

The Development of the Wild Boars Abundance in the Czech Republic, and Influence of Wild Boar on Small Game Populations.

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Abstract

Already Emperor Joseph II. In 1786 banned the breeding of wild boar in freedom, not only in the Czech Republic, but in the whole of Austria-Hungary, where wild boar could be hunted by everyone. This action has caused a strong reduction in the number of wild boar throughout Central Europe. After the First World War, the stock of wild boar in the Czech Republic was at its long-term minimum. Population growth began in the 1980s. Wild boar is currently the most commonly hunted hoofed game in the Czech Republic. In 2017, a record number of this game was captured, namely 230,035 (an average of 33pcs/1000 ha). In some areas, up to 86 pcs/1000 ha were caught. The increase in the catch of wild boars is more than a thousand times higher in the Czech Republic since the end of World War II. Today, we are predicting a decline in stock of wild boar due to the spread of African swine fever that occurred in the Czech Republic in 2017. The number of wild boars significantly affects small game species (brown hare, pheasant, rabbit, grey partridge) in the Czech Republic. The bigger catches of wild boar were in hunting grounds, the smaller the number (or catching) of small game there was found. Statistically significantly more ($p < 0.05$) small game was counted in hunting grounds, where the wild boar were shot down to 20pcs/1000 ha. Conversely, the level of the catch of the wild boar did not have a negative effect on the catch rate of roe deer. The more wild boars were caught, the more roe deer were caught in the hunting ground. In hunting grounds where up to 20 wild boars per 1000 ha were caught, significantly fewer ($p < 0.05$) roe deer was caught than in other hunting grounds. On the contrary, in hunting grounds where more than 80 wild boars per 1000 ha were caught, significantly more roe deer were caught ($p < 0.05$). When we analyzed the impact of the environment on the level of the wild boar catches, it was found that in hunting grounds with a proportion of farmed land up to 40% there were caught significantly more ($p < 0.05$) wild boars than in hunting grounds with a larger proportion of farmland. On the other hand, in hunting grounds with forest representation up to 40%, significantly fewer ($p < 0.05$) wild boars were caught, than in hunting grounds with a larger proportion of the forest. The greater the proportion of the forest was in hunting ground, the more wild boars were caught in it.

Keywords: count development, Czech Republic, environment, small game, wild boar

Introduction

The number of hoofed game has changed significantly over the years in the Czech Republic mainly due to climate change (Laštůvka & Krejčová, 2004). Great changes have been brought by the first farmers by deforestation, which culminated in the Middle Ages. At that time, for example aurochs or European elk were eradicated, in the Bohemia. In the past centuries, beast of prey (wolf - 1914 Beskydy, bear - 1856 Šumava and 1893 Hukvaldy) and European bison (half of the 18th century) were exterminated in the Czech Lands. At these times, the lives of

people were heavily dependent on what they themselves cultivated. Game caused damages was often severely reduced. This was primarily about wild boar (Turek et al, 2017).

Empress Maria Theresa issued a patent in 1766, which was ordered by owners of hunting rights to cover damages (Vodňanský et al, 2003). In 1770 another regulation was issued on the closure of wild boars in to the game preserve. Already Emperor Joseph II. In 1786 banned the breeding of wild boar in freedom, where wild boar could be hunted by everyone (Pikula et al, 2002). Žalman (1948) states that wild boars lived more continuously only in eastern Moravia. Hanzák and Veselovský (1965) say that in Britain, Ireland and Denmark the wild boars was completely exterminated, as in the neighboring Alps. After World War II, this game was predominantly in the game parks and has spread from Poland, Slovakia and Germany.

The aim of this work is to describe the development of black game abundance in the Czech Republic from the historical point of view and determine its possible influence on small game populations and describe influence the environment on the pig population to.

Data and Methods

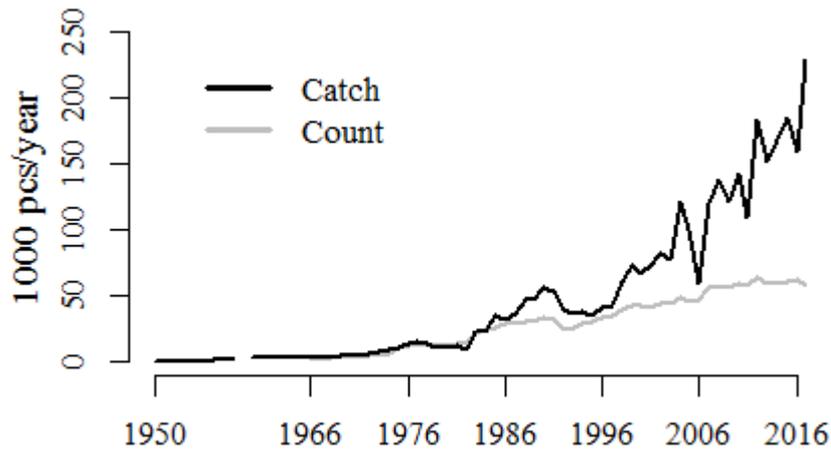
The survey used hunting records published by the Czech Statistical Office, since 1950 and the Ministry of Agriculture since 1966. The data comes from 5815 hunting grounds found in the Czech Republic and covers an area of 6 887 969 ha. Data on agricultural land and forests are part of the hunting record. Data on catches of black game are documented on the basis of recorded seals. Game data is obtained based on the spring census of the game, which is always on 31 March of the previous year. Counting is done by hunters only on the basis of their own experience, not on the basis of solid methodology. Conversely, game counts may not fully correspond to reality. The size of the populations can therefore only be estimated by the size of the catch of each species. The data from game parks and pheasantries were filtered out to determine the influence of the wild boar (*Sus scrofa*) on roe deer (*Capreolus capreolus*). And when detecting the impact of a wild boar on small game populations, data from hunting grounds where the game was artificially discharged was also filtered out. In this case, small game is considered to be brown hare (*Lepus europaeus*), wild rabbit (*Oryctolagus cuniculus*), pheasant sp. (*Phasianus sp.*) and grey partridge (*Perdix perdix*). The statistical data from hunting grounds was displayed by districts of the Czech Republic. The data was divided into the grid Kartierung der Flora Mitteleuropas (KFME), too. KFME is a system of squares for the mapping of abundance of the Central European biota. Statistical data processing was performed using the software STATISTICA. The hypotheses were tested using the non-parametric Kruskal-Wallis test or by using the Mann-Whitney U-test. The HSD test was used for data with different N; and the multiple comparison of *p*-values was applied for non-parametric data. The graphs in text show average, standard error of average and standard deviation.

Results and Discussion

After the First World War, the stock of wild boar in the Czech Republic was at its long-term minimum. The catch was only 161 in 1925, while Vodňanský et al. (2003) reported that wild boar was shot in the Czech Republic between 1874 and 1911, ranging between 470 and 882 pieces per year. Population growth began in the 1980s. Thereafter, the catches of the wild boars growth steeply and only the strong winters in 2005 and 2010 were negatively affected. At present, the wild boar is the most frequently hunted hoofed game in the Czech Republic. In 2017, a record number of this game was captured, namely 230,035 (an average of 33pcs/1000 ha). This is more than a thousand times higher than the 1950 catch, when 198 pieces (0.03 pcs/1000 ha) were caught in the Czech Republic (fig. 1). Also the spring conditions of pigs

counted by hunters growth from 1910 in 1966 to 62,134 in 2016. Turek et al. (2017) suggests that the increase in the number of the wild boar population in the last 20 years is in the Czech republic similar to that in Slovakia (5.2 and 5.3 times respectively).

Figure 1: Catch and spring census of a wild boar in the Czech Republic in the years 1950-2017.



In 1997, 43,053 pieces of black game were caught in the Czech Republic, twenty years later (2017) it was 230,035 pieces, which represents more than five times the increase. In 1997, a maximum of 20 pieces of wild boars per 1000 hectares of hunting area were caught, while in 2017 it was almost 90 units per 1000 ha in some districts (tab. 1 and fig. 2 and 3). Last year, there is a presumption of a reduction in the number of black game due to increased catches and occurrence of African swine fever.

Table 1: Catch of the black game in 1997 and 2017 in the Czech Republic by individual districts.

	1997	2017
catch/1000 ha	number of districts	number of districts
0-1	3	0
1-4	22	0
5-6	21	0
7-10	23	1
11-20	8	6
21-30	-	26
31-40	-	23
41-90	-	21

Figure 2: Map of wild boar shot in the Czech Republic by districts in 1997 (catch on 1000 ha of hunting area).

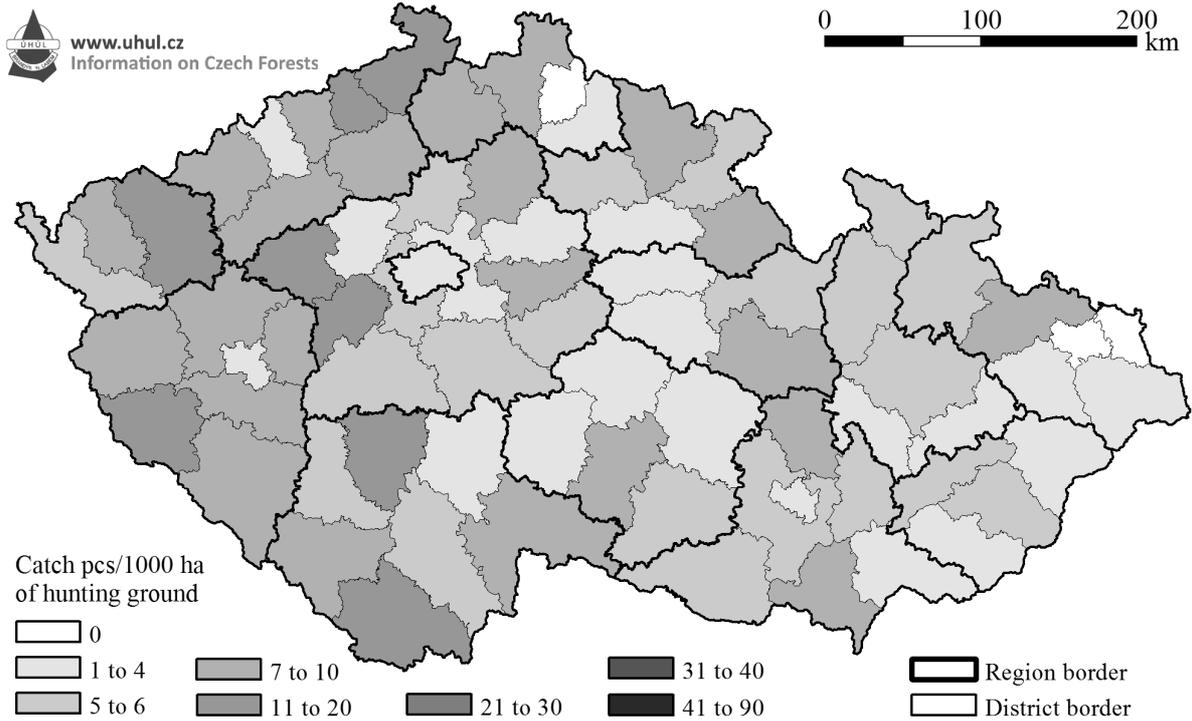
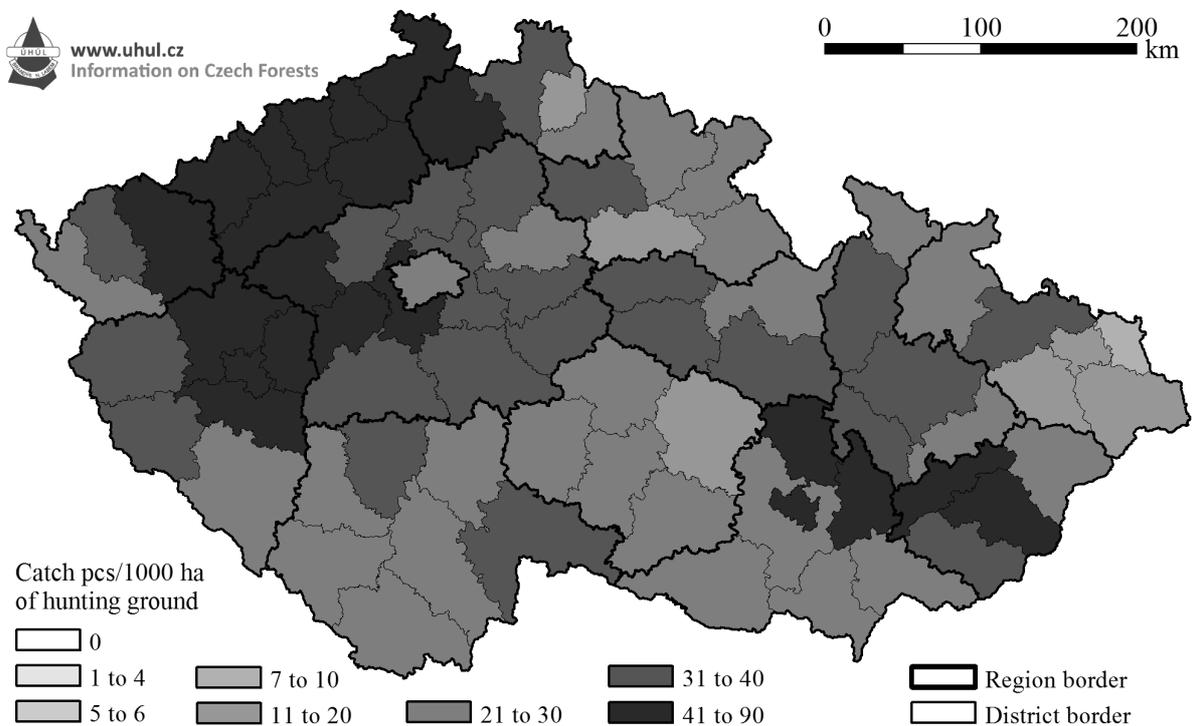


Figure 3: Map of wild boar shot in the Czech Republic by districts in 2017 (catch on 1000 ha of hunting area).



In 2016, in the Czech Republic, 160,448 black game was caught before the outbreak of African swine fever. Catch culminated in mid-range between 300 and 500 m above sea level, and above 800 m above sea level only a minimum of black game was caught. In 2016, a maximum of 842 wild boars were caught in one square KFME, equivalent to 63.2 units per 1000 ha of hunting

area. In 2017, even 1150 pieces were caught in one square, equivalent to 86.3 pieces per 1000 ha of hunting area (tab. 2 and fig. 4 and 5). The wild boar catching grew between 2016 and 2017, when African swine fever occurred in the Czech Republic by 43%. The increase is evident especially in the southeast of the Czech Republic in the Zlín region.

Table 2: Catch of black game in the Czech Republic in 2016 and 2017 in the mapping quadrants of the KFME Network of Biological Mapping (before and after the outbreak of African swine fever).

catch pcs/quadrant	2016		2017	
	number of quadrants	catch pcs/1000 ha	number of quadrants	catch pcs/1000 ha
1-180	258	7,3	151	8,1
181-320	177	18,7	181	15,8
321-500	123	30,2	172	30,4
501-850	68	44,8	125	47,4
851-1150	-	-	25	73,9
maximum		63,2		86,3

Figure 4: Map of wild boar catching in the Czech Republic in map quadrants of the KFME Network of Biological Mapping in 2016 (shot in pieces on a hunting area in a quadrate).

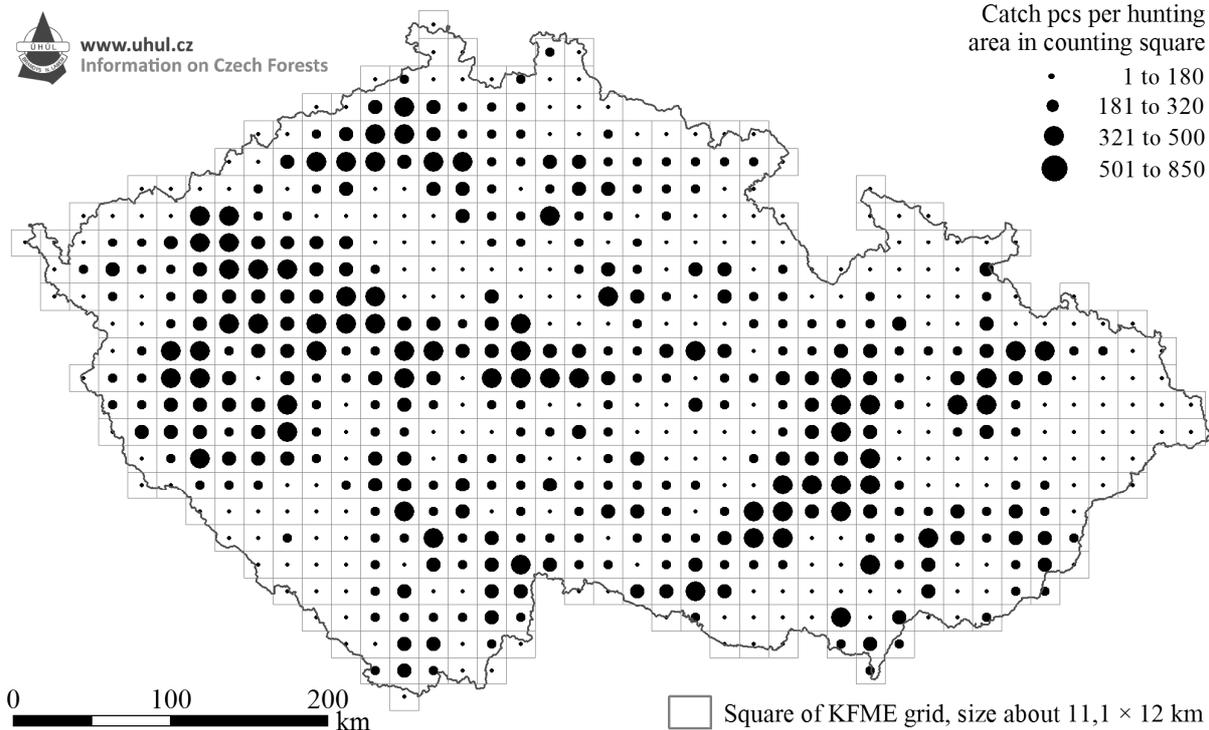
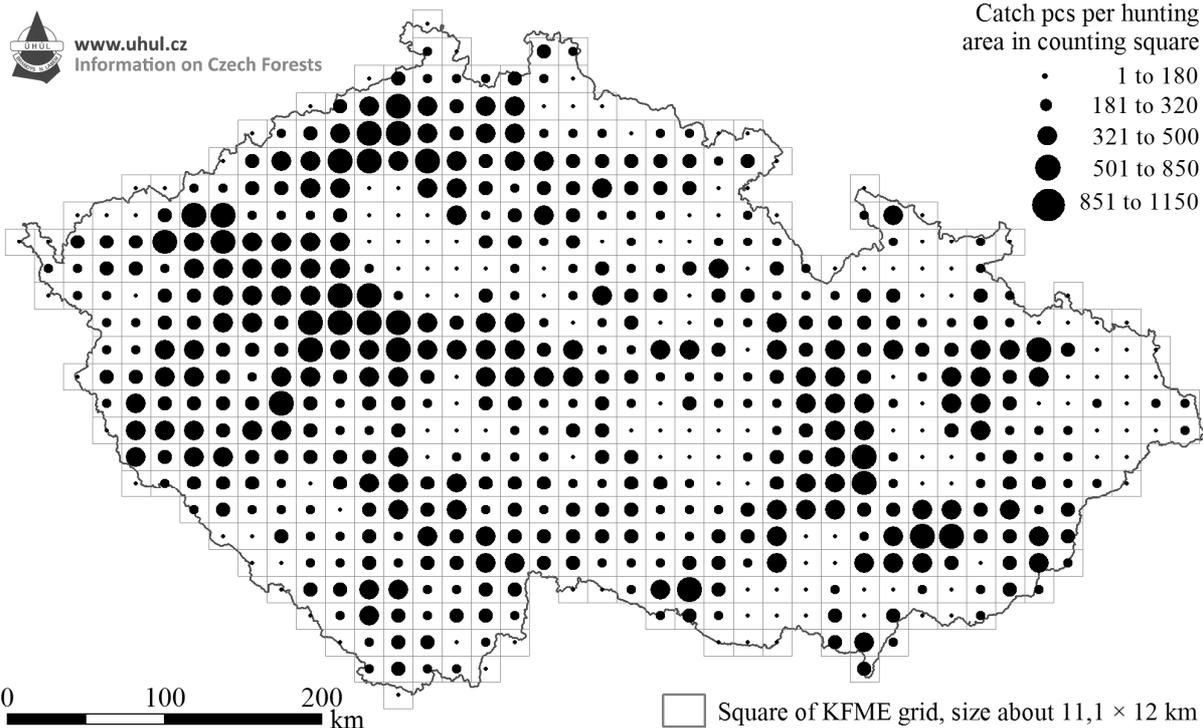
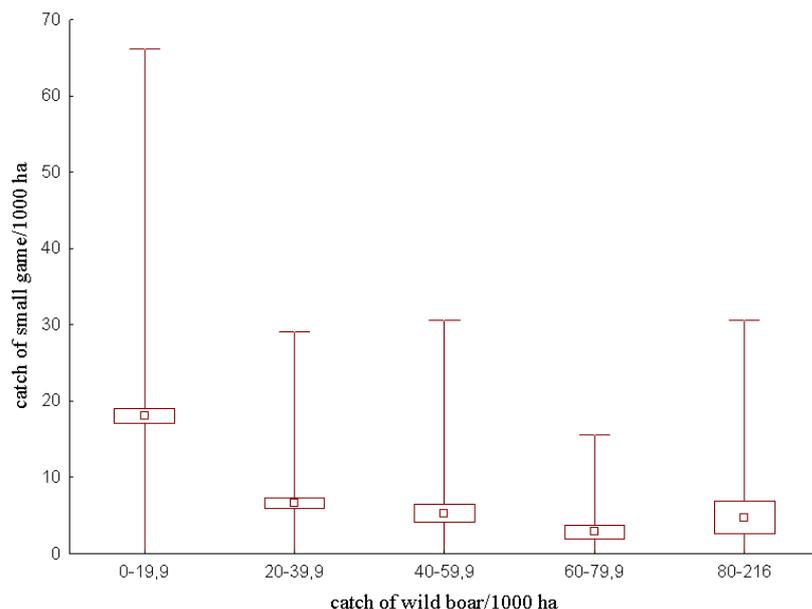


Figure 5: Map of wild boar catching in the Czech Republic in map quadrants of the KFME Network of Biological Mapping in 2016 (shot in pieces on a hunting area in a quadrate), after the outbreak of African swine fever (ASF).



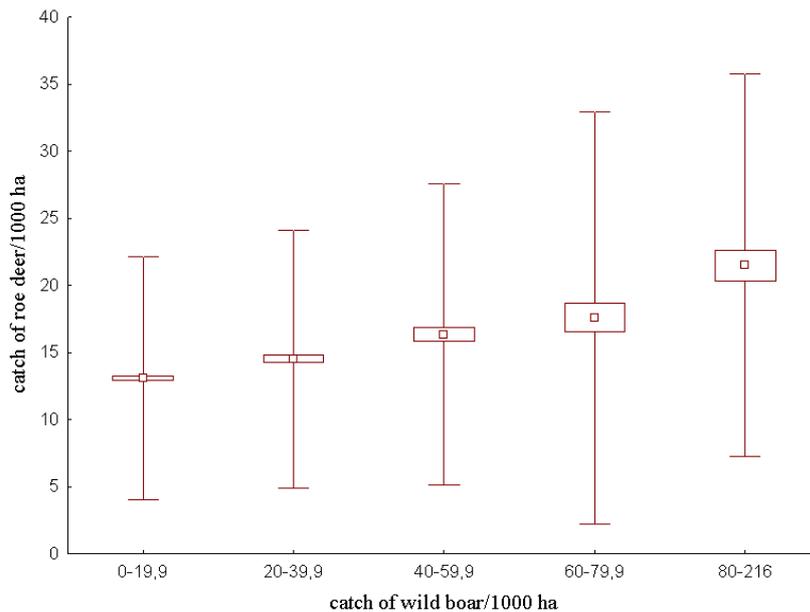
We considered that the number of black game affected small game species (hare, pheasant, rabbit, partridge). In analyzes, therefore, the states and catches of these game species were compared in individual hunting grounds. The bigger catches of wild boar were in hunting grounds, the smaller the number (or catching) of small game there was found. Statistically significantly more ($p < 0.05$) small game was counted in hunting grounds, where the wild boar were shot down to 20pcs/1000 ha. At the same time, in these hunting grounds, statistically significantly more ($p = 0,00$) small game was hunted than in hunting grounds, where 20 or more pigs per 1000 ha were caught (fig. 6).

Figure 6: Graph of wild boar and small game catch per 1000 ha.



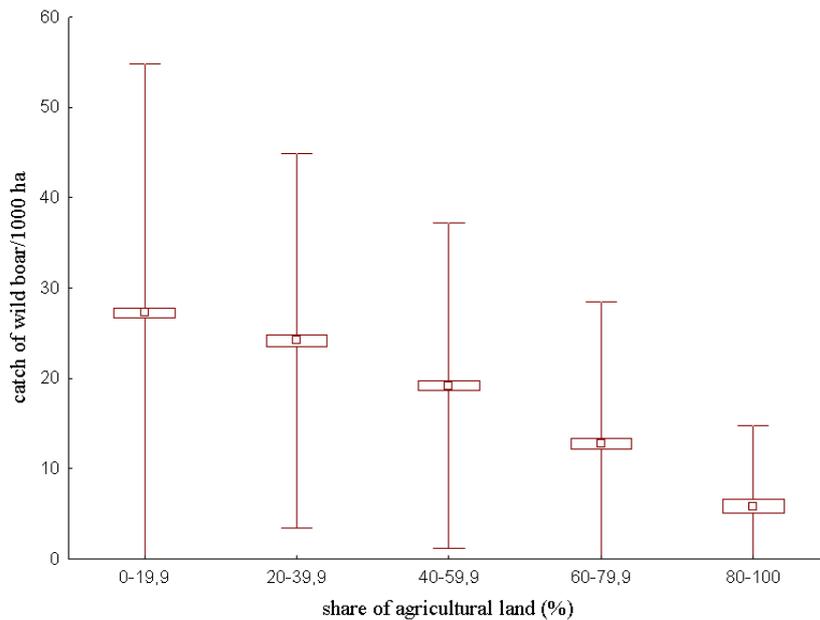
Conversely, the level of the catch of the wild boar did not have a negative effect on the catch rate of roe deer. The more wild boars were caught, the more roe deer were caught in the hunting ground. In hunting grounds where up to 20 wild boars per 1000 ha were caught, significantly fewer ($p < 0.05$) roe deer was caught than in other hunting grounds (fig. 7). On the contrary, in hunting grounds where more than 80 wild boars per 1000 ha were caught, significantly more roe deer were caught ($p < 0.05$). Black game apparently does not make the predatory pressure on roe deer game as expected.

Figure 7: Graph of wild boar and roe deer catch per 1000 ha.



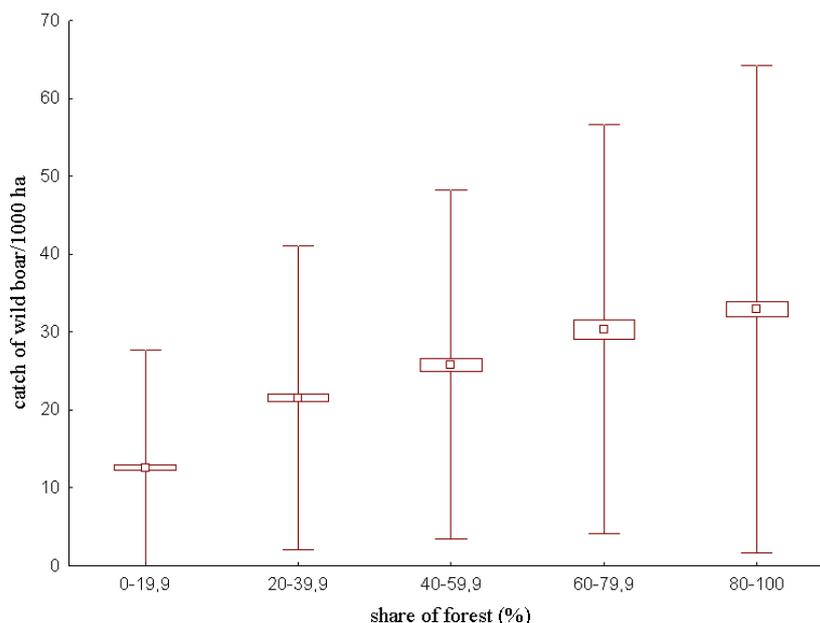
It has been assumed that the number of black game also affects the environment in which they live. For this reason, the agricultural and forest land analysis was carried out in individual hunting grounds and their representation was compared to the amount of catches of black game. It was found that in hunting grounds with a proportion of farmed land up to 40% there were caught significantly more ($p < 0.05$) wild boars than in hunting grounds with a larger proportion of farmland (fig. 8).

Figure 8: Graph of black game catching per 1000 ha and representation of agricultural cultivated land in hunting grounds (%).



And in the hunting grounds with forest representation up to 40%, significantly fewer ($p < 0.05$) wild boars were caught, than in hunting grounds with a larger proportion of the forest (fig. 9). The greater the proportion of the forest was in hunting ground, the more wild boars were caught in it. It seems that the share of the forest in hunting grounds has a considerable influence on the number of wild boars. It seems that the optimal environment for pigs is found in hunting grounds with a maximum of 40 percent of the fields and a maximum of 40 percent of the forest.

Figure 9: Graph of black game catching per 1000 ha and forest representation in hunting grounds (%).



In general, it was assumed that a large proportion of fields in hunting grounds where pigs can reproduce peacefully, was considered to be essential for the growth of the wild boar population (Vodňanský et al, 2003). It is therefore possible that a stronger influence on the numbers of

wild game populations has feed and the intensity of its hunting, rather than the representation of farm land in hunting grounds. Agricultural crops provide black game food for only 2 to 4 months a year and cover only slightly longer. For the rest of the year, wild boar is hiding in the woods, where they also find food that hunters present to a large extent.

Conclusion

Already Emperor Joseph II. In 1786 banned the breeding of wild boar in freedom, not only in the Czech Republic, but in the whole of Austria-Hungary, where wild boar could be hunted by everyone. This action has caused a strong reduction in the number of wild boar throughout Central Europe. After the First World War, the stock of wild boar in the Czech Republic was at its long-term minimum. Population growth began in the 1980s, as Hromas (2003) pointed out. Wild boar is currently the most commonly hunted hoofed game in the Czech Republic. In 2017, a record number of this game was captured, namely 230,035 (an average of 33pcs/1000 ha). In some areas, up to 86 pcs/1000 ha were caught. The increase in the catch of wild boars is more than a thousand times higher in the Czech Republic since the end of World War II. Today, we are predicting a decline in stock of wild boar due to the spread of African swine fever that occurred in the Czech Republic in 2017.

The number of wild boars significantly affects small game species in the Czech Republic. The bigger catches of wild boar were in hunting grounds, the smaller the number (or catching) of small game there was found. Significantly more small game was counted in hunting grounds, where the wild boar were shot down to 20pcs/1000 Conversely, the level of the catch of the wild boar did not have a negative effect on the catch rate of roe deer. The more wild boars were caught, the more roe deer were caught in the hunting ground. Black game apparently does not make the predatory pressure on roe deer game as expected.

When we analyzed the impact of the environment on the level of the wild boar catches, it was found that in hunting grounds with a proportion of farmed land up to 40% there were caught more wild boars than in hunting grounds with a larger proportion of farmland. And in the hunting grounds with forest representation up to 40%, fewer wild boars were caught, than in hunting grounds with a larger proportion of the forest. The greater the proportion of the forest was in hunting ground, the more wild boars were caught in it.

Acknowledgements

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