A LARGE CARNIVORE INITIATIVE FOR EUROPE

# Carnivore Damage Prevention News

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## Notes from the Editors

The show must go on!

During the last meeting of the core group of the Large Carnivore Initiative for Europe LCIE, we discussed on how to go on with the Carnivore Damage Prevention Newsletter. CDPNews is meant to be a forum to discuss practical problems, experiences and solutions. It is an interface between the research and the application, a place to promote measures that work and attempts that failed. The basic idea was that there are many people across the world trying to mitigate the carnivore-livestock-human conflict, and that not everybody should be forced to make the same mistakes and to re-invent the wheel. The problem with such an interface tool is however the communication. To distribute information in English through the World Wide Web is the easiest, fastest and cheapest way of communication today. However, we know that many of the practicians across the world do not communicate that way. We have therefore produced and distributed a printed version in addition to the PDF version available on the internet. But we were never able to produce CDPNews in a different language than English. Also we hope that part of the information provided may have been translated to and spread in other languages, there was never such a feedback.

We want to continue CDPNews, but give it a somewhat different shape. We intend to produce two issues a year, but this depends on funding available. We will however strengthen the internet presence of CDPNews, and this is already done for the present issue. All articles will be available as HTML documents in addition to the PDF versions of all issues, and rubrics such as news, address lists, providers etc., requiring frequent changes will be delegated to the websites. Furthermore, we want to produce fact sheets and topical brochures featuring damage prevention. These, as they go beyond actualities, may even be translated into several languages.

Whatever we, the editors, plan to do – whether CDPNews is a lively tool or not depends mainly on you, the reader, on your feedback, your comments and your contributions. CDPNews should not compete any scientific publication. We will feature new publications (e.g. by publishing abstracts), but we all know that there is a wealth of important practical intelligence available that will never make it into a scientific journal. That's exactly what we are looking for. Please report also your negative experience and your problems, to ask other CDPNews readers for their help and opinion, and do not hesitate to write us in other languages than English.

The Editors

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## Contents

# Recovering the Use of Livestock Guarding Dogs in Portugal: Results of a Long-term Action

by
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Wolf predation on livestock is one of the major threats to wolf conservation worldwide. Included in this conflict are more than just economic issues. Wolf damages are often perceived as being higher than real damages and as having a larger economic impact than livestock losses due to other factors such as disease. In some areas of Portugal mortality of goat kids due to the lack of disease prevention can reach more than 50 % of the yearly production, per flock, while maximum wolf predation registered was around 5 %. Therefore, despite the use of compensation measures, their effectiveness at increasing tolerance may be limited.

Besides the financial losses that result directly from wolf predation, other costs must also be considered. Wolf presence also implies changes in livestock husbandry, management and protection techniques that involve additional work and extra costs. These changes are difficult for livestock producers to accept. Therefore we could therefore expect the imposition of adequate husbandry and protection measures to actually increase animosity towards the wolf and the agencies responsible for its protection in the short term. The answer may be implementing long-term awareness and cooperative actions to improve husbandry and livestock protection practices thus reducing the potential for conflict. In our experience, in wolf areas where the damages on livestock are low, tolerance is recognisably higher. Besides damage's reduction those actions would also result in establishing a direct working partnership with the rural community leading to a more trusting relationship that seems to be important when dealing with tolerance issues.

In the scope of wolf conservation efforts, several techniques are being developed and implemented to reduce predatory impact on livestock. One of the most widespread and successful is the use of Livestock Guarding Dogs (LGDs). LGDs are part of the traditional husbandry system used in Europe and Asia, where dogs were selected to protect livestock from several predators. In recent decades the use of these dogs was gradually abandoned due to socio-economical reasons (mainly related to the depreciation of the traditional livestock production and the reduction of predators). With the new policies on wildlife restoration and revitalisation of traditional livestock production, there is the need for tools that could prevent conflicts and make coexistence possible. This will enable the wolf to live in areas where its presence would not otherwise be acceptable.

**Recovering the use of LGDs**

In Portugal, *Grupo Lobo* initiated a programme aiming to contribute to the conservation of the endangered Iberian wolf through the development and implementation of practical measures to reduce livestock predation. This programme has been ongoing since 1997 and will be briefly presented here.

The first action was to help recover the use of native breeds of LGDs. In Portugal three breeds of LGDs (*Cão de Castro Laboreiro*, *Rafeiro do Alentejo* and *Cão da Serra da Estrela*, that has both long and short hair varieties) were selected to protect livestock from predators. A total of 75 pups (38 males and 37 females) from these breeds were selected and given to shepherds (Fig. 1).

**Fig. 1**: A shepherd holding his new *Cão de Castro Laboreiro* pup, before placing it with the flock.

They were integrated into goat and/or sheep flocks, ranging from 50-700 animals, in the North and Centre of the country. The progenitors of the

[1]A fourth LGD breed named *Cão de Gado Transmontano* (originated in the Northeast of Portugal) is currently under recognition by the Portuguese Kennel Club.

dogs were preferentially working dogs that presented no physical abnormalities or health problems. Criteria for flock selection were based on:

1. the amount of damages,
2. the existence of conditions to receive a dog and,
3. the shepherd's motivation to cooperate in the project.

Before delivering the pup, the shepherd had to sign a cooperation contract with the entity coordinating the programme. The contract established the education and raising conditions/rules the shepherd should comply in order for the dog to become a good working dog and was valid until the animal reached adulthood. During this period the dog belonged to the entity implementing the action and thus could not be given away or sold if the shepherd sold the flock. The project team was responsible for replacing the dog in case of its death (only if the shepherd was not directly responsible) or if it was considered inefficient by researchers. We found this contract to be very useful, because it would enable the exclusion of the shepherd if he was not raising the dog according to the conditions previously defined (thus risking its future success) as well as the dog transfer to other shepherd. Also it contributed to increase the shepherd responsibility towards the dog and thus the success of the action

The pups were integrated in the flocks after weaning (around 7-8 weeks old), during the socialization period. After a short period of 2-3 weeks, of strict confinement in the stables/corral (where the livestock was kept during the night), the pup would then start to accompany the flock to the pasture/mountain during grazing periods. Limited contact with other livestock, dogs or people (apart from the strictly necessary contact for the pup to know the shepherd and its family) was observed. As soon as the pup started to go with the flock to the pasture an member of the project team would regularly accompany the flock to monitor the dog's behavioural development. The periodicity ranged from 15 to 30 days, respectively for pups younger or older than 6 months. Dog monitoring was maintained until they reached adulthood (12-18 months). This schedule was followed as much as possible and intended also to control the shepherd's behaviour towards the dog and allow the prompt correction of undesirable behaviour (whether by the dog or the shepherd). During the visits the general condition of the dog was verified and any health problems were treated. The shepherds were also requested to contact the project team in case the dog was sick or behaving strangely, and if they needed any other help or advise. The project team provided the food for the dogs until they reached adulthood as well as the veterinary care. In spite of the extra care devoted to these dogs, a mortality rate of 24 % was observed, with disease as the main cause of death (n=8), followed by poison (n=2), while 4 dogs died from other causes (run over by car, shot by hunters, blow to the head, attacked by a wolf) and 4 dogs disappeared.

The evaluation of the dogs' efficiency was based on three different types of analysis: damages reduction, dog's behaviour, and owners' satisfaction. This evaluation was done only for adult dogs (>18 months). For each flock we compared the mean number of damages in the three years before the integration of the dog with the number of damages that occurred in the year after the dog filled 12 months of age. We observed a general reduction in the number of damages, ranging from 33 % to 100 %. Nevertheless, there was a considerable variability in the number of damages throughout the years, suggesting that other factors unrelated to the dog's action (e.g. fluctuations in predators density, availability of alternative prey, changes in flock management, and in habitat conditions affecting the efficiency of the attacks) could also be responsible for the observed changes. When analysing the number of damages relative to the total damages in the nearby flocks, we observed a reduction from 10-40 % in 60 % of the cases. This indicates that there was a reduction in the number of damages in the studied flocks compared to the predatory impact in the region. As stated before, this could result from the presence of the dog or from other factors. In some flocks, where there was no change or a small reduction in the relative damages, there was nonetheless a significant increase in the number of attacks that were efficiently prevented by the dogs (Petrucci-Fonseca *et al.*, 2000).

The behaviour of adult dogs was evaluated according to the three behavioural components defined by Coppinger & Coppinger (1978) for this type of dogs: attentiveness, trustworthiness and protectiveness. Attentiveness refers to the dog maintaining its proximity to the flock and following its daily movements during grazing as well as exhibiting social behaviours towards the animals in the flock. Trustworthiness implies the dog not disturbing flock's activity or chasing/injuring animals in the flock. Protectiveness refers to the dog being alert to any new or strange situation or intruder (barking) and actively preventing a potential attack.

Almost 90 % of the adult dogs were attentive to the flock. Most dogs displayed adequate investiga-

**Fig. 2**: A juvenile *Cão de Castro Laboreiro* dog displaying submissive behaviours towards an animal from its flock

**Fig. 3**: An adult short-haired Cão da Serra da Estrela dog perfectly integrated in the flock.

tory and submissive behaviours towards the animals in their flock (Fig. 2). However, during monitoring seven juvenile dogs were identified as not behaving correctly, mostly due to incorrect behaviour by the shepherds that were reinforcing their own bond with the dog or limiting their contact with livestock. After some actions were initiated to correct these situations, 4 dogs died soon after (disease, run over). In 2 other cases the shepherds did not change their conduct and the dogs were transferred to other flocks; one was recovered and the other died soon after (disease). One dog was definitely removed.

Regarding trustworthiness, although it is fairly common for juvenile dogs to chase/injure (rarely kill) kid goats or lambs during play sequences only one adult dog attacked and killed flock animals and was immediately removed. Excessive play behaviour in juvenile dogs can become a real problem and was thus immediately corrected to prevent it from being reinforced. This was facilitated since most of the flocks were shepherded. The permanent presence of a shepherd and the continuous monitoring of the dogs' behaviours by the work team could account for the high percentage of attentive and trustworthy dogs when compared to other studies. All adult dogs exhibit protective behaviours (alert to the flock activity and movements, barking in strange situations, placing themselves between intruders and the flock, chasing and occasionally fighting intruders) and actively preventing wolf attacks. Shepherds were generally satisfied with their dogs: 95 % consider them very effective and 60 % say the dogs were responsible for the observed damage reduction.

The analysis of the amount of damages before and after the introduction of the dog is the method generally used to assess LGDs' efficiency. Nevertheless, since the amount of damage can be influenced by several factors difficult to assess, an alternative would be to focus on the number of attacks prevented by the dog as well as on the behaviour exhibited by the dog in specific situations. According to Lorenz & Coppinger (1986), the development of protective behaviour is a result of good trustworthy and attentive behaviours. Attentiveness is also considered to be a key indicator of success because most predation problems are associated with low attentiveness (Coppinger *et al.*, 1983) (Fig. 3).

## Alternative protection methods

Raising a LGD requires a great commitment by an inexperienced shepherd and some requirements must be met for a LGD to become an efficient guardian (e. g. gregarious livestock, the absence of potential causes of death like the illegal use of poison). Moreover, more than a year is necessary to evaluate the dog's efficiency, since the dog may not be fully effective until after reaching adulthood. Taking this into account, a new project (AGRO 311 – INIAP-Ministry of Agriculture) has been initiated in 2001 that aims to test the efficiency of alternative or complimentary methods to LGDs, namely electric fences and fladry, as well as to recover other traditional protection methods. Preliminary inquiries (n=74) on traditional techniques of livestock protection conducted in Central Portugal, led to interesting findings on the use of different light-mobile barriers (at least until 1950), some similar to fladry, to protect sheep flocks kept in small enclosures (corrals) overnight. The gathering of information is still underway and the test of the effectiveness of these methods will be conducted this year. Although testing the long-term efficiency of fladry to protect livestock from wolf predation in natural environments is still underway, the use of similar barriers by Portuguese shepherds increases our confidence in this technique. The success of livestock protection measures necessarily requires the implementation of new and traditional methods that best complement and adapt to each situation.

**Importance of long-term support actions**

After the initial scepticism showed by shepherds, this long-term action resulted in an increasingly positive acceptance of LGDs. Participating shepherds can now recognize a good working LGD and are aware of the conditions necessary for raising one. They frequently ask for supplementary dogs to substitute their other dogs and improve flock protection. There is also a good receptivity from other shepherds that learn about the dog's efficiency and increasingly ask for LGDs descending from those dogs. This flow of information between shepherds from the same and neighbouring villages seems to be very effective at a local scale and contributes to enhance their confidence in LGDs and their willingness to use them. Once livestock producers are satisfied with the use of LGDs the mere presence of a good working dog in the flock can contribute to reduce conflicts with the wolf and put damages in a real perspective.

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# Influence of Large Carnivores on the Distribution of Excreta by Sheep on a Summer Pasture, in the NW-Italian Alps

by
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**Introduction**

The presence of large carnivores in the Alps has caused great changes in sheep pastoral systems: the traditional grazing management (exploitation of summer pastures by free ranging flocks) has been replaced by a non-traditional one, with constant shepherd supervisoin and the use of night-time enclosures. As a consequence of the changes in flock distribution and movements, the distribution of animal excreta has been affected, with possible effects on vegetation and pastoral quality.

To evaluate the consequences of the non-traditional grazing management, the distribution of excreta was surveyed in an Alpine summer pasture and related to vegetation types, flock movements, stocking density, and efficiency of grazing. The results concerning dung distribution are presented in this paper.

**Interactions between domestic animals and predators, and consequences for grazing management**

In Valle Stura of Demonte (NW Italian Alps, province of Cuneo), sheep breeding is a traditional activity (still important for the economy of the valley), based mainly on the exploitation of summer pastures. At the same time, it is an important area for the conservation of the alpine environment. Until a few years ago, because of the absence of large carnivores and the lack of labour, shepherds used to drive their flocks to mountain pastures and leave them alone for the whole summer: free ranging flocks used to exploit even the remote areas of summer pastures, spending the night outdoors without protection.

Recently, in relation to the increasing presence of *Canis lupus, Vulpes vulpes* and stray dogs, the risk of losses due to depredation has affected alpine grazing management; discouraging the exploitation of more remote and inaccessible pastures, and forcing shepherds to guard flocks during the day and fence them in protected enclosures during the night. Even the

**Tab. 1:** Solid excreta and nitrogen distributed on the rangeland during the grazing season.

| | **Vegetation type (ecofacies) and sub-facies** | **Surface (ha)** | **Faeces N faeces (kg ha$^{-1}$)** | **(kg tot)** | **N urine (kg ha$^{-1}$)** | **N total (kg ha$^{-1}$)** | **(kg ha$^{-1}$)** |
|---|---|---|---|---|---|---|---|
| A | Nardus stricta | 86.3 | 78.1 ± 12.1 | 6741 | 1.68 | 1.72 | 3.39 |
| B | Festuca paniculata | 17.6 | 4.4 ± 2.3 | 77 | 0.09 | 1.63 | 1.72 |
| | + *Festuca* gr. *ovina* | 46.1 | 47.5 ± 11.1 | 2’188 | 1.02 | 0.92 | 1.94 |
| | + *Anthoxantum alpinum* | 13.4 | 25.3 | 340 | 0.54 | 1.05 | 1.59 |
| | + *Vaccinium myrtillus* | 7.1 | 19.6 ± 9.9 | 140 | 0.42 | 0.59 | 1.01 |
| | + *Potentilla aurea* | 7.2 | 64.7 | 464 | 1.39 | 0.63 | 2.02 |
| C | Festuca gr. ovina | 45.0 | 58.6 ± 33.9 | 2’634 | 1.26 | 2.03 | 3.29 |
| D | Poa alpina | 4.8 | 74.9 ± 21.7 | 363 | 1.61 | 1.52 | 3.13 |
| E | Dactylis glomerata | 3.7 | 37.6 | 138 | 0.81 | 3.28 | 4.09 |
| Total | | 243.0 | 55.4 ± 6.6 | 13‘085 | 1.19 | 1.42 | 2.61 |

distribution of excreta on rangelands has been affected by changes in grazing management, with transfer of nutrients from the rangeland to paddocks, which was evaluated in an alpine pasture and related to vegetation types, stocking-rates and grazing efficiency.

## The situation on the “Alpe Ischiator”

Studies have been carried out during 2001, at the Ischiator summer pasture (1800-2830 m a.s.l.), grazed by a flock of 500 Sambucana sheep. Vegetation, morphological characteristics of the grazing areas and sheep solid excreta distribution were surveyed. The vegetation composition was determined with the Daget-Poissonet method (1969), along 32 transects.

To estimate the quantity and distribution of faeces, so to detect possible gradients from shelters outwards, 52 sample areas (20 x 0.80 m) were located over the rangeland (243 ha of herbaceous surface out of 824 ha of total surface), inside which faeces were counted after the sheep had been grazing there. The length of exploitation inside each sector of the pasture, as well as the intensity of grazing were also surveyed. To assess the transfer of organic matter and nutrients from the rangeland due to the actual grazing management, faeces samples were collected, oven-dried (40°C) to determine dry weight, and analysed for N, P, K, Na, and Ca content.

The quantity of nutrients supplied by urine was assessed on the base of literature (Barrow, 1987; Barrow and Lambourne, 1962; Lancon, 1978a, 1978b).

## Fertility management

The rangeland was characterized mainly by *Festuca paniculata* (45 % of the surface) and *Nardus stricta* (34 %) dominated swards. The pastoral value (Daget & Poissonet, 1972) was on average low (12-15 compared to 30 for a good quality pasture in those conditions), but higher forage values (up to 38) were computed for less extended types

As an effect of actual grazing management (sheep grazing for no more than 12 h d$^{-1}$ and night sheltering in 2 areas of approx. 1 ha each, near the shepherds buildings), the flock brought to the rangeland about 13.1 t y$^{-1}$ (55 kg ha$^{-1}$y$^{-1}$) of faeces (table 1), which is less then 50% of the supply with traditional management (26.8 t y$^{-1}$ over a 243 ha surface).

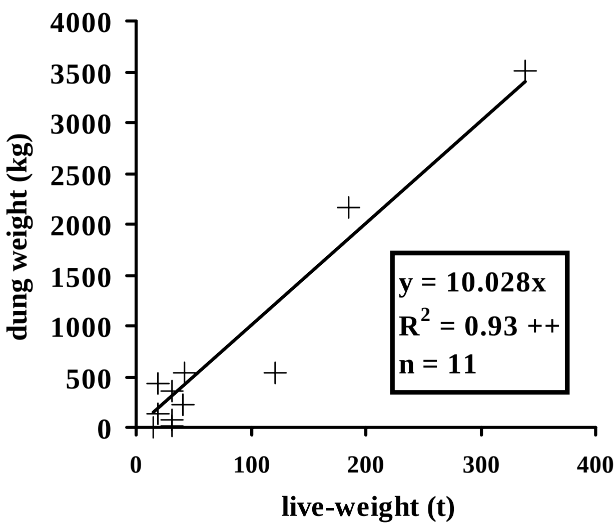


**Fig 1:** Relationship between stocking-rate and quantity of dung.

Because of the wide variability of faeces distribution within the same vegetation type (even if the sheep were herded an uniform grazing pressure was not maintained), a significant effect of vegetation composition on excreta distribution could not be identified in the analysis of variance (P = 0.26 ns). Furthermore, as the shepherd used to guide the flock during the day all over the grazing area, no correlation was found between the quantity of dung and the distance from the night shelters (r = -0.01 ns, n = 44).

Instead, the quantity of dung distributed on the rangeland was linearly related to the stocking-rate, expressed as live-weight (Fig. 1), and well correlated to the intensity of defoliation by sheep (r = 0.62 ++, n = 44).

Among morphological factors, the dung distribution was mainly determined by the slope, to which it was inversely correlated (r = -0.45 ++, n = 44), in agreement to what was found by Lombardi (1997), with cattle.

With regard to nitrogen, 2.6 kg $ha^{-1}y^{-1}$ returned to the rangeland (35% of the amount with traditional mangement), of which 1.2 kg $ha^{-1} y^{-1}$ with faeces, with a wide variability among vegetation types (from 1 to 4 kg $ha^{-1}y^{-1}$) confirmed also in literature (Whitehead, 1995; Lancon, 1978a).

The quantity of dung concentrated inside night shelters, assessed on the basis of stocking-rate and daily distribution of defecations, was 13.7 t $y^{-1}$ of dry faeces and 1200 kg $y^{-1}$ of N (faeces + urine). As a consequence, since 1996, 275 kg $ha^{-1}$ of faeces and 25 kg $ha^{-1}$ of N have been transferred from the rangeland and concentrated into the two small corrals (1 ha each) used during the night. In spite of the little amount per hectare and per year, N and organic matter removal from the grazing area might affect the nutrient budget of this fragile alpine ecosystem, and facilitate the spreading of non-pastoral species, even in a short time period, as reported by Cugno (2001) in a similar environment of the same valley.

## Conclusion

According to Vidrih (2002) the corrals, surrounded by permanent electric fences, seem to be an interesting solution (in terms of cost and feasibility) to prevent livestock depredation. Nevertheless, with the actual grazing management, excreta are excessively concentrated in the areas where flocks are sheltered. In fact, in the summer pasture where the experiment was carried out, about 50% of seasonal faeces production was released in the shelters, with unfavourable effects on the nutrient budget. An important nutrient and organic matter transfer may create conditions for the deterioration of the pastoral quality of vegetation, especially in the more remote areas. As a perspective, this may make it impossibile to carry on sheep grazing, and may be detrimental for the production of high quality lamb meat, on which the local breeding system is based (Sambucano heavy lamb meat is well appreciated not only at a regional scale). Consequently, the presence of large carnivores might be indirectly detrimental not only to the ecosystem, but also to the economic system, if management changes to integrate them will not be put into practice. The long term effects of an integration of predators, which are an important element in food chain and might be a tourist attraction (especially wolves), have to be further investigated.

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# King Collar: Predator Protection Collars for Small Livestock

by

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## Introduction

Predation on small stock in South Africa is widespread. Many graziers will lose up to 30 % and even 40 % of their lamb crop from birth to adulthood, to predation by wild animals. Over 90 % of the predation is by caracal and black-backed jackal. Depending on age, the breed of animal and how the value is calculated, the loss of a lamb will imply a direct loss to the grazier of between R140 (1 Rand = 0.15 US$) and R275. Typical ewe flock size will range between 500 and 1'000 animals. The average number of lambs dropped per flock of 2'000 animals will be about 700 for animals used in fibre production (wool sheep and Angora goats) and perhaps 1'400 in meat producing animals. There are in excess of 30 millions small stock in South Africa. 1990 estimates are 29,9 million sheep and 2.8 million goats. Traditional control measures have almost exclusively concentrated on the elimination of the predator. Methods used include: hunting by means of dog packs, by means of rifle, leg-hold trapping, poison baits, baited cages, poison collars placed on lambs' necks and poisonous explosive baits. A small number of farmers attempt to exclude predators with electrified fencing. Some farmers attach bells to the lambs' necks, and others slip pieces of old inner tube over the neck.

Both caracal and black-backed jackal use very specific methods of killing prey. Both suffocate their prey by biting the windpipe from the underside. Caracal will stabilise their prey while biting by using their claws behind the head and on the back of the neck. Jackal will bite on the cheek, injuring a nerve running down the side of the face. This injury apparently causes a degree of paralysis. The jackal then changes its grip to the windpipe. Very occasionally jackals have been known to bite in the hindquarters and attempt to kill in this way.

## Innovation

We believe that no amount of hunting will eliminate the predation problem. There will always be predators that will elude eradication. Many small stock graziers border cattle farmers, game farmers or game reserves, none of whom have an interest in eradicating caracal or jackal. However, accepting a permanent predator presence implies a preventative approach.

Our device attempts (successfully) to armour stock against attack (see Fig. 1). It is important to note that the bells and inner tubes mentioned above attempt to repel predators. They are also not successful for more than short periods as the predators soon adapt to the strange sounds and strange appearance/texture.

## Use of quality materials, manufacture and assembly

The collars are manufactured out of black 1mm HDPE sheet. The collars are pressed out using a dieknife and a mechanical press. We have purchased our own press and manufacture the collars on the farm. The collars require no assembly. They are flat, shaped plastic sheet with various slits and holes in them. They are smooth and do not irritate the lambs they are fitted to.

## Safety and Ergonomics

The plastic used is inert and contains no poison. The collars are adjustable in size, and so may be "let out" as the lamb grows. Once the lamb has outgrown the small collar, the large one is fitted. The collars do not damage wool or mohair. The collars allow free movement of the neck and head, and do not interfere with suckling or grazing. The collars have several small holes in them in order to allow for the release

**Fig. 1**: King Collar on sheep: it can be nicely seen how they protect the side of the cheek.

of moisture. Wet wool would attract blow-fly infestations.

**Affordability**

We sell our collars at R4.00 each for the small size and R5.50 for the large, VAT included. The collars, being made of UV resistant high density polyethylene, should last at least 5 years. They are re-usable and the cost of protecting a lamb to adulthood will therefore be R4.00 + R5.50 divided by the 5 years, totalling R1.90.

Presume a lamb crop of 100, a predation rate of 10 %, a collar protection success of 90 % and a lamb value of R200. An unprotected crop will result in a loss of R2000 to predation. Protection will reduce this by R1'900, at a cost of R160. The only other successful preventative measure – electric fencing – will cost from R10'000 to up to R80'000, depending on the area to be fenced.

We must point out, that while success in preventing attacks by jackal is reported to us by users to be almost 100 %, against caracal predation, the collar is effective but not as successful. Users have described it as "65 %" effective against caracal. We suspect that the caracal is able to hold its prey still with its claws and thus find the small unprotected area of neck, this area is necessary in order to allow the lamb sufficient mobility to eat and drink.

**Environmental impact**

The collars can be manufactured from "regrind" – recycled plastic, which has the added advantage of being cheaper. The small amount of waste plastic can be recycled.

However, the major environmental impact will result from the cessation of attempts at killing jackal and caracal. These attempts are very often indiscriminate and can impact very heavily on non-target animals. Leg-hold traps are not humane and eliminate many innocent animals. Only the very best packs of hunting dogs can be dissuaded from attacking animals other than jackal and caracal. But it is the (usually indiscriminate) use of poison that causes very significant environmental damage. Many farmers become so desperate that they distribute unsuitable poisons in baits and carcasses, and fail to monitor or clear up the poison afterwards. Other carrion feeders then become targets and significant losses of particularly vultures have occurred in this way. Some poisons do not break down and by remaining in the food chain can continue killing for long periods. The widespread use of the collars can do much to obviate this damage.

**Ease of maintenance and installation**

The collars can be fitted and removed in less than a minute per sheep by farm labourers. Adjusting the collars for growth is equally quick and needs to be done every third week in young lambs and perhaps every 3 months in weaned lambs. The collars require no maintenance. This must be contrasted with traditional control methods, all of which require significant and regular time inputs, as well as varying degrees of skill.

**Social acceptance**

Our sales to date are just over 270'000 collars, the first sale having taken place in October of 1997. We have been somewhat surprised that acquaintances particularly, in spite of appreciating the advantages outlined above and in the face of proof of efficacy, have been reluctant to use the collars. In spite of being farmers ourselves, we have come to the conclusion that farmers are a very conservative and suspicious lot. And secondly, that they have come to hate predators so much that it is hard for them come to terms with control methods that do not result in dead jackals and caracals.

More information on:
http://brigham.sphosting.com/kingcollar/index.htm

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There is currently a small trial under way at one of the SA agricultural colleges, but no results are available yet. CDPNews intends to keep you updated.

# Bringing Insight into Livestock Depredation by Wolves in Southwestern Alberta, Canada

by
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Conflict between the livestock industry and wolves has been ongoing in southwestern Alberta, Canada since settlement of the area, because of wolf depredation on domestic livestock (Gunson 1992, Musiani *et al.* 2003, Musiani and Paquet 2004). Although impacts of depredation on the livestock industry in Alberta as a whole are very small, costs to individual ranchers can be high, as depredation events often reoccur in the same area. The common management practice in response to depredation, both in the past and present, is to cull wolves, affecting the viability of wolf populations in this portion of the province (Gunson 1992, Musiani *et al.* 2003, Musiani and Paquet 2004). It is in the interest of many segments of the general public, including ranchers, to reduce depredation (Gunson 1992, Kellert *et al.* 1996, Musiani *et al.* 2003, Musiani and Paquet 2004). Benefits to the rancher are obvious, with the potential for additional benefits to all concerned stakeholders, including increased tolerance for wolves in the area leading to a probable reduction of culling, resulting in more stable wolf populations in the southwest portion of Alberta.

Some studies in other parts of the world have used a spatial approach to model and predict areas of livestock depredation (Mech *et al.* 2000, Treves *et al.* 2004). In southwestern Alberta, depredations tend to re-occur in the same areas; therefore we used a similar approach, using Geographic Information Systems (GIS) to model spatial factors we thought had an impact on depredation events in southwestern Alberta. We used multivariate statistics to determine what variables could be used to predict areas of livestock depredation risk. Some of the factors we looked at included: human disturbances (e.g. buildings and roads), habitat (e.g. vegetative cover, riparian areas and terrain ruggedness) and wild prey distribution (elk density). Our goal is to provide information to ranchers in southwestern Alberta on what defines areas of livestock depredation, and thus help them better manage their livestock to reduce depredation risk when wolves are in the area.

**Methods**

We contacted ranchers along the foothills of southwestern Alberta to determine locations of depredation sites. We visited these depredation sites with the ranchers to record GPS locations. We established the relationship of these depredation locations to roads, buildings, vegetative cover, riparian areas, and prey density in comparison to random points on the landscape available to wolves using multivariate statistics.

**Depredation Risk Factors**

Some of the parameters we tested had a nominal relationship to depredation risk. These parameters indicated that depredation risk was related to cattle distribution. For example, contrary to what was expected, depredation risk was higher closer to paved roads and buildings but lower closer to remote areas and dirt roads. This is because we looked at depredation risk across a large scale. In relation to habitat available to wolves, depredation happens in areas where humans are located, as this is where cattle are located. If we examined depredation at a smaller scale (e.g. at the individual ranch) we believe depredation risk would be lower where human presence is high. However, it is also possible that human disturbance levels in southwestern Alberta are not high enough to deter wolves from attacking cattle. Regardless, these parameters had a weak relationship to depredation risk and are not the most useful for predicting areas susceptible to depredation.

Conversely, the elk density and distance to vegetative cover parameters had the greatest ability to predict depredation risk. Depredation events occurred in locations where elk density was higher and in closer proximity to vegetative cover when compared to available sites. Wolves likely use cover to avoid detection of prey (Kunkel *et al.* 1999) and cover likely decreases detection of wolves by humans, important in areas where culling of wolves is practiced. Depredation risk is higher where elk density is higher, potentially because these areas are expected to be colonized and hunted by wolves (Mech 1970, Jedrzejewski *et al.* 2000 and Carroll *et al.* 2003). When livestock are put into these areas, chance encounters with wolves are higher (Linnell *et al.* 1999) and depredation events may be more likely to occur.

**Implications for Ranchers and Wildlife Managers**

Proximity to vegetative cover is an important indicator of where depredation events occur in southwestern Alberta. This is a variable we believe can be managed by ranchers and wildlife managers when depredation becomes a problem on a given ranch. Movement of cattle away from forested areas will result in decreased risk of depredation to that livestock and will potentially result in fewer depredation events. Ranchers and managers should focus anti-depredation strategies to areas where vegetation cover is substantial (when livestock are located there) to deter wolves from preying on livestock.

Elk density is a factor that would be difficult for wildlife managers and ranchers to manage. However, at the very least, wildlife managers and ranchers may be able to determine the vulnerability of an area where cattle are grazed to depredation by understanding the density of wild prey in the area. Eliminating wild prey in an area will not necessarily decrease depredation risk and may in fact increase reliance of wolves on livestock (Meriggi and Lovari 1996, Meriggi *et al.* 1996) and is unlikely a management tool available to ranchers or wildlife managers. Public support for removal of big game species, such as elk, to reduce depredation risk would likely be very low if it existed at all. Improved understanding on the finer scales of the relationship of wild prey density to livestock depredation will provide further insight into what drives livestock depredation by wolves in southwestern Alberta.

**Acknowledgements**

We would like to thank the following for their support of the project. The ranching community of southwestern Alberta, Alberta Beef Producers, Alberta Conservation Association, Alberta Ecotrust, University of Calgary Faculty of Environmental Design, the Alberta Government, and the Calgary Zoo.

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Treves, A., L. Naughton-Treves, E. K. Harper, D. J. Mladenoff, R. A. Rose, T. A. Sickley, and A. P. Wydeven. 2004. Predicting Human-Carnivore Conflict: a Spatial Model Derived from 25 Years of Data on Wolf Predation on Livestock. Conservation Biology. 18:114-125.

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# Reduced Wolf Attacks on Sheep in Østfold, Norway using Electric Fencing

by
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**Short summary:** *Improving traditional fencing with electric wires significantly protected sheep from wolf attacks in an area experiencing high losses in Norway 2002. The attack frequency on pastures with traditional fencing was 5-6 times higher than on pastures with improved fences. Also, attacked pastures lay farther from houses than pastures not attacked, which supports the use of night closures near farmyards.*

Wolves returned to the county of Østfold, Norway in 1997 after being absent for almost 150 years. With traditional fencing and no shepherd guarding, the wolves then had free access to grazing livestock, and the number of attacks rapidly increased (Fig. 1). In the majority of cases sheep were attacked (i.e. 31 out of 35), but also some cattle were involved. One wolf territory in particular became a "problem area". Of the 35 attacks reported until 2002, 29 occurred within this territory, called Moss-Våler.

The territory covered approximately 600 km$^2$ across 8 different municipalities. The density of winter-fed livestock varied locally from 3.0 to 10.2 animals per km$^2$, of which one fifth were sheep or goats, and the rest beef cattle, diary herds and a few horses. Most livestock in Østfold graze in pastures for parts of the year, mainly in May-Sept. Sheep are traditionally fenced off with a non-electric 15x20 cm mesh wire 90-100 cm in height, while an electric one- or two-wired fence is used for cattle and horses. Østfold does not have the extensive free-ranging of livestock common elsewhere in Norway, and most pastures lie within 1 km from the farmyard.

From 2000 and onwards, farmers could apply for financial support to improve their fences through the scheme "Preventive measures against livestock depredation". By 2002, 17 % of all farms with grazing livestock within the county had applied, and a total of 182 km of fences had been improved for the cost of € 325'000 (US$ 400'000). Within the Moss-Våler territory, the figure was 60 %. Those who received financial support had to follow a given standard, i.e. minimum height: 100 cm; maximum distance from ground to first wire: 20 cm; maximum distance between wires: 20 cm (30 cm in upper half). In the end of 2002, the minimum height was raised to 120 cm.

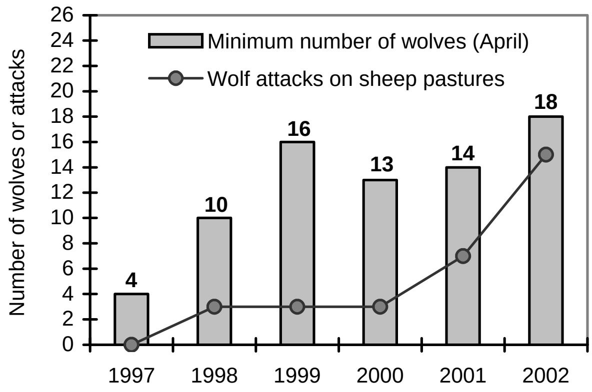


**Fig. 1:** Number of wolves and attacks on sheep pastures in Østfold, Norway 1997-2002.

In the summer 2002 the losses were higher than ever, and 40 % of all registered sheep farmers within the territory had one or more wolf attack on their pastures. This was a valuable opportunity to test the preventive effects of the improved fences. Roughly half the sheep pastures had experienced losses, while the other half had not. Which factors differed between the two?

## Methodology

A field survey of all registered sheep pastures within the territory was conducted in the spring 2003. The following were registered at each site:

*Fence type*
- Improved or not
- Mesh wire vs. fully electric

*Fence parameters*
- Minimum height
- Number of electric wires
- Largest distance from ground to 1.wire
- Largest distance between wires
- Number of "weak" points along fence

*Position of pasture*
- nearest distance to houses
- nearest distance to roads

The data obtained from the survey was treated statistically with non-parametric methods, where pastures with and without attacks were compared with a Wilcoxon rank sum test. Despite the data being non-normal, we here present the mean (not the median) of parameters, since the mean is more familiar to most people.

**Tab. 1**. Fence parameters for pastures with and without wolf attacks on sheep in Østfold, Norway 2002.

| Fence parameter | Pastures attacked by wolves | Pastures not attacked by wolves |
|---|---|---|
| Minimum height (cm) | **62** ± 12,0 (N=15) | **110** ± 5,1 (N=22) |
| Largest distance from ground to 1.wire (cm) | **29** ± 5,0 (N=15) | **29** ± 4,9 (N=22) |
| Largest distance between wires (cm) | **42** ± 5,4 (N=3) | **32** ± 1,4 (N=14) |
| Number of electric wires | **0.9** ± 0,41 (N=15) | **2.4** ± 0,4 (N=22) |
| Number of "weak" points along fence | **4.0** ± 0,9 (N=15) | **0.7** ± 0,3 (N=22) |

## Results

Of the 15 wolf attacks on grazing sheep within the Moss-Våler territory in 2002, only 3 occurred on pastures with improved fences (Fig. 2). Since there were a total of 27 pastures with improved fences, the attack frequency on these pastures were 11 %. In contrast, there were a total of 15 registered pastures with traditional fencing, which makes an attack frequency of 80 % [1].

Of all the 15 attacks, 14 occurred on pastures with mesh-wire fences (of which two were improved), while one attack was registered on a pasture with both improved mesh-wire and stretches of fully electric fence. The sample size is too small, however, to say anything about the relative preventive effect of improved mesh-wire vs. fully electric fences.

The attacked pastures had fences with lower height (N=37, W=185, P=0.001) and fewer electric wires (N=37, W=111, P=0.015) than pastures not attacked (Table 1). Also the attacked pastures had larger maximum distances between fence wires (N=17, W=42; P=0.034), a slightly larger distance from ground to the first wire (not significant, N=37, W=160, P=0.256) and more weak points along the fence (N=37, W=73, P=0.006).

Pastures not attacked by wolves were closer to houses than the attacked ones, i.e. 76 ± 30 metre vs. 203 ± 71 metre (N=37, W=137, P=0.013). The proximity to roads, however, did not affect the chance of being attacked: the distance to nearest road was 53 ± 33 metre for attacked pastures, and 44 ± 24 metres for pastures not attacked (N=37, W=102, P=0.476).

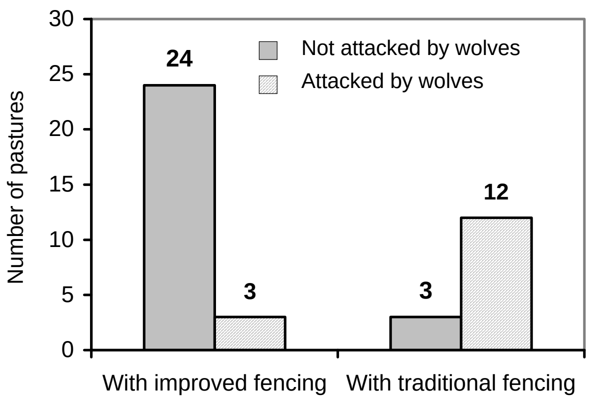


**Fig. 2:** Attacked and not attacked sheep pastures within the Moss-Våler territory 2002.

## Discussion

Clearly the improvement of traditional fences was preventive against wolf attacks in Moss-Våler 2002. What the Østfold experience cannot tell us so far is to what extent the preventive effects will last. The improved fences are mainly psychological, not physical, barriers for wolves.

Along with this survey, we also checked the general condition of one third of all improved fences in Østfold (N=29, randomly chosen). This revealed that there were deviations from the given standard along the fences at 28 out of 29 farms. A highly adaptive species like the wolf may quickly learn about these weak points in the fence, and then gradually loose the wariness it originally had against the improved fences.

The most prevailing deviation in Østfold was too high distances from the ground to first wire. This was also reflected in the farmers' own comments. The remark most often made was how time consuming it is to have the first wire only 20 cm above the ground (vegetation underneath the wire has to be frequently removed not to shortcut the electricity). It might be socio-economically viable to compensate farmers for doing this job. A fence with weak points not only increases the risk of attack on that particular pasture, but it may also lower the protective effect of all similar fences in the area.

The study was financially supported, and conducted on behalf of the county government of Østfold. The full report can be found at:
http://skandulv.nina.no/ (*in Norwegian only*).

[1] There might have been some additional sheep pastures within the territory, as e.g. sheep kept as pet are not registered. Therefore, the attack frequency of pastures with un-improved fences is likely to be slightly over-estimated.

# A Simple Carnivore Improvement of Existing Sheep Fencing

by
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**Summary:** *We present technical specification for a simple way of securing sheep pastures against large carnivore attacks. The method was originally planned to suit pastures already fenced off with a mesh-wire, i.e. the traditional fence used for sheep in Norway.*

In 2000-2002, the Norwegian government spent € 325'000 (US$ 400'000) on securing livestock fences against large carnivores in the county of Østfold. Sheep owners had two options; either they could improve an existing mesh-wire fencing (Fig. 1a) by adding 1-3 electric wires, or exchange the whole fence with a fully-electric wire fence (Fig. 1b). Most sheep owners chose the first option. However, due to low height of their existing fences several owners also chose the latter option. Thereby long stretches of high-quality sheep mesh-wire was taken down, and exchanged with fully-electric fencing.

Although immediate preventive effects of the improved Østfold fences have been documented (see this issue of CDPN), their long-term effects are uncertain since they predominantly work as psychological barriers. The most prevalent argument for not building fences with stronger physical effects has been high material costs.

We present a fence alternative that represents more of a physical barrier, but still lies within the cost range of improved fences in Østfold.

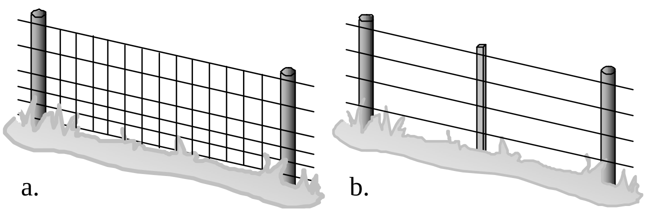


**Fig. 1:** Sheep fencing used in Østfold: a. traditional mesh-wire, and b. a fully-electric "carnivore" fence.

## Technical specifications

We assume that the pasture is already fenced off with a traditional sheep mesh-wire fence. The challenge with such a fence is to get sufficient height to prevent carnivores from jumping in. The posts usually stand 100-120 cm above the ground. On sloping ground this means the effective height can be very low on the outside.

The distance between posts in the traditional fence is normally 1.5-2 m. Along with the mesh-wire this makes them very rigid. They can easily withstand the pressure of adding extra height without any of them being exchanged. This may of course be done in several different ways, not all equally robust. We suggest that higher fence posts are added for every third existing one (Fig. 2). This means that no parts of the original fence have to be removed (although it may be a good idea to simultaneously tighten up the mesh-wire).

## Conclusion

The cost of the described fence alternative is intermediate compared to the improved fencing in Østfold (see Table 1). Though, without a mesh-wire fence present, it will become the most expensive alternative with the present cost-regime in Norway. However, if one considers the potentially higher preventive effects of such a fence, it may still be the best option. A cheaper fence with mainly psychological effects may turn out to be more expensive over time.

**Tab. 1**: Alternative carnivore improvement of sheep fencing in Norway, their cost and subjectively estimated barrier effects (based on the Østfold experience and present knowledge on carnivore behaviour, not tested). Costs include the labour needed to build the fence (for details, please contact the corresponding author).

| Fence type | Height | Number of electric wires | Psychological effect | Physical effect | Costs per metre |
|---|---|---|---|---|---|
| Traditional sheep mesh-wire | 100-120 | 0 | 10 % | 20 % | € 3.75 |
| As above with carnivore improvement as recommended by the Authority | 90-125 | 1-3 | 80 % | 60 % | € 1.50 |
| As above with carnivore improvement as recommended in this paper | 150-160 | 5 | 90 % | 90 % | € 2.25 |
| Fully-electric "carnivore" fence as recommended by the Authority | 100-120 | 4-5 | 70 % | 50 % | € 2.75 |

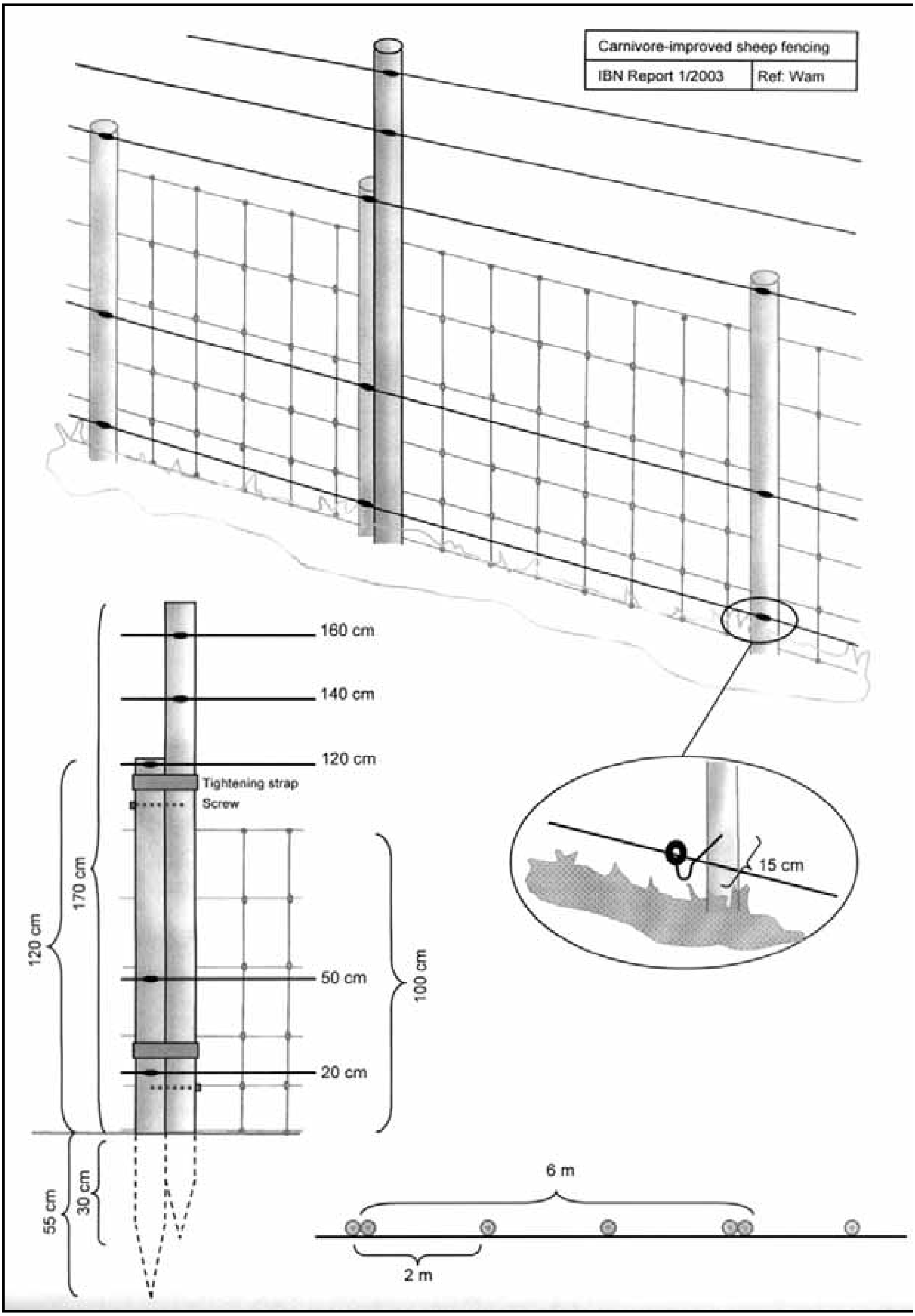


**Fig. 2:** A simple way of securing sheep mesh-wire fences against attacks from large carnivores.

# Publications

**Treves, A, L. Naughton-Treves, E. K. Harper, D. J. Mladenoff, R.A. Rose, T.A. Sickley & A.P. Wydeven, 2004. Predicting Human-Carnivore Conflict: a Spatial Model Derived from 25 Years of Data on Wolf Predation on Livestock. Conservation Biology 18, 114-125.**

Many carnivore populations escaped extinction during the twentieth century as a result of legal protections, habitat restoration, and changes in public attitudes. However, encounters between carnivores, livestock, and humans are increasing in some areas, raising concerns about the costs of carnivore conservation. We present a method to predict sites of human-carnivore conflicts regionally, using as an example the mixed forest-agriculture landscapes of Wisconsin and Minnesota (U.S.A.). We used a matched-pair analysis of 17 landscape variables in a geographic information system to discriminate affected areas from unaffected areas at two spatial scales (townships and farms). Wolves (*Canis lupus*) selectively preyed on livestock in townships with high proportions of pasture and high densities of deer (*Odocoileus virginianus*) combined with low proportions of crop lands, coniferous forest, herbaceous wetlands, and open water. These variables plus road density and farm size also appeared to predict risk for individual farms when we considered Minnesota alone. In Wisconsin only, farm size, crop lands, and road density were associated with the risk of wolf attack on livestock. At the level of townships, we generated two state-wide maps to predict the extent and location of future predation on livestock. Our approach can be applied wherever spatial data are available on sites of conflict between wildlife and humans.

**Shivik, J. A., A. Treves & P. Callahan, 2003. Nonlethal Techniques for Managing Predation: Primary and Secondary Repellents. Conservation Biology, 17 Page 1531-1537.**

Conservation biology requires the development of practical tools and techniques to minimize conflicts arising from human modification of ecosystems. We applied behavioral theory of primary and secondary repellents to predator management by using aversive stimulus devices (electronic training collars) and disruptive stimulus devices (behavior-contingent audio and visual repellents) in a multipredator (Canis lupus, Haliaeetus leucocephalus, Ursus spp.) study in the United States. We examined fladry and a newly developed disruptive stimulus device contingent upon behavior on six wolf territories in Wisconsin, (U.S.A.) and determined that the disruptive stimulus device gave the greatest degree of protection from predation. We also compared the efficacy of a primary repellent (disruptive stimulus device) versus a secondary repellent (electronic training collars) to keep captive wolves from consuming a food source. Disruptive stimulus devices effectively prevented captive wolves from consuming the food resource, but did not produce an aversion to that food resource. With training collars, logistical and behavioral variability limited our ability to condition wolves. Our studies highlight the complexity of application of nonlethal techniques in real-world situations.

You can get this publication on:
http://www.aphis.usda.gov/ws/nwrc/is/03pubs/shiv032.pdf

**Sidorovich,V.E., Tikhomirova L.L. & Jedrzejewska, B. 2003: Wolf *Canis lupus* numbers, diet and damage to livestock in relation to hunting and ungulate abundance in northeastern Belarus during 1990-2000. Wildl. Biol. 9: 103-111.**

Wolf *Canis lupus* relationships with wild ungulates, domestic animals and humans were studied in an area of ca 800 km2 at the head of the Lovat River in northeastern Belarus during 1990-2000. The region was dominated by natural habitats (78 %) consisting mainly of forests and bogs, but also lakes and rivers. The abundance of wild ungulates, such as moose *Alces alces*, wild boar *Sus scrofa*, and roe deer *Capreolus capreolus*, as censused by snow tracking and assessed by game wardens, declined 5 to 6-fold between 1990 and 1996, most probably due to uncontrolled exploitation and poaching. During 1997-2000, the numbers of ungulates began to recover. Wolves responded to the shortage of wild ungulates by a strong shift in feeding habits. When wild ungulates were numerous, wolf diet as studied by scat analysis was composed of wild ungulates (80-88 % of consumed biomass), with small additions of medium- and smallsized wild animals (7-13 %), mainly beaver *Castor fiber* and hare *Lepus* sp., and domestic animals (4-6 %), mainly cattle. In the years when the recorded numbers of wild ungulates were at their lowest, wolves preyed on domestic animals (38 % of biomass consumed), wild ungulates (32 %), and medium- and smallsized wild prey (29 %). Wolf damage to domestic animals (28 head of cattle and 247 dogs killed) and wolf-human interaction (100 observations of wolves in and near villages, including one attack by a rabid wolf on 11 people) were recorded in 14 villages. The rate of wolf predation on domestic animals and their appearances in villages increased exponentially with the declining biomass of wild ungulates and ceased again when wild ungulates began to recover; a one-year time lag in wolf response to changes in ungulate abundance was observed. The numbers of wolves as estimated by snow tracking and assessed by game wardens played a weaker role in shaping wolf-livestock and wolf-human interaction. The wolf population was strongly affected by hunting during the study. Wolves responded numerically with a 1 to 2-year time lag to the varying intensity of harvest by humans. Our study showed the role of the human factor in shaping wolf numbers and wolf-livestock interaction in eastern Europe. The three major components of this relationship were: 1) the manifold decline in wild ungulate abundance, which was most probably caused by uncontrolled exploitation by humans in the years of political transformation and economic regress, made wolves shift to predation on domestic animals; inevitably, wolves were frequently seen in the rural areas; 2) people interpreted the growing rates of wolf damage and appearances near the settlements as an effect of greatly increasing numbers of wolves, and demanded that authorities and hunters fight the 'wolf plague'; 3) hunting impact on wolves increased and led to a marked reduction in wolf numbers and a decline in wolf-human conflicts. This scenario was most probably repeated in many areas of eastern Europe during 1990-2000, which was a decade of political and economical transformation. From a management perspective, we suggested that predation levels and wolf-human conflicts could be reduced not only by increased wolf harvest but also by enhancing the density and diversity of wild ungulates.

**Ogada, O., Woodroffe, R., Oguge, N.O., & Frank L.G., 2003: Limiting Depredation by African Carnivores: the Role of Livestock Husbandry . Conservation Biology 93: 381-391.**

Most large carnivore species are in global decline. Conflict with local people, particularly over depredation on livestock, is a major cause of this decline, affecting both nominally protected populations and those outside protected areas. For this reason, techniques that can resolve conflicts between large carnivores and livestock farmers may make important contributions to conservation. We monitored rates of livestock depredation by lions ( Panthera leo), leopards (Panthera pardus), cheetahs (Acinonyx jubatus), and spotted hyenas (Crocuta crocuta), and retributive killing of these species by farmers in livestock-producing areas of Laikipia District, Kenya. Farmers killed more lions, leopards, and spotted hyenas where these predators killed more livestock. Livestock husbandry had a clear effect on rates of depredation and hence on the numbers of predators killed. Cattle, sheep, and goats experienced the lowest predation rates when attentively herded by day and enclosed in traditional corrals (bomas) by night. Construction of the boma, the presence of watchdogs, and high levels of human activity around the boma were all associated with lower losses to predators. Although most of this work was carried out on commercial ranches, local Maasai and Samburu pastoralists have practiced nearly identical forms of husbandry for generations. Our study shows that traditional, low-tech husbandry approaches can make an important contribution to the conservation of large carnivores.

**Treves, A. & Karanth, K.U., 2003. Human-Carnivore Conflict and Perspectives on Carnivore Management Worldwide. Conservation Biology 17: 1491-1499.**

Carnivore conservation depends on the sociopolitical landscape as much as the biological landscape. Changing political attitudes and views of nature have shifted the goals of carnivore management from those based on fear and narrow economic interests to those based on a better understanding of ecosystem function and adaptive management. In parallel, aesthetic and scientific arguments against lethal control techniques are encouraging the development of nonlethal approaches to carnivore management. We anticipate greater success in modifying the manner and frequency with which the activities of humans and domestic animals intersect with those of carnivores. Success should permit carnivore populations to persist for decades despite human population growth and modification of habitat.

**Breck, S.W., Williamson, R., Niemeyer, C., & Shivik, J.A., 2002: Non-lethal Radio Activated Guard for Deterring Wolf Depredation in Idaho: Summary and Call for Research.**

With the reestablishment of wolves in the western United States, managing adverse interactions between wolves and livestock is re-emerging as an issue for resource managers. Lethal control of wolves is often difficult to implement due to the constraints of the Endangered Species Act, predator population goals, and public disfavor for lethal control. In response to the need to manage wolf predation in a non-lethal manner, we developed and tested a behavior contingent system for disrupting predation events. The Avian Systems Model 9000 Frightening System, also called a Radio Activated Guard (RAG), is activated by signals from nearby wolf radio collars. The strobe light, tape player with 30 different recorded sound effects, and behaviorally contingent activation are designed to minimize habituation to the system. Based on studies in Idaho, we belive RAG boxes are effective for protecting livestock in small pasture situations. Limitations of the scare device include electronic complexity, area coverage, and price. We continue to develop and test the limitations of their effective use in ongoing experimental research.

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http://www.aphis.usda.gov/ws/nwrc/is/02pubs/brec021.pdf

**Musiani, M., Mamo, C., Boitani, L., Callaghan, C., Gates, C.C., Mattei, L., Visalberghi E., Breck, S., & Bolpi, G., 2003. Wolf Depredation Trends and the Use of Fladry Barriers to Protect Livestock in Western North America. Conservation Biology 17: 1538-1547.**

In Alberta, Canada (1982-2001), and in Idaho, Montana, and Wyoming, United States (1987-2001), wolves (Canis lupus) killed various domestic animals, among which the major prey were sheep in the United States (68 %, n = 494) and cattle in Canada (95 %; n = 1633). Under recovery programs, the wolf population increased in the United States, and depredation events increased proportionately. In both countries, the number of domestic animals killed each year was correlated with the number of wolves killed by government authorities for depredation management. We tested the ability of antiwolf barriers made of flags hanging from ropes to impede wolf access to food and livestock. In 18 experiments, barriers prevented captive wolves (n = 9) from accessing food for up to 28 hours and allowed daily separation of wolves to administer contraceptive pills to a female wolf. Barriers prevented access by wild wolves to 100-$m^2$ baited sites during two 60-day tests. We also set barriers around three cattle pastures. In Alberta during two 60-day trials on 25-ha pastures, wolves approached barriers on 23 occasions but did not cross them, and no cattle were killed. Wolves killed cattle on neighboring ranches during the trials and before and after the trials on the tested ranches. In Idaho four radiocollared wolves crossed barriers and killed cattle in a 400-ha ranch after 61 days of barrier exposure. Our results suggest that antiwolf barriers are effective in deterring captive and wild wolves for >1 and >= 60 days, respectively, and that wild wolves switch to alternative livestock when excluded from one herd of livestock. Our depredation data indicate that protecting livestock from wolves reduces the necessity for killing wolves. Barriers could play a role among the limited set of preventive measures available and offer a cost-effective mitigation tool for the problem of livestock depredation on a local scale.

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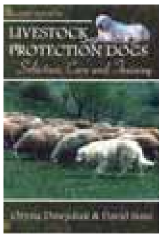


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**KORA-Report No 25**

**Rapport final, Projet Loup Suisse – Prévention, 1999 – 2003 (in French and German only)**

Antoine Burri, Eva-Maria Kläy, Jean-Marc Landry, Tiziano Maddalena, Peter Oggier, Chiara Solari, Damiano Torriani, Jean-Marc Weber

January 13, 1999, at the time of a press conference held in Brig, the Swiss Agency for the Environment, Forest an Landscape (SAEFL) launched the Swiss Wolf Project (SWP). Its general objective? To seek solutions within the conflicts generated by the presence of the wolf. Coordinated by the KORA, the project defined itself on three principal axes: prevention, information and monitoring. With the main objectives, the development and the evaluation of prevention measures of the damage to livestock, prevention unquestionably constituted the backbone of the mandate. The project was a lot inspired by prevention measures applied in regions, large carnivores never disappeared. Thus, we recommended the use of shepherds and protection animals (dogs, donkeys) as well as the regrouping of sheep in electrified enclosures at least at night. At the end of 2003, the SWP changed its structure and the prevention became the competence of agriculture. We present here the experiences gained during five years of our mandate.

The report can be downloaded on: www.kora.ch

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## Meetings of interest

**November 14 - 17, 2004**
Carnivores 2004
*Location*: La Fonda Hotel, Santa Fe, New Mexico
*Information*: www.carnivoreconference.org/

**July 31 - August 5, 2005**
Nineth International Mammalogical Congress
formerly *International Theriological Congress, ITC*
*Location*: Sapporo, Japan
*Information*: www.imc9.jp
e-mail: MAMMAL2005@hokkaido-ies.go.jp.

**September 27 - October 1 2005**
Sixteenth International Conference on Bear Research and Management
*Location*: Riva del Garda, Trentino, Italy
*Information*:
www.provincia.tn.it/foreste/16IBAconference/

**Please send Information on Meetings to:**
**cdpnews@kora.ch**

## Coming topics

We are planning to produce the next Newsletter with the main topic on Livestock Guarding Dogs (LGDs). If you are running a project dealing with LGDs, please don’t hesitate to contact us for writing an article for the CDPNews.
You can find authors guidelines for the article on our website on www.kora.unibe.ch.

The next issue will be opened for any other topics as well. Please contact us on *cdpnews@kora.ch* before writing your article for better coordination.

Thanks

the Editors

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There are three ways to receive CDP News:
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We welcome the translation and further distribution of articles published in the CDP News under citation of the source.
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## LCIE card

**The Large Carnivore Initiative for Europe aims**
*"To maintain and restore, in coexistence with people, viable populations of large carnivores as an integral part of ecosystems and landscapes across Europe".*
According to this mission statement, the LCIE defines four important fields of activity:
1. conservation of large carnivore populations and their habitats;
2. integration of large carnivore conservation into local development of rural areas;
3. support for large carnivores through appropriate legislation, policies and economic instruments;
4. the human dimension (information and public awareness with the aim of obtaining the acceptance of large carnivores by all sectors of society).

To solve the conflict arising from the predation of large carnivores on livestock, the prevention of damages is of high priority. For more information on the LCIE please visit the LCIE website (www.large-carnivores-lcie.org) or contact the LCIE co-ordinator, Agnieszka Olszanska (agnieszka.olszanska@coe.int)

## Contributions desired

Dear subscribers,
The CDP News will only thrive with your active participation. Articles should be as „down to the earth" as possible. Please send us any contribution on the following topics (please see article guidelines on our website):

- Prevention measures
- Prevention measures that did not work
- Statistics on damage
- Compensation systems
- Technical articles
- Problem animal management
- Opinion and forum papers

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