Boehringer Ingelheim

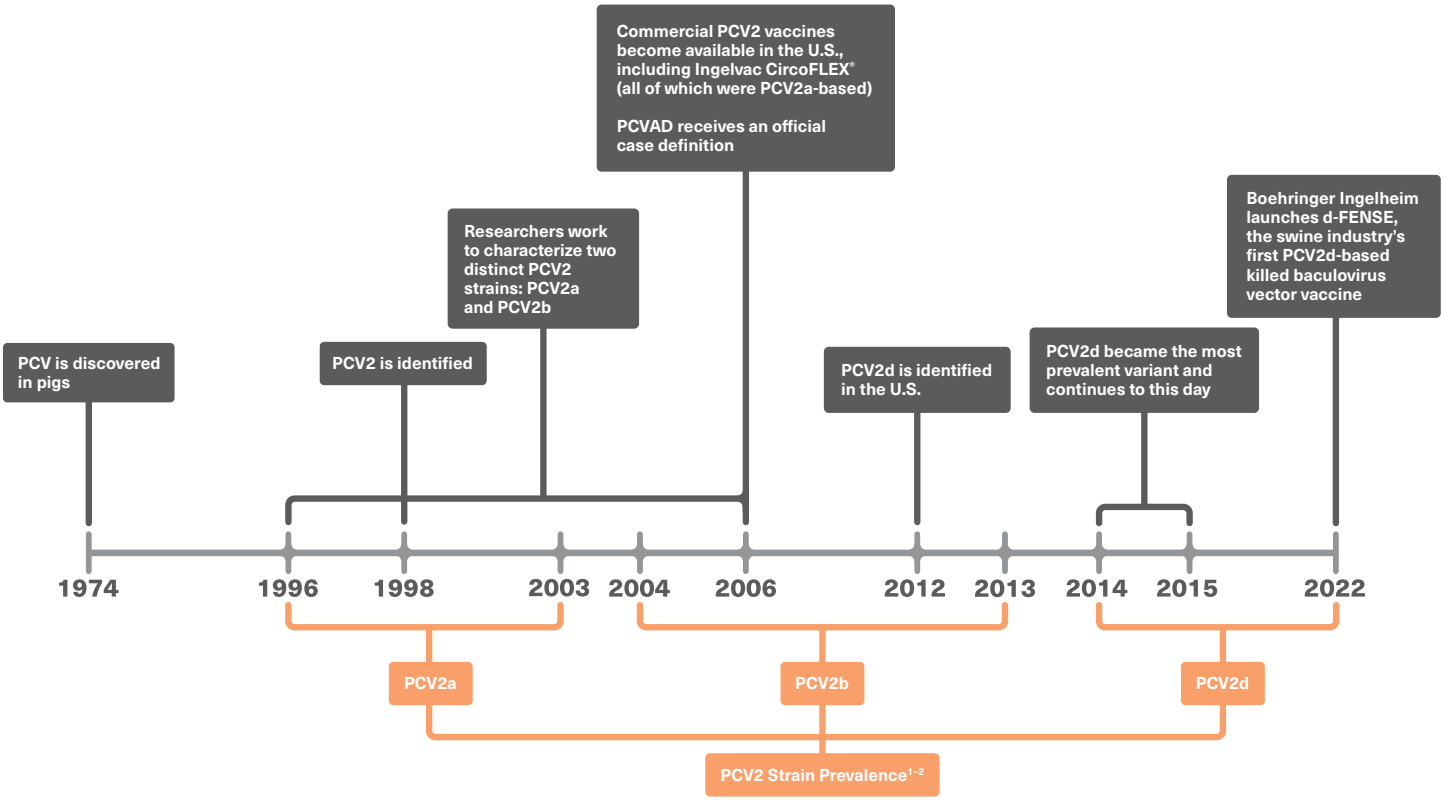
SECURING TOMORROW

Control PCV2 in all its forms with innovative solutions from Boehringer Ingelheim.

The Changing Landscape of PCV2

Porcine circovirus through the years

Porcine circovirus (PCV) has a long history, having first been identified in the 1970s and evolving into the different strains that persist today. Currently, there are three major porcine circovirus Type 2 (PCV2) genotypes in circulation: PCV2a, b and d.[1] Today, PCV2d is the predominant genotype circulating in the United States, accounting for more than 90% of PCV2 infections.[2]



As is clear from the complex and ever-changing nature of PCV2, producers need flexible and comprehensive solutions to fight every strain of the disease to prevent performance loss from porcine circovirus associated disease (PCVAD).

A new approach for protecting pigs against worst-case PCVAD

An extensive body of research has demonstrated that Ingelvac CircoFLEX®, a PCV2a-based vaccine, can provide heterologous cross-protection against PCV2d.[3–7] In most cases, producers can rely on this trusted vaccine to protect their herds from the harmful effects of PCVAD. But in some worst-case scenarios, such as a PCV2d infection along with severe co-infections, some pigs within vaccinated populations can still present clinical signs. In these cases, PCV2d control calls for a different approach.

To stay ahead on PVCAD management and provide producers and veterinarians with another tool in their toolbox, Boehringer Ingelheim introduced d-FENSE, the swine industry's first PCV2d-based killed baculovirus vector vaccine. It is designed to provide a different solution for severe PCVAD presentations.

Proven Protection Against PCV2d

Boehringer Ingelheim conducted a randomized, blinded challenge study to measure whether a PCV2d-based vaccine (d-FENSE) would provide more robust and targeted protection against PCVAD in cases of severe PCV2d co-infections (PRRS, IAV-S and endemic bacteria), compared to cross-protection levels of a PCV2a-based vaccine (Ingelvac CircoFLEX®).

Study Key Findings

- Severe co-infection of PCV2d and porcine reproductive and respiratory syndrome virus (PRRSV) resulted in mortality of more than 60% of non-vaccinates, compared to only 8.2% of PCV2d vaccinates.[8]
- PCV2d vaccinates demonstrated a significant reduction in lymphoid lesion severity and viral replication under severe PCVAD field conditions, compared to non-vaccinates and PCV2a vaccinates.[8]
- The number of pigs requiring treatment in the acute phase of PCVAD was significantly less among PCV2d vaccinates, compared to non-vaccinates and PCV2a vaccinates.[8]

d-FENSE Delivers Efficacy and Robustness Under Severe PCVAD Conditions[8]

Experimental co-infection resulted in high mortality and severe PCVAD among non-vaccinates. Table 1 shows the effect of overall lymphoid lesion score and the detection of the virus.

Table 1: Overall lymphoid lesion score and virus identification – Subset of 20 pigs

Parameter	Non-vaccinates	PCV2a vaccinates	PCV2d vaccinates	se	*P*-value
Overall lymphoid lesion score (average)	1.63[a]	0.77[b]	0.09[c]	0.18	< 0.0001
PCR lymphoid tissue (Ct)	12.1[a]	17.8[b]	26.1[c]	1.35	< 0.0001

*Means with different superscripts indicate difference at $P \leq 0.05$

There were no significant differences in mortality between the vaccinated groups (Table 2). The PCV2d vaccinates had 1.5% lower mortality and 7.6% fewer treated pigs (Table 3) than PCV2a vaccinates.

Table 2: Mortality (%)

Study day	Non-vaccinates	PCV2a vaccinates	PCV2d vaccinates
Day 28–56	61.7[a]	9.7[b]	8.2[b]
Day 57–140	1.3	2.9	3.1

*Means with different superscripts indicate difference at $P \leq 0.05$

Table 3: Treated pigs (%)

Study day	Non-vaccinates	PCV2a vaccinates	PCV2d vaccinates
Day 28–56	87.0[a]	44.2[b]	36.6[c]
Day 57–140	6.4	5.7	3.3

*Means with different superscripts indicate difference at $P \leq 0.05$

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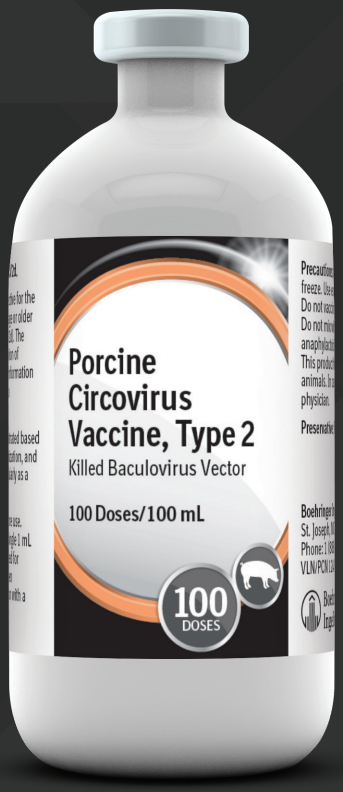
d-FENSE

d-FENSE is a single-dose PCV2d vaccine that can be administered to pigs 3 weeks of age and older while providing a duration of immunity (DOI) of at least four months.



- Onset of immunity within two weeks of vaccination
- Reduces PCV2 viremia
- Convenient single 1-ml dose
- Low risk of adverse reactions and stress on pigs due to one-dose administration
- PQA® Plus friendly
- Contains ImpranFLEX®, an effective aqueous-based (non-oil) polymer adjuvant

NAME	CODE	SIZE
Porcine Circovirus Vaccine Type 2, Killed Baculovirus Vector	162664	100 mL

References
[1] Segalés J, Allan G, Domingo M. Circoviruses. Zimmerman J, Karriker LA, Ramirez A, et al., eds. *Diseases of swine* (11th Edition) 2019;473–487.
[2] Madson D. Porcine circoviruses: Are changes occurring?, in *Proceedings*. AASV 50th Annual Meeting 2019;5–8.
[3] Payne B, Jacobs, Dvorak C, et al. PCV2 vaccine cross-protection: Identification of sequences in successfully vaccinated field cases, in *Proceedings*. AASV 2016 Annu Meet 2016;202–206.
[4] Fano E, Schaefer N, Schmaling E, et al. Comparison of efficacy between two PCV2 vaccination protocols under PCV2d field exposure, in *Proceedings*. AASV Annu Meet 2017;95–97.
[5] Fano E Comparison of efficacy between two PCV2 vaccines under PCV2d experimental exposure, in *Proceedings*. AASV Annu Meet 2021.
[6] Philips R, Fano E, Schmaling E, Edler R. A severe PRDC challenge and the effect of a trivalent PRDC vaccine for PCV2, Mhp and PRRS. Boehringer Ingelheim Vetmedica, Inc., Health Management Center (HMC), Field Research Services. 2018.
[7] Friedrich R, Patterson AR, Johnson W, et al. Efficacy of porcine circovirus Type 2a- and 2d-based vaccines following PCV2 challenge. *J Vaccines Vaccination* 2019;10(2):1–5.
[8] Fano E Exploring the efficacy of a PCV2d-based vaccine under current severe PCVAD conditions, in Proceedings. AASV Annu Meet 2022.