Testing and Implementing the Use of Electric Fences for Night Corrals in Romania

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In Romania, significant populations of large carnivores still coexist with livestock: in the Carpathian mountains, with a surface of approximately 70,000 km² there are about 5500 bears, 3000 wolves, 2000 lynx, 4.5 million sheep and 1.5 million cattle. In Romania, traditional damage prevention methods are still well preserved: in the evening livestock is always brought back to the livestock camp and is penned. Furthermore they are permanently guarded by shepherds and livestock guarding dogs. Despite these measures, damage still occurs due to depredation by wild predators. Results from our research over the last four years indicate that wolves and bears killed round 1.5% of the sheep present in the mountain livestock camps, an average of about seven sheep per camp.

Electric fencing has been successfully used in many places to prevent wildlife damage to human activities. Thus, we decided to test this method in Romania and implement its use in the livestock camps in our study area. Since 1999 we have installed fences around the night-time pens (corrals) at eleven different livestock camps (Tab. 1). We have chosen the camps according to the amount of damage they have experienced so far, the interest of the livestock breeder for testing this method and his reliability. In summer 2001 we distributed the fences throughout our study area of about 1000 km². In addition, we installed two fences in two counties distant from our study area.

Two of the shepherds have been using the fences for over a year. Now, they put it up only when they have animals in camp. The shepherds of two other camps were not convinced of this technique and so they did not use the fence. All the others used it for varying periods of time. Most of them were satisfied with the fence as a protection method. Four of the livestock raisers have used the fence also during last winter and are already self-sufficient in its use.

Description of the fences

We use “Gallagher” mobile fencing with five wires. Each wire contains six rustproof steel strands and three copper strands, interspersed with plastic strands. This makes the wire more flexible. The gate is made of five easily extendable metal springs (one for each wire). The posts are of plastic with iron spikes that are driven into the ground. They are 1.6 m high. The wires are spooled onto special plastic reels that make it very easy and fast to stretch the wire when the fence is set up. The reels are fixed onto metal posts that are set up near the gate. The

Tab. 1: Fences that were installed at livestock camps from summer 1999 to fall 2001. The number of kills refer to the period in which the sheep were penned in the fence.

Camp	Date installed	Days used	Kills	Predator	Days not used[1]	Kills when not used[2]
Gircin	October 1999	185	0		-	-
Prejmer	November 1999	14	0		-	-
Vurpar	November 2000	150[3]	0		-	-
Musoiu	01.04.01	183[3]	1 sheep	wolf	0	-
Ohaba	01.05.01	86	0		66	18
Enescu	15.05.01	0	0		152	47
Pruna	11.06.01	111[3]	0		41	0
Ciuma	18.06.01	104[3]	1 sheep	bear	48	2
Pietre	27.06.01	41	0		111	7
Coja	27.06.01	0	0		152	4
Vladusca	21.07.01	47	0		105	6
Total		**839**	**2**		**675**	**84**
Average		***76.2***	***0.18***		***84.4***	***12***

[1] The days in which the fence was in use was detracted from 152, the total number of days of the average grazing season.
[2] All the days in which the fences were not installed and periods during day, when sheep were not penned.
[3] The fences are still in use. The cut off date for “days in use” was 30th of September 2001.

wire is then unrolled from the reel simply by pulling it, and, at the other end of the fence (at the opposite side of the gate), it is fixed to the gate. In this way, the electricity is led from the wire directly through the gate. The posts have several slots for the wire at different heights. Thus, it is possible to choose different spacings for the wires (see www.gallagher.co.nz Gallagher New Zealand; www.gallaghereurope.com, Gallagher Europe or www.gallagherusa.com, Gallagher USA for further information).

The fence that has been used for the longest time has been out since 1999. We have not noticed any sign of deterioration in the components. The fences can probably be used for many years if they are properly maintained.

Power supply

We use Gallagher 12V impulse generators (PowerBox 200) powered by normal car batteries. They have an impulse energy of 1.2 joules and can generate impulses in fences up to 10 km long (without vegetation). They produce two different impulse frequencies: 1 impulse/sec and 1 impulse/3 sec. The generator and the battery are placed in a special plastic box. This allows the device to be left near the fence without being damaged by the weather, animals, etc. The generated impulses can reach 6000V, according to the strength of the impulse generator, the grounding system, and the amount of vegetation along the fence. We try to maintain impulses of at least 5000V. The car batteries can be charged by a simple charger connected to a 220V source or connecting the battery to a running car. In camps, lacking the ability to charge the batteries, we have installed solar panels that are directly connected to the battery and the generator. Our generators can produce impulse in 1 to 10 km of wire, depending upon the amount of vegetation along the fence.

Setting up the fence

We place the wires 20-30 cm apart, the lower wires closer to one another than the others. However, we vary the wire-spacing and the height of the highest wire according to the steepness of the terrain and the predator species (wolf or bear) which causes most damage to the camp: where wolves are a bigger danger we tend to concentrate the wires lower to the ground to avoid wolves sneaking through under the lower wires. Where bears are the main problem we set the wires as uniformly as possible. When the fence is on a slope, on the higher side of the slope we put the wire on the highest level to reduce the possibility that an animal jumps in from above. We set the posts at 5 to 10 meter intervals. This also depends very much on the topography: where the

Fig. 1: Electric fence for a night corral installed on a mountain pasture in Romania

ground is irregular we put the posts closer in order to be able to follow the contour of the ground as well as possible. In the corners we always put a wooden post, made by the shepherds, on which we place screw-in ring insulators. The wooden posts give the system higher stability. We always check that the wires on the posts have the same spacing as on the plastic posts. We noticed that the shepherd dogs immediately identified differences in the spacing of the wires and passed through. If the vegetation is very high we ask the shepherds to cut the grass under the wires. The wires have to pass without touching the ground or the vegetation in order to avoid power loss along the fence. We used wire rolls of 400 m and 200 m length but we rarely used the whole rolls. Most of the enclosures covered 400 m² to 600 m².
The mobile fences we use are appreciated because they can be set up quickly. The first set up of a 400 m fence can take a maximum of 3 hours for two persons. After it has been set up the first time (the various parts are assembled, the insulators are put on the wooden post etc.) two persons can move (take down and set up again) the fence in one hour.

Effectiveness

The 85 camps without electric fences we monitored in the past four years had an average of 7.05 (SD = 9.82) sheep killed per summer. The median value of kills was 4 (lower quartile: 1, upper quartile: 7). The average number of kills is as high as the upper quartile due to the fact that some of the livestock camps suffered very high damage (8 had over 20 sheep killed, 4 had over 30 and 2 over 40). 67 (79%) camps had at least one sheep killed per grazing season. The camps that had electric fences suffered a damage of 0.12 kills per day (Tab. 1) in periods in which the sheep were not penned.

Since we began testing the electric fences, we have recorded three cases in which predators entered an enclosure: in two cases, at the same livestock camp, a bear entered the fence. Here the fence was working with only 3 impulses per minute due to the fact that the battery was not properly charged. In one of these cases a sheep was killed. The third case was of a wolf that managed to enter a fence and attack a sheep. It then became scared of the fence, left the sheep (it was still alive and had to be killed) and left. We don't know how the wolf managed to enter the fence. Overall, there has been a killing frequency of 0.002 kills/day. This is 1.6% of the killing frequency of the same camps when the fences were not used and 2.59% of the killing frequency (0.077 kills/day) in the camps without electric fences. Even if the damage reported from camps where sheep were not protected by fences would be an overestimation to a certain degree, this can still be considered to be a significant difference.

Problems

According to our observations, sheep and cows learned very quickly to keep away from the wires. After one day of being in the enclosure the animals never approached the wire closer than one meter. Especially sheep seemed to learn from each other to avoid touching the fence. Livestock guarding dogs also never seemed to have problems with this device. After each of them got shocked once they never approached the fence very closely again. One case was reported in which the sheep in the enclosure were frightened (the cause is not known), ran through the fence, and four of them were tangled in the wires. To our knowledge this was the only incident in which the fence caused trouble to the flock. Occasionally, we found batteries discharged and thus the fences were not properly working. However, most of the time the batteries were working properly. The majority of the shepherds have a battery charger at home. Once a week they managed to go home to charge the battery. Alternatively, they can attach the battery to their car to charge. Still, if the use of electric fences were to spread, the batteries might become one of the major problems. Solar panels can easily be used, but they also present some problems: they attract thieves, it is one technology more shepherds have to use properly and solar panels present a further cost. As far as we can see, the fencing system we are using has not shown any particular weaknesses in preventing bear or wolf from attacking livestock. However, problems may arise which we have not noticed so far.

Implementation of the use of electric fences

In Romania the use of electric fences is almost unknown. In the first two years we wanted to test these fences, we managed to set up only two. Most of the shepherds were suspicious of this method. They did not understand why we wanted to give them an electric fence for free. Furthermore, they were not willing to make an effort to learn a new method, and they were scared that their sheep could be killed by the fences. To solve this problem, we organised meetings in spring 2001 to which we invited fifty livestock breeders, as well as the two shepherds that had already used the fences. At the meeting, we demonstrated the use of the fences and gave slide presentations. The two shepherds that had

already used the fences told the others about their positive experience with the fences - they had no losses since they have installed the fence. As a result of these meetings, many livestock breeders became quite interested in using this device. In summer 2001, we managed to install all the fences at livestock camps. Through our media activities, people from other areas in Romania were informed of our activities, and we even received a request for an electric fence from a shepherd located far from our study area. At present, we can't meet the huge demand for electric fences. Thus, our next step will be to find a manufacturer to produce fences within Romania that can be sold at prices affordable to Romanian livestock raisers.

Does the reduction of damage pay for the costs of electric fences?

Our experiments have shown that the use of electric fences can help to reduce the damage to livestock caused by large carnivores . However, an electric fence is not a cheap measure. On the western European market, a good quality fence of 400 m length with five wires can cost US$ 500.- to 800.-. This is much too expensive to be affordable for Romanian livestock breeders. However, we are interested in knowing how much an electric fence could cost in order to be profitable, if it were produced more cheaply in Romania.

This year we calculated an average damage at livestock camps of US$ 260.- per camp. This includes animals killed and the loss of milk production. The damage caused at camps with electric fences was US$ 6.70, only 2.59 % of the damage caused at the other camps. According to these calculations, an electric fence that cost approximately US $ 250.- would be paid for by the reduced loss of livestock in one year.

However, there is one factor influencing these calculations: the person in charge of the livestock camp never has to pay for all the damage caused by large carnivores. He has to pay only a part of the damage. The animal owners bear the rest of the loss. Thus, nobody suffers such a high loss that it would be profitable to pay a high price for an electric fence. On the other hand a fence like the one we tested can work for many years if it is properly maintained. Thus, the investment for an electric fence would probably be profitable for a person who owns many animals or who is in charge of a flock for a longer period.

See also the *Carpathian Large Carnivore Project* on: www.clcp.ro

How to Prevent Damage from Large Predators with Electric Fences

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Swedish experiences with electric fences

The Wildlife Damage Center / Viltskade center (WDC) in Sweden continually tries to develop and evaluate preventative methods against large predators and other protected species. Since the majority of livestock in Sweden are grazed in fenced areas, WDC has put some effort in finding the most efficient fence design to exclude large predators. In 1997 we learnt that electric fences successfully prevented bears from raiding beehives, which is among the most attractive food they can get. At that time we tested fences with both three and six wire strands. Both turned out to be "bear safe". Building on this knowledge, this kind of fence (but with four or five wires) has been erected all over the country. There have been few, if any, livestock attacked by large predators within well constructed and maintained "predator-proof fences" in Sweden.

Fence tested with captive lynx

These fences seem to effectively exclude bears and wolves in Sweden, but when it comes to lynx people have been more doubtful. Some reports of lynx that had jumped between the wires led us to set up a study in cooperation with Swedish zoological parks in the fall of 2001. So far we have only results from experiments with lynx but we plan to perform tests with wolves in spring and summer 2002.

Four types of fences were tested:

- a standard non-electric sheep net (woven wires, height 90 cm)
- a sheep net supplied with two electric wires – one on top of the net and one at the bottom (see figure 1)
- an electric fence with three wires (wires on heights of 20, 40 and 70 cm)
- an electric fence with five wires (wires on heights of 20, 40, 60, 85 and 110 cm (see figure 2)

The lynx (one at a time) were kept in an enclosure in which the test fences (two at the time) cut off a corner. Food (roe deer meat) was only supplied on the other side of the test fences. Monitoring cameras that registered and recorded every movement the animals made were installed close to the fences. The results from this study are not yet published, but we