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# Experience in African swine fever control in the Russian Federation and its value for the other countries

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**SUMMARY**
Basic characteristics of African swine fever, being one of the most significant transboundary infections with a devastating potential for pig production, are presented in the paper. It occurred in Georgia for the first time in 2007 and spread among domestic pigs and wild boar in the European part of the Russian Federation. After that, ASF virus was detected in Belarus, Ukraine and since 2014, the disease has been reported in the European countries. Having spread in Europe, African swine fever became an epizooty, caused by ASFV genotype II and exhibiting a deteriorating trend. Modern ASF infected areas in the Russian Federation, Europe, China and Asia are described. Currently the disease is the most serious epidemiological problem due to huge losses (high mortality among susceptible animals); ability to occur and spread in the most unexpected parts of the world and absence of specific prevention tools and means. Russia has developed a high level of expertise in the disease prevention, control and eradication. A scientifically justified set of measures to prevent and eradicate ASF, which has proved its effectiveness in the disease control, was developed and introduced. The core of this set is formed by biosafety assurance along the whole production chain at the establishments of any type of ownership involved into breeding, keeping, slaughter, processing, storage, movement and marketing of live pigs and pig products; by wild boar population control and improvement of waste management approaches. Other ASF infected countries can benefit from the Russian Federation's experience in ASF control by adapting it to the concrete region with due regard to local social and economic conditions.

**Key words:** African swine fever (ASF), biological safety, ASF control measures, experience in ASF control.

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# Опыт борьбы с африканской чумой свиней в Российской Федерации и его значение для других стран

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**РЕЗЮМЕ**
Представлены основные характеристики африканской чумы свиней как наиболее важной трансграничной инфекции с катастрофическим разрушительным потенциалом для свиноводства. Появившись в Грузии в 2007 г., АЧС распространилась среди домашних свиней и кабанов на территории европейской части Российской Федерации. Затем вирус АЧС был обнаружен в Беларуси, на Украине, а с 2014 г. заболевание стали регистрировать в странах Евросоюза. Распространившись на территории Европы, африканская чума свиней приняла характер широкой эпизоотии, вызванной вирусом АЧС II генотипа, с трендом на ухудшение ситуации. Описан современный ареал распространения АЧС в Российской Федерации, странах Европы, Китае и Азии. В настоящее время болезнь является самой серьезной проблемой эпизоотологии ввиду: чрезвычайно большого прямого ущерба (высокой летальности восприимчивых животных); способности к возникновению и эпизоотическому распространению в самых неожиданных регионах мира; отсутствия средств специфической профилактики и лечения. В России накоплен богатый опыт предотвращения возникновения, распространения и ликвидации этой болезни. Разработан и внедрен научно обоснованный комплекс мер по профилактике и ликвидации АЧС, доказавший свою эффективность в условиях борьбы с данным заболеванием свиней. В основу комплекса мер положены: обеспечение биобезопасности по всей производственной цепочке предприятий, связанных с разведением, содержанием, убоем, переработкой, хранением, перемещением и реализацией живых свиней и свиноводческой продукции, независимо

от форм собственности; регуляция численности популяции кабана; совершенствование проблемных вопросов по обращению с биологическими отходами. Опыт борьбы с АЧС в Российской Федерации можно рекомендовать другим неблагополучным по данному заболеванию странам, но с адаптацией его к конкретному региону с учетом местного социально-экономического состояния.

**Ключевые слова:** африканская чума свиней (АЧС), биологическая безопасность, комплекс мер по противодействию АЧС, опыт борьбы с АЧС.

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## INTRODUCTION

African swine fever (ASF) (lat. *Pestis africana suum*; Montgomery's disease) is a contagious disease of pigs, it can occur in acute, subacute, chronic or asymptomatic form and is characterized by fever, hemorrhagic diathesis, inflammatory and parenchymal dystrophies and necrosis. ASF is caused by DNA virus of *Asfarviridae* family, *Asfivirus* genus. Under natural conditions domestic pigs and wild boar of all ages and breeds are susceptible to the disease at any season.

This disease, exotic for the European and Asian countries, is enzootic in many African countries, where 24 genotypes are circulating, and in the island of Sardinia. In 2007 ASF was firstly reported in Georgia in domestic pigs and wild boar; after penetrating wildlife, the disease spread in the territory of bordering countries, including in the Russian Federation. After that, ASF was detected in Ukraine, Belarus and since 2014, the disease has been reported in European countries. Having spread in Europe, African swine fever became an epizooty, caused by ASFV genotype II and exhibiting a deteriorating trend. Since that time, ASF has been demonstrating a rampant diffuse spread [1].

Ten European countries are currently infected with ASF. Within less than five years after ASF occurred in Lithuania, the disease has infected a huge territory, including Latvia, Estonia, Poland, Czech Republic, Hungary, Romania, Bulgaria, Slovakia, Serbia.

China, the largest pork producer in the world, firstly reported ASF in 2018. Up to 2020 ASF has been registered in many South Asian countries. The forecast is unfavourable, that is why the list of ASF infected countries, will likely be extended.

Currently African swine fever is the most important transboundary disease with a devastating potential; one of the most serious challenges in epizootology due to huge direct losses (high mortality among susceptible animals), ability to occur and spread in the most unexpected parts of the world and absence of specific prevention tools and means [2]. ASF epidemic process analysis showed that the biggest number of outbreaks in pigs occurs in backyards, peasant farms and smallholder farms with the least number reported by large commercial pig holdings [3].

Experience has shown that the best tool to control ASF is to ensure biological security of a pig farm. Only a large farm can afford full funding of biological security measures, because it requires considerable investments.

A wild boar is an equal participant of ASF epidemic process. The population of wild boar shall be strictly regulated, otherwise biological security is compromised. Evident transboundary nature of the disease and an important role of a wild boar was demonstrated in Russia, Europe and other countries.

A set of ASF control measures, which has proved its effectiveness in addressing the problem, was developed and introduced in Russia. Constant monitoring, analysis and modelling of the epidemic situation as well as annual forecasts are performed to control the disease. In case of ASF unfavorable scenario, the need in expanded international cooperation in ASF control, experience sharing and ASF awareness campaigns arises.

## MATERIALS AND METHODS

Data of the World Organization for Animal Health (OIE), FGBI "Veterinary Centre" under the RF MoA, FGBI "ARRIAH" Information and Analysis Centre on ASF epidemic situation in the Russian Federation and in the world since 2007 as well data from the public sources on ASF control measures in infected countries were used.

Retrospective analysis of epidemic trend in the Russian Federation and other countries was carried out. General tendencies in ASF epidemic were shown in graphs and maps.

## RESULTS AND DISCUSSION

African swine fever after occurrence and spread in Georgia in 2007, entered other neighboring countries: Armenia, Azerbaijan, Iran and Russia (Fig. 1).

Up to 2020, the disease has infected many Russian regions, East European and Baltic countries, struck pig production in China, North and South Koreas and South East countries. The humanity has never faced an epizooty of such a magnitude.

According to experts, ASF can be especially detrimental to Asian countries, where 80% of global pig population is concentrated. More than 500 million pigs are kept in China. Losses, inflicted by ASF up to 2020, amount to a trillion CNY [4].

ASF control in China, South Korea, Vietnam, Laos, Cambodia and the Philippines is complicated by a specific pig management, i.e. most of animals are kept at smallholder farms and in backyards with inadequate biological security; poor registration, insufficiently regulated and sometimes not regulated (even illegal) long-distance movements of potentially dangerous goods (pigs, pork products, pig feeds); poor infrastructure of slaughter, processing, storage and marketing of pork products; feeding with food wastes.

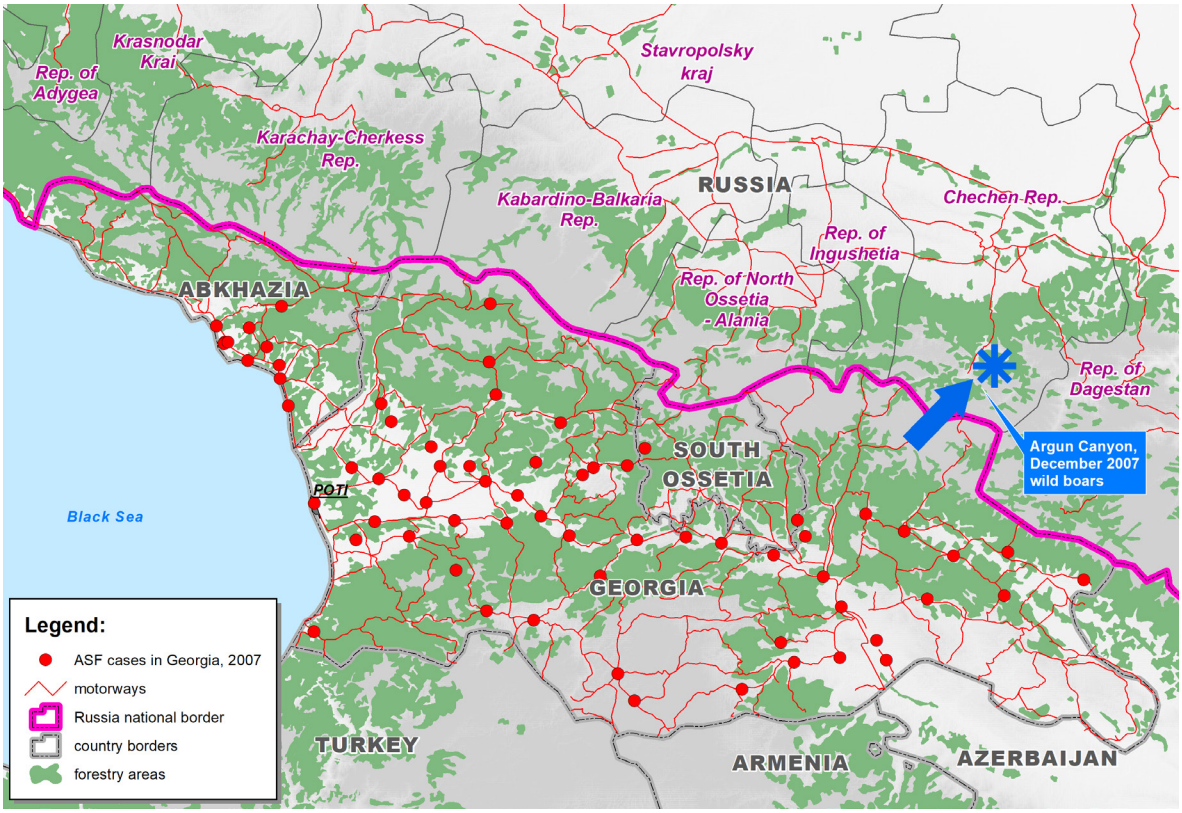


*Fig. 1. ASF introduction into the Russian territory in 2007 (https://www.fsvps.ru/fsvps-docs/ru/iac/asf/2015/asf_chronology_15.pdf)*

*Рис. 1. Проникновение АЧС на территорию России в 2007 г.*

To control and eradicate ASF, analysis of global experience in the disease combating is needed. At the meeting of the Standing Group of Experts on ASF in Ho Chi Minh the experts discussed the ways to prevent rapid spread of the disease in Asia. Taking into account the basic causes of ASF spread in Asian region, the participants concluded that the major tool in the disease control must be the improvement of biological security along the whole production chain of pig holdings (farms, slaughterhouses, processing plants, cold storages, etc.) [5].

Average speed of ASF epidemic development in 2007–2017 in Eurasia was 1.273 countries per year [3]. The calculation of ASF spread speed in China and South East Asia due to explosive nature of ASF infection in different regions poses certain challenges (Fig. 2.)

From our perspective, countries, which face ASF for the first time, often make systemic mistakes, i.e. no decisive measures are taken to prevent and eradicate the disease (rapid diagnostics, restrictions, destruction of infected pigs and pig products, biological waste management) with due regard to ASFV high resistance to external factors and its persistence in wild nature; insufficient attention is paid to wild boar population regulation (being one of the key factors in ASF spread and persistence in wild life); poor awareness campaigns and inadequate knowledge about ASF danger not only among the farmers, but also among the veterinarians.

Our country has developed a high level of expertise in this disease prevention, control and eradication [3]. The experience shows that it is practically impossible to reach high biosecurity levels in backyards. That is why under the current epidemic conditions it is necessary to transfer stepwise the pig production to middle-sized and large commercial holdings, located in ASF free regions and using compartmentalization system (animal health status assessment at pig farms). Smallholder farms and backyards should shift to alternative livestock productions, like poultry or rabbit productions, and if sufficient land is available, sheep and goat production or meat and milk production. A comprehensive approach of the Russian Veterinary Service to upgrading of biological security at all facilities, involved into the production cycle; the regionalization of the country territory and use of e-certification for transported products has proved its effectiveness. Currently this approach is well known in the international community (OIE and FAO). Now China and Vietnam, which are in a dismal state, make use of the lessons, learned by Russia.

The retrospective analysis of ASF situation in the Russian Federation during the past three years shows a declining trend in the number of outbreaks among both domestic pigs and wild boar (Fig. 3).

There are three underlying postulates:

1. Biological security along the whole production chain at establishments, involved into breeding, keeping, slaughter, processing, storage, movements and marketing of live pigs and pig products, regardless of their ownership type.
2. Wild boar population regulation.
3. Solution of biological waste management issues.

Regional programmes on ASF control have been developed as well as the mechanisms for their implementation

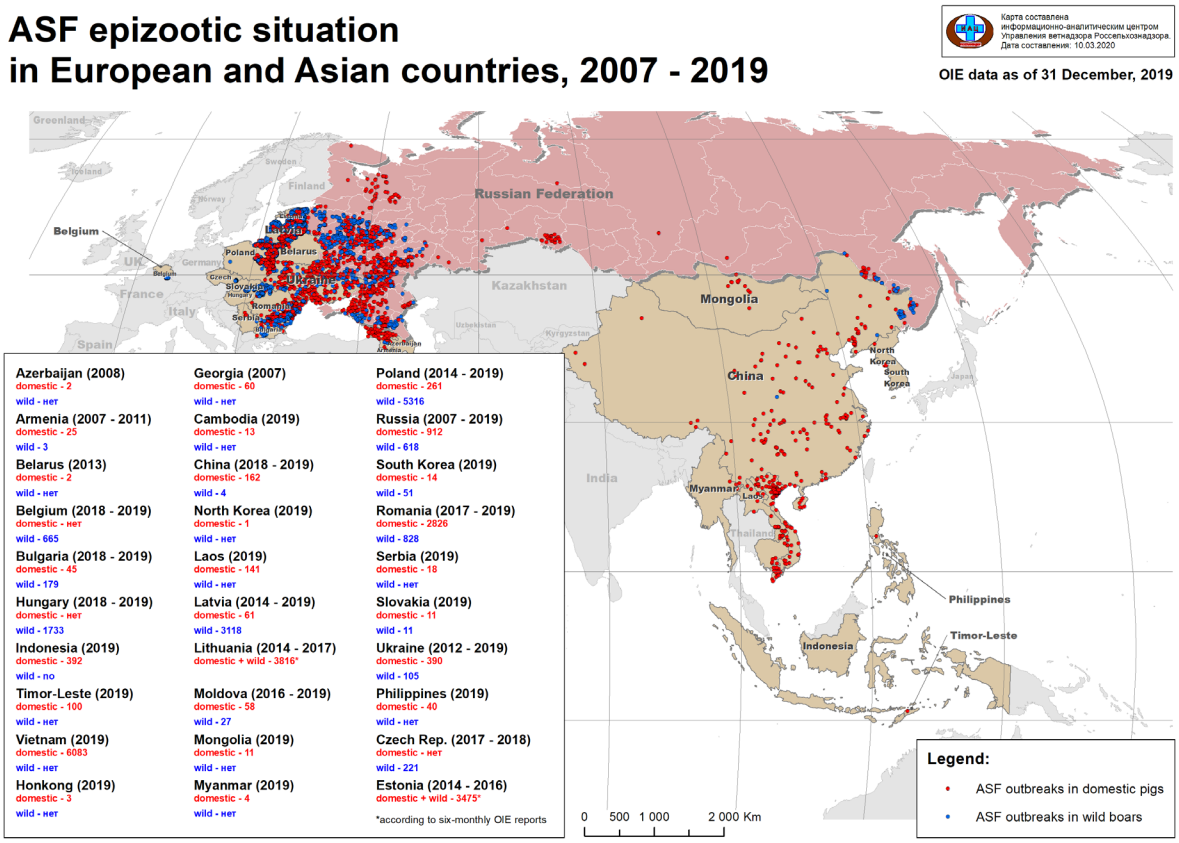


*Fig. 2. ASF outbreaks in Europe and Asia in 2007–2019 (https://www.fsvps.ru/fsvps-docs/ru/iac/asf/2019/12-31/05.pdf)*

*Рис. 2. Вспышки АЧС в странах Европы и Азии в 2007–2019 гг.*

and financing have been sought in the Russian Federation. At the same time at the federal level coordinating bodies (commissions, headquarters), first under the Ministry of Agriculture, then under the Russian Government, have been established. Scientifically justified federal laws of a great strategic potential, having a real impact on ASF outbreak prevention and eradication, have been adopted. Here are just a few to mention: the Veterinary Law and the Federal Law on Hunting and Preservation of Hunting Resources have been amended 12 times. Numerous orders have been issued by the Russian Ministry of Agriculture and Russian Ministry of Natural Resources, including those registered by the Ministry of Justice of the Russian Federation:

– Order of the RF Ministry of Agriculture No. 258 of 23.07.2010 (amended on 15.10.2013) "On Approval of Rules to Determine Animal Health Status of Pig Holdings and Organizations, Involved into Pig Slaughter, Processing and Storage of Pig Products" (Registered by the RF Ministry of Justice on 12.11.2010, No. 18944);

– Order of the RF Ministry of Agriculture No. 114 of 29.03.2016 "On Approval of Veterinary Rules of Pig Keeping for the Purposes of Reproduction, Growing and Marketing" (Registered by the RF Ministry of Justice on 04.07.2016, No. 42749);

– Order of the RF Ministry of Agriculture No. 635 of 14.12.2015 "On Approval of Veterinary Rules of the RF Territory Regionalization" (Registered by the RF Ministry of Justice on 23.03.2016, No. 1508);

– Order of the RF Ministry of Agriculture No. 161 of 22.04.2016 "On Approval of the List of Animal Species Subject to Identification and Registration";

– Agro-industrial Regulatory Document (RD-APK) 3.10.07.05-17. Veterinary and Sanitary Requirements for Design, Construction, Reconstruction and Operation of Animal Production Facilities (Moscow, 2017);

– Order of the RF Ministry of Agriculture No. 213 of 31.05.2016 "On Approval of Veterinary Rules of Preventive, Diagnostic, Restrictive and other Measures, Quarantine Imposition and Removal and other Actions, Taken to Prevent the Spread and Eradicate African Swine Fever Outbreaks" (Registered by the RF Ministry of Justice on 24.08.2016, No. 43379);

– Order of the RF Ministry of Agriculture No. 329 of 06.07.2017 "On Approval of Veterinary Rules of Pig, Pig Product and Feed Transportation by Motor Vehicles" (Registered by the RF Ministry of Justice on 03.08.2017, No. 47649);

– Order of Rosselkhoznadzor No. 235 of 19.03.2018 "On Approval of Check-lists, used by Officials of the Federal Service for Veterinary and Phytosanitary Surveillance Territorial Offices for Scheduled Audits Within the Federal State Veterinary Monitoring";

– Decree of the Russian Federation Government No. 2048-p of 30.09.2016 "On Approval of the Action Plan to Prevent Introduction and Spread of African Swine Fever in the Russian Federation";

and some other acts, which are regularly amended and supplemented.

To restore the order it is also needed to enhance responsibility of animal owners for violations of veterinary rules and legal requirements. Physical persons and business operators have already experienced the consequences of the judicial practice.

The major achievement of Russia, as we believe, is the understanding by all social strata that ASF is an awful disaster! It affects every person, authorities of all levels and business society.

There shall be no exclusions from adopted rules to control ASF. As there are no means of specific prophylaxis and treatment it is important to strengthen the requirements for biological security at pig holdings of different compartments, especially of industrial holdings, and to implement the policy of alternative livestock production.

Russia's experience in ASF control is invaluable for the modern world. The developed set of measures made it possible to preserve and even develop pig production as an industry; every year the pig population is increasing, pig performance and pork production are growing. According to the National Union of Pork Producers total annual pork production increased by 2.4 times from 2005 to 2018 [6]. The international expert society acknowledged that Russia is becoming a pork exporter [7].

This is facilitated by promising developments, conducted by the Rosselkhoznadzor and the FGBI "ARRIAH" subordinate to it, i.e. regionalization of the country, animal registration, e-certification (FGIS MERCURY), etc.

Implementation of the RF Presidential Decree No. 204 of 07.05.2018 envisages expanding of agro-industrial product exports equal to 45 billion USD up to 2024, including increase in pork production. That is why everybody will have to work hard and implement the set of ASF control measures.

## CONCLUSIONS

1. The Russian Federation has developed a set of practical measures to prevent and eradicate ASF, covering regulatory framework on federal and regional levels as well as fieldwork, which has proved its effectiveness in ASF control.

2. Intensive industrial pork production allows systematic control of ASF and has unquestionable advantages over small-scale pork production, including backyards.

3. Industrial pork production, compliant with all developed and scientifically justified requirements for biological security along the whole production chain at establishments, involved into breeding, processing, storage, transportation and marketing of live pigs and pork products, regardless of their ownership type; regionalization of the Russian Federation territory; electronic certification can contribute to solution of the issues, related to the national food security and meat product export in an optimal manner.

4. Other ASF infected countries can benefit from the Russian Federation's experience in ASF control by adapting it to the concrete region with due regard to local social and economic conditions.

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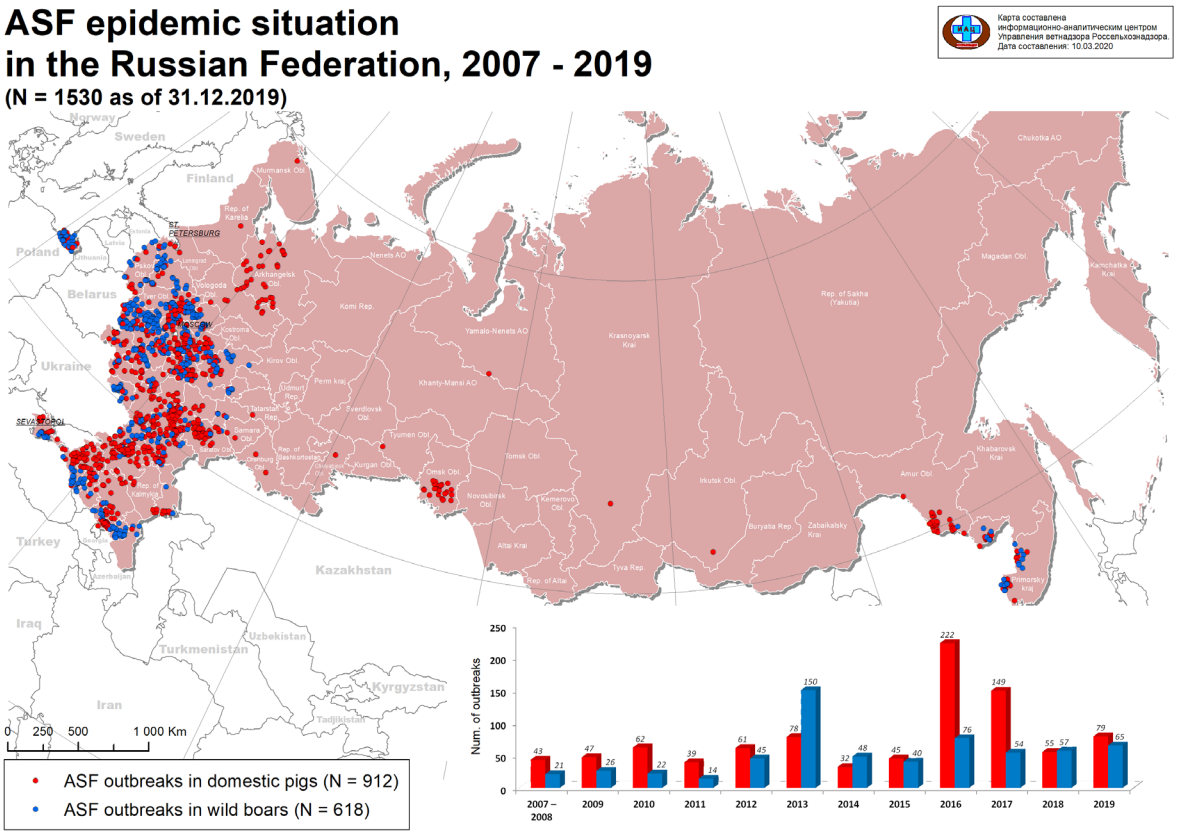


*Fig. 3. Declining trend in the number of ASF outbreaks in Russia since 2016 (https://www.fsvps.ru/fsvps-docs/ru/iac/asf/2019/12-31/03.pdf)*

*Рис. 3. Тренд снижения количества вспышек АЧС в России с 2016 г.*

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