PEDv Vaccination

I don’t have all the answers

Oregon Pork Producers Board

January 28, 2016

Salem, OR

Charles Estill, OSU Extension Veterinarian

Suckling piglets affected by PED

Photos courtesy of Drs. Joe Connor & Lisa Becton

A PED Control Strategy

3 Components

- Biosecurity
  - Internal
  - External
- Sanitation
  - Premises
  - Vehicles
  - Equipment
  - Personnel
- Sow vaccination
  - Autogenous feedback
  - Licensed vaccine

Porcine Epidemic Diarrhea (PED): Vaccination

PEDv Vaccination Strategy

- Sow vaccination for maternal antibody transfer to litters
- Autogenous feedback used in some herds
- Licensed vaccine the preferred alternative

Stimulating an Immune Response

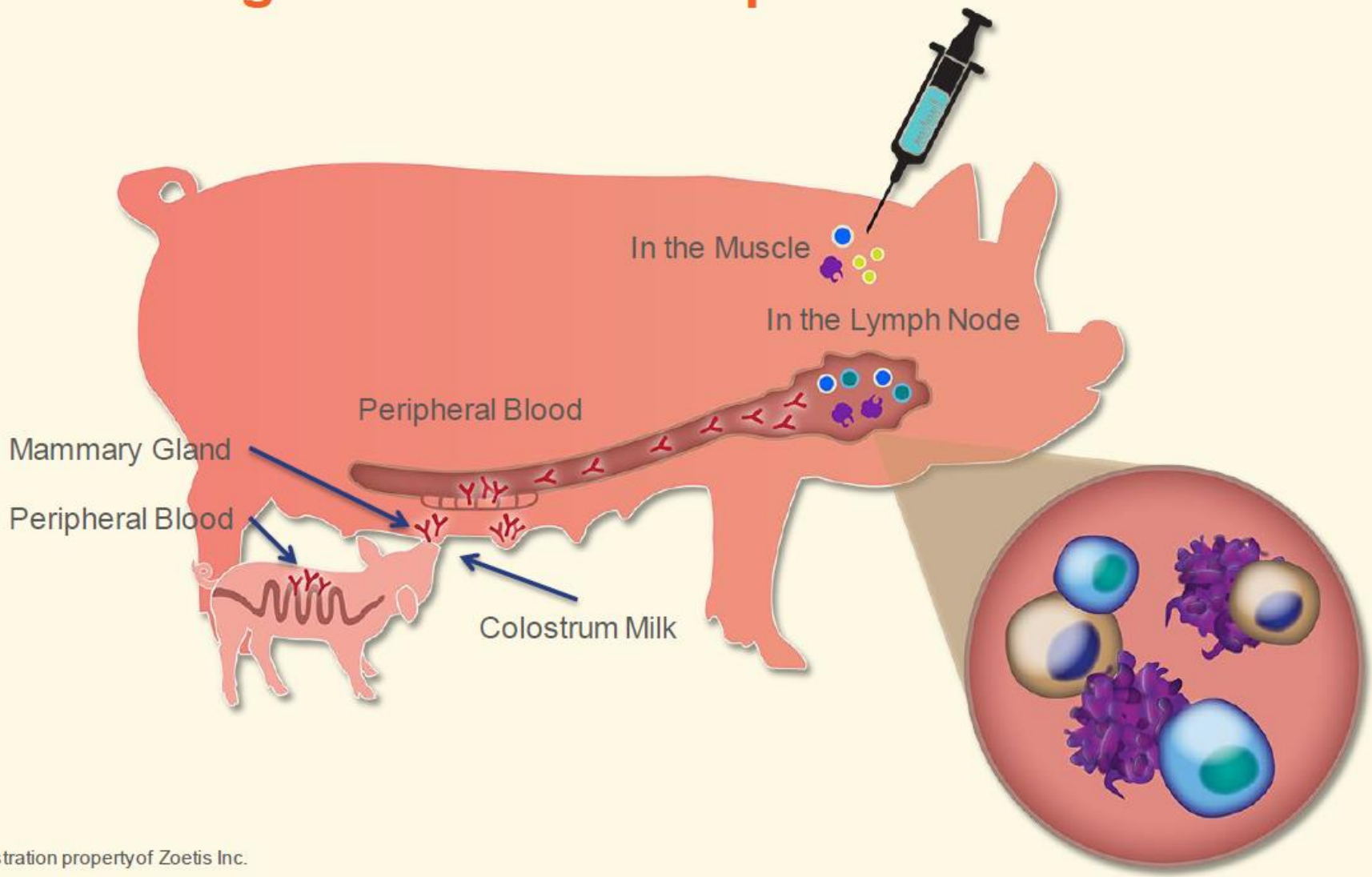
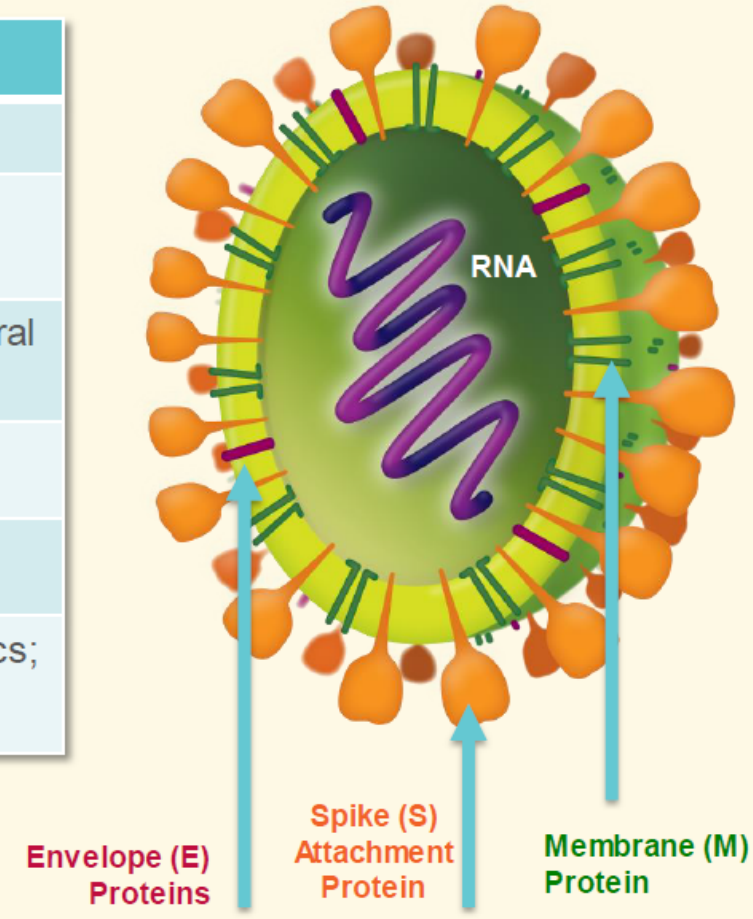


Illustration property of Zoetis Inc.

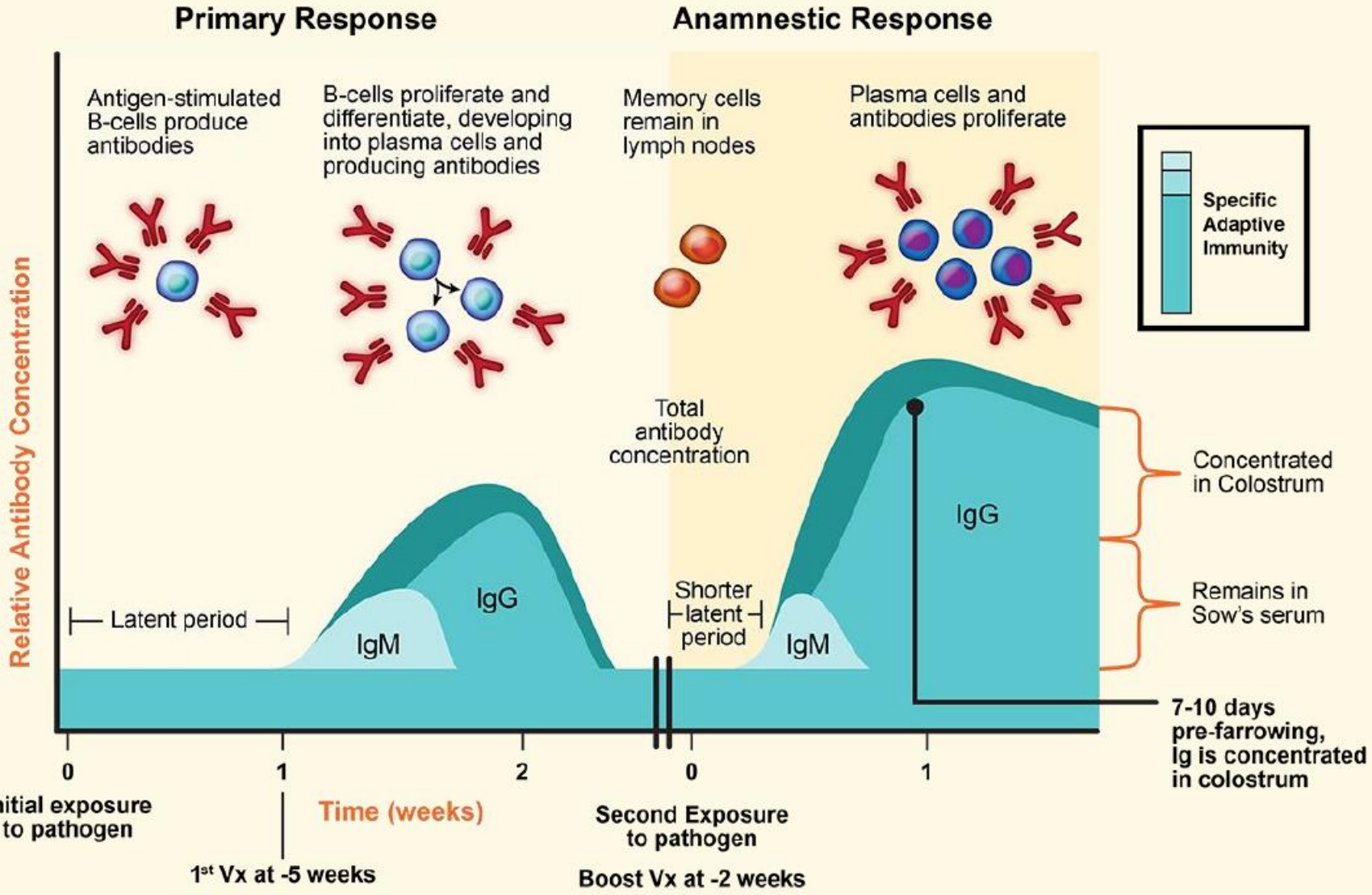
PEDv Immunizing Antigens

Key PEDv Antigens	
Antigen	Relevance
S (spike)-protein	Cellar attachment; induces antibodies; virus-cell fusion[1]
M (membrane)-protein	Most abundant protein; enables viral assembly; induces antibodies[2]
E (envelope)-protein	Deletion causes viral attenuation
N (nucleocapsid)-protein	Contains RNA genome
RNA	Carries virus genetic characteristics; predominates in infected cells

PED Coronavirus



1. Li W, et al. *Emerg Infect Dis*. 2012;18:1350-1353.
2. Pan Y, et al. *Virol J*. 2012;9:195.



PEDv Vaccine Comparison

Zoetis KV Vaccine	Inactivated Subunit
2 serum neutralizing proteins Contains S- and M-proteins ▸ Both induce antibody response ▸ M-protein is most abundant	Contains S-protein only
Adjuvanted to help enhance immune response	Non-adjuvanted
Contains whole virus to help stimulate a more complete immune response[1,2]	Subunit vaccine
2 year dating	Short shelf life
Access to vaccine (widespread distribution)	Direct shipment to individual producers

1. Issel CJ, et al. *J Virol*. 1992;66:3398-3408.
2. Geeraedts F, et al. *Influenza Other Respir Viruses*. 2008;2:41-51.

Porcine Epidemic Diarrhea vaccine, RNA

Harris Vaccine

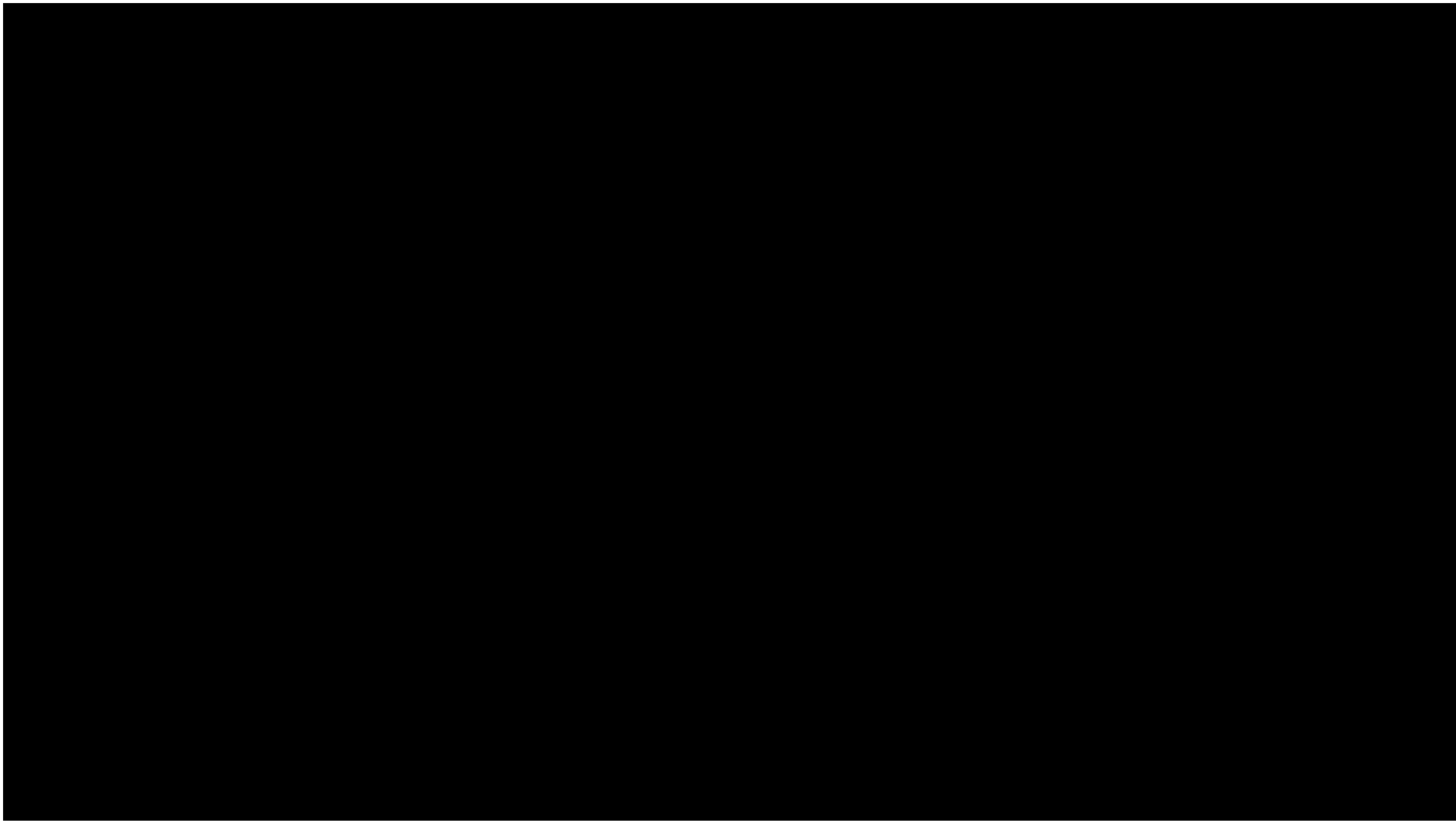
This is their second generation vaccine
Released 6/2014

The First U.S. Conditionally Licensed PED Vaccine

iPED+ developed by Harrisvaccines (Ames, IA)

- January 2014 – Introduces iPED+, inactivated subunit vaccine
- Contains S-protein
- Sows vaccinated 1 – 3 weeks pre-farrowing Now recommend 1-4 weeks
  - 1 dose in previously exposed herds
  - 2 doses in naïve herds

Harris Vaccine RNA technology



Will not comment on efficacy in naïve animals but said “there is a difference”

Harris said its vaccine is predominately being used in herds that are already affected by the virus. The pigs have either already been exposed to the virus or it is being used when bringing in animals where the virus is already present. “What we’ve seen is there is a statistically higher antibody level in those vaccinated sows versus non-vaccinated ones,” he said.

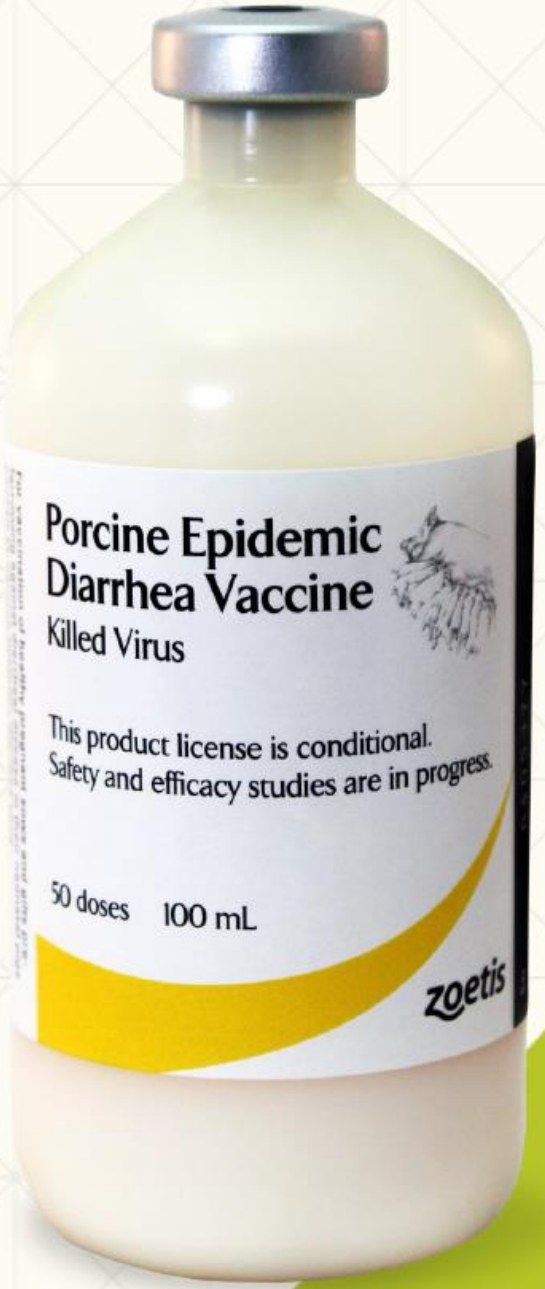
Another problem!

- There are various strains with different clinical presentations. The original North American PEDv strain that closely resembles the Chinese strain AH2012 caused severe illness and deaths in piglets in 2013. The second North American PEDv variant-INDEL strain (OH851) that has a spike gene deletion, correlated with less severe clinical presentations. The third strain was reported as PEDv strain (S2aa-del) with the two amino acids deletion at positions 55 and 56.

Introducing!

Porcine Epidemic Diarrhea Vaccine *
Killed Virus

Shake well and administer 2 mL intramuscularly. Healthy pregnant swine should receive 2 doses with the first dose being administered 5 weeks prior to farrowing. The second dose should be given 2 weeks prior to farrowing. Pregnant swine should be vaccinated with a single dose 2 weeks before each subsequent farrowing. Duration of immunity has not been evaluated.



* This product license is conditional. Efficacy and potency studies are in progress.

Does the vaccine work? (well-managed, PEDv pos farm)

- Litters from vaccinated sows had a lower PED-associated pre-weaning mortality rate compared to litters from placebo control sows,0.6% versus 6.3% (a 90% relative reduction).
- Vaccinated sows weaned 20.1% more litters compared to placebo control sows, 93.8% versus 78.2%. Litters not weaned had 100% mortality due to PEDv or any other reason.

Pre-weaning Mortality Due to PEDv – Broken Out by Parity*

Parity	Treatment	No. Sows	Back-transformed Mean Percent Litter Mortality due to PEDV	Standard Deviation	Range
≥ P4	T01	40	5.4	22.41	0 – 100%
	T02	38	0.1	0.79	0 – 30.77%
P1 – P3	T01	37	4.1	16.64	0 – 100%
	T02	37	0.3	2.25	0 – 80%
Gilts	T01	37	10.1	36.88	0 – 100%
	T02	38	2.0	11.95	0 – 100%

* Also have data broken out by block and parity to look at dynamics over duration of the study, but since only 4–5 sows per parity per treatment, the data are variable.

zoetis

Evaluation of the effects of PEDV Vaccine on PEDV Naïve and Previously PEDV-Exposed Sows: Challenge model with comparison of immune response and preweaning mortality

Trevor Schwartz, DVM
Suidae Health and Production

Zoetis PED Vaccine

PEDV Vaccine Trial

Objectives of study:

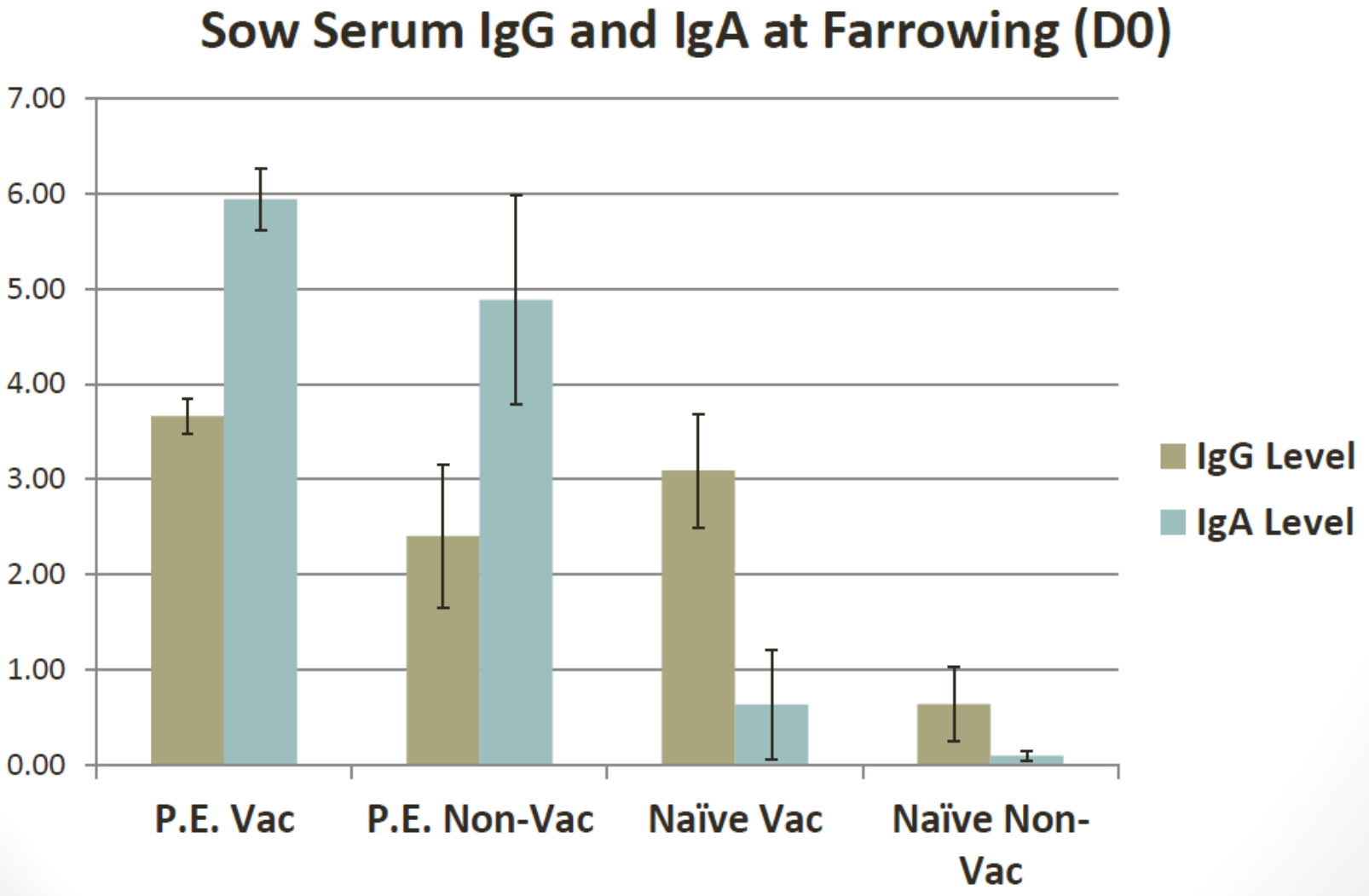
1. Determine the effect of PEDV vaccination on antibody response in PEDV naïve and PEDV previously exposed sows

- IgG and IgA in sow serum
- IgG and IgA in sow colostrum
- IgG and IgA in sow milk

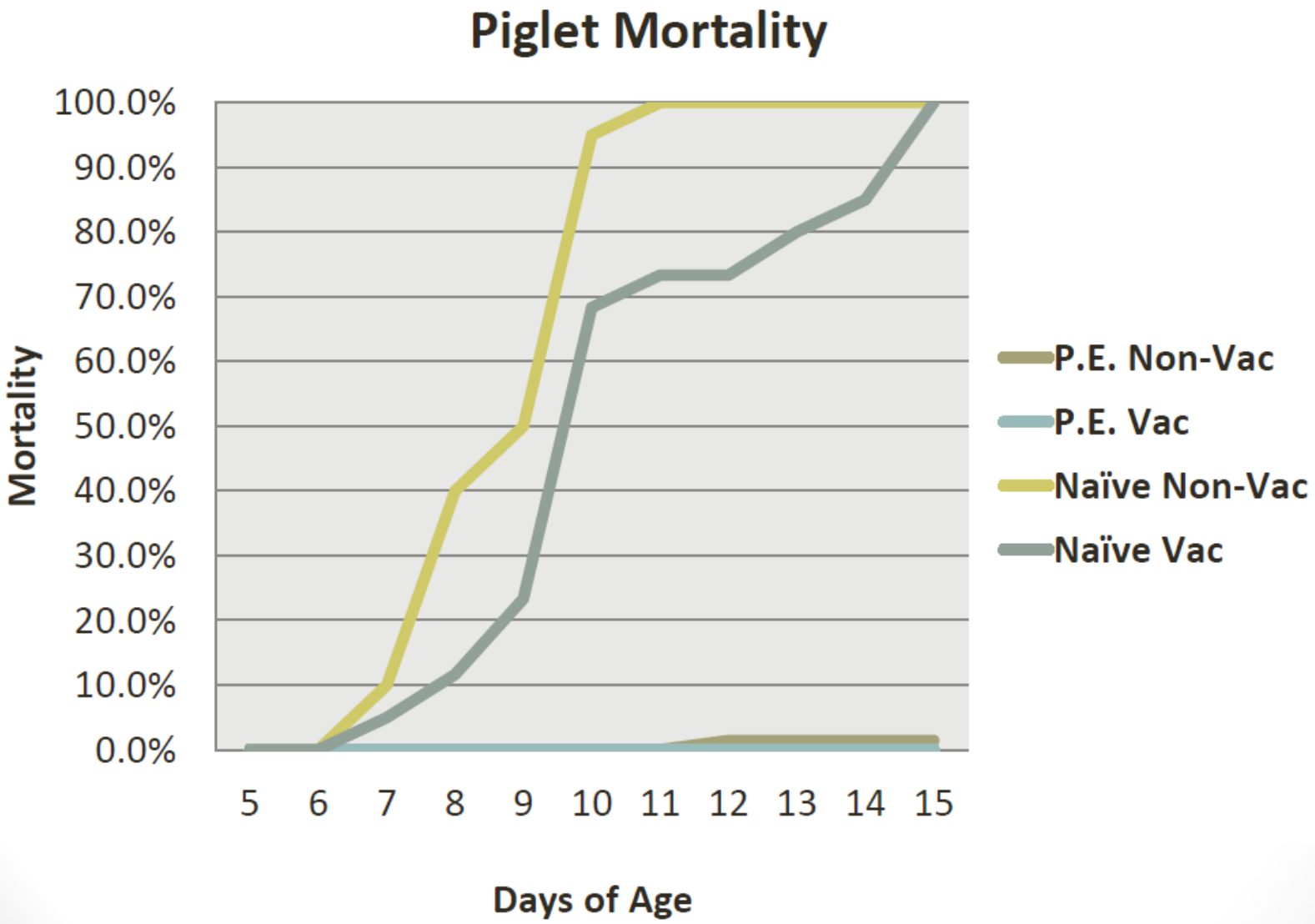
2. Determine the effect of PEDV challenge on piglets from vaccinated PEDV-exposed sows and PEDV-naïve sows

- IgG and IgA in piglet serum at 2 and 9 days-of-age
- Piglet mortality

Results - Sows



Results Piglets



Take Home Messages:

- Under the conditions of this study, PEDV vaccine (as a 2 dose protocol) did not protect piglets born to naïve sows
  - Piglets from vaccinated sows lived longer but still eventually died
  - Possibly due to re-exposure to high doses of PED virus

- IgA isotype was the most important antibody for protection
  - The amount or protective threshold of antibody is unknown.

- PEDV vaccine did appear to booster IgG and IgA levels in previously exposed sows
  - Vaccine may lengthen the magnitude and duration of immunity in previously exposed sows
  - Vaccine may be an aid in increasing the rate of return to normal production

Vaccine side effects - Zoetis

- *Transient injection site swelling may occur following vaccination*
- No systemic adverse reactions, no off-feed and no abortions

How much does the vaccine cost?

- Harris iPED+ is $150/50 dose plus shipping
  - No prescription required
- Zoetis PED vaccine is $175/50 dose plus shipping
  - Requires authorization from a veterinarian

Who are the manufacturer contacts?

- Harris Vaccine:
  - Joel Harris – Director of Sales
    - (515) 296-3930
    - questions@harrisvaccines.com
- Zoetis:
  - Darren Remsburg, DVM, Dipl ABVP | Livestock Veterinarian Zoetis | Veterinary Medical Information & Product Support
    - Office: 800.366.5288 | Fax: 866.590.1149 | darren.remsburg@zoetis.com Visit Us: zoetis.com