

# PRRS Virus – Within Herd Transmission Dynamics

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## Overview

- Introduction
- Study
- Survival analysis
- Findings
- Summary



## Introduction

- PCV2 getting under control .... Now back to PRRS
- PRRS transmission
  - Between herds
  - Within herds
- A lot we still do not know
  - Don't have answers
  - What are the nutrition needs of these pigs



## How contagious is PRRS?



## PRRS transmission

Route	ID <sub>50</sub>
SQ (parenteral)	~10
Intranasal	~8,000
Artificial Insemination	~31,600
Oral	~158,500
Aerosol	??

Herman et al/2005



## Study


- Prospective cohort study
- Identify Farm – willingness to participate
- Tagged 20 pigs on arrival to nursery
- Tagged pigs had to stay together through out the entire study (nursery & finishing)
- Bleed pigs at start and every 2 weeks until gone to market
- Collected data on start and end weights as well as several other parameters



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## Study

- Bleeding every 2 weeks from approx. 3 wks of age until market
  - PRRS ELISA on all samples (detect antibodies)
  - PCR for PRRS on 1<sup>st</sup> bleed (detect virus)
- 26 barns
  - 2 Stayed PRRS negative
  - 1 Sold mid nursery
  - 1 Vaccinated for PRRS with MLV
  - 15 from 3 sites with 5 barns each
  - 7 Independent positive flows




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## Study

- 520 animals enrolled
  - 104 PCR positive (20%) at start
- 5,516 samples collected
  - 3,995 positive ELISA (72.4%)
  - 1,521 negative ELISA (27.6%)
- 54 deaths (10.4%)
  - 4 no samples (7.4%)







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## Survival Analysis

- Logistic regression:
  - Outcome = Yes or No
  - Calculate OR or RR
- Survival analysis:
  - Similar to logistic regression
  - Look at time to event
    - How long it takes for outcome to occur
    - Does not have to be death





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## Survival Analysis

- Calculate hazard function
  - Instantaneous potential per unit time for the event to occur given the individual has survived up to this time
- Then compare hazard functions from two group and get a hazard rate
  - Similar to an odds ratio
  - Cox PH regression model




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## Survival Analysis

- Compare TIME to event
- In this case we looked at time to seroconversion
  - An increase from negative titer to a positive titer (S/P ≥ 0.4) that is maintained for at least 2 consecutive bleedings
  - Modified definition of seroconversion = 1st upward tend or 1st positive change in pattern



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## Survival Analysis

	1/9/2006	1/24/2006	2/6/2006	2/20/2006	3/6/2006
ELISA-1	ELISA-2	ELISA-3	ELISA-4	ELISA-5	
4 wks	6 wks	8 wks	10 wks	12 wks	
	0	2.152	2.915	4.283	3.174
	0.025	0.867	1.853	1.973	1.263
	0.72	0.535	1.185	1.532	1.043

= Original definition for seroconversion
  = Adjusted definition for seroconversion

ELISA values ≥ 0.400 are considered positive for PRRS



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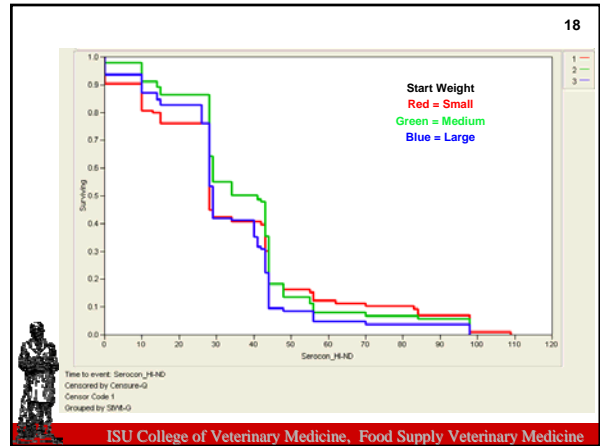
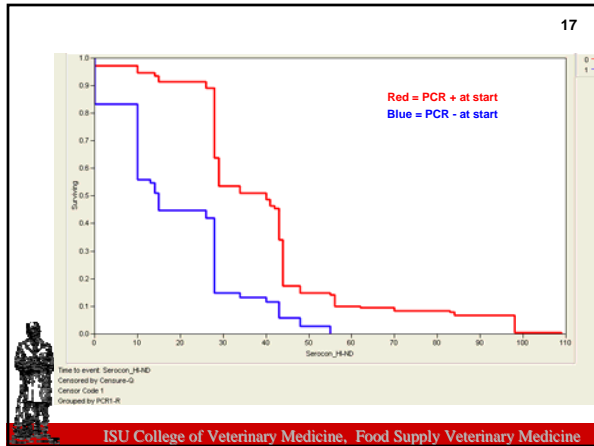
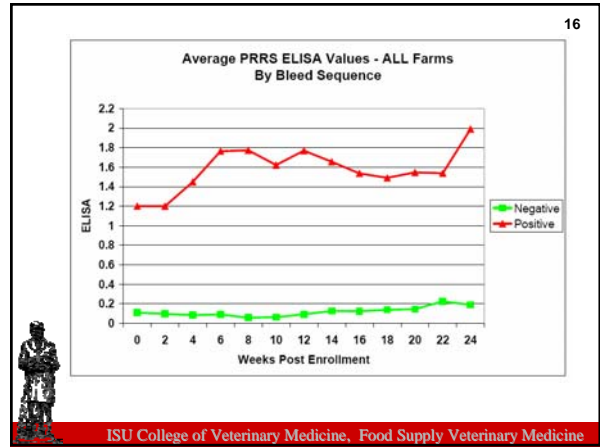
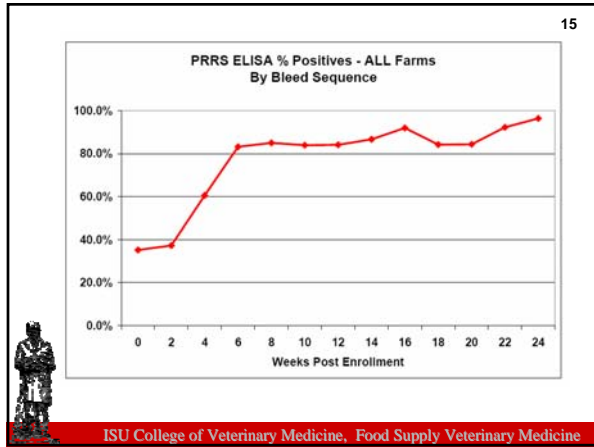
Farm	Total days to event	Number seroconverted	Incidence rate	Days to sero-conversion	# Left censored
1	2,716	0	0	NA	0
2	2,786	0	0	NA	0
3	1,890	18	0.009524	105.0	0
4	653	20	0.030628	32.7	0
22	439	12	0.027335	36.6	4
23	365	6	0.016438	60.8	6
24	248	18	0.072581	13.8	0
25	395	16	0.040506	24.7	2
26	420	14	0.033333	30.0	2
ALL	20,276	379	0.018692	53.5	33
Positive Only	14,774	379	0.025653	39.0	33

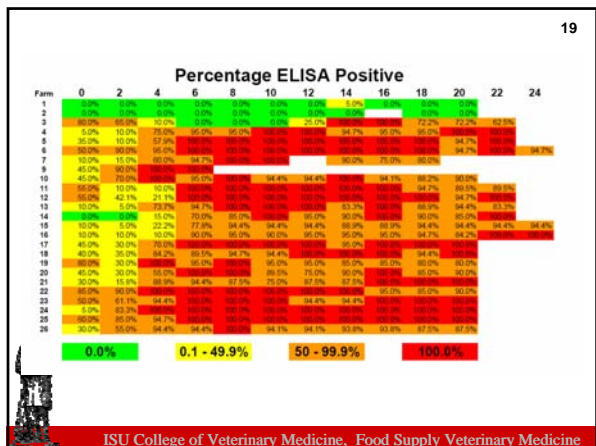
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## Summary

- Survival analysis is an exciting way to look at outcomes
- PRRS virus is not very contagious
  - Slower moving in a herd
  - Dragging out the outcome
- Pigs nutritional needs will vary
- There is definitely a lot more to be learned



## Acknowledgements

- National Pork Board
- Dr. Locke Karriker and Lori Layman
- Veterinarians in the field
  - Willingness to cooperate
  - Time and effort
  - Access to farms
- VDL staff



## Questions?

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