

# Eight years of African swine fever in Poland

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### Summary

African swine fever (ASF) was detected in Poland on February 17, 2014. Epidemiological studies from other European countries and the results of epidemiological investigations in different regions of Poland in which the disease was detected indicate that the African swine fever virus (ASFV) must have been present in Poland for at least a few months before the first ASF outbreak was detected. The ASFV virus was introduced into the territory of the Republic of Poland from the Republic of Belarus. During the 8 years of the ASF epizootic in Poland, multidisciplinary measures were taken to eradicate the disease from the wild boar population and limit the possibility of virus transmission from the wild boar habitat to pig farms. Despite the various attempts to stop the expansion of ASF, we have not been successful in eradicating the disease in Poland. By the end of March, 2022, a total of 14016 ASF outbreaks were found in the wild boar population and 488 in the pig population.

Throughout the 8-year ASF epidemic in Poland and other countries of Central and Eastern Europe, the course of the disease in the wild boar population, and consequently in pigs, differed significantly from that observed in the 1960s, 70s, 80s, and 90s in Portugal and Spain.

First of all, according to predictions by experts from countries previously affected by ASF, the emergence of the disease in the wild boar population in Eastern Europe was supposed to result in the disease becoming spontaneously extinct in the wild boar population because of its mortality rate amounting to almost 100% and the high virulence of ASFV. However, these predictions have not materialized. The possible development of the epizootic situation in Eastern Europe was similarly underestimated. Experts expected a course of ASF similar to that of classical swine fever (CSF) in the wild boar population in Europe in the 1990s and at the beginning of the 21<sup>st</sup> century.

Unfortunately, observations made so far in Poland, the Baltic countries, and southern Europe show that most assumptions regarding the dynamics of ASF spread were inaccurate.

Actions aimed at limiting the circulation and spread of ASFV in the wild boar population in Poland proved to be insufficient. The regulations, and above all their implementation and enforcement, were ineffective.

Consequently, during the period analyzed (February 2014 – end of March 2022), the disease spread to 11 out of 16 voivodeships in the case of pigs and to 11 voivodeships, though not exactly the same, in the case of wild boar. In principle, the number of ASF outbreaks in the pig and wild boar populations increased year by year. It can be concluded that since the appearance of the first case of ASF the chances of eradicating the disease in Poland have been continuously diminishing. It seems that the situation may improve only if there is a fundamental change in the approach to controlling ASF. This should include radical measures against producers who do not comply with the established principles of biosecurity and a significant change in the strategy of controlling ASF in the wild boar population with a more active involvement on the part of hunters, foresters, veterinary inspectors, police, and farmers themselves.

**Keywords:** African swine fever, Poland, 8 years, eradication

In 1921, African swine fever (ASF) was first detected in Africa in a population of domestic pigs imported from Europe to Kenya (19). Since then, the disease has been continuously present and endemic in African wild pigs (warhogs, wild boars, red river hogs), mainly in Sub-Saharan Africa, where all known virus genotypes (24 genotypes) can be found.

African swine fever virus (ASFV), genotype I, was endemic in Spain and Portugal for over three decades between 1960 and 1995. At the same time, also other European countries, such as France (1964), Italy (1967, 1969, 1993), Malta (1978), Belgium (1985), and the Netherlands (1986), periodically struggled with the problem of ASF. In the second half of the 1970s, ASF

appeared in several countries of America: Cuba (1971, 1980), Brazil (1978), the Dominican Republic (1978), and Haiti (1979) (5, 7).

After more than 30 years, in the mid-1990s, ASF was successfully eradicated from the Iberian Peninsula. At that time, the disease was eradicated in all European countries except the Italian island of Sardinia, where ASF has been endemic since 1978 (8).

The current ASF pandemic began in Georgia, where it was detected on June 5, 2007. The Georgia 2007/1 isolate (ASFV genotype II) was carried to the Port of Poti on the Black Sea with garbage from a ship that sailed from Mozambique (East Africa). After that, ASF was recorded in the Russian Federation in 2007 (23). At the same time, the disease was found in almost all countries of the Caucasus. In 2012, ASF outbreaks were recorded in Ukraine and Belarus in 2013, and Lithuania in January 2014. As already mentioned, the first ASF outbreak in Poland was detected in February 2014, and in the same year, the disease appeared in Latvia and Estonia. There is no doubt that ASFV was brought to Poland from the Republic of Belarus (14). In the following years, ASFV was detected in many countries in Europe, Asia, and South America (2, 10).

### The development of ASF in Poland and other European countries

From the diagnosis of the first outbreak to the end of December 2021, i.e. in a period of 8 years, 14016 ASF outbreaks were found in Poland in the wild boar population (as of the end of March 2022) and 488 in the pig population (Fig. 1 and 2).

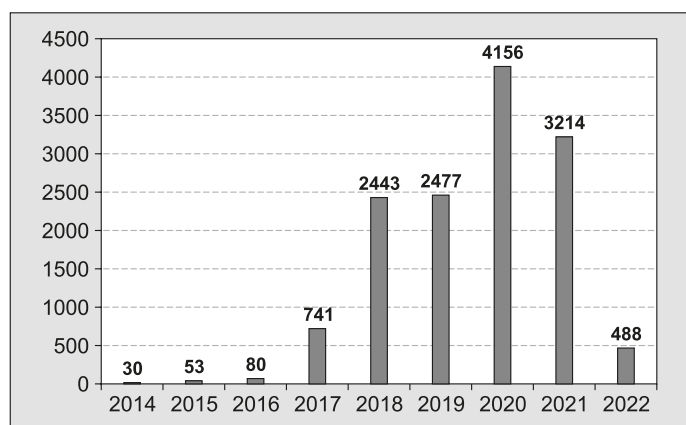
The wild boar is the main reservoir and source of ASFV in Poland, as well as in practically all European countries affected by this disease. The etiological

**Tab. 1.** The number of ASF outbreaks in the pig population in Poland, by voivodeship in 2014-2021

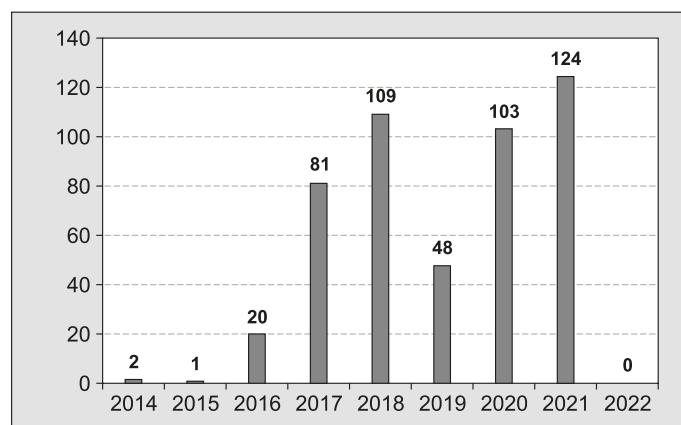
Voivodeship	Year							
	2014	2015	2016	2017	2018	2019	2020	2021
Podlaskie	2	1	13	14	3	2	0	1
Lubelskie			5	61	76	17	62	3
Mazowieckie			2	6	8	9	4	2
Warmińsko-mazurskie					14	20	8	19
Podkarpackie					8	0	17	55
Wielkopolskie							6	9
Lubuskie							4	6
Dolnośląskie							2	12
Małopolskie								6
Łódzkie								3
Świętokrzyskie								8
<b>Total</b>	<b>2</b>	<b>1</b>	<b>20</b>	<b>83</b>	<b>109</b>	<b>47</b>	<b>103</b>	<b>124</b>

factor of ASF is transferred to the pig population in various ways, mainly by humans, from this reservoir (4, 9, 15).

Despite all measures taken to stop the spread of infections, the number of ASF outbreaks in wild boar and pig populations in Poland has been growing dynamically, which has been particularly visible over the last 2 years. At the same time, the area where ASF outbreaks are detected in the wild boar and pig populations expands (Fig. 3). The annual numbers of ASF outbreaks in the wild boar population in the years from 2014 to the end of March 2022 were as follows: 30, 53, 80, 741, 2443, 2472, 4156, 3208, and 488 (1, 3). Likewise, the number of outbreaks in the pig population is also increasing. The annual numbers of outbreaks from 2014 to the end of March 2022 were 2, 1, 20, 81, 109, 48, 98, 124, and 0 (Fig. 2). In total, during the 8 years of ASF occurrence in Poland, 14016 outbreaks of this disease were found in the wild boar population and 488 in the pig population. The number of ASF outbreaks in Europe is also increasing every



**Fig. 1.** ASF outbreaks in the wild boar population in 2014-2022 according to data from the Chief Veterinary Inspectorate (<https://www.wetgiw.gov.pl/nadzor-weterynaryjny/asf-w-polsce>). The number of outbreaks in 2022 is current by the end of March 2022



**Fig. 2.** ASF outbreaks in the pig population in 2014-2022 according to data from the Chief Veterinary Inspectorate (<https://www.wetgiw.gov.pl/nadzor-weterynaryjny/asf-w-polsce>). The number of outbreaks in 2022 is current by the end of March 2022

year – in 2021, 12150 outbreaks were recorded in the wild boar population and 1874 in the pig population.

In Poland, the relationship between the number of outbreaks in the wild boar population and the pig population has been surprisingly different each year over the last 8 years. The number of outbreaks in the wild boar population per one outbreak in the pig population fluctuated over the years from about 4 in 2016 to about 51 in 2019. For the entire period of the ASF epizootic, this ratio amounts to 27.45, which means that for approximately every 27 outbreaks in the wild boar population, there is one outbreak in the pig population. These data are astonishing in terms of its breadth for the individually analyzed years. The value of the ratio is particularly surprising for the first period of ASF

occurrence in Poland. In the first 3 years (2014-2016), the number of outbreaks in the wild boar population (163) was only about 7 times as high as the number of outbreaks in the pig population (22). This fact shows that the owners of pig herds were unprepared to protect their animals against ASFV or unwilling to search for wild boar that had died of ASF (13).

What is particularly important and has significant epidemiological consequences is that the etiological factor of the disease entered the Polish pig population relatively quickly, unlike in most ASF-affected countries in Central Europe, i.e. after the first 9 outbreaks in wild boars had been detected. In the Czech Republic and Belgium, the disease was not transferred to the pig population even after several hundred outbreaks had been detected in the wild boar population. In Germany, in a period of more than 2 years from the introduction of ASFV into that country, more than 2800 outbreaks in the wild boar population resulted in pigs becoming infected only four times (20).

Interesting and revealing conclusions come from analyzing the proportion between the number of ASF outbreaks in the wild boar population and the number of outbreaks in the pig population in particular European countries. The analysis was based on data from 2020 and 2021, and the results are presented in Table 2. As shown in the table, the proportions between the number of ASF outbreaks in the wild boar population

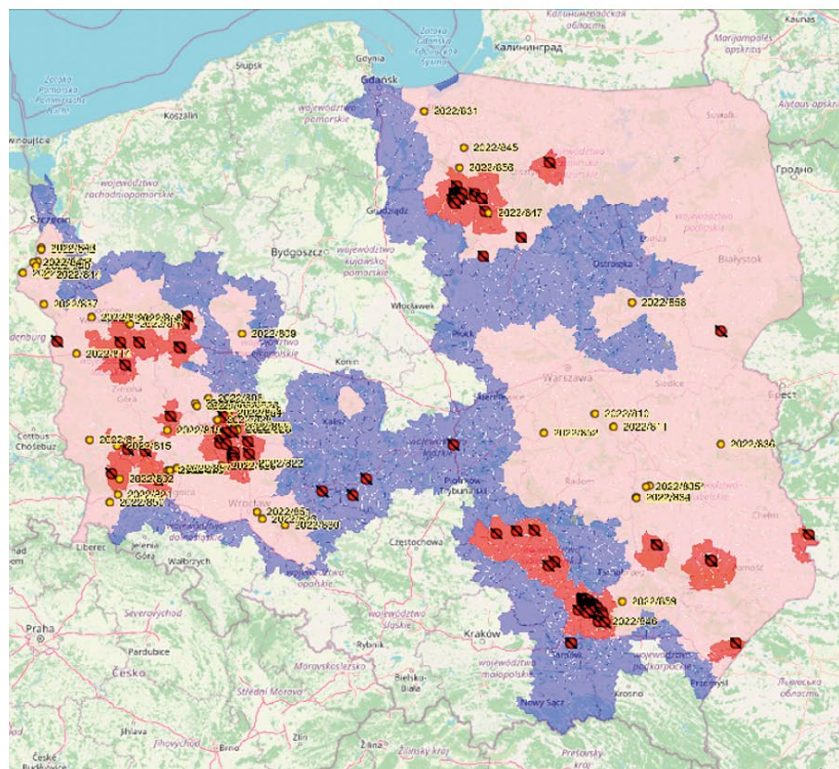
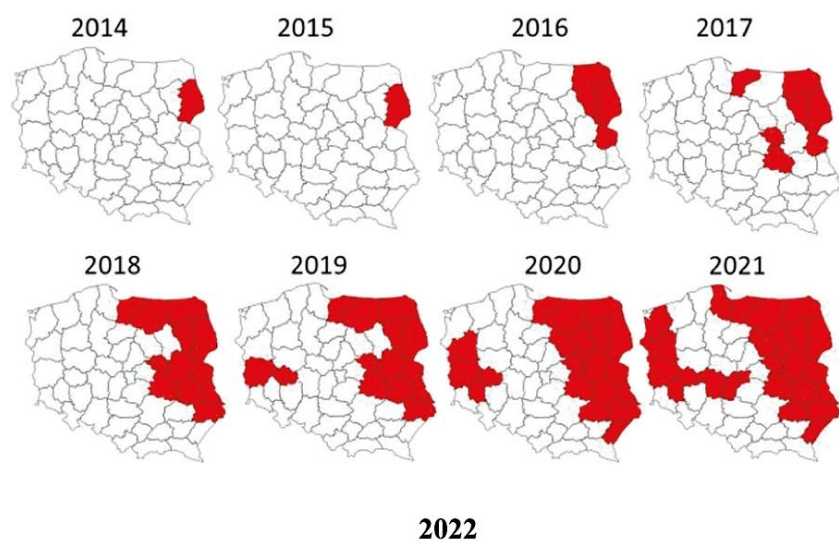


Fig. 3. The dynamics of ASF spread from 2014 to the end of March 2022. Source of maps: Chief Veterinary Inspectorate (<https://www.wetgiw.gov.pl/nadzor-weterynaryjny/asf-w-polsce>)

Tab. 2. The proportions between the number of ASF outbreaks in the wild boar population and the pig population in 2020 and 2021 in Poland and other European countries where ASF was found

Country	Outbreaks		
	in wild boar	in domestic pigs	in wild boar population per one outbreak in pig population
Belgium	3	0	–
Bulgaria	851	25	34.0
Germany	3180	4	795.0
Estonia	139	1	139.0
Latvia	698	5	137.6
Lithuania	471	3	157.0
Moldova	0	3	0
Poland	7215	227	37.8
Romania	1931	2714	0.7
Serbia	106	48	2.2
Slovakia	2006	28	71.6
Ukraine	8	36	0.22
Hungary	6588	0	–

and the pig population differ significantly from one country to another. Interpretation of these differences is challenging because of the questionable reliability of data from some countries. The causes may have been prosaic, including insufficient search for wild boars that died of ASF, or more complex, such as the approach of administrative authorities to the issue in question. The data indicate that there are countries where the ratio of outbreaks in the wild boar population to those in the pig population is surprisingly low or incredibly high.

Apart from the Czech Republic and Belgium, where there was no transfer of ASFV from wild boar to pigs in 2020-2021, Germany is the highest in the ranking because there have been about 700 outbreaks in the wild boar population per one ASF outbreak in the pig population since the beginning of the epizootic. The second group includes the Baltic countries, where the ratio ranges from 137.6 in Latvia to 157.0 in Lithuania. The next group includes Poland with 27.4 and Bulgaria with 34.0 outbreaks in the wild boar population per one outbreak in the pig population.

Data from Romania, Serbia, and Ukraine seem unreliable: in these countries the ratio ranges from 0.22 to 2.2.

Considering the development of the situation in all European countries, the data from Hungary seem interesting. There were 6,588 outbreaks in the wild boar population and not a single outbreak in pigs in that country from 2020 to 2021. Moreover, despite hundreds of cases in the wild boar population in previous years, no outbreaks in the pig population were found there (<https://www.fli.de/de/aktuelles/tierseuchengeschehen/afrikanische-schweinepest/>).

There is no doubt that the ratio depends on human action: firstly, on the determination to search for wild boar that died due to ASF, and secondly, on the biosecurity maintained by animal owners on their farms. It is also imperative to limit the spread of ASF among wild boar, quickly and properly designate zones, and supervise the circulation of animals in areas determined by the veterinary inspectorate and the European Union Commission. With this in mind, we can conclude that, apart from the Czech Republic and Belgium, the best results in this respect were obtained in Hungary and Germany. The Baltic countries are next in the ranking. Poland's situation is similar to that of Bulgaria, which may indicate an inadequate approach to biosecurity. Involvement in the search for dead wild boar or, to put it more bluntly, willingness to find them may play a significant role in determining the relationship between the number of ASF outbreaks among boar and pigs. This view seems to be supported by data from Romania, Serbia, and Ukraine, where the number of outbreaks in the pig population – especially in Romania – was very high, the wild boar population was relatively big, but the number of wild boar found dead due to ASF was surprisingly low.

The value of the parameter in question may be strongly influenced by the density of the wild boar population and the number or density of pig farms in particular countries or regions affected by ASF. Unfortunately, due to the low reliability of the available data, especially regarding the number and density of wild boar populations, the significance of this crucial factor cannot be objectively evaluated. Also, ASF management has to rely on data that are fundamentally at odds with reality, which results in wrong decisions. This is confirmed by numerous examples. For instance, in the commune of Sława in the Lubuskie voivodeship, according to inventory data from the 2018/2019 hunting season, there should have been a few to a dozen wild boar in a fenced area of 80 km<sup>2</sup>. However, searches carried out in late 2019 and early 2020, due to the occurrence of ASF in that region, revealed the remains of 212 wild boar. Moreover, 7 wild boar were caught and 6 shot by hunters (8). This example demonstrates significant differences between data presented by hunters and reality.

The data on the number of ASF outbreaks in pigs in 2020-2021 in countries with a favorable ratio of the number of outbreaks in the wild boar population to the number of outbreaks in the pig population confirm the hypothesis about the influence of biosecurity on the ratio. In the period analyzed, 4 outbreaks of ASF in the pig population were noted in Germany, 1 in Estonia, 3 in Lithuania, and 5 in Latvia. By contrast, as many as 227 outbreaks in the pig population were recorded in Poland and 25 in Bulgaria.

Comparing the current situation in Poland and the Baltic countries, where ASF was detected in the same year (2014), it should be noted that our Baltic neighbors coped with ASF in the wild boar population much better, which is shown by the number of ASF outbreaks in the wild boar population and, consequently, in the pig population in the period from 2014 to 2021 (9, 11, 12).

The fact that in successive years, since 2018, the indicator in question has increased substantially in Poland to around 50, may result mainly from a significant decrease in the number of pig farms. In 2014, there were about 179,000 pig farms, and in 2021 only about 75,000. It is also probable that there was an increase in the awareness of pig producers regarding the importance of biosecurity as protection against ASF.

Comparing the dynamics of the increasing number of ASF outbreaks in Poland and the Baltic countries, where the disease epidemic occurred during a similar period, it should be noted that in 2014-2016 ASF spread significantly faster in the Baltic countries than it did in Poland. Since 2017, however, the course of the epidemic in Poland has been much more violent than in Estonia, Lithuania, or Latvia (4). In 2020, no more ASF outbreaks in the pig population were detected in Lithuania. These facts prove that the Baltic countries were more successful at fighting the disease than Poland was.

The analysis of the correlation between the season of the year and the number of ASF outbreaks in pig and wild boar populations indicates that ASF in pigs can be considered as a seasonal disease in Poland (Fig. 4.) and, even more so, in the Baltic countries (12). The disease manifests itself in pig herds, as a rule, in the period from June to the end of September. In 2021, single outbreaks of ASF in pigs were also found in the fall. Data from Lithuania show that the mean seasonal prevalence of ASFV in pigs increased from 0% in spring to 3.68% in summer (12). On the other hand, in the wild boar population, the highest number of outbreaks is detected in spring and summer.

### The dynamics of ASF spread in the pig population in particular voivodeships of Poland

The first ASF outbreak in the pig population was found on July 21, 2014, in the Podlaskie voivodeship on a backyard pig farm 3 km from the border with Belarus (Zielona, the Gródek commune, the Białystok county). The piggery was located close to the forest, and the animals were kept in paddocks near the woods, where they could have direct contact with boar droppings. Another outbreak was found in this commune on a small-scale pig farm (one pig) in the same year. The pig farm was located 9 km from the border with Belarus. Another outbreak in this voivodeship was detected in the Sokółski county in January 2015. The infected ASFV pig farm included 5 pigs, and the farm was located 8 km from the border with Belarus. The fourth outbreak in the Podlaskie voivodeship was detected after almost 18 months in the Hajnowski county – the infected pigsty housed over 250 pigs (14). In 2016, humans played a decisive role in introducing ASFV into pig herds in another twelve outbreaks in this voivodeship. One documented case – in the Mońki county – showed that the source of ASFV in wild boar was a dead ASFV-infected pig that was buried in the forest.

This could explain how ASFV spread from the Podlaskie voivodeship to the neighboring Lublin voivodeship bordering with Belarus. There is no doubt, however, that indirect vectors for the transmission of ASFV in subsequent outbreaks of the disease in the pig population in this region from 2016 to 2021 were primarily humans.

It was probably humans who transferred the etiological factor of the disease from the Podlaskie voivodeship to another voivodeship affected by ASF, the Mazowieckie voivodeship. An important evidence for the probable human involvement in the introduction of ASFV into the area of Mazowsze was the fact that the closest outbreak from the first one identified in this region was located at a distance of over 100 km.

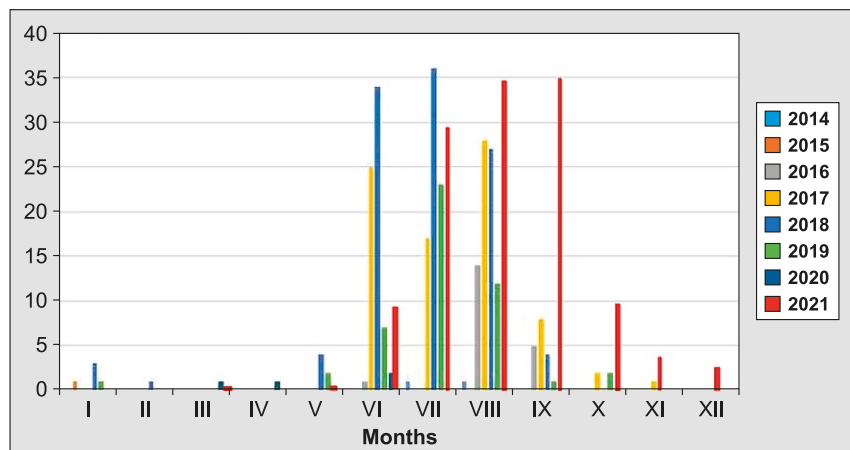


Fig. 4. Seasonality of ASF outbreaks in the pig population in Poland in 2014-2021

It seems that ASFV-infected wild boar migrating from the ASF-affected Kaliningrad region introduced the virus into the Warmińsko-Mazurskie voivodeship in 2018. It can be assumed that most of the subsequent ASF outbreaks in this region were related mainly to the activities of humans who introduced ASFV into pig herds in various ways.

According to the available data, it was also humans who introduced the virus in 2018 into the Podkarpackie voivodeship. The ASFV was most likely transferred from the Lublin voivodeship. It seems that the subsequent several dozen ASF outbreaks in the pig population that occurred there were related to human activity. This applies mainly to the Mielec county.

The year 2020 was a period in which ASFV was introduced into pig herds in three voivodeships: Lubuskie, Wielkopolskie, and Dolnośląskie. In the first of these areas, ASFV was first introduced into the wild boar population. There is no doubt that humans were responsible for transferring the virus into the wild boar population. This is proved by the fact that the nearest ASF outbreak occurred in the Mazowsze voivodeship, more than 350 km from the first ASFV-positive boar, found post-accident in the Lubuskie voivodeship. The development of the epizootic situation in this region, assessed on the basis of the number of ASFV-positive dead wild boar found there, suggests that at the time when the first positive animal was found in the forest, there were already a significant number of wild boars dead due to ASF. This would indicate the prior presence of ASFV in this region for at least 3-5 months. The development of the epizootic situation in neighboring Germany supports this hypothesis. A fence built in the Lubuskie voivodeship between areas theoretically free from ASFV and those infected with this virus did not prevent the spread of infections in the wild boar population.

ASFV was introduced into a pig herd located in the next affected voivodeship, namely Wielkopolskie, in 2020 (March) along with infected piglets from the Lubuskie voivodeship. That year, 5 more ASF outbreaks in the pig population were detected in this

voivodeship. Outbreaks occurred in four different counties of this voivodeship: Poznań, Leszno, Nowy Tomyśl, and Kalisz, which is crucial from the epizootic point of view.

In June of the same year, the first ASF outbreak was found in the pig population on a small-scale farm in the Dolnośląskie voivodeship. The source of ASFV in the case of this herd was probably an infected dead wild boar, the presence of which was detected in the vicinity of the affected farm, whereas the vector introducing the virus directly or indirectly were humans. The source of ASFV for wild boar in the Dolnośląskie voivodeship were probably infected wild boar arriving from the Lubuskie voivodeship.

It can be said with a high degree of probability that the virus was introduced into the first infected pig herd in the Łódzkie voivodeship in June by a person from another region of the country. This is indicated by the favorable epizootic situation in the wild boar population until the end of 2021 in this region. The virus was introduced into two more pig farms in this voivodeship from the primary ASF outbreak in the pig population. The vectors were infected piglets from the primary outbreak.

ASF was found in pigs in the Świętokrzyskie voivodeship the same year. ASFV was most likely carried into a piggery located in this region by an individual from the Mielec county (the Podkarpackie voivodeship), highly affected by ASFV. It should be noted that the spread of the disease was not hampered by a fence built to separate virus-free and virus-infected areas.

The vector that introduced ASFV into Małopolska, where the first ASF outbreak was found in the pig population in July 2021, were humans. This is suggested by the fact that during that year no ASF outbreaks were detected in the wild boar population in this region. The source of the virus was most likely located in the Mielec county, which was highly affected by ASFV (196 outbreaks in the wild boar population and 55 outbreaks in the pig population). This region is also adjacent to the Podkarpackie voivodeship.

The development of the epizootic situation of ASF in Poland shows that in none of the voivodeships where ASF occurred in pigs was it possible to prevent further ASF outbreaks in the pig population during the following 12 months. For example, in the Podlaskie voivodeship, ASF outbreaks have been recorded continuously for 8 years, in the Lublin voivodeship and the Mazowieckie voivodeship for 6 years, and in the Warmińsko-Mazurskie voivodeship and the Podkarpackie voivodeship for 4 years. In most voivodeships, the highest number of outbreaks was recorded in the second or third year after the first ASF outbreak was detected. The long-term persistence of ASFV in the environment may, with high probability, turn the epidemic form of the disease into the endemic form, which is much more difficult to combat. This is

suggested, among others, by the results of research conducted in Lithuania. When examining the seroprevalence of ASFV infections in the wild boar population there, it was shown that the seroprevalence increased from 0.83% in 2014 to 12.39% in 2017 and 12.39% in 2017 (14).

With regard to the correlation between ASF outbreaks in the wild boar and pig populations, it can be stated that in 9 out of 12 voivodeships affected by ASF from 2014 to 2022, the virus responsible for the occurrence of this disease was introduced into the area of a given voivodeship most probably by wild boar living in the forest environment, fields, or meadows. In two voivodeships (Świętokrzyskie and Łódzkie), ASF was detected in pig herds, but not in the local wild boar population. Humans were most likely responsible for introducing ASFV into the Lubuskie voivodeship and the Mazowieckie voivodeship.

In three voivodeships – Lubuskie, Świętokrzyskie, and Podkarpackie – attempts were made to stop the virus from spreading in the wild boar population by building fences. All those efforts were unsuccessful.

Due to a significant ambiguity in this regard, it is difficult to determine exactly how the virus was introduced into the farms. It was frequently assumed that this microorganism entered pig herds on the tires of agricultural machinery and vehicles returning from fields or meadows and on the shoes and clothing of individuals taking care of pigs that previously lived in forests, fields or facilities infected with ASF. In several cases, it was proven that outbreaks in pig herds were due to the introduction of infected animals during the incubation period of the disease. It is also difficult to determine the precise way in which the virus was introduced into herds in other countries (2, 9, 11). In Estonia, for example, an in-depth analysis of 26 ASF outbreaks in the pig population failed to establish the route of entry of the virus into the herd in every single case (11).

The experience from 8 years of fighting the ASF epizootic in Poland and other European countries shows that the main reservoir of ASFV in Europe are wild boar. This fact has been repeatedly proven by research (1, 6, 16-18, 21). Estonia is a good example (11). By analyzing various risk factors, it was proven that in 88% of farms affected by ASF, infections were correlated with the presence of a wild boar infected with ASFV within 15 km of the farm. There is no doubt that humans play a crucial role in spreading the disease among the pig population and often transport ASFV over long distances among wild boar. This happened in particular in central Poland (Warsaw) in 2017, western Poland (the Lubuskie voivodeship) in 2019, and Łódź in 2021.

It is worth noting the situation in the Czech Republic in 2017 and in Belgium in 2018. It is true that the scale of ASF in the Czech Republic, where a total of 251 cases were found in the wild boar population in an

area of approx. 80 km<sup>2</sup>, is difficult to compare with the situation in areas where this disease occurs in Poland. The very limited area where ASF occurred in the Czech Republic made it possible to immediately combat this disease by methods such as the use of a solid fence with electric elements and the application of chemicals to repel wild boars. Thanks to quick actions, it was possible to suppress this disease in the wild boar population by the end of March 2018. The immediate involvement of snipers in the Czech Republic played an important role in this process. The strategy was successful in preventing the dispersal of infected animals. Throughout the period of the epizootic, 251 cases of wild boar infection were found, with a prevalence of 60.5%. Interestingly, the presence of ASFV antibodies was found in approximately 0.9% of the wild boar tested. ASF was eliminated in a similar way from the territory of Belgium in 2018. Ultimately, the control strategies adopted there eradicated the disease. In total, during the ASF epizootic in Belgium, about 800 cases of the disease were reported in wild boar and 33 cases in culled boar. The disease prevalence in ASF-affected areas of Belgium was a maximum of 62.8% of all wild boar tested. Importantly from the epizootic point of view, no seropositive animals were found throughout the ASF epizootic period in Belgium, which proves that the disease was successfully suppressed in its early stage. Due to the outbreak of the disease in the wild boar population near (1.5-2 km from) the borders with Luxembourg and France, the authorities in these countries introduced fencing elements in the area of

potential migration of infected wild boar. Measures to reduce ASF occurrence on pig farms included active monitoring in the area of ASF cases, i.e. in the province of Luxembourg and free-range farms outside the so-called risk area. In addition, passive monitoring of pig farms throughout the country was intensified, including examination of dead pigs in which clinical signs indicated ASFV etiology. The most critical measure, which prevented the occurrence of ASF on pig farms in Belgium in 2018-2020, was the implementation of strict biosecurity rules, including the mandatory registration of all pigs. As far as the measures to control ASF in the wild boar population are concerned, in addition to the installation of multi-sector net fences (approximately 330 km long) and using repellants against wild boars, access to the area of ASF occurrence was strictly prohibited for the public, including hunters other than those designated by the veterinary authorities (1, 3).

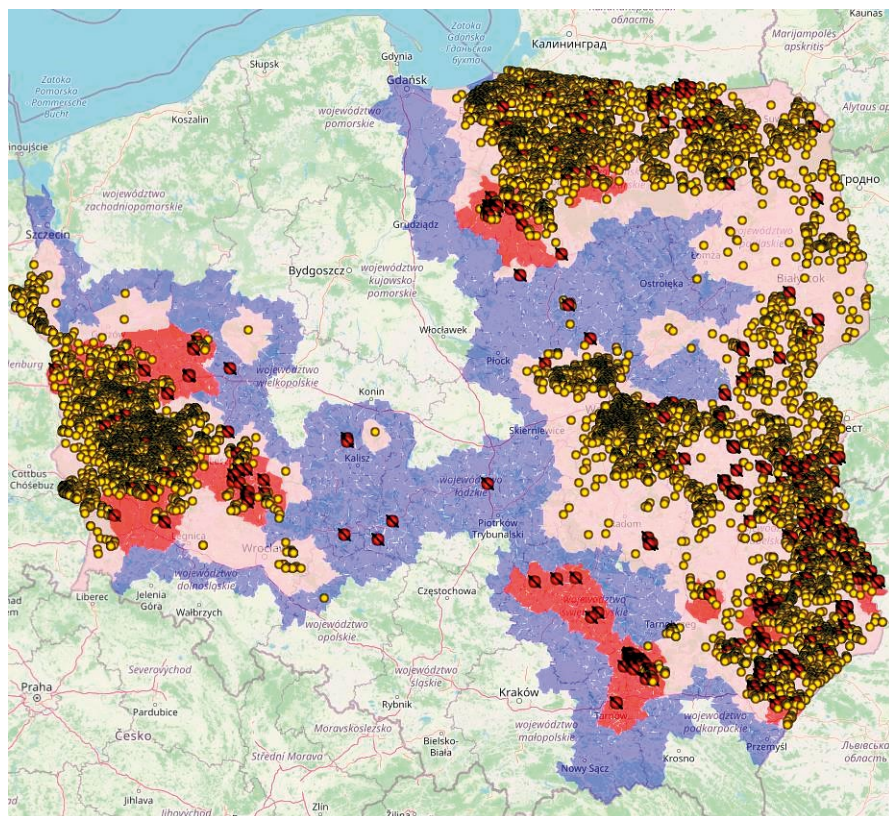
It can be added that pig herds in Germany are very effectively protected against ASF. From the moment of the first ASF outbreak in the wild boar population (November 2020) until the end of March 2022, only four small pig herds were infected with the etiological factor of ASF, although more than 2,800 outbreaks were identified in wild boar. Moreover, the pig herds were infected in the first months of the epizootic.

Fences built in all of the above three countries played an important role in limiting the spread of ASF. Constant monitoring of their integrity and ongoing maintenance was vital.

It seems that the failure to implement the abovementioned measures after the construction of fences in Poland and probably the incorrect assessment of the epidemiological situation in regions where the fences were built rendered them ineffective.

Summarizing the European achievements in combating ASF in the wild boar population and preventing the disease in the pig population, it should be stated that the success of the Czech Republic, Belgium, and Germany was due to the continuous cooperation between veterinary authorities, hunters, and the police, including snipers, whose participation in the elimination of ASFV-infected boars proved to be crucial.

Judging by the number of ASF outbreaks in the wild boar and pig populations and the spread of the disease in March 2022 (Fig. 5), the measures taken to control the epidemiological situation in Poland have been largely ineffective. This is due to many factors, but the decisive one was probably the fact that, in the first two years of the



**Fig. 5.** The country's epidemiological situation in relation to ASF occurrence in the wild boar and pig populations (February 2014-March 2022)

ASF epizootic in Poland, the presence of numerous small farms that did not follow the rules of biosecurity was ignored and such farms were not closed down. The vast majority of those farms have stopped producing pigs anyway. A significant problem is still the unknown density of the wild boar population, which may result in an insufficient number of culled boars. Moreover, the ASF control measures that have been shown to be effective in the Czech Republic or Belgium do not necessarily have the same effect when applied in Poland. This is due to epizootic conditions (different phases of the disease), geographic conditions, and the aforementioned large population of wild boar. It should be emphasized that the only effective method to protect pig herds from ASF is strict adherence to the principles of biosecurity by breeders, hunters, foresters, veterinarians, and other people potentially exposed to contact with live or dead animals infected with ASFV (2). A study conducted jointly in Lithuania by Lithuanian and German scientists (9) proved that frequent veterinary inspections of pig farms (at least every 6 months) significantly reduce the risk of ASF in the pig population. Moreover, such inspections help increase and maintain an appropriate level of biosecurity.

Considering the many uncertainties of epidemiological analysis, it appears necessary to undertake interdisciplinary research to identify the causes of the unsatisfactory control of ASF in Poland.

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