

**KEEP PROTECTION  
ON TRACK FROM  
START TO FINISH**



Porcilis® PCV



Porcilis PCV — Keep protection on track from start to finish



# Contents

This technical brochure is designed to provide a concise overview of Porcine Circo Virus type 2, its characteristics and the disease syndromes with which it is currently associated. In addition, it contains an account of recent advances in our knowledge of the relationship between PCV2 and the immune system, leading to a better understanding of the PCV-related diseases, and the role of Porcilis PCV in managing them.

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# Porcine Circo Virus type 2

Porcine Circo Virus type 2 (PCV2) belongs to the Circoviridae family. These viruses cause disease in vertebrates including birds. Circovirus is a very small virus (17 nm) and has a circular single-stranded DNA genome of <2.5 kb.

The Circoviridae family includes the following Genera:

## a) Genus Anellovirus.

The Genus includes the Transfusion Transmitted Virus or Torque Teno Virus (TTV). It is believed to be asymptomatic (Segales et al., 2009). The virus affects several domestic animals and swine (Kekarainen and Segales, 2009) and was circulating in pigs before the virus was officially discovered. TTV has been found in the serum of pigs suffering from Post-weaning Multi-systemic Wasting Syndrome (PMWS) in Spain (Segales et al., 2009).

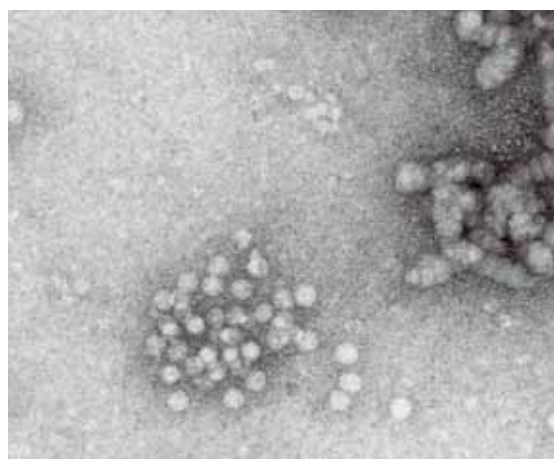
## b) Genus Gyrovirus.

This Genus includes the Chicken Anemia Virus (CAV). It causes anemia and immuno-suppression in baby chicks, characterized by aplastic anemia and generalized lymphoid atrophy with immune suppression, frequently complicated by viral, bacterial or fungal infections (Bulow, Schat, 1997).

## c) Genus Circovirus.

This Genus includes Porcine Circovirus type 1 and 2, canary circovirus, bovine circovirus, goose circovirus, columbid circovirus, ostrich circovirus and raven circovirus. In humans the circovirus is extremely common.

PCV2 is considered not to be the sole cause of Porcine Circo Virus Diseases (PCVDs). However PCV2 is believed to be an essential contributor to the development of the clinical signs of the PCVDs.



PCV2, EM picture\*

\*Source: Dr. Jan van Lent, Wageningen EM center (WEMC), Wageningen University, the Netherlands

# Porcine Circovirus associated diseases

## Porcine circovirus diseases

PCVDs were first observed by Canadian veterinarians in 1991 (Harding, 1997; 1998), since when they have been reported throughout the world (Segales et al., 2006). PMWS epizootics had occurred worldwide by 1995-97 associated with PCV2; while PCV2 strains had been circulating in the pig population for at least several decades before the disease was described (Segales, 2007). PCV2 is ubiquitous and can be isolated from both diseased and healthy pigs (Allan and Ellis, 2000). However, the amount of PCV2 virus and viral particles present in tissues is significantly higher in pigs suffering from PCVDs. This disease was estimated to cost approximately 600 million Euros to the pig industry in European Union in 2004 (Segales 2007). Pigs can be naturally infected with multiple genotypes of PCV2 (Hesse et al, 2008), and these can also be found on farms where no clinical signs of PCVDs have been observed (de Grau et al., 2008).

PCV2 virus has been associated with Postweaning Multisystemic Wasting Syndrome (PMWS), Porcine Dermonephrotic Syndrome (PDNS), reproductive failure, enteritis and pneumonia but infection is primarily characterized by wasting, enlarged lymphnodes, jaundice and weight loss.

A number of possible factors have been mentioned in the literature as causing PCVDs in conjunction with PCV2 virus. The converse is even more important: *When PCV2 viremia can be prevented, as for example, by vaccination, PCVDs are not observed.*

PCV2 infections are being widely studied by several research groups. The immunological aspects of a PCV2 infection are intriguing and, for the veterinary profession, fascinating.

Intervet/Schering-Plough Animal Health has therefore asked one of these researchers to contribute to this technical document on the subject of PCV2 and immunology and, in particular, what it implies for the immunological system of the pig.



Pigs affected by PCVDs

# The immunology of PCV2 diseases

by Artur Summerfield, DVM, PhD

*Institute of Virology and Immunoprophylaxis, Miteilhäusern, Switzerland.*

*Introduction by Intervet/Schering-Plough Animal Health.*

*Recently, a number of scientific publications have appeared on the subject of immuno-modulation of PCV2 virus. Intervet Schering-Plough Animal health has asked Artur Summerfield to summarize the current knowledge on this aspect of PCVDs.*

## Immunosuppressive characteristics of PCV2 infections

PCV2 has successfully established itself in the pig population in which 99% of PWMS cases have been found to be associated with co-infections such as PRRSV, *M. hyopneumoniae*, bacterial septicemia and pneumonia, influenza and parvovirus. An explanation for this could be PCV2-induced immuno-suppression resulting in increased susceptibility to secondary infections. In fact, pathological studies of pigs with PWMS describe generalized severe lesions within the primary and secondary lymphoid tissue. The nature of these lesions with disintegration of lymphoid structures, lymphocyte depletion and macrophage infiltration will certainly result in severe suppression of immune responses.

## Overview of different phases of immune responses influenced by PCV2 infection

Figure 1 (see the next page) illustrates how PCV2 modulates the immune system and disrupts the tightly regulated balance between immunostimulating and immunosuppressant triggers required for health and well-being. It has become clear that immuno-regulation is important in avoiding immune-mediated damage, such as severe uncontrolled inflammation, allergies or autoimmune diseases.

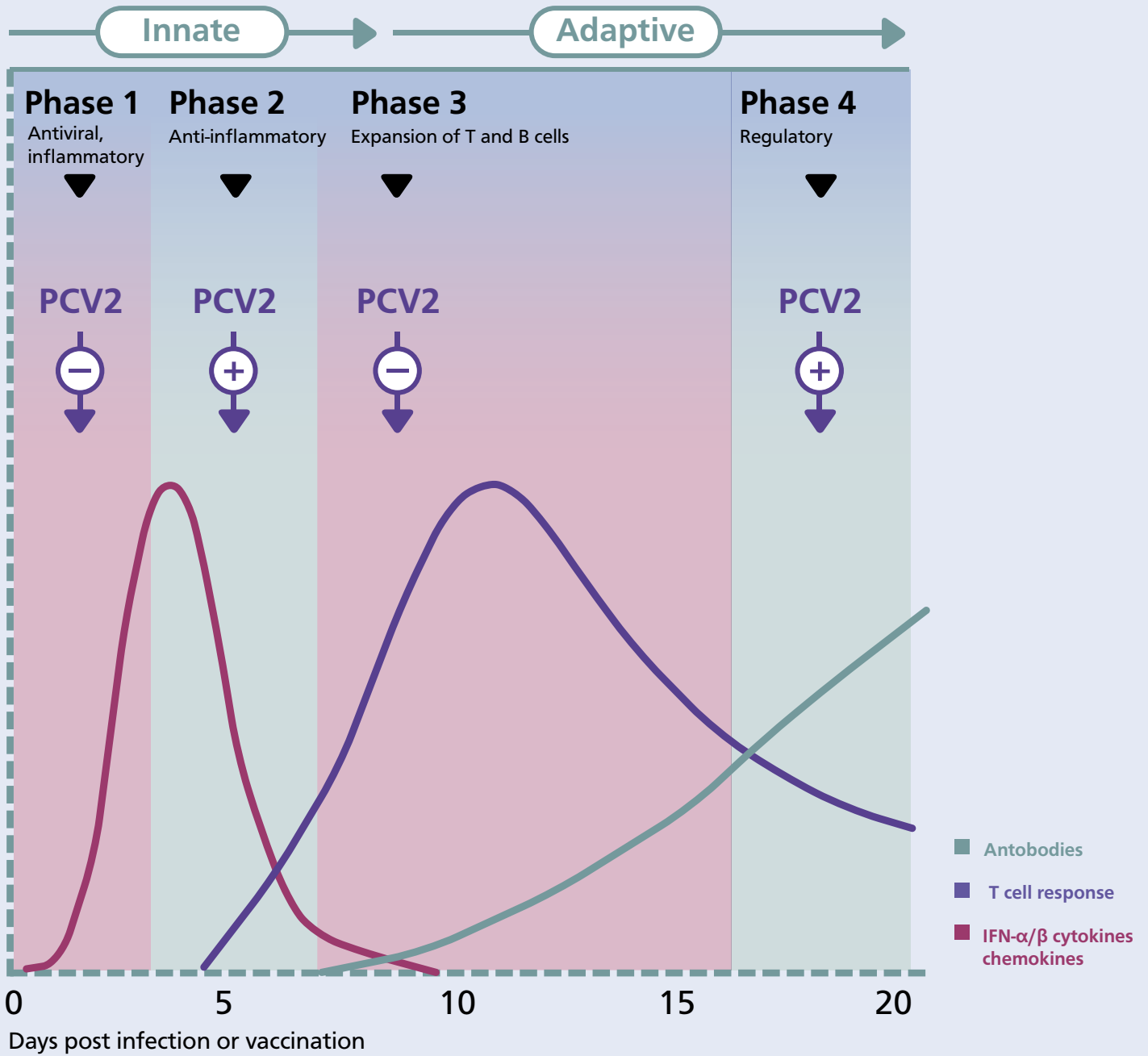


Pig with "classical" PDNS presenting multifocal reddish to dark purplish coalescent, sometimes raised skin lesions, predominantly on the ventral regions of the body.



Subacute to chronic PDNS: enlarged kidney with edema and bleeding in the pelvic region and a granular aspect of a somewhat shrunken cortex revealing the affected glomeruli as pinpoint grey dots.

FIGURE 1



In **PHASE 1**, cells of the innate immune system are activated to produce antiviral factors such as IFN- $\alpha/\beta$ , pro-inflammatory cytokines and chemokines. This limits early pathogen replication and provides important “danger signals” required to trigger the adaptive response.

The anti-inflammatory **PHASE 2** prevents extensive tissue damage caused by uncontrolled innate immune responses.

In **PHASE 3** adaptive immune responses are induced following expansion and activation of lymphocytes. After pathogen elimination, in **PHASE 4** the adaptive immune response settles down to steady state levels.

PCV2 can interfere by its inhibitory action during the activation **PHASES 1** and **3** and promoting the regulatory **PHASES 2** and **4**.

PCV2 replicates mainly in epithelial and endothelial cells, but can also Infect Macrophages (IM) and dendritic cells (DC) in which the virus persists and modulates their function. This is critical, due to the central importance of DC and IM in sensing invading pathogens and mediating innate immune responses to suppress pathogen replication. As “professional” antigen presenting cells, DC initiate adaptive immune responses and regulate T-cell activity through the production of stimulatory or inhibitory cytokines.

IM are more important in phagocytic clearance, inflammatory reactions and for the control of tissue homeostasis. Therefore, the immunomodulating effects of PCV2 on these cells can be expected to have an important impact on various elements of the innate and adaptive immune response, as illustrated in figure 2.

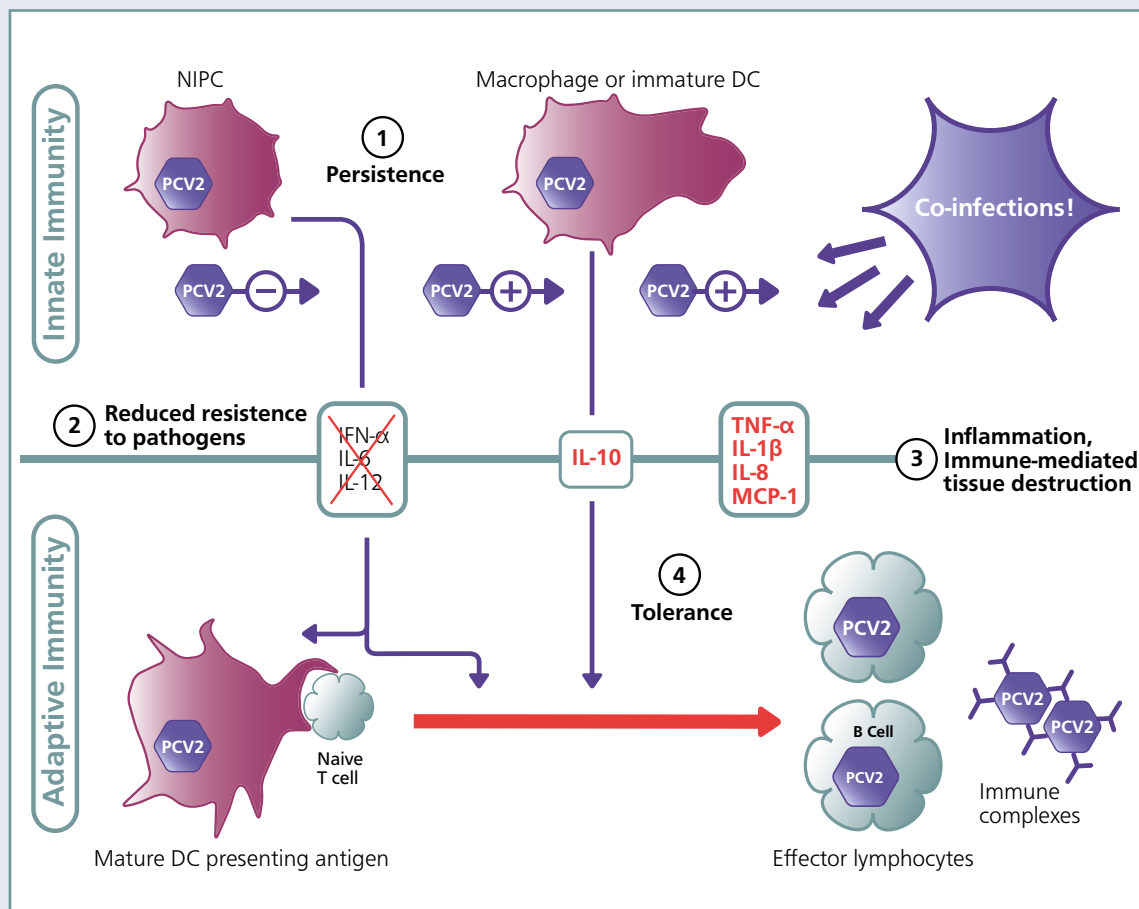
### Protective immune responses

Despite the immunomodulation described above, experimental PCV2 infections of weaned piglets have a very low morbidity and appear to be controlled by the immune system. Furthermore, vaccination programs against PCVDs can be successful.

The nature of these protective immune responses is still unclear although the importance of neutralizing antibodies is indicated by studies showing a correlation between protection and antibody levels. Nevertheless, after infection, neutralizing antibodies do not appear before 21 days, and it is unclear whether this relatively slow response is caused by the immunosuppressive characteristics of PCV2 or by poorly immunogenic neutralizing viral epitopes. Interestingly, PCV2-specific T cell-responses induced by infection also follow this slow kinetic, and are generally weak. Their role in protection is not clear.

### Summary

An interdisciplinary look at PCVDs strongly suggests that PCV2 can mediate immuno-suppression. Nevertheless, the virus has pleiotropic effects on immune functions, which range from triggering to suppression of immune responses. While this is perplexing, it is not surprising, considering the functioning of the immune system based on the interaction of highly specialized cell types within a regulatory network. Furthermore, a most important feature of the immune system is its “double-edge sword” nature, which requires a tightly regulated balance between stimulatory and regulatory elements. Our current understanding is that PCV2 has evolved by creeping into this system to hide from immune responses. PCV2 alone appears to be inoffensive but its immuno-modulating activity, together with co-infections and other husbandry factors, contribute to the devastating effects of PCVDs.



**FIGURE 2**

Overview of current knowledge on PCV2 immunomodulation.

**1-** PCV2 infects and persists in IM and DC and may use these cells as a “Trojan horse” for virus transport into lymphoid tissue where it will modulate the function of various cell types.

**2-** PCV2 inhibits the function of Natural Interferon Producing cells (NIPC, also called plasmacytoid DC, pDC) to produce IFN $\alpha/\beta$ , Inter Leukine 6 (IL-6) and IL-12. Particularly the inhibition of IFN $\alpha/\beta$  is important since NIPC are most potent producers of this cytokine, which plays a prominent role in controlling virus infections. In addition to its direct antiviral effect, IFN $\alpha/\beta$ , together with other cytokines, promotes the induction of adaptive immune responses through the induction of DC maturation and by enhancing cytotoxic T-cell and B-cell responses. DC that have not

been matured are inefficient in stimulating effector and memory T-cell responses and may even promote antigen tolerance.

**3-** PCV2 can stimulate the production of pro-inflammatory cytokines Tumor Necrosis Factor (TNF $\alpha$ , IL-1 $\beta$ ) and chemo-attractants (IL-8 and IM chemotactic protein-1, MCP-1). These cytokines may account for the inflammatory responses and the destruction of lymphoid tissue found in pigs with PWMS. A chronic stimulation of the immune system with such cytokines could also contribute to immune complex mediated diseases such as PDNS.

**4-** PCV2 promotes IL-10 secretion. During immune responses, this cytokine has an anti-inflammatory and tolerogenic role. All these functional modulations are influenced by co-infection which represents an important factor in disease development.

**LITERATURE FOR READING (REVIEWS)**

Ramamoorthy S, Meng XJ. 2008.

*Porcine circoviruses: a minuscule yet mammoth paradox.*

Anim Health Res Rev 2:1-20

Segalés J, Mateu E. 2006.

*Immunosuppression as a feature of postweaning multi-systemic wasting syndrome.*

Vet J 171:396-397.

Opriessnig T, Meng XJ, Halbur PG. 2007.

*Porcine circovirus type 2 associated disease: update on current terminology, clinical manifestations, pathogenesis, diagnosis, and intervention strategies.*

J Vet Diagn Invest 19:591-615.

Segalés J, Allan GM, Domingo M. 2005.

*Porcine circovirus diseases.*

Anim Health Res Rev 6:119-142.

Chae C. 2005.

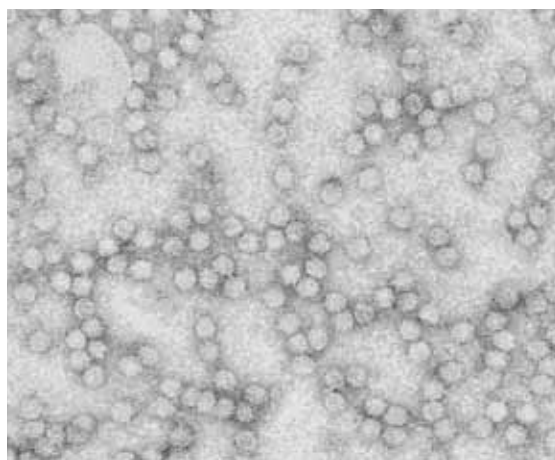
*A review of porcine circovirus 2-associated syndromes and diseases.*

Vet J 169:326-336

# Porcilis PCV: High performance protection



PCV2, EM Picture\*



Virus Like Particles (VLP) of ORF2 after harvesting, see the similarity in shape and size\*

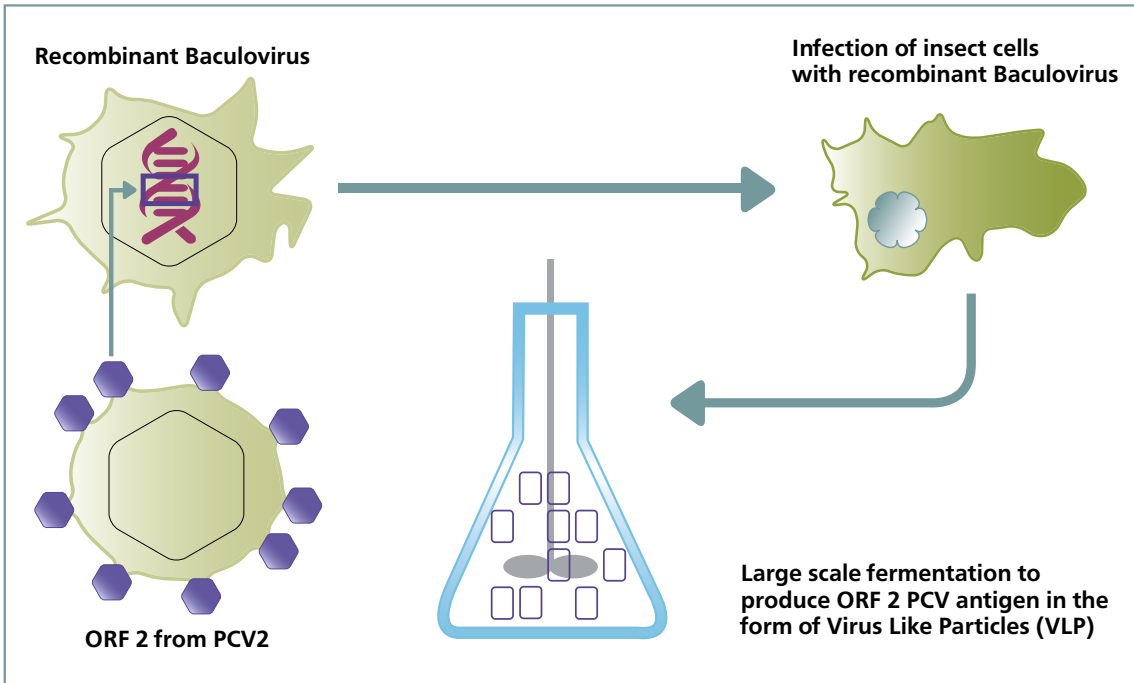
\* Source: Dr. Jan van Lent, Wageningen EM center (WEMC), Wageningen University, the Netherlands

Porcilis PCV contains the ORF2 of the PCV2 as antigen. ORF2 has been reported to be the dominant immunogenic factor that will induce solid protection against a PCV2 virus infection.

It is important for a vaccine to contain the right amount of antigen required to produce the optimal immune response. PCV2 grows very slowly, which makes it difficult to produce vaccines with a high antigen content.

Intervet/Schering-Plough Animal Health is well-known for its longstanding experience in sub-unit vaccines and therefore chose Baculo-virus vector System proven technology to produce the ORF2 antigen for Porcilis PCV.

Surprisingly, this ORF2 antigen forms after harvesting Virus Like Particles that resemble PCV2 virus, which will contribute to its excellent immunogenic properties.



Porcilis PCV, antigen production. Expression of ORF2 PCV2 Antigen using a Baculo-virus vector System

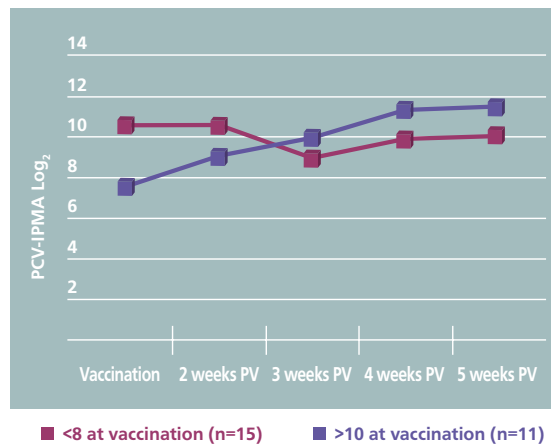
The adjuvant used in Porcilis PCV is XSolve, which is precisely the right adjuvant to induce solid protection when using sub unit antigens.

The combination of the right quantity of VLP (PCV2 ORF2 antigen) and XSolve has proved to give a most efficacious vaccine which is reflected in the two important claims that this vaccine has been granted. Firstly, the ability to break through medium to high levels of Maternally Derived Antibodies (MDA), and secondly the onset (within 2 weeks) and the duration of immunity (22 weeks after vaccination at 3 weeks of age, that is, up to 25 weeks of age).

CRISA in Barcelona performed a study on behalf of Intervet/Schering-Plough Animal Health with Porcilis PCV. In this study it was clearly shown that the product breaks through higher levels of MDA. A single dose of Porcilis PCV was used at 3 weeks of age with a challenge 2 weeks after vaccination. The serological results shown here are of the non-challenged control group. A clear seroconversion is seen in the group of piglets with an MDA titer of 8

(log<sub>2</sub> IPMA), while a delayed response to vaccination is seen in the piglets carrying higher levels of MDA. As these levels of MDA are clearly protective, active immunization can take place under the protective umbrella of MDA. Thus an immunity gap is effectively prevented. (Fort et al, in press 2009)

**Porcilis PCV serological results in vaccinated pigs with different level of MDA**

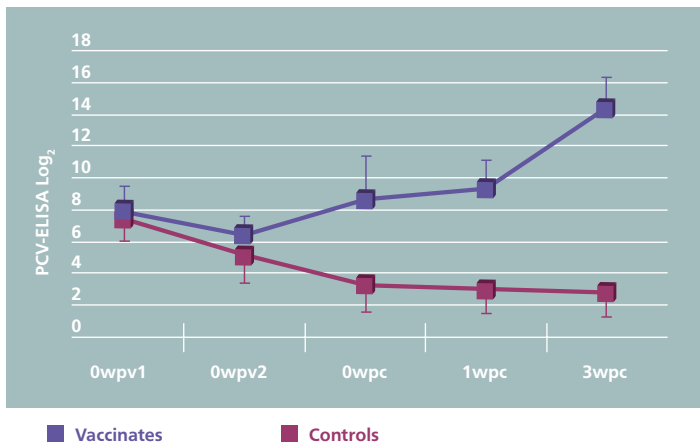


# Porcilis PCV: Laboratory experiments

## Vaccine efficacy

Vaccine efficacy is measured in the reduction of PCV2 viral load of vaccinated pigs after challenge. Under experimental condition this should, of course, be related to a non-vaccinated control group. Vaccine efficacy can also be measured in the induction of protective antibodies, either in SPF animals with no MDA or in commercial piglets that can carry high levels of MDA. In the example below, the seroconversion in the face of MDA clearly demonstrates the vaccine take.

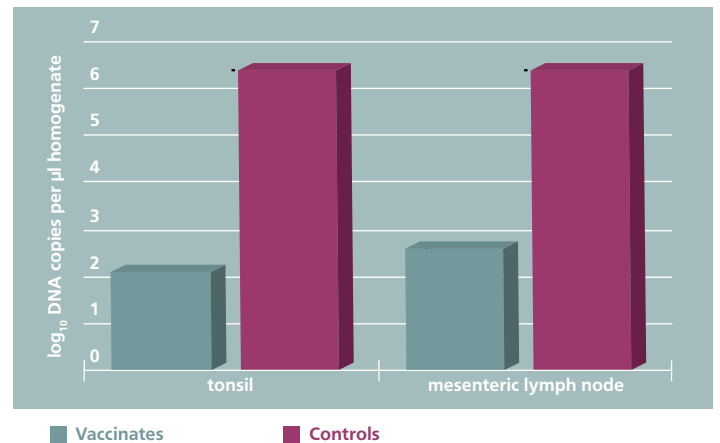
## Porcilis PCV serological response after vaccination and subsequent challenge



Serological response: piglets with moderate to high levels of MDA were vaccinated at 3-5 days of age and at 3 weeks of age and challenged 2 weeks after the second vaccination.

A clear difference was seen 3 weeks after challenge with a genotype 1 PCV2 strain. An example of the highly significant (note the log<sub>10</sub> scale) reduction in viral load in tissue is shown below.

## Amount of PCV2 in lymphoid tissues at 3 weeks post challenge



### Duration of immunity

Vaccinated animals were challenged 22 weeks after vaccination. Note in the following graph, the MDA titer at the time of vaccination, and the height of the antibody titer when challenged.

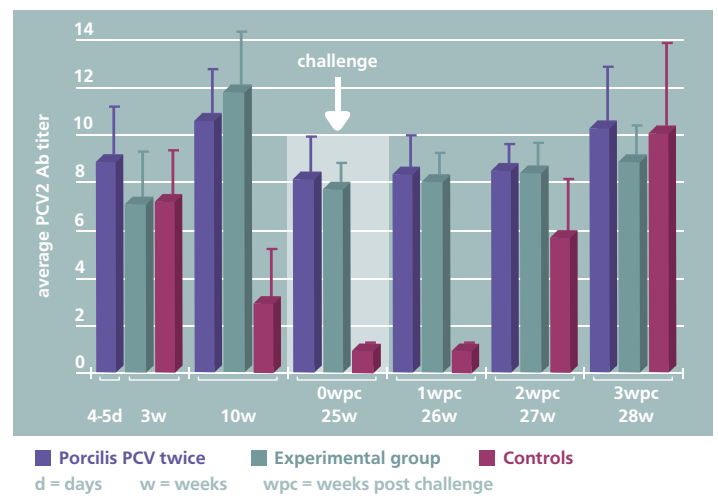
Three groups were included in this duration of immunity study. An unvaccinated control group, one group vaccinated twice and one experimental group vaccinated once only, at 3 weeks of age. This graph shows the serological titers.

Please note:

- The height of the MDA levels at time of vaccination.
- The height of the titers when challenged 22 weeks later and
- The difference in response to challenge in the vaccinated versus the control group.

The serological titers remained above the protective level for the duration of the study and the reduction in viral load after challenge was highly significant.

Duration of Immunity study (22 weeks)



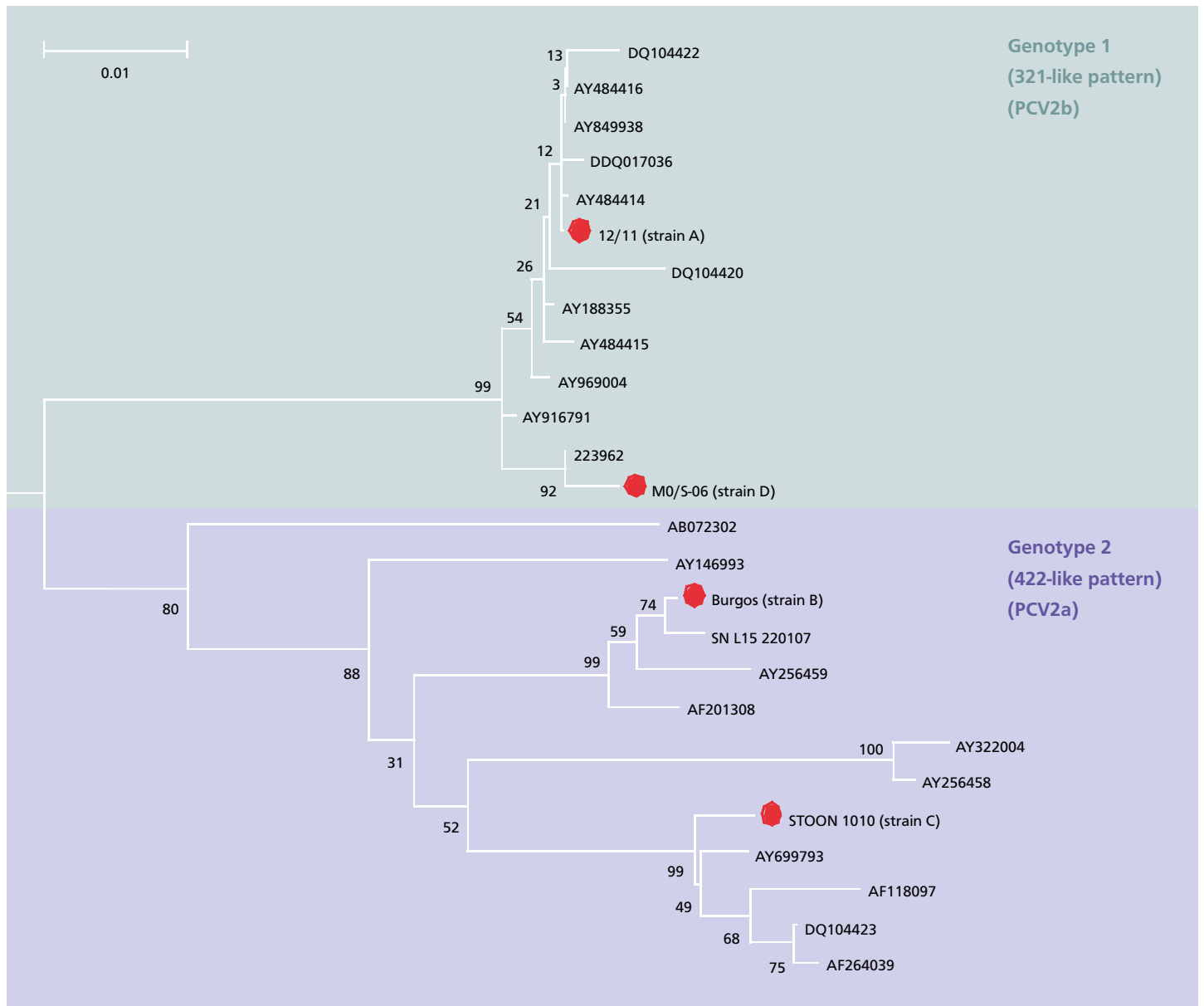
As well as monitoring the serology over time, other aspects of cellular immunity induced by Porcilis PCV have been studied by the PCV2 virus group at CRESA in Barcelona. A clear cellular response was measured after a single vaccination with a clear and fast anamnestic response after challenge (Fort et al in press).

**Porcilis PCV protection against PCV2a and PCV2b virus isolates of different geographical origins**

Pathogenic isolates from Europe, 1-12/11 (PCV genotype 2b) strain A and Burgos (PCV genotype 2a) strain B, and from North America, MO/S-06 (PCV genotype 2b) strain D and STOON 1010 (PCV genotype 2a) strain C, were used to challenge pigs 2 weeks

after vaccination with Porcilis PCV.

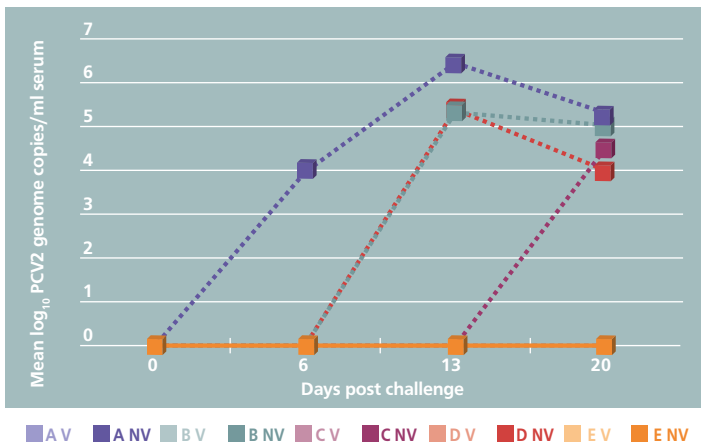
The red dots indicate the challenge strains used in this experiment, which was reported in Vaccine.



**Challenge studies**

The graph below shows the levels of PCV2 viremia after challenge in the different groups. Again this is a log<sub>10</sub> scale, so the values and the reduction in circulating virus are enormous. All the dotted lines visible in this graph are the groups that were not vaccinated but challenged with one of the four selected PCV2 field viruses. For example, AV means Group A vaccinated and challenged with challenge strain A, and A NV means Group A not vaccinated and challenged with challenge strain A, and so on for B, C and D. The two E groups were control groups, one vaccinated but not challenged and the other neither vaccinated nor challenged. It will be noticed that all the straight lines remain horizontal at the level of, or close to 0.

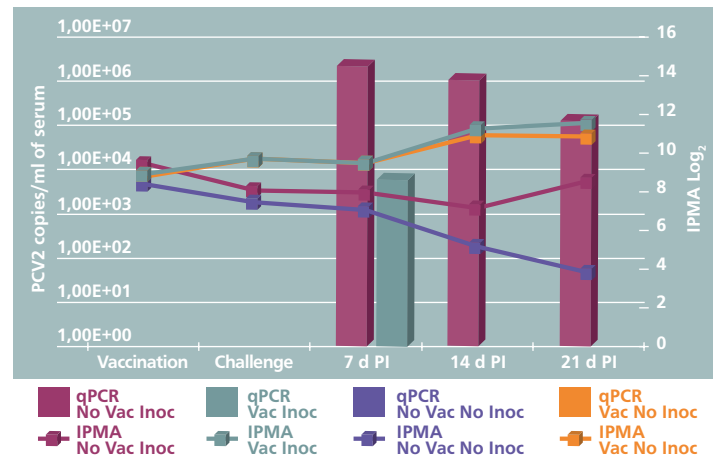
**Porcilis PCV: viremia after challenging vaccinated and non-vaccinated pigs**



The graph shows that no viremia was detected in the vaccinated groups challenged with any of the four different isolates. By contrast, viremia was detected in the unvaccinated groups whatever the challenge.

Also, in a second experiment, with a Genotype 2b challenge strain after a single vaccination at 3 weeks of age with Porcilis PCV, in the face of high levels of MDA, a similar result was obtained. The solid bars show the level of viremia and the lines show the serological response. Please note the high levels of MDA (IPMA Log<sub>2</sub> titers) at 3 weeks of life. (Segales et al, IPVS 2008). There was only a single moment that a low amount of virus was found by qPCR in the vaccinated and challenged group. However a significant difference was observed when compared with the control group.

**Porcilis PCV: serology and qPCR after challenging vaccinated and non-vaccinated pigs**



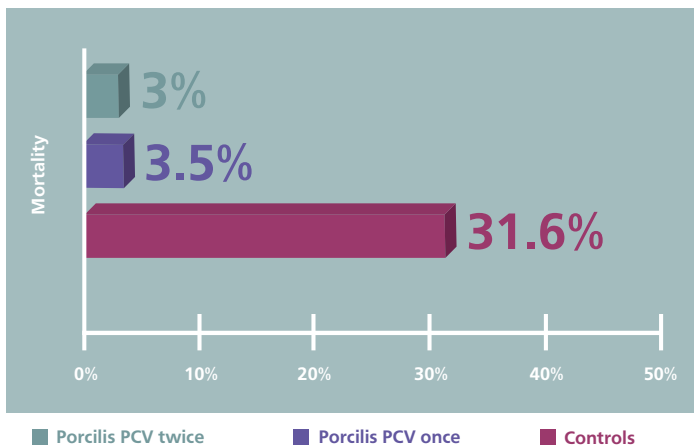
# Porcilis PCV: Field trials

## Experiences with Porcilis PCV, data from field experiments

During the registration process in Japan, several field trials were carried out successfully and officially registered label claims were granted for both the 2 x 2ml dose scheme (at 3 days and 3 weeks of age) and the 1 X 2ml dose scheme (from 3 weeks of age onwards).

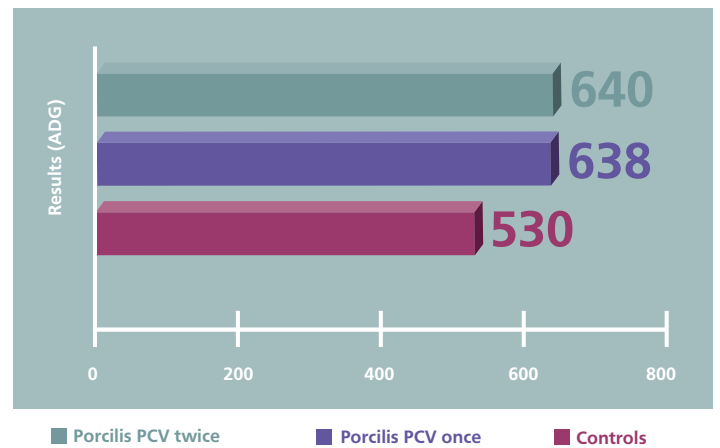
The figure below shows the percentage mortality including culls, demonstrating a clear difference between the control and the vaccinated groups. No clear difference is seen between the two vaccinated groups in this official field trial.

## Porcilis PCV: mortality and culls vaccinated and non-vaccinated pigs



On top of this remarkable improvement in the number of pigs surviving a PCV2 field virus infection, there is also a notable improvement in the average daily growth (ADG), see the figure below.

## Porcilis PCV: average daily gain of vaccinated and non-vaccinated pigs



In Europe, the problems in the field related to PCVDs are very often noticed more in the increased use of antibiotics and lower than expected growth rates.

**Results from a field trial performed by the University of Munich, Germany**

The trial summarized below focused on the improvements in ADG observed on farms with less obvious clinical symptoms than had been seen in the USA, Canada and, for example, Japan.

**Porcilis PCV: average daily gain of vaccinated and non-vaccinated pigs**

Porcilis PCV	Body weight 1 <sup>st</sup> week of live	BW at 3 <sup>rd</sup> week of live	BW at 11 <sup>th</sup> week of live	BW at 24 <sup>th</sup> week of live
Vaccination 3 <sup>rd</sup> week of live	2.20 kg	5.75 kg	29.99 kg	97.28 <sup>**</sup> kg
Controls	2.17 kg	5.77 kg	30.65 kg	94.82 <sup>*</sup> kg

<sup>\*\*</sup> significantly different from <sup>\*</sup>  
P<0.05 140 pigs per group

This is one of the many examples reported by different researchers from their field experience with PCV2 vaccines. The increase in bodyweight in vaccinated pigs is a constant finding on farms suffering from signs of PCVDs, but of course is only noticeable when systems are in place to measure days to market in relation to final body weight and feed intake.



# Safety

Safety testing of any new vaccine is carried out both under laboratory conditions, following Good Laboratory Practice (GLP) guidelines and under field conditions following Good Clinical Practice (GCP) guidelines.

The following text is an integral part of the leaflet accompanying Porcilis PCV. *Transient local reactions at the injection site may occur after vaccination, mainly in the form of a hard, warm and sometimes painful swelling (diameter up to 10 cm). These reactions resolve spontaneously over a period of approximately 14-21 days without any major consequence on the general health status of the animals. Immediate systemic hypersensitivity-like reactions may occur after vaccination, resulting in minor neurological symptoms such as tremors and/or excitation, which normally resolve within minutes without requiring treatment. A transient increase in body temperature, normally not*

*exceeding 1°C, may occur until 2 days after vaccination. Occasionally, an increase of rectal temperature up to 2.5 °C lasting less than 24 hours may occur. Some piglets may be depressed and show a reduced feed intake for up to 5 days. Vaccination may result in a transient impairment of growth rate in the immediate period after administration of the vaccine.*

With the experience of the use of our PCV vaccines in several countries accumulated so far, it can be concluded that these side-effects are an infrequent occurrence (on the assumption that the product is used correctly, with respect to technique, hygiene and equipment). There will always be differences between farms, management practices and vaccination techniques that will influence the number and character of reactions observed. It is strongly advised that the product be allowed to reach the ambient temperature before use (normally within 3 hours of removal from the refrigerator).



# Summary of Product Characteristics

Each dose of 2 ml contains:

Porcine circovirus type 2 ORF2 subunit antigen: at least 4.5 log<sub>2</sub> ELISA units\*

\* Antibody titre obtained according to the *in vivo* potency test in chickens.

**Adjuvants:** DI- $\alpha$ -tocopheryl acetate and paraffin

## PHARMACEUTICAL FORM

Emulsion for injection

**Target species:** Pigs

## Indications for use

For the active immunisation of pigs to reduce the virus load in blood and lymphoid tissues and to reduce weight loss associated with PCV2 infection occurring during the fattening period

Onset of immunity: 2 weeks

Duration of immunity: 22 weeks

**Contraindications:** None

## Special warnings

From the data provided, it can be concluded that a full dose regimen of vaccination breaks through medium to high levels of maternally derived antibodies in piglets.

No data are available on the use of the vaccine in breeding boars.

## Special precautions for use in animals

Vaccinate only healthy animals.

## Special precautions to be taken by the person administering the veterinary medicinal product to animals

To the user:

This product contains mineral oil. Accidental injection/self injection may result in severe pain and swelling, particularly if injected into a joint or finger, and, in rare cases, could result in the loss of the affected finger if prompt medical attention is not given. If you are accidentally injected with this product, seek prompt medical advice even if only a very small amount is injected and take the package insert with you. If pain persists for more than 12 hours after medical examination, seek further medical advice again.

To the physician:

This product contains mineral oil. Even if small amounts have been injected, accidental injection with this product can cause intense swelling, which may, for example, result in ischaemic necrosis and even the loss of a digit. Expert, PROMPT, surgical attention is required and may necessitate early incision and irrigation of the injected area, especially where there is involvement of finger pulp or tendon.

## Adverse reactions (frequency and seriousness)

Transient local reactions at the injection site may occur after vaccination mainly in the form of a hard, warm and sometimes painful swelling (diameter up to 10 cm). These reactions resolve spontaneously over a period of approximately 14-21 days without any major consequence on the general health status of the animals. Immediate systemic hypersensitivity-like reactions may occur after vaccination, resulting in minor neurological symptoms such as tremors and/or excitation, which normally resolve within minutes without requiring treatment. A transient increase in body temperature, normally not exceeding 1°C, may occur until 2 days after vaccination.

Occasionally, an increase of rectal temperature up to 2.5 °C lasting less than 24 hours. Some piglets may be depressed and show a reduced feed intake for up to 5 days. Vaccination may result in a transient impairment of growth rate in the immediate period after administration of the vaccine.

## Use during pregnancy and lactation

Do not use during pregnancy and lactation.

## Interaction with other medicinal products and other forms of interaction

No information is available on the safety and efficacy of this vaccine when used with any other veterinary medicinal product. A decision to use this vaccine before or after any other veterinary medicinal product therefore needs to be decided on a case by case basis.

## Amounts to be administered and administration route

Before using the vaccine, allow it to reach room temperature and shake well before use. Avoid multiple vial broaching. Use sterile syringes and needles. Avoid introduction of contamination. Avoid use of vaccination equipment with rubber parts.

## Vaccination

Administer 2 ml by intramuscular injection in the neck, in the area behind the ear, according to the following schedule:

The first dose (2 ml) can be given from an age of 3 days, with the second dose (2 ml) 2-3 weeks later.

## Overdose (symptoms, emergency procedures, antidotes)

Following the administration of a double dose of vaccine no side-effects have been observed other than those described under 'adverse reactions'.

**Withdrawal period:** Zero days

## Shelf life

Shelf life of the veterinary medicinal product as packaged for sale: 2 years

Shelf life after first opening the immediate packaging: 8 hours.

## Special precautions for storage

Store in a refrigerator (2 °C – 8 °C).

Do not freeze.

Protect from light.

## Special precautions for the disposal of unused veterinary medicinal products or waste materials derived from the use of such products

Any unused veterinary medicinal product or waste materials derived from such veterinary medicinal products should be disposed of in accordance with local requirements.

## MARKETING AUTHORISATION HOLDER

Intervet International BV  
Wim de Korverstraat 35  
5831 AN Boxmeer  
The Netherlands

# THE NEW WINNING FORMULA IN LIFETIME PCV2 PROTECTION!



## Porcilis PCV guarantees:

- 22 weeks of protection
- longlasting antibodies
- ability to break through maternally derived antibodies

Intervet International bv  
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Phone +31 (0)485 587600  
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