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Predation impacts due to dogs on sheep herds in wolf-free areas: a synthesis based on surveys in eleven breeding territories in France

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Abstract. In order to get a better understanding of the situation in terms of predation in several French areas, the CERPAM of Provence, the SIME-SUAMME of Languedoc Roussillon, and VetAgro Sup conducted a study based on surveys in 11 territories in Southern France. These territories involved 12 departments: Monges (04), eastern Lubéron (04) and western Lubéron (84), Cévennes (30), Larzac (34), Livradois (63), Jura mountain (25 and 39), Couserans in Pyrénées (09), Ardèche mountain (07), Millevaches plateau (19 and 23) and Aix in Provence area (13). The surveys have been carried out between 1999 and 2013, during wolf-free periods of several years, in order to obtain a database on losses due to wandering dogs predation. We visited 307 farms or breeders (about 24 per territory). Two indicators have been evaluated. The attack rate is the number of attacks during a period divided by the number of farms and the number of years. The predation rate is the number of victims during a period divided by the number of grazing sheep and the number of years. We focused on adult sheep (> 4 months of age). Dog attack rate was on average 0.22 (minimum per territory 0.10, maximum 0.47) corresponding to one attack every 5 years, and dogs predation rate was 0.29%, (minimum 0,06%, maximum 0.6%) corresponding to 1 victim per year for a flock of 330 sheep. Sheep density on the whole territory had no influence on the attack rate over the level of 10 sheep per km². Each dog's attack caused an average loss of 6.3 sheep (from 1.6 to 22.9) and strongly disturbed the flocks in terms of behaviour. These attacks only occurred during the day and the visual identification of the attackers was very frequent (85%).

Keywords. Predation – Dog – Sheep herds – France – Attack rate – Predation rate.

Impact de la prédation par des chiens sur les troupeaux ovins hors zone à loups : une synthèse basée sur onze territoires d'élevage en France

Résumé. *Afin de mieux comprendre la prédation dans plusieurs régions françaises, le CERPAM, le SIME-SUAMME et VetAgro Sup ont conduit une étude basée sur la réalisation d'enquêtes dans 11 territoires répartis sur 12 départements : Monges (04), Lubéron oriental (04) et Lubéron occidental (84), Cévennes (30), Larzac (34), Livradois (63), massif du Jura (25 et 39), Couserans en Pyrénées (09), Monts d'Ardèche (07), Plateau de Millevaches (19 et 23) et pays d'Aix en Provence (13). Ces territoires ont été enquêtés entre 1999 et 2013, sur des périodes pluriannuelles sans présence de loups sur le territoire, afin d'obtenir une base de données sur les dégâts imputables aux chiens divagants. 307 unités d'exploitations, d'estive ou de transhumance ont été enquêtées. Deux indicateurs ont été pris en compte. La fréquence annuelle d'attaque correspond au nombre d'attaques sur la période enquêtée, ramené au nombre d'exploitations et au nombre d'années de cette période. Le taux de prédation est calculé en divisant le nombre total de victimes enregistrées durant la période par le nombre total d'ovins de même catégorie pâturant chaque année dans la zone, ramené au nombre d'années de la période considérée. L'étude porte sur ovins de plus de 4 mois. Les fréquences annuelles d'attaque sont de 0,22 (minimum par territoire 0,10, maximum 0,47), soit une attaque tous les 5 ans. Les taux de prédation due aux chiens sont de 0,29%, (minimum 0,06%, maximum 0,6%), soit 1 victime par an pour un troupeau de 330 têtes. La densité ovine sur le territoire n'influe pas de façon marquée sur le taux de prédation pour les bassins d'élevage ovin ayant plus de 10 ovins/km². Chaque attaque de chiens provoque en moyenne la perte de 6,3*

ovins (minimum 1,6, maximum 22,9) et perturbe de manière significative le comportement du troupeau. Ces attaques sont essentiellement diurnes et les chiens sont repérés dans près de 85% des cas.

Mots-clés. *Prédation – Chiens – Troupeaux ovins – France – Taux d'attaque – Taux de prédation.*

I – Introduction

In order to get a better understanding of the state of predation due to wandering dogs the CERPAM, the SIME-SUAMME and VetAgro Sup have been carrying out a study, over a period of 14 years, to assess the impact and frequency of predation, in seven French regions (Provence, Alpes-Côte d'Azur, Languedoc-Roussillon, Auvergne, Franche-Comté, Midi Pyrénées, Rhône-Alpes and Limousin), four mountains (Alps, Massif Central, Jura, Pyrenees) and 12 departments (04, 07, 09, 13, 19, 23, 25, 30, 34, 39, 63, 84). This study encompasses the diversity of French breeding sheep territories. A previous bibliography (Garde, 2005) showed that no global study was previously available on this subject. The figures reported in the literature remain estimates or extrapolations from partial data and are extremely divergent (Campion-Vincent, 2002). Our surveys were therefore conducted to assess the exact losses caused by dogs, in areas without wolves or before wolf installation. The objective of the study was to produce a database on the damage caused by dogs and to better characterize their level of predation.

II – Materials and methods

Eleven territories were selected for the diversity of the situations presented. They were surveyed similarly, by direct interviews with farmers, with surveys conducted by students. Small sheep flocks (< 75 or 100 sheep) were excluded. The reference period ran on 4-5 years before the survey date. For each farm, the sheep flock and its management were characterized. Each predation event was described (date, number of victims, circumstances, place, flock management and protection, predator...) and all the informations collected were analyzed jointly (Brunschwig et al., 2007). The method applied is thus similar to investigations of "victimization" well known in sociology, to detect insecurity acts unreported or recorded systematically (Robert, 2002).

Each territory investigated takes into account a representative area of French livestock grazing systems. These territories were wolf-free areas during the years surveyed. In total 307 individual and collective flock units were surveyed, with an average of 24 units per territory. This constitutes a total of 168,000 sheep over 4 months of age, managed at grazing and a total area of 14277 km² (see Table 1).

Table 1. Characteristics of farms and territories

Departments Territories	Monges	Eastern Lubéron	Western Lubéron	Larzac	Cévennes	Livradois	Jura Mountain	Couserans Pyrénées	Ardèche Mountain	Millevaches Plateau	Aix Area
Nb of farms surveyed	29	34	43	31	26	32	24	25	21	25	17
Sheep number over > 4 months	27,682	23,673	23,387	12,995	13,630	17,599	7,829	8,480	6,830	7,320	18,617

Two main indicators were used for the analysis. The attack rate is the number of attacks during a period divided by the number of farms and the number of years. The predation rate is the num-

ber of victims (male and female sheep; animals killed, wounded or missing) during a period divided by the number of grazing sheep and the number of years. We focused on “adult” sheep (over 4 months of age).

III – Results and discussion

On the whole data the attack rates are very homogeneous, about 0.22 attacks per year over the period, representing an average attack every 5 years for a given flock unit. The attack rate ranges between 0.1 and 0.47 depending on the territory considered. Western Lubéron is an exception with a frequency of 0.36 in fact due to two neighboring herds subjected to repeated attacks in a very particular context of malevolence. When these two cases are removed from the mean, the frequency for this territory decreases to 0.1. The Jura Mountain has a high frequency of 0.41, apparently due to the low density of sheep in this region: 2.5 sheep / km ² *vs* 12 to 100 for the other regions. Aix Area presents the higher frequency of 0.47 linked to the city proximity.

Predation rate averaged at 0.29% of victims per year (three victims per year for a herd of 1000 heads). The results are consistent for 7 of the 11 territories, being between 0.17 and 0.38. Cevennes and Aix Area stand out with a very low rate of 0.06%. Western Lubéron and Jura Mountain have conversely slightly higher rates with 0.55% and 0.60%, probably due either to an unusual concentration of losses in two neighboring farms, or to a very low number of sheep farms respectively.

Table 2. Main results of predation on sheep herds by dogs

Departments Territories	Grazing time (month)	Attack rates	Predation rate (%)	Dogs identification rate (% of attack)	Average number of victims per attack
Monges	5.8	0.11	0.25	92	22.8
Eastern Lubéron	8.3	0.16	0.17	78	14.2
Western Lubéron	8.2	0.35	0.55	90	4.5
Larzac	9.0	0.13	0.19	95	5.7
Cévennes	8.8	0.12	0.06	100	1.6
Livradois	6.9	0.10	0.20	88	11.7
Jura Mountain	7.1	0.41	0.60	85	3.1
Couserans Pyrénées	10.0	0.21	0.38	65	7.4
Ardèche Mountain	10.3	0.27	0.35	86	4.2
Millevaches Plateau	8.5	0.17	0.25	76	3.6
Aix Area	8.5	0.47	0.06	97	8.6
Average	8.2	0.22	0.29	86	6.3
SD	2.73	0.548	0.941	36.0	12.40

Attacks are performed by a single dog, or in a few cases by two dogs. It is important to note that the dog(s) responsible for the attack is on average identified and described in 85% of cases, the minimum value is 65%; this concerns the Couserans territory. Farms are insured for damage due to wandering dogs in 25% of cases (on average).

Nearly two-thirds of the attacks are performed by neighborhood dogs (35%) and hunting dogs (29%). Tourists’ dogs, often stigmatized, represent only a small proportion of attacks (6%). The cases attributed to “stray dogs” in the sense of an animal without owner (Charmettant and Dimanche, 2006) are very rare (0.4%).

Each dog attack causes an average loss of 6.3 animals. However, this mean figure includes large disparities per territory (1.6 in Cevennes, from 3.1 to 4.5 in Jura Mountain, Millevaches Plateau, Ardèche Mountain and western Lubéron, 5.7 to 7.4 in Larzac and Couserans, from 11.7 to 14.2 in Livradois and Eastern Lubéron; 22.9 in Monges) and per type of dog involved (from 4.4 per hunting dogs to 6 or 10 for tourists dogs or neighborhood dogs).

Finally half of dog attacks occur during autumn (51%), associated with the hunting season, while the rest of the attacks are distributed quite evenly between spring (16%), summer (20%) and winter (13%).

These surveys, conducted on various territories and combined into a single database, enable for the first time in France a precise analysis of predation due to wandering dogs. The first achievement of this study is the establishment of a predation rate obtained from direct surveys of farmers: the annual average for the eleven territories is 0.29% victims of dog attacks per year and the figure never exceeds 0.60%. These observations remain far below the figures reported in the references where the order of magnitude is from 2 to 5% of animals killed (Wick, 1998; Chevallier, 1999; Moutou, 1999; Sales, 2001; Pfeffer, 2000; Bobbé, 2002). A doubt on the validity of these various ungrounded references had already been mentioned by Cousse and Matter (2002). This doubt was confirmed by an audit work which shows that none of the figures came from a field study (Garde, 2005). So the question of the scientific status of these data and their engagement in the debate on large size predators is raised.

IV – Conclusions

This study, based on 11 territories, and carried out over a period of 14 years, was the first one in France to present field based results about dog predation. The diversity of territories surveyed and the homogeneity of the results enabled to consider the figures of the predation rate and attack rate as representative of the French situation. The results, which keep between 0.1 and 0.6% losses, are comparable to the international literature, which offers a range from 0.1 to 0.9% of loss (Solari and Maddalena, 2002; Taylor *et al*., 2005; USDA, 2007; Massucci, 2009).

In order to get a better knowledge of the whole predation impact, it could be of interest to complete this study by surveys or analysis considering predations due to various wild animals. Some preliminary results attest that sheep were attacked by wolfs, bears and lynx, but also by foxes, crows and boars. If data of predation due to one predator is available, it seems we haven't data about predation due to various predators in France.

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