

Results of epizootological monitoring of African swine fever in the Altai Krai

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Abstract. African swine fever (ASF) is a particularly dangerous viral infectious disease causing great damage to pig breeding due to high contagiousness, lethality and need for complete elimination of infected and healthy pigs in the epizootic focus and the threatened zone. The article describes the data on epizootic monitoring of ASF in the Altai Krai for the last nine years. The current legislative acts on the basis of which measures are taken to combat and prevent the disease are presented. The results of laboratory tests for the presence of the ASF pathogen of biological material, plant feed, raw materials and finished products of pig breeding imported from other entities of the Russian Federation are presented. The main preventive measures against carrying ASF carried out by the veterinary service are described. Thanks to the comprehensive preventive work of the veterinary service, the Altai Krai remains a prosperous region for ASF.

1 Introduction

African swine fever (ASF) is a particularly dangerous and widespread infectious disease of all types of pigs, including domestic, ornamental and wild boars. It causes significant economic damage to agriculture and has negative social consequences. This is due to the high mortality of pigs; direct losses as a result of total depopulation of pigs in the foci of infection; indirect costs when introducing a complete ban on the export of agricultural products and significant restrictions on the sale of raw materials and products outside the region; significant costs for the elimination, control and prevention of the spread of infection; losses in the field of agricultural communications [1-3].

The disease was first observed in 1903-1904 in the South Africa. Since 1910-1915, it was studied in the East Africa. In the 20th century, the causative agent of the disease was repeatedly brought to Europe and America, but outbreaks of infection were successfully eliminated, although in some countries it took decades. After another introduction of the virus to Georgia in 2007, it spread widely in the European part of the continent [4, 5].

On the territory of the Russian Federation, the first ASF outbreak was registered in 2007. In the period from 2007 to 2015, 821 outbreaks were recorded, while ASF was more often registered in domestic pigs. In 2016, 14 outbreaks were recorded, of which 5 were in wild boars and 9 in domestic pigs.

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In 2020, 280 ASF outbreaks were detected on the territory of the Russian Federation, including 118 among wild pigs and 162 among domestic pigs.

In just 15 years of ASF registration, it was detected on the territory of 47 entities of the Russian Federation.

The dynamics of the growth of unfavorable points indicates a rapid expansion of epizootics. A significant difference in the number of foci in the population of wild and domestic pigs in different regions of the country indicates the unhindered movement of infected meat and pig products.

For the first half of 2021, according to the OIE, 71 ASF-affected points were registered in the Russian Federation. The forecast for the development of epizootics in 2021 remains unfavorable, and the risk of further spread of infection is "high" [6, 7].

ASF in wild pigs was detected in the Amur, Arkhangelsk, Volgograd, Voronezh, Kaliningrad, Kaluga, Nizhny Novgorod, Novgorod, Orenburg, Orel, Samara, Tver and Ulyanovsk regions, the Jewish Autonomous Region, in the Primorsky, Krasnodar, Khabarovsk and Trans-Baikal Territories, the Republics of Tatarstan, Adygea, Kalmykia and Chuvashia.

ASF in domestic pigs has been registered in the Amur, Arkhangelsk, Volgograd, Voronezh, Kaluga, Kursk, Nizhny Novgorod, Novgorod, Pskov, Rostov, Omsk, Orel, Samara, Smolensk, Tver and Tula regions, the Jewish Autonomous Region, as well as the Stavropol, Primorsky, Krasnodar, Trans-Baikal, Khabarovsk Territories and the Republic of Adygea [7].

The current epizootic situation on the territory of the Russian Federation requires constant monitoring of the prevention, occurrence and spread of African swine fever on the territory of each entity of the federation.

The purpose of the study is to monitor the epizootological safety for African swine fever in the Altai Krai to assess the effectiveness of preventive measures.

2 Materials and methods

The African swine fever was chosen as the object of research. The region of study is the Altai Krai. The subject of the study is the effectiveness of preventive measures aimed at preventing the occurrence of ASF in the Altai Krai. The research period is 2012-2020.

To monitor the epizootic situation for ASF, we conducted our own research, and also used the data of the statistical veterinary reporting of the KSBI Testing Center "Altai Regional Veterinary Center for the Prevention and Diagnosis of Animal Diseases".

To monitor epizootological safety for ASF in the Altai Krai, generally accepted methods were used, including those described in the Order of the Ministry of Agriculture of the Russian Federation No. 258 dated 23.07.2010 "On approval of the Rules for determining the zoosanitary status of pig farms, as well as organizations engaged in pig slaughter, processing and storage of pig products" and the Order of the Government of the Russian Federation No. 2048-r dated September 30, 2016 "On approval of the action plan for preventing the introduction of African swine fever into the territory of the Russian Federation and its spread in the territory of the Russian Federation" [8-10].

Information about the number of pigs and the spread of ASF in the Russian Federation and the Altai Krai was taken from the official websites of the Ministry of Agriculture of the Russian Federation, the Veterinary Department for the Altai Krai, the Federal Service for Veterinary and Phytosanitary Control.

The total number of tested samples for the presence of contamination with ASF virus was 20,490.

The material for laboratory tests was selected as follows:

- ✓ pathological material from domestic pigs (slaughtered and dead), n=284.

- ✓ pathological material from wild boars (obtained by shooting), n=477.
- ✓ blood serum of domestic pigs, n=3388.
- ✓ pig farming products, n=16231.
- ✓ feed, planting material, n=110.

17,262 samples were examined by PCR, and 3,228 samples were examined by ELISA, respectively.

Biological material was selected in agricultural enterprises of all forms of ownership, as well as in hunting grounds during the planned shooting of wild boars on the territory of the region.

Samples of plant feed and planting material were taken and examined when they were transported to the territory of the Altai Krai.

3 Results and discussion

Since 2007, pork production in the Russian Federation has been constantly growing, and the main increase is due to an increase in the number of livestock at industrial enterprises.

The Altai Krai is among the TOP 20 regions of the Russian Federation for pork production. At the end of 2020, there were 395.8 thousand heads in the region. The total number of pigs in farms of all categories varies from year to year, that is, there is no clear trend to increase or decrease. At the same time, a decrease in the number of pigs in peasant (farm) enterprises is clearly expressed. The same trend is observed on a nationwide scale.

Analyzing the data on the dynamics of the spread of ASF in the territory of the Russian Federation for the entire period of infection registration, it can be noted that personal subsidiary farms are most often the sources of deterioration of the epizootic situation. Owners of small businesses often cannot create conditions sufficient to completely prevent outbreaks of infection or simply ignore the necessary rules for keeping animals. These farms have a low level of biological safety. This conclusion is confirmed also by the fact that the improvement of the epizootic situation in Russia for ASF over the past ten years has been consistently occurring with a reduction in the number of pigs in private farms.

The Altai Krai has close economic ties and is geographically adjacent to regions that are unfavorable for ASF, so there is a real threat of infection. Natural-geographical and socio-economic prerequisites and factors contribute to the formation of a biological hazard for ASF. The increased threat of the introduction of African swine fever into the territory of the Altai Krai in recent years requires tighter control over the epizootic situation in the region.

The system of anti-epizootic measures for the prevention and elimination of ASF provides for a comprehensive implementation of measures aimed at the source of the causative agent of infection, at destroying the mechanism of its transmission and at susceptible animals.

All the activities carried out are regulated by a number of legislative acts, the first of which is the Action Plan for the Prevention, Spread and Elimination of the African swine fever virus on the territory of the Russian Federation. It was adopted by the Interdepartmental Commission on ASF of the Ministry of Agriculture of the Russian Federation in 2011, and the plan was updated in subsequent years [10].

According to the All-Russian Plan, the departmental target program "Prevention of the introduction of African swine fever into the Altai Krai and the spread of African swine fever on its territory" for 2013-2018 was approved by the Decree of the Administration of the Altai Krai No. 653 dated November 27, 2012 [11].

At the end of 2018, the program was extended for the period from 2019 to 2021.

Additional measures aimed at preventing the introduction of ASF when working at industrial pig-breeding enterprises in a closed type mode and in private subsidiary farms with a pig-free content are described in the Order of the Ministry of Agriculture of the

Russian Federation No. 258 dated 23.07.2010 "On approval of the Rules for determining the zoosanitary status of pig farms, as well as organizations engaged in pig slaughter, processing and storage of pig products". Also, by means of this Order, the execution of previously adopted Rules for the maintenance of domestic animals is additionally monitored and a ban on the use of raw food waste in pig feed was introduced [12].

The funds allocated for solving the tasks set were used for the purchase of cold storage cells, for the storage of detained livestock cargo, laboratory equipment, specialized clothing and equipment for the destruction of hazardous biological waste.

Epizootic and veterinary-sanitary safety determines the economic and food security of any subject of the Russian Federation. Laboratory tests are widely used for the study and monitoring of infectious diseases in the Altai Krai.

Thus, the Departmental target program "Prevention of the introduction of African swine fever into the Altai Krai and the spread of African swine fever on its territory" provides for laboratory monitoring of biological material from live and dead pigs, wild boars, pig farming products entering the region from outside its borders for contamination with the ASF virus. These measures have been held since 2012. The results of monitoring using laboratory tests are shown in Tables 1, 2.

Table 1. Results of laboratory studies of biological material by PCR for African swine fever.

Material under study	Amount of samples	Years								
		2012	2013	2014	2015	2016	2017	2018	2019	2020
Pathological material from domestic pigs	total studied	30	37	5	4	6	35	51	53	48
	positive	-	-	-	-	-	-	-	-	-
Pathological material from wild boars	total studied	5	-	15	31	25	32	103	112	120
	positive	-	-	-	-	-	-	-	-	-
Blood serum of domestic pigs	total studied	51	-	-	10	44	-	117	-	-
	positive	-	-	-	-	-	-	-	-	-
Pig farming products	total studied	-	282	723	786	686	2245	3986	3500	4010
	positive	-	-	-	-	-	-	-	-	-
Feed, seed material	total studied	-	-	24	4	-	25	11	20	26
	positive	-	-	-	-	-	-	-	-	-

Table 2. Results of laboratory studies of biological material by EIA for African swine fever

Material under study	Amount of samples	Years								
		2012	2013	2014	2015	2016	2017	2018	2019	2020
Pathological material from domestic pigs	total studied	12	3	-	-	-	-	-	-	-
	positive	-	-	-	-	-	-	-	-	-
Pathological material from wild boars	total studied	34	-	-	-	-	-	-	-	-
	positive	-	-	-	-	-	-	-	-	-
Blood serum	total	47	85	70	20	80	744	260	840	1020

of domestic pigs	studied	-	-	-	-	-	-	-	-	-
	positive	-	-	-	-	-	-	-	-	-
Pig farming products	total studied	-	13	-	-	-	-	-	-	-
	positive	-	-	-	-	-	-	-	-	-

Tables 1 and 2 show that the control of the epizootic situation for ASF in the territory of the Altai Krai has been carried out over the past nine years. For research, pathological material from dead domestic pigs in agricultural enterprises of all forms of ownership, blood serum from susceptible animals, biological material from shooting of wild boars, pig farming products coming to the Altai Krai from other regions of Russia, as well as seed material and feed imported from the Krasnodar and Stavropol Territories are selected.

The number of samples examined annually is not a constant value and generally tends to increase. It depends on the following indicators:

- ✓ Number of new pig population received.
- ✓ Number of breeding pigs sold or purchased.
- ✓ Number of dead and slaughtered pigs.
- ✓ Amount of imported raw materials, feed and pig farming products.

A total of 20490 samples of the material were received for research during the designated period. In all cases, a negative result was obtained during the studies, that is, the region remains safe for ASF.

To preserve the region safety, measures are being taken everywhere that prevent the introduction of ASF. In particular, compliance with the following veterinary rules is monitored:

- to oblige the owners of enterprises to purchase animals only if they have veterinary documents and in specialized pig breeding complexes;
- to keep pigs in closed rooms and avoid the possibility of contact with other animals, especially wild ones;
- it is mandatory that all pig populations must be subjected to veterinary inspection, mandatory vaccination and other veterinary treatments;
- to carry out mandatory scheduled disinfection and deratization at enterprises;
- to prohibit feeding pigs with untested food waste or animal slaughter products;
- to carry out the slaughter of animals only at certified slaughterhouses;
- to prohibit the import/export of raw materials and products of animal origin without the approval of the state veterinary service;
- to prohibit unauthorized persons from visiting livestock enterprises;
- to oblige hunters to provide carcasses of shot wild boars for veterinary and sanitary examination;
- to prohibit the dumping of animal corpses, as well as by-products of slaughter or hunting, they must be utilized.

Many of the listed rules indirectly allow to also prevent a number of other infectious and invasive diseases.

For the implementation of preventive measures over the past nine years, the regional veterinary service has purchased two refrigerating chambers with a capacity of 10 tons and four crematoriums, which, as they were received, were distributed to areas where there are large pig farms, processing enterprises and crossings across the state border.

As part of the implementation of the long-term target program "Organization of measures for the disposal and destruction of biological waste in the Altai Krai" for 2013-2018 [13], 246 animal burial grounds were brought into compliance.

Comprehensive training of veterinary specialists and other interested persons, organization and implementation of monitoring of the epizootic situation for ASF, selection, storage and transportation of samples for laboratory research was also conducted.

4 Conclusions

Ensuring veterinary safety in pig breeding is one of the main tasks of the veterinary service, and the implementation of measures to prevent the spread of ASF requires coordinated interaction of all executive bodies of the subject, strict control over the implementation of regulatory documents on the transportation and use of pig products.

The main factors of ASF control in the territories of the constituent entities of the Russian Federation remain the passive and active monitoring of the preservation or change of the status of the region according to regionalization.

Epizootological monitoring of African swine fever, taking into account regional characteristics, is necessary in all unfavorable regions, as well as regions with a risk of infection.

The Altai Krai is safe in terms of ASF due to the implementation of a complex of veterinary and sanitary measures aimed at preventing the introduction of the disease, the organization of permanent laboratory control over the biological safety of raw materials and pig products entering the region, as well as the prevention of other infectious diseases of pigs.

Budget financing allows to improve the material and technical base of the veterinary service of the Altai Krai, to purchase special equipment for the disposal of bio-waste and other units for performing veterinary and sanitary work.

For stable veterinary safety for ASF, we believe that it is necessary to fully comply with the requirements for the transfer of pig farms of all forms of ownership to the III or IV levels of compartmentalization as a priority task of the veterinary service of the region.

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