Recent diagnostic techniques for Porcine Circo-virus 2 Associated Disease in the USA

Marvin A. Ssemadaali and Sheela Ramamoorthy

Over 90% of the pigs in the USA carry Porcine circo-virus strain 2 (PCV2). This virus causes several diseases in pigs, collectively referred to as Porcine circo-virus associated disease syndrome (PCVAD). Weight loss, respiratory and reproductive disorders, skin disease, kidney disease and jaundice are all symptoms associated with PCV2. Because the weight loss associated with this virus is very severe, there is reduction in productivity of affected herds, which leads to tremendous economic losses in swine production. However, not all the pigs that carry PCV2 show symptoms of the diseases.

Contact with other infected pigs is the main mode of transmission; meaning that if the virus is detected early, new cases of the disease can be reduced through vaccination, good hygiene and good nutrition. It was in 2006 that vaccines were introduced and since then, PCVAD incidence in pigs has greatly reduced. However a new challenge of emergence of new strains of the virus has rendered the available vaccines on the USA market ineffective. Symptoms of the disease are now more severe since the vaccines cannot fully protect the pigs against the new strains. It is crucial that new techniques that can detect both strains of the virus are developed.

Currently diagnosis of PCV2 is divided into 2 broad techniques; ante-mortem and post-mortem techniques. Both techniques are useful in the definitive detection and control of the disease in pig populations. Whereas the post-mortem technique uses clinical signs and pathological lesions to diagnose the infections, ante-mortem techniques rely on the detection of PCV2 antigens (molecular techniques) and antibodies against the virus (Serological techniques).

Due to their affordability, serological tests such as ELISA and Immuno-fluorescent Assay (IFA) are more widely used in the USA compared to molecular techniques, whose reagents and equipment are more costly. Currently, there are no serological techniques to differentiate between vaccinated and naturally infected pigs, hence control of the disease is difficult. However, some serological tests have attempted to make the differentiation. In addition, new serological tests, like the fluorescent microsphere immuno-assay (MIA), are more sensitive, analyze more samples in one run compared to ELISA, and they also allow simultaneous detection of co-infections associated with PCVAD.

In comparison, molecular techniques are generally considered highly specific and sensitive. For instance, they can detect very small amounts of the virus in the pigs. An example is the quantitative PCR which has
been used to determine the minimum viral load required for development of PCVAD in PCV2 infected pigs. The introduction of the loop-mediated amplification (LAMP) technique, which is faster and more robust compared to the conventional PCRs is expected to greatly improve PCVAD diagnosis since it can directly be used on farms.

References

8. Opriessnig, T., et al. (2013). "A PCV2 vaccine based on genotype 2b is more effective than a 2a-based vaccine to protect against PCV2b or combined PCV2a/2b viremia in pigs with concurrent PCV2, PRRSV and PPV infection." Vaccine 31(3): 487-494.

This policy brief is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the Africa-U.S. Integrated Disease Management Network (AFRUS-IDM) and do not necessarily reflect the views of USAID or the United States Government.