

Use of Livestock Guarding Dogs in Norway – a Review of the Effectiveness of Different Methods

by
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Introduction

The most traditional method where livestock guarding dogs (LGDs) are used is that they follow the sheep and their herder around the grazing areas. The intensity of shepherding is usually dependant upon factors such as herd size, flocking abilities of the sheep breed, terrain, vegetation, and predator density. LGDs may also work alone either with free roaming sheep or in enclosed pastures.

The principle of livestock guarding by dogs is based upon a strong social bonding between dogs and sheep. By rearing the pup together with sheep from the age of 6 weeks, and with restricted human contact, the dog will perceive the sheep as pack members, which it will defend if necessary.

The economy of sheep farming in Norway is based up on extensive management procedures using rough grazing during summer (usually forest or alpine tundra habitats), most often with supervision of the animals only once a week. The sheep tend to graze widely dispersed in small family groups. A pre-requirement for an effective livestock guarding by dogs is that the sheep are flocking, as a dog cannot guard sheep that are widely scattered, thus making use of traditional LGD methods in Norway difficult. If LGDs are to be used in Norway, sheep need to be herded or kept within a fenced pasture. As an alternative, one can develop new ways of using LGDs which are better suited for use with dispersed, free-ranging sheep.

Livestock depredation in Norway is a severe problem with several thousand animals killed by carnivores every year (Linnell and Brøseth 2003). 2.1 million sheep graze on open mountain or forest ranges in Norway every

summer and another 0.3 million sheep graze within fenced infields (MD 2003). Of these, nearly 32,000 sheep were compensated as documented or likely killed by protected carnivores in 2002 (MD 2003).

Data on LGD research in Norway

Three main LGD projects have been implemented in Norway during the past 8 years (Table 1). This includes a project with patrolling dogs, a project where LGDs were used in combination with shepherding and a three-year follow-up project, which followed 25 different dogs used in different ways on various farms. A total of four different LGD methods have been evaluated:

- (M1) LGDs used in combination with herding and use of night corrals;
- (M2) LGDs on fenced pastures (Figure 1);
- (M3) LGDs alone with sheep on open range (Figure 2);
- (M4) LGDs loose on patrol together with a range inspector (Figure 3).

LGDs on fenced pastures (M2) is the least expensive method and shows the second best preventive effect (Nilsen et al. 2003). Losses can be reduced by close to 100%, dependant upon pasture size. This way of using dogs is not very time-consuming because the dogs may guard during both day and night without people being present. To be



Figure 1. A *Great Pyrenees* within a fenced pasture. This pasture actually is too big for the dog to work effectively because sheep are too scattered. (Photo: Inger Hansen)

able to guard sheep alone, the dog should be strongly socialized to sheep. Dogs which are more socialized to people may also perform well, however, this presupposes that the grazing area is located close to the farm.

The owners look after and feed the dogs once a day, as automatic feeders are not common. The fenced areas vary between 1 and 100 ha, but the smaller the areas are the better because sheep are “tighter” together and easier to guard in small enclosures. Non-electric wired sheep fencing is the most common (i.e. fences to restrain sheep but not to exclude predators). The fenced area usually has a natural water supply. Nevertheless, grazing on small and limited areas may result in problems with internal parasites and the lamb growth might be poor compared to free-ranging sheep (Nilsen et al. 2003, Hansen et al. 2004). Poor lamb growth might be caused by several things; poor plant quality, homogenous plant development, high density of internal parasites, too many sheep on a limited area etc. Fenced cultivated or forest pastures in Norway do not have the same plant quality and quantity as infields and cannot be compared to grazing fields in southern Europe. Very few sheep farmers have enough infield such that they can use them for summer grazing (instead they are used to grow hay for winter fodder or grass for silage).

The patrolling method (M4) implies that a range inspector patrols the grazing area together with a loose LGD in a systematic way, such that the range

is covered during a certain time. LGD breeds are preferred to other dog breeds because they have a good combination of behaviours suited for this job: they are calm with respect to livestock, will chase carnivores away, and have a low hunting instinct towards other wildlife. M4 has a lower loss-reducing effect than M2, however, total losses (depredation, accidents and illness) have been reduced from 15% to as little as 2–3% in the area where the best results are achieved (Hansen et al. 2002). Furthermore, after this two year LGD study was finished and the dogs were taken away, losses increased again. Other studies (Mysterud et al. 1996, Hansen et al. 1998) have shown that patrolling without a dog has minor loss reducing effect.

The great advantage with this method is that it does not require the sheep to flock, and therefore is better suited to the scattered grazing pattern typical in Norway. The inspector does not control the flock, he just looks after animals and controls that everything seems OK in the grazing area. In the northern parts of Norway, with light summer nights, patrolling might be the most effective during night time, in southern areas the best time for patrolling is during dawn and dusk. To be effective, the dog must patrol the area frequently, therefore the area size is a limiting. During our research we have found that one man and a dog are able to patrol an area of 10–12 km² (1,000–1,200 ha), based on 15 hours work a week. If the range is bigger, more people and dogs are needed or the labour input per unit should

be greater. To make the method more effective, one may restrict the range by patrolling only the most depredated areas and during the most critical months of the year (July, August, September in Norway). This has been tried in *Møre og Romsdal* county with promising results. Another advantage regarding patrolling dogs is that strong social bonding to sheep is not necessary. This means that the dog may be easier to keep as an ordinary family dog outside the grazing season.

LGDs used in combination with herding in daytime and nighttime corrals (M1) was tried in *Lierne* municipality, and is close to the traditional way of using LGDs. Again, a strong social bonding between dogs and



Fig. 2: A *Tatra Mountains Shepherd Dog* used on open range with widely scattered sheep. The sheep farmer may need to gather the sheep before the night, in order for the dog to work as efficiently as possible. (Photo: Inger Hansen)

Table 1. Summary of LGD projects performed in Norway.

Project	Patrolling method (M4)	Guarding and herding (M1)	Experiences from different farms (M1, M2, M3, M4)
Years implemented	1996–1999	1997–1999	2000–2002
Localisation	<i>Hattfjelldal</i> municipality	<i>Lierne</i> municipality	Different places
Responsible research institute	Planteforsk Tjøtta Development Centre	Norwegian Inst. of Nature Manage.	Planteforsk Tjøtta Development Centre
Number of grazing areas	3	1	12
Number of herds	8	3	38
Number of LGDs used	4	4–7	25 in total (15–18 yearly), divided in 12–15 grazing areas
Complimentary preventive measures	Range inspector	Shepherds and nighttime corrals	M1. Shepherds and night corrals M2. Fences (non-electric) M3. None M4. Range inspectors
Main problems	- To cover the whole area frequently enough - Conflicts with neighbouring sheep farmers	- High expenses - Poor lamb growth rates - Conflicts with neighbouring sheep farmers	M1. See “guarding and herding method” M2. Poor lamb growth and not enough pastures available M3. Poor preventive effect because of dispersing sheep M4. See “patrolling method”
Predator species (the most common named first)	Wolverines, lynx, bears, foxes, golden eagles	Bears, wolverines, lynx, foxes, golden eagles	Wolverines, bears, lynx, foxes, golden eagles
Predator densities	No measures, but relatively scarce	No measures, but one of the most dense bear habitat in Norway (however low compared to some other European countries)	No measures. Predator densities differs between areas
Livestock to be protected	Sheep	Sheep	Sheep
Livestock densities	33 sheep per km ² at the most	Very high local density because the sheep were herded	Differs between herds and grazing areas
Sheep keeping	Free range	Shepherding	M1. Shepherding M2. Within fenced pasture M3. Free range M4. Free range
Number of sheep per herd	265 (ewes and lambs)	200 (ewes and lambs)	220 (ewes and lambs)
Sheep mortality caused by predators	0.5–9.5%	0.4%	2–12%
Sheep mortality caused by guarding dogs	0	1 sheep	2 sheep and newborn lambs
Mortality from illness and accidents	Approx. 2.5%	Approx. 1.5%	Approx. 2.5%
LGD breeds used (differs between years)	<i>Great Pyrenees</i> (GP) <i>Maremmano-Abruzzese</i> (MA)	MA <i>Tatra Mountains Shepherd Dog</i> (TMSD)	GP TMSD MA
Average no. of LGDs used within the grazing area (many herds may graze together in the same area)	1–2	4–7 (of these 2–3 young dogs)	1–7 (depending on method used)

Project	Patrolling method (M4)	Guarding and herding (M1)	Experiences from different farms (M1, M2, M3, M4)
Socialization	Reared at sheep farms (but not in corrals with sheep) from the age of 8 weeks. More socially bonded to people than to sheep. Calm towards sheep.	MAs: Reared with sheep from birth and strongly socially bonded to sheep. TMSDs: Reared with sheep from birth, but weaker socialization to sheep than the MAs because of more human contact	M1 & M3: Reared with sheep from birth and strongly socially bonded to sheep M2. Some socialized to people, some to sheep M4. Socialized to people
Effectiveness	Moderate	MA: Very good TMSD: Moderate	Differs between methods and individual dogs
Documented encounters between dogs and predators	GP chased wolverine once Foxes chased many times	MAs chased bears 3 times. Disturbing the predatory sequence because of the mere presence of the dogs	Incidents of chasing bears and foxes described
Improvement of the effectiveness	- Decreasing the patrol area by inspecting only the worst depredated areas systematically	- Using sheep breeds with better flocking behaviour - Dogs should be strongly socialized to the sheep and visa versa - Education of herders	- Correct socialization program for the specific LGD method used - Supervision of new LGD owners and breeders - More and better genetic material to select dogs from (import necessary)
Annual dog-keeping costs (Approx. farmer income: NOK 300.000 per year; NOK 1 = \$ 0.15)	NOK8,000 (approx. 2.7% of yearly income)	NOK8,000 (approx. 2.7% of yearly income)	NOK8,000 (approx. 2.7% of yearly income)
Puppy price	NOK8–10,000	NOK8–10,000	NOK8-10,000
*Weekly labour costs per farmer (200–250 sheep) during the grazing season	Approx. 26% of income	Approx. 97% of income	Costs vary between farms and methods: M1. 97% M2. 2%** M3. 43%*** M4. 26%
Main problems with the dogs	- Play chasing - Too eager to hunt (birds, hares etc.) - They might get lost or stay with sheep carcasses they have found	- Aggressiveness towards herding dogs - Biting /chasing sheep - They did not stay with the sheep (TMSD)	- Aggressiveness towards people - Chasing/wounding sheep - Poor guarding skills due to poor genetic material

* Presuppositions: Yearly income: NOK300,000 (NOK 1.- = \$ 0.15) of which NOK160,000 is income from the sheep production, the rest from other work. Weekly income: NOK5,770. Payment of hired labour per hour: NOK100. All estimations based on hired labour costs. The preventive measure will be cheaper, the more work input the farmer can do himself.

** Extra costs due to the management of sheep grazing within fenced pastures rather than on open ranges are not accounted for. (Investment in fences (fixed and mobile); purchase of additional winter feed and/or hire of additional farmed land; working hours spent on prophylactic internal parasite treatments; the rotation of sheep to different pastures; maintenance of the fence and so on.

***Time/work spent to gather the sheep every evening, so that the dog(s) may guard as effectively as possible, is included.



Figure 3. A Tatra Mountains Shepherd Dog used on patrol in "Ulvådalen", a mountain range in Møre og Romsdal county. The sheep are scattered all over the valley. (Photo: Inger Hansen)

sheep is needed. M1 is the significantly most successful loss-reducing method, but also the most expensive due to the need for continuous herding (Krogstad et al. 2000). Additionally, the limitation placed on grazing pattern may result in reduced lamb growth. The *Lierne* project showed that daily lamb growth was reduced by 23% (mean of three years) for *Dala* breed lambs that were herded and put in nighttime corrals, compared to neighbouring herds grazing on open range (Krogstad et al. 2000). However, herded lambs of the lighter *Spæl* breed showed better growth rates than herded *Dala* lambs. Due to unrealistic high costs and poor lamb growth Planteforsk Tjøtta Development Centre cannot recommend this method in Norway, unless most of the expenses incurred are supported by Government funding.

LGDs alone with sheep on open range (M3) requires dogs that are strongly socialized to sheep. This method is not to be recommended under Norwegian condition because this way of dog-keeping might be too uncontrolled, and as already mentioned, widely scattered free-ranging sheep make the guarding difficult (Hansen et al. 2002, Nilsen et al. 2003).

During the three-year follow-up project, 8 out of the 25 dogs were put down for behavioural reasons. One (TMSD) did not have the right guarding skills, one (MA) showed aggressiveness towards herding dogs, three (1 TMSD, 2 MAs) had wounded sheep and three (MAs) were aggressive towards people

(Figure 4, Nilsen et al. 2003). During the first 8 years of LGD research in Norway, two dogs have been killed by LGDs. Conflicts with hikers have not been a big problem so far, even though all free ranges are open to the public. However, we recommend that the owners put up signs where LGDs are on duty. We also recommend that dogs showing aggressiveness towards people should be put down as soon as possible. There have been some conflicts between local people and LGDs, especially because the

dogs may roam and also because they may chase unfamiliar sheep. But the hardest criticism has come from other sheep farmers: "LGDs as a preventive measure are too expensive."

Today, about 20 LGDs are working in Norway and another 10–20 LGDs are used as "property" guardians; They are socialized to people, but are guarding everything that is on the property (sheep, horses, geese, people etc.).

Recommendations

Based upon the effectiveness of the dogs and cost/benefit analyses of different LGD methods, two methods could be recommended under Norwegian conditions (Hansen et al. 2002, Nilsen et al. 2003):

1. LGDs used alone within fenced pastures and
2. LGDs patrolling the mountain or forest range together with a range inspector.

Because the use of LGDs within fenced pastures is a very good preventative measure, but requires a total alteration in sheep management, we recommend this method only in areas with high carnivore densities – in areas where the alternatives are either to drastically change the sheep management procedures or to abandon sheep farming. To reduce the size of the guarded area as much as possible and at the same time achieve an optimal lamb growth, a system of rotational grazing should be practised.

Well planned rotational grazing, cultivating measures and a good treatment regime against internal parasites are decisive to achieve satisfactory growth in lambs grazing within restricted pastures (Hansen et al. 2004).

LGDs on patrol are recommended in areas where depredation accounts for up to 15% of losses, preferably in areas with damages caused by foxes *Vulpes vulpes*, lynx *Lynx lynx* and wolverines *Gulo gulo* (typical for the majority of the sheep farming areas in Norway). The method alone is too “weak” for areas with frequent bear *Ursus arctos* or wolf *Canis lupus* damage. Some communities have already received governmental financial support to use patrolling LGDs as a preventive measure. In practice, the community administration or the local sheep grazing association will hire a range inspector with a LGD to patrol one or more ranges throughout the grazing season. There are not many countries which practice free grazing in open mountain or forest ranges, but the countries which do this, should try the patrolling method. It would be interesting to get results from other countries, as well.

To date, the use of LGDs has not been a great success in Norway. High costs, widely dispersing sheep and also strict laws for dog keeping in Norway, might be the reasons. However, one should bear in mind that LGD work took 10–15 years of introduction in the USA, before it was accepted and used frequently as a preventive measure. Furthermore, use of LGDs is not an “easy” measure. Many things may go wrong, specially regarding the dog and it’s behaviour (Table 1). In Norway we need to import good working dogs to get a wider genetic material to select the best dogs from.

Economical estimates have shown that none of the LGD methods are cost effective, mainly because of the high wages in Norway (Table 1). Nevertheless, LGDs should be used for other ethical, animal welfare- and psychological reasons. To motivate the farmers even more, we

suggest that LGDs used as a preventive measure should receive governmental financial support.

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Figure 4. A Maremmano-Abruzzese used on patrol. This dog had to be put down because he attacked a person. (Photo: Inger Hansen)

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Livestock Guarding Dogs in Sweden: a Preliminary Report

by
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Sweden has no modern knowledge of working with guarding dogs to protect livestock from large predators and there are no special breeds of livestock guarding dogs from Scandinavia. Records from people living in the 19th and the beginning of the 20th centuries inform us however that some kind of dogs in those days were used as all-round dogs, some of them accompanying livestock and people during the days in the forest. On some occasions some of them actually got into fights with both wolves *Canis lupus* and bears *Ursus arctos*. In time these dogs were bred as hunting dogs and the “old grey dogs” eventually became lost. Still, the interest in guarding dogs is aroused again and both farmers and the authorities want to learn more about how they work and how to

raise and keep them.

Today, most livestock in Sweden is fenced, either within electrical fences (wires), traditional sheep wire-netting fences, or with sheep wire-netting fences supplemented with two electrical wires. The 210,000 (adult) Swedish sheep are found in 7,600 flocks. Only 1,000 herds have more than 50 adult sheep. Only a small number of farms have more than 200 sheep. Some of them are situated in areas with large carnivores, mainly wolves and lynx *Lynx lynx*. The Wildlife Damage Centre has worked intensively with electrical fences to protect against large predator depredation since 1997 (Levin 2002). The knowledge about this is becoming more and more widespread among farmers and quite a few have invested (with grants from the regional authorities) in these types of fences. These fences are however, not completely safe and especially lynx might jump through them in exceptional cases. Large herds of sheep that still suffer from predation problems can probably benefit from having a livestock guarding dog or two in the enclosure.

A minority of farmers (i.e. less than a hundred) let their animals range freely during the summer. These farms are situated in boreal areas in the central to north central parts of Sweden. A majority of them are located in the same area as dense, or growing, populations of bears and wolves. During the last 10 years problems have been reported from a few farms with free ranging sheep or dairy cattle. The confirmed number of free ranging animals being killed or injured by large predators is not high, but there is a widespread anxiety that something will happen and some farmers are also convinced that the actual presence of predators in the neighbourhood stresses the livestock and causes indirect damage, like failed ovulation, abortions, decreasing milk production, etc. In these situations a livestock guarding dog might be of help, as long as it can work by itself. There are no shepherds in Sweden and it will probably be very difficult, if not impossible, to get people to work as shepherds. Less than 2% of the economically active population is engaged in farming. We welcome all advice and happily share other countries experience from similar situations.

The Wildlife Damage Centre encourages farmers with certain needs to get puppies of good quality guarding dogs and also recommends that the county councils subsidise the purchase of the dogs. Our intention is to follow the development of these dogs under Swedish conditions in the long term. We do this with a yearly survey for each dog, as well as annual meetings with the dogs' owners to discuss and