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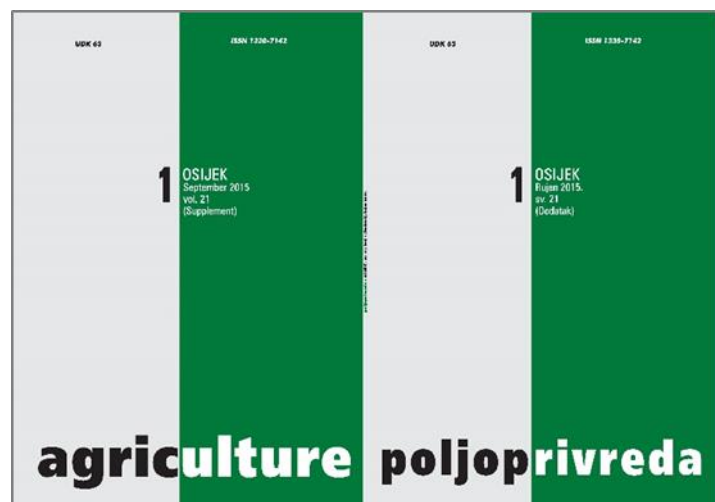
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WOLF (*CANIS LUPUS*) PREDATION ON DAIRY CATTLE IN EASTERN ITALIAN ALPS

Faccioni, G.⁽¹⁾, Sturaro, E.⁽¹⁾, Calderola, S.⁽²⁾, Ramanzin, M.⁽¹⁾

Original scientific paper

SUMMARY

Natural wolf recolonization of the Alps brings the challenge to reduce livestock losses and social conflicts. The uncommon impact of a wolf pack on the cattle farming systems of the "Lessinia", in the eastern Italian Alps was examined in this study. Dairy cattle farming predominates there using summer pastures (June-September) and grazing on lowland meadows out of summer. Grazing is organized with aim to minimize labour and costs. Animals are usually left unattended during the day and night in unprotected pastures. Since the return of the wolf in 2012, which formed a pack in 2013, attacks to livestock increased rapidly. Predations peaked during the summer, and they also were extended into the preceding and following months, especially during 2014. Cattle were the predominant species predated (79% of events and 71% of individual losses), with a strong selection towards young age classes. To prevent attacks, livestock should be grouped and kept protected by electric fences or in stables during the night, but this is in contrast with the free-grazing management that farmers have adopted for reducing costs. We suggest that management costs and introduction of protection measures changes should be taken into account for a future economic valorisation of the cattle farming sector.

Key-words: dairy cattle, mountain, wolf, livestock systems, depredation

INTRODUCTION

The recent natural recolonization of many European areas by wolf has increased the conflicts with humans (Linnel and Boitani, 2011; Reinhardt et al., 2011). Conflicts arise particularly where farmers have lost the habit to protect their livestock, which are often left grazing unattended and unprotected, even at night (Reinhardt et al., 2011). Reducing the conflicts due to predation on livestock will therefore require changes in the farming practices and the adoption of protection methods (Dalmaso et al., 2011; Linnel and Boitani, 2011). In fact, damages compensation alone fails to reduce animosity towards wolves (Dalmaso et al., 2011; Reinhardt et al., 2011). Sheep and goat are the most frequently livestock species killed by wolves in Europe (Reinhardt et al., 2011), but predation on cattle may also occur (Dalmaso et al., 2011). In order to assess the feasibility of adoption of prevention methods on cattle herds it would be useful to focus on recently recolonized areas strongly committed to cattle farming. This is the situation of "Lessinia", in the eastern Italian pre-Alps, where a wolf pair settled in 2012 and formed a reproductive pack in 2013.

Predations on livestock raised in the farmers a strong objection and the willingness to get rid of wolves again. In this study, conducted in the context of the A7 action of the LIFE Wolfalps Project (LIFE 12 NAT/IT/000807), co-financed by the EU, we present the farming and grazing systems in Lessinia and describe the patterns of predations on livestock by the recently formed wolf pack. We then discuss the changes in farming practices, with the appropriate protection measures for reducing the impact of predations, and the cultural and economic difficulties to implement them.

MATERIAL AND METHODS

Study area

The Lessinia is located in the eastern Italian pre-Alps. It includes 18 municipalities of the Verona province in the Veneto region and one municipality in the Trento

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Province, with a total surface of 689 km². Almost 100 km² are included in the Lessinia Natural Regional Park established in 1990 by the Veneto Region. The area is mostly mountainous; the main villages are located on the slopes below 1200 m a.s.l., where forest patches and meadows are predominant land cover. Above this elevation, wide areas of grassland are used for livestock summer grazing. The potential wild prey for wolves are mainly roe deer (*Capreolus capreolus*) and wild boar (*Sus scrofa*). Alpine chamois (*Rupicapra rupicapra*) is present in habitats where predation is difficult, and red deer (*Cervus elaphus*) still has a very low abundance (Calderola S., personal communication).

Data collection and analysis

To describe the livestock farming and grazing systems in Lessinia we used data from Official Agricultural Censuses (ISTAT) and databases produced for previous studies (Mrad et al., 2009; Sturaro et al., 2013; Sturaro et al., 2014). We gathered information on predation events collected by the Veneto Region. Predation events were assigned to wolf based on an *in situ* inspection by trained personnel (at least two persons per event, in total 11 persons during 2012-2014) of the State Forestry Corp and the Lessinia regional Park. In the study area there are no other large carnivores, and stray dogs are absent. Information about the date, location, the owner of the farm/livestock, species of the prey, age and number of individuals injured or killed was organized and analysed. We georeferenced the predation events (open-GIS software Quantum GIS) and calculated the size of the area where attacks occurred by the use of minimum convex polygon method (ArcGIS® software by ESRI). The frequencies of predation events among periods were compared using the Chi square test.

RESULTS AND DISCUSSION

Livestock farming and grazing systems

Dairy cattle farming largely predominates sheep and goat farming in Lessinia (Table 1). Many small traditional farms have been abandoned and the intensification of production systems has led to an increase in the herd size in the period 1980-2010 (Table 1). Despite these changes, cattle farming in the area is still based on the use of meadows and pastures (Sturaro et al., 2014), especially during summer. Summer farms are located at an average elevation of 1462 ± 128 m, allowing long usage period (124 ± 9 days). The average size of pastures is 68 ± 38 ha and stocking rate is 0.96 ± 0.36 LU/ha (LU=Livestock unit). Composition of herds/flocks in summer farms is 43% dairy cows, 38% heifers and calves, 6% beef cattle (suckler cows with calves), and 12% sheep and goats (only 2 flocks). Summer farms are managed to reduce labour and costs as much as possible: the animals are left unattended and free to graze in unfenced areas during day and night, without guarding dogs (Mrad et al., 2009; Sturaro et al., 2013). Thanks to

the very good accessibility (it is possible to reach 84% of summer farms by normal car), farmers make only short visits once or twice per day to check the animals or to milk them, but farmers usually (86% of the units) do not stay permanently with them. Many farmers use lowland meadows for a period of grazing, also unattended, before and after the summering season.

Table 1. Trend of the livestock sector (permanent farms) in Lessinia from 1982 to 2010 (ISTAT) (na = not available)

Farming systems	1982	1990	2000	2010
Cattle farms	2256	1661	983	656
Cattle heads	38952	40683	34335	26668
Dairy cows	16108	18558	15234	12072
Sheep and goat farms	na	na	237	142
Sheep and goat heads	na	na	2229	3117

Wolf Predation

Wolf predations on livestock first occurred during the winter 2011/2012, and since then increased rapidly (Figure 1). In 2014, 42 events and 64 livestock losses were observed. In addition, in this year the permanent farms, previously never attacked, suffered 10 predations on lowland meadows after the summer period, revealing that wolves began to follow the herds on their return to the villages. The total surface (minimum convex polygon) affected by predation events was 26 km² in 2012, 33 km² 2103, and increased to 105 km² in 2014. The distributions of predation events and of livestock losses (Figure 2) differed significantly between months ($\chi^2=37.5$, $P<0.001$, and $\chi^2=54.3$, $P<0.001$). Summer was the most dangerous period, although predations extended over the previous and following months. The median number of days between subsequent attacks decreased from 11 days in 2012 and 2013 to 3 days in 2014. The strong increase of predations after the wolf return happened in the area where livestock is managed without protection practices and the temporal pattern of predations peaking in summer are similar to those observed in other areas (Dondina et al., 2014).

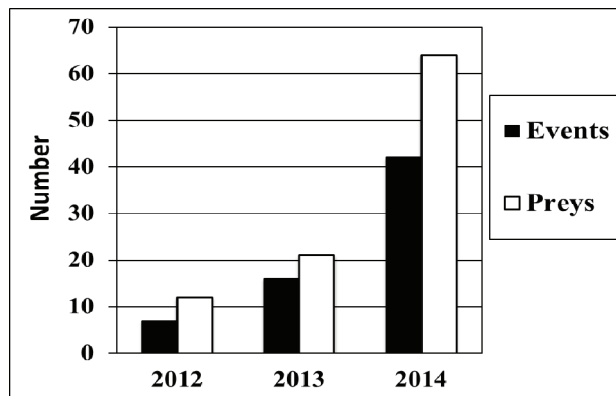


Figure 1. Total number of predation events and livestock losses in the Lessinia from 2012 to 2014

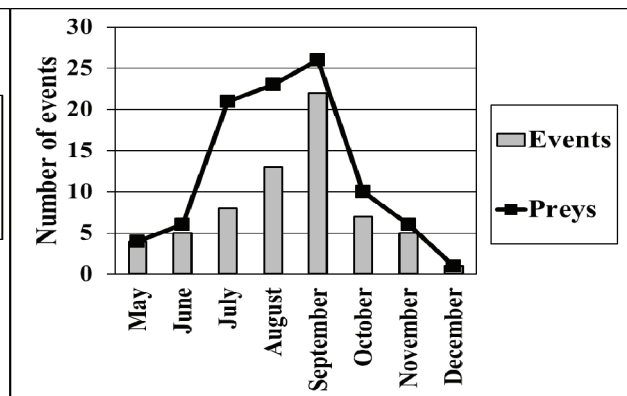


Figure 2. Monthly distribution of predation events and livestock losses in Lessinia from 2012 to 2014

Attacks mostly occurred on cattle (79% of events and 71% of individual losses), secondly on equids (15% and 18%), and lastly on sheep and goats (6% and 11%). This pattern is unusual, since sheep and goats are the preferred domestic prey of wolf (Reinhardt et al., 2011), but it can be related to the very low availability of small ruminants combined with the lack of protection measures for grazing cattle. In such situations, predation on cattle may be remarkable (Álvares and Blanco, 2014). Wolf clearly exerted a selection for age classes of cattle preyed: most of the attacks (77%) were on calves < 1 year old (42 % on calves < 6 month of age). Yearling cattle were attacked less (21%), whereas individuals older than 2 years were avoided (2%), although they were almost half of the cattle grazing. This pattern is consistent with the observed in other areas (Dondina et al., 2014).

In the farming and grazing systems of Lessinia there are many problems to be addressed in order to reduce the impact of the wolf predation. The most effective protection tools for livestock are electric fences and guarding dogs, especially for sheep and goat (Marucco and Boitani, 2012; Reinhardt et al., 2011). Dissuasive methods, acoustic or visual, are effective only temporarily and in specific situations (Reinhardt et al., 2011). Delimitation with permanent anti-predator fences of the rugged and wide pastures is impossible, because of the cost and impact on wild animal biodiversity and touristic attractiveness of the regional park. Experience of using guarding dogs with cattle is very limited in Italy, and in any case dogs may work only if livestock are not dispersed over wide pastures. Therefore, the only option to protect cattle in Lessinia is the night gathering within appropriate electric fences or stables. For making this feasible, however, farmers should abandon the practice of continuous free-grazing, adopting instead rotational grazing, making easier to group and protect the animals. However, single farmers cannot afford the additional costs of providing fences and water troughs to create pasture sections, and especially the salary for a shepherd to move the animals and to gather them before the night. An improvement in pasture productivity through

a better management would not create a benefit for the farmers, because actual stocking rates are already lower than the pasture capacity and/or animal requirements are compensated with concentrate supplementation. These difficulties increase the negative attitude of farmers and other local stakeholders against wolf. Although the livestock losses are refunded by the regional administration and can be estimated at < 1% of the number of cattle present in Lessinia, intolerance towards the wolf is growing (WOLFALPS, 2015). Most of the farmers do not accept the idea of implementing livestock protection measures, even if publicly supported, because if applied they would implicitly accept the presence of wolf. In this context, we suggest that the mitigation of wolf predation should be integrated into a comprehensive plan aimed at re-valuing the cattle farming sector in Lessinia, which is weakened (Sturaro et al., 2014) by the limited attitude of the owners towards innovating the farming structures and practices, the inadequacy of buildings and equipment in summer farms (Sturaro et al., 2013), and the low price paid for the milk sold to private dairies. For this purpose, opportunities are good (Sturaro et al., 2014), since the area has a high touristic attractiveness and the "Monte Veronese" local cheese is protected by a PDO, that could be used as a marketing tool. Therefore, the mitigation of the human-wolf conflict needs an effort of farmers and local stakeholders, supported by the regional agricultural policies, for a structural and technical innovation of the farms, a cooperative processing and milk marketing to increase its value, and a diversification of incomes through agro-touristic activities. This might greatly increase the economic viability of farming, and then justify the complication in management and the increased costs of grazing management for protection against wolf attacks.

CONCLUSION

This study examined the uncommon case of predations concentrated on dairy cattle by a wolf pack recently established in an area with a high density of livestock. In protection measures absence, predations

are increasing, and this has shaped a strongly negative attitude of the local communities against wolf. The farmers are unwilling to modify the practices that they consider traditional in order to adopt adequate prevention measures for which they cannot afford the costs. Simply compensating the direct costs of such measures would not be acceptable in front of the indirect costs of the modified management practices. Therefore, the solution of the human-wolf conflict must be integrated into a global approach to innovate and sustain the livestock sector, taking advantage of the synergies with tourism and marketing that are now undervalued.

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