WILD BOAR DISTRIBUTION TRENDS IN THE LAST TWO CENTURIES: AN EXAMPLE IN NORTHERN SPAIN

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Abstract: An analysis of the Wild boar distribution in the province of Asturias has been monitored from 1800 to 1991. Considering periods of half a century our results reveal a minimum in Wild boar distribution occurring around the middle of the XIXth century and a strong increase in the second half of the XXth century. Several hypotheses have been advanced in order to explain this expansion, including an amelioration of winter temperatures, Wolf population reduction, human depopulation and ageing in rural areas. Comparing each of these data sets with the Wild boar distribution from 1850 until now the results show that only ageing of rural people has evidenced a good relation with the Wild boar expansion occured in these last decades. Obviously, ageing of human rural population led to the desertion of crops and field as well as to a decrease in stockbreeding practices. All this meant an instantaneous take over of shrublands and forests which have been used by wild boars as diurnal shelters.

Keywords: Wild boar, *Sus scrofa,* Suidae, Populations, Historical distribution, Environmental changes.

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1. Introduction

The spectacular expansion of the Wild boar during the last decades is a generalized fact in Europe (Sáez-Royuela & Tellería, 1986). Several hypotheses have been proposed in order to find the reasons which account for this process. These are based on several factors whose variation through time may have affected the population of wild boars, such as the milder winters (Sáez-Royuela & Tellería, *op. cit.*), the reduction of Wolf populations, the desertion of the countryside, the ageing of the rural population and other related activities, such as the decrease in the Goat population and in the wood collection activity. (Tellería & Sáez-Royuela, 1985).

The availability in Asturias of measurable information on the presence of wild boars and wolves (expressed in surface occupied by each species), thermometrical registers and estimations of human population by ages in the XIX and XX centuries, allow the validity of these hypotheses in that territory to be verified along a longer period of time than that studied in Spain by Tellería and Sáez-Royuela (*op. cit.*).

2. Study area

The Principado de Asturias spreads along a stretch of land of about 60 km of average width between the Cantabrian Mountain Range and the northern coast of Spain, with an extent of more than 10,500 km^2. Its relief and vertical zonation are very well defined, with altitudes between sea level and 2,648 m. Climatic conditions range from atlantic to mountain climats with average annual rainfall higher than 1,000 mm which duplicates in mountainous zones.

3. Material and methods

Historical information on the presence of wild boars and wolves has been obtained from a number of geographical dictionaries, specially those of Martinez Marina (1801-1802), Miñano (1825-1827), Madoz (1846-1850), González Aguirre (1897) and Sánchez Mazas (1956-1961) and recent information derives from a questionnaire carried out in 1991, by the Hunting and River Fishing Service of the Principado de Asturias.

The results have been studied considering five chronological periods of half a century, *i.e.* 1800, 1850, 1900, 1950 and the present one 1991. The territorial unit used has been the demarcation of the 78 asturian municipalities.

Faunistic information comes from the hunting species lists available in the geographical dictionaries for municipality, considering that a species is present when it is included in a list, absent when it is not included, and without information when there is not any list related

to the municipality or when the information is ambiguous. The study of the Wild boar presence variation was carried out considering only those municipalities with shared information (presence or absence) in the compared periods. Data on human population (density and percentage of inhabitants older than 60) only refer to rural municipalities (Criado & Pérez, 1975; Sadei, 1992). Climate data, such as the average minimum temperature in the coldest month, as a representation of winter temperatures, come from the climatological station of Oviedo, where there is a virtually continuous register since 1851 (Mateo, 1983).

4. Results

The Wild boar in Asturias has undergone reductions and expansions in its range in the last two centuries which may become evident considering the number of municipalities where its presence has been proved (Fig. 1) and it can be compared with other parameters equally variable during the same period (Tab. 1).

A statistically significant reduction of the range of the Wild boar between 1800 and 1850, when the smallest extent is reached, has been stated. In the 1850-1900-1950 periods its increase is not significant (Q of Chochram=3.700; p=0.1572; n=41), but since the middle of this century the Wild boar extends throughout the municipalities with a softer relief in the West center of the region along the montainous axes, and it reaches the East and West coasts. Nowadays it is absent, or scarce, in the central municipalities, which are flatter and more densely populated. The expansion is verified in the fact that an occupation of 63% of the land units around 1950, becomes 92% in 1991.

In Asturias, the Wild boar now is not an important prey for the Wolf, since it only appears in 6% of its scats (Braña *et al.*, 1982). Therefore, the present increase of the Wild boar does not correspond to a decrease in the number of wolves. The historical data corroborate this assumption, since they show a similar variation considering that the smallest number of wolves is in 1900 and there is also a later increase (Q=15.461; p=0.0004; n=53) which is smaller than that of the Wild boar in the second half of this century (Fig. 2).

The increase in winter temperatures doesn't either provide a sufficient explanation for the great increase of Wild boar in the last decades. Even though a positive and significant correlation through time is achieved (r=0.2871; p<0.005), indicating an increase of winter temperatures in more than one century, such increase is probably a slow and accumulated the long term effect. This is proved by the fact that dividing the thermometrical series in spans none of the slopes of temperature increments in each one differs significantly from zero ($b_{1851\text{-}1899}$=8.985, p=0.412; $b_{1900\text{-}1945}$=0.018, p=0.3; $b_{1946\text{-}1990}$=8.248, p=0.551). In addition, the comparison of the average temperature increase in winter between the first and second half of this century doesn't either show a significant increase (t=1.5716; p>0.1).

In rural municipalities, a reduction in the density of human population is confirmed, from 47.9 inhabitants/km^2 in 1950 to 37.2 inhabitants/km^2 in 1991. However, such variation is relatively small when compared with the ageing of rural population (the percentage of inhabitants older than 60 increase from 7.7 to 24.9).

5. Discussion

From the existing data in Asturias it is not possible to prove a significant relation of the milder winters, the lower rates of wolves, or the decrease in the density of human population in rural areas, with the recent expansion of the Wild boar. Nevertheless, the ageing of rural population shows a bigger increase which is parallel to that of the Wild boar. The ageing, caused by youth depopulation of the countryside, has caused the desertion of lands dedicated to production of grass using a traditional stockbreeding.

There is a parallel strong decrease in the Goat population, whose browsing feeding limited the expansion of the bush. The number of goats has decreased in Asturias from 102,313 in 1938 to 15,895 in 1964, with a slight increase in later years (Fernández Lamuño, 1986). Such decrease of goats was due to the reforestation policy which began in the fourties carrying out repressive measures against those livestock species which were harmful for the forest crops.

All these effects have increased the areas covered by bushes and woods, used by wild boars as diurnal shelters thus favouring their expansion, even in agricultural ecosystems which have been modified by mechanization (see Cargnelutti *et al.*, 1990).

While in the northern side of the Cantabrian Mountain Range the expansion developed from the mountain to the coast, in the southern side the contrary procedure took

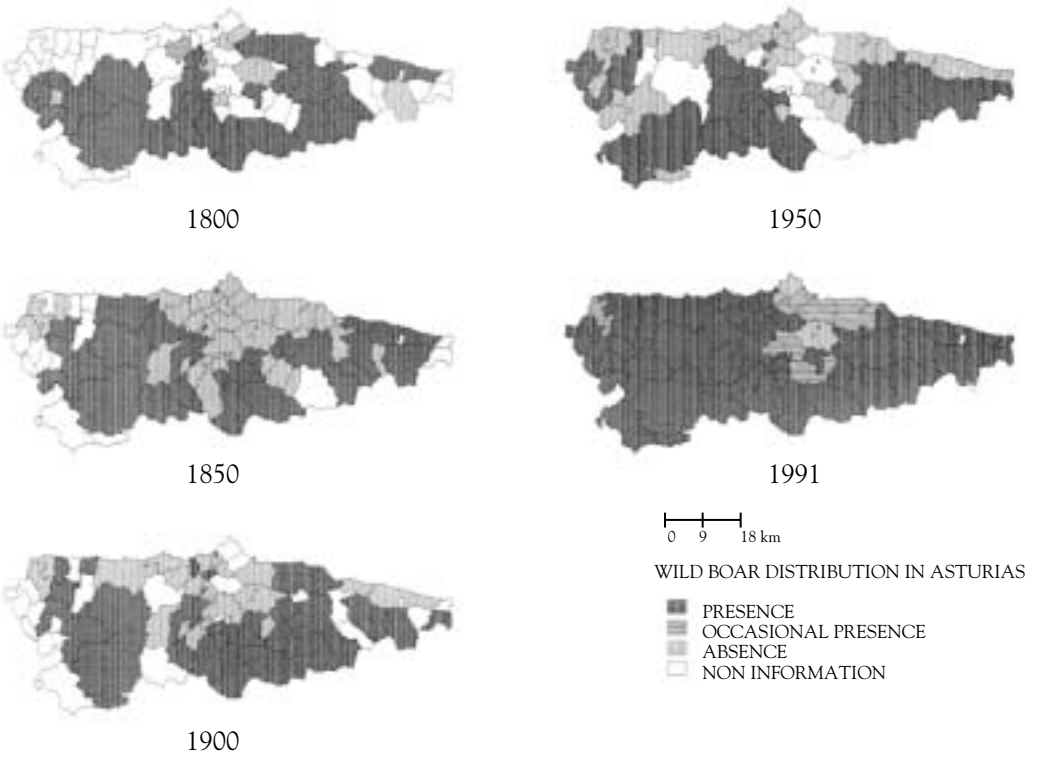

Figure 1. Asturian municipalities with a presence of wild boars between 1800 and 1991.

Tab. 1. Environmental variables susceptible to affect the Wild boar population in Asturias. Signification levels of the MacNemar correlated proportions test show the differences between frequencies of Wild boar presence at different periods.

Variables	1800	1850	1900	1950	1991
inhabitants/km^2	-	42.6	45.3	47.9	37.2
% inhabitants older than 60	-	4.0*	6.0*	7.7	24.9
average minimum temperature**	-	1.94	2.06	2.60	2.76
Signification level		0.007	0.092	0.179	0.000

*Estimated values; **average variable values of every 25 and 50 years

place. In the middle of the last century, wild boars were scarce in the Leonese mountainous areas and these were not widely occupied until a century later. Such recolonization is interpreted as an expansion to the least climatically suitable zones due to the human pressure in the lower cultivated lands (Sáenz de Buruaga, 1987).

An explanation to this inverse model of the territorial expansion of the Wild boar may be due to the topographical dissymmetry of both sides. Whereas in the northern one, with an average slope of 34%, deep valleys allow wild boars to experience great altitude variations with few movements, in the southern side this is not possible owing to its smaller slope (21%). Under such conditions, the answer of wild boars to adverse meteorological conditions is much more flexible in Asturias than in León.

6. Acknowledgements

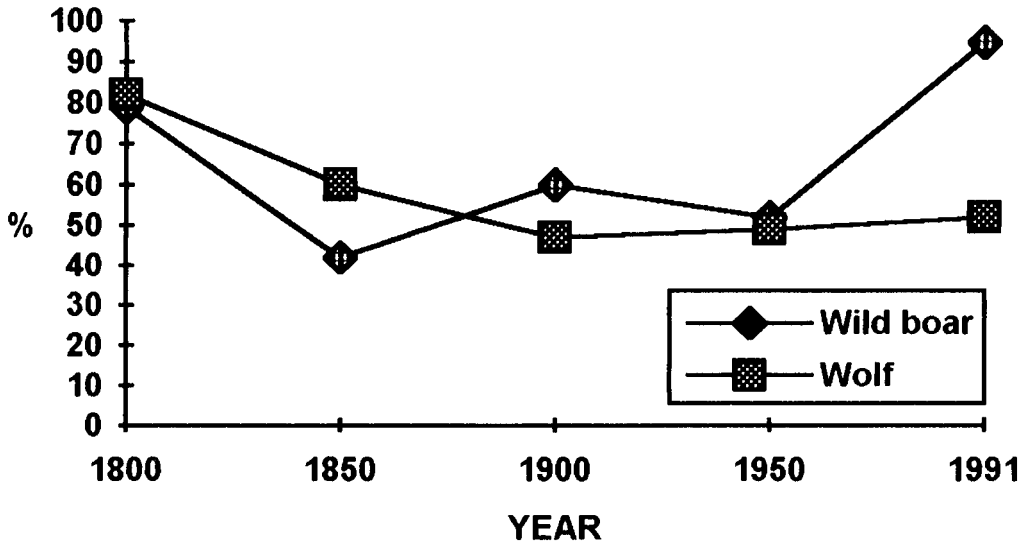

Figure 2. Variation of Wild boar and Wolf presence percentages in Asturian municipalities in the different time periods.

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