

22nd PINOY PORK CHALLENGE

Seda Vertis North, QC

October 4, 2018

Latest on PED dynamics and what we are learning from the recent Philippine breaks

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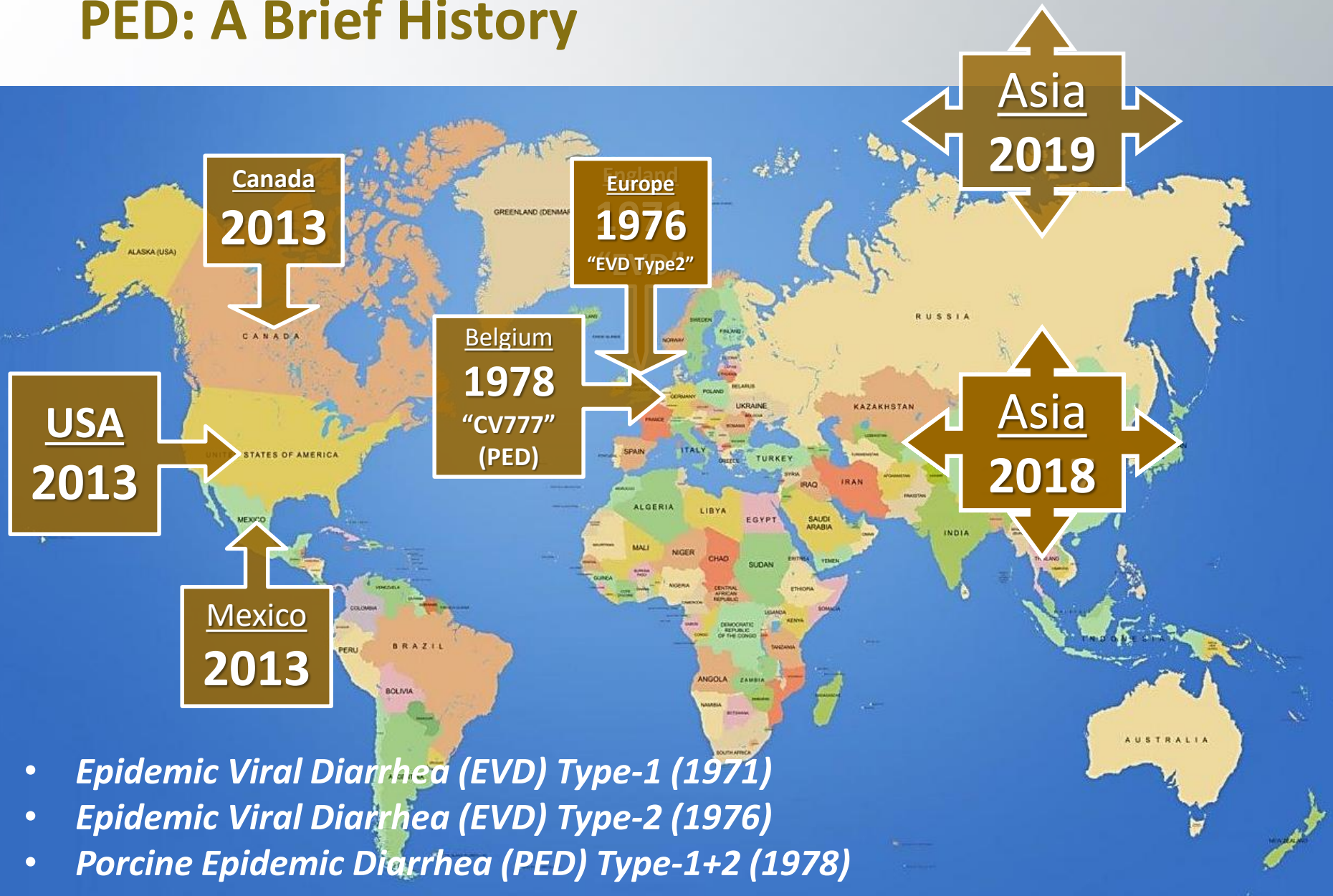
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Outline

- **PED:** A brief history
- **PED:** Dynamics of the disease within the past 4 decades
- **PED:** What we are learning based on local experiences

PED: A Brief History



PED: Dynamics within the past four decades

“Know Thy Enemy”

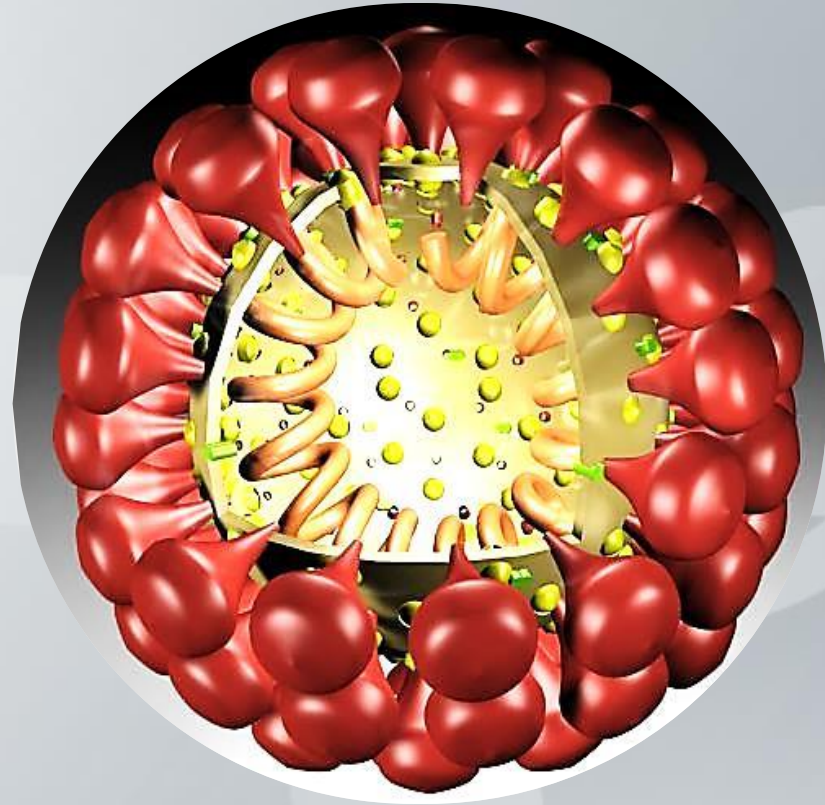
- How does PEDv look like?
- What are its strengths and weaknesses?
- What can it do to my pigs?
- What can it do to my herd profitability?
- How do I fight it?



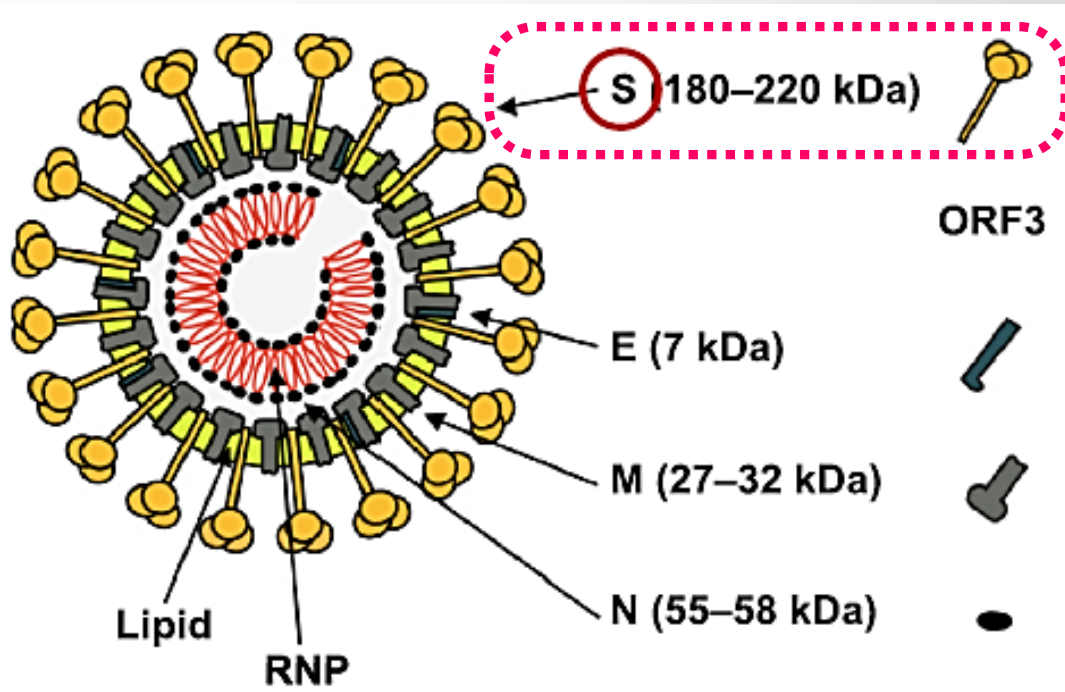
PED: Dynamics within the past four decades

The PED Virus

- Large, enveloped ssRNA virus
 - Genus: Alphacoronavirus
 - Family: Coronaviridae
 - Order: Nidovirales
- Encapsulated by a single N protein
- Wrapped in Lipid envelope containing 3 surface SP's
 - **Spike**, Membrane, Envelope



The PED Virus

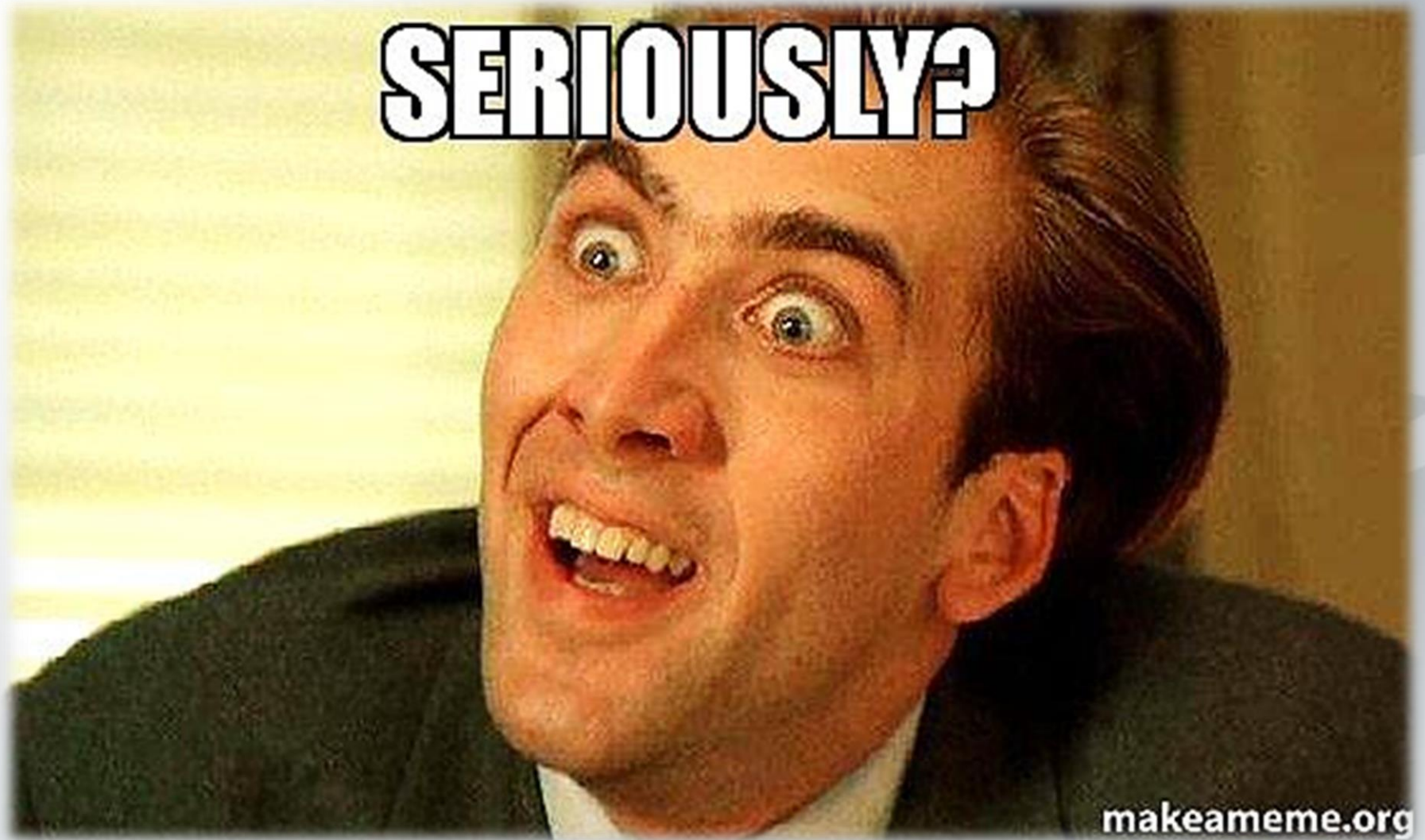


***S protein** is the major envelope type 1 glycoprotein of the virion*

Spike protein

- Interacts with the cellular receptor during virus entry
- Stimulates induction of neutralizing antibodies in the natural host
- Used as the basis for developing vaccines
- Used as a basis for developing Dx assays

The PED Virus: What can it do to my pigs?



The PED Virus: What can it do to my pigs?



2011/02/23 10:51

The PED Virus: What can it do to my pigs?



Profuse Diarrhea



The PED Virus: How can it impact my profitability?



Opportunity Loss!
5 to 6 months downstream

PED: Dynamics within the past four decades



- Although only one serotype of PEDV has been reported, phylogenetic studies of the **S gene** suggested that PEDV can be genetically separated into 2 groups:
- Genogroup 1(**G1**): classical
 - G1a – prototype strain CV777; vaccine strains; cell-culture adapted strains
 - G1b – new variants first ID'd in China, USA, S. Korea, and EU
- Genogroup 2(**G2**): global field isolates (including the S InDels)
 - G2a – previous local epidemic outbreaks in Asia
 - G2b – recent pandemic outbreaks in NA and Asia

PED: Dynamics within the past four decades



Transmission

Alonso et al. *Veterinary Research* 2014, **45**:73
<http://www.veterinaryresearch.org/content/45/1/73>



VETERINARY RESEARCH

SHORT REPORT

Open Access

Evidence of infectivity of airborne porcine epidemic diarrhea virus and detection of airborne viral RNA at long distances from infected herds

Carmen Alonso, Dane P Goede, Robert B Morrison, Peter R Davies, Albert Rovira, Douglas G Marthaler and Montserrat Torremorell*

🕒 Airborne transmission

PED: Dynamics within the past four decade



● Airborne transmission

- Twelve 7 to 8 week old piglets were challenged intragastrically
 - Air samples were collected by using a cyclonic air collector
 - 62 Samples were collected from 9.6m up to 24.14 km
 - Bioassay consisting of inoculating susceptible piglets with the air samples was performed.
- Eleven of 62 (18%) air samples collected under field conditions tested RT-PCR **positive**

Conclusion

- “This is the first report to establish that PEDV can be found in the air (>10miles), that suspended airborne particles can be infectious, and that PEDV genetic material can be transported over long distances.”

PED: Dynamics within the past four decades



Transmission

- PEDv spread via boar semen shedding?

Gallien et al. *Vet Res* (2018) 49:7
<https://doi.org/10.1186/s13567-018-0505-2>




VETERINARY RESEARCH

RESEARCH ARTICLE

Open Access



Evidence of porcine epidemic diarrhea virus (PEDV) shedding in semen from infected specific pathogen-free boars

Sarah Gallien^{1,2,3*} , Angélique Moro^{1,2}, Gérald Lediguerher^{1,2}, Virginie Catinot⁴, Frédéric Paboeuf^{1,2}, Lionel Bigault^{1,2}, Mustapha Berri³, Phillip C. Gauger⁵, Nathalie Pozzi⁴, Edith Authié⁴, Nicolas Rose^{1,2} and Béatrice Grasland^{1,2}

PED: Dynamics within the past four decades



Conclusion

- “Here, we showed the presence of PEDV RNA in the semen of infected specific pathogen-free boars inoculated with a non-InDel strain of PEDV as early as 0.5 dpi.”
- PEDV RNA was present in both fractions of semen (seminal and sperm-rich) although larger amounts of PEDV were more consistently detected in the sperm-rich fraction.
- Boars infected by PEDV may be detected after delivery of potentially infected semen.

Animal Reproduction Science

Volume 122, Issues 1–2, October 2010, Pages 42-51

Impact of porcine epidemic diarrhea virus infection at different periods of pregnancy on subsequent reproductive performance in gilts and sows

Em-on Olanratmanee, Annop Kunavongkrit, Padet Tummaruk  

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<https://doi.org/10.1016/j.anireprosci.2010.07.004>

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Pathogens

Impact of PEDV infection at different periods of pregnancy on subsequent reproductive performance in gilts and sows

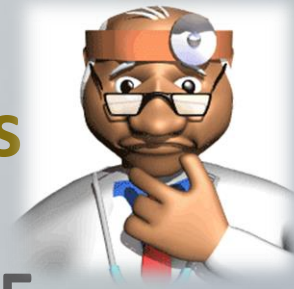
- PED outbreak in a Thai farm in March 2008
- Feedback exposure initiated for all gilts and sows within 2 weeks after the onset of the outbreak
- Reproductive data were collected from January 2007 to July 2008 and retrospectively evaluated
- The following parameters were compared (Bef/Aft):
 - FR, RR, AR, TB, BA, %Sb, %Mm, piglet bwt.
- The impact of PEDV infection on the reproductive performance of gilts and sows depended on the period of pregnancy when the females were exposed to the pathogen, and parity number.

Impact of PEDV infection at different periods of pregnancy on subsequent reproductive performance in gilts and sows

Parameter	Before FBk	After FBk	p=Value
1 st Trimester Preg. FR, %	91.1	78.5	P = 0.003
1 st Trimester Preg. RR, %	3.5	9.2	P = 0.01
1 st Trimester Preg. AR, %	2.1	3.4	P = 0.01
1 st Trimester Preg. Mm, %	3.5	5.6	P = 0.001
1 st Trimester Preg. TB, hd	11.7	10.3	P = 0.001
1 st Trimester Preg. BA, hd	10.7	8.5	P = 0.001
3 rd Trimester Preg. Sb, %	4.5	6.2	P = 0.01

- It was concluded that natural infection of PEDV in the pregnant gilts and sows caused a reduction of subsequent reproductive performance.

PED: Dynamics within the past four decades



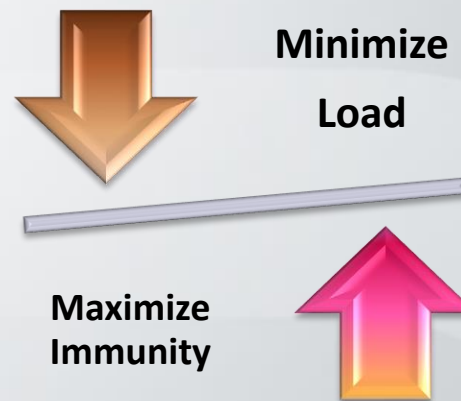
Take Home Information from the ISERPD 2015

- The PEDv can be transmitted via **feeds**
 - Soybean Meal (*Dee, S.; et al*)
 - Spray dried Plasma Protein (*Sullivan, T.; et al*)
- **Lactogenic immunity** is considered most crucial for immediate protection of newborn piglets (*Saif, L., et al*)
- **Neutralizing Antibodies (NA)** are important in PEDv immunity (*Murtaugh, M.; et al*)

PED: What we are learning based on local experiences



- Apply **Holistic Approach** to attain a more reliable, predictable, and sustainable PEDv control program



- Minimize pathogen load thru strict, systematic, and monitored disinfection, sanitation, pigflow, waste disposal
- Do not compromise on implementing and monitoring both internal and external Biosecurity protocol strictly

PED: What we are learning based on local experiences



- Maximize immunity by adhering to the recommended breeder immunization protocol (one-time mass vacc; twice breeder vacc prefarrowing; gilt vacc pre-breeding)
- Monitor and always manually check/palpate sows' mammary glands when going around the production area, including the flow rates of water lines
- Do not skimp on the application of NSAID (with/without antibiotics) particularly around parturition, to manage mastitis and/or agalactia
- Ensure adequate piglet colostrals uptake particularly during the first 24 hours of life



PED: What we are learning based on local experiences



- Minimize frequent entry of replacement animals, specially in the absence of proper quarantine procedures and facility
- Apply proper/proven sanitation technique:
 - Pressure wash
 - Descale/biofilm removal
 - Scrub with firm bristle brush
 - Rinse
 - Disinfect
 - Dry
 - Bleach
 - Rinse
 - Dry



PED: What we are learning based on local experiences



- Remember: Neither feedback exposure nor pre-farrowing vaccination will work if lactation and colostral uptake are compromised
- At times of re-break, a vaccinated* herd would manifest the following:
 - Shorter duration of clinical diarrhea, with less or no piglet loss
 - Shorter to minimal duration and morbidity among older animals
 - Higher weanling survival rate due to older age getting hit
 - Lesser to no cases of the “recurrent” type of PED breaks
 - Lower overall losses when compared to non-vacc period

PED: What we are learning based on local experiences



- Apply **Holistic Approach** when dealing not only with PED:



Thank you.



Boehringer
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