

Short communication

# LLAMAS FOR LIVESTOCK PROTECTION – EXPERIENCE AND RECOMMENDATIONS

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## 1. Introduction

Since the return of large carnivores to Switzerland in the late 20<sup>th</sup> century, the use of different livestock protection measures has been discussed. Livestock guarding dogs (LGDs) and electric fences are established methods, financially supported by the Federal Office for the Environment (Bundesamt für Umwelt, 2019; Hahn, 2019; Mettler and Schiess, 2020). Experience in the field and various international studies have demonstrated their effectiveness (Herrera et al., 2017, Hansen, 2018a).

However, complete electric fencing of livestock is not possible in all circumstances, depending on the soil, topography and flock size. On the other hand, using LGDs poses a challenge to smallholders, especially in tourist areas and close to villages, where interactions between dogs and people can lead to conflicts. Moreover, LGDs require considerable additional time, which is not always worthwhile for small-scale livestock farmers, especially if they only farm to supplement their main income from other activities. In many regions of the Alps, small flocks are kept as a hobby rather than a main source of income. Therefore, alternative protection measures are frequently discussed and it is important to learn from experience gained in other countries (Heurich et al., 2019).

## 2. Guard llamas

Llamas were first used to protect livestock against coyotes (*Canis latrans*) in the USA in the early 1980s (Markham et al., 1993). Today, guard llamas are found mainly in the USA and Australia, where they protect flocks of sheep from coyotes, dingoes and stray dogs (Drufke, 2000; Franklin and Powell, 1994, 2006; Meadows and Knowlton, 2000). Their protective effect is based on a natural aversion to unknown intruders, especially canines. Llamas form social bonds with other species (Fig. 1) and, as they stay near them, are able to defend them from predators by biting, kicking, screaming, spitting and/or chasing them away (Franklin and Powell, 1994; Giudicelli and Giudicelli, 2013; Jenkins, 2003).

A good guard llama does not flee from predators but instead either stops or approaches out of curiosity or defence. This behaviour, combined with the llama's unusual appearance, can unsettle predators and hence prevent an attack. Overall, experience shows that the protective behaviour of llamas is useful against small predators and most effective in situations where predators do not attack in social groups. The available evidence for this is based largely on anecdotal accounts (Mettler et al. 2013). We could not find any scientific studies that assessed the efficacy of guard llamas against packs of wolves.



**Fig. 1** Llamas are vigilant, have good eyesight and readily bond with sheep. (Photo: AGRIDEA)

### 3. Pilot project in Switzerland

There is little experience of livestock protection with llamas in Europe. Therefore in 2012–2016 the Swiss Association for the Development of Agriculture and Rural Areas (AGRIDEA) carried out a pilot project to identify under which conditions their use can be worthwhile to protect sheep from foxes, lynx and wolves in Swiss alpine pastures and husbandry systems.

The size of sheep flocks in Switzerland varies greatly, ranging from 10 to 1,500 head depending on the region. Around half of all flocks are kept in valleys year-round, spending the winter in stables or farm-yards and the remaining months in fenced pastures. Other flocks spend the summer months in mountain pastures. Swiss alpine pastures are often steep, difficult to access and with limited visibility. Sheep are partly fenced, partly free-grazed or accompanied by a shepherd who leads them between pastures (see Mettler et al. 2021 in *CDPnews* issue 22).

To evaluate in which pastures llamas could protect sheep from predators, several studies were carried out. The behaviour of llamas newly integrated into flocks was observed, the degree of socialisation with sheep was evaluated using llama–sheep proximity as a proxy for bonding and their reaction to canids was tested using unfamiliar dogs (Ineichen, 2013). In addition, GPS collars were used to study the spatial behaviour of llamas and sheep when kept together. Llama keepers were interviewed face-to-face to gather accounts of their experience (Hansen 2018b; Hilfiker and Mettler, 2015). Here, we summarise the main findings of the pilot project and suggest recommendations for

best practice. We conclude with an overview of the current situation in Switzerland regarding the use of llamas as livestock guardians.

### 4. Findings and recommendations for best practice

#### 4.1 Which individuals are suitable?

Preliminary tests with dogs showed that the behaviour of llamas varied greatly. Some individuals reacted aggressively, lashing out, biting or screaming, while others approached in a curious, non-aggressive manner. Some positioned themselves between the dog and the sheep but otherwise remained calm. There were also some llamas that reacted nervously and ran away (Ineichen, 2013). Therefore, selection of the ‘right’ llamas is crucial.

In addition to their protective behaviour, attention should be paid to llamas’ interactions with humans. They are mostly friendly towards people, but llamas are ‘flight animals’ (i.e. when they sense danger they tend to flee) and are very sensitive to any physical contact. They approach humans to within a short distance out of curiosity but may flee at the slightest movement. Although it is possible to train llamas to allow handling, patience is often needed (Müller, 2014). A llama breeder should always be available to advise on selection of suitable individuals. This requires considerable knowledge of the different characters of individual llamas and their behaviour towards humans and other animals of all types.

Another important criterion for selection is dominance behaviour. A good combination of dominant and subordinate animals may make the best protection ‘team’. Two llamas together in one flock were seen to complement each other (Horn, 2014). During observations, a dominant llama tended to circle round the flock while a subordinate llama stayed more within the flock (Fig. 2). Even though it was not seen in all cases, such ‘job-sharing’ seems to have parallels with the protection behaviour of groups of LGDs (Horn, 2014).

#### 4.2 Integration into flocks

In order for llamas to protect their flock, they must be bonded with livestock. Bonding is fostered through 2–4 months of close contact with a homogeneous group of sheep (Hilfiker et al., 2015). This should take place in a stable or small, fenced pasture before llamas accompany sheep to alpine pastures. During the integration phase, changes of pasture and animals should be minimised. In addition to llamas bonding with the flock, sheep also become accustomed to the presence of llamas. In some cases, sheep may even begin to follow llamas (Ineichen 2013).

Keeping llamas individually is prohibited in Switzerland due to animal welfare concerns. Therefore, at least two llamas must be used together for livestock protection (Fig. 3). With two llamas, bonding to livestock is less strong but, on the other hand, they can complement each other. Experience has shown that multiple llamas often look in different directions and so are probably more likely than a single animal to detect possible predators (Hilfiker et al., 2015; Ineichen, 2013). However, if more than two llamas are used there is a risk of them forming a separate group, away from the flock, leading to loss of their protective function. Nor is it advisable to use young animals with their mother. Ideally, two adult castrated llama stallions should be integrated into one flock. The use of uncastrated llama stallions can be problematic as they may attempt to mount ewes, leading to injuries (Franklin and Powell, 1994).

#### 4.3 Maintenance and care

Once llamas have been integrated into a flock, they can be maintained with little financial outlay or additional work (Fig. 3). Neither summer nor winter husbandry with sheep cause any difficulties. Llamas eat the same food as sheep, they can live up to 20 years, they are typically robust and have little



**Fig. 2** Llamas, with their long necks, have a better overview of meadow than the sheep. (Photo: AGRIDEA)



**Fig. 3** Two llamas protecting a flock of sheep in a Swiss alpine pasture. (Photo: AGRIDEA)

susceptibility to diseases. In principle, the usual vaccinations for sheep are also recommended for llamas. They can be susceptible to internal parasites, however, so regular deworming is necessary (Hilfiker et al., 2015).

Llamas are classified as Tylopoda (meaning “calloused foot”). If they are kept mainly on soft ground, their toenails have to be trimmed twice a year. On harder ground their nails wear down naturally and do not require trimming. In addition, if llamas are not regularly brushed, they should usually be shorn once a year in spring (Hilfiker et al., 2015).

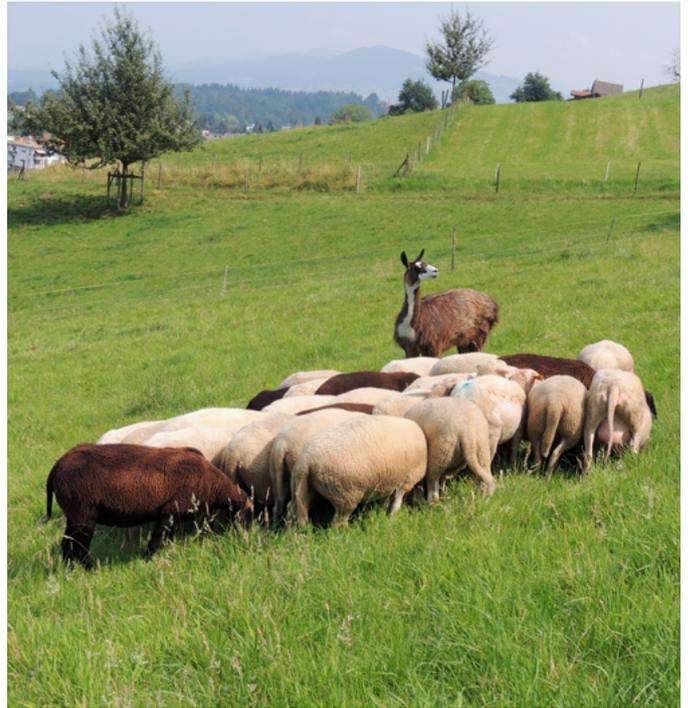
#### 4.4 Optimal conditions for effective protection

Since llamas detect potential threats primarily by sight, pastures with good visibility are needed for them to exercise their protective function in the best possible way. Llamas are ideally suited to protection of small, cohesive flocks of between 10 and 100 sheep (Fig. 4). If the flock is kept compact by a shepherd or fence, llamas can protect up to 200 individuals. It is preferable for the sheep to belong to a single owner and be used to each other so they are more likely to stay together rather than splitting into separate groups. This makes it much easier for llamas to protect them (Mettler and Ineichen, 2013).

Fencing can be very helpful to keep the flock compact and hence optimise its protection. In this case, fences do not have to keep predators out but primarily keep the flock and llamas together in the pasture. Electric nets (with a minimum height of 90 cm) or fences with at least two electrified wires can be used to prevent sheep spreading out too much. Especially in areas where it is not possible to install electric fencing without weak points, llamas can be a good additional measure. While fencing keeps the flock together, llamas deter predators from entering the pasture. Llamas are very sure-footed and can cope with steep terrain (Ineichen, 2013, Horn, 2014, Hilfiker et al 2015).



**Fig. 4** Llamas can be kept together with sheep without much extra effort but beware: they like to peel fruit trees. (Photo: AGRIDEA)



**Fig. 5** Llamas are ideal for the protection of small, compact sheep flocks. (Photo: AGRIDEA)

## 5. Swiss working group

In order to ensure exchange of experience and transfer of knowledge after the end of the pilot project, the Llamas and Herd Protection working group<sup>1</sup> was founded in 2017. AGRIDEA is responsible for coordination on the national level, financed by the Association of New World Camelids Switzerland<sup>2</sup>, WWF Switzerland<sup>3</sup> and CHWolf<sup>4</sup>. Members are experienced llama and sheep keepers as well as livestock protection consultants who work in areas where llamas are already used for livestock protection or where there is interest to use them.

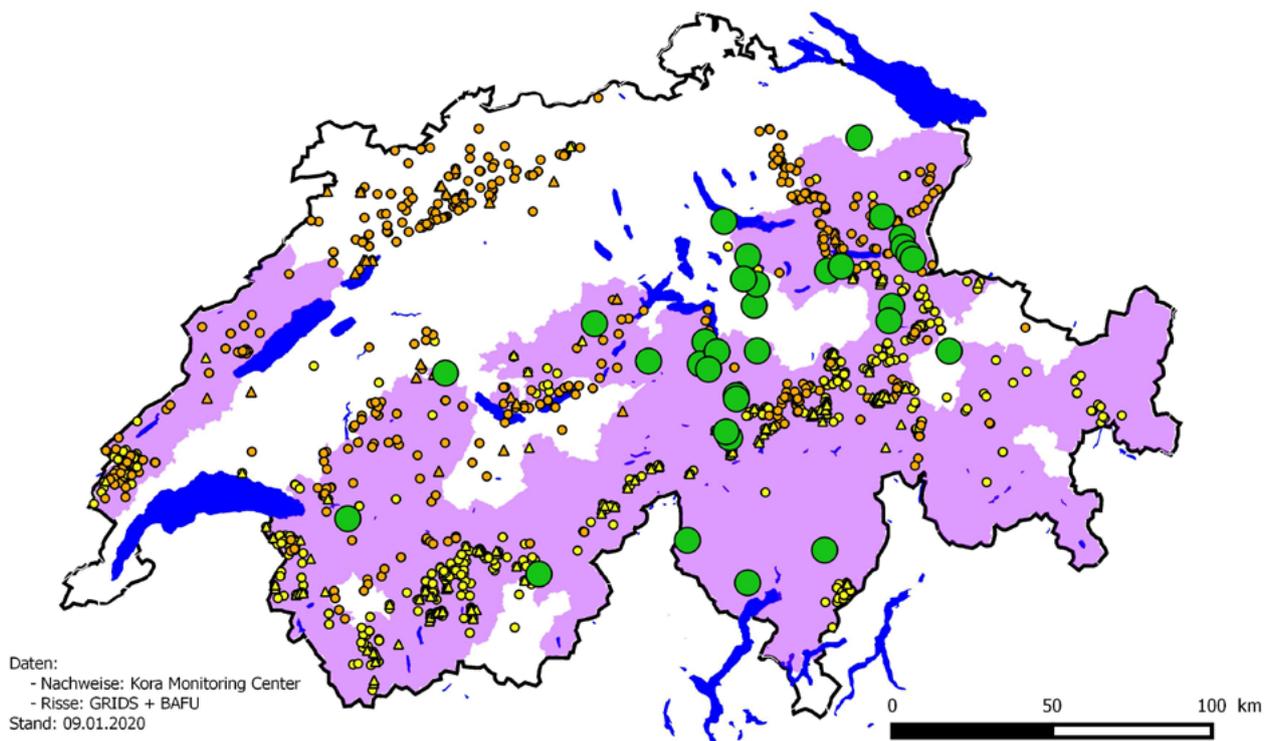
The aim of the working group is to promote the transfer of knowledge between interested llama and small livestock keepers and to maintain a national network. Individual projects and information materials are also financed with the help of donors.

<sup>1</sup> <https://www.protectiondestroupeaux.ch/fr/planung-beratung/projekte/projekt-lamas-und-herdenschutz>

<sup>2</sup> <http://www.nwks.ch/info/>

<sup>3</sup> <https://www.wwf.ch/de>

<sup>4</sup> <https://chwolf.org/>



**Fig. 6** Map of Switzerland showing locations of farms using llamas for livestock protection as of 2019 (green dots); damage by lynx (orange triangles); confirmed lynx occurrence (orange dots); wolf damage (yellow triangles); confirmed wolf presence (yellow dots); and regions where wolf presence was likely based on data from 1999–2018 (purply shading). Source of wolf and lynx data: KORA<sup>5</sup>.

## 6. Current situation in Switzerland

Currently, about 35 farms in Switzerland have llamas to protect sheep or goats against lynx, foxes, wolves or stray dogs. It is difficult to prove their efficacy scientifically. However, since the start of the pilot project in 2012, there has been no damage by lynx to flocks protected by llamas under recommended conditions even though the majority of them are in regions with confirmed lynx presence and, in some cases, there was damage before the acquisition of guard llamas. There are also no officially recorded cases of foxes or stray dogs causing damage, although records are not kept in a standardised way for these species. Moreover, most flocks with llamas have not experienced any wolf attacks since 2012 even though almost all are located in regions where wolf presence is likely (Fig. 5). In the nine years since the pilot project began, there has only been one case of wolf damage to a sheep flock in which llamas were used in accordance with the recommendations described above. One sheep was killed. In two other cases, sheep were spread out across large pastures or were kept in pastures without good visibility so that llamas were

not able to perform their protective function effectively (Hansen, 2018b)

So far in Switzerland llamas have only been used in areas with single wolves. Where there are packs of wolves, llamas are not recommended as the sole method of protecting small livestock. In such cases, the use of llamas is only recommended in combination with electric fences. Guard llamas are not financially supported by the Swiss government since their protection function has not yet been scientifically proven. However, most users report positive experiences and a general analysis of interviews and surveys with farmers showed that, at least against small predators and single wolves, llamas could be a viable alternative to more costly prevention measures. Even if they are limited in their effectiveness against large carnivores, llamas have proven their worth as a livestock protection measure in many flocks. They offer farmers an easy way into livestock protection and sheep breeders often enjoy having such unusual, long-necked protectors watch over their flocks (Hansen, 2018b)

<sup>5</sup> <https://kora.ch>

## References

- Bundesamt für Umwelt (2019) Vollzugshilfe zur Organisation und Förderung des Herdenschutzes sowie zur Zucht, Ausbildung und zum Einsatz von offiziellen Herdenschutzhunden. [in German]
- Drufke NK (2000) The use of llamas to protect goats, cattle, and poultry from canid predators. Retrospective Theses and Dissertations. 21179. <https://lib.dr.iastate.edu/rtd/21179>.
- Franklin WL, Powell KJ. (1994) Guard llamas – a part of integrated sheep protection. Iowa State University Cooperative Extension Service Pm-1527, Ames IA, USA.
- Franklin WL, Powell KJ (2006) Guard llamas – a part of integrated sheep protection. The Camelid Quarterly.
- Giudicelli C, Giudicelli B (2013) Lamas et alpagas: les connaître, les élever. Available: <http://christiane.giudicelli.free.fr/livre.html>. [in French]
- Hahn F (2019) Herdenschutz mit Hunden. AGRIDEA leaflet. Available: [www.herdenschutzschweiz.ch/downloads](http://www.herdenschutzschweiz.ch/downloads). [in German]
- Hansen K (2018a) Effectiveness of fences as livestock protection. Master thesis, Free University of Bozen.
- Hansen K (2018b) Projektbericht Erfahrungssammlung Lamas im Herdenschutz. AGRIDEA report. Available: [www.herdenschutzschweiz.ch](http://www.herdenschutzschweiz.ch). [in German]
- Herrera P, Saucedo C, Fierro S (2017) Livestock guardian dog: An Old World tool used for conservation in Chilean Patagonia. Carnivore Damage Prevention News 16, 1 – 10.
- Heurich M (2019) Wolf, Luchs und Bär in der Kulturlandschaft. Ulmer Verlag, 242 – 44 p. [in German]
- Hilfiker D, Mettler D (2015) Dynamik von Lamas im Bezug zur Schafherde. AGRIDEA project report. Available: [www.herdenschutzschweiz.ch](http://www.herdenschutzschweiz.ch). [in German]
- Hilfiker D, Mettler D, Ineichen P (2015) Einsatz von Lamas für den Herdenschutz. AGRIDEA leaflet. Available: [www.herdenschutzschweiz.ch](http://www.herdenschutzschweiz.ch). [in German]
- Horn B, (2014) Herdenschutz mit Lamas und Alpakas. Project report. Available: [www.krummenacker.ch](http://www.krummenacker.ch). [in German]
- Ineichen P (2013) Herdenschutz mit Lamas. Bachelorarbeit ETH Zürich, AGRIDEA. [www.herdenschutzschweiz.ch](http://www.herdenschutzschweiz.ch). [in German]
- Jenkins DJ (2003) Guard animals for livestock protection: existing and potential use in Australia. NSW Agriculture, Australia.
- Markham D, Hilton P, Hochsprung D, Schreiner D (1995) Guard llamas: an alternative for effective predator management. International Llama Association Educational Brochure 2.
- Meadows LE, Knowlton FF (2000) Efficacy of guard llamas to reduce canine predation on domestic sheep. Wildlife Society Bulletin 28, 614 – 622.
- Mettler D, Ineichen P, (2013) Herdenschutz mit Lamas: Wunschdenken oder Erfolgsrezept? Forum für Kleinwiederkäuer, 5/2013. [in German]
- Mettler D, Schiess A (2020) Wolfschutzzäune auf Kleinviehweide. AGRIDEA leaflet. Available: [www.herdenschutzschweiz.ch/downloads](http://www.herdenschutzschweiz.ch/downloads). [in German]
- Mettler D, Lüthi R, Reinhart S, Schiess A (2021). Good practice for night pens on Alpine summer pastures. Carnivore Damage Prevention News 22, 12 – 18.
- Müller F (2014) Esel, Lamas und Herdenschutzhunde: ein Vergleich der innerartlichen Interaktion zweier Herdenschutztiere. Available: [www.herdenschutzschweiz.ch](http://www.herdenschutzschweiz.ch). [in German].