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„BIOSECURITY" - JOINT ACTION IN EMERGENCY SITUATIONS IN CASE OF THE IDENTIFICATION OF DANGEROUS AND WIDESPREAD INFECTIONS IN CARPATHIAN REGION"

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STUDY
„Research on the Prevention of the Spread of ASF and Avian Influenza"

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INTRODUCTION

Over the past five years, several infectious diseases have threatened both wild animals and domestic livestock in the Central European region. These diseases cross borders easily, posing a continuous risk to the region's economies because they significantly limit both livestock farming and wildlife management. For domestic livestock, the presence of these diseases results in trade restrictions for both live and slaughtered animals. In wildlife management, these diseases lead to hunting restrictions that mainly affect hunting tourism, but they also affect both open-air and covered wildlife farming.

The emergence of African Swine Fever (ASF) has had the most significant impact on Hungarian wildlife management. By 2018, the disease had affected an estimated 105,000 wild boars (Figure 1).

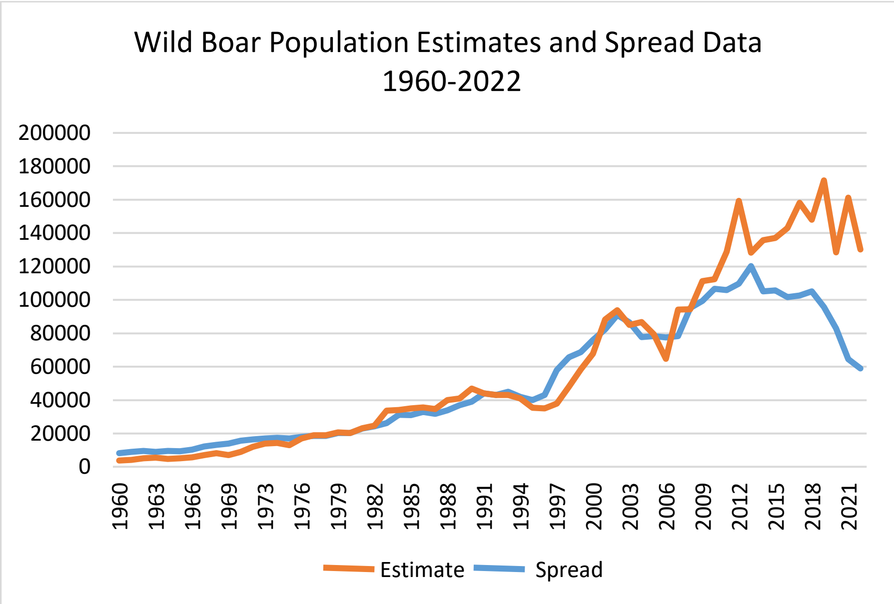

Fig. 1

With such population size and density, wildlife managers rightly feared that African Swine Fever (ASF) would swiftly sweep across the country, potentially decimating the wild boar population and thereby halting the wild boar hunts cherished by both Hungarian and foreign hunters. Even specialists in veterinary epidemiology could not accurately predict the speed, at which the infection would spread throughout the country. Fortunately, Hungarian animal health authorities were well-prepared for the outbreak and onset of the disease, and thanks to this readiness, the impacts on wildlife management were less severe.

Given that the highest likelihood of the disease's emergence was from Ukraine and Romania, domestic animal health initiatives focused on preventive measures in these regions. A crucial component of these measures was informing wildlife managers and pig farmers through professional events. As it later became evident, these information sessions played a pivotal role in ensuring that public, livestock owners, and hunting license holders received accurate information about the disease's progression, infection rate, mortality rate, and overall severity. Since the stakes involved not only the wildlife management sector, but also the survival and operational continuity of domestic pig farming, the presentations and briefings emphatically alerted stakeholders across all sectors to the gravity of the issue and its anticipated consequences.

The Hungarian wildlife management sector had a distinct perspective on avian influenza. The primary reason for this was that the disease predominantly affected small wildlife management, especially indoor breeding of pheasants and wild ducks, presenting operational challenges to a considerably smaller segment of wildlife managers. These managers primarily became aware of the impact of avian influenza on their sector, when certain wild duck and pheasant breeding sites shut down, culling their populations, which then led to shortages of day-old pheasants and pre-reared ducks. This impact was mostly felt by hunting associations in the lowlands, which had been engaged in pheasant and wild duck breeding for several decades.

Additionally, avian influenza outbreaks abroad, especially in Europe, influenced indoor pheasant farming in Hungary. A case in point is the spring of 2022, when a significant portion of pheasant breeding sites in France closed, with their populations culled due to the onset of avian influenza. This resulted in a widespread shortage of pheasant chicks in the European pheasant breeding market. The consequential price surges also affected Hungarian wildlife management, leading to a 25-40% increase in the prices of culled pheasants from one year to the next.

1. HISTORICAL OVERVIEW OF AFRICAN SWINE FEVER (ASF)

African Swine Fever (ASF) is currently one of the most devastating viral infections affecting domestic pigs, wild boars, and other suids. Its spread knows no continental or national boundaries, causing significant economic losses not only in the livestock sector but also in wildlife management.

Researchers first noticed ASF in Kenya in 1909. However, it wasn't until 1921 that an English scientist distinctly described the disease and differentiated it from classical swine fever. This acute hemorrhagic fever can cause a mortality rate of up to 100% among infected domestic pigs. Most infections arose, when domestic pigs came into contact with wild suids, especially warthogs (*Phacochoerus aethiopicus, Phacochoerus africanus*). Consequently, the primary prevention strategy for ASF involves limiting contact between domestic and wild pigs.

ASF first appeared outside of Africa in Portugal in 1957, likely introduced through food waste from Lisbon International Airport. Authorities quickly contained this incident, but a subsequent outbreak in 1960 established the disease in the Iberian Peninsula until 1995. Another brief resurgence of ASF in Portugal in 1999 was swiftly controlled. Beyond these Iberian episodes, ASF made several appearances in various European countries during the 20th century: France saw an outbreak in 1964, Italy in 1967, 1969, and 1993, Malta in 1978, Belgium in 1985, and the Netherlands in 1986. In each case, rapid action suppressed and eventually eliminated the disease from these European regions. However, Sardinia remains an outlier, where ASF established its roots in 1978 and continues to persist. The most recent outbreak occurred there in 2008, as reported to the World Organisation for Animal Health (WOAH).

In 1971, the disease “conquered” a new continent, first appearing in Cuba. Although it took significant effort, authorities managed to eliminate the disease from the island. But by 1978, the ASF virus had shown up in Brazil, and then on the Caribbean islands: first in the Dominican Republic, then in Haiti in 1979, and it resurfaced in Cuba in 1980. Officials identified airport food waste as the primary cause of the disease's transatlantic spread.

While the virus's appearance in Senegal in 1978 and Cameroon in 1981 might initially seem unsurprising given its African origin and spread to several continents, the role of warthogs as epidemic reservoirs and transmitters remained unconfirmed in this region. Research showed that the virus strains from the Cameroonian outbreak matched those found in Europe and the Caribbean. This similarity suggests that the infection might have traveled back to this part of Africa from either Europe or the Caribbean. In 1994, the disease broke out near Nairobi, Kenya. It then spread to Ivory Coast in 1996, and to Benin, Nigeria, and Togo in 1997. Later outbreaks occurred in Ghana in 1999 and 2002, and Burkina Faso in 2003. Out of these countries, only Ivory Coast managed to eradicate the disease completely. In other countries, the disease has become endemic and remains such with multiple subsequent outbreaks.

The year of 2007 marked a turning point in the ASF's history. The disease emerged in the Georgian port city of Poti, likely brought in by food waste from African cargo ships. From there, it spread rapidly to Armenia and Azerbaijan. By the end of that year, officials had found it in a wild boar in Chechnya, part of the russian federation. In 2009, Iran reported the disease, which then quickly moved westward, hitting Ukraine in 2012 and Belarus in 2013. By February 2014, Poland and the Baltic states, located on the European Union's eastern border, reported cases, reintroducing the disease to the EU.

In 2012, officials detected the ASF virus in a domestic pig in Ukraine's southeastern Zaporizhzhia region. In 2014, they found it in both wild boars and domestic pigs near Luhansk. These discoveries alarmed not only the Directorate of Animal Health and Welfare of the National Food Chain Safety Office but also Hungary's hunting communities. After finding a positive ASF sample near the Hungarian border close to Vynogradiv around Christmas time in 2016, the question for Hungary shifted from “if they would face” an ASF outbreak to “when they would face it”. This grim milestone occurred on April 21, 2018 with the discovery of the ASF virus in a wild boar near Gyöngyös (source: Csivincsik Á. D., ZSELICI PRAXIS, 2018).

2. INTRODUCTION TO AFRICAN SWINE FEVER

The disease results from a highly contagious virus, unrelated to the classical swine fever pathogen. The African Swine Fever (ASF) pathogen is a DNA virus that falls under the Asfarviridae family and Asfivirus genus. This virus shows impressive resistance to external environmental impacts. Meanwhile, the classical swine fever pathogen is a member of the Pestivirus genus within the Flaviviridae family, previously placed under Togviridae. Only potent disinfectants can destroy the ASF virus, as it retains its infectiousness in environments ranging from acidic to alkaline (pH 3.9 to 11.5). The ASF virus has various virulence strains, and using molecular biology techniques, researchers have identified at least 22 genotypes (I-XXII). The strain that currently circulates in Eastern Europe is of genotype II and is highly virulent.

Pigs and wild boars are the only species susceptible to this disease. Animals that recover from the illness don't develop immunity and might continue to shed the virus for the rest of their lives. The African warthog (Phacochoerus aetiopicus), the bushpig (Potamochoerus porcus), and the giant forest hog (Hylochoerus meinertzogeni) all carry the virus without showing symptoms (Bicsérdy, Egri, Sugár, & Sztojkov, 2000).

2.1. Notable cases during the virus spread in Hungary

The virus emerged near Gyöngyös in Heves county on April 21, 2018, and by December 31, 2022, tests identified 8,724 positive wild boars.

Today, eight counties report virus cases.

- The first positive sample from Szabolcs-Szatmár-Bereg county was found in a deceased wild boar **in Tiszakerecseny on May 16, 2018**, prompting to establish another Restricted Zone.
- Animal population thinning in **Tarcal** yielded the first positive sample in a shot wild boar in Borsod-Abaúj-Zemplén county **on October 2, 2018**.
- The first positive case in Nógrád county was detected in deceased wild boar in **Pásztó-Mátrakeresztes on October 28, 2018**. An epidemic investigation linked the positive case to previous Heves county cases, pointing to virus spread among the wild boar population (National Food Chain Safety Office, 2018b).

- Another outbreak struck **Hangony** in Borsod-Abaúj-Zemplén county **on January 13, 2019**, leading officials to declare another Restricted Zone.
- Organized searches near **Nyírábrány and Álmosd on April 29, 2019** uncovered positive ASF samples in three wild boar carcasses. Officials had already placed the area under observation due to Romanian domestic pig outbreaks.
- Initial investigations indicate that migrating wild boars likely introduced the infection from Romania.
- Positive ASF samples surfaced in 2 and correspondinhly 3 deceased wild boars from **Tiszakeszi and Poroszló on August 28, 2019**, prompting another Restricted Zone.
- The ASF virus has crossed a new county borderline, when it was detected in four deceased wild boars near **Tiszafüred on August 30, 2019.**
- **On September 30, 2019**, the ASF virus claimed seven wild boars in the fenced hunting area of Budakesz Forestry. Investigators believe human intervention likely introduced the virus to the area. The virus then spread to another county and even crossed the Danube, endangering 60% of the wild boar population in Transdanubia.

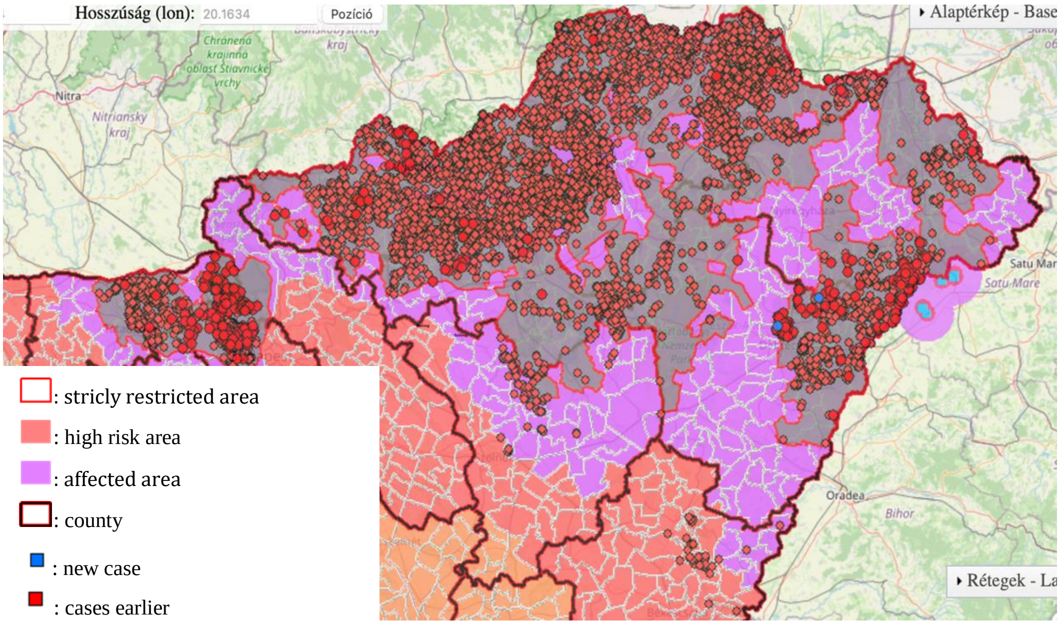

Fig. 2: ASF positive cases in Hungary before September 1, 2023

2.2. Spread of the virus

In epidemiology, vectors are organisms that transmit diseases between two definitive hosts. Reservoir species are those, which not only transmit, but can also store the pathogen in a viable state for an extended period between encounters with two definitive hosts.

After the virus surfaced in Europe, scientists quickly turned their attention to it. While the creation of a protective vaccine didn't succeed, researchers clarified the role of soft ticks (related to blood-sucking mites) in preserving the disease. The initial African cases established a clear epidemiological connection between African swine fever (ASF) and warthogs. However, Spanish research shed light on the role of arthropod vectors. Researchers in the Iberian Peninsula proved that the soft tick species Ornithodoros erraticus could harbour and sustain the virus for extended periods in pig habitats.

Later African studies verified the vector and reservoir roles of the O. moubata, O. porcinus domesticus, and O. porcinus porcinus soft tick species. Studies showed that these ticks, hiding in warthog burrows or pigsties, can maintain the virus in an infectious state for years, establishing them as major reservoirs of the disease in Southern and Eastern Africa.

The discussion about the virus's spread would be incomplete without considering humans' significant role. Humans continually introduced the virus into domestic pig populations due to gaps in epidemic prevention, such as constant back-and-forth animal transportation, improper storage, and the neglect of fences. Over several decades, the virus started adapting to domestic pigs. Initially, it killed them in just days, but consistent human mistakes and frequent infections led to the emergence of a virus strain that no longer killed the infected pigs. After their recovery, these pigs began to carry the virus, leading to new outbreaks.

This adaptation is also clear in the wild boar population. Since its 2007 appearance in Georgia, the virus has freely spread for 12 years, primarily because of human mistakes, allowing it to adopt to its new host. An increasing number of case studies show antibodies in hunted wild boars, suggesting that they overcame the disease and became potential spreaders of the virus.

2.3. Symptoms of African Swine Fever

The incubation period for the disease lasts between 4 to 9 days. Symptoms manifest within a few days, and the animal dies shortly after. These symptoms include high fever, causing the wild animal to move erratically, favouring some limbs over others. Common signs are bloody feces, nosebleeds, and a bluish-purple coloration on the ears, tail, and extremities. The animal often shows a lack of appetite and appears lethargic. Because wild boars have a secretive nature and the disease progresses quickly, detecting these symptoms can be a challenge. People often find dead animals in marshy areas or near stream banks, where the fever-stricken animals go to find relief.

The virus can survive in various conditions: it remains infectious in frozen meat products for several years, in smoked products for up to six months, and in decaying blood, carcasses, and soil for 4-8 months. However, this disease is not zoonotic, so it does not transfer to humans. Exposing the virus to temperatures above 60°C for half an hour kills it.

Following World War II, the pig farming sector in Angola's central highlands expanded rapidly. They recognized soon the significant threat of African swine fever (ASF). In response, in 1950, they established a unit at the Huambo Central Veterinary Laboratory to develop an ASF vaccine. However, their research didn't yield a successful result. When the virus surfaced in Europe, researchers redoubled their efforts based on findings from Angola. Still, they could only confirm that there is no effective vaccine against ASF to this day.

3. INTRODUCTION TO AVIAN INFLUENZA

Avian influenza, or bird flu, is a disease caused by the influenza virus adopted to birds. Due to the variability of the influenza virus, mutations can produce strains capable of infecting humans.

We categorize avian influenza strains based on their virulence into two main groups: those with low pathogenicity and those with high pathogenicity. Like other influenza viruses, the avian flu virus is genetically variable. The proteins on its surface (H and N antigens) can change in various ways. The H5 and H7 subtypes have the highest virulence. Because the disease's symptoms can vary and might be non-specific in some cases, specialized laboratory tests detecting the virus or its fragments are essential for diagnosis.

The most dangerous strain of avian influenza for humans is the H5N1 subtype – *highly pathogenic avian influenza* (HPAI). This strain can infect both wild bird species and domestic poultry.

According to experts, different subtypes of avian influenza have appeared in Europe over the past two years. The primary strain was H5N8 in Europe this year, which also caused significant outbreaks among domestic and wild birds in 2016 and 2017. Additionally, there have been instances of H5N5 and H5N1 in recent years.

3.1. The relationship between avaian influenza and humans

Avian influenza was first identified in Italy in the early 20th century and by the century's end, the disease had spread globally.

In 1997, 18 people tested positive for the H5N1 strain of avian influenza in Hong Kong. These cases were the first documented instances of a bird transmitting the virus to humans. Six of the infected individuals died from complications caused by the infection. Following this, the World Health Organization (WHO) assessed the situation as a potential source for a global pandemic.

The most severe crisis occurred from the end of 2005 to mid-2006, when the virus spread from Asia to the Middle East, then to Europe and Africa. After the implementation of vaccinations reduced mortality rates and global precautions were taken, a total of 862 people were infected with the H5N1 strain between 2003 and the end of 2020 (over 17 years). Avian influenza claimed the most lives in Indonesia and Vietnam. The most recent infected individual was reported in Laos last October.

While the primary strain of this year – H5N8 has a low risk of transmitting to humans, the European Food Safety Authority (EFSA) pays close attention to its study. It is known that besides H5N1, the H7N9 and H9N2 strains can also transmit to humans.

3.2. Cases in Hungary

Hungary first detected the H5N8 strain in 2016, and since then, the strain emerges every year. In January 2020, health authorities culled over 160,000 turkeys due to animal health concerns in the country. This year, experts first diagnosed avian influenza in a great egret found dead near the Old Lake in Tata. Despite the declaration of strict precautions in January, the disease surfaced in Komárom-Esztergom and later in Bács-Kiskun county. In the former, experts ordered the culling of 90,000 turkeys, while in the latter, 101,000 laying hens faced the same fate. However, thanks to continuous surveillance by the National Food Chain Safety Office using both traditional and modern techniques like drones, Hungary managed to prevent a widespread outbreak in 2021. These inspections also revealed that, despite the devastation of two major avian influenza outbreaks in recent years, several animal keepers still try to circumvent epidemic prevention regulations and deliberately break the widely publicized and well-known rules.

3.3. Avian influenza cases worldwide

Germany, France, Denmark, Poland, Italy, the UK, Bulgaria, and Slovakia all reported cases of the disease in 2019.

In the fall of 2020, nearly 500,000 chickens died in the Netherlands due to the H5N8 avian influenza strain. Last November, almost 900,000 animals were culled at a poultry farm in western Poland, out of a total of 930,000 laying hens.

In December 2020, Russia reported the first case, where humans contracted the H5N8 avian influenza strain: seven workers at a poultry farm in southern Russia tested positive for the virus. Fortunately, they experienced no severe health consequences from the infection, and by

February 2021, all seven were in good health. Similar to the H5N1 strain in 1997, those who contracted the virus had direct contact with the infected poultry.

From January 2021, due to the highly pathogenic avian influenza strain H5N8, Denmark, Sweden, Slovakia, the Czech Republic, and Romania had to take measures to curb the disease. In Denmark, domestic poultry was affected, while in Slovakia – birds in Kosice zoo, and in Romania – the virus-induced disease afflicted 13 mute swans in Constanța port.

In the period between September 1, 2022 and August 31, 2023, experts detected the highly pathogenic avian influenza virus in 901 European poultry farms, 301 institutions holding captive birds, and 19,021 wild birds.

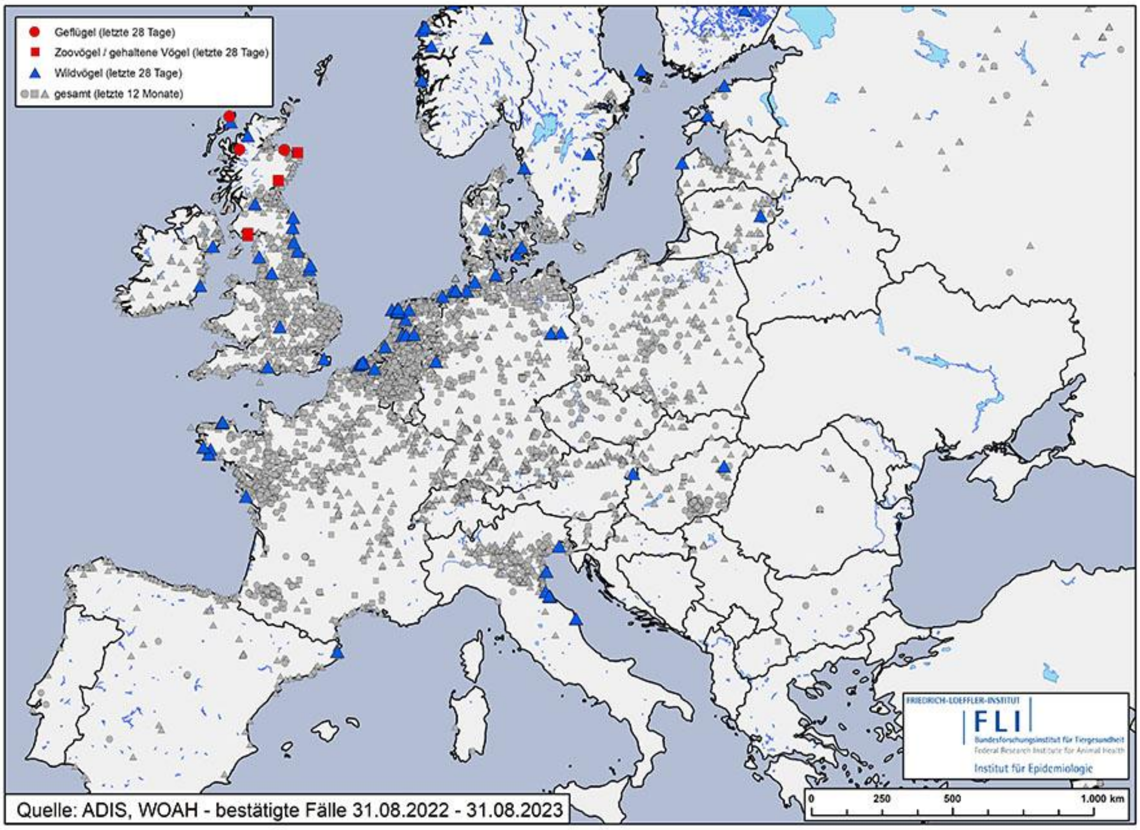

Fig. 3: The map of detected avian influenza in wild birds

Source: Friedrich-Loeffler-Institut (FLI)

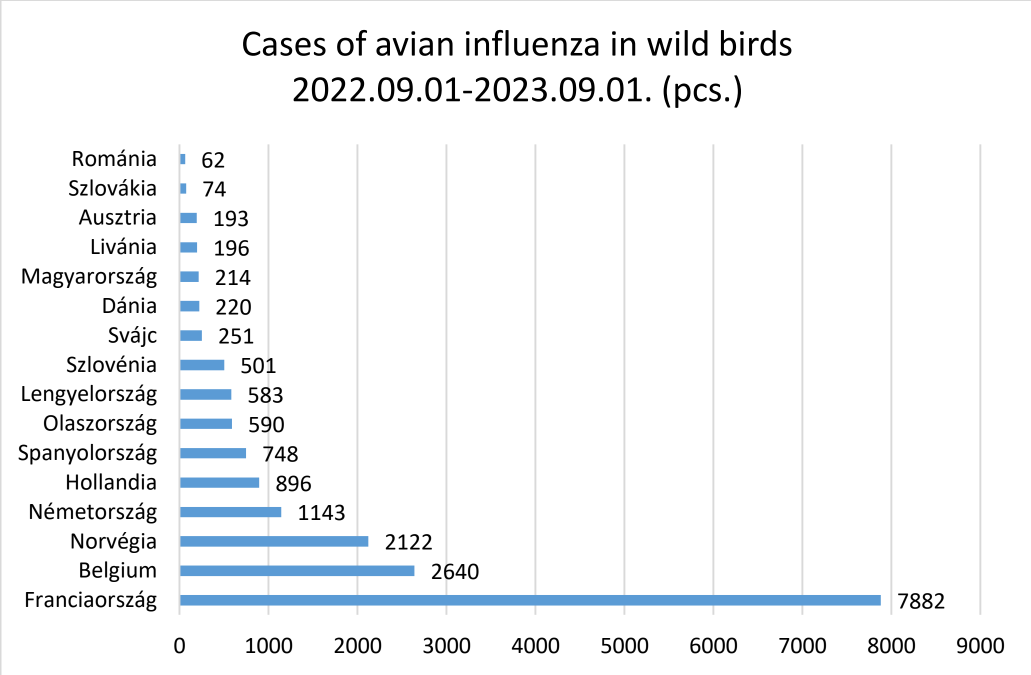

Fig. 4: Avian influenza cases in wild birds by country

3.4. Spread of avian influenza

As in most European countries, the virus entered our country through migratory bird species present within our borders. Birds can transmit the disease to each other most easily through faeces, meaning they do not need direct contact. For example, if straw or feed contaminated by the faeces of a virus-carrying bird enters a barn, it can infect domesticated animals. In addition to faeces, the virus can be found in an infected bird's feathers and trachea.

The infectious agent spreads most effectively over short distances with the aid of wind. For longer distances, like between settlements, humans in constant movement, vehicles, and equipment play the most significant role in its spread.

Often, contamination can occur from straw or feed tainted with infectious faeces, or even from the soles of our shoes when entering a barn. The spread among domesticated animals is facilitated by airborne dust, feather fluff, and repeated contact with other animals.

The virus' ability to remain detectable in faeces for weeks and in natural waters often for up to two weeks aids its spread. This explains why waterfowl, including wild ducks or wading birds often disseminate the infection.

The cases in our country in January 2022 vividly illustrate that the pathogen is not always eradicated by winter colds. Unfortunately, the virus remains infectious even at low temperatures.

3.5. Symptoms of avian influenza

While wild birds often remain asymptomatic, domesticated birds exhibit various symptoms. The manifestation of the disease depends on the virulence of the virus, the bird's species, age, pre-existing illnesses, and living conditions.

Initial symptoms can include a loss of appetite and reduced fluid intake. In some cases, birds may suddenly perish without prior symptoms, or after showing general signs like lethargy, loss of appetite, and ruffled feathers. A decline in body weight and egg production can also indicate the disease.

If any of our poultry display behavioural changes similar or identical to the ones mentioned, we must promptly notify a veterinarian. Infected birds not only carry the virus but also produce it in large quantities, amplifying the risk of spreading the infection. It is essential to understand that once a bird becomes infected, it is likely to fall ill and eventually die. Therefore, it is crucial to curb the spread of the virus as soon as possible and cull the affected animals.

4. RECOMMENDED STEPS FOR DEFENSE AGAINST AFRICAN SWINE FEVER

4.1. ASF risk categories, designation of infected areas

From an epidemiological perspective regarding African swine fever (ASF), it is recommended to categorize the country into three risk areas: high, medium, and low risk area. IT is advisable to set up an ASF Risk Analysis Action Group to ensure effective implementation. In Hungary, to create these risk categories this action group has set up a database based on data of the National Wildlife Database, its region-specific wild boar population estimates and data on domestic swine holdings from the Breeding Information System (BIS). The action group has also combined this data with forest coverage and road network data. Significant consideration should be given to the number and proximity of ASF outbreaks reported in the neighbouring countries like Ukraine, Slovakia, and Romania. After analysing this data, emphasis was placed on the risk of disease introduction, particularly the role of the wild boar population. The virus has been confirmed in wild boars in Zakarpattia, and according to data from the European Food Safety Authority (EFSA), the infection spreads slowly in wild boar populations (1-2 km per month), but continuously without human intervention.

Further analysis on the disease's introduction into the country by a wild boar deemed it necessary to designate a relatively vast geographical area as "infected". This designation took into account the natural movement patterns and population density of wild boar. However, European experiences to date indicate that stopping the disease's spread in the wild boar population is virtually impossible; the most successful countries have only managed to slow it. The primary goal was to identify the country's high and medium-risk areas from ASF perspective and make recommendations.

A good example for this was how Hungary managed ASF's emergence. Following the first confirmed case near Gyöngyös in Heves County, a temporary infected zone was immediately established. Later, the designation of the infected area and the high-risk zone was based on a new risk analysis, as outlined in Annexes II and I respectively, of the Commission Implementing Decision 2014/709/EU. When defining the infected area, natural barriers like the Mátra mountain range were considered, which played a significant role in the earlier spread of classical swine fever from Nógrád to Heves County.

The minimum size of an area declared as ASF infected is 2,000 km^2. Within the ASF-infected area, the zone, where the first ASF case in wild boar was detected, is called a "specially controlled area" (or core area, referred to as SCA), which should be at least 50 km^2 in size. The area surrounding the SCA is an about 5 kilometres wide buffer zone. Together, they form the strictly restricted area (abbreviated as SRA), which should span approximately 300 km^2. The SCA should cover the entire hunting unit, where the primary case was found, and all other hunting units touched by a circle within a 3 km radius drawn around the primary case. The total area of the hunting units surrounding the SCA forms the buffer zone, ensuring it is at least 5 km wide everywhere. If a hunting unit's size justifies it, its area can be divided so that only part of it falls within the SCA or buffer zone. Any such division requires the approval of the National Epidemic Control Centre.

4.2. Investigation and notification obligations for hunters

4.2.1. Regulations on hunting

Following an initial ASF detection, hunting, both group and individual, of wild boars must be prohibited in the Strictly Restricted Areas (SRA). Additionally, temporary suspensions should be applied to all hunts, both group and individual, of other game species.

For individual hunting – for all game species except wild boars – regardless of the time passed since the initial detection, the manager of the Local Epidemic Prevention Centre (LEPC) may grant permissions, provided there is a continuous submission of samples from deceased wild boars from the SRA.

Only hunters, who have participated in and passed the epidemic prevention training held by the animal health authority, may conduct individual and group hunts for all game species (excluding wild boars). This requires permission of the head of the local epidemic centre. Guests and contract hunters, who cannot verify the successful completion of this epidemic prevention training, can only hunt in strictly restricted areas if accompanied by a local hunter, who has successfully completed the training.

For group hunts of every game species (excluding wild boars), following the initial detection of the disease – regardless of the time passed since the detection – the head of the local epidemic centre may grant permissions if regular sample submissions from deceased wild boars are made for virological examinations. A hunting right holder may submit an application in writing at least five working days before the planned hunting date. Details of participants in the group hunt (hunting license, name, address) must be recorded during the hunt and retained for two years, available for inspection upon request. Additionally, the territorial hunting authority must give its consent to hold the group hunt on the designated hunting area, based on the expert opinion of the chief hunter of the relevant region.

The hunting authority may issue a permit, if the following conditions are met:

1. the designated hunting area does not exceed 300 ha;
2. there are no wild boar hideouts in the designated hunting area;
3. there is no evidence of wild boar presence in the designated hunting area;
4. the hunting process does not disturb the nearby wild boar population; and,
5. hunting dogs can only be used for small game hunting and are not permitted in big game group hunts.

The hunting right holder can only entrust the management of the group hunt to someone, who participated in and passed the epidemic prevention hunting training. Only those individuals, who do not keep domestic pigs, can participate in the group hunt.

If a hunter observes in a wild boar symptoms of African swine fever (primarily motor disorders, bloody discharge from body openings), the hunter must cull the affected individual for diagnostic purposes and promptly report the clinical symptoms observed to the local epidemic centre. Subsequently, the hunter must act according to the instructions of the local epidemic centre.

4.2.2. Reporting and organized search for dead wild boars

Hunting right holders must promptly report any wild boar carcasses they become aware of to the local epidemic centre. They should make this report as soon as possible after spotting the carcass, and the report should include the geographic coordinates of the carcass's location or a detailed description of the site.

When a hunting area receives a strictly restricted area classification, the systematic search of deceased wild boars must start immediately. Professional hunters carry out this activity and document their findings. The state compensates for the discovery of deceased wild boars.

4.2.3. Regulations for reducing wild boar populations

Following the initial detection of the disease, the local epidemic centre must order individual diagnostic culling to reduce the population in the areas classified as strictly restricted. Additionally, the epidemic centre may authorize group diagnostic culling of wild boars. Group diagnostic culling is only permissible in areas, where at least three months have passed since the first positive case was identified, and in the last month, samples have been sent from deceased wild boars in numbers at least equivalent to the average of the previous two months. Furthermore, the number of ASF positive results must have decreased in the last month. Another condition is that hunting right holders cannot, in written or unwritten form, restrict or prohibit the culling of sows and piglets. Flashlights approved by the hunting authority can be used during diagnostic culling.

When necessary, individuals with hunting rights can be involved for the execution of diagnostic culling, or, if necessary for successful execution, an individual qualified for sampling can be involved. Only individuals, who have successfully completed hunter epidemic protection training, can be obliged to participate actively.

For every seemingly healthy individual culled for population collection, samples must be taken following specific rules. The carcasses cannot be used and must be disposed of at state expense after sampling.

Hunting right holders are required to submit samples taken from culled wild boars during diagnostic culling along with the completed sample identification form the morning after the culling at any designated sample collection point, regardless of the day of culling.

The local epidemic centre must ensure there are sufficient sample collection points in the region, where samples are collected in the morning every day, including weekends and public holidays. The epidemic centre is responsible for the transportation of submitted samples to laboratories.

4.2.4. Rules for disposal of wild boar carcasses

In strictly restricted areas, wild boars that are found deceased, hit by vehicles, or culled for diagnostic purposes due to symptoms should primarily be neutralized at an animal by-product processing facility. Therefore, collection sites must operate to gather the wild boar carcasses and store them until they are transported for neutralization. Even the bodies of seemingly healthy wild boars culled for population control need to be delivered to these collection sites. These sites must accept wild boar carcasses daily and maintain a record of incoming and outgoing deliveries. Operating these collection sites entitles one to state compensation.

For the transportation of wild boar carcasses and bodies of seemingly healthy wild boars culled for diagnostic purposes to collection sites, hunting rights holders or other suitable legal entities or natural persons must be actively involved. During transportation, leakage and dripping prevention must be ensured in line with veterinary regulations concerning carcass transportation. Those completing this task are entitled to state compensation.

If transporting the deceased wild boars found in infected areas to an animal by-product processing facility encounters obstacles, the primary method of neutralization should be on-site burial, ensuring a covering of 30-50 cm thick layer of soil. In practice, this means either burial at the discovery site or as close as possible. Before burial, the carcass should be sprayed with an ASF-effective disinfectant. Visibly contaminated soil and plant matter must be buried along with the carcass. If circumstances do not allow burial at or near the discovery site, the deceased wild boar should be transported to a fenced pit established by the hunting rights holder. Neutralization in the pit involves placing the carcass inside, spraying it with an ASF-effective disinfectant, and covering it with a sufficient layer of soil. After the neutralization process, individuals involved must disinfect their hands, feet, contaminated clothing, and any vehicles or tools used with an ASF-effective disinfectant solution.

4.2.5. Rules concerning shot wild boar bodies

A fundamental rule is that a complete hunting prohibition applies to wild boars within strictly restricted areas. Therefore, only culling for diagnostic purposes can be ordered or permitted to manage the population. One must neutralize the body of every wild boar culled for diagnostic purposes according to appropriate regulations. Given the value of wild boar meat, the head of the local epidemiology centre can grant a special permit, based on a written request from the hunting rights holder, allowing a portion of the boars culled for diagnostic purposes to be used for private consumption within the boundaries of the strictly restricted area or to process its trophy.

One may only use the meat or process the trophy after receiving a negative virological test result. Until then, the hunting rights holder must store the body in a manner and location approved by the local epidemiology centre. The state does not compensate the hunting rights holder for bodies consumed under this individual permit. However, if they process the trophy but do not use the body, the hunting rights holder is entitled to state compensation for the body unused. The hunting rights holder must transport the offal and any unconsumed parts to collection sites.

If the virological test returns positive, one must confiscate the body of the wild boar that tested positive and any other boar bodies it may have come into contact with, and you must neutralize them as by-products. After removing the bodies, one needs to clean and disinfect the storage area. The state provides compensation for the confiscated bodies.

4.2.6. Regulations related to wildlife parks and farms

Transporting wild boars, including those living in game parks, both within and outside strictly restricted areas is prohibited. Within 90 days of being classified as a strictly restricted area, every game park, which houses wild boars, must either be surrounded by fence or any other method approved by a competent chief county veterinarian, taking into account the opinion of the regional chief hunter, to prevent contact with the wild boar population. There is no need for double fencing, when the entire game park is surrounded by fence and the wild boars are contained within another fenced area on its territory.

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A local epidemiology centre must ensure for every game park housing wild boars that the wild boar population in the game park is eradicated by the end of the given hunting year, adhering to the compensation rules for diagnostic culling.

In the case of every wild farm housing wild boars or solely wild boars, the local epidemiology centre must ensure the wild boar population in the farm is eradicated within six months after the park is being classified as a strictly restricted area. The owner of the eradicated animals is entitled to state compensation. During the period of strictly restricted area designation, the licensing authority can only grant permission to establish game farms for species other than wild boars.

4.2.7. Rules for wild animal feeding in strictly restricted areas

Feeding or baiting wild boars for population maintenance is prohibited in strictly restricted areas. To ensure the success of diagnostic culling, those authorized to hunt can place 10-15 kg of feed per week at bait stations near their hunting blinds. When operating equipment designed for the live capture of wild boars, 10-15 kg of feed can be used per deployment. Those authorized to hunt must maintain a record of the feed used for this purpose and keep this record for at least 2 years for inspection by the regulatory authority. In these areas, feeding other game species should be managed in a way that wild boars cannot access the bait.

4.2.8. Relevant measures of the National Chief Veterinary Officer's Regulation No2/2021, broken down by risk categories

Table 1: **Summary table of the National Chief Veterinary Officer's Regulation No2/2021**

Action intervention	Low risk area	Medium risk area	High risk area	Infected area, part outside SRA	Infected area, part outside SRA
Prohibition of hunting wild boars, both individual and group	-	-	-	x	x
Temporary suspension of individual and group hunting of species other than wild boars	-	-	-	Group hunts only	x
Ordering diagnostic culling of wild boars	-	x	x	Diagnostic culling only	Diagnostic culling only
Group diagnostic culling of wild boars upon request	Not relevant	-	-	x	x
Group hunting of species other than wild boars upon request	Not relevant	-	-	x	x
Culling and reporting of ASP-suspected wild boars	x	x	x	x	x
Mandatory participation in epidemic prevention training	-	-	-	x	x
Reporting of deceased wild boars	x	x	x	x	x
Organized search for deceased wild boars	-	x	x	x	x
Sampling from found wild boar carcass	x	x	x	x	x
Sampling from wild boars taken during hunting and/or diagnostic culling	-	Diagnostic culling only	x	x	x
Active involvement requirement (carcass search, diagnostic culling, sampling, carcass disposal)	Upon finding deceased wild boar	x	x	x	x
Disposal of deceased and culled wild boars	Upon finding deceased wild boar	x	x	x	x
Utilization of the body of wild boars culled diagnostically	Not relevant	-	With negative lab results	Upon request with negative lab results	Upon request with negative lab results
Special transportation and storage of wild boars taken during hunting and/or diagnostic culling	-	x	x	x	x
Utilization of trophies from wild boars taken during hunting and/or diagnostic culling	x	x	With negative lab results	Upon request with negative lab results	-
Prohibition and specific conditions for live wild boar transport	x	x	x	x	x
Double fencing of game parks and wild farms	-	x	x	Disband wild boar population by the end of the hunting season after fencing	Disband wild boar population by the end of the hunting season after fencing

5. RECOMMENDED METHODS FOR LIVESTOCK BREEDERS TO DEFEND AGAINST AVIAN INFLUENZA

Avian influenza is a notifiable disease. Therefore, if someone observes changes in poultry behaviour resembling or matching the symptoms of the disease, he/she must inform immediately the veterinarian or the relevant staff at the Food Chain Safety and Animal Health Department of the County Governmental Office.

Infected animals not only carry but also produce the virus in large quantities, increasing the risk of disease spread. It's crucial to understand that if an animal becomes infected, it will unfortunately fall ill and die. Thus, it's imperative to halt the virus's spread as soon as possible.

5.1. Investigation and notification obligations about avian influenza cases

A generalized symptom in birds is lethargy, loss of appetite, reluctance to move, and in many cases, the animal dies before the appearance of respiratory symptoms. Respiratory signs include nasal discharge, conjunctivitis, sneezing, croaking, inflammation of the cavities beneath the eye socket, sore throat, and watery swelling of the head appendages. There is also diarrhoea, neurological symptoms in the flock, and a significant decrease in egg production. Pheasants are less susceptible to the disease, suggesting a longer incubation period in these populations. During the H5N8 outbreaks in 2016-2017 and 2020, mortality rates rose without symptoms, while water and feed consumption remained unchanged.

Infected pheasants can have mucosal inflammation in the nasal passages, and inflammation of the trachea and air sacs. Swollen liver and spleen are also evident.

5.2. Initiating the examination, prevention of spread

If the Chief Veterinary Officer deems the suspicion valid, the poultry farm is placed under official surveillance. Following this, samples are taken to confirm or rule out the disease, and the livestock farmer is directed to execute the following tasks and adhere to the following regulations:

- inventory of all animals (poultry, other captive birds, mammalian pets);

- daily recording sick, deceased, or suspicious individuals;
- keeping some birds confined;
- using disinfection measures at the entrances and exits of buildings;
- removal or introduction of birds (poultry, other captive species) from or to the farm is strictly prohibited;
- removal of items or materials likely to spread avian influenza (e.g. eggs, poultry meat, feed, equipment, waste, manure) is strictly prohibited; and,
- movement of domestic mammals, people, vehicles, and equipment to or around the farm can only occur with permission.

Beyond the abovementioned, the Chief Veterinary Officer conducts an epidemiological investigation, and may extend these measures to additional locations based on its results.

5.3. Management of avian influenza-infected stock

If the investigation confirms that the flock is infected with avian influenza, every poultry and other captive bird in the affected livestock farm must be culled immediately under official supervision to prevent the spread of the outbreak. Deceased animals and eggs also need to be safely disposed. All tools, materials, areas, and structures potentially contaminated by the virus must be immediately thoroughly disinfected and neutralized.

Given that the disease can incubate in animals for 1-2 weeks without showing any visible symptoms, and there is very high probability that the rest of animals would eventually become infected, all birds must be culled immediately, as mentioned in the previous paragraph.

5.4. Restrictions in the case of avian influenza-infected wild birds (pheasant, wild duck)

The authority designates a protection zone within a 3 km radius of the infected site, and an additional surveillance zone covering at least a 10 km radius around the same site. Transport of birds and eggs into or out of both zones is strictly prohibited.

Within the 3 km protection zone, restrictions on the movement of poultry and their products are more stringent than in the surveillance zone. Farms and poultry-raising locations inside this protection zone undergo clinical examinations, and samples are taken based on suspicion. Moreover, events such as bird fairs, markets, races, or any similar gatherings are forbidden within this zone.

These restrictions apply to all domesticated and captive birds, including indoor pheasants, partridges, and wild quail farms.

Following the safe disposal of 100% of the infected flock, the owner is entitled to state compensation. The competent veterinary authority determines this amount based on the market value of the livestock at the time of the incident. The culling of the animals is carried out by veterinary experts, while the disposal of carcasses is managed by ATEV.

It is crucial to understand that any hindrance to epidemic defence measures can lead to severe consequences beyond exclusion from compensation and substantial fines. Such interference could result in criminal charges and, potentially, imprisonment.

6. IMPACT OF ASF AND AVIAN INFLUENZA ON WILDLIFE MANAGEMENT

6.1. The impact of ASF on wildlife management

In Hungary, as in most Central European countries, wild boar is one of the favourite game species among hunters. This species attracts the most hunting activity, and its hunts, particularly wild boar drives, rank among the most paid hunts. The emergence of African swine fever (ASF) introduced significant changes to wild boar management. An 80% mortality rate in the wild boar population in Hungary's north-eastern region was a heavy blow for game managers. This setback was compounded by restrictions and regulations imposed by veterinary authorities, as well as related administrative duties. Leaders in the industry, and especially professional hunters, faced with many new responsibilities, translating to an increased workload. The ASF outbreak significantly undermined the economic stability of hunting units. While the state compensation system provided some relief, hunting groups had to offer new hunting opportunities as focus shifted to other game species in most affected areas. For game managers in the Northern uplands, their highest revenue came from 3-4 annual wild boar drives, which became impossible due to the outbreak. Local hunters lost their most practiced hunting method of stalking wild boar, leading some to consider leaving hunting associations. The loss of revenue from wild boar increased the financial burden per hunter (through increased membership fees), while available hunting opportunities sharply decreased, pushing several associations towards crisis.

Perhaps the only positive effect of the ASF outbreak for game managers was the decrease in damage caused by wild boars. However, as focus shifted to deer populations as a future revenue source, damages caused by the increasing deer populations also grew.

Another potential positive outcome of ASF is that certain lowland hunting associations, which previously managed wild boar, have turned back to small game management with the decline of the wild boar species.

Currently, the only strategy in Hungary to prevent the spread of ASF in wild boar populations, slow it down, or eventually eradicate it, is a significant reduction of the population. This has already occurred in the Northern Uplands and near the Ukrainian and Romanian borders due to high mortality rates. However, it is evident that a significant reduction in population density does not automatically eradicate the disease, as evidenced by recent positive cases in Hajdú-Bihar county (Figure 5).

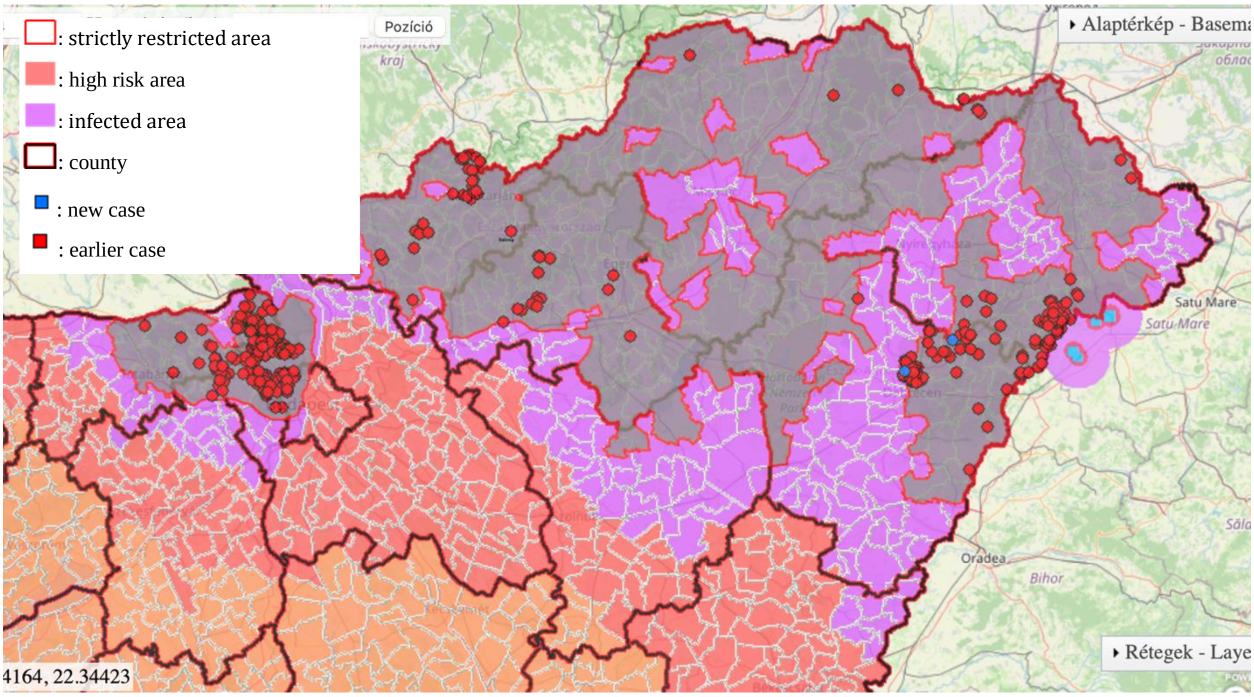

Fig. 5: Positive ASF cases in Hungary over the past 12 months

Currently, the south-western and western regions of Hungary have not yet been hit by the epidemic, and wild boar populations remain dense. However, there's a nationwide goal to reduce the wild boar population throughout the country to prevent the disease's persistence. Available literature indicates that low population density is crucial for disease-free zones. To ensure the successful reduction of the wild boar population, a key strategic target is achieving a density of 0.5 wild boar/km^2 (0.5 wild boar/100 ha), which Hungary aims to reach by February 28, 2025.

6.2. Wildlife management methods to combat the ASF epidemic

The regulatory system for controlling African swine fever (ASF) in wild boar populations operates through individual and group diagnostic culling. As an epidemiological measure, diagnostic culling allows not only traditional culling but also the use of live-capture devices in parallel. Strictly restricted areas do not have quotas set for diagnostic culling, whereas in other parts of the country, procedures must align with the guidelines laid out in the ASP Eradication Plan.

Every hunting license holder, with the exception of those in strictly restricted areas, must draft an annual plan detailing their adherence to the diagnostic culling requirements stated in the ASF Eradication Plan as well as on the veterinary authority's mandated target of 150% culling across all age groups.

Given the limitations of population estimates and considering that these estimates do not include yearly population growth, it is vital that hunting yields for the 2024/2025 season also corroborate target achievement. This target is obligatory for free-range populations, which is why the Action Plan specifies different provisions for operators of wild boar or mixed game parks and farms.

Strategies must be developed based on the region's characteristics and the capabilities of the licensed hunter for every hunting area. Therefore, every licensed hunter must create a long-term multi-year plan. This plan should naturally include yearly culling numbers by age groups, ensuring that these numbers are not less than the ones specified in the veterinary authority's decision, namely 150% of the base year. If hunters believe the diagnostic culling targets won't achieve strategic goals, they can seek guidance from the regional chief hunter in determining culling numbers. This also applies to hunters operating in strictly restricted areas, given they have no set culling quotas. The multi-year plan should also elaborate on the hunting pressure required to maintain a maximum density of 0.5 wild boars per square kilometre.

Both plans must be submitted to the hunting authority for approval. If the execution falls short of the plan, hunters must adjust their long-term strategy to achieve a maximum density of 0.5 wild boars per square kilometre by the end of the cycle.

For any game management unit, where the wild boar density has not exceeded 0.5 wild boars/km^2 in the last five hunting seasons, the territorial hunting authority may waive the submission requirement for the hunter's plan.

If a licensed hunter fails to achieve a maximum density of 0.5 wild boars/km^2 (or 0.5 wild boars per 100 ha) by the deadline, they won't be held accountable if the hunting authority, considering the opinion of the regional chief hunter, verifies that due to circumstances beyond the hunter's control related to the hunting area's characteristics, the targeted population density was unattainable. In such cases, hunters must draft a new plan aimed at reaching a density of 0.5 wild boars per square kilometre (or 0.5 wild boars per 100 ha) and submit it to the hunting authority for approval.

6.2.1. Tools and methods available for reducing wild boar populations

1. Using live-capture devices alongside individual or diagnostic culling is beneficial. Operating these devices effectively requires specialized knowledge and expertise. While authorities recommend the use of these capture devices, they do not mandate it.
2. To enhance the efficiency mentioned in the previous paragraph, properly positioned wildlife cameras can be effectively employed.
3. Installing various fencing devices (e.g. fencing, electric fences) not only hinders and slows the movement of animals but, by directing the path of wild boars, facilitates an increase in diagnostic shots and more strategic placement of live-capture devices along their trails.
4. The successful execution of the prescribed measures would greatly benefit if hunters were equipped with up-to-date knowledge that better aligns with current veterinary health standards during their pre-examination training. This includes primarily information on African swine fever, epidemic prevention (biosecurity), and the importance of reducing the wild boar population.

6.3. The impact of avian influenza on wildlife management

Evaluating the impact of avian influenza on small game management is challenging, as mortality in free-ranging game birds (like mallards, huntable wild geese, pheasants, and partridges) is hard to detect. Waterfowl populations likely suffer the most from the disease-related mortality, but even international wildlife biologists seldom venture to estimate this.

In Hungary, the virus poses the most significant threat to huntable bird species bred and raised in closed spaces. When the virus emerges, these closed breeding grounds are susceptible to infections, and they can be affected by veterinary preventive measures. Both the breeding grounds for wild birds and game managers, who engage in breeding and releasing birds for hunting purposes are at risk.

Most pheasant and mallard breeding sites in Hungary are understandably located in the Great Plain region, and almost all fall within the migratory paths of waterfowl. Nowadays, these breeding sites utilize closed technologies (like net-covered rearing) that effectively prevent wild birds from entering throughout the year. The most significant risk for pheasant and mallard breeding sites is a nearby appearance of the virus in an infected migratory wild bird, leading to the inclusion of the breeding site within a 3 km protective zone. This happened in 2017 to the pheasant-breeding site of the Abádszalók Hubertus Hunting Association, when 10,000 breeding birds already set for egg production had to be culled due to avian influenza. Although state compensation replaced the breeding stock, it did not cover the yearlong production gap and especially not the market-related losses.

Hungarian game management units annually release more than 500,000 pheasants onto their hunting grounds, mostly to enhance hunting opportunities and, to a lesser extent, to replenish breeding stocks. The release techniques have evolved so that in most areas, the birds intended for release are kept under bird nets until the day of hunting, minimizing losses from dispersal. This method essentially prevents the bred pheasants from interacting with potentially infected wild bird species. However, placing pheasants on hunting grounds qualifies as wildlife restocking, which is not permissible in restricted areas.

The semi-wild and intensive rearing of mallards for hunting purposes is much more exposed to virus infection. In this method, birds are relocated to a wet habitat (a small pond or canal) at four weeks of age, where they live freely for several more months. During this period, they can interact with migrating waterfowl in the fall, posing a significantly higher infection risk than for birds kept and raised in enclosed spaces.

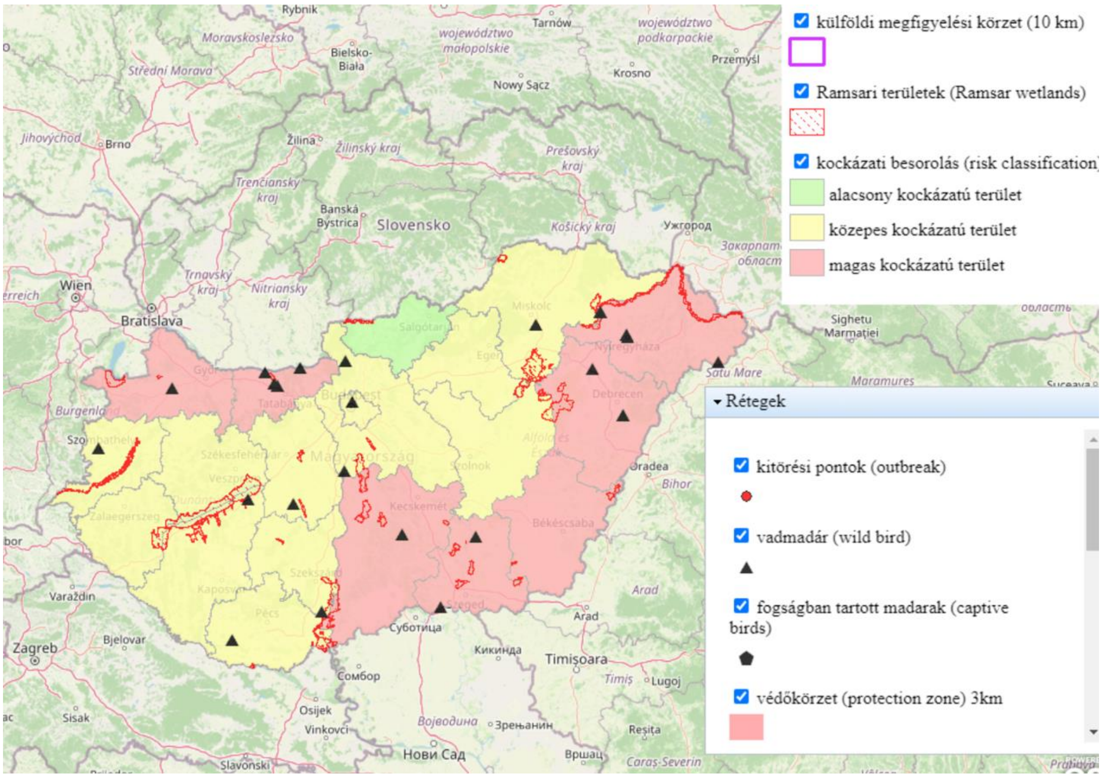

Fig. 6: Avian Influenza Observations as of September 2022

6.4. Practical suggestions to prevent the spread of avian influenza

Poultry should be kept in a closed, sheltered area to prevent contact with wild birds.

If keeping them closed is not feasible, the run should be protected with durable bird netting from top and the sides.

Animals should be fed and watered in a fully sheltered area, preferably enclosed on the sides. Feed and bedding materials should be stored in a covered, closed area or kept covered to prevent access by wild birds.

Hygiene practices should be maintained with due diligence. Hands must be washed thoroughly with soap and water before and after handling poultry.

Clothing should not be repurposed, including shoes and boots, worn during animal care for other uses. Tools and equipment used for animal care should be cleaned daily.

To handle sick or deceased poultry nylon or rubber gloves should be worn.

When introducing new stock, the newly purchased animals must be quarantined away from the existing ones.

Animal carcasses and by-products must be disposed only through licensed professionals.

Vaccination of poultry and other birds against avian influenza is prohibited in Hungary. This is because, even with the partial protection offered by the vaccine, the avian influenza virus can persist in poultry stocks, allowing for antigenic and genetic changes in the virus, leading to the emergence of more dangerous strains. Additionally, the presence of vaccinated animals can pose diagnostic challenges in the event of an outbreak.

7. PRESENTATION OF PROCESSING BUSINESS

Nativus Wild Game Meat Processing Plant was founded on August 27, 2020. Driven by a deep respect for nature, the company's founders aimed to introduce everyone to the unique flavours and values of the country's remarkable wild animals through their premium-quality products. Their philosophy, "naturally from nature", underscores their objective to present game meat, one of the healthiest meat types, preserving both its appearance and intrinsic values, nutrient content, without additives and strictly adhering to rigorous standards, right from store shelves to households. Through their efforts, they also openly aim to increase both the quantity and quality of game meat consumption in Hungary.

According to the family holding's plans, export will play a pivotal role in their capital meat sales, while the domestic market will be their target for finished products. The meat plant will also produce sous-vide game meat, simplifying cooking game meat for both restaurants and households. Ensuring the plant's steady future operations, they have access to approximately 15,000 hectares of hunting grounds, where the company conducts game management, to procure game through their own or other family businesses.

As Miklós Támba, the owner of the plant, shared, the game processing facility primarily purchases large game species hunted in three north-eastern Hungarian counties: Szabolcs-Szatmár-Bereg, Hajdú-Bihar, and Borsod-Abaúj-Zemplén. Since the game meat plant was handed over after the outbreak of the African swine fever epidemic, purchase and processing restrictions related to wild boars immediately affected the company.

The ongoing African swine fever epidemic has affected the amount and sales prices of processed wild boar meat. The market has seen a decline in wild boar meat by approximately 30-40%. This particular game meat is highly demanded in our country, mainly due to its easy cooking. The decrease in commerce of wild boar meat because of hunting restrictions are in place in areas infected with African swine fever, and only diagnostic shootings are permitted to thin out the wild boar population. The carcasses of specimens brought down for diagnostic purposes must be disposed of and cannot enter commercial circulation, even though African swine fever does not pose a risk to humans.

The family business's newly built plant primarily processes raw materials from the hunting season. Their main products include both fresh and frozen game meat. The product range includes premium hams, smoked salami, sausages, aged beef and game meats, as well as sous-vide (vacuum-cooked) products. According to their plans, another section of the factory will process shot wild birds and other poultry. The game meat processing plant comprises 98 rooms in total, including a finished product dispatch area, packaging, aging and smoking chambers, technological corridors, machine rooms, boning and portioning areas, cold storage, game meat reception, and offices.

8. PRESENTATION OF FARMS AND HUNTING ORGANIZATIONS

In Hungary, hunting and game management are conducted through the following organisational structures:

1. Hunting associations
2. Closed forestry corporations
3. Agricultural closed corporations and limited companies
4. National parks

The African swine fever and avian influenza diseases have affected each of the aforementioned management and organisational forms, to varying degrees. The African swine fever primarily affected the economic stakeholders in game management due to large-scale wild boar mortalities. In contrast, avian influenza exerted its influence mainly through poultry and wild bird farming.

8.1. Hunting associations

By their legal status, they are non-profit civil organisations with their primary objective being to provide hunting opportunities for their members. According to the Hunting Act, the membership must consist of at least 10 individuals, each of whom must possess the requisite qualifications for hunting (hunting licence, firearms permit, etc.). A five-member Executive Committee elected from amongst the members oversees their management. The committee performs its duties as a civic responsibility, without being paid any fees.

8.2. Closed forestry corporations

Corporations managing both state-owned and private forests are responsible besides managing woodlands with timber utilisation as their focus, for wildlife management as a supplementary activity. Since these forests predominantly house large game, they conduct extensive large game management at a notably high professional standard. The wildlife management sector in these contexts is specifically revenue-driven, which includes enclosed large game breeding. The regional emergence of African swine fever has had a particularly detrimental effect on this activity.

8.3. Agricultural closed corporations and limited companies

Agricultural companies engaged in farming activities (crop production, livestock breeding) also practise game management on the lands they cultivate. Given that their lands primarily host small game populations and roe deer, the revenue expected from their wildlife management sector is comparatively lower. It is evident that they also operate their game management sector for protocol purposes.

8.4. Nemzeti Parkok

They manage state-owned conservation areas and provide expert opinions in conservation authority matters. According to the Hunting Act, large conservation areas should be designated as independent game management zones. While conservation takes priority here, game management also takes place under specific rules. The primary goal of game management in these areas is to regulate wildlife populations, focusing on large game species and both mammalian and avian pests. Traditional small game hunting is not practised in these zones. Conservation officers also serve as professional hunters within their operational areas. The hunting area of Hortobágy National Park is the largest hunting zone in Hajdú-Bihar County, covering more than 42,000 hectares.

In Szabolcs-Szatmár-Bereg County, the Government Office records 95 game management units. Two of these units are managed by closed joint-stock forestry companies (NYÍRERDŐ JSC, Napkor Foresters JSC), while the remaining 93 operate under hunting society structures. Szabolcs-Szatmár-Bereg County's hunting chamber registers 4,332 hunters.

There are 84 game management units in Hajdú-Bihar County, one of which belongs to Hortobágy National Park; four of them are managed by NYÍRERDŐ JSC, and six – by agricultural limited companies. The remaining game management units are hunting societies. The county's hunting chamber registers 3,569 hunters in Hajdú-Bihar County.

9. RESULTS OF PROFESSIONAL VISITS AND CONSULTATIONS ON SITE

The outbreak of African swine fever has affected the entire north-eastern region of Hungary, affected local businesses at different times and in varying ways. When selecting the three case studies, criteria included the date of appearance and ensuring representation from a state-owned company, a hunting society, and a renowned (world-famous) game manager. Although two of the entities selected operate under the management of NYÍRERDŐ JSC, the two hunting areas are in separate counties, almost 150 kilometres apart, with significantly different geographical locations and characteristics.

9.1. Lónya hunting area of NYÍRERDŐ Closed JSC

Located within the triangle enclosed by the Tisza River and the Ukrainian border, the 3,285 ha Lónya hunting area of NYÍRERDŐ JSC encompasses the ecologically rich Lónyai-Tiszakerecseny forest. The region's unique game management value lies in its Carpathian type red deer population, though the Company also manages fallow deer and wild boar. A distinct feature of this hunting area was the 516 ha game park, dissolved and terminated in 2018, where the Company kept a significant number of wild boars and fallow deer. Its border fence ran for several kilometres directly along the Ukrainian-Hungarian border.

"Lónya was among the first of Hungary's hunting areas, and its management was profoundly impacted by the outbreak of African swine fever," said Gergő Kaulák, director of Fehérgyarmat Forestry of NYÍRERDŐ JSC. As the positive cases of African swine fever in Ukraine approached the Hungarian border, the Company was compelled to cull the entire wild boar population in the game park as a preventative measure in spring 2018. Samples were taken from the culled wild boars, but none tested positive at that time. Half a year later, the entire park was closed down, retaining the fence only along the Hungarian-Ukrainian border to prevent infected wild boars from crossing. It later emerged that this only delayed the onset of the epidemic in the hunting area, as the first positive cases appeared there in the summer 2018.

Since then, the hunting area has consistently been categorised as an infected zone, and they have been implementing countermeasures based on the decrees of the National Chief Veterinary Officer. They accepted our suggestion to liaise with the adjacent Ukrainian hunting areas and monitor the epidemic's progression and dynamics. The avian influenza epidemic has not affected the game management unit's operations.

9.2. Vámospércs Farkasvölgy Hunting Association

Located 20 kilometres east of Debrecen, the game management unit covers 6,720 hectares, encompassing free-range small game management, free-range large game management, and enclosed pheasant breeding. As a result, both the African swine fever outbreak and avian influenza affect the ongoing operations here.

"Given that the hunting area is situated just 10 kilometres from the Romanian border, the emergence of the African swine fever epidemic did not catch the hunting association off guard," commented Péter Hunyadi, president of the hunting association. Still, they detected the first positive case only in spring 2019. By that time, they were already collecting lymph node and blood samples from every culled wild boar, as mandated by the National Chief Veterinary Officer. Initially, they buried the culled wild boars in a large pit dug for that purpose. Later, based on directives from the county epidemiological centre, they transported the carcasses of the culled wild boars to the central container located at the neighbouring Nyírábrány Hunting Association. From there, ATEV transported the containers away twice a week. The two professional hunters of the association inspect the thickets, where wild boars hide, twice weekly aiming to detect any deceased specimens and collect samples from them.

During our visit to the association, they highlighted that numerous issues arose from hunters extracting the lymph node and blood samples from their kills, as these were not always adequate. We therefore recommended that hunters should leave the killed specimens at the scene, and only the professional hunters should extract the samples the next morning, ensuring uniform sample collection throughout the association.

The hunting association raises 6-7 thousand pheasant chicks annually for hunting purposes. They sell 4,000 pre-raised pheasants (6-8 weeks old) to a business partner in Romania. They rear the remaining roughly 2,000 birds in a 1.2-ha aviary covered with bird nets for hunting sessions in November-December. The hunting association was affected by the avian influenza occurrence in

Hajdúhadház in autumn 2020, as the 10 km surveillance zone encompassed the hunting association's area. As a result, they could not conduct small-scale sales during that period.

9.3. NYÍRERDŐ Closed JSC Gúth hunting area

The most prominent game management unit of NYÍRERDŐ Nyírség Forestry Ltd. is the Gúth hunting area, located between Nyíradony and Nyíracsád in the South Nyírség region. This area is famous not only for holding two world records for deer, but it is also the only hunting area twice awarded the Edmond Blanc prize by CIC, the International Council for Game and Wildlife Conservation. The area boasts the largest contiguous forest of the Great Plain. Due to its habitat conditions, big game management is the primary activity within the wildlife management sector. There is the 200-hectare Kökényes wild boar garden within this hunting area, which, prior to the outbreak of the African swine fever epidemic, housed approximately 100 wild boars.

"The African swine fever epidemic caused significant economic losses to the forestry's game management sector," remarked Pósán Ferenc, director of Gúth Forestry of NYÍRERDŐ Ltd. The impact of this loss was multifaceted. Even before the first positive cases emerged, the hunting area received a strict infected classification, as the virus had appeared in the neighbouring Nyírábrány and Fülöp. Consequently, the Kökényes wild boar garden had to be emptied and remains vacant to this day. The clearing was only partially done through hired hunting; the remaining boars had to be culled by the staff. Since the state compensation amounts were still quite high at that time, the loss here was somewhat limited.

The company suffered its greatest setback when the strictly restricted area territorial classification has forbidden the collective diagnostic culling (wild boar drives) of wild boar. Given that, alongside deer hunting, large-scale wild boar drives were a significant revenue stream for the Gúth hunting area — during which many deer and roe deer were also hunted — its absence deprived the forestry of substantial income. Moreover, due to the absence of guests, the responsibility and labour of culling deer fell upon the staff members.
To address this issue, we suggested them alongside their traditional German-Austrian hunting guests, they should also offer deer hunting opportunities to Scandinavian hunters, who are keen on hunting both deer and roe deer.

Due to the increased mandatory culls and natural deaths on the hunting grounds, the wild boar population is approaching the population density of 0.5 animals/100 ha set out in the national chief veterinarian's decree.

The game management unit is not directly affected by the avian influenza epidemic.

10. REFERENCES

Bicsérdy, G., Egri, B., Sugár, L., & Sztojkov, V. (2000). *Vadbetegségek.* Budapest: Mezőgazda Kiadó.

Csivincsik, Á. D. (2018 Június 26.). *ZSELICI PRAXIS*. Forrás: Zselickisfaludi Állatorvosi Praxis: http://www.zselicipraxis.hu/blog-post/az-afrikai-sertespestis-tortenete/

Földművelésügyi Értesítő. (2021). Az Országos Főállatorvos 2/2021. számú határozata.