scales.

FENCING

Permeant fencing can be very effective for protecting livestock from predators, particularly for smaller flocks that are regularly kept in one place; for example, overnight at the fold in summer pastures. However, it is vital that such structures are of optimal design and well maintained as if a predator does get in, the fact that the stock are confined will increase the risk of more animals being injured or killed.

Electric fencing

Probably the most effective type of fencing uses a combination of five or six alternating electrified (hot) and non-electrified (ground) wires strained upon wooden posts. To offer an effective barrier, the fence should be at least 1m high with the bottom wire no more than 15cm from the ground (to prevent the animals from going under the fence).

The main components of an electric fence are:

The energiser produces a pulsed electric current which is directed along the fence wires. They are usually powered by a battery which needs to be regularly recharged from, for example, a wind generator or solar panel with a non-switching voltage regulator (to prevent overcharging). Specialised batteries are recommended because standard tractor or car batteries are not able to withstand the fluctuating charge.

An earth/grounding rod assembly is an essential requirement to return the electrical pulse of energy to the energiser. It consists of one or more copper covered or galvanised steel rods driven into the ground and firmly clamped to the return wire of the energiser. Very dry soils are poor conductors of electricity and a tensioned line wire placed on or just above the ground along the fence-line and earthed with a metal peg every 50 m will assist in the conducting process.

Fence supports (posts) may be made of wood, metal, plastic or fibreglass. Some commercial forms have built-in fixed or adjustable insulators. Wooden stakes with strong insulators are needed where tensioned HT wires are used.

Insulators are a fundamental component, ensuring the pulsed current is not lost to earth but maintained to provide a high voltage shock (recommended at 4 kV or above) to any animal touching the fence.

For predator exclusion, **conducting wires** should be of single or multi-strand steel wire. Wires should be tensioned by strainers appropriate to the line wire material and all electrical connections should use the correct joining clamps.

A fence tester is essential during maintenance to show whether the fence is providing sufficient voltage.

The hot/ground system (where insulated wire and clamps are used to jump and connect wires, respectively) mentioned above works best as this overcomes poor soil conditions or grounding issues by providing a return for the current through the additional grounded wires. The animal must touch both the hot and the ground wire to receive the shock so spacing between the wires is important; in general, no more than 30-40 cm apart.

As the need for protection at the fold is seasonal, it may be sufficient to use a temporary electric fence which can be set-up easily at the beginning of the summer and removed at the end and stored at your house over the winter. The only difference between these and ore permanent fencing is the type of posts used and the depth at which they are set into the ground.

GUARDING

Nigh time protection of corralled livestock can be improved by having one or two people actively guarding the fold.

FLADRY

A simple and inexpensive method is **'*fladry*'**: a series of red or orange cloth flags hung along a thin rope. For unknown reasons, wolves avoid crossing these lines (at least for a period). The technique was developed to hunt wolves in Eastern Europe and Russia, but it has also been successfully adapted to protect livestock from wolves in Canada, Poland and Slovakia. *Fladry* fences are much less expensive to produce and install than wire or permanent fencing. *Fladry* is also easily moved and can be quickly installed over large areas, even by one person.

Although after a time wolves may overcome their wariness of *fladry*, in Canada they avoided it for up to 60 days, which could be long enough to keep them away from calves and lambs. The added 'bite' of **turbo-*fladry*** – *fladry* on top of electrified line – uses electric shock to enhance the negative experience of wolves that encounter the fence-line. Wolves that attempt to cross, bite or touch turbo-*fladry* experience an electric shock which reduces the likelihood of them losing their fear, thus extending the period that it functions as an effective barrier. Turbo-*fladry* is more expensive than regular *fladry* but can be three or more times as effective and is also highly portable and relatively easy to produce although, like *fladry*, it requires regular maintenance to remain effective.

Key Points

- Lambs should be confined to corrals next to the lambing shed for up to two weeks after birth. In addition to protecting lambs from predation, this can

lead to higher survival rates because sick or orphaned lambs can be identified and cared for.

- To reduce stress on livestock they should be introduced to new barriers gradually.
- Fencing should be moved regularly to keep vegetation from being trampled or overgrazed.
- ***Fladry*** lines should be made from thin but strong string with pieces of coloured material (traditionally red) sewn on at 30–50cm intervals. The pieces should be 40–60cm long and 10cm wide. When using *fladry* to protect livestock, the lines should be strung around the pasture (rather than around the corral or pen), ideally attached to posts hammered into the ground so that the bottom edges of the material are 15–20 cm above the ground and can move in the wind.
- **'Turbo-*fladry*'** is simply *fladry* hung on an electrified fence-line powered by solar-charged batteries.
- **Regular maintenance is essential**, including the replacement of aged, torn or faded material, as a broken, tangled, pinned down or otherwise compromised *fladry* barrier is likely to fail. *Fladry* tends to sag if soaked by heavy rain, flags will wrap around the line when blowing in the wind and livestock may chew or pull on them.
- The Outreach Officer remains involved as a monitor, evaluating the effectiveness depending on the materials used etc. and working with livestock owners and herders to ensure that barriers are adequately maintained.

PROTECTING CROPS

Protecting your crops from wild boar is best done with fencing as, when properly built and well maintained, this presents a physical barrier to the boar. Generally, there are two main types of fencing; standard (usually a woven wire mesh) and electrified. Below are some basic descriptions of both.

STANDARD (NON-ELECTRIC) FENCING

Boar are large, strong, and adept at breaching many standard fencing designs. Fences designed specifically to completely block access by wild boar, must be considerably stronger than normal fencing and have different design features.

The two main parts of a permanent or temporary barrier fence are the support structure and the cladding material. The *support structure* is freestanding and usually consists of wooden posts and tensioned steel line wires. The line wires are usually located at the top and bottom of the netting and there may be additional support wires in between. The *cladding* is secured to the support structure and normally consists of mesh or netting of hexagonal woven mild steel, high tensile woven wire or welded wire. For added protection, it is also wise to allow enough fencing material along the bottom (fill-in) to have it dug into the ground to a depth of around 40 to 60cm as this helps prevent the boar from digging under the fence.

The parts of a typical fence are shown in Figure 1.

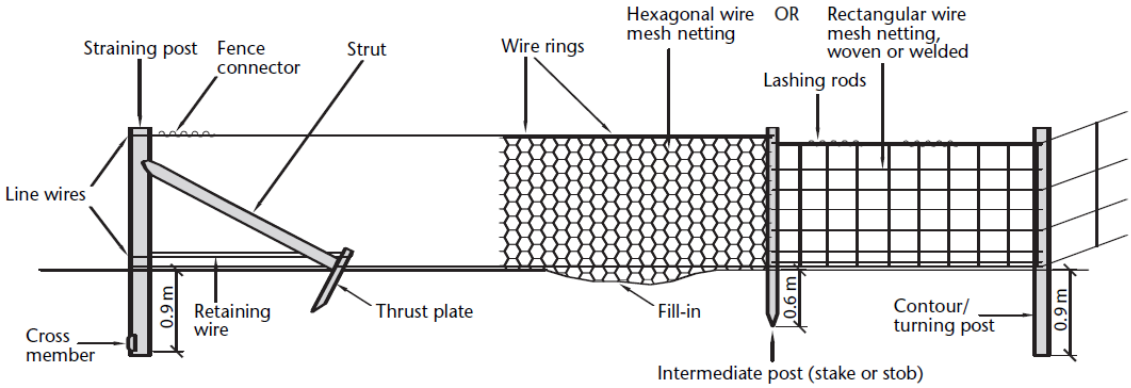
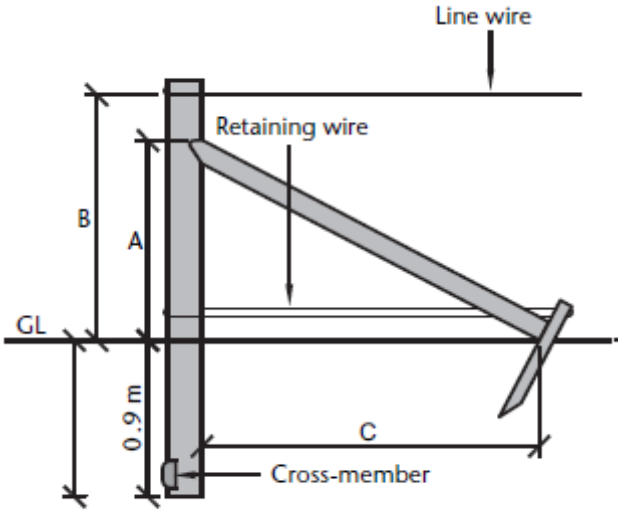


Figure 1: Component parts of a typical barrier fence

Woodwork for the support structures should be round softwood, treated with preservative so that they outlast the metal cladding components of the fence. For wild boar, posts should be around 2 metres long and at least 10cm in diameter, placed at 6m intervals.

End post assemblies are anchors that take and retain the tension put onto the line wires and netting and as a result they are usually referred to as straining posts. The basic design is the strutted end post (Figure 2) which has a cross-member (around 0.5m) underground at the base to increase its holding power and therefore has to be put into a shaped hole that is dug by hand and then rammed firm or set in concrete. A driven strutted straining post must have at least 1.5m below ground.



A Height of notch (0.75 of B)
B Height of top line wire
C Distance from post to base of strut (1.25 x A)

Figure 2: Structure of a basic end post design for maintaining the tension along the fence-line

Metalwork in fences may include mild steel, spring steel and high tensile steel. All metalwork in fences should be protected from corrosion. The **steel support wire** component consists of tensioned line wires or the retaining/stay wire of straining post assemblies. Tensioned line wires are required to support mesh netting between posts as this reduces sagging.

The **cladding material** is normally netting attached to the support structure on the side facing the direction of approach of the target species (usually the outside of the fence). The netting must be sufficiently strong and positioned to prevent the wild boar crossing the fence line by jumping over, pushing through or under or pushing down (see below).

The overall height of the fence should be at least 1.2m (plus 60cm buried at base) and the mesh size should be no more than 200 x 200 mm with locked joints. For added protection, include a line of barbed wire on top.

There are several ways that boar can force their way through existing fencing; here are descriptions of the most common along with some potential methods for preventing them from doing so.

Lifting-up

Boar can lift the base of the mesh [and sometimes stakes] or stretch the netting to create a gap. A 100mm gap under an existing fence may be enough to encourage entry. The addition of a single 'snout wire' using high tensile twin stranded barbed wire joined to the base of the mesh by lashing rods may help prevent this. An additional, lower wire will be needed at ground level if the mesh is as little as 100mm above the ground. If the original posts are at 10m intervals, insert one or

two extra short stakes between them. Angle the new stakes over the bottom mesh wire to prevent lifting.

Treading down

Stock fencing which uses hinge-joint mesh can easily be bent down by boar. Either join a strained high tensile top line wire to the top net wire using lashing rods at 2 metre intervals or, raise the height of the fence with an extra width of narrow stock net.

Jumping over

A 1.5 metre height should be considered the minimum to prevent boar from jumping a fence. If your existing fence in less than this, either raise the height of the fence with an extra width of narrow stock net (with a high-tensile top line wire and lashing rods at 1m intervals) or, if the stakes are sufficiently long, add extra line wires using high tensile or twin stranded barbed wire set above the fence to increase the height. However, deer may become entangled in such a fence. An alternative, then, is to install an electrified offset wire and electrified top wire.

Pushing through

Hexagonal rabbit netting and temporary plastic deer netting are not strong enough to stop boar tearing it or ripping it from the stakes. Mild steel stock net can be deformed to gain entry. Adding one or two [braided or high-tensile] offset electric fence wires may reduce the chances of boar penetrating the fence, however, this may not stop a boar from jumping over. Two lengths of twin stranded HT barbed wire may help prevent boar entering but may not prevent tearing of the net.

ELECTRIC FENCING

Boars and wild pigs are intelligent, strong animals: they can easily batter down an existing fence or press down gates with their snout. If you opt for an electric fence with sufficient voltage, this won't happen again.

The principle of an electric fence is to provide a sufficient short pulsed electric shock (ideally 5–9 kV for less than 1/1000th of a second) along a wire and through the body of any animal touching it. The animal learns to avoid what may be only a very weak physical barrier. They consist of line wires supported by stakes but separated by insulators and are most effective for the protection of small areas, such as sheep folds or small pastures.

Main components

The energiser produces a pulsed electric current which is directed along the fence wires. They are usually powered by a battery which needs to be regularly recharged from, for example, a wind generator or solar panel with a non-switching voltage regulator (to prevent overcharging). Specialised batteries are recommended because standard tractor or car batteries are not able to withstand the fluctuating charge.

An earth/grounding rod assembly is an essential requirement to return the electrical pulse of energy to the energiser. It consists of one or more copper covered

or galvanised steel rods driven into the ground and firmly clamped to the return wire of the energiser. Very dry soils are poor conductors of electricity and a tensioned line wire placed on or just above the ground along the fence-line and earthed with a metal peg every 50 m will assist in the conducting process.

Fence supports may be made of wood, metal, plastic or fibreglass. Some commercial forms have built-in fixed or adjustable insulators. Wooden stakes with strong insulators are needed where tensioned HT wires are used.

Insulators are a fundamental component, ensuring the pulsed current is not lost to earth but maintained to provide a high voltage shock (recommended at 4 kV or above) to any animal touching the fence.

Conducting wires may be of single or multi-strand steel wire or plastic twine, string, rope or tape containing fine stainless steel wires. Wires should be tensioned by strainers appropriate to the line wire material and all electrical connections should use the correct joining clamps.

A fence tester is essential during maintenance to show whether the fence is providing sufficient voltage.

Key points

Adequate tension must be provided to prevent a 'dead short' through energised wires touching the ground or each, which will damage the equipment and render the fence inoperative.

Electric fences must not be installed parallel to or under power lines.

Warning signs should be displayed along the fence-line.

Disconnect the power supply when working on the fence.

Monitoring should ensure the fence remains live and is not allowed to be unpowered for any period.

Key maintenance issues

Regular maintenance and inspection is essential, not only to check the voltage but also the integrity of the fence-line posts. Broken insulators must be replaced and vegetation along and under the fence-line controlled.

Check around the base of end posts for movement as, in some soil types the post may move slightly, leading to a loss of tension on line wire and netting. Check also for straining and intermediate posts that have broken or lifted out of the ground, for example, by a tree falling on the fence.

Replace any staples that have partially or completely pulled out.

Repair holes made by animals, machinery or vandalism by using additional netting clipped over the hole.

Check for damage after heavy snowfall or strong winds, removing any fallen trees or branches.

OTHER DETERRENTS

In much of Europe, and for a variety of reasons, wild boar numbers are increasing and there are three main methods commonly used to reduce damage to crops and livestock: intensive hunting (to keep densities low), supplemental feeding in the forest (to keep the wild boars away from farmland) and fences (to prevent wild boars from entering the fields). Whilst hunting does reduce wild boar damage in the short term, populations recover very quickly and the net benefits, in terms of mitigating agricultural damage, become small. There is also much debate on the effectiveness of supplemental feeding for damage reduction as some studies suggest that it results in higher populations.

Field protection then, is still essential for damage prevention. However, fences require regular surveillance to assure maintenance of both fences and, with electric fences, batteries; this can be costly in terms of time. Additionally, electric fences are expensive to install and the government does not provide financial support.

Cheaper, less time-consuming alternatives are much sought after. Furthermore, as wild boars become nocturnal in areas where they are hunted and, therefore, damage to agricultural land is exclusively caused at night, deterrents designed to work on the animals' senses, such as sight, smell and taste, have been developed. Such commercially available deterrents claim to be effective in protecting crops from wild boar damage.

However, tests carried out on these kinds of repellents have, so far, shown them to be ineffective and, generally, it is not recommended that farmers be encouraged to use any deterrent systems other than electric fences, which have been proven effective in protecting crops.

REPORTING HUMAN-WILDLIFE CONFLICT EVENTS

GENERAL RECORD KEEPING

The most important thing to consider is that the challenges you face with raising livestock or growing crops in this part of the country are appreciated by others. The Carpathian Large Carnivore Project is committed to helping you manage these issues and to help you coexist with wildlife. To do that, however, it is vital that we continue gathering information and data so that we can better understand the issues. This process of learning would be greatly improved if you, the farmer, were able to make records of all encounters with wildlife you have. Basic information for such a report should include:

- date, time and location of the encounter
- details of the person reporting the encounter
- characterization of the encounter (e.g. observation from XX m, approach by wolf, observed scavenging etc.)
- action taken by the person reporting the encounter
- behaviour of the animal(s) before, during and after the encounter (and in response to any action taken)

WHO TO REPORT HWC TO

Human-Wildlife Conflict Response Team

The LIFE Connect Carpathians Project has established a Human-Wildlife Conflict Response Team to help manage the issue. The HWC-RT is there to respond to your reports of conflict events so that they can collect data, provide advice and support and to act as an interface between you and the local authorities.

If your livestock or crops are attacked by wolves, bears or boars, you should ring the HWC-RT as soon as possible (this is particularly important in cases of livestock loss as the team will need to inspect any remains left by the predators); contact Radu POPA at 0786.256.431. Be ready to give as much detail as you can over the phone including your location and the basic details of the event.

As well as offering advice on protecting your property and collecting data, the team can also help you make an official report if your encounter is viable for compensation.

Local Authorities

Under Romanian legislation, game animals are a renewable natural resource and, as such, represent a public good of national and international interest. The institute responsible for the administration and management of game, in Romania, is the Ministry of Waters and Forests (MWF), who are responsible for maintaining the nations natural habitats and preventing damage, caused by game and through hunting, to crops, livestock and forests. To achieve this, MWF licences legal entities to manage a network of hunting-areas, established throughout the country, usually for periods of 10 years at a time.

Who is responsible for paying HWC compensation?

Where wildlife does impact the livelihoods of people (through livestock depredation, property damage or even threat to life; i.e. human-wildlife conflict) Romanian legislation allows the Government to provide monetary compensation. Where the damage involves large carnivores, compensation is provided by the Ministry of Environment; where damage is caused by wild boar, and if both the farmer and the Game Administrator have met their obligations (see below), it is the MWF that fund the compensation. So that both hunters and farmers do not become dependent on this resource, the legislation also identifies their obligations for protecting livestock and crops from such damages happening in the first place.

What are the obligations of crop and livestock owners?

Crop owners:

- Declare and register the areas on which they have crops
- Request in writing that hunting-area managers undertake actions to prevent damages to their crops during periods when these are frequented by wildlife in search of food
- Employ permissible deterrents (fixed or moving, physical or chemical) designed to chase away or prevent game species from accessing their crops.

Livestock owners:

a) Declare and register livestock
b) Ensure livestock is adequately guarded
c) Use only those areas permitted for grazing
d) Shelter livestock overnight in fenced and guarded enclosures
e) Move animals through the forest to grazing and watering sites only on routes established for this purpose and in agreement with any hunting area and/or forestry managers

In addition, hunting-area managers are obliged to:

a) harvest the full quota of animals allocated for the previous hunting season
b) Supply complementary feeding
c) Carry out actions to remove wildlife from exposed areas
d) Request the necessary approvals for the supplementation of hunting quotas for wildlife species that cause damage

e) Prioritise hunting in places where game causes, or poses a potential threat to damage property

What is the procedure for claiming compensation?

If you think you are entitled to compensation for a HWC event, you will need to contact the town, or village hall covering your area. You will need to submit a written account of your claim within 24 hours of discovering the damage. Once this complaint is received by the mayor, he must, within 24 hours, establish a committee that will be responsible for investigating the reported HWC event. The committee will consist of representatives of the mayor's office, the Environmental Ministry in the territory and a local representative of the Ministry of Agriculture and Rural Development (MARD). In addition, a representative of the hunting-area or protected area can be included if deemed appropriate by the mayor. The committee then has 48 hours to assess and report on the damages detailed in your original complaint and will make their recommendation son whether compensation is due and to how much that compensation should be.

KNOW YOUR WILDLIFE

WOLVES

Historically, the wolf has the largest distribution of all carnivores, occupying almost all the worlds' continents. A massive reduction of its range occurred relatively recently and it was still present in all of Europe until the 19th century. After that the wolf was heavily persecuted in Europe so that, by the mid-20th century, only a few small populations existed in isolated pockets of the Mediterranean and in Eastern Europe.

A typical adult wolf weighs around 38kg and stands about 70cm at the shoulder. They are extremely intelligent, adaptable and gregarious animals and can live in isolated monogamous pairs or in packs of up to 20, mostly depending on the type of prey available. They are sexually mature at around two years and the breeding season usually falls between January and April.

Packs are extended family units (usually between 5-12 members, depending on what type of prey is most readily available) consisting of parents, pups, earlier offspring and related animals. The pack is held together by a sophisticated communication system based on vocalisations, facial expressions, body-posture and olfactory clues (howling can be used to communicate between animals up to 8km apart).

Ultimately, the success of the pack depends on the cooperation shown by and to each of its members, as evidenced by the communal way in which they raise their pups. Neighbouring packs actively avoid each other through a system of well-maintained territorial borders (territory ranges form 60-300km^2). However, on the rare occasions when they do meet, there is often a fight that usually results in at least one dead wolf.

They eat a wide range of food, most of which requires killing prey much larger than themselves, such as deer. They contribute to maintaining healthy populations of their natural prey as 60% of prey will be old, young or sick individuals. In addition to large animals, smaller animals, such as rabbits and even mice, can supplement their diet with fish, berries and carrion consumed seasonally.

Wolves play a key role in keeping ecosystems healthy. They help keep deer and boar populations in check, which can benefit many other plant and animal species. The carcasses of their prey also help to redistribute nutrients and provide food for other wildlife species, like bears and scavengers. Scientists are just beginning to fully understand the positive ripple effects that wolves have on ecosystems.

The early relationship between humans and wolves was one based on respect and admiration for the wolf. However, with changes in human lifestyle (from hunter to herder) there was a gradual shift to a more negative view, which saw the wolf as both a natural enemy and a manifestation of evil. In more modern times, this negative view has been somewhat perpetuated through children's stories, films and even advertising.

In the last few decades, however, a growing recognition of the importance of wild areas has allowed people to view the wolf more favourably; as a symbol of wilderness and a totem of the challenge we now face to reduce our own negative impact on the natural world.

After centuries of persecution, that reduced their numbers to only a few thousand, wolves are making a comeback in Europe. They have been steadily re-populating many western-European countries because of a combination of factors, including; newly implemented protection laws in many countries, the positive shift in public attitudes and the movement of people from rural areas and into cities.

BEARS

The brown bear is the most widely distributed of the bears. It once ranged across a large portion of North America, throughout Europe, Asia, the Middle East, and even across North Africa. A long history of prolonged over-exploitation and persecution in Europe, resulted in the elimination of brown bears from many countries and it now occurs mostly in small and isolated patches.

It is one of the largest carnivores alive today; adult males can weigh up to 350kg whilst females tend to grow to around 200kg. In Europe, the brown bear is mostly found in mountain woodlands, preferring areas with dense cover in which they can shelter by day.

Generally, brown bears hibernate and this can last from around October to May, depending on their location and the local climate. In certain southern areas however, hibernation is very short or may not occur at all. To hibernate, bears choose a location such as a burrow, located on a sheltered slope under a large stone or among the roots of a large tree. Dens may be used on repeated occasions over the years.

Breeding season is between May and July with a long gestation period of between six and nine months; births occur from January to March, usually while the female is still in hibernation. She generally has two to three young and breeds again 2 to 4 years later.

Cubs grow quickly, reaching 25kg in the first six months but won't be fully weaned from their mothers' milk until around two years old. They usually remain with the mother until they are three of four. Although they mature sexually between 4-6 years of age, the species continues to grow until 10-11 years old. In the wild, the brown bears can reach 20 to 30 years of age.

Brown bears are omnivorous, and their diet varies with the season; from grass and shoots in the spring to berries and apples in the summer, nuts and plums in autumn. They usually forage in the morning and evening and rest under dense vegetation during the day. During the autumn, as they prepare for hibernation, they may travel hundreds of kilometres to locate food supplies.

Brown bears were once subject to hunting and big game trophies, as well as being sought for their meat and hides. Bear gall bladders bring high prices on the Asian aphrodisiac market, but although demand is growing, there is no evidence that products derived from bear parts have medical value. Other serious threats to bears

are habitat destruction and persecution, problems that affect populations to different extents across their range.

WILD BOAR

The Eurasian wild pig, or wild boar, is one of the most widespread of all mammals, occurring on nearly all continents and on many islands. It is the ancestor of most (but not all) ancient and modern domestic pig breeds and has been favoured by subsistence hunters since the earliest times. Today, it is one of the most important targets for recreational hunting wherever it remains sufficiently abundant.

Over-hunting and changes in land use have resulted in the fragmentation of its range and local extinction in many parts of its range. Nevertheless, the species remains widely distributed and is often locally abundant. Because of its depredations on crops it is regarded as a pest in many countries, where it remains unprotected outside designated wildlife reserves or is managed as a game animal.

The Eurasian wild pig is found in a variety of habitats but, in Europe, it prefers broadleaved forests and especially evergreen oak forests. It is omnivorous, though vegetable matter (mainly fruits, seeds, roots and tubers) makes up about 90% of its diet and they are important seed dispersers.

Adult males weigh in the region of 120 to 150 kg and will stand 70 to 90cm at the shoulder. Males usually have razor sharp tusks that grow progressively from two years of age. Females are about 30% lighter in weight than males, and both sexes have a mane of longer hair running down their backs.

Wild pigs are normally most active in the early morning and late afternoon, though they become nocturnal in disturbed areas (e.g. where hunting occurs), where activity usually commences shortly before sunset and continues throughout the night. In either case, it will spend between four and eight hours foraging or traveling to feeding areas. Feeding is generally a social activity and even solitary males may join feeding groups.

Wild pigs are gregarious, forming herds or 'sounders' of varying size depending on locality and season, but usually of between 6-20 individuals. The basic social unit is one or more females and their last litters but this is often extended to include sub-adults from previous litters, and adult males during the mating season. Breeding tends to be seasonal, occurring in time with the availability of principal food items. In Western Europe, litter size is usually between four and seven piglets.

At a global level, there are no major threats to the species. However, there are many threats at a more local level, principally habitat destruction and hunting pressure, either for food, sport or in reprisal for crop damage, particularly in areas near human habitation. Wild pigs are also susceptible to a variety of highly contagious diseases which can decimate their populations.

Generally, wild boars are highly adaptable and hardy and may thrive under conditions of habitat modification and hunting pressure which devastate other forms of wildlife. In addition, most subspecies are well represented in protected areas in their relatively extensive ranges.

SECTION 3: IMPROVING THE EFFICACY OF LIVESTOCK GUARDING DOGS: METHODOLOGIES FOR ASSESSING THE EFFECTIVENESS OF LGDS

IMPROVING THE EFFICACY OF LIVESTOCK GUARDING DOGS: METHODOLOGIES FOR ASSESSING THE EFFECTIVENESS OF LGDS

Gareth Goldthorpe: February 2017

FAUNA & FLORA INTERNATIONAL

Contents

INTRODUCTION

Included within this manual are guidelines for carrying out three sets of tests on livestock guarding dogs which follow their progress from pups to adult life. The first two tests, Puppy Aptitude Test and a Monitoring Programme assume that puppies have been provided to farms as part of a trial. The third, Determining the Quality of Adult LGDs can be used either to continue monitoring of those trial pups once they have reached 2 years of life or can be used separately from pup trials on adult dogs currently being used by livestock farmers in the project area. This latter approach can be a useful way to assess the overall quality of LGDs within a certain area and to assess whether a community might benefit from the distribution of new pups.

The key objective of these trials is to (re)introduce effective methods for raising livestock guarding dogs (LGDs) into the sheep farming community. A *best practices* manual has also been developed for distribution to participating farmers. The manual contains detailed but understandable guidelines on LGD socialisation and husbandry methods. You should also retain a copy for reference whilst monitoring these trials and any subsequent and similar work.

Participants in the trials should be selected according to the location of their summer pastures (i.e. in relation to any HWC hotspots), the number and quality of their existing dogs and their willingness and ability to take on the responsibility of maintaining up to three pups. Each should be trained in basic socialisation and husbandry techniques and you, the HWCRT, will have been trained in the methods and protocols for monitoring the participating farmers and ensuring their continued commitment to the trial.

The following sections include detailed explanations of and protocols for the various sets of observations and tests required for the trial and provide a template for data collection.

PUPPY APTITUDE TESTING

It will be useful to familiarise yourself with the puppy selection (see the Practical Manual for Keeping Livestock Guarding Dogs) and aptitude methods. Differences among dogs of the same breed can be considerable. Even within the same litter, puppies often differ widely in their aptitudes and personalities. Standardised tests, known as puppy aptitude tests (PAT), evaluate a pup's response to a series of exercises and scenarios, thus providing a means of objectively measuring such differences. This may prove useful in selecting pups for particular situations, including for work as livestock guarding dogs. By building a database of the performance of pups in PAT matched to their subsequent progress and outcomes through their working lives, it might be possible to identify at an early age which pups are likely to make the best LGDs. PAT scores can change as a pup grows and becomes more confident so, for comparisons to be valid, pups should always be tested at the same age.

GENERAL PRINCIPLES, PREPARATIONS AND EQUIPMENT

Test the pups at around 7–8 weeks of age and when they are free of apparent ill health. Ideally one person (the Tester), unknown to the puppy, administers the tests and another person (the Scorer) makes note of the results; with practice, it is possible for one person to perform both tasks. The tests are likely to require a total of around 15–20 minutes per pup, plus set-up time and you should familiarise yourself with the tests, the score sheet and the types of behaviours to look for. You will need the following:

- a copy of the score sheet
- a small, soft ball
- a metal spoon and pan
- an umbrella
- a small towel or a sock filled with rags and tied to a string
- a mesh screen or other see-through barrier
- a stopwatch or watch showing seconds
- access to livestock (for the livestock test – can be done on a separate occasion)

Conduct the tests in a place unfamiliar to the puppy and free of distractions. If the pup has been raised in a barn, an unfamiliar part of the barn would be sufficient. Tests can be conducted outside if weather permits. If the floor is slippery, provide some old carpet.

The Tester takes one pup at a time to the test area, handling it gently and speaking reassuringly. The puppy should be mildly stressed but not traumatised by the experience. Avoid direct eye contact with the puppy (except during the dominance and restraint tests) and treat each puppy equally. However, if a puppy is particularly upset or frightened, allow time at the beginning for it to get used to the Tester and calm down.

Try to make the whole procedure fun for the puppy. If the puppy urinates or defecates during testing, ignore this until the tests have been completed, but clear it up before testing another puppy in the same area.

The Scorer should sit or stand quietly in a position offering a clear view of the test area but without causing a distraction. For each test, mark on the score sheet the description which most closely matches the observed behaviour during the test.

INSTRUCTIONS FOR INDIVIDUAL TESTS

Part I: General Aptitude

1. Social attraction

Tester: Immediately on entering the test area, place the puppy in the centre and back away 1–2 metres towards the exit. Crouch down and encourage the puppy to come to you by calling and gently clapping.

Scorer: Does the puppy go to the Tester? If so, how quickly and is its tail up or down?

2. Following

Tester: Place the puppy beside you and then walk away slowly with short steps, making sure that the puppy sees you leaving. The pup can be encouraged to follow and the test can be repeated several times to gauge the response, but treat each pup the same way.

Scorer: Does the puppy follow? If so, what is the position of its tail and ears?

3. Restraint dominance

Tester: Crouch down beside the puppy and roll it onto its back. Place one or both hands gently on the chest and restrain the puppy in this position for 30 seconds.

Scorer: Does the puppy struggle or accept this position?

4. Social dominance

Tester: Crouch down beside the pup and position it to face you at a 45° angle. Place your head close to the puppy and stroke it, beginning at the head and moving towards the back. Continue stroking until the pup shows a recognisable behaviour but in any case, for at least 30 seconds. If the pup moves away, continue stroking. You may speak to the pup, but do the same for each pup.

Scorer: Does the puppy respond passively or actively, with aggression or affection?

5. Elevation dominance

Tester: With the pup facing away from you, reach underneath its chest and belly with both hands, lock your fingers together and lift the pup so that all its feet are slightly off the ground for 30 seconds.

Scorer: Does the puppy struggle or accept this position?

Part II: Obedience Aptitude

1. Retrieving

Tester: Kneel beside the pup and attract its attention with a small, soft ball. When the pup is watching, throw the ball 1–2 metres diagonally away from and in front of the pup. If the pup does not respond, repeat the test up to two more times. If the pup goes for the ball, take a step back and encourage the pup to come to you.

Scorer: Does the pup go after the ball? If yes, what does it do then?

2. Touch sensitivity

Tester: Take one of the pup's front feet and spread two toes to expose the webbing between. Beginning lightly at first, squeeze the webbing between your thumb and finger. Gradually increase the pressure. Stop as soon as the pup pulls away or shows discomfort.

Scorer: After how many seconds does the puppy respond?

3. Sound sensitivity

Tester: Leave the puppy on the ground and walk a few steps away. Make a sharp, loud noise by striking a metal pan with a spoon.

Scorer: What is the pup's response to the sound?

4. Chase instinct (sight sensitivity)

Tester: Place the pup in the centre of the test area. Use a piece of string to drag a small towel or stuffed sock across the floor a metre or so in front of the pup. If the pup grabs the towel/sock in its mouth, stop pulling on the string.

Scorer: Does the puppy approach or avoid the object?

5. Stability

Tester: Place the pup in the centre of the test area. Point a closed umbrella at the pup, holding it a metre away. Open the umbrella smoothly and quickly (but without letting it spring open), then put it down and allow the pup to investigate.

Scorer: How does the puppy respond after the umbrella is set down on the ground?

Part III: Energy Level

Scorer: What has been the pup's general level of energy and activity so far?

Part IV: Problem Solving

Tester: Place a see-through barrier, such as a mesh screen or wire netting attached to a frame, so that it rests perpendicularly or diagonally against a wall or other impermeable obstacle at one end, but is open at the other end. The barrier should be high enough that the pup cannot climb over it. Place the pup behind the barrier, in the centre, ideally by reaching over the top. Keep in front of the barrier, so that to return to you the pup will first have to turn and walk

away from you. Then, encourage the pup to come to you by any appropriate means (calling may be sufficient, but food can also be offered as motivation), but do not show the pup which way it should go to reach you. If testing multiple pups in the same test area, move the barrier and clean the floor between tests to avoid pups following scent trails.

Scorer: How does the pup react and how long does it take it to find the exit?

Part V: Response to Livestock

Tester: If available, use a young lamb or other sheep which is known to usually remain calm around dogs. Place the pup a few metres away so that pup and livestock are facing each other and back away a few steps. Be ready to intervene to protect the pup and terminate the test if the livestock reacts aggressively.

Scorer: What are the responses of both livestock and pup?

INTERPRETING RESULTS

The outcome of PAT is not pass or fail but an indication of ranges of behaviour. This information can be used to match temperament with the most suitable environment or, conversely, to choose the most appropriate dog for a given scenario. PAT results are useful indicators but not fool-proof predicators. The amount of early handling, stimulation and socialisation can affect scores while subsequent life experiences are likely to play a major role in forming the dog's adult personality. However, advocates of PAT report that it provides a reliable indication of a pup's reactions to people, livestock and mild stress as well as its tendency to be aggressive or submissive.

PAT scores should not be summed together or averaged, but examined for signs of a clear pattern. If there is no clear pattern of scores for a pup, this may indicate that the dog's behaviour is erratic, but it could also be due to the pup not feeling well, so retest after 2–3 days. Retesting later is also appropriate if a pup was distracted or fearful during the first round of tests. However, bear in mind that repeating tests can affect scores.

Parts I and II. Livestock guarding dogs have usually been found to score 3–5 in General Aptitude and Obedience Aptitude tests, with scores of 6 and 7 not uncommon. A pup showing less inclination to seek human interaction and which appears independent may be more likely to be attentive to livestock and will require less direction from people. Scores of 6 and 7 suggest a dog that will be most suited to stable routines in wide open spaces. Few LGDs have highly social/dominant traits (scores of 1–2). If a whole litter scores predominantly 1–2, it may be advisable to avoid selecting any of them for work with livestock, although some people intentionally select the most outgoing, confident and aggressive dogs for livestock protection.

Mostly 1: Extremely dominant, shows a tendency to be aggressive and may be quick to bite. May be difficult to handle and requires an experienced, competent trainer.

Mostly 2: Dominant, may be provoked into biting. Should respond well to firm, consistent and fair handling. May be energetic and outgoing.

Mostly 3: Easily accepts a human leader and obedience training. Adapts well to new situations, has a 'common sense' approach, though may tend to be active.

Mostly 4: Submissive and adaptable, slightly less outgoing.

Mostly 5: Extremely submissive and needs special handling to build confidence. Best suited to a routine, structured environment. Patience is required when introducing the dog to new experiences.

Mostly 6/7: Likely to be shy, aloof and highly independent. Not generally affectionate and may even dislike petting. May be best suited to a place with plenty of space and little human contact.

Part III. Quieter, less active and more reserved pups tend to do better as LGDs, particularly on smaller farms. However, a very active pup, if not overly socially attracted to people, could be an asset in areas of open grazing with abundant predators, as it will have the energy necessary for extensive patrolling.

Part IV. This test gives an overall indication of the pup's intelligence in terms of its ability to solve a problem. However, the degree of motivation can also play a role: a pup may not be particularly interested in re-joining the tester and so makes little effort to do so, which might suggest that it is less people-oriented (an asset for the future LGD).

Part V. Pups which respond aggressively to livestock, including defensive responses under provocation, are unlikely to become good (trustworthy) LGDs. On the other hand, pups that completely ignore livestock may also not make good (attentive) LGDs.

SCORE SHEET FOR PUPPY APTITUDE TESTING

Tester: _____ Scorer: _____ Location: _____

Date: _____ Name of dog: _____ ID: _____

Breed: _____Male/female: _____ Age (weeks): ____

Part I: General Aptitude

1. Social attraction	*Score*
Comes readily, tail/ears/body posture up, may jump up	1
Comes readily, tail/ears up, licks hands	2
Comes readily, tail up, may wiggle upon reaching Tester	3
Comes readily, tail down, ears may be back, may wiggle	4
Comes hesitantly, tail/ears down	5
Comes after much encouragement	6
Does not come at all or goes away	7
Explores first before coming to Tester	Yes / No
If explores first – for how long?	

2. Following	*Score*
Follows readily, tail/ears/body posture up, gets underfoot	1
Follows readily, tail/ears up, tries to keep up	2
Follows readily, tail down, ears may be back, may stay behind	3
Follows hesitantly, tail/ears down, may stop and start again	4
Follows after much encouragement	5
Does not follow or goes away	6

3. Restraint dominance	*Score*
Struggles fiercely, flails, tries to bite	1
Struggles fiercely, flails, may settle briefly, may make eye contact	2
Struggles/settles, may be vocal, makes some eye contact	3

Some struggling at the beginning or end, heart rate steady or slightly raised	4
No struggle, steady or slightly raised heart rate	5
No struggle, strains to avoid eye contact, heart rate usually raised	6

4. Social dominance	*Score*
Jumps, growls, may try to bite, may be vocal, posture up	1
Jumps, may paw, may nip and lick, tail/ears often up	2
Cuddles up to Tester, nuzzles, may wag tail, ears may be back	3
Wiggles around Tester, may lick hands	4
Appears hesitant, ears/tail down, may roll over	5
Freezes in place or leaves Tester, avoidance	6

5. Elevation dominance	*Score*
Struggles fiercely, attempts to bite, growls	1
Struggles fiercely, may vocalise	2
Hangs relaxed, no struggle, calm, steady heart rate	3
Settled but some struggling at the beginning or end, raised heart rate	4
Slight struggle, raised heart rate, head/eye may be still	5
No struggle, limbs frozen, raised heart rate	6

Part II: Obedience Aptitude

1. Retrieving	*Score*
Chases ball, picks it up, runs away, posture up, may pounce	1
Chases ball, stands over it, does not return	2
Chases ball, returns with it to or near Tester without prompting	3
Chases ball, may pick it up, returns to Tester without ball	4
Starts to chase ball, loses interest	5
Does not chase ball, may actively avoid watching ball	6

2. Touch sensitivity	*Score*

9–10 seconds before response	1
7–8 seconds before response	2
5–6 seconds before response	3
3–4 seconds before response	4
1–2 seconds before response	5

3. Sound sensitivity	*Score*
Listens, locates sound, walks toward it barking/growling	1
Listens, locates sound, barks, posture up	2
Listens, locates sound, shows curiosity, walks toward it	3
Listens, locates sound, ears up	4
Startles, backs away, ears/tail down, may try to hide	5
Ignores sound, shows no response/curiosity	6

4. Chase instinct (sight sensitivity)	*Score*
Looks, attacks, bites, may growl, shakes towel/sock after it stops	1
Looks, tail/ears up, follows, may bark, bites at towel/sock	2
Looks curiously, attempts to investigate, tail up, may bite	3
Looks, may follow, hesitant, tail/ears down, may growl	4
Tail tucked, backs away, tries to hide	5
Runs away, actively avoids towel/sock	6

5. Stability	*Score*
Walks forward, tail up, attacks umbrella, may growl/bark, posture up	1
Walks forward, tail up, mouths umbrella	2
Walks forward, attempts to investigate	3
Looks curiously at umbrella, stays in the same place	4
Goes away, tail down, hides	5

Ignores umbrella, shows no curiosity	6

Part III: Energy Level

Activity during testing	*Score*
Continually runs, pounces, wiggles, paws	High
Mostly trots, occasionally runs, pounces	Medium
Walks slowly, sits quietly, remains in position	Low
Stands rigidly, eyes rolling, tail down, ears back	Stressed

Part IV: Problem Solving

Barrier test	*Tick*
Anxious, tries to go through barrier	
Anxious, paces back and forth	
Anxious, whimpers, yelps	
Anxious, does not move	
Finds exit but does not go through	
Finds exit, goes through immediately	
Calm, does not try to leave	
Calm, looks for exit quietly	
If finds exit and leaves – after how many seconds?	

Part V: Response to Livestock

Livestock passive: does not make eye contact with puppy	*Score*
Curious, tail up, makes eye contact, goes to livestock, barks, jumps or bites at livestock	1
Curious, tail up, makes eye contact, goes to livestock	2
Curious, tail up, makes eye contact	3
Fearful or cautious, looks at stock then away, tail down	4
Leaves, stays away, watches stock from a distance	5
Ignores stock	6

Livestock active: makes eye contact with puppy but does not approach	*Score*
Curious, tail up, makes eye contact, goes to livestock, barks, jumps or bites at livestock	1
Curious, tail up, makes eye contact, goes to livestock	2
Curious, tail up, makes eye contact	3
Fearful or cautious, looks at stock then away, tail down	4
Leaves, stays away, watches stock from a distance	5
Ignores stock	6

Livestock aggressive: makes eye contact with puppy, stomps and lowers head(s)	*Score*
Curious, tail up, makes eye contact, goes to livestock, barks, jumps or bites at livestock	1
Curious, tail up, makes eye contact, goes to livestock	2
Curious, tail up, makes eye contact	3
Fearful or cautious, looks at stock then away, tail down	4
Leaves, stays away, watches stock from a distance	5
Ignores stock	6

Livestock very aggressive: makes eye contact and charges the puppy	*Score*
Stands ground, growls or barks, keeps eye contact	1
Stands then moves out of way, growls or barks	2
Moves out of way, tail up, not worried	3
Moves out of way, tail down, avoids eye contact	4
Moves out of way, tail down, lies down or rolls over, avoids eye contact	5
Runs and hides	6

MONITORING THE DEVELOPMENT OF LGD PUPS

Once pups are presented to a farmer it is vitally important that they are visited regularly to ensure that guidelines for raising LGDs are adhered to and, when necessary, to take corrective measures promptly. This is particularly important in the first 16 weeks of the pups' lives, as mistakes made during socialisation with livestock can be difficult to correct later. For this reason, it is recommended that weekly visits are carried out until pups are at least four months old. This should be followed by ongoing visits every 2–4 weeks until dogs are two years old.

Farm personnel have most opportunity to observe pups and their interactions with livestock. During farm visits, you should therefore talk with livestock owners and shepherds to garner information and identify any issues that need to be addressed. In addition, you should also observe pups and livestock directly to assess the degree to which guidelines for raising LGDs are being followed: is the young pup being kept close to livestock, away from other dogs and people?

THE DATASHEET

The first page of the datasheet for LGD pup monitoring is self-explanatory, comprising basic data to identify and describe the dog, followed by a series of multiple-choice questions as well as space to record comments from farm personnel and to draw attention to any health or welfare issues, which are dealt with in greater detail in a separate datasheet (see section below).

The second page of Part A of the LGD monitoring datasheet is an overall assessment and so should be filled in towards the end of the farm visit, after completion of detailed behavioural observations (see next section). Answers to each item are indicated by marking a cross on a scale (a dashed line) drawn between the minimum possible expression of that item (i.e. the recommended guidelines are not being followed at all) and its maximum expression (i.e. guidelines are being followed perfectly). This is a valid means to measure complex behaviour but, as it requires you to form a judgement, all observations should be conducted by the same observer to ensure consistency between pups and over time.

Part B of the datasheet for LGD pup monitoring should be used to record observations of LGD behaviour. The intention is to quantify behaviour such that the progress of individual pups can be measured and compared. The following section describes how to conduct and record these observations.

GENERAL PRINCIPLES, PREPARATIONS AND EQUIPMENT

Observe pups at intervals of 1 week from when they are first placed with livestock at participating farms (from 7–8 weeks of age). All observations should be conducted by the same observer and should be made for 60 continuous minutes per pup, plus set-up time. You will need the following:

- a copy of the datasheet;

- a timer or watch showing seconds;
- something to sit on, such as a folding stool.

Conduct the tests in the area where the pup would normally be, whether this is inside a barn or outside in the pasture and choose a time of day when both pup and livestock are likely to be active.

Livestock should be present prior to, as well as during, the test. If livestock and dog are put together shortly before observations begin, having been separated during the preceding period, their interactions are likely to be significantly influenced by this change in circumstances so sufficient time should be allowed for the animals to settle into normal patterns of behaviour.

The presence of other dogs or people is likely to influence the behaviour of the dog under observation. While the reaction of the LGD to these stimuli is also of interest (and can be described in the section of the datasheet labelled 'Responses to external factors'), for observations to be comparable among pups, the circumstances under which observations are conducted should be as standardised as possible.

Familiarise yourself with the datasheet, which is a partial ethogram of dog behaviour. It includes the most pertinent types of behaviour, both desirable and undesirable, for LGDs to exhibit. You should be able to recognise each of these behaviours, most of which are self-explanatory but the following may be less immediately obvious:

- in the 'play bow' posture, the dog lowers the front part of its body while keeping the rear raised, often wagging its tail;
- 'approach/withdrawal' behaviour is when a less confident, younger LGD advances towards a potential threat but then withdraws into the flock if challenged.

Prior to beginning formal observations, the observer should take up a position which is close enough to the pup and livestock to allow adequate observation but not so close as to distract the animals. Try to be inconspicuous. Once seated, allow 5 minutes for the animals to settle before beginning the 60-minute observation period.

Do not interact with the animals during observations. An exception to this is if a pup or older dog harasses livestock excessively. In this case, the observer may have to intervene (and record having done so on the datasheet) because LGDs should not be allowed to engage in such behaviour.

Whenever one of the behaviours included in the datasheet is displayed by the LGD under study, its duration in seconds should be timed and recorded in the corresponding box. In cases of neutral or submissive interactions between the pup and livestock, note whether the pup or the livestock made the initial approach.

For the purposes of data analysis, the number of times that each behaviour occurred as well as the total time that it was exhibited over the 60 minutes of observations shall be calculated.

PUP HEALTH AND WELFARE

During each visit, each pup should be examined carefully to assess its state of health and to administer any vaccinations or treatment as required. Ideally, this should be done once per week by a veterinarian. Farm personnel should also be interviewed to identify any welfare issues that may have arisen in the intervening period or are not apparent during the examination.

DATASHEET FOR LGD PUP MONITORING

Part A

Observer: _____ Location: _____ Date: _____

Name of dog: _____ ID # (tattoo, microchip): _____

Breed: _____Male/female: _____ Age (weeks): ____

Current health/welfare issues and recommended action: _____

_____

_____

Where is the pup? (1): large barn / small barn / pasture / corral / other: _____

Where is the pup? (2): training pen / enclosure / free-ranging / other: _____

Livestock contact: direct / through fence / visual / none / other: _____

Livestock present: sheep: # ____ lambs: # ____ goats: # ____ kids: # ___

cows: # ____ calves: # ____ dogs: # ____ pups: # ___

Is the pup kept mostly with livestock? yes / no / partly / details: _____

Can the pup escape/leave the livestock? yes / no / partly / details: _____

Does the pup spend time near the house? yes / no / partly / details: _____

Where is the pup fed? barn / pasture / house / other: _____

Does the pup have access to clean water? yes / no / partly / details: _____

Can the pup interact with livestock? yes / no / partly / details: _____

Can the pup interact with other dogs? yes / no / partly / details: _____

Can the pup interact with people? yes / no / partly / details: _____

Comments or additional information from the livestock owner/shepherd: _____

_____

_____

_____

Now use Part B to record 60 minutes of observations of the pup with livestock.

Answer the following questions <u>after</u> you have finished observing the pup with livestock. Indicate your answers to each item by marking a 'X' on the dashed line.

Overall, to what extent are the guidelines for raising LGDs being followed?

Not at all – Perfectly

Overall, does the pup appear to be becoming part of the group with the livestock?

– Perfectly

Overall, does the livestock seem to accept the pup's presence?

– – – – – – – – – – – – – – – – – – – –

Overall, is the pup attentive to livestock? (i.e. stays near and interacts with it)

– – – – – – – – – – – – – – – – – – – –

Overall, is the pup trustworthy with livestock? (i.e. does not harm it)

– – – – – – – – – – – – – – – – – – – –

Overall, does the pup show protective behaviour?

– – – – – – – – – – – – – – – – – – – –

Issues and recommended action regarding raising and training: _____

_____

_____

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Part B: Behavioural observations

Start time: _____ End time: _____ Weather (if observations done outside): _____

Neutral interactions between pup and livestock (attentive, trustworthy behaviour)		
	Dog approached livestock	**Livestock approached dog**
Muzzle-muzzle contact/lick		
Muzzle-fur contact/lick		
Anal-genital sniff/lick		
Grooming		
Resting together		
Other (describe)		
Submissive behaviour of pup towards livestock (trustworthy, attentive behaviour)		
	Dog approached livestock	**Livestock approached dog**
Averts gaze, ears/tail down		
Rolls over, shows belly		
Other (describe)		
Obnoxious behaviour of pup towards livestock (attentive, less trustworthy behaviour)		
Biting ears		
Grab-biting leg		
Wool/tail pulling		
Play bow		
Play chasing		
Sexual mounting		

Other (describe)	
Aggressive behaviour of pup towards livestock (untrustworthy behaviour)	
Unprovoked threat	
Pin down, stand over	
Inhibited biting	
Severe biting	
Other (describe)	
Patrolling, marking, reactions to possible threats (protective behaviour)	
Barking	
Growling	
Huffing	
Stands in front of livestock	
Approach/withdrawal	
Pursuit of threat	
Stands/rests on raised spot	
Patrolling	
Raised leg urination	
Defecation, scratching	
Other (describe)	
Responses to external factors	
Shepherd	
Other dog	
Thunder	
Gunshot	
Other (describe)	
Defensive behaviour of pup towards livestock (not necessarily untrustworthy)	

Vocalisation (growl/bark)	
Snap bite/lunge	
Runs away	
Other (describe)	
Other behaviour by pup	
Sleeping	
Resting	
Feeding	
Drinking	
Self-grooming/rubbing	
Exploring/investigating	
Stalking/chasing wildlife	
Chasing vehicles	
Other (describe)	

Comments or explanations on behavioural observations: _____

_____

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DETERMINING THE QUALITY OF ADULT LGDS

INTRODUCTION

Assessment of LGDs has traditionally focused on three traits regarded as essential for effective working dogs: attentiveness, trustworthiness and protectiveness. Some authors have used questionnaires to obtain ratings of farmers' satisfaction with their dogs or compared levels of losses at farms with and without LGDs. Telemetry could be a useful technique to monitor dogs, particularly when direct observations are difficult such as in complex terrain, among dense vegetation or in darkness and may be something to consider for the future.

A baseline survey of livestock farms in the project area found that many losses to wolves occurred during the day whilst the sheep were at the pasture, suggesting that daytime attentiveness of LGDs might be a contributory factor. The following is a protocol for focal sampling of LGD behaviour, originally used in Georgia, to assess dogs accompanying flocks of several hundred sheep in pastures.

SAMPLING PROTOCOL

Farms should be randomly selected, stratified into those that suffer from high depredation and those that suffer from low (or no) depredation, with as close to equal representation as possible. This will help us determine whether attentive dogs are correlated with low depredation by wolves.

Try to observe all dogs at the selected farms as this will allow us to determine whether farms tend, overall, to have attentive or inattentive dogs. Ensure that you observe all dogs during a single session. If a selected farm has more than four dogs, randomly select four from the total but then focus on these dogs for all subsequent sessions.

Try to vary the time of day during which observations are made as this will help account for external variables that may affect the behaviour of the dogs.

GENERAL PRINCIPLES, PREPARATIONS AND EQUIPMENT

Our primary interest is in how well the dogs perform as livestock guarding dogs so our basic sample unit is the individual dog. Observations should be made while the dogs are with the sheep at the pastures and, ideally, all observations should be conducted by the same observer or observers.

Before observations begin photograph each dog belonging to the target farmer and assign a unique identifier to each. For example, the ID could be a combination of the dog's sex, a unique number (XX) followed by the total number of dogs from the farm you are observing; so, a male dog, which is the second one you photographed from a total of five dogs would be M-XX-2/5. Print out the image and carry it with you as this will help you locate the dog for subsequent sessions.

An observation period is the time spent observing one LGD (the focal animal) and should be limited to 1 hour. An observation session is the time spent observing dogs

at a single farm in a single day; an observation session should contain several observation periods. You will need the following:

- several copies of the datasheet (1 page = 15 minutes of observations);
- a stopwatch or analogue watch to mark fixed intervals of time for instantaneous sampling (see below);
- a clipboard (preferably with a cover to protect form rain) and two pens (one as a back-up).

The presence of other dogs, or of people, is likely to influence the behaviour of the dog under observation. While the reaction of the LGD to these stimuli is also of interest (and should be recorded in the sections of the datasheet labelled 'Proximity' and 'Approaches by LGD'), for observations to be comparable among dogs, the circumstances under which observations are conducted should be as standardised as possible.

Familiarise yourself with the datasheet and the types of behaviour to watch out for (here you can use the coded ethogram). During the observation period, it is important to be able to record several pieces of information on the datasheet as quickly as possible so that important behaviours are not missed while the observer is writing.

Take up a position close enough to the LGD and livestock to allow adequate observation but not so close as to distract the animals. Try to be inconspicuous. In some circumstances observations might be possible from a vehicle, although it is likely that animals will sometimes move out of sight. Preferable is for you to spend some time with the herder prior to beginning observations to explain that you will be accompanying the flock and making notes on the dog's behaviour. The herder should reassure the LGDs during this discussion that you are not a threat. Once the observation period begins, the herder should prevent LGDs from repeatedly challenging or otherwise approaching you.

Do not interact with animals during observations. An exception to this is if a dog is harassing livestock excessively. In this case, and if a shepherd is not present, you may have to intervene (and record having done so on the datasheet) because LGDs should not be allowed to engage in such behaviour.

<u>Instructions for conducting observations and completing the datasheet</u>

Standard information

The first page of the datasheet contains basic information to identify the dog under observation and the date, time, location and circumstances in which observations were conducted, including how many animals were present and the weather conditions at the time of observation.

It is important to describe the prevailing weather conditions on the datasheet as this can influence the proximity of dogs to sheep. Even highly attentive dogs may leave the flock temporarily to seek shade or water during hot weather.

Behavioural information

Allow 5 minutes for the animals to habituate to the presence of the observer before beginning the observation period.

Some items are monitored using fixed intervals ('instantaneous sampling' or 'one-zero sampling'), others are recorded whenever they occur ('continuous recording'). Further details of specific types of observations are given below.

If a focal animal behaviour does not change for several observations (for example, it may be resting for half an hour) then it is not necessary to record each 60 second observation. However, it is important to maintain observation of that animal so that recording can continue as soon as its behaviour or situation changes. When inputting data into the database, however, it is important that all 60 second interval data is recorded regardless of repetition.

Instantaneous sampling

At each 60-second interval, observe the focal animal and record the following information:

1. *State*; what is the LGD doing e.g. lying with head up, self-grooming, sniffing a lamb's muzzle, walking towards the herder, etc.
2. *Proximity;* estimate by eye the distance from the LGD to the nearest livestock, other dog, herder and you using the following categories:
   <1m = 1; 1 – 10m = 2; 10 – 50m = 3; 50 – 100m = 4; >100m = 5; Not visible = 6
3. *Between;* is there any livestock on a direct line of sight between the observer and the LGD? Answer 'yes' or 'no'.
4. *In/out;* is the LGD inside or outside the flock? Answer 'in' or 'out'. To do this, imagine a minimum convex polygon drawn around the flock.

One-zero sampling

1. *Social.* For each 60-second interval, indicate with a '1' if there was any social interaction of any nature between the LGD and livestock. If there was not, enter '0'.

Continuous recording

1. *Interactions with livestock*. All behaviour shown by the LGD toward livestock should be categorised. Refer to the partial ethogram.
2. *Approaches by LGD*. Whenever the LGD moves, indicate whether it approached the livestock, herder, another dog or the observer. If the movement is towards something else, this should be specified, e.g. the barn door, a perceived threat, etc.
3. *Protective behaviour*. This should be noted on the datasheet whenever it is seen during the observation period. Examples include: advancing toward perceived threats; barking, growling or huffing; imposition between sheep and threat; approach-withdrawal (advancing toward a threat but retreating among sheep if

challenged); walking ahead or above the flock; resting at sites with a wide view of sheep and surroundings; patrolling; scent marking including raised leg urination.

4. *Livestock behaviour*. The response of livestock can also be a useful indicator of the degree to which LGDs are integrated into a flock. Note if livestock approaches and investigates the LGD, flees from it or threatens it with lowered head, hoof stamps, etc.

LGD ETHOGRAM

Interactive Behaviours	
Neutral interactions between LGD and livestock (attentive, trustworthy)	
Behaviour	**Code**
Muzzle-muzzle contact	Mc
Muzzle-fur contact	Fc
Anal-genital sniff	AGs
Grooming	Grm
Resting together	Rest-T
Submissive behaviour towards livestock (trustworthy, attentive)	
Averts gaze, ears/tail down	Avert
Rolls over, shows belly	Roll
Obnoxious behaviour towards livestock (attentive, less trustworthy)	
Biting	Bite
Wool/tail pulling	Pull
Play bow	PB
Play chasing	PC
Sexual mounting	SM
Aggressive behaviour towards livestock (untrustworthy)	
Unprovoked threat	Th
Pin down, stand over	P-S
Inhibited biting	InB
Severe biting	SevB
Non-Interactive Behaviours	
Patrolling, marking, reactions to possible threats (protective)	
Barking	Bk
Growling	Grl

Huffing	Hf
Stands in front of livestock	StF
Approach/withdrawal	A-W
Pursuit of threat	PuT
Stands/rests on raised spot	Ra
Patrolling	Pt
Raised leg urination	RU
Defecation, scratching	Def
Responses to external factors	
Shepherd	Shpd
Other dog	OD
Thunder	Thn
Gunshot	Gs
Defensive behaviour towards livestock (not necessarily untrustworthy)	
Vocalisation (growl/bark)	VG/B
Snap bite/lunge	SnB/L
Runs away	Run
Other behaviours	
Sleeping	Slp
Resting	Rst
Feeding	Fdg
Drinking	Dkg
Self-grooming	Sgrm
Exploring	Ex
Stalking/chasing wildlife	Stk
Chasing vehicles	ChsV

DATASHEET FOR FOCAL SAMPLING LGD BEHAVIOUR

Date: _____Observer: _____ LGD owner: _____ Farm: _____ Weather: _____ Start time: _____

LGD – name/#: _____ breed: _____ age: _____ **sex:** m/f **status:** intact / neutered **comments:** _____

Location of observations: pasture / other: _____ **Present – sheep #: ____ cattle #: ____ dogs #: ____ herders #: _____**

Time (minute intervals)	**Instantaneous sampling**							**1/0**	**Continuous recording**				
	State	**Proximity**				**Betw'n**	**In/out**	**Social**	**Interactions with livestock**	**Approaches by LGD**	**Protective behaviour**	**Livestock behaviour**	**Notes**
		Liv	Dog	Hrdr	Obs								

Sheet #____ of ____

Time (minute intervals)	**Instantaneous sampling**							**1/0**	**Continuous recording**				
	State	**Proximity**				**Betw'n**	**In/out**	**Social**	**Interactions with livestock**	**Approaches by LGD**	**Protective behaviour**	**Livestock behaviour**	**Notes**
		Liv	Dog	Hrdr	Obs								

Notes:

_____

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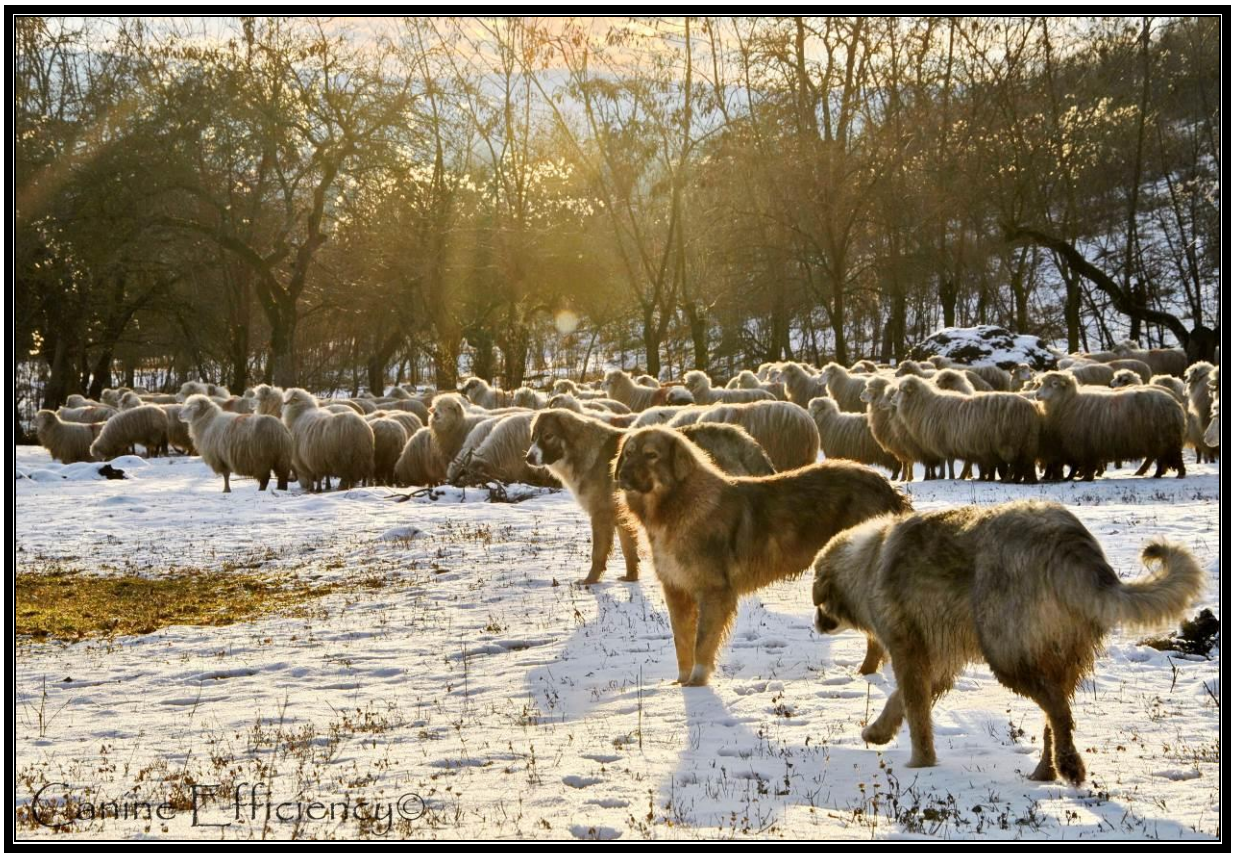
_____

SECTION 4: BEST PRACTICES FOR RAISING AND MAINTAINING EFFECTIVE LIVESTOCK GUARDING DOGS

BEST PRACTICES FOR RAISING AND MAINTAINING EFFECTIVE LIVESTOCK GUARDING DOGS



Credit: Canine Efficiency

Gareth Goldthorpe: April 2016

(Adapted from Rigg & Sillero, 2010)

FAUNA & FLORA INTERNATIONAL

Table of Contents

INTRODUCTION

PHYSICAL CHARACTERISTICS OF LGDS

LGDs are usually large (often 70 cm tall and weighing over 40 kg), particularly the breeds from cold mountain climates. Most breeds have a large head and pendant, rather than pricked, ears. Many LGDs are various shades of brown and grey or have patches of colour, but there are also several breeds of white dogs. Traditionally, the colour of many LGDs has been similar to the livestock they protect. Non-white dogs such as the Caucasian Shepherd Dog and the Kangal Dog in Turkey might have pre-dated the ability to wash and dye white wool. White wool was favoured in Roman times and white dogs were selected, leading to Maremma-type dogs, which have been protecting sheep from bears and wolves in present-day Italy for more than 2,000 years. Lighter coloured dogs were probably also easier for shepherds to distinguish from wolves in the dark.

Shepherds often dock the tails and crop the ears shortly after birth, possibly to prevent biting by wolves or other dogs. Some people believe that cropping pendant ears helps the dog hear better. Sometimes shepherds also put spiked metal collars on their dogs to protect their throats from the wolf's bite.

KEY BEHAVIOURAL TRAITS OF LGDS

The typical temperament of adult livestock guarding dogs is independent, courageous, domineering and territorial. They tend to be calm and steady but wary of strangers and quick to react to perceived threats. Although the presence and behaviour (patrolling, barking, scent-marking) of dogs near livestock may deter predators, sometimes LGDs must actively defend the flock. In this case, the dog stands between the flock and the threat, chases the predator away or even, occasionally, fights with it.

Like other dogs, LGDs are social animals with a great need to stay in a group, especially with individuals that they have known since their early years. This feature has been inherited from the wolf, which is the ancestor of all domestic dogs. LGDs seem to retain juvenile characteristics throughout their lives, allowing them to bond with livestock such as sheep, which they follow and protect as if they were part of the flock.

Experts have identified the following three characteristics as being the most important for livestock guarding dogs:

Attentive –it must stay with the flock as much as possible, both day and night, following when it moves and resting among or near the livestock.

Trustworthy – it must become part of the flock without disturbing or harming it; showing submission by approaching with ears back and squinting or averting eyes, rolling over to expose the belly.

Protective – it should bark at new or strange activities and situations. Pups typically rush out barking with tail raised, but if challenged may retreat to the flock with tail between legs. As they mature they should become more confident, advancing further towards potential threats and showing dominance.

SELECTING AND TRAINING A GOOD LGD PUP

Livestock guarding dogs require both instincts and learned behaviour, so achieving good LGDs is a combination of choosing the right pups and raising them in the correct way. Pups which do not have the right genes will not succeed regardless of how they are raised, but also dogs not reared properly cannot be retrained later. As we have seen, a good livestock guardian must be attentive, trustworthy and protective. The aim of the LGD breeder and trainer is to achieve an acceptable level in all three of these characteristics.

To ensure that a LGD stays with the flock as much as possible, it should become part of the flock from an early age. *"The dog should be kept with, brought up with, socialised with and bonded with the stock it is going to protect."* Domestic dogs have a so-called "critical period", between about 4 and 14 weeks of age, during which they can form strong social bonds not only with other dogs but also with other species, including livestock. This process is facilitated by LGDs having only weakly developed predatory instincts, which helps livestock accept the dogs among them.

PREPARATION

Raising and training a livestock guarding dog requires an investment of time and money. A small percentage of dogs will fail despite their owner's best efforts, but if you choose a pup from a recognised LGD breed/type then it will most likely have the right instincts, so the outcome will depend mostly on your attitude and expectations. To maximise the chance of achieving a good dog, before you begin, ensure that you are as well prepared as possible. Read through the main steps carefully and plan how you will implement each stage. Initially, you will need a corral or other secure area to keep the young pup in contact with livestock, away from human distraction and other dogs, and from which it cannot escape.

The time needed to raise LGDs well is often overlooked. Ranchers in America reported spending around 1.5 hours per day supervising, training and feeding pups during their first year. Older dogs required less than 0.5 hours per day and often saved their owners time in reduced livestock management, but some dogs might need occasional corrective training until they are 18–30 months old.

WHEN TO START

Although older dogs have sometimes been successfully incorporated into flocks, the process of socialising them with livestock can fail if begun later than 16 weeks of age. Training should therefore begin with young pups. Pups should not be separated from their mother and siblings too early or they may later be afraid of other dogs. Taking all these factors into account, the ideal age to begin training LGDs is 6–8 weeks old.

Time, effort and money must be invested to raise good LGDs. It normally takes one to two years to begin to see the results of dogs' guarding abilities. Some may become ill, get injured or die prematurely. It is critical that the initial steps of training are done correctly, as early mistakes can be very difficult to correct, so make sure you have enough time to work with young dogs. Avoid starting during periods when you will be too busy or a young dog could be too disruptive. Winter is often a good time to get a new dog.

How many dogs is enough?

It is usually recommended to have at least two dogs, because together they will be more confident and courageous in confronting threats. For larger flocks, more dogs are needed, with a good rule of thumb being one dog per 100 sheep. However, LGDs should not usually be raised together, as they may bond more to each other than to the livestock or owner and can form a pack when playing with sheep. It is often easier to start with one pup and add additional dogs later.

What type of dog

In Romania, there are three breeds typically used for protecting livestock from wild animals; the Carpathian (Ciobănesc Românesc Carpatin), Mioritic (Ciobănesc Românesc Mioritic) and Bucovina (Ciobănesc Românesc de Bucovina) Shepherd Dog. Of these, the Carpathian Shepherd Dog is generally considered to be the best livestock guardian as it is very well adapted to the harsh conditions found in the mountains.

Which sex works best?

Several studies have found no difference in the effectiveness of males versus females or of intact versus neutered dogs. However, if several dogs are to be used together, then their sex should be considered to avoid future problems. Usually a male and a female is the best combination whereas two females that do not accept each other upon maturation may fight, even if they have been neutered. On the other hand, males may take longer than females to mature and settle into being trustworthy guardians.

Intact males have more of a tendency to wander away from the flock, whereas females will attract males when in heat and, if allowed to breed, will not be able to accompany the flock always while nursing pups. **Neutering (at 6 months for females, 9 months for males) is often beneficial in avoiding such problems and should not affect the ability of dogs to protect livestock**. If a female is kept intact, she will become sexually mature at around 10–12 months of age. However, **females should not be allowed to mate before 2 years old** because LGDs continue growing until then. If a female breeds earlier, she and her pups will have lower weights.

CHOOSING A PUPPY

Select a pup of a recognised LGD breed, 6–8 weeks old, or an older dog that was raised with the type of livestock that you want it to protect. Separating a puppy from its mother and

littermates before six weeks of age can have negative effects on its weight and physical condition.

Ideally, the pup should come from good working parents rather than relying on the reputation of a breed, because differences in temperament within a breed can be greater than those between different breeds.

Credit: Lizzie Duthie / FFI

When acquiring a pup, do so from a reputable breeder after seeing at least the mother, if not both parents. The surroundings should be clean. The parents should have sound shoulders, legs and feet and be free of hip dysplasia. Be sure that neither parent exhibits excessive aggressiveness or shyness, because these traits could appear later in their offspring.

Look for a confident, outgoing and friendly pup that appears rounded and firm, standing on strong straight legs and feet, with a smooth gait. Avoid a pup that seems either very shy or that dominates its litter mates. Look for sound muscle and bone structure, including a well-shaped head, jaws and teeth, which should meet, or preferably overlap in a scissors bite (upper incisors slightly overlap the lower ones). Gums should be pink and healthy looking, not pale. The pup should breathe in and out without effort.

The pup's nose should be cool and moist and there should be no discharge from the nose, eyes or ears. The eyes should be clear and bright with dark pupils that have no lines or white spots. Ears should have well furred tips, not crusty which could indicate a skin disease such as Sarcoptic mange. A healthy coat is bright and shiny.

HEALTH CARE

Water – Pups need a lot of water and dehydrate quickly if they do not get enough fluids. They should have a bowl of fresh water available always. Bowls for water and food should

be unbreakable, ideally stainless steel or plastic, and weighted to prevent tipping over. Clean them daily with soap and water.

Food – Puppies should be fed 3–4 times a day until 6 months of age with good quality food providing a balanced diet. This should be particularly rich in protein to supply the essential amino acids that ensure good growth but also containing sufficient carbohydrates, fat, vitamins and minerals. Pups up to 6 months of age need twice as many calories per kilogram per day as adult dogs.

Raw meat, such as sheep carcasses including organs, should not be fed: there is a high risk of the dog picking up internal parasites or infectious diseases. However, it is not a problem if dogs eat afterbirth from lambing.

From 6 months of age, feeding twice per day is sufficient. From 1 year of age, the diet should be changed to that of an adult dog: less protein, fewer calories and 1–2 feedings per day. Working dogs need a highly digestible diet with increased fat content to maintain stamina and body condition.

Vaccinations – Young puppies should be vaccinated to build their immunity against infectious diseases, particularly distemper, hepatitis, parvovirus, parainfluenza and rabies. A suggested schedule is given in the table below. Other diseases may occur in some areas which should also be vaccinated against.

Age	Vaccine
5–6 weeks	Distemper-measles-parainfluenza
8–12 weeks	DHPP (distemper-hepatitis-parainfluenza-parvovirus)
12 weeks	Rabies
16 weeks	DHPP
15–16 months	Rabies, DHPP
Annual booster (12 months after first)	DHPP
Booster every 1–3 years	Rabies

Health checks – If a dog is not healthy, it will not work well. It is recommended that puppies are de-wormed at 2, 4, 6 and 8 weeks of age and then monthly for 6 months. De-worm a newly acquired dog immediately and then again after 2 weeks. All dogs should be treated for roundworms and tapeworms every 3–6 months. Check for and control external parasites (fleas, ticks, mites). Regularly examine your dog's ears, eyes, mouth and feet. Keep its nails clipped and trim the hair on its feet and under the tail if needed. Look for cuts and scratches that can become infected and treat them. During hot weather, you may need to shear or brush the dog's coat.

HOW TO RAISE A GOOD LIVESTOCK GUARDING DOG

The main elements to raising good livestock guarding dogs are: choosing the right type of dog; socialising it with livestock so that it stays with them; and correcting unwanted behaviour appropriately to ensure the dog is trustworthy as well as attentive. Protectiveness will take care of itself as this is an instinctive behaviour that does not need to be taught, although some dogs are more protective than others.

The following system has been used successfully in many countries to incorporate LGDs into livestock operations, even where they have not been used before and there are no adult working dogs to act as teachers. The text refers to sheep but the same principles apply to raising dogs with other types of livestock.

The emphasis in the first year of the dog's life is on socialising it with sheep to form social bonds. For this to happen, the dog must be kept with the sheep and away from the house, people and other dogs. Until it is 16 weeks old, the pup should be kept in a pen close to the sheep. This could be in a lambing barn, night corral, pasture or other place where sheep gather. The pup should be let out to exercise several times a week but always returned to the pen afterwards.

A STEP-BY-STEP GUIDE TO RAISING AN LGD PUP

0–6 weeks

1. Choose a healthy pup, of a recognised LGD breed, from a reputable source. The pup should stay with its mother for the first 6 weeks.

2.Before the puppy arrives, prepare a pen that is large enough for the dog to move freely and allows regular contact between pup and livestock but is secure enough to prevent the

pup getting out. This could be a fenced off area of the farmyard or barn. It should be out of sight and hearing of the farmhouse.

6–8 weeks

3. Take the pup from its mother and siblings and immediately put it in the pen close to the livestock you want it to protect. Give the pup some toys to play with and provide high-quality dog food regularly.

4. Ensure that the pup is kept with several sheep or lambs, not only 1 or 2, and ideally animals that are going to stay as part of the flock rather than be sold. Once one group of sheep accepts the dog, other sheep unaccustomed to guard dogs will tend to accept it more quickly. Change the sheep for others every few days.

5. Some farmers leave their pups together with livestock from an early age. If you do this, consider the dog's personality when selecting which sheep to put with it. A few weak lambs may be suitable for small or shy dogs but they might be injured by a larger, more energetic dog, which would be better off with male yearlings. Do not leave a pup unattended with livestock for long periods of time until both are clearly adjusted to the situation.

6. Do not allow the pup to escape from the pen, wander around or hang about near people. It is important that you do not reward such behaviour by giving it food or attention if it leaves the livestock.

7. Minimise contact with humans and other dogs. Remember, the pup is going to be a working dog, not a pet. Do not let it play for long periods with people (including children) or other dogs. Apart from short visits, the pup should be kept isolated and in contact with the livestock until 16 weeks of age.

8. Whenever you are doing chores near the pen, let the pup out among the livestock. Supervise early contacts with sheep carefully. Reprimand the pup immediately if it chases sheep, chews their ears or pulls tails and wool.

9. Spend time with the pup so it is not afraid of you and will allow you to handle it later. Routine worming, vaccination and veterinary checks are essential for good health and performance. Begin the dog in obedience training ("come", "no", "stop") during its early exposure to sheep. However, always return it to the pen after a short time and praise it when it greets livestock and stays with them.

10. As the pup gets older, introduce it (on a leash) to the rest of the farm including equipment, other livestock (horses, cattle) and dogs. Supervise the dog closely when it is first introduced to new-born lambs. Build its confidence by praising good behaviour.

4–5 months

11. Start to leave the dog with the flock for longer periods of time. As the dog matures and becomes accustomed to being with sheep, move it to situations which provide progressively more freedoms and opportunities for independent action. Move it from a small pen to a larger pen to a pasture and from a few lambs to the whole flock that it will eventually guard. Monitor it carefully, encouraging good behaviour and reprimanding it for bad behaviour.

12. Observe the dog carefully after each move or change in routine. Make sure it adjusts properly and react quickly to correct any mistakes.

13. Continue to be consistent in making sure the dog stays with the sheep. Return it to the flock any time it tries to leave and praise it when it stays.

14. Even when the pup is older it is a good idea to provide a place where it can rest and eat that the sheep cannot get to.

15. LGDs should receive at least basic obedience training. Having control over the dog is not only important for the safety of sheep and humans but it also allows it to be examined and treated when necessary and provides an opportunity for development of an affectionate dog-human bond. Work with the dog on a regular basis in the pasture with the sheep so that training becomes associated with the pleasure of the owner's company and with sheep.

6–12 months

16. By now the dog will probably begin to mark its territory, exhibit more serious concern for the sheep, and bark with deliberate intent. However, it is important to continue to supervise young dogs as they are vulnerable when not yet physically and mentally mature. Young dogs can suffer mental traumas while guarding stock that may prevent them from developing the confidence necessary to become successful adult guardians.

17. If left alone with livestock, the dog should be checked daily and provided with sufficient food, water and shelter. You may need to train it to watch your livestock rather than those of a neighbour.

18. Be patient and allow plenty of time for your dog to mature. LGDs may show ideal behaviour within the first six months, but it will most likely take longer for them to develop enough confidence to attack predators. LGDs can usually be expected to begin working effectively **between one and three years old**.

Golden rules

- Select a suitable breed and reputable breeder.
- Raise pups singly from 6–8 weeks of age with sheep.
- Minimise contact with humans and other dogs.
- Ensure the dog's health and safety.
- Monitor the dog and correct undesirable behaviour in an appropriate way.
- Encourage the dog to remain with or near the livestock.
- Remember, *"If the dog isn't with the sheep it isn't where it's supposed to be."*
- Manage the livestock according to the dog's age and experience.
- Be patient and allow enough time for training.

SOLVING COMMON PROBLEMS

Some dogs repeatedly roam away from livestock, causing problems with neighbours or hunters; others may injure livestock, chase vehicles or be too aggressive in confronting people. LGDs may also interfere when livestock are moved. However, given careful selection of appropriate dogs, patient training and removal of undesirable individuals, many such problems can be avoided or resolved.

Some dogs may not be aggressive to predators, although they may still help to detect them and raise the alarm. On the other hand, very aggressive dogs are not appropriate in areas frequented by unfamiliar people such as tourists and mushroom pickers. Even the best dogs might not stop all losses. Predators often watch livestock from a safe distance and wait for opportunities to attack. Dogs that wander away from the flock leave it vulnerable to attack. Wolves sometimes learn to distract LGDs or approach sheep without being detected. Rarely, LGDs have been badly injured or even killed by bears and wolves.

In a long-term study of more than 1,000 dogs of various Old World breeds and crossbreeds used on livestock farms in over 30 different states of the USA, it has been found that 65–75% of dogs turn out to be good or excellent. Nevertheless, there are a variety of problems that can occur during the process of raising and training. Some of the commonest concerns are described below, with suggestions on how to alleviate them.

Not trustworthy: harassing livestock

Most pups and young dogs will act playfully towards livestock at some point. This typically includes chasing, biting, mounting and wool-pulling. Occasionally it can result in injury or even, in extreme cases, death. Such behaviour can usually be corrected with patient training: less than 5% of LGDs become habitual sheep killers. However, if stalking-type behaviour is observed, the dog should be replaced.

Most young dogs grow out of disruptive play behaviour by the age of 12–18 months. You may be able to achieve a trustworthy dog at an earlier age by careful supervision and correction. Whenever a young dog is seen harassing stock during the training period it should be reprimanded immediately: grab it by the scruff and jerk it once or throw a stick or other object near (but not at) the dog and tell it firmly *"No!"* You must be consistent, firm and fair in making these corrections. Praise the dog when it stops the unwanted behaviour and backs off.

Sick, old or odd sheep may be attacked by otherwise trustworthy LGDs, so if possible replace them with healthy individuals. Likewise, if fearful lambs are inadvertently encouraging the dog to chase them by running away, replace them with yearlings or older (but not aggressive) animals. The unwanted behaviour may be due to boredom: give the pup some toys to play with. Chasing can be reduced by lowering the dog's calorie intake (but not quantity of food), such as with a 2-week diet of cooked oats or other food low in fat and carbohydrates.

If the problem persists, a chicken wire fence can be used to temporarily separate dog and sheep while keeping them in contact with each other within the barn or farmyard. For older dogs, a "dangle stick" attached to a chain on the dog's collar and hanging 8–10 cm above the ground should slow it down. This can be used for 3–4 weeks but should then be removed: first the stick, later the chain. Another measure would be to put a basket muzzle on the dog to stop it biting or to tie the dog up for a short time so that sheep can approach without getting chased. These are temporary measures, however, and do not teach the dog not to chase. Perhaps the dog is not ready to be left alone with livestock.

Normally it is desirable for LGDs to bark at and otherwise threaten anything new and unexpected. Sometimes, however, this behaviour can cause problems. They may be unsettled by changes in the flock if some animals are sold or others brought in. Some dogs will act aggressively to new or unusual flock members, for example if they are differently coloured or move abnormally due to illness or injury. New livestock will probably also need time to get used to the dog. Moving to a new location can also upset them so extra time may be needed to familiarise them with the new area, which can be done by walking the dog on a leash around its boundaries.

Not attentive: wandering away from livestock

Not all dogs will stay with the flock and be attentive all the time. Most sleep during the day, although they tend to be more attentive at night. During hot and humid weather dogs may leave to seek shade or water. Brushing out the under-fur, shearing long-haired dogs and giving plenty of water can reduce this. Dogs may also go looking for shelter from bad weather or for extra food. **Make sure that you provide LGDs with their basic needs, including sufficient food, to allow them to do their job.** Leaving the flock can also be associated with sexual activity, so neutering at 6–12 months of age may decrease roaming. Neutered dogs also tend to eat less food and remain healthier while remaining effective guardians.

Escaping (as well as chasing) can be impeded by attaching a weight to the dog's collar using a chain. The weight should be a piece of wood, tyre or other material not likely to cause injury, about 30 cm long, 8–35 cm in diameter and up to a quarter of the weight of the dog. The chain should be a metre or more in length.

The most common attentiveness problem is dogs returning to areas of human activity. Seriously inattentive dogs tend to be those treated as pets or allowed to develop social relations with pet dogs. If all corrective measures have failed, even dogs more attentive to people than livestock can be useful in some situations, such as where a shepherd is always present, within a fence or where pastures surround a house or barn.

Although most LGDs do not have well-developed predatory instincts, some do chase wild animals. Besides leaving livestock vulnerable to predators this can also lead to conflicts with

human hunters, who may shoot LGDs. To reduce the risk of this happening, follow procedures for socialising pups with livestock diligently, reprimand them whenever they try to leave the flock and be sure to provide them with sufficient food. As with tackling harassing of livestock, a “dangle stick” can be used to restrict the dog’s movements. Try to talk to local hunters about your efforts to protect your livestock and consider marking your dogs with a coloured collar so they can be clearly identified.

Not protective

LGDs do not need to be always ferocious to deter predators. The dog that appears to be lazing around all day doing very little might in fact be performing its role very well, particularly at night, when predators tend to be more active. Be patient in allowing a young dog sufficient time to develop the confidence to confront large predators. Having the company of other dogs tends to give LGDs more courage. They will also be less anxious in novel surroundings. More than one dog may be needed to protect a larger or widely scattered flock and this will also reduce the impact of a deficient animal. Some dogs might not be aggressive towards predators but are very vigilant and so can still be useful in barking to alert other LGDs and shepherds, which also distracts the attention of predators. Most protectiveness problems are associated with poor attentiveness.

Aggression towards people

Whilst serious injury is thankfully rare, sufficient consideration should be given to the issue of human safety. A certain degree of aggression is to be expected from dogs whose job is to guard and protect. However, **LGDs do not need to be overly aggressive towards people** to successfully defend livestock from predators.

If your dog is going to be working in areas frequented by unfamiliar people, such as tourists, make sure it gets used to meeting a variety of people from an early age. LGDs are likely to react more negatively to strangers when the owner is not present. Intact males can become more aggressive as they mature; bitches when in heat or lactating. Dogs are often especially protective of their food or a territory boundary such as a fence. Those which remain excessively aggressive after neutering, even without provocation, should be replaced unless they can be contained in a secure area and very carefully managed.

CONTACTS FOR HELP AND ADVICE

If you want further information about using Livestock Guarding Dogs to protect your livestock from large carnivores, or you are interested in being involved in any trails carried out by the project, then please contact:

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Credit: Canine Efficiency