Satellite symposium focuses on vaccination to control viral swine diseases

At the recent IPVS Congress in Jeju, Korea, Komipharm International hosted a Satellite Symposium.

The opening presentation was by Prof. X. J. Meng from the USA and was on novel PRRSV vaccines and control strategies.

Since its discovery almost two decades ago PRRSV (porcine reproductive and respiratory syndrome virus) has been, and still is, difficult to control because of things such as immune modulation, heterogeneity, persistent infection, and co-infection with other pathogens.

Although both modified live attenuated and killed vaccines are commercially available, their efficacies against heterologous field strains of PRRSV remain poor.

The extensive genetic variations of PRRSV in the field suggest that a vaccine based on a single strain of PRRSV will be unlikely to confer protection against heterologous field strains that are currently around.

Accordingly, the design of future PRRSV vaccines needs to take the genetic and antigenic diversity of PRRSV into account or else the disease will remain difficult to control. He summarised the major obstacles for the development of effective vaccines against PRRSV (Table 1).

One drawback of the modified live vaccines is that vaccinated pigs can not be differentiated by blood testing from pigs that are naturally infected with PRRSV. However, the advent of PRRSV reverse genetics systems now provides a way that will enable the production of marker PRRSV vaccines.

Major obstacles	Potential solution
Extensive genetic variations of PRRSV strains	Multiple strain based vaccines Vaccine based on mosaic virus strain developed by molecular breeding of genetically distinct strains
Immune modulation by PRRSV	Vaccines suppressing Tregs Vaccines targeting immune cells such as dendritic cells Vaccines inducing type I IFN
Co-infection with other swine agents	Multivalent vaccines capable of protecting pigs against multiple swine pathogens

Table 1. The major obstacles for the development of effective vaccines against PRRSV.

The availability of this technology coupled to a better understanding of anti-PRRSV immunity should allow the development of the next generation of PRRSV vaccines.

Prof. Hyunjin Shin from Korea then reflected on the efficacy of PEDV-Fc (porcine epidemic diarrhoea virus) inactivated vaccine. Porcine epidemic diarrhoea is a real concern, especially in Asia, and is difficult to differentiate from TGE.

He reported on a study in Korea into the efficacy of PEDV-Fc vaccines that also looked at other types of PEDV vaccines.

Sows vaccinated with inactivated PEDV-Fc vaccines produced significant levels of antibodies and showed high titers of neutralising antibodies that increases after delivery and in the colostrum. Piglets from gilts vaccinated with a PEDV-Fc vaccine were protected against challenge from porcine epidemic diarrhoea virus.

Hyung Jang from Komipharm International then considered new technology for swine vaccine development for porcine epidemic diarrhoea, PRRS and PCV-2 infections.

He highlighted how his company had utilised recombinant protein expression and production technology to produce an efficacious PCV-2 vaccine which is licensed for use in sows and piglets.

This vaccine reduces viraemia and enhances immunity in the pig.

He went on to consider protein surface display technology.

Komipharm's PRO-VAC SP2 expresses the ORF2 protein of PCV-2 on a non-virulent Salmonella typhimurium vaccine and this should become the first commercial vaccine of this type.

Their PRO-VAC PRRS trivalent vaccine uses three serologically different strains of PRRS – two from North America and one from Europe.

Jungwung Yang and Hyun Jang from Komipharm then described the use of a recombinant subunit vaccine, PROVAC-Circomaster vaccine that contains ORF2 protein antigen derived from PCV-2 isolated from pigs on a Korean farm where the pigs showed typical signs of PMWS.

Piglets were vaccinated three and five weeks after weaning and sows were vaccinated five and three weeks before farrowing.

It was shown that vaccination reduced PCV-2 shedding as a result of vaccination induced virus neutralising antibodies.

This vaccination significantly reduced virus concentration in the piglet's blood and in sows and boars.

Sow vaccination against PCV-2 increased antibody titers in blood and colostrum and the latter prevented infection in young piglets.

These two speakers also reflected on a genetical and serological analysis of PRRSV variants that has been isolated in Korea. ■