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CLASSICAL SWINE FEVER AMONG POPULATIONS OF WILD AND DOMESTIC ANIMALS

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Classical swine fever (CSF) is a highly contagious viral disease of both domestic and wild pigs of all ages and breeds, which is characterized by acute fever, continuous flow type, septicemia and anemia, acute catarrhal or croup us — hemorrhagic gastroenteritis; and in sub acute and chronic type — hemorrhagic pneumonia and also by diphtheritic or follicular — ulcerative colitis. From the economic point of view CSF is one of the most dangerous infectious viral disease of domestic and wild pigs, because the incidence can reach 100 %, and mortality — 80–100 %. A great deal of money and time is spent conduct preventive and quarantine measures such as disinfection, vaccination and others, in addition to the actual damages that can occur in an epizootic situation in a domestic pig herd. The reports of OIE testify that presently illness meets more, than in 60 countries on all continents. CSF was intensively studied in the last few years, offer vaccines, worked out facilities and methods of diagnostics, however, a complete elimination of an illness it isn't reached

In this articles revue on more then 10 years period on serological monitoring of CSF in wild pigs from different region of Ukraine .

This paper presents the international and Ukrainian about the epizootic situation for the classical swine fever pathogen circulation among the populations of wild and domestic pigs, which in turn allows the timely prediction of the future epizootic situation, in order to prevent any biological hazards to domestic pig herds.

Keywords: SWINE CLASSICAL FEVER, DOMESTIC PIGS, WILD PIGS, MONITORING, POPULATION, EPIZOOTIC SITUATION.

КЛАСИЧНА ЧУМА СВИНЕЙ СЕРЕД ПОПУЛЯЦІЇ ДИКИХ І ДОМАШНІХ ТВАРИН

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Класична чума свиней (КЧС) — висококонтагіозне вірусне захворювання всіх вікових груп і порід домашніх і диких свиней, що характеризується при гострому перебігу лихоманкою постійного типу, септицемією та анемією, гострим катаральним або крупозно-геморагічним гастроентеритом, а при підгострому та хронічному перебігу — крупозною або крупозно-геморагічною пневмонією та дифтеритичним або фолікулярно-виразковим колітом. З економічної точки зору КЧС є одним з найнебезпечніших інфекційних вірусних захворювань домашніх і диких свиней, оскільки захворюваність може досягати 100 %, а смертність — 80–100 %. Багато затрат і часу витрачається на проведення профілактичних та карантинних заходів, такі як дезінфекції, вакцинації та інших, на додаток до фактичних збитків, які можуть виникнути в епізоотичній ситуації серед поголів'я свиней. Повідомлення міжнародного епізоотичного бюро свідчать, про те, що нині хвороба зустрічається більше, ніж в 60 країнах на усіх континентах. КЧС була інтенсивно вивчена в останні декілька років, запропоновані вакцини і методи діагностики, проте, повної ліквідації хвороби не досягнуто.

У статті наведені дані за 10-річний період щодо серологічного моніторингу КЧС серед диких свиней у різних регіонах України.

Стаття представляє міжнародну й українську дані про епізоотичну ситуацію щодо циркуляції збудника класичної чуми серед популяцій диких і домашніх свиней, які в свою чергу дають можливість своєчасно прогнозувати епізоотичну ситуацію, для запобігання будь-якої біологічної небезпеки серед стада свиней.

Ключові слова: КЛАСИЧНА ЧУМА СВИНЕЙ, ДОМАШНІ СВИНІ, ДИКІ СВИНІ, МОНІТОРИНГ, ПОПУЛЯЦІЯ, ЕПІЗООТИЧНА СИТУАЦІЯ

КЛАССИЧЕСКАЯ ЧУМА СВИНЕЙ СРЕДИ ПОПУЛЯЦИИ ДИКИХ И ДОМАШНИХ ЖИВОТНЫХ

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Классическая чума свиней (КЧС) — очень заразное вирусное заболевание всех возрастов и пород домашних и диких свиней, которое характеризуется при остром течении лихорадкой постоянного типа, септицемией и анемией, острым катаральным или крупозно-геморрагическим гастроэнтеритом, а при подостром и хроническом — крупозной или крупозно-геморрагической пневмонией и дифтеритическим или фолликулярно-язвенным колитом.

С экономической точки зрения КЧС является одним из самых опасных инфекционных вирусных заболеваний домашних и диких свиней, поскольку заболеваемость может достигать 100%, а смертность — 80–100 %. Много затрат и времени тратится на проведение профилактических и карантинных мероприятий, такие как дезинфекции, вакцинации и других, в дополнение к фактическим убыткам, которые могут возникнуть в эпизоотической ситуации среди поголовья свиней. Сообщения международного эпизоотического бюро свидетельствуют, что в настоящее время болезнь встречается больше, чем в 60 странах на всех континентах. КЧС была интенсивно изучена в последние несколько лет, предложены вакцины и методы диагностики, однако, полной ликвидации болезни не достигнуто.

В статье приведены данные за 10-летний период серологического мониторинга КЧС среди диких свиней в разных регионах Украины.

Статья представляет международные и украинские данные об эпизоотической ситуации по циркуляции возбудителя классической чумы среди популяций диких и домашних свиней, которые в свою очередь дают возможность своевременно прогнозировать эпизоотическую ситуацию, для предотвращения любой биологической опасности среди стада свиней.

Ключевые слова: КЛАССИЧЕСКАЯ ЧУМА СВИНЕЙ, ДОМАШНИЕ СВИНЬИ, ДИКИЕ СВИНЬИ, МОНИТОРИНГ, ПОПУЛЯЦИЯ, ЭПИЗООТИЧЕСКАЯ СИТУАЦИЯ

CSF natural focal disease that is caused by the circulation of the virus in wild pigs [1]. The CSF disease is known by many different names in different countries and languages such as: Pestis suum — Latin; Hog cholera — English (USA.); Swine fever — English (UK); Poste porcine — in France and Spain; Shweinepest — in Germany; Pomorswin — in Poland; Morprasat — in the Czech Republic; Pesteswina — in Italy.

CSF has been studied since the beginning of the nineteenth century, when the disease spread to almost all countries over the world. The first descriptions of CSF were mentioned in 1810 in the state of Tennessee (USA), and later — in 1830 in the state of Ohio (USA).

In France, CSF was first observed in 1822. In the state of Ohio (USA) it was mentioned by Shutz in 1888 and by Joest in1906. In Germany it was first diagnosed in 1833. In 60 years of the nineteenth century CSF had spread to most of Europe. The classical swine fever virus was brought to Russia in 1893 from Western Europe.

CSF was first recognized and described in 1885 by Salmon and Smith in North America, but they mistakenly believed the

disease pathogen was Salmonella. The viral nature of the disease was recognized by the U.S. researchers Shweinitz and Dorset in 1903–1904 [2].

In 1908, Dorset and Ulenhuta created the hyperimmune serum to the CSF pathogen and developed the method of simultaneous immunization (simultaneous injection of serum and virus of CSF).

Mc Bride in 1936, and I. I. Kulesko in 1938 produced inactivated crystal violet vaccine against CSF, which at that time played an important role in the prevention and control of the disease. Hansen developed three theories of CSF existence in the wild nature. According to his constitutional theory, the virus has always existed among the pig population, but until the 19-th century it had not spread to the relatively stable environment of domestic pig herds used for breeding and rearing of animals. In the constitutional theory, the strong immune system of the pigs in the wild and in small herds hid any signs of chronic CSF, but when pig farming methods changed to intensive breeding in large, closely-housed herds along with thoroughbred herds with little genetic diversity, these conditions added to the epizootic opportunity and to the disease changed from chronic but subclinical to becoming pathological for the pigs.

In some parts of Europe the CSF virus adopted endemic forms in a population of wild pigs, which creates a constant threat to the population of pigs.

The aim is to explore the epizootic and serological monitoring of CSF pathogen distribution among population of wild and domestic pigs in the country and abroad.

Materials and methods

The epizootic CSF situation in the world was learned by OIE's World Animal Health Information (WAHIS) surveillance and data analysis of Federal Service for Veterinary and Phytosanitary Surveillance (Russian Federation), State Research Institute of Laboratory Diagnostics and Veterinary Examination (RILDVE) of Ukraine.

Analysis of epizootic data is associated with the data of the wild pig population in different regions of Ukraine which was carried out using Manage Wild life Service materials, and data from the State Agency of forest resources of Ukraine.

Conducted epidemiological and statistical analysis of indicators of the intensity and extensiveness of the manifestations of epizootic process, namely: the number of epizootic foci, affected areas, diseased, dead, forced killed and vaccinated animals. Expected and analyzed indicators manifestations of epizootic process — morbidity, mortality, cognoscenti. To calculate epidemiological indicators used statistical, epidemiological data on the population of wild pigs in different areas, using materials Control hunting of the State Agency of forest resources of Ukraine, the Association and the regional and district laboratories of veterinary medicine of Ukraine.

Results and discussion

Classical swine fever (CSF) is one of the most dangerous infections from an economic point of view, both in wild and domestic population of swine. Currently, the disease is found in more than 60 countries on all continents (except the USA, Canada, Australia, and Scandinavian countries). Countries in Europe, Asia, South and Central America are more affected with this infection, where a pig breeding is well-developed. In recent years, CSF had been thorough studied, a vaccine was developed and methods for diagnosis were offered, but attempts to completely eliminate the disease have not yet reached a stable success.

In recent years, outbreaks of CSF infections have been recorded in the countries neighboring Ukraine and in countries near and far abroad. [3] Therefore, our research team conducted observations and analysis of the epizootic situation of CSF in the world, focusing on Ukraine neighboring countries (Table). For Table, it should be noted that the epizootic situation with respect to outbreaks of CSF in these countries was different.

Table

The number of CSF outbreaks among wild and domestic pigs in the world for the 2012–2013period

Countries	Numerical indicators				
	Flashes	Susceptible animals	Diseased animals	Dead animals	Destroyed animals
Colombia	2	63	16	16	9
Guatemala	9	439	25	62	352
Hungary	***142****	***24648****	***4****	***181****	***-****
Korea	1	300	-	300	-
Latvia	89	16	1	15	-
			-*	***128****	***-****
			1*	***143****	***-****
Russia	37	356	65	58	7
Slovakia	**39***	**24907***	-**	-**	-**
Bulgaria	**0**	**0**	0	0	0
France	**0**	**0**	0	0	0
Slovenia	**0**	**0**	0	0	0
Romania	**0**	**0**	0	0	0
Germany	**0**	**0**	0	0	0
Total	280	25822	112	903	368

Note: * — Wild pigs, ** — unknown, — Domestic swine

Thus, since 2012, CSF was recorded in Colombia, Guatemala, Korea, Latvia and Russia among domestic pigs. In population of wild pigs CSF was recorded in Hungary, Latvia, Slovakia and Russia.

An outbreak of CSF among domestic pigs has caused the biggest concern in the pig breeding of Korea, where 300 pigs were diagnosed for CSF and confirmed. Based on the data presented in Table, the third of dead animals, which have the virus is in the wild fauna in comparison with domestic animals. This shows the circulation of the pathogen among susceptible animals which migrate freely and are in the wild.

A. A. Kolomitsev and others (2002) propose the theory that wild pigs that have been infected with CSF for a long period and are still infected [4]. According to this, it should be assumed that wild pigs are able to maintain the circulation of the virus even without showing any signs of disease. Since it is known that CSF field virus has immunosuppressive capability, wild pigs should be considered as a potential source of the given pathogen infection, and failure to use effective prevention activities contributes to the spread of the virus directly (contact of infected pigs, feeding them with virus wastes) or indirectly (rats and mice, sparrows, chickens, cats and dogs, arthropods — flies, mosquitoes and also air currents) [5, 6].

Analyzing the data, one should consider that there is always a threat of an infection spreading as a cross-border disease against a background of international trade relations. Therefore, it is very important to have reliable data about the circulation of the CSF pathogen in a population of wild pigs, because the monitoring data analysis enables us to examine regional differences of the epizootic process and the manifestation of classical swine fever. Monitoring CSF pathogens in wild pig populations also helps us to locate any dangerous origination centers of the CSF infection and its vectors of spatial distribution, which will provide an opportunity to apply prophylactic strategies to prevent an increased threat of biological hazards. For example, serological CSF diagnosis among wild pigs is essential to detect the subclinical forms of infection and the possible detection of pathogen circulation in natural population. There are some research results about pathogen circulation that symptoms may differ greatly depending on the age of the animal and the virulence of the particular strain of the CSF virus. The classic acute form

of CSF often develops among young animals, resulting in fever, hemorrhage and high mortality. This normal classical pattern is not always evident, so CSF can also run hidden in chronic form among young pigs and it also leads to death. Among older animals clinical symptoms are often poorly defined. So the epizootic CSF process among wild pigs varies depending on pathogen virulence and susceptibility of the animals. A large variation of possible clinical signs often prevents the rapid detection of the primary multiple foci of the infection. An increase in density of wild pigs and their behavior play important roles in the epizootiology of CSF, because wild pigs can be infected.

Analysis of CSF outbreaks during last years has shown that the infection also occurs as a result of violations of veterinary and sanitary requirements and ignoring proper maintenance by hunting managers and employees. There are cases when pig owners did not destroy the corpses of pigs with CSF, but left them in the woods. Wild pigs found these infected dead bodies, at them, got CSF infection, became ill and died. Therefore, it is important to consider the significant role of wild pigs as an important source of the CSF pathogen spreading.

In the struggle against CSF in disease countries, including Ukraine — positive results were recorded using live vaccines made from the «K» strain of CSF. But we should not relax our vigilance, we must control this disease constantly. We also must remember the warnings of some scientists, including.

A. I. Buzun et al. (1995), indicating that after the elimination of infection foci among swine population there is still some infectious agent in the form of a reserve version. When using live vaccines it is possible to inadvertently induce the formation of virulent variant of the virus.

It has been proven that increasing the number and density of wild pigs which live in a particular area near herds of domestic pigs is one of the prerequisite for the development of various infectious diseases including CSF [7]. Wild pigs in Ukraine are common in many geographical areas, and their number is increasing in recent years, so in 2011 there — 64.834 head, and in 2012 — 64988 head [8].

Given data State Research Institute of Laboratory Diagnostics and Veterinary Examination (see the table in the article by L. A. Dedok «Monitoring classical swine fever among livestock of wild boars in Ukraine for the period 2005–2012») [9]. In the previous year, the number of CSF seropositive animals in the populations of wild pigs in Ukraine increased sharply in Zhitomir and Lugansk regions, namely 19 and 13 seropositive animals, respectively.

It is very important that veterinary services and hunters are properly educated about of the structure and dynamics of animal population in local reservoirs as it is found that increasing the number of individuals in the wild pigs population is accompanied with an increased risk of spreading the CSF virus [10–12]. This question is relevant for Ukraine, because the epizootic situation for CSF in Russia, Latvia, Hungary is unstable. The continuing presence of the CSF virus in populations of wild animals and the constant threat to pig farms in some areas requires the development of effective prevention strategies.

The control and eradication of hog cholera may require the immunization of wild boar piglets in some regions. The oral immunization of wild boar piglets at 2–3 months of life is difficult due to physiological problems associated with the immunological gap and limited bait uptake of these animals [13].

Vaccination against CSF has a long history, leading to the development in the 1960s of a number of highly effective live attenuated vaccines. Prophylactic vaccination is still carried out in many parts of the world. If used systematically and on anational or regional basis, conventional live vaccines will lead to a marked reduction in clinical cases and in the levels of circulating virus. This can be used as a transitional phase towards non-vaccination and stamping out as was done in Europe and elsewhere. Within Europe, legislation on CSF control has permitted emergency vaccination using conventional live attenuated CSF vaccines, but only as a last resort. This type of emergency vaccination would result in an extended loss of trading status, since it prolongs the period during which a country

remains under export restrictions due to its incompatibility with the use of serology to demonstrate disease freedom animals [14, 15].

Vaccination of wild boar is also of great interest as a possible tool for CSF eradication. Wild boar vaccines are delivered by bait sand therefore need to be effective orally. Marker vaccines would again facilitate serosurveillance to monitor the true extent of infection in the face of vaccination.

Conclusion

Analysis of epizootic data revealed the presence and flow of CSF in countries neighboring Ukraine with significant mortality among the population of wild pigs. Actively combating CSF among wild pigs, along with prevention strategies for different regions of Ukraine are still important and economically dangerous problems.

To prospect of further researches. As a result of the established patterns of development of the epìzootological process of CSF are essential for the improvement of the measures for the control of this disease. Conducts researches on the epizootic and serological monitoring of CSF pathogen distribution among populations of wild pigs in Ukraine, and monitors the epizootic situation in the world according to this disease among the domestic and wild pigs, to ensure stable well-being of livestock veterinary in Ukraine.

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