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

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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.

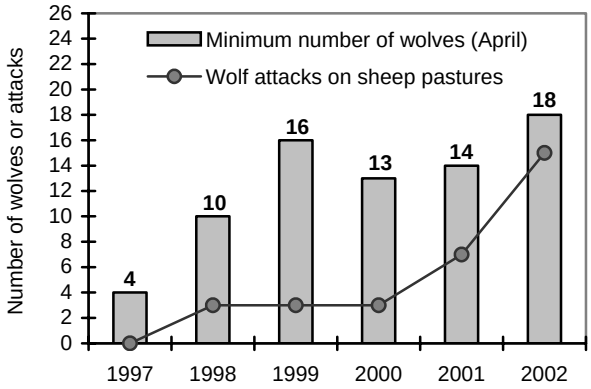

Fig. 1: Number of wolves and attacks on sheep pastures in Østfold, Norway 1997-2002.

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).

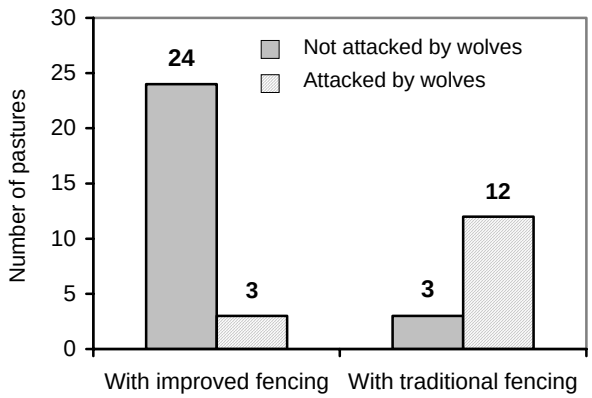

Fig. 2: Attacked and not attacked sheep pastures within the Moss-Våler territory 2002.

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.