It's as easy as one, two, three – Porcilis PCV comes to the EU

Intervet/Schering Plough Animal Health recently held two technical conferences in Portugal, for European veterinarians, to launch their Porcilis PCV vaccine in the EU. International Pig Topigs attended and in this review we cover the topics that were addressed at the meeting.

Diseases associated with porcine circoviruses (PCVs) were first seen a little over 25 years ago in 1991 in western Canada.

Then, in 2004-5, major disease outbreaks associated with the virus with mortalities around 30-35% were seen in Quebec, Canada. Not surprisingly, and in view of the relationship between the Canadian and US industries, problems were soon seen in the USA.

A similar picture was soon encountered in some herds in Japan and, soon after, China – Japan's neighbour and the world's largest pork producer – saw a new disease which was referred to as 'highly virulent PRRS' by the Chinese. Problems were also seen in Brazil, Australia and Europe.

Possible 'X' factor?

A debate has raged for many years as to the precise cause of entities such as PMWS and PDNS and just what the role of PCV-2 was.

As recently as 2005, prominent scientists were saying 'there is no link between PMWS and PCV-2' and there was much heated discussion about a possible 'X' factor. Then in 2006 research showed that 'when there was no PCV-2, there were no PCVDs' (PCV diseases).

PCV-1 An apathogenic virus of little consequence
PCV-2a Found in herds before PMWS appeared
PCV-2b Predominantly found in herds with PMWS and then became widespread post 2004
PCV-2c Found retrospectively in some samples from Denmark that were collected in the 1980s.

Table 1. The nomenclature of PCVs.

A comprehensive Canadian study early in 2007 finally settled the debate. This study looked at PCV-2 vaccinated pigs and non-vaccinated pigs on 22 farms. There was a dramatic difference in mortalities between the two groups as the vaccinated pigs were not affected by PCVDs.

PCV-2 is particularly associated with entities such as PMWS (Postweaning Multisystemic Wasting Syndrome) and PDNS (Porcine DermoNephrotic Syndrome) as well as reproductive, enteric and respiratory diseases in which there are a variety of contributing factors.

However, it soon became obvious that when PCV-2 viraemia can be prevented, for example by vaccination, PCVDs are not seen. It would now appear that a key aspect of the action of PCV-2 is on the pig's immune system. When this is suppressed or 'knocked out' then a whole host of other lesions, often precipitated by other agents occur.

Today, over 99% of PMWS cases are associated with co-infections such as PRRSV, Mycoplasma hyopneumoniae, bacterial septicaemia and pneumonia as well as viral infections such as parvovirus and influenza.

Impact on immune system

In PMWS severe lesions are seen in primary and secondary lymphoid tissue (the immune system) and these lesions are typified by disintegration of lymphoid structures, lymphocyte depletion and macrophage infiltration.

PCV-2 also infects key immune cells, such as macrophages and dendritic cells, and persists there and, as a consequence, modulates their roles in countering and controlling infections. This is very important and these two cells play a key role in identifying invading pathogens and initiating innate immune responses to suppress their multiplication.

Dendritic cells initiate adaptive immune responses and regulate T-cell activity through the production of stimulatory or

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Fig. 1. Mortality data from the Japanese trials.

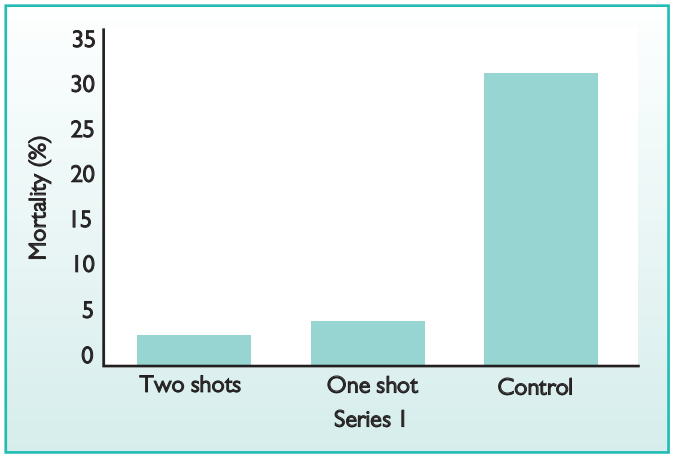
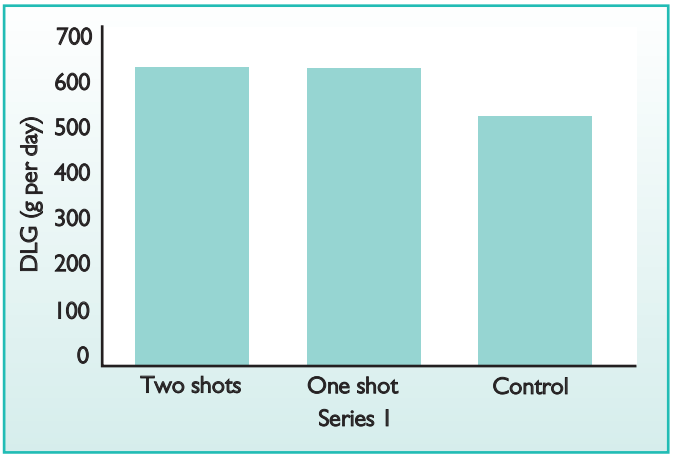


Fig. 2. Average daily gain data from Japanese trials.



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inhibitory cytokines while the macrophages have an important role in phagocytic clearance. The word macrophage literally means 'big eater' and, as these are large cells that devour invading pathogens, they are aptly named.

Without getting too involved, the immunomodulating effects of PCV-2 on these two types of cell have an important impact on various aspects of the innate and adaptive immune responses in the pig which, in effect, reduces their ability to counter other infections.

PCV-2 infection per se is of little consequence to the pig but its immunomodulating effect coupled to co-infections and husbandry, management and possibly breed factors contribute to the devastating effects of PCVDs.

Over the years the nomenclature of PCVs has been confused but it has very recently been clarified and is summarised in Table 1.

Fortunately PCV-2 makes a good vaccine and recently Intervet/Schering Plough Animal Health launched their vaccine, Porcilis PCV, in Europe.

Porcilis PCV contains the three key components any vaccine must contain:

1 A good immunogen to stimulate the pig's immune system.
1 A good adjuvant to produce a solid, protective immunity.
1 The correct amount of antigen to produce an optimal immune response.

The first of these is achieved by utilising the ORF2 which an antigen consisting of the capsular protein of PCV-2. ORF2 is what is called a sub-unit and Intervet/Schering Plough Animal Health has a vast experience in the production of sub-unit vaccines using its proven Baculo Vaccine Vector System proven technology.

Couple this to a proven adjuvant and you have a vaccine with two very useful properties which form the basis of two of the vaccine's claims on its licence.

Firstly, the vaccine is able to break through medium to high levels of maternally derived antibodies and, secondly, the vaccine's duration of immunity – 22 weeks after vaccination with a single shot at three weeks of age.

Recent work at CReSA in Barcelona, Spain has confirmed that Porcilis PCV can break through high levels of maternal immunity.

	Weight (kg)			
	Week 1	Week 3	Week 11	Week 24
Vaccination one shot at 3 weeks	2.20	5.75	29.99	97.28
Controls	2.17	5.77	30.65	94.28

Table 2. Body weights data (kg) from Japanese trials.

Japanese trials

Trials carried out in Japan for the licensing of one (at three weeks) and two shot (at three days and three weeks) vaccination regimens in that country showed the one shot approach to be just as effective as the two shot one. These trials were substantial in that each group contained 200 pigs housed and the trial was repeated five times.

If we look at mortality, there is a great difference between the vaccinated animals and the controls in these trials but no real difference between the two vaccination options (see Fig. 1).

Fig. 2 shows a real difference between the controls and vaccinated pigs in terms of average daily live weight gains. This again shows no real difference between the vaccination options, but these were markedly better than the non-vaccinated controls.

Table 2 shows how a one shot vaccination regimen gave a 3.5kg cumulative live weight advantage by the 24th week.

Results from a very recent Austrian trial show a significant benefit from a one shot Porcilis PCV vaccination programme (Table 3). So, what were the key take home messages from this meeting?

1 Vaccination has shown that subclinical effects are probably more important than we thought (see results of trials).
1 Maternally derived antibodies interfere with vaccination and, therefore, need a vaccine that can overcome these at the time it is administered.
1 Antibody levels correlate to protection.
1 Currently clinical signs are appearing later and later in the fattener's life so persistence of vaccinal antibodies is important.
1 We need a vaccine that is capable of overcoming maternal antibodies and provides a long lasting protection.

Porcilis PCV provides this with a **one** shot programme of **two** mls of vaccine at **three** weeks of age! ■

Table 3. Austrian results from a one shot vaccination programme.

	Control	Vaccinates
Mortality (%)	1.72	0.49
Poor pigs (%)	2.70	1.83
Non-marketable pigs (%)	4.82	2.52
Daily liveweight gain (g)	480	507