PREVALENCE OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME IN PIG FARM ‘B’

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ABSTRACT
Purpose of this work was to analyse prevalence of porcine reproductive and respiratory syndrome (PRRS) in pig farm ‘B’. It was established that this virus infection had spread in the farm when quarantine conditions had been disregarded and newly brought pigs had been mixed with the ones present at the farm. During 1999, when the breakthrough of the disease was present, sows delivered 21421 piglets, including 19661 (91.7%) alive, 850 (4%) dead and 910 (4.3%) that died after delivery. In the farm ‘B’ from 529 main and 518 alternative sows 75 ones (7.1%) delivered prematurely (up to 108 days) and 58 (5.5%) aborted. Specific PRRS symptoms were high body temperature (up to 41°C), cyanosis of ears and milk glands, loss of appetite, increased irritability, abortions and deliveries of dead piglets. 25 percent of sows were found agalactic. Sows let them suckle reluctantly, and the piglets died for the cause of starvation. Further appearance of the disease was stabilised by using strict fight and prophylactic measures.

Introduction
Porcine reproductive and respiratory syndrome virus (PRRSv) is one of the most significant pathogens of swine diseases in the world at the moment, as it makes a very big economic loss, disturbing reproduction of gilts and sows, causing their abortions and respiratory pathology for the ablactated piglets. First reports about the disease appeared in the United States and Canada in 1987 (Loula, 1990, Keffaber, 1989), Japan, 1989 (Shimizu et al., 1994), Germany, 1990 (Lindhaus and Lindhaus, 1991), but the pathogen was isolated in Europe only in 1990 and in USA in 1992 (17, Collins et al., 1992). Pig farmers suffer economic loss because of decreased reproduction of herd, death of diseased piglets, big expenses for the veterinary cure, lost production and general as well as specific prophylactic measures. Especially big economic loss is common in those pig farms where animal get is very intensive (19). Most often the infection goes round in respiratory way and spreads in the body through the blood stream (vireamia). It inhibits the periphery circulation, causes hyperaemia, or skin cyanosis in the limbs and ears (7). For some time the disease was not noticed very often and it was thought that the virus had lost its high virulent power, but within one/two years from the first appearance it has spread in Austria, East Germany, Czech Republic, and, later, in West Europe (2, 3, 6, 14). Into the Danish pig farms the disease has spread in January 1992 – as it is thought, by aerogenic transmission from Germany (20). In this country the disease clinically appeared in more than 40 pig herds (4). The same year, testing porcine blood sera, the disease was found in Italy and, with clinical symptoms, in Poland (20).

From the literature we can see that from 3 to 80 percent of copulated sows abort (1). The farms suffer the most at intense breakthroughs of the disease. Different sources present data that intense PRRS breakthroughs decrease the productivity of herds by 5-20%, whereas loss constitutes
TABLE 1
Structure of the main herd of farm ‘B’

<table>
<thead>
<tr>
<th>Year</th>
<th>Groups of pigs</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Main sows</td>
<td>442</td>
<td>529</td>
<td>490</td>
<td>547</td>
</tr>
<tr>
<td></td>
<td>Alternative sows</td>
<td>406</td>
<td>518</td>
<td>463</td>
<td>506</td>
</tr>
<tr>
<td></td>
<td>Boars</td>
<td>34</td>
<td>66</td>
<td>26</td>
<td>23</td>
</tr>
</tbody>
</table>

from 1.0 to 3.8 piglets for one sow a year (22).

From the world pig-farming practice we know that big farms are the most profitable, but because of high concentration of animals they are vulnerable to many factors. In big farms there is high possibility for infectious diseases to appear and spread. New pathogens are especially dangerous, as they may spread quickly and cause massive pig deaths (13, 15). In Polish pig farm “C” there was an intense breakthrough of the PRRS disease in 1994, which caused a very big economic loss for the farm. The diagnosis was confirmed by serologic and virologic tests (9, 19, 11, 20, 10).

In Lithuania, the first clinical PRRSv symptoms were noticed at the start of 1997. Preliminary IFA tests indicated specific PRRSv antibodies (8, 5, 16) – this allowed to think that in Lithuania’s pig farms a new virus had spread, for which data about its existence had not been available yet. For the first time in Lithuania PRRS virus was identified in 2000.

Aim of the research is to explore and estimate the prevalence of porcine reproductive and respiratory syndrome virus in the pig population of farm ‘B’.

Materials and Methods

Test blood samples were selected randomly: from piglets of 20-30 days, 50-60 days, and 80-90 days; porkers: 120-180 days; sows: the 1st, the 2nd and the 3rd months of pregnancy; sows after delivery: from 1 to 10 days, also sows after piglets’ ablationation and boars. The blood sera were conserved by 1:10000 mertiolat, poured into special test tubes 1.0 ml each and, until the test, were kept at negative (~20°C) temperature. PRRS virus antibodies were tested using IFA test kits ‘IDEXX’ (USA) and ‘Test-line’ (Czech Republic) according to the manufacturer’s instructions.

Results and Discussion

As it was unclear how PRRS virus had entered the pig farm and the spread of the virus had not been epizootically studied in uninfected yet farm, serological/epizootical research was carried out in 1998-2001 and the situation was consistently analysed only since PRRS virus had entered the pig farm. It was a matter of great relevance to explore what influence PRRS virus had on the average Lithuanian pig farm. By herd size and structure (farm relatively small and motion not very intensive) pig farm ‘B’ represented the average Lithuanian pig farm, so we chose it for the research of PRRS virus prevalence.

In farm ‘B’ we began to observe pigs in respect of PRRS since 1998. Situation then was favourable for infectious diseases. Motion/reproduction of pigs was administered one-way, from reproductive group to fattening premises. Reproductive nucleus of pig herd was concentrated in reproductive department (A) and close reproductive farm (B). During the time of observation we didn’t notice any fact of breaking this pig-motion order in the farm. Pig farm ‘B’ was growing averagely 10000 pigs a year. The main data for the herd are given in Table 1. Number of main sows varied very little, but number of reproductive boars significantly decreased in 2001 because of artificial insemination of pigs.

Until PRRS virus entered the farm ‘B’ in 1998, the available main 442 and alternative 406 sows had delivered 16844 piglets, from which 484 (2.9%) had died because of different reasons, but premature and abortive deliveries as well as acute respiratory problems had not been present. IFA
tests showed that there had been 29.5 percent of serologically PRRSv positive pigs in the herd, although specific clinical PRRS symptoms had not been present (Fig. 1). At the end of the year new reproductive boars were brought into the observed herd from a farm in which PRRS had appeared in acute form.

1999 tests of blood serum samples showed that from 20 researched (1-3 years) sows all had high specific PRRS antibody titers, although the previous test had shown serologically negative results. Additional test of 152 samples showed 54.6 percent of PRRSv positive pigs (Fig. 1). In the farm ‘B’ from 529 main and 518 alternative sows 75 ones (7.1%) delivered prematurely (up to 108 days) and 58 (5.5%) aborted. At the same time specific PRRS symptoms, such as high body temperature (up to 41.5°C), cyanosis of ears and milk glands, loss of appetite, increased irritability, abortions, many deliveries of dead piglets, were present; 25 percent of sows were found agalactic. Sows let them suckle reluctantly, and the piglets died for the cause of starvation. More so, piglets were underweight, lacked energy, found hard to suckle; problems of digestive system were more common. Cases of failed insemination increased: 84 percent of sows successfully delivered before the breakthrough of the PRRS disease, and 70 percent – after the breakthrough. During the 1999 breakthrough of the disease sows delivered 21421 piglets, including 19661 (91.7%) alive, 850 (4%) dead and 910 (4.3%) that died after delivery.

To stabilize PRRS, pigs in farm ‘B’ were liquidated, and the piggery was prepared for the new herd. Breed gilts were brought into ‘B’ premises from Denmark. The gilts were quarantined and tested for PRRS two times repeatedly. Serologically positive pigs were not found. Sows delivered without complications, and the piglets were strong and energetic. But there was reconstruction of farm buildings for the new technology, and because of shortage of place 100 gilts were brought into the farm ‘B’ from the farm ‘A’ at the end of 2000. PRRS breakthrough recurred in 2001. Pig blood serum analysis showed that part of PRRS positive pigs significantly increased – up to 61.5 percent. Clinical symptoms were similar to already described clinical symptoms that were common for the 1999 breakthrough. Cases of piglet deaths were 2.7 times more common in 2001, as compared to 2000, and 1.6 times, as compared to 1999 data of pig deaths (Table 2).

From Table 2 we can see that sows delivered 16495 piglets in 2000, including 16445 (99.75%) alive, 50 (0.3%) dead and 519 (3.1%) that died after delivery. But the disease flared up again in 2001, as for the shortage of place regrouping of pigs had taken place in the fattening piggery, leaving relatively healthy pigs with serologically positive ones. That year sows delivered 23701 piglets, including 1421 (5.9%) that died after delivery. From 953 sows 25 (2.6%) ones aborted.

To analyse the PRRSv prevalence in the fattened herd of farm ‘B’, we additionally tested blood serum samples of fattened pigs in 1999-2001 (Fig. 2). Obtained data showed that from 24 tested pigs 20 (83.8%) ones were PRRS positive. This may be explained by the fact that clinical PRRS symptoms had already been present in the farm and the virus prevalent not only in reproductive herd, but also between the...
TABLE 2

Analysis of piglets' delivery and death

<table>
<thead>
<tr>
<th>Year</th>
<th>Piglets delivered by sows</th>
<th>Piglets that died</th>
<th>Piglets delivered by sows</th>
<th>Piglets that died</th>
<th>Piglets delivered by sows</th>
<th>Piglets that died</th>
<th>Piglets delivered by sows</th>
<th>Piglets that died</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>15320</td>
<td>242</td>
<td>16489</td>
<td>360</td>
<td>15533</td>
<td>386</td>
<td>20455</td>
<td>1072</td>
</tr>
<tr>
<td>B</td>
<td>1524</td>
<td>242</td>
<td>4932</td>
<td>550</td>
<td>962</td>
<td>133</td>
<td>3246</td>
<td>349</td>
</tr>
<tr>
<td>Total</td>
<td>16844</td>
<td>484</td>
<td>21421</td>
<td>910</td>
<td>16495</td>
<td>519</td>
<td>23701</td>
<td>1421</td>
</tr>
</tbody>
</table>

Fig. 2. Study of fattened pigs in farm ‘B’ in regard of PRRSv.

Fattened pigs. When PRRSv infection developed into chronic, 2000 test of 40 fattened pigs showed PRRSv positive reaction in 18 of them (45%). But in 2001 the PRRS flare-up symptoms in fattened pigs began to show up again, as from 33 tested pigs 20 ones (60.6%) were PRRSv positive. Presented data are statistically significant (p<0.009).

Analysis of PRRSv prevalence in farm ‘B’ showed that PRRS virus spread between fattened pigs when breed pigs had been transferred from the other farm with acute infection. For this reason the virus firstly had spread in the group of breed pigs, and only later – into the herd of fattened pigs.

The fact that part of PRRSv positive pigs in farm ‘B’ significantly increased the year when new breed pigs were transferred into the herd (regardless of specific quarantine and animal motion conditions) confirmed the way by which the virus entered and spread into the herd. It was found the first time only that PRRS-infected boars were transferred into the relatively uninfected herd, but the second time PRRS breakthrough began when breed pigs with already present PRRS virus had been transferred into the serologically PRRSv-negative herd. Clinical symptoms of the disease and analysis of piglet deaths also confirmed the results of serological tests.

Serological PRRS tests in pig farm ‘B’ showed that the virus was circulating in the whole herd. It had spread when quarantine conditions had been disregarded and the newly brought pigs were mixed with the present ones. Economic loss because of PRRS breakthrough was significant. During the period of 1998-2001 years sows delivered 78462 piglets, from which 3334 (4.2%) died after delivery. Gradually PRRS breakthrough developed into the stable stage. Compared to the 1998 results, when 58 (5.5%) sows aborted and 1760 (8.3%) of piglets were delivered dead or died after delivery, these numbers were significantly lower in the next stage. Our test results correspond (12) data, where it is indicated that up to 10% of piglets are being lost during intense PRRS breakthroughs. In the farm ‘B’ from 529 main and 518 alternative sows 75 ones (7.1%) delivered prematurely (up to 108 days) and 58 ones (5.5%) aborted. These results of our test correspond to the data presented in literature sources (1), where it is indicated that 3-80% of copulated sows abort. In the farm ‘B’ cases of failed conception increased, as 70% of sows delivered during the PRRS
breakthrough, compared to 84% before the breakthrough. During 1999 (the breakthrough) year sows delivered 21,421 piglets, including 19,661 (91.7%) alive, 850 (4%) dead and 910 (4.3%) that died after delivery.

We used SPSS statistical package (SPSS Inc., 1989-1995) for statistical evaluation of data. For the data analysis we applied the ANOVA method (21). For reliability of difference between groups (p criterion) we used the multiple comparison method described by Sheffe. We took the difference as statistically significant if p<0.05. For graphic presentation of the data we used Microsoft Excel 7.0 program.

Conclusions
1. PRRS infection in farm ‘B’ started when genetically PRRSv vulnerable pig breeds had been brought from Denmark and from farm ‘A’, and these had been mixed with the pigs present at the farm ‘B’.
2. PRRS prevalence was not related with the age of pigs.
3. Disregard of quarantine requirements facilitated the spread of PRRS.

REFERENCES