

László BÚZA

Intervet Hungária Kft., affiliate of MSD Animal Health, Budapest, Hungary

László ÓZSVÁRI

University of Veterinary Medicine Budapest, Hungary

COMPARATIVE STUDY ON RISK AND CRITICAL MANAGEMENT FACTORS FOR PRDC FROM THE CENTRAL-EUROPEAN VETS' AND FARM MANAGERS'

Perspective,
opinion and
commentary

Keywords

PRDC (Porcine Respiratory Disease Complex);
Management;
Risk factors;
Pig farms;
Central-Europe

JEL Classification

M11

Abstract

In this study the authors surveyed and compared the Central European (Hungarian, Czech and Slovakian) vets' and farm managers' opinion on the critical risk factors and effective farm management of Porcine Respiratory Disease Complex (PRDC). From February to May 2014, 39 farm managers (32 from Hungary, 6 from Czechia, 1 from Slovakia) and 37 vets (26 from Hungary, 10 from Czechia, 1 from Slovakia) working on 75 farrow-to-finish swine farms with 82,500 sows were personally questioned about their opinion on the risk factors and successful management factors for PRDC. The findings revealed that lack of effective farm management and the relating prevalent, recurring, operational problems have the most detrimental effect on the PRDC status on the Central-European pig farms. The results show that the vets considered the majority of the PRDC general risk factors (e.g. housing) to be more reasonable than the farm managers, however, the perceptions of the severity of PRDC pathogens showed much more similarity. It can be concluded that the swine farm managers and vets in Central-Europe should more often conduct a systematic farm monitoring to avoid the operational blindness and to better understand the risk factors of PRDC.

INTRODUCTION

Porcine Respiratory Disease Complex (PRDC) affects pigs and is a result of a combination of different infectious agents, environmental conditions and management practices, causing significant production losses, such as deteriorated daily weight gain and feed conversion ratio (Bíró & Ózsvári, 2006). It results in increased mortality, culling rate and medication costs, making it one of the most important health concerns with high economic losses for swine producers (Klawitter et al. 1988., Baekbo et al. 2002). The severity of clinical signs in a given farm greatly depends on the type of infectious agents involved and the environmental and management conditions (USDA APHIS, 1997, Bíró & Ózsvári, 2006).

Non-infectious causes, primarily management and environmental conditions contribute to the development of respiratory diseases by facilitating the spread of pathogens. Unfavourable housing conditions may also cause stress which can negatively affect the defence mechanisms of the respiratory tract (The Pigsite, 2012). Swine production has become more intensive in the past 30 years, with large herd sizes on most farms, which emphasizes the importance of proper decision-making processes, situational herd health management, ventilation and hygiene (Ózsvári & Búza, 2015). Overcrowding and inadequate ventilation may lead to an increased amount of CO₂, ammonia, humidity and dust in the buildings, which negatively affects respiratory tract defences (Bíró, 1998). Inappropriate temperatures (chilling or overheating) can have the same consequences. Operating with continuous pig flow can be considered a severe management mistake: without an all-in/all-out system in place younger pigs can mix with older pigs, which maintains the infection within the herd or can cause severe, acute respiratory disease outbreaks (Zimmerman et al., 2012).

PRDC generally affects 30 to 70% of the animals in a herd, with mortality between 4% and 6% depending on the severity of secondary infections. Clinical signs are generally seen at 14 to 20 weeks of age, manifesting in a significant decrease in performance and severe respiratory symptoms – depending on the type of concurrent infections. This respiratory disease not responding to antibiotic treatment and the presence of pathological lung lesions are indicative of PRDC (Ózsvári & Búza, 2015).

PRDC prevention is hindered by the fact that the pigs are exposed to the pathogens at different time points during production. Vaccination plays an important role in preventing PRDC, but its success is greatly affected by the immune status of the pigs, environmental conditions and management practices. This means that farms should have tailor-

made farm health management protocols that are updated regularly according to the animal health status and the economic situation on the swine market (Búza & Ózsvári, 2016a, 2016b).

In a successful PRDC management, the close cooperation of farm managers and vets on the swine farms is essential. It has a direct impact on production indices and on manifestation and predisposing factors of PRDC. At the same time the ineffective farm management is responsible for imprudent overuse of antibiotics and economic losses. That is why it would be very important that the farm managers consider the risk factors (Dvorsky et al., 2018; Oláh et al., 2019a; Oláh et al., 2019b), the risk assessment, the control and supervision of PRDC more or less along the same lines as the vets.

The aim of this study was to survey and compare the opinion on the risk factors and the effective PRDC management of vets and farm managers working on Central-European commercial pig farms.

MATERIAL AND METHODS

From February to May 2014, 39 farm managers (32 from Hungary, 6 from Czechia, 1 from Slovakia) and 37 vets (26 from Hungary, 10 from Czechia, 1 from Slovakia) working on 75 farrow-to-finish swine farms were personally questioned about their opinion on the risk factors and management of PRDC applied in their herds by using the ResPig™ (MSD AH) questionnaire (Figure 1).

Farm managers and vets who participated in the survey on the management factors determining the success of PRDC control received a list with 30 aspects of PRDC control and they had to choose the ones they considered to be the most important in terms of building a new farm (theoretical approach) and of the farms that they work on (practical approach). Furthermore, they had to select and score on a 100-point scale the most critical PRDC management factors as regards to the future operation of their herds. Afterwards, the general risk factors and management for PRDC, and the severity of PRDC pathogens were rated by farm managers and veterinarians on a scale of 0 to 3 with 0 being excellent and 3 being immediate intervention needed (from 1 to 3 points the evaluated factor was non-compliant), and we compared the scorings of the veterinarians with the farm managers regarding the evaluated aspects.

The following general aspects were assessed:

- Farming environment (FE) includes farm isolation (FI), biosecurity (BS), quarantine practices (QP), all-in/all-out procedures (AIAO), hygiene level (HL).
- Management (M) includes owner's attitude (OA), staff qualification and moral (HR), feed quality (F), water supply (WS), daily veterinary practices

(GVP), and collection and management of data (DM).

- Housing (H) issues are ventilation, cooling and heating (V), stocking density (SD), separation of sick animals (SSA), while
- Production technical parameters (PTP) are disposal rate (DR), average daily gain (ADG), feed conversion ratio (FCR), uniformity (U), and animal health costs (HC).

The perception of farm managers and vets regarding lung health status (clinical signs, pathology, epidemiology), other diseases and slaughterhouse checks, and the severity of PRDC pathogens was also surveyed.

RESULTS AND DISCUSSION

Figure 2 shows the 10 most critical management factors for PRDC when a new farm is built according to the farm managers and vets working on the surveyed swine farms. The top 3 factors are the biosecurity, the all-in/all-out procedure and the good veterinary practice.

Figure 3 shows the 10 most critical management factors for PRDC on an operational farm according to the farm managers and vets working on the surveyed swine farms. All the farm managers and vets considered the implementation of all-in/all-out procedure and the selection of suitable manpower to be crucial in the prophylaxis against PRDC.

Figure 4 shows the average ratings of the 10 most critical PRDC management factors in a 100-point scale. According to the leaders of the swine farms avoiding the overpopulation within the farm, the effective biosecurity measures, the good veterinary practice and the location and isolation of the herd are the most essential management factors against PRDC.

Biosecurity, AIAO, Good Veterinary Practice, human resources, low farm density, feed quality, feed safety (mycotoxins), internal biosecurity (animal hygiene), management and owners' attitude were identified by respondents as being critical management factors. Only low disposal rate (culling and mortality) had been chosen from the group of production parameters, FCR, ADG, output and data management were not considered to be that important. The research survey revealed that farm management is not efficient, which means that unsolved problems arising persistently from daily operations (not adequate AIAO, biosecurity, internal biosecurity, and feed safety) have the most damaging effect on the PRDC situation in pig farms in Central-Europe.

When we compared the farm managers' and vets' opinion, the farm managers identified and evaluated only 62% of existing non-compliant general conditions compared to veterinarians, who were stricter during the evaluation of predisposing factors

than farm managers for all but one factors (farming environment, management, housing, production technical parameters, lung health status and other diseases), although we would have expected farm managers to evaluate general factors more strictly (Figure 5). Veterinarians considered other diseases, housing and production technical parameters to be the most important PRDC risk factors.

Regarding diseases, the severity of PRDC pathogens, 81% of farm managers' results coincided with veterinarians, but farm managers failed to recognize clinical signs of atrophic rhinitis (Figure 6).

PRDC occurs as a result of the combined effect of multiple infectious pathogens and various farm operational, environmental, technological and other management factors. PRDC, which results in markedly reduced performance as well as increased mortality rate, culling rate and veterinary treatment costs, is the animal health problem causing the greatest economic losses to pig production (Ózsvári & Búza, 2015). Studies of the risk factors of PRDC has revealed that the management technology, herd health management and disease status of the farms are interrelated, and that the environmental and management factors primarily have an influence on the mortality rate and the feed intake of pigs (Bíró, 1998; Bíró & Ózsvári, 2006; Búza & Ózsvári, 2016a, 2016b). On many farms, the environmental factors presented a risk of PRDC because the preventive disease control measures are not fully observed, although these have a key role in the control of PRDC and consequently in the profitability of the farm. In many herds, the quarantine facility is within the pig farm, in barns not sufficiently separable from the production facilities causing direct (immediate) risk for introduction of infection diseases (e.g. African swine fever). In many finishing farms the inadequate stocking capacity of the different pig houses prevents the development of a suitable batch system, and therefore the all-in/all-out practice is not implemented (Búza & Ózsvári, 2016b).

There is a connection between management strategies and animal health practices (Bíró & Ózsvári, 2006). The majority of farm managers are committed to increasing efficiency and production performance, although they do not consider the development of human resources to be of primary importance. Today the quality of feed and drinking water already appears to have a less pronounced adverse impact on the health status of pig herds (Búza & Ózsvári, 2016a). It is a well-known fact that there is a significant correlation between farm management technologies and herd health status (Bíró, 1998).

Our findings show that the efficient swine farm management is missing in the Central-European region. The fundamental cause of this is the high prevalence of continuously recurring operational

problems that have been unsolved for many years; these are responsible for vast majority of adverse effects impacting the current status of PRDC on the Central-European pig farms (Búza & Ózsvári, 2016b). To move ahead cooperation and joint technical knowledge of vets and farm managers are needed for more effective pig farming. This has a direct influence on production indices and on manifestation and predisposing factors of PRDC. Beyond the technical knowledge and strong work ethic, good management skills are also required to run a financially successful swine farm. Besides the farm managers, veterinarians also need to have managerial responsibilities for setting up an efficient pig farming in Central-Europe.

CONCLUSIONS

Based on these results we can conclude that farm managers and vets in Central-Europe should perform external monitoring of their farms more frequently to avoid becoming “blind” to problems and to gain better understanding of the predisposing factors and the multifactorial nature of PRDC. Results also point out that both farm managers and veterinarians need regular trainings in internal biosecurity (animal hygiene) and management. Farm managers should receive in-depth training regarding disease symptoms, and it would be beneficial to implement a training and coaching system based on regular farm assessments in order to prevent production losses arising from “operational blindness”. The evaluation method used in this study could be a good tool for such monitoring.

Acknowledgement

The Project was supported by the European Union and co-financed by the European Social Fund: EFOP-3.6.2-16-2017-00012 ‘Development of a product chain model for functional, healthy and safe foods from farm to fork based on a thematic research network’.

REFERENCES

- [1] Baekbo, P., Andreasen, M. et al. (2002): Growth reduction in pigs with Pneumonia. Proceedings of the *International Pig Veterinary Society*. Ames, Iowa, USA, 2002. 283.
- [2] Bíró, O.: The economic aspects of production-oriented animal health management on large-scale swine holdings. *PhD thesis*. Gödöllő Agricultural Science Univ., Dep. of Farm Management, Gödöllő, Hungary, 1998. 118.
- [3] Bíró, O., Ózsvári, L. (2006): Állat-egészségügyi gazdaságtan. *Egyetemi jegyzet*. SZIE ÁOTK Állat-egészségügyi Igazgatástani és Agrár-gazdaságtani Tanszék. Budapest, 2006. 170.
- [4] Búza, L., Ózsvári, L. (2016a): Critical success factors of PRDC management in Central-Europe. *8th European Symposium of Porcine Health Management and 24th International Pig Veterinary Congress. Dublin, Ireland, 2016*. 303.
- [5] Búza, L., Ózsvári, L. (2016b): Comparative study on risk factors and management of PRDC from the Central European vets’ and farm managers’ point of view. *8th European Symposium of Porcine Health Management and 24th International Pig Veterinary Congress. Dublin, Ireland, 2016*. 315.
- [6] Dvorsky, J., Popp, J., Virglerova, Z., Kovács, S., Oláh, J. (2018): Assessing the importance of market risk and its sources in the SME of the Visegrad Group and Serbia. *Advances in Decision Sciences*, 22(A) 22nd Anniversary Special Issue, 1-25.
- [7] Klawitter, E., Hoy, S., Mehlhorn, G. (1988): Influence of inflammatory respiratory lesions on the liveweight gain of selected young and fattening pigs. *Monatsh. Vet. Med.*, 43. 597–600.
- [8] Oláh, J., Virglerova, Z., Klieštiková, J., Popp, J., Kovács, S. (2019a): The Assessment of Non-Financial Risk Sources of SMES in the V4 Countries and Serbia. *Sustainability*, 11(17), 4806, 1-19.
- [9] Oláh, J., Kovács, S., Virglerova, Z., Lakner, Z., Popp, J. (2019b): Analysis and Comparison of Economic and Financial Risk Sources in SMEs of the Visegrad Group and Serbia. *Sustainability*, 11(7), 1853, 1-19.
- [10] Ózsvári, L. – Búza, L.: Comparative Study on Technology Level, Major Production Parameters and Management of Porcine Respiratory Disease Complex (PRDC) in Fattening Pig Herds. *Magyar Állatorvosok Lapja*, (2015) 137. 79-92.
- [11] The Pigsite (2012): The control of swine respiratory disease. <http://www.thepigsite.com/pighealth/article/353/respiratory-diseases-and-control-strategies/> (eCollection: 2018.08.19.)
- [12] Usda Aphis (1997): Changes in the US Pork Industry, 1990–1995. Fort Collins. USA, 1997. 40.
- [13] Zimmerman, J., Karriker, La., Ramirez, A., Schwartz, Kj., Stevenson Jw. (2012): Diseases of swine. 10th edition, John Wiley & Sons, Inc., USA.

List of figures

	<i># of farms</i>	<i># of sows</i>	<i>Farm managers (FM)</i>	<i>Veterinarians (V)</i>
<i>Hungary</i>	63	66,500	32	26
<i>Czech Republic</i>	11	14,050	6	10
<i>Slovakia</i>	1	2,000	1	1
TOTAL	75	82,550	39	37

Figure No. 1
Number of farms, sows, farm managers and vets involved in Central-European PRDC survey

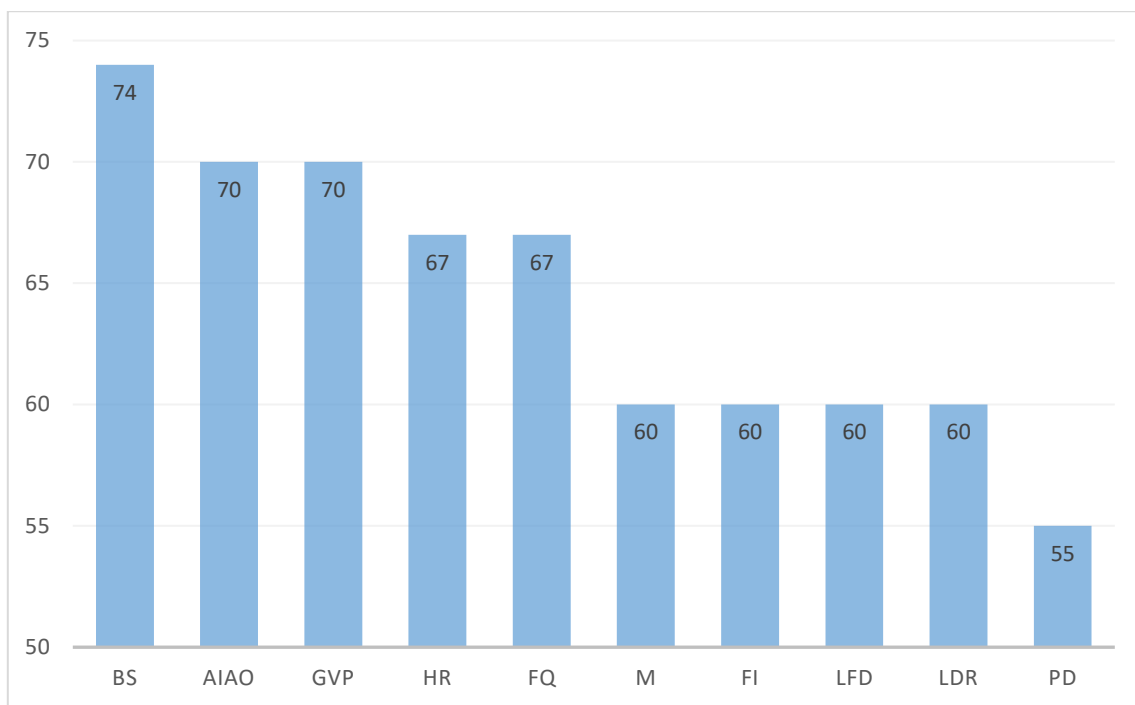


Figure No. 2
The 10 most critical PRDC management factors when a new farm is built (as % of the answers, n = 76)
Note: BS – Biosecurity; AIAO - All-In/All-Out; GVP - Good Vet Practice; HR – Human Resources; FQ - Feed Quality; M – Management; FI - Farm Isolation; LFD - Low Farm Density; LDR - Low Disposal Rate; PD - Population Density



Figure No. 3

The 10 most critical PRDC management factors on an operational farm (as % of the answers, n = 76)
 Note: AIAO - All-In/All-Out; HR – Human Resources; GVP - Good Vet Practice; FQ - Feed Quality; M – Management; BS – Biosecurity; HL - Hygiene Level; FS – Feed Safety; Owner Attitude OA; LFD - Low Farm Density

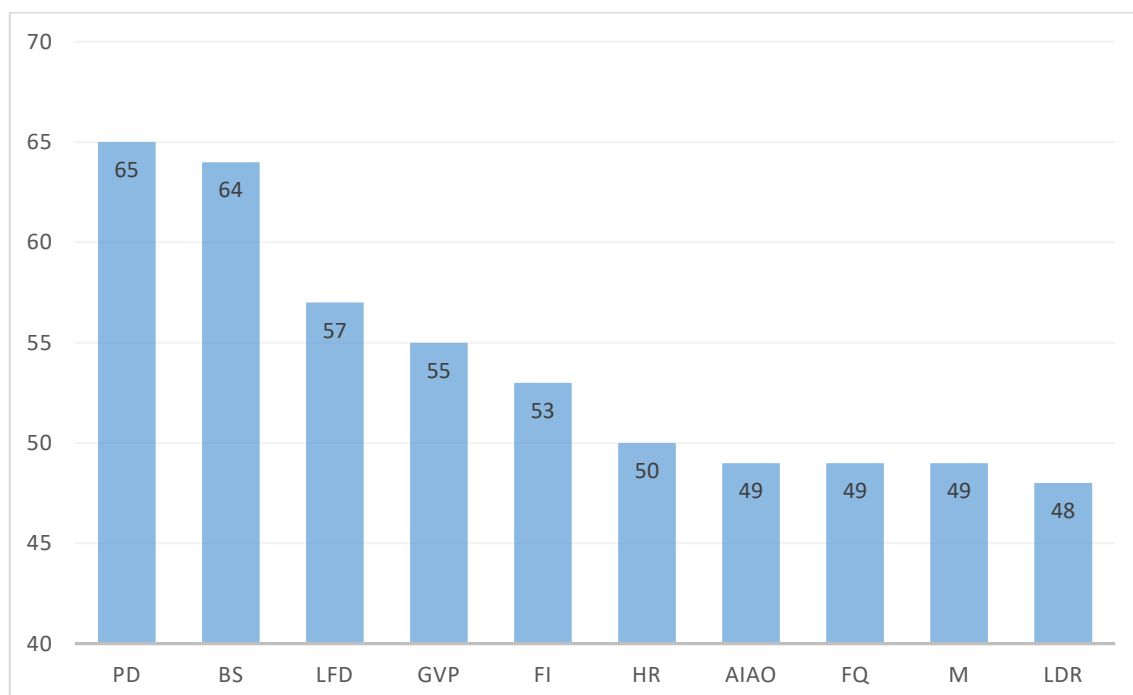


Figure No. 4

The average points of the 10 most critical PRDC management factors in a 100-point scale (n = 76)
 Note: PD – Population Density; BS – Biosecurity; LFD - Low Farm Density; GVP - Good Vet Practice; FI – Farm Isolation; HR – Human Resources; AIAO - All-In-All-Out; FQ - Feed Quality; M – Management; LDR - Low Disposal Rate;

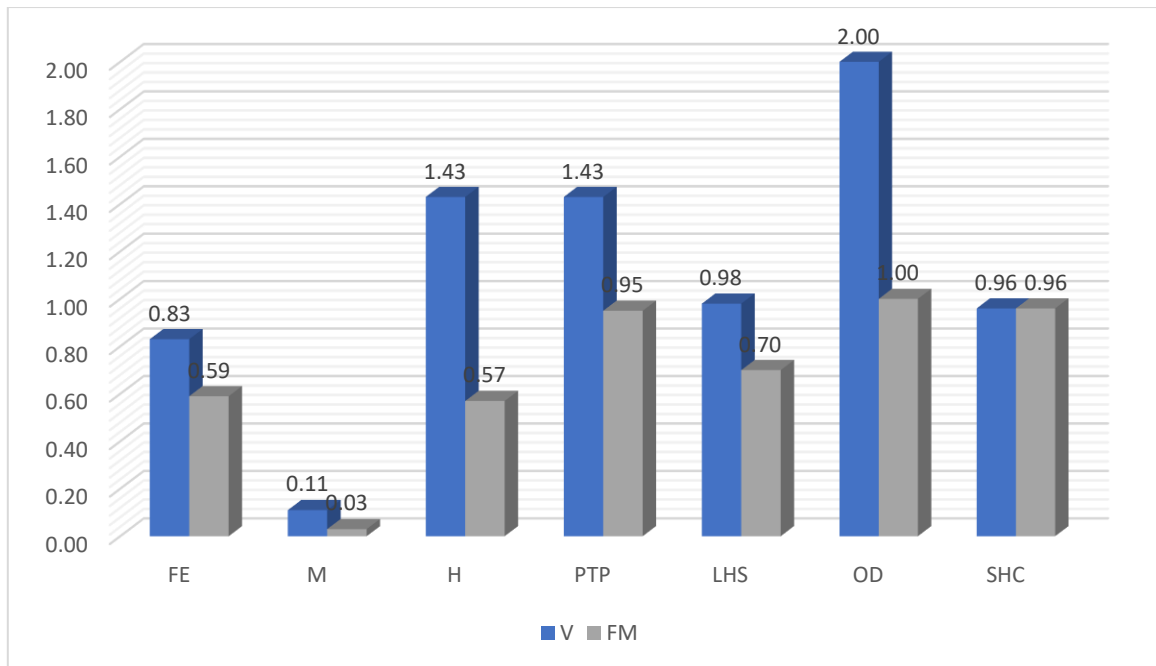


Figure No. 5

The importance of general risk factors for PRDC according to veterinarians and farm managers

Note: FE - farming environment; M – management; H – housing; PTP - production technical parameters; LHS - lung health status; OD - other diseases; SHC - slaughterhouse check;
V = average vet points, FM = average farm manager points

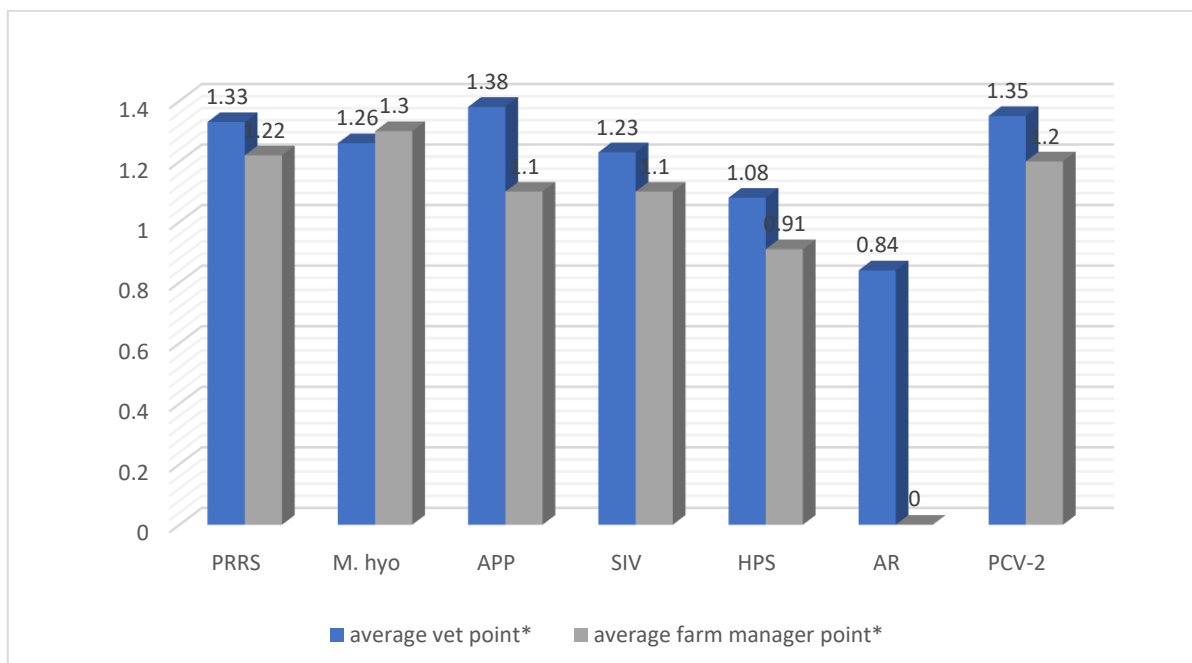


Figure No. 6

The severity of PRDC pathogens according to veterinarians and farm managers

Note: Porcine respiratory and reproductive syndrome – PRRS; Mycoplasma hyopneumoniae - Mhyo, Actinobacillus pleuropneumoniae - APP, Swine influenza virus - SIV, Haemophilus parasuis - HPS, Atrophic rhinitis – AR; Porcine Circovirus Type2 - PCV2