

## Seroprevalence of Antibodies to Main Porcine Infectious Pathogens in Wild Boar in Some Regions of Russia

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**Abstract** – Results of testing 107 serum samples from wild boars (*Sus scrofa* L., 1758) for the presence of antibodies to six economically significant porcine infectious disease agents (porcine reproductive and respiratory syndrome (PRRS) virus, porcine parvovirus (PPV), swine influenza virus (SIV) of H1N1 and H3N2 subtypes, Aujeszky’s disease virus (ADV), porcine transmissible gastroenteritis virus (TGEV) and *Mycoplasma hyopneumoniae*) are presented in the paper. Wild boar were sampled in seven regions of Russia for diagnostic purposes. The obtained results showed the presence of antibodies to ADV in 32.5% of samples (83/27), to PPV – in 62% of samples (92/57), to *Mycoplasma hyopneumoniae* – in 52% of samples (98/51). All samples were seronegative to PRRS virus (107/0), TGEV (91/0) and SIV of H1N1 (89/0) and H3N2 (58/0) subtypes. The researches demonstrated the extensive circulation of porcine parvovirus, Aujeszky’s disease virus and *Mycoplasma hyopneumoniae* among Wild boar in some regions of Russia.

**Wild boar (*Sus scrofa* L., 1758) / PRRS / Aujeszky’s disease / monitoring / Russia**

**Kivonat** – A leggyakoribb sertéspatogén kórokozók antitestjeinek szerológiai gyakorisága vaddisznókban Oroszország néhány régiójában. Antitestek kimutatására 107 vaddisznókból nyert vérsavó-mintát vizsgáltunk, különös tekintettel hat gazdaságilag jelentős sertéspatogén kórokozóra (sertés reprodukciós zavarokkal és légzőszervi tünetekkel járó szindrómáját okozó vírus (PRRS), sertés parvovírus (PPV), sertésinfluenza vírus (SIV) a H1N1 és a H3N2 altípusa, Aujeszky-féle betegség vírusa (ADV), fertőző vírusos bélgyulladás (TGEV) és *Mycoplasma hyopneumoniae*). Elemzés céljából hét orosz területen lőttek ki vaddisznókat. A kapott eredmények alapján a következő antitestek jelenlétét mutattuk ki: az ADV a minták 32,5%-ában (83/27), a PPV a minták 62%-ában (92/57), a *Mycoplasma hyopneumoniae* a minták 52%-ában (98/51) fordult elő. Az összes minta szeronegatív volt PRRS vírusra (107/0), TGEV-re (91/0), és a SIV altípusaira, a H1N1 (89/0) és a H3N2 (58/0) vírusra. A kutatás bizonyította Oroszország néhány régiójában a sertés parvovírus, az Aujeszky-féle betegség és a *Mycoplasma hyopneumoniae* széleskörű elterjedését a vaddisznókban.

**vaddisznó (*Sus scrofa* L., 1758) / PRRS / Aujeszky-féle betegség / monitoring / Oroszország**

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## 1 INTRODUCTION

The problem of wild animal diseases is topical in reference to epizootic, epidemic, social and economical situations. Farm and wild animals are often involved in the circulation of pathogenic agents in nature, thereby maintaining the existence of natural foci of some diseases. A significant role in these processes is played by wild boars. Moreover, the presence of such infectious diseases as classical swine fever (CSF), African swine fever (ASF), Aujeszky's disease among domestic and wild pigs has a significant negative effect on international trade. PRRS virus (PRRSV), SIV, *Mycoplasma hyopneumoniae*, porcine circovirus type 2 (PCV2), PPV and some other agents are the most economically significant porcine pathogens.

PRRSV and PPV are the cause of mass reproductive disorders in sows in the form of abortions, barrenness, birth of mummified fetuses, dead and weak piglets. PCV2, PRRSV, SIV and *Mycoplasma hyopneumoniae* are the main causative agents of respiratory disorders in growing and fattening pigs. TGEV causes mass morbidity and mortality of piglets with a diarrhea syndrome from the first days of life.

Many researches in different countries were devoted to the study of circulation of porcine infectious disease agents among wild boars. But in recent years the situation on many topical porcine infectious diseases among Wild boar in Russia remained uncertain.

Our researches were aimed at testing sera from Wild boar (*Sus scrofa* L., 1758) (shot for diagnostic purposes in some regions of Russia) for the presence of antibodies to six economically significant porcine infectious disease agents: PRRSV, PPV, TGEV, SIV, ADV and *Mycoplasma hyopneumoniae*.

## 2 MATERIALS AND METHODS

One hundred and seven serum samples from wild boars, collected during autumn-winter hunting seasons of 2002-2007 in 7 regions of Russia: Belgorodskaya, Vladimirskaya, Moskovskaya, Tverskaya, Smolenskaya, Kirovskaya Oblasts and Khabarovsky Krai, were tested (*Figure 1*).

Wild boar sera were tested for the presence of antibodies to PRRSV, ADV, SIV of H1N1 and H3N2 subtypes and *Mycoplasma hyopneumoniae* using IDEXX ELISA commercial kits (IDEXX Laboratories, Westbrook, ME, USA), to porcine parvovirus - using hemagglutination inhibition test and to TGEV – using microneutralization test.

## 3 RESULTS

*Table 1* gives brief characteristics of regions where serum samples from Wild boar were collected. As seen from *Table 1*, the wild boar population density varies in different subjects of the Russian Federation. The wild boar-to-domestic pig ratio in the Khabarovsky Krai was 1:6.45, in the Smolenskaya Oblast – 1:14.83, in the Tverskaya Oblast – 1:16.87, in the Vladimirskaya Oblast – 1:23.88, in the Moskovskaya Oblast – 1:31.22, in the Kirovskaya Oblast – 1:94.52 and in the Belgorodskaya Oblast – 1:107.74.



Figure 1. The regions of Russia where samples from Wild boar were collected (Regions of habitats adapted from Lomanov 2004)

Table 1. Characteristics of regions where blood serum samples from Wild boar were collected for the given study

| Index  | Vladimirskaya Oblast | Moskovskaya Oblast | Tverskaya Oblast | Smolenskaya Oblast | Belgorodskaya Oblast | Kirovskaya Oblast | Khabarovskiy Krai |
|--|----------------------|--------------------|------------------|--------------------|----------------------|-------------------|-------------------|
| Federal District                               | Central              | Central            | Central          | Central            | Central              | Privolzhsky       | Far Eastern       |
| Total area, ths. km <sup>2</sup>               | 29.0                 | 47.0               | 84.1             | 49.8               | 27.1                 | 120.8             | 788.6             |
| Forest area, ths. ha                           | 1520.9               | 1914               | 4500             | 2100               | 246.3                | 7340              | 62030             |
| Area of cropland, ths. ha                      | 930.9                | 1851               | 2434.6           | 1750               | 2713.4               | 3322              | 695.5             |
| Population of domestic pigs, ths. heads (2006) | 100.3                | 161.4              | 107.1            | 93.7               | 548.4                | 198.5             | 56.7              |
| Population of wild boars, ths. heads (2003)    | 4.20                 | 5.17               | 6.35             | 6.32               | 5.09                 | 2.10              | 8.79              |

As a result (Table 2), antibodies to ADV, PPV and *Mycoplasma hyopneumoniae* were detected in 32.5% (83/27), 62% (92/57) and 52% (98/51) of tested samples, correspondingly.

All serum samples were tested negative for PRRSV (107/0), TGEV (91/0) and SIV of H1N1 and H3N2 subtypes (89/0 and 58/0, correspondingly).

Table 2. Seropositive status of Wild boar with respect to main porcine infectious pathogens in some regions of Russia

| Antibodies to pathogen          | Samples tested / positive |                    |                  |                    |                      |                   |                   | Total         |
|---------------------------------|---------------------------|--------------------|------------------|--------------------|----------------------|-------------------|-------------------|---------------|
|                                 | Vladimirskaya Oblast      | Moskovskaya Oblast | Tverskaya Oblast | Smolenskaya Oblast | Belgorodskaya Oblast | Kirovskaya Oblast | Khabarovskiy Krai |               |
| Total samples                   | 26                        | 17                 | 21               | 23                 | 13                   | 1                 | 6                 | 107           |
| PRRSV                           | 26/0                      | 17/0               | 21/0             | 23/0               | 13/0                 | 1/0               | 6/0               | 107/0 (0%)    |
| PPV                             | 25/20                     | 11/5               | 19/13            | 22/8               | 13/10                | 1/1               | 1/0               | 92/57 (62%)   |
| TGEV                            | 25/0                      | 11/0               | 19/0             | 22/0               | 13/0                 | 1/0               | n.t.              | 91/0 (0%)     |
| SIV H1N1                        | 25/0                      | 11/0               | 19/0             | 23/0               | 10/0                 | 1/0               | n.t.              | 89/0 (0%)     |
| SIV H3N2                        | 15/0                      | n.t.               | 19/0             | 23/0               | n.t.                 | 1/0               | n.t.              | 58/0 (0%)     |
| ADV                             | 25/9                      | 10/4               | 19/6             | 18/1               | 9/7                  | 1/0               | 1/0               | 83/27 (32.5%) |
| <i>Mycoplasma hyopneumoniae</i> | 25/11                     | 17/9               | 19/11            | 20/13              | 10/7                 | 1/0               | 6/0               | 98/51 (52%)   |

n.t. – not tested

#### 4 DISCUSSION

The results of our study correlate to the data obtained by other authors. According to the literature, antibodies to Aujeszky's disease virus were often detected in Wild boar in different countries. Albina et al. (2000) reported that antibodies to ADV were detected in 423 (3.5%) out of 12,025 serum samples from Wild boar collected in France during the period from 1991 to 1998. In Germany the results of the broad examination of wild boar sera in 1991-1992 in the federal lands Sachsen-Anhalt and Brandenburg showed that 13 (2%) out of 640 serum samples were tested positive for ADV (Oslage et al. 1994).

During 1996 one hundred and twenty serum samples from Wild boar were tested in 13 districts of Oklahoma (USA) but antibodies to ADV and TGEV were not detected. In the same study 17% and 11% of samples were tested positive for PPV and SIV, correspondingly (Saliki et al. 1998).

Antibodies to PPV were detected in Wild boar in 10% (Vicente et al. 2002) and 56.6% of samples (Ruiz-Fons et al. 2006) in Spain and in 49% of samples (Vengus et al. 2006) in Slovenia. According to Vengust et al. (2006) antibodies to TGEV were not detected in Wild boar in Slovenia, though 21% of tested samples were positive for *Mycoplasma hyopneumoniae*. These data correlate to the results of our study.

There was only one report on detection of antibodies to TGEV in Wild boar in the Czech Republic in one sample out of 134 tested samples. In the course of the same research antibodies to ADV, bovine viral diarrhea virus and PCV2 were detected in 30% (101 out of 338), 1% (2 out of 352) and 43% (57 out of 134) of wild boars, correspondingly (Sedlak et al. 2008).

We detected antibodies to PPV, ADV and *Mycoplasma hyopneumoniae* in Wild boar in the majority of examined regions. Unfortunately, only single samples were tested in the Khabarovsk Krai and Kirovskaya Oblast and this makes it impossible to assess objectively the level of pathogen spread among Wild boar in these regions.

PRRSV is widespread in domestic swine in the world (Cho – Dee 2006). In Wild boar antibodies to PRRSV were found only in 0.3-3.6% of cases in the USA, France and Germany (Saliki et al. 1998; Albina et al. 2000; Oslage et al. 1994). In the United States, there was no evidence of infection in feral swine serum samples collected between 1976 and 1993, and only two positive animals were found in 1994 (Zimmerman 2002). Lutz and Wurm (1996) found no positives to PRRSV among 768 wild boar samples collected in 1992-1993 and in 1995-1996 in Germany. Only one serum sample from a wild boar was found positive for PRRSV antibodies in Poland (Szczotka et al. 2007). Tests of blood sera from Wild boar in Spain, Croatia and Slovenia were negative (Vicente et al. 2002; Ruiz-Fons et al. 2006; Zupancic et al. 2002; Vengust et al. 2006). The specific nucleus acid of PRRSV was detected using PCR in lung samples from Wild boar in Italy and Germany (Bonilauri et al. 2006; Reiner et al. 2007).

In spite of wide spread of PRRSV among domestic pigs in Russia, including regions of sample collection for the given examination (Kukushkin et al. 2008), all tested sera from Wild boar were negative. Thus, Wild boar do not to play any role in epidemiology of PRRS in Russia.

## 5 CONCLUSION

Unfortunately, we are not aware of direct or indirect contacts between domestic pigs and Wild boar in examined regions. The transmission of infectious pathogens between them is possible in both directions, i.e. from domestic pigs to Wild boar and vice versa.

Thus, the conducted studies show a wide circulation of porcine parvovirus, Aujeszky's disease virus and *Mycoplasma hyopneumoniae* in Wild boar in some regions of Russia. Wild boar can probably be reservoirs of these pathogens.

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