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## IMPACT OF CO-INFECTION WITH PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS ON DURATION OF PORCINE CIRCOVIRUS TYPE 2 VIREMIA IN FIELD CONDITIONS

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*Porcine reproductive and respiratory syndrome virus (PRRSV) and porcine circovirus type 2 (PCV2) infections cause serious economic losses to the global swine industry. The study aimed to study of the impact of co-infection with porcine reproductive and respiratory syndrome virus on duration of porcine circovirus type 2 viremia. The experimental study was based on serological ELISA based testing, and PCR assays. Results has been calculated using biostatistical methods. PRRS infection was occurred in 17 from 22 farms. Also the PCV-2 co-infection has been described. Prolonged infection with this PRRSV may affect farm productivity. PRRSV may potentially affect control of PCV infection by immunoprophylaxis. Proper management practices are very important in reducing the impact of PCV2 on the health status of the herd, even in herds where PCV2 immunoprophylaxis is already implemented.*

**Keywords:** porcine reproductive and respiratory syndrome virus, porcine circovirus type 2, prophylaxis, co-infection

**Introduction.** Porcine reproductive and respiratory syndrome virus (PRRSV) and porcine circovirus type 2 (PCV2) infections cause serious economic losses to the global swine industry (2, 3, 5). Porcine reproductive and respiratory virus may cause reproductive disorders in sows and respiratory lesions in weaners and fatteners (5). PCV2 causes mainly subclinical infections in nearly all commercial pig herds, but is also associated with a range of different disease syndromes collectively described as Porcine Circovirus (Associated) Disease. Although PCV2 is a main etiological agent of PCVD, multiple other infectious or non-infectious factors are also involved in clinical expression of the disease.

Experimental infection studies proved that PRRSV enhance and prolong PCV2 replication and shedding in co-infected pigs what may result in enhanced respiratory disease and severity of associated lesions (1, 4). Co-infections with those viruses are often observed in swine herds, but little is known on the possible outcome of their synergistic effect in the field.

The objective of a present study was to determine if co-infection with PRRSV may influence the circulation of PCV2 in field conditions.

**Materials and Methods.** The study was carried out in 22 randomly selected Polish swine farms with different size of sow herds (80-1100) and production systems. Based on the present infections, environmental conditions and management practices herds were classified into categories indicating their health and biosecurity level. Serum samples were collected cross-sectionally in 2 week intervals from several age groups of swine simultaneously. Samples were tested with ELISA for the presence of antibodies specific to PRRSV (IDEXX, Switzerland) and PCV2 specific IgM/IgG antibodies (Ingenasa, Spain). Commercial Real-time RT-PCR kit (Tetracore, USA) and *in house* real-time PCR based on previously described protocol (3) were used for detection of PRRSV and PCV2 genetic material respectively.

Based on obtained serological and virological profiles the age of infection and duration of infection with PCV2 and PRRSV were compared between herds.

**Results.** Seventeen of 22 examined farms were infected with PRRSV (Table 1). Infection with PCV2 was confirmed in all farms by both PCR and serology or serology only (No. 9, 12, 14, 16). In 11 PRRSV-positive farms co-infections with both pathogens were detected in the same age groups (No 1-8 and 19-21).

In herds 1-8 where health status was described as poor and co-infection with PRRSV was identified, PCV2 viremia lasted from 6 to 16 weeks, despite vaccination against PCV2 applied in 6 of those farms. On the other hand, in farms 9-13 with similar poor health/biosecurity status but no PRRSV/PCV2 co-infection PCV2 viremia was not detected or lasted up to 6 weeks only.

In 3 herds classified in satisfactory health/biosecurity status group viremia lasted 6 weeks or longer. Two of those herds (No 20 and 21) were co-infected with PRRSV. In the other herds with similar health and environmental conditions PCV2 viremia was either not detected (No 14) or short. The schematic duration of PCV2 and PRRSV viremia as well as overlapping co-infection period are presented in Fig. 1.

**Table 1 –** Summary results

| Farm no. | Duration of PRRSV viremia (weeks) | Duration of PRRSV/ PCV2 co-infection (weeks) | Duration of PCV2 viremia (weeks) | PCV2 vaccination | Health/ biosecurity status |
|---|---|---|---|---|---|
| 1 | 2 | 2 | 14 | + | very poor |
| 2 | 8 | 6 | 6 | + | very poor |
| 3 | 9 | 9 | 13 | + | poor |
| 4 | 10 | 10 | 10 | + | poor |
| 5 | 7 | 3 | 9 | - | poor |
| 6 | 8 | 8 | 14 | + | poor |
| 7 | 8 | 8 | 16 | + | poor |
| 8 | 2 | 2 | 13 | - | poor |
| 9 | 8 | nd | nd | + | very poor |
| 10 | nd* | nd | 6 | + | poor |
| 11 | nd | nd | 6 | + | very poor |
| 12 | 11 | nd | nd | + | poor |
| 13 | nd | nd | from 20** | + | poor |
| 14 | 12 | nd | nd | + | satisfactory |
| 15 | 6 | nd | 1*** | + | satisfactory |
| 16 | 15 | nd | nd | + | satisfactory |
| 17 | nd | nd | 7 | + | satisfactory |
| 18 | nd | nd | nd | + | satisfactory |
| 19 | 8 | 2 | 2 | - | satisfactory |
| 20 | 12 | 6 | 6 | - | satisfactory |
| 21 | 12 | 12 | 12 | - | satisfactory |
| 22 | 9 | nd | from 23** | - | satisfactory |

***** not detected, ** last sampling, ***one age group positive in PCR

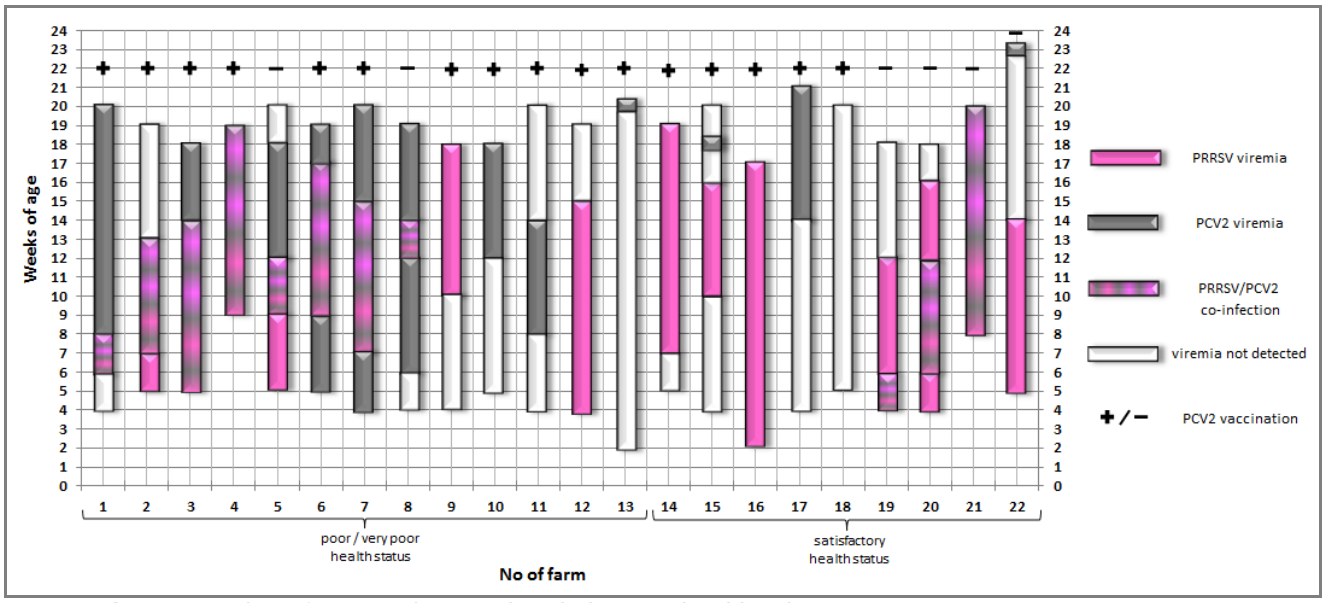


**Fig. 1.** Duration of PRRSV/PCV2 viremia in examined herds

**Conclusions and Discussion.** Porcine circovirus type 2 viremia was previously identified as a factor affecting growth of pigs even in herds with subclinical PCV2 infections (2). Therefore prolonged infection with this virus may affect farm productivity. The results of this study clearly showed, that in herds with poor biosecurity and the presence of PRRSV co-infections, vaccination against PCV2 did not reduce the duration of PCV2 viremia. This suggests that co-infection with PRRSV may affect control of PCVD by immunoprophylaxis.

In conclusion, proper management practices are very important in reducing the impact of PCV2 on the health status of the herd, even in herds where PCV2 immunoprophylaxis is already implemented.

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## ВПЛИВ ЗМІШАНОЇ ІНФЕКЦІЇ СВИНЕЙ: РЕПРОДУКТИВНО-РЕСПІРАТОРНИЙ СИНДРОМ НА ФОНІ ЦИРКОВІРУСНОЇ ІНФЕКЦІЇ СВИНЕЙ ТИПУ 2 У ПОЛЬОВИХ УМОВАХ

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*Вірус репродуктивно-респіраторного синдрому свиней (РРСС) і цирковірус свиней типу 2 (ЦВС-2) викликають серйозні економічні збитки в галузі свинарства по всьому світу. Метою дослідження було вивчення впливу змішаної РРСС-ЦВС інфекції. Експериментальне дослідження виконане на основі ІФА і ПЛР. Результати були обраховані з використанням біостатистичних методів. РРСС інфекцію виявлено в 17 з 22 господарств. Також в ряді з них описана ЦВС-2 ко-інфекція. Тривале зараження цим вірусом РРСС може вплинути на продуктивність тварин. Вірус РРСС може потенційно знижувати ефективність імунопрофілактики ЦВС-2 інфекції. Належний ветеринарний супровід є запорукою зменшення негативних наслідків впливу ЦВС-II на стан здоров'я стада, навіть в стадах, де вживається імунопрофілактика цієї інфекції.*

**Ключові слова:** вірус репродуктивно-респіраторного синдрому свиней, цирковірус свиней типу 2, профілактика, змішана інфекція