RESEARCH

Assessment of hunters' awareness of African swine fever in Samara Oblast, the Russian federation

Glazunova Anastasia^{1*}, Korogodina Elena¹, Lunina Daria¹, Bespalova Tatiana¹, Kustikova Olga¹, Gasanov Ruslan¹, Sevskikh Timofey^{2*} and Krasnova Elena¹

Abstract

Background African swine fever (ASF) continues to threaten the global pig industry, primarily due to the absence of effective treatments and vaccines, complicating disease management. Control measures depend on strict quarantine protocols, including culling infected animals and reducing wild boar populations. Effective ASF management in the wild involves controlling these populations, adhering to biosafety standards while hunting, identifying and safely disposing of boar carcasses, and isolating affected areas. Hunters are crucial for early ASF detection through both passive and active surveillance, influenced by their motivation and adherence to safety protocols.

Results A pilot survey among hunters in an ASF-affected Russian region assessed attitudes toward control measures. The results showed skepticism about the effectiveness of individual hunting bans and additional feeding sites, although measures preventing wild boar-domestic pig contact and banning wild boar meat harvesting in affected areas were favored. The survey results also revealed shortcomings in hunters' compliance with biosafety measures, such as disinfection methods, proper disposal of carcasses after butchering and lack of interaction with state veterinary services.

Conclusions Evaluating hunters' perspectives and active involvement in control efforts are crucial for effective ASF management. Hunter surveys serve as valuable tools for gathering information and should be utilized globally to enhance ASF control and hunting season biosecurity.

Keywords Wild boars, Pilot project, Survey, Hunters, Control measures, Russia

*Correspondence:

Glazunova Anastasia GlazunovaAA@outlook.com; samara@ficvim.ru Sevskikh Timofey sefskih@mail.ru; info@ficvim.ru ¹Federal Research Center for Virology and Microbiology, Branch in Samara, Russian Federation, Magnitogorsk str. 8, Samara Oblast, Samara 443013, Russia ²Federal Research Center for Virology and Microbiology, Academician Bakoulov Street, bldg. 1, Petushki area, Vladimir Oblast, Volginsky 601125, Russia



© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicate otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by-nc-nd/4.0/.





Background

African swine fever (ASF) is an acute, contagious viral disease characterized with nearly 100% lethality rate among susceptible animals of the *Suidae* family, leading to significant financial losses in pig farming and posing a serious global economic threat to the industry [1]. The high resilience of the ASF virus in the environment, in feed, and on agricultural equipment facilitates the rapid spread of the infection and complicates its control [1, 2]. The absence of effective treatments and commercially available vaccines makes combating ASF complex and costly [2]. Key countermeasures include strict quarantine and carefully designed outbreak eradication strategies.

According to the World Organization for Animal Health (WOAH), in the first half of 2023, 4,326 cases of ASF were registered in 24 countries, with 82% of the outbreaks occurring in the wild. Notably, Europe experienced a significantly greater percentage of ASF outbreaks among wild boars (99.6%) compared to Asia (0.4%). In the Russian Federation, while most outbreaks were among domestic pigs, nearly half of all outbreaks were detected among wild boars [3].

There are published data on the causes of the introduction and spread of the ASF virus worldwide. For example, it has been established that the possible introduction of the virus into previously unaffected areas in Northeast Europe occurred as a result of the migration of wild boars [4]. Meanwhile, in the Dominican Republic and the Russian Federation, the main factors for the spread of the virus were likely illegal animal movements and the transportation of infected pork products [5, 6].

Despite the widespread implementation of strict quarantine measures, the ASF virus continues to circulate in wild boar populations, persisting for extended periods in their carcasses. This creates an increased risk of the disease becoming endemic in the region [7]. Although natural virus spread among wild boars is relatively slow, hunter's activities, particularly non-compliance with biosecurity requirements during hunting, processing, and transportation of carcasses, can significantly accelerate the transmission of the infection, further facilitating the spread of the virus among both wild boars and domestic pigs [8].

Currently, in the Russian Federation, restrictive measures are implemented per the Ministry of Agriculture's order from January 28, 2021, No. 37, in suspected ASF cases. According to this order, the discovery of dead wild boars serves as grounds for suspicion of ASF in the wild. In areas where ASF is suspected, hunting of wild boars is prohibited, except in cases of population regulation. Additionally, access by unauthorized persons, entry of non-official vehicles, and the harvesting of feed for susceptible animals are also prohibited in the suspected territory. An epidemiological focus is recognized as a territory or premises with a laboratory-confirmed source of the pathogen, and an epidemiological focus is established with a radius of at least 5 km from it. For preventive measures, wild boars brought into hunting grounds for relocation, acclimatization, maintenance, and breeding in semi-free conditions and artificially created habitats must be kept in isolation for at least 30 calendar days from the date of import (capture) for laboratory testing for ASF, in accordance with paragraphs 24–28 of these regulations. Hunters and those equated to them are required to ensure the destruction of waste after processing the carcasses of harvested wild boars by incineration.

The preservation of the ASF virus in wild boar populations remains a global problem due to the extensive geographic coverage of outbreaks and the dispersal of susceptible wildlife [9]. Early detection of ASF virus in the wild is crucial, and passive and active surveillance, which includes sampling of all wild boars found dead or killed during hunting, plays a vital role in the control system [10]. Hunters can provide substantial assistance to state veterinary services in implementing ASF control measures by participating in both active and passive monitoring studies [11]. An important fact is that hunters, possessing experience, knowledge, and a regular presence in the forest, serve as important partners for the veterinary service in implementing disease control measures.

The likelihood of detecting ASF-positive wild boars is much greater among dead animals than among those hunted during hunting activities [12], and the willingness and motivation of hunters to participate in passive surveillance are of utmost importance in the control of ASF. Currently, published studies are available that are based on data collected through surveys, offering new insights into the issues and experiences of hunters. In particular, hunters in Germany from regions affected by ASF express less optimism regarding measures to combat this disease compared to hunters from unaffected areas. Measures perceived as hindering hunting or conflicting with the principles of fair hunting are considered ineffective or questionable [13]. Hunters in Estonia and Latvia share similar views on combating ASF, with passive observation in Latvia being regarded as an obligation rather than an incentive [14]. It is worth noting that the perception and motivation of hunters can vary significantly depending on the region. As hunters can make a significant contribution to ASF control, it is important to understand their attitudes toward the implemented control methods and their willingness to participate in these measures. Addressing these differences through personalized communication, incentives, and approaches based on broad participation may enhance their engagement in the fight against ASF.

Based on the above, a pilot survey was conducted among hunters to assess their level of awareness about ASF, their attitude toward elimination measures, and their willingness to participate in combating the disease.

Methods

Epidemiological data

The Samara Oblast, situated in the southeastern part of European Russia, served as the location for the pilot survey. This region is identified as a high-risk area for the emergence of new ASF outbreaks (Fig. 1) [15].

Data on outbreaks of ASF in the Samara Oblast from January 2020 to December 2023 were obtained from the World Organisation for Animal Health (WOAH) database. Information on the population of wild boars in the region at the administrative district level for the years 2020–2023 was collected from the official website of the Department of Hunting and Fishing of the Samara Oblast (https://dor.samregion.ru/). Data colle ction was conducted as part of the state monitoring of wild animal populations, which employs standard counting methodologies, such as winter route counts (WRC) and assessments at supplementary feeding sites. Population estimates were made through both visual observations and the use of photo and video recording devices to enhance the accuracy and objectivity of the results.

The obtained data were adapted into a shape file format for further analysis. To visualize the epidemiological situation, the software product ArcGIS 10.6.1 (ESRI Inc) was used. The method of descriptive epidemiology was applied to describe the epidemiological situation in the studied region.

Development of a pilot study

The pilot survey project was implemented as a preliminary study aimed at exploring the level of interest among



Fig. 1 Wild boar population density and epidemiological overview of ASF in the Samara Oblast from 2020 to 2023. This figure illustrates the population density of wild boars in the Samara region over the past few years, as well as the epidemiological overview of ASF. The map for 2023 visualizes the percentage data of the areas where respondents participating in the survey hunt (ArcGIS Desktop 10.6.1)

hunters and testing the approaches, methodologies, and tools used for data collection. The survey was conducted between March 30 and the end of July 2023, inclusive, before the start of the boar hunting season.

The pilot version of the questionnaire for hunters included 22 questions. There were 16 single-choice questions, 2 multiple-choice questions, and several open-ended questions allowing hunters to express their personal observations and attitudes toward the measures used to combat ASF in the wild. The pilot questionnaire can be found in the attached supplementary materials (Additional file 1).

The questions were structured to be grouped into four blocks: (1) general information about the hunter (age, hunting experience, subjective knowledge about ASF, contact, handling, and transportation of livestock and/or meat; purpose of using the game meat; purchasing wild boar meat from other hunters); (2) specifics of hunting (hunting areas, types of hunting grounds used, hunting methods, and number of games (wild boars) harvested); (3) awareness of biosecurity during hunting and compliance with its requirements (place of carcass processing, waste management practices, vehicle disinfection practices, detection of dead wild boar carcasses and actions taken upon discovery); and (4) participation in ASF control measures and attitudes toward implemented eradication measures (involvement in wild boar population management, hunting near pig farms, and agreement/ disagreement with implemented quarantine measures).

For convenience and ease of data processing, the questionnaire was created using the Google Forms platform, which allowed real-time updates and automated analysis of responses. The raw data can be accessed in Google Sheets for further in-depth analysis and processing of the obtained results.

The questionnaire was revised in collaboration with the Department of Hunting and Fishing of the Samara Region and was published on their official open portal (https://dor.samregion.ru/2023/03/31/opros-dlya-ohotni kov/) as an anonymous online survey [16]. Additionally, the staff of the Department of Hunting and Fishing of the Samara Region provided verbal information to hunters about the online survey while issuing permits for hunting resource extraction and as well as for those who received permits for wild boar hunting through a by drawing lots. Prior to the survey, the hunters were informed about the purpose of the survey and assured of the complete anonymity of the results obtained. Survey participants were not subject to any exclusion criteria.

Analysis of survey data

For subsequent analysis, only those surveys were used that contained responses to questions with one or more answer options. The analysis of the collected survey data was conducted using the free software R (version 4.3.1, available at http://www.r-project.org). The data processing involved categorical data analysis methods, as well as the calculation of percentage distribution using the «table» function in conjunction with the «prop.table» function [17].

The analysis of open-ended questions was conducted based on the grouping of responses by thematic areas (issues), with the identification of conditional categories.

The next steps in the data analysis were to examine the following possible associations: (1) the age of the surveyed hunters according to their hunting experience, subjective knowledge about ASF, the number of wild boars harvested per year, the type of hunting grounds used, and the participation in the regulation of the wild boar population in the region; (2) the hunting experience of respondents with subjective knowledge about ASF, the number of wild boars harvested per year, the type of hunting grounds used, and participation in regulation of wild boar population management in the region; (3) subjective knowledge about ASF, carcass processing site requirements, waste management practices after carcass processing, methods of disinfecting vehicles and clothing after hunting, the type of wild boar hunting, information about detecting wild boar carcasses during hunting, attitudes toward implemented quarantine measures, and the desire to learn more about ASF; (4) participation in the regulation of the wild boar population in the region with hunting near pig farms, vehicle and clothing disinfection practices after hunting, purchasing wild boar meat from other hunters, potential pig farming and pork production, and the possible sale of harvested wild boars during hunting; and (5) the type of hunting grounds used to participate in wild boar population management, disinfection practices of vehicle.

Possible associations were also investigated using the free software R. The analysis was conducted using the chi-squared test through the function "chisq.test", as well as Fisher's exact test using the function "fisher.test" [17]. Fisher's exact test was applied to analyze small samples where the use of the chi-squared test was not feasible. The statistical significance of the association between variables was assessed based on the *p*-value: if it was less than 0.05, this indicated a statistically significant relationship.

Results

Epidemiological data

A significant and uncontrolled spread of ASF in Samara Oblast was recorded starting in mid-January 2020 [15], with 41 outbreaks in domestic pigs and 40 in wild boars. It is believed that transportation and trade of infected pigs/pork products play much more significant role in the spread of ASF rather than the wild boar population [18]. To prevent the introduction and spread of ASF in the Russian Federation, a plan was developed to reduce the wild boar population to 0.25 animals per 1,000 hectares annually (0.025 individuals/km²) [19]. Notably, the total area of hunting grounds in Samara Oblast is 4,654.63 thousand hectares, with 23.4% being publicly accessible hunting grounds (PHAGs) [20].

In 2020, this threshold was exceeded in several districts of Samara Oblast, including the southwestern, western, northwestern, central, northern, and northeastern districts, as well as one district in the southern part of the region (Fig. 1). Favorable food resources and climatic conditions contributed to the increase in the wild boar population, which reached 2345 individuals [21].

Following the large-scale ASF epidemic in 2020 in Samara Oblast, the epidemiological situation improved in 2021. ASF outbreaks were recorded in only seven districts (Krasnoyarsky, Pestrovsky, Volzhsky, Kinelsky, Bogatovsky, Syzransky, Neftegorsky), with eight outbreaks among domestic pigs and five among wild boars.

A high density of wild boar (ranging from 0.078 to 0.131 individuals/km²) was registered in the border areas with Orenburg and Ulyanovsk Oblasts, the Republic of Tatarstan, and in the northern and central parts of Samara Oblast.

By 2022, the disease was registered only in 5 districts (Volzhsky, Pokhvistnevsky, Privolzhsky, Bezenchuksky, and Khvorostyansky) among both pigs (6 cases) and wild boars (6 cases). The population density of wild boars remained within acceptable limits (less than 0,025 individuals/km²).

By mid-2023, ASF cases were detected among pigs (3 cases) only in previously affected districts of the region (Bezenchuksky and Khvorostyansky). As a result of the ASF epidemic and control measures, including the culling of wild boars as part of population control, the population size decreased to 595 individuals as of March 31, 2023, according to the Department of Hunting and Fishing of Samara Oblast [21]. However, the wild boar density in some areas of the oblast reached the limits of acceptable values (Fig. 1).

Analysis of survey data

Over a four-month period, 269 online questionnaires were collected. The majority of responses (68%) were received within the first two days of data collection. For further analysis, 219 questionnaires were selected, while the remaining 50 questionnaires (18.6%) were excluded due to lacking responses to key questions, specifically those requiring single or multiple-choice answers.

Analysis of the first block of questions revealed that most respondents were aged 21–40 years (121 individuals (ind.), 55.3%) and had over 10 years of hunting experience (128 ind., 58.4%). A significant portion of hunters had heard of ASF (146 ind., 66.7%), yet only 29.2% (64 ind.) rated their knowledge of the disease as "well-informed." Many respondents (201 ind., 91.8%) reported not engaging in pig farming or breeding in their personal house-holds. The vast majority (208 individuals, 95%) consumed the meat they hunted, while 7.8% (17 ind.) also purchased wild boar meat from other hunters for personal use.

According to the results of the second block of responses, most respondents (215 ind., 98.2%) preferred to hunt primarily in the Samara region. The most popular hunting areas among respondents were Kinelsky (11.1%), Volzhsky (8.7%), Bolshieglushitsy (8.7%) and Borsky (8.2%) districts. Respondents hunted across various territories in the region (in 92.9% of the area's districts), including both ASF-affected and unaffected areas. The remaining percentage of respondents preferred to hunt in other regions of the Russian Federation, such as Nizhny Novgorod, Saratov, Ulyanovsk regions, and the Yamal Peninsula.

Additionally, the results from the second block of questions indicated that among the preferred hunting methods for wild boar, 50.7% (111 ind.) chose driven hunts with dogs, while 37.4% (82 ind.) preferred ambush hunting from elevated stands. More than half of the respondents (128 ind., 58.4%) hunted exclusively in publicly accessible hunting grounds (PAHG). Two-thirds of the respondents (149 ind., 68%) reported not harvesting any wild boar in 2022, while 18% (40 ind.) reported harvesting only one wild boar during the hunting season, and only 11.9% of hunters (26 ind.) harvested between 2 and 5 boars.

In the third section of the survey, the questions were aimed at assessing hunters' awareness of biosecurity during hunting and the application of this knowledge in practice. One-third of the respondents reported that they engaged in field dressing and processing game on hunting grounds (79 ind., 36.1%), another third (70 ind., 32%) did this while hunting, and the remaining 27.9% (61 ind.) did it in their own backyards. The majority of respondents (90 ind., 41.1%) buried the waste after dressing the game, while one-third (70 ind., 32%) incinerated it. However, 18.3% (40 ind.) of the respondents left the waste at the dressing site without proper disposal. According to the data obtained, the overwhelming majority of respondents (176 ind., 80.4%) were aware of the necessary actions to take with the carcass of a wild boar and were willing to report their findings to a game manager or ranger. It is worth noting that only 7.8% (17 ind.) of respondents would report a finding to the state veterinary service. Additionally, 6.4% (14 ind.) of respondents, in a subsequent open-ended question that was not directly related to the topic, expressed their negative views regarding the performance of the veterinary service, claiming that it does not fulfill its assigned responsibilities. Less than half of the respondents (88 ind., 40.2%) disinfected their vehicles and clothing after hunting. During the 2022 hunting season, only 11.0% (24 ind.) of respondents found wild boar carcasses while hunting.

Regarding participation in the fight against ASF, nearly one-third of respondents (63 ind., 28.8%) indicated their involvement in managing the wild boar population. Of these, 31.7% (20 ind.) hunted near farms (within a 30-kilometer protection zone). The remaining participants hunted in other areas as part of population control efforts to reduce the overall density of the wild boar population. Notably, of the two-thirds of respondents (156 ind., 71.2%) who did not participate in population control hunting, 14.1% (22 ind.) hunted near pig farms.

When analyzing the responses to the question "What quarantine measures do you consider justified?" nearly half of the hunters (106 ind., 48.4%) expressed opposition to the entire set of implemented measures. It is also worth noting that hunters showed interest in open-ended questions, with 22% (48 ind.) of survey participants providing responses. The categorization of responses by thematic areas (issues) is presented in Table 1. Among them, 75% (36 ind.) suggested their own control measures. Hunters proposed strengthening biosecurity measures on pig farms and banning the purchase of imported feed, as they believe that anthropogenic factors are the primary source of ASF introduction and that the main route of infection spread is from pig farms to the wild, rather than the other way around.

Additionally, there were suggestions to make laboratory testing of game mandatory for any hunting of wild boar and to conduct sanitary culling during outbreaks in neighboring areas (regions), as respondents believed that checking each harvested carcass and implementing sanitary culling would increase the detection of ASF in the wild and help respond promptly to outbreaks. Some respondents expressed interest in receiving training on carcass handling, loading and unloading procedures, transportation, and assistance in communicating with state veterinary specialists and services. Proposals were also made for managing the population of scavenging predators, which may play a role in the spread of ASF. Suggestions were made to prohibit recreational hunting of wild boar in protection zones and to conduct population control only under the supervision of a hunting inspector to prevent poaching.

It is noteworthy that a quarter (12 ind., 25%) of the respondents repeatedly emphasized the issue of hunting in the PAHG. According to them, wild boars are extremely rare in the PAHG, which reduces the likelihood of harvesting them. This is attributed to the limited number of hunting permits allocated by the Department of Wildlife Management through a lottery system. Furthermore, respondents believe that private landowners intentionally drive wild boars and deer out of the PAHG onto their properties, where they can freely issue hunting permits and set their own prices. Some hunters noted that the cost of hunting organized by private landowners ranges from 10,000 to 120,000 rubles, depending on the size and weight of the trophy, which significantly exceeds the state fees and charges for utilizing wildlife resources when obtaining a hunting permit under the state program. Respondents also suggested that as a result of animals migrating from the PAHG to private lands, wild boars are concentrated in small areas that are poorly monitored by state veterinary services.

In some cases, statistical analysis of possible associations between responses to different questions confirmed the presence of statistically significant results. Regarding the questions in the first block of the questionnaire, significant dependencies were found between respondents' experience in hunting activities and their age (p < 0.001)

Thematic categories	Grouping of responses by thematic areas	Hunter's responses	Share of responses to open-ended ques- tions from total num- ber of respondents
Proposed	For wildlife	Conducting mandatory laboratory tests on harvested specimens.	16,7%
Measures for		Introducing a ban on hunting within protected zones.	6,3%
Combatting		Organization of sanitary culling during disease outbreaks in adjacent districts (regions).	8,3%
lssues		Regulating predator and scavenger population levels.	12,5%
	For farmers	Strengthening biosecurity measures on farms.	31,3%
Difficulties En- countered by Hunters Dur- ing Activities	On PAHG	A limited number of hunting permits are issued. Proposal: Increase the number of permits.	25%
	On private lands	Lack of compliance with oversight measures due to difficulty accessing these areas.	18,8%
		Proposal: Enhance supervision. High cost of hunting licenses. Proposal: Reduce prices.	31,3%
	General questions	Insufficient cooperation with state veterinary services.	29%
Other	Improving	Training in waste management (or disposal) methods.	20,8%
	awareness	Participation in exercises for conducting disinfection procedures.	12,5%

Table 1 Thematic analysis and classification of responses to open-ended questions by problem areas

Table 2 Results of the analysis of possible associations

Comparable variables		Statistical
		significance,
	11	<i>p</i> - values
Age	Hunting experience	< 0,001*
	Subjective assessment of knowledge about ASF	0,945
	Number of wild boars harvested per year	0,823
	Type of hunting grounds used for hunting	0,864
	Participation in wild boar population control in the region	0,191
Hunting experience	Subjective assessment of knowledge about ASF	0,002*
	Number of wild boars harvested per year	0,904
	Type of hunting grounds used for hunting	0,667
	Participation in wild boar population control in the region	0,191
Subjective assessment of knowledge about	Territory used for carcass processing	0,325
ASF	Disposal of waste after carcass processing	0,757
	Disinfection of vehicles and clothing after hunting	0,271
	Type of hunting method used for wild boars	0,092
	Attitude toward implemented quarantine measures	0,003*
	Encountering wild boar carcasses during hunting	0,065
	Desire to learn more about ASF	0,627
Type of hunting grounds used for hunting	Participation in wild boar population control in the region	0,055
	Disinfection of vehicles and clothing after hunting	0,102
	Fact of wild boar harvest during hunting	0,026*
	Type of hunting method used for wild boars	0,943
	Hunting near farms during population control period	0,088
Encountering wild boar carcasses during hunting	Actions when encountering wild boar carcasses during hunting	0,105
Location of carcass processing	Disposal of waste	< 0,001*
Participation in wild boar population con-	Disinfection of vehicles and clothing after hunting	0,106
trol in the region	Fact of acquiring wild boar meat from other hunters	0,206
	Attitude toward pig farming and pork product manufacturing	0,078
	Sale of harvested wild boars during hunting	0,338
	Hunting near pig farms	0,010*

and their subjective knowledge of ASF (p = 0.002). Hunters with much experience were less likely to report a lack of knowledge about ASF, and the majority (76.3%) of respondents with more than 10 years of hunting experience were older (40–60 years and above).

According to the responses to the second block of the questionnaire, hunters more frequently harvested wild boars in PAHG than in private hunting grounds (p = 0.026).

According to the analysis of the third block, hunters primarily perform carcass disposal on hunting grounds, and the waste is buried near the butchering site (p < 0.001).

Significant differences were observed in the fourth block of questions, hunters who refrained from participating in wildlife population regulation also avoided hunting in prohibited areas, (those adjacent to farms and villages) (p = 0.010).

According to the cross-analysis of the responses to the first and fourth blocks of questions, most respondents who rated their subjective knowledge of ASF highly expressed opposition to the implemented quarantine measures (p = 0.003). The results of the analysis of possible associations are presented in Table 2.

Discussion

The optimal approach for controlling ASF in the wild involves several key factors: passive monitoring of ASF in wildlife, managing wild boar populations, strict adherence to biosecurity measures during hunting, and the prompt discovery of carcasses. The isolation of infected areas is also crucial [22, 23]. Effective ASF control in the wild requires the engagement of all relevant organizations; otherwise, eradicating the disease becomes significantly more challenging. The success of these measures largely depends on the willingness and motivation of hunters to actively participate. Therefore, the success of implementing these measures largely depends on the willingness and motivation of hunters to do so. Assessing the opinions of hunters regarding hunting resources and the existing ASF control measures system is of paramount importance for achieving the best possible results in disease control. Surveys are among the most accessible and widespread tools for collecting information. Similar projects in EU countries [24] have revealed hunters' negative attitudes toward measures restricting hunting, selective hunting of females, bans on supplementary feeding, and involving additional forces in ASF control. Although ASF spread in the wild remains a pressing issue, there are currently no available publications on such research in the Russian Federation [25].

Despite a decreasing trend in ASF outbreaks in Samara Oblast compared to 2020, the spread of the disease in the wild remains a relevant and poorly controlled problem.

Hunting in the Russian Federation is subject to specific regulations. Hunting for all age and sex groups of wild boars is permitted from June 1 to February 28 (or 29), with a prohibition on hunting sows with offspring during the summer months. Spring hunting for wild boars is prohibited in Russia according to the "Hunting Rules," as this is the time when offspring are born and need time to grow, while adult animals require time to replenish their fat reserves. The hunting season dates are established annually in each Federal subject in accordance with Federal legislation, considering population density and the epidemiological situation in the region [26].

Although the total number of hunters in the Samara Oblast is estimated to be approximately 60,000 people [27], not all of them prefer to hunt wild boars. According to the Department of Hunting and Fisheries of the Samara Oblast, during the hunting season from 07/01/2023 to 02/29/2024, only 386 wild boar hunting permits were issued [28], accounting for only 0.6% of the total number of all registered hunters in the region.

All promotional efforts to encourage hunters to participate in the survey were carried out by the staff of the Department of Hunting and Fishing of Samara Oblast during the issuance of hunting permits. As a result, more than two-thirds of hunters completed the questionnaire, and the data from the majority of them were used for the research.

For the analysis, questionnaires containing responses to key questions requiring single or multiple-choice answers were selected. This ensured accurate data interpretation, identification of clear trends, and analysis of potential associations. The exclusion of questionnaires lacking such responses minimized distortions, thereby enhancing the reliability and validity of the results.

The survey primarily involved experienced hunters (those with more than 10 years of experience), with few representatives from the age group over 60. A similar situation was observed in surveys conducted among hunters in Latvia [29].

Respondents hunted across almost the entire region, including both previously affected and unaffected ASF areas. Notably, about one-third of participants were involved in wild boar depopulation, with some hunting near farms within a 30-kilometer protective zone to prevent ASF introduction from the wild into farms, in accordance with the Hunting Rules approved by the Ministry of Natural Resources and Ecology of the Russian Federation on July 24, 2020 [26]. The remaining participants hunted in other areas, managing the population to reduce the overall density of wild boars, also in line with the aforementioned Rules.

However, not all hunters strictly adhered to the established laws. Approximately one-seventh of respondents who did not participate in population management hunted near pig farms, posing a risk of ASF spread due to potential biosecurity rule violations. Nevertheless, the majority of hunters who did not engage in wildlife population management did not hunt in prohibited areas, including zones near farms and populated areas. This indicates that most hunters complied with Federal Law No. 209-FZ "On Hunting and Conservation of Hunting Resources and Amendments to Certain Legislative Acts of the Russian Federation," dated July 24, 2009. This data was later recognized as statistically significant in further analysis.

The surveyed hunters in Samara Oblast, like those in Latvia and Estonia, considered measures such as a ban on individual hunting and supplementary feeding sites ineffective in combating ASF [24]. However, they fully supported measures to prevent even indirect contact between wild boars and domestic pigs. Respondents aware of ASF prevention rules agreed with the need to ban the processing of wild boar meat and the creation of taxidermy, as well as the procurement of feed and bedding materials for pigs. However, the analysis of the questionnaires showed that approximately half of the hunters had a negative attitude towards quarantine measures. Some respondents disregarded hunting regulations in their activities and did not recognize their potential role in the spread of the disease. One-fifth of those who opposed the existing quarantine measures rated their subjective knowledge of the problem as "well-versed in ASF," which could indicate either a deliberate disregard for the rules or a prominent level of subjectivity in assessing their knowledge. Almost half of the hunters demonstrated a willingness to participate in wild boar population control, provided they had access to private hunting grounds, increased quotas for permits, or reduced permit prices. Respondents expressed their interest in acquiring new knowledge about ASF and positively perceived the opportunity to participate in systematic training on biosecurity during hunting.

According to the survey results, respondents expressed concern about the low population of wild boars in public hunting grounds compared to their significant numbers in private hunting grounds, which occupy about 80% of the total hunting area in the region. The limited number of hunting permits for public grounds, combined with inflated prices for hunting in private grounds, makes this activity financially inaccessible for most hunters. This, on the one hand, reduces interest in hunting, and on the other, contributes to an increase in poaching. The current situation leads to a growth in the wild boar population, which may negatively affect the ecological balance of the region and the sustainability of hunting resources. To address the issue, it is necessary to revise hunting policies, including regulating prices in private grounds and increasing license quotas. This will improve access to hunting for a wider range of hunters and promote sustainable management of the wild boar population.

Conducting a pilot survey among hunters in this region of the Russian Federation provided insights into their opinions on existing ASF control measures. The results highlighted insufficient cooperation and lack of trust between hunters and government agencies, particularly state veterinary services, hindering effective ASF eradication efforts.

The survey aimed to explore respondents' general perceptions about the distribution of ASF spread, assess the level of compliance with biosecurity measures during hunting activities, and gather their opinions on the strategies employed for controlling and combating ASF in wildlife.

This pilot project highlights hunters' attitudes toward the implemented measures to combat ASF and the issues they face in their activities. Gaps in hunters' compliance with biosecurity measures related to disinfection, carcass utilization, and interaction with state veterinary services were identified. Therefore, it is necessary to strengthen targeted awareness-raising efforts with this specific target audience. It is important to continue such work in other regions of the Russian Federation to improve ASF control measures and biosecurity during hunting and to strengthen cooperation between hunters and state veterinary specialists, considering geographical and climatic peculiarities, trade, and economic connections with other regions and countries.

Conclusions

The majority of the surveyed hunters in the Samara Oblast possess experience and knowledge regarding ASF, yet not all fully adhere to biosecurity measures. There is an issue concerning the hunting of wild boars in PAHG within the region. Over 50% of the surveyed hunters actively engaged in controlling the wild boar population and endorsed the enforcement of quarantine measures to combat ASF, in contrast with the remainder who oppose such measures. Hence, educating hunters about the efficacy of measures aimed at preventing ASF introduction and spread remains relevant. The interdisciplinary exchange of information becomes paramount in strengthening cooperation between hunters and government authorities and choosing an optimal strategy for ASF monitoring and control. These findings can be used to develop and improve ASF control programs for wild boars in the Samara Oblast, as well as in neighboring regions and nearby countries.

Supplementary Information

The online version contains supplementary material available at https://doi.or g/10.1186/s12917-025-04664-5.

Additional file 1: The translated copy of questionnaire for hunters, used for pilot survey in this study

Acknowledgements

We would like to thank the hunters of the Samara Oblast for their active participation in this pilot project and for sharing their opinions. We express our gratitude to the Department of Hunting and Fisheries of the Samara Oblast for their assistance in creating and distributing the questionnaire. Your participation and contribution are valuable to our research.

Author contributions

E.Ko. and A.G. conceptualized the study and developed the methodology. E.Ko., A.G., and D.L. were responsible for the software and formal analysis. The investigation was conducted by E.Ko., A.G., and E.Kr., with resources provided by O.K. Data curation was managed by E.K., A.G., and R.G. E.K. and A.G. prepared the original draft, while E.Kr., T.S., T.B., and O.K. reviewed and edited the manuscript. Visualization was handled by D.L. The project was supervised by O.K., with project administration by E.Kr. and T.S. All authors reviewed the manuscript.

Funding

This research received no external funding.

Data availability

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate Not applicable.

Consent for publication

Not applicable.

Institutional review board statement Not applicable.

Informed consent Not applicable.

Competing interests

The authors declare no competing interests.

Received: 23 September 2024 / Accepted: 11 March 2025 Published online: 28 March 2025

References

 Dixon LK, Stahl K, Jori F, Vial L, Pfeiffer DU. African swine fever epidemiology and control. Annu Rev Anim Biosci. 2020;8:221–46. https://doi.org/10.1146/a nnurev-animal-021419-083741.

- Wang T, Sun Y, Qiu HJ. African swine fever: an unprecedented disaster and challenge to China. Infect Dis Poverty. 2018;7(1):111. https://doi.org/10.1186/ s40249-018-0495-3.
- 3. World Organisation for Animal Health. Wahis [Internet]. (2024). Available online at: https://wahis.woah.org/#/event-management
- PAFF Committee. Overview of ASF Situation in EU. [Internet]. (2024). Available online at: https://ec.europa.eu/food/sites/food/files/animals/docs/reg-com_ ahw_20190321_asf_overview-sit_eur.pdf (accessed September 30, 2019).
- Pigprogress ASF. Dominican Republic: Virus spreads to 11 provinces. [Internet]. (2024). Available online at: https://www.pigprogress.net/health-nutrition /asf-dominican-republic-virus-spreads-to-11-provinces/
- Gogin A, Gerasimov V, Malogolovkin A, Kolbasov D. African swine fever in the North Caucasus region and the Russian federation in years 2007–2012. Virus Res. 2013;173(1):198–203. https://doi.org/10.1016/j.virusres.2012.12.007.
- African swine fever in wild boar Ecology and biosecurity. [Internet]. (2024). Available online at: https://www.woah.org/app/uploads/2022/07/asf-in-wil d-boar-ecology-and-biosecurity-2nd-ed.pdf
- Boklund A, Cay B, Depner K, Földi Z, Guberti V, Masiulis M, Miteva A, More S, Olsevskis E, Šatrán P, et al. Epidemiological analyses of African swine fever in the European union (November 2017 until November 2018. EFSA J. 2018;16:e05494. https://doi.org/10.2903/j.efsa.2018.5494.
- Schulz K, OJševskis E, Staubach C, Lamberga K, Seržants M, Cvetkova S, Conraths FJ, Sauter-Louis C. Epidemiological evaluation of Latvian control measures for African swine fever in wild Boar on the basis of surveillance data. Sci Rep. 2019;9:4189. https://doi.org/10.1038/s41598-019-40962-3.
- Torsten Mörner. Preparing European hunters to eradicate African Swine Fever CIC opinion on combatting ASF. [Internet]. (2024). Available online at: https:// food.ec.europa.eu/system/files/2019-02/ad_control-measures_asf_cic-opinio n-on-combatting-pres10.pdf
- Pejsak Z, Niemczuk K, Frant M, Mazur M, Pomorska-Mól M, Ziętek-Barszcz A, Bocian Ł, Łyjak M, Borowska D, Woźniakowski G. Four years of African swine fever in Poland. New insights into epidemiology and prognosis of future disease spread. Pol J Vet Sci. 2018;21(4):835–41. https://doi.org/10.24425/pjvs. 2018.125598.
- Zakharova OI, Burova OA, Yashin IV, Blokhin AA. Active and passive monitoring of African swine fever in the wild Boar population in the Russian federation. Bull KrasGAU. 2023;7. https://doi.org/10.36718/1819-4036-2023-7-140-1 45.
- Lisa R, Katja S, Josef F, Carola C. Sauter-Louis. (2023). African Swine Fever in Wild Boar: German Hunters' Perception of Surveillance and Control—A Questionnaire Study. Animals. https://doi.org/10.3390/ani13182813
- Nico U, Carola S-L, Christoph S, Franz, Josef C, Katja S. A comparison of perceptions of Estonian and Latvian hunters with regard to the control of African swine fever. Front Veterinary Sci. 2021;8:642126–642126. https://doi.org/10.33 89/FVETS.2021.642126.
- 15. Interfax Russia. The emergency regime of an intermunicipal nature was introduced in the Samara Oblast due to ASF outbreaks. [Internet]. (2024). Available online at: https://www.interfax-russia.ru/volga/main/rezhim-chs-mezhmunici palnogo-haraktera-vveden-v-samarskoy-oblasti-iz-za-vspyshek-achs
- Questionnaire for hunters. [Internet]. (2024). Available online at: https://docs. google.com/forms/d/e/1FAIpQLScJuv1obc6so3kb9U8pV9JCWt82yYEGXXpz MN4RvXLid7CoyQ/viewform
- Shipunov AB, Baldin EM, Volkova PA, Korobeynikov AI, Nazarova SA, Petrov SV. V. God. Sufianov. Visual statistics. We use R! [Internet]. (2024). Available online at: https://cran.r-project.org/doc/contrib/Shipunov-rbook.pdf
- Kolbasov DV. The role of wild boars in the spread of ASF. Veterinary medicine. Pig breeding. doi: 10.25701/ZR.2021.92.31.014. [Internet]. (2024). Available online at: https://zzr.ru/sites/default/files/article/pdf/zzr-2021-09-007.pdf

- Electronic fund of legal and regulatory documents. Government of the Russian Federation order from December 7, 2022 N 3789-p. [Internet]. (2024). Available online at: https://docs.cntd.ru/document/1300181463?marker=656 0IO
- 20. Public hunting grounds PAHG maps. PAHG Samara region public hunting grounds. [Internet]. (2024). Available online at: https://odou.ru/pfo/odou-sam arskoj-oblasti.html
- The government of the Samara region. Department of Hunting and Fishing of the Samara region. State monitoring of hunting resources. [Internet].
 (2024). Available online at: https://dor.samregion.ru/category/deyatelnost/m onitoring-i-reestry/gosudarstvennyj-monitoring-ohotnichih-resursov/
- O'Neill X, White A, Ruiz-Fons F, Gortázar C. Modelling the transmission and persistence of African swine fever in wild Boar in contrasting European scenarios. Sci Rep. 2020;10(1):5895. https://doi.org/10.1038/s41598-020-6273 6-y.
- 23. EFSA Panel on Animal Health and Welfare (AHAW), More S, Miranda MA, Bicout D, Bøtner A, Butterworth A, Calistri P, Edwards S, Garin-Bastuji B, Good M, Michel V, Raj M, Nielsen SS, Sihvonen L, Spoolder H, Stegeman JA, Velarde A, Willeberg P, Winckler C, Depner K, Guberti V, Masiulis M, Olsevskis E, Satran P, Spiridon M, Thulke HH, Vilrop A, Wozniakowski G, Bau A, Broglia A, Cortiñas Abrahantes J, Dhollander S, Gogin A, Muñoz Gajardo I, Verdonck F, Amato L, Gortázar Schmidt C. African swine fever in wild Boar. EFSA J. 2018;16(7):e05344. https://doi.org/10.2903/j.efsa.2018.5344.
- Urner N, Sauter-Louis C, Staubach C, Conraths FJ, Schulz K. A comparison of perceptions of Estonian and Latvian hunters with regard to the control of African swine fever. Front Vet Sci. 2021;8:642126. https://doi.org/10.3389/fvets .2021.642126.
- Veterinary medicine and life. Information portal and newspaper. Rosselkhoznadzor: the situation with ASF in Russia is dysfunctional, but controlled. [Internet]. (2024). Available online at: https://vetandlife.ru/sobytiya/rosselhoz nadzor-situaciya-s-achs-v-rossii-neblagopoluchnaya-no-kontroliruemaya/
- Normativ.kontur. Ministry of [Internet]atural [Internet]esources and [Internet] cology of [Internet]he Russian federation order 477 of July 24, 2020 on [Internet]he approval of hunting [Internet]ules. [Internet]. (2024). Available online at: https://normativ.kontur.ru/document?moduleld=1%26;documentId=446 330
- 27. Hunter's map. Geoportal of the hunting economy of Russia. map of public and fixed hunting lands of the Samara Oblast. [Internet]. (2024). Available online at: https://huntmap.ru/karta-oxotnichix-ugodij-samarskoj-oblasti
- Department of Hunting and Fishing of the Samara Region. The results of the lottery for the distribution of permits for wild boar hunting as of May 12, 2023. [Internet]. (2024). Available online at: https://dor.samregion.ru/2023/0 5/18/rezultaty-zherebevki-po-raspredeleniyu-razreshenij-na-dobychu-kaban a-ot-12-maya-2023-goda/
- Urner N, Seržants M, Užule M, Sauter-Louis C, Staubach C, Lamberga K, Oļševskis E, Conraths FJ, Schulz K. Hunters' view on the control of African swine fever in wild Boar. A participatory study in Latvia. Prev Vet Med. 2021;186:105229. https://doi.org/10.1016/j.prevetmed.2020.105229.

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.