Health and Behavior: Impact on Stocker and Feedlot

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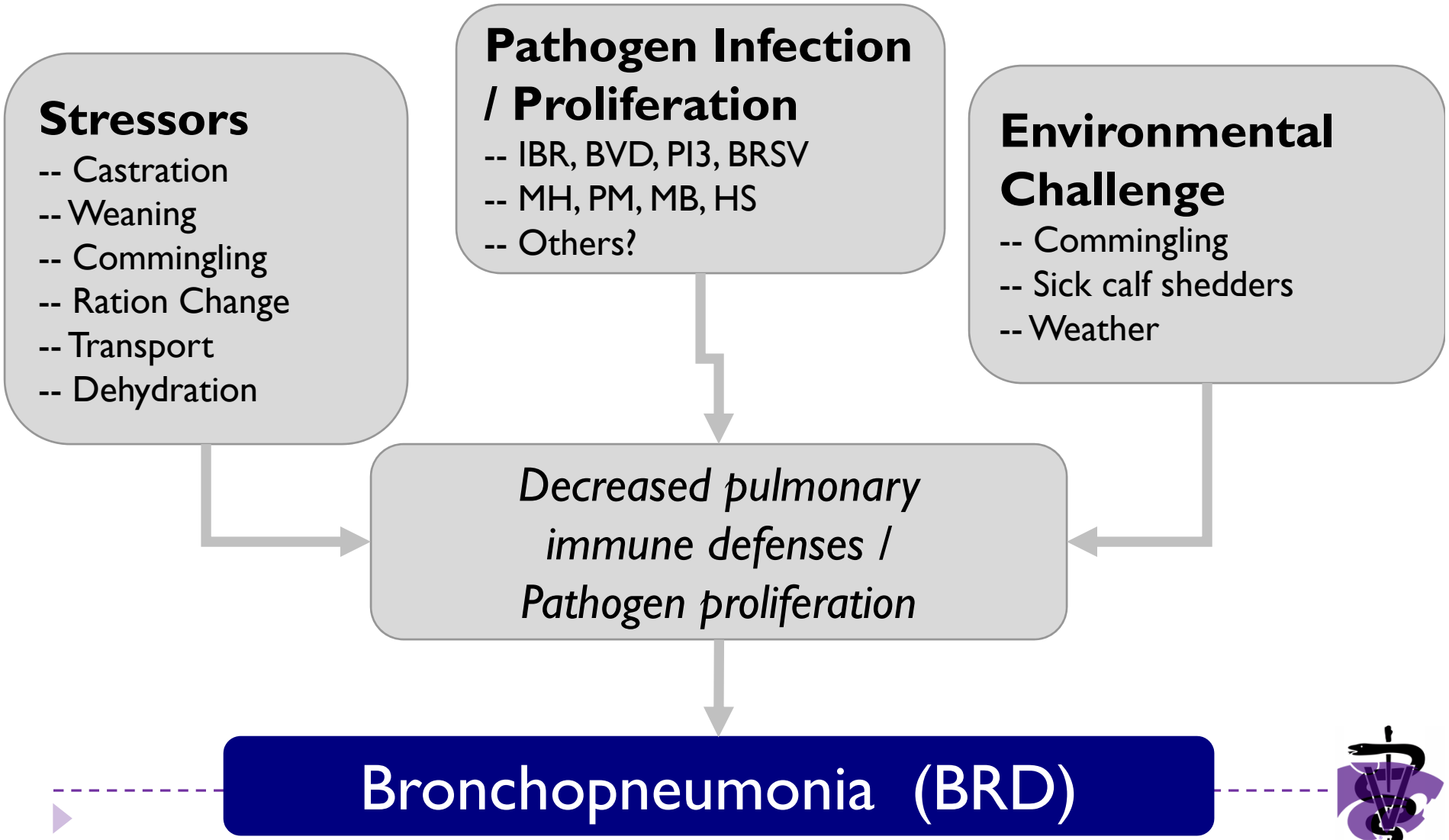
Bovine Respiratory Disease



Economic and performance consequences associated with the number of treatments for initial individual cases of bovine respiratory disease in commercial feeder cattle

Objective:

- Estimate cost of treating individual calf:
  - Never(0X)
  - Once (1X)
  - Twice (2X)
  - Three or more times (3or>X)

N. Cernicchiaro, B. White, D. Renter, A. Babcock

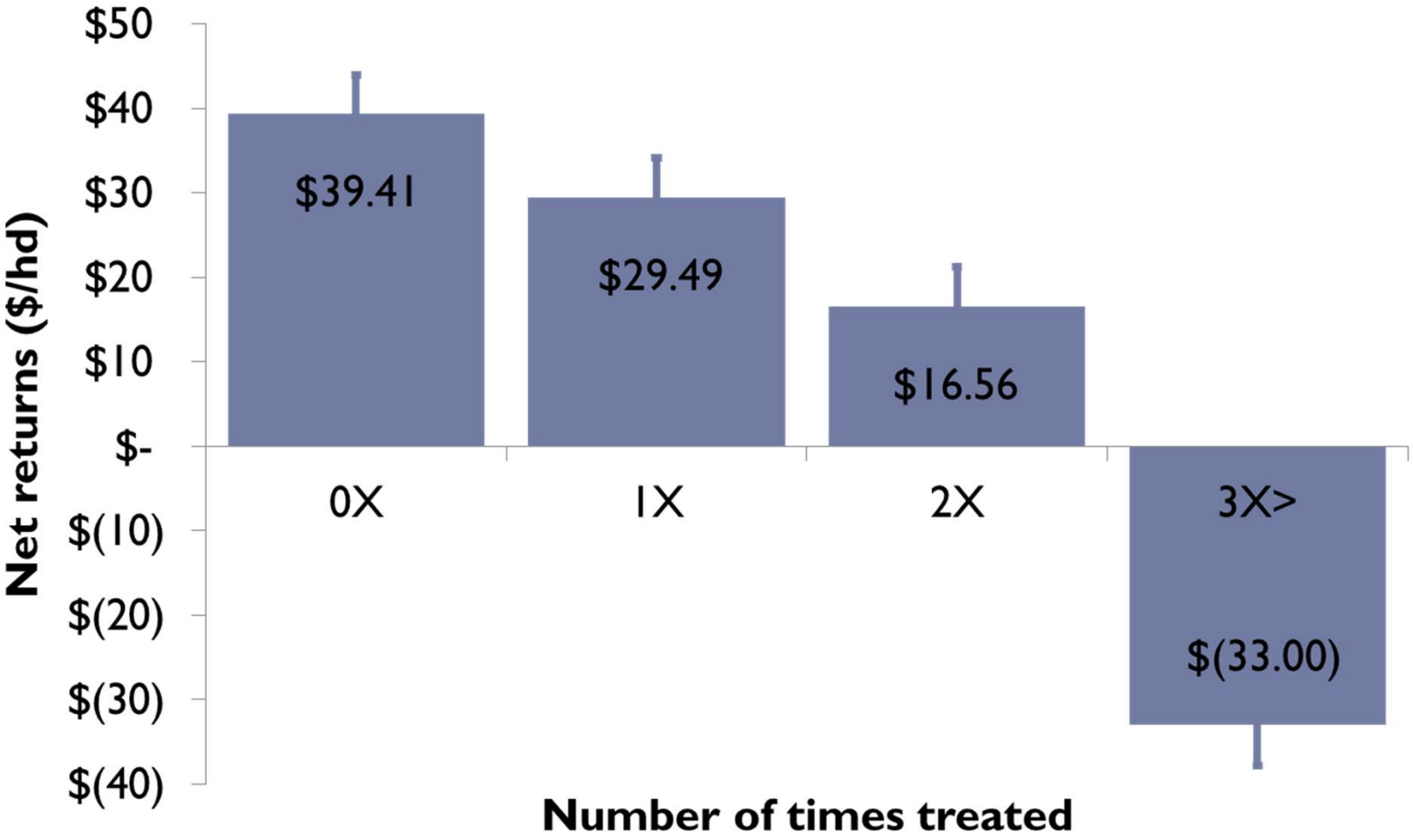
2012 Am J Vet Res 74(2):300-309

Data Analysis

- Individual calf performance, health, carcass data
- 212,867 hd
- 2001-2006

- Economic models:
  - Standardized markets, feed costs (10 yr averages)
  - Comparisons based on differences in performance
  - Calculated net returns for each calf

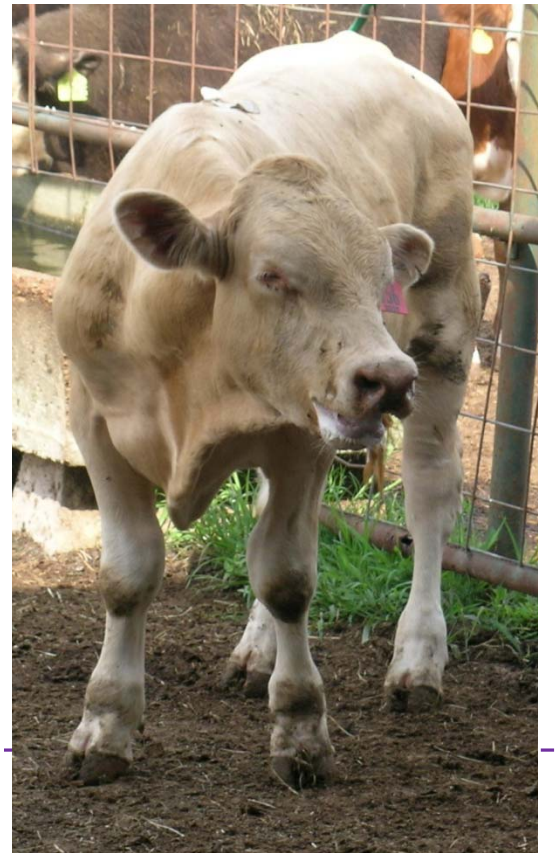
Net Returns by # Tx (fall only)



BRD: Data based evaluation

1. **Refined classification of BRD events**
   a) Individual animal diagnosis
   b) Pen-Level Events: Magnitude and Temporal

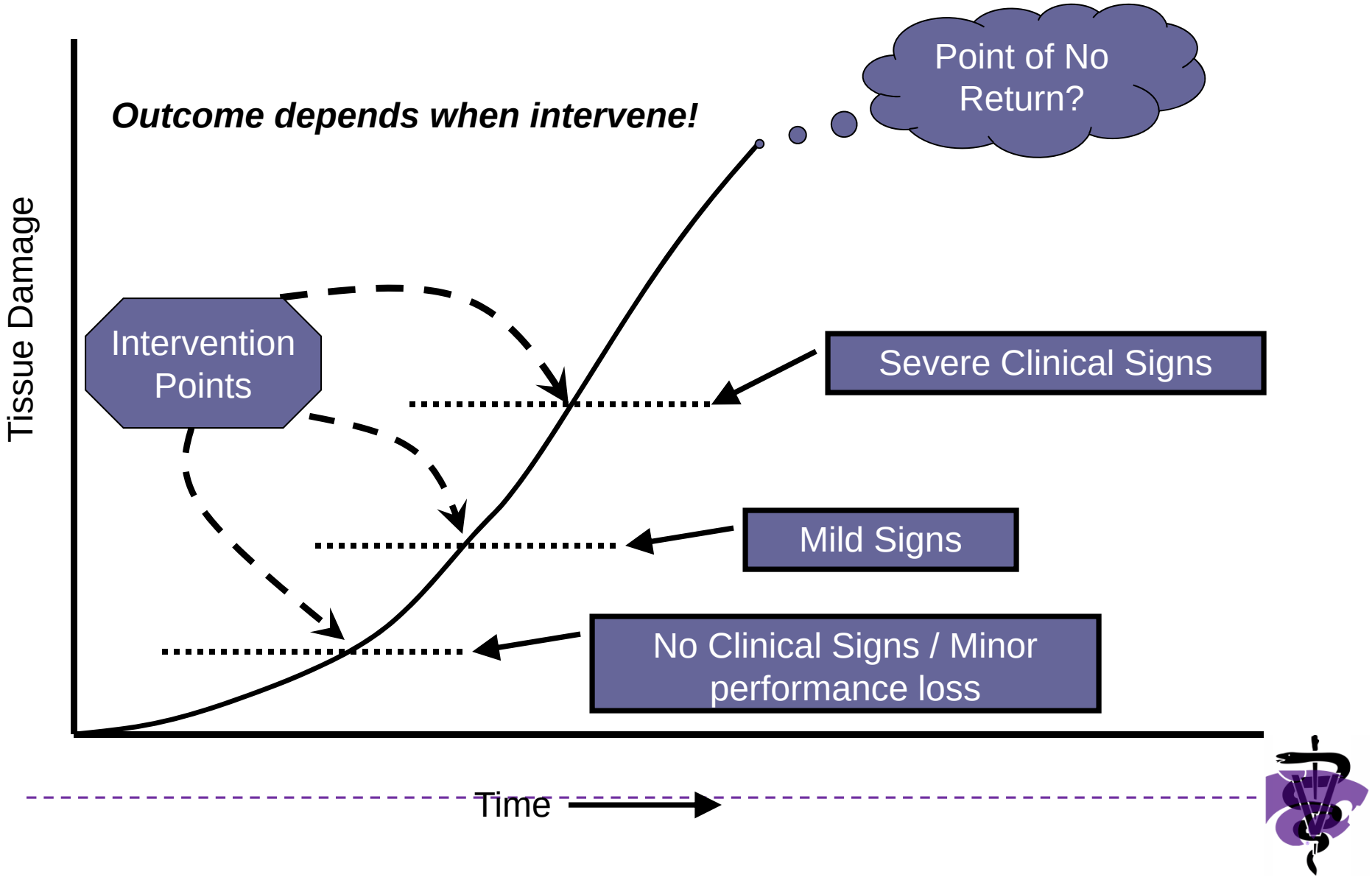
2. **Managing BRD**



BRD in individuals

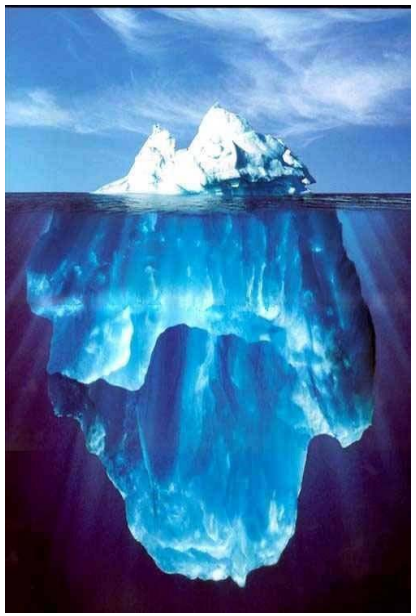
- Find the sick calf
  - Clinical diagnosis
- Disease progression

Disease Detection Thresholds



Subclinical Disease: Iceberg Effect

- *Wittum, JAVMA 1996*
  - *Survey 469 steers: birth to harvest*
  - *35% treated for BRD (78% had lung lesions)*
  - *65% not treated for BRD* (68% had lung lesions)



- Schneider et al, JAS 2009
  - 1,665 calves: BRD Morb = 8.2%, Lung lesions = 62%

- Reinhardt et al, JAS 2009
  - 21,528 calves with individual performance data
  - Morbidity & lung lesions negatively associated with initial BW, ADG, HCW
  - Avg 0.12 treatments per calf w/ lung lesions (n=269)
  - Avg 0.07 treatments per calf w/out lung lesions (n=6557)

Serial progression of induced Mannheimia haemolytica pneumonia

Objective:

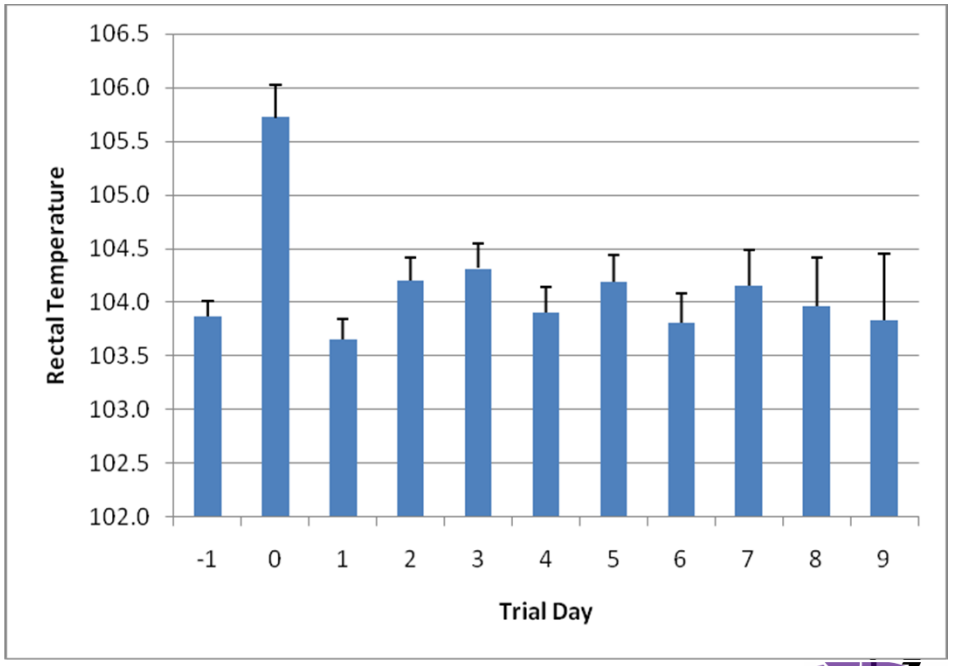
To perform serial evaluations to quantify changes in behavior, physiologic, and pathologic parameters related to disease progression in experimentally induced Mannheimia haemolytica pneumonia calves.

Hanzlicek et al, 2010 AJVR

Conclusions

- BRD Induction Model
  - Rapid disease progression; all calves displayed clinical signs
  - Clinical signs and lung lesions similar in appearance to field BRD cases (smaller lesions than fatal field cases)

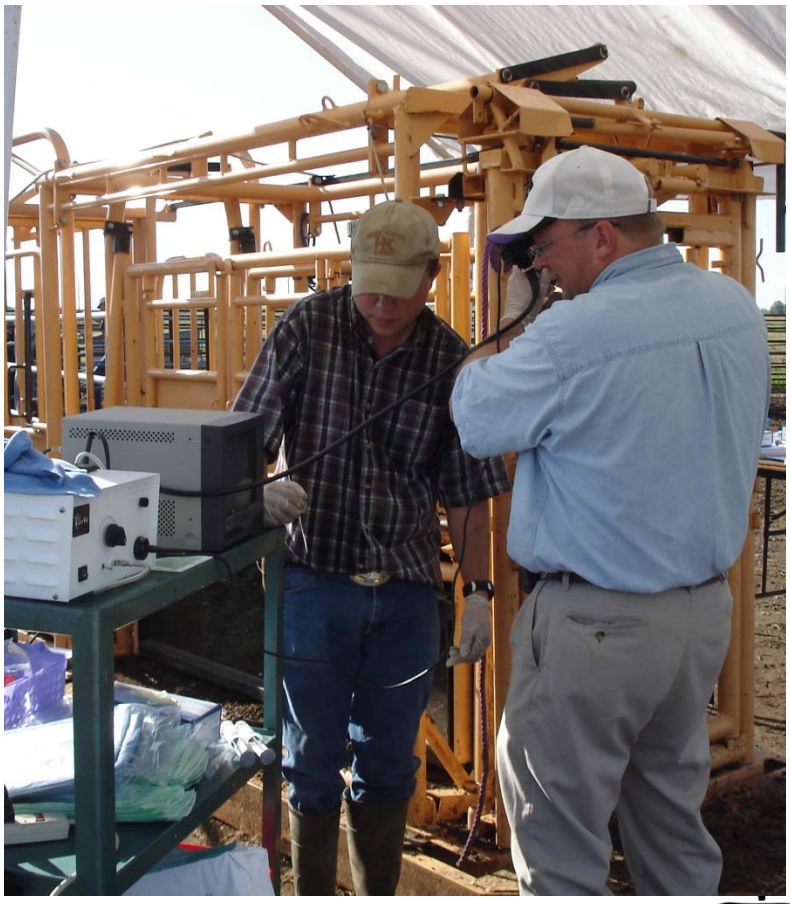
- Diagnostic Parameters:
  - Measured parameters failed to predict level of lung lesions
  - Behavior and clinical scores useful



Effect of Mannheimia haemolytica pneumonia on behavior and physiologic responses of calves experiencing hyperthermal environmental conditions.

Objectives:

- Determine effects of inducing BRD (Mannheimia) in high ambient temperatures
  - Body temperature
  - Behavior
  - Inflammatory profile



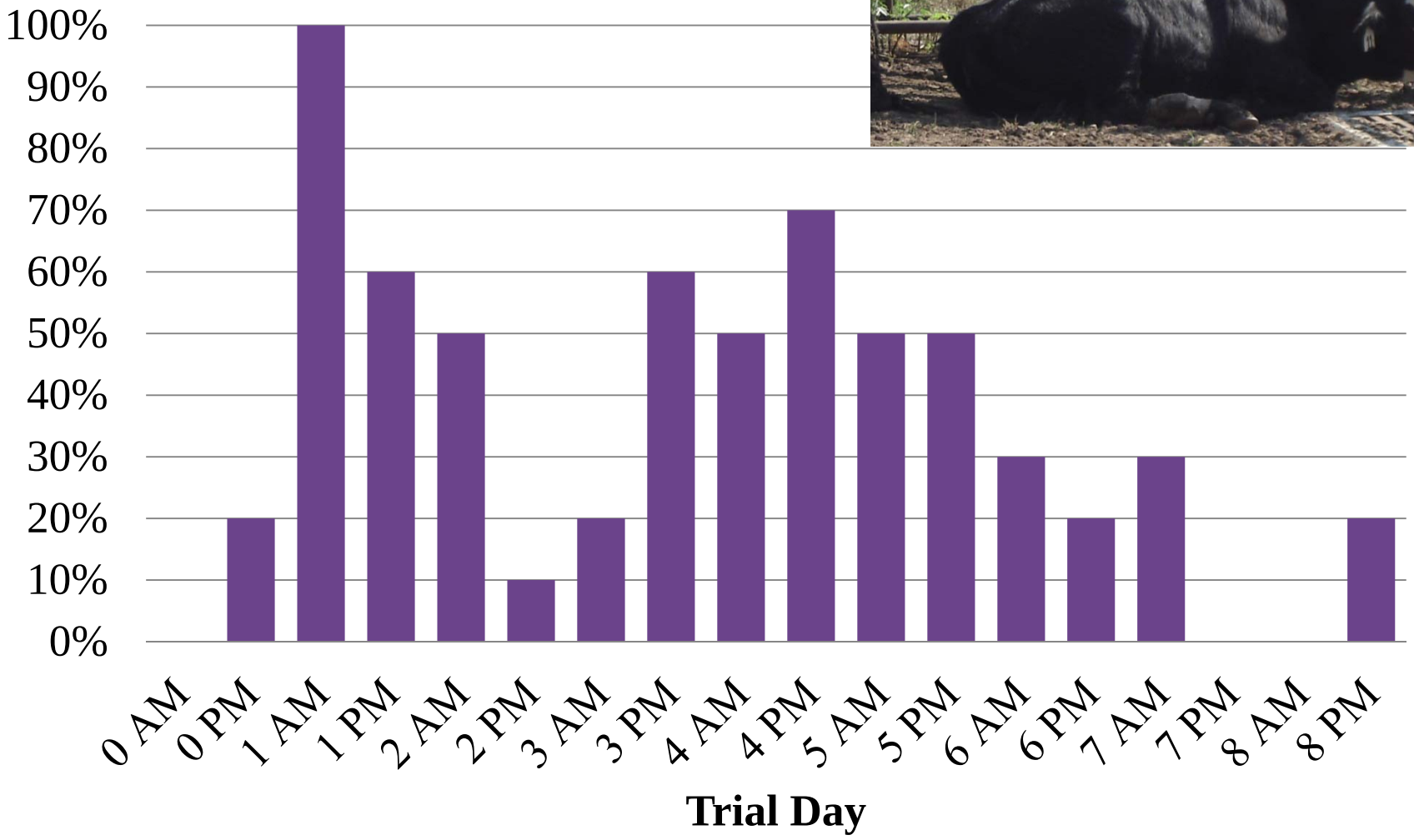
M.E. Theurer, D.E. Anderson, B.J. White, M.D. Miesner, D.A. Mosier, J.F. Coetzee, J. Lakritz, D.E. Amrine.

2013 J Anim Sci. 91:1-13.

Mannheimia challenge

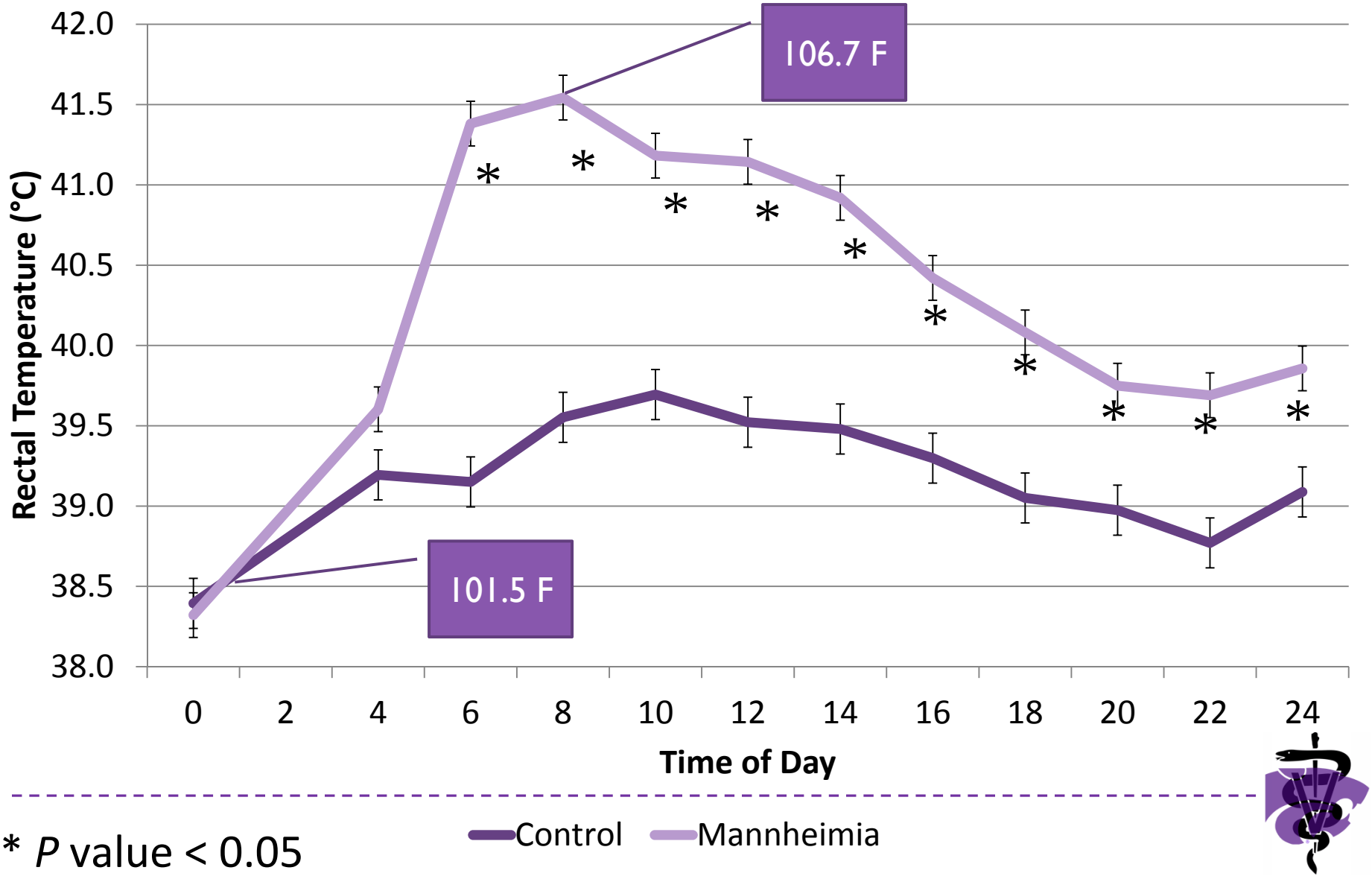
- Conducted during high ambient temperatures (July)
- 18 heifers randomly assigned to either Mannheimia haemolytica (n=10) or Control (n=8) group
- Calves were group housed for 10 days after challenged
- Directed endoscopic challenge: accessory bronchus

% of *MH* calves sick (CIS 2) by Trial Day



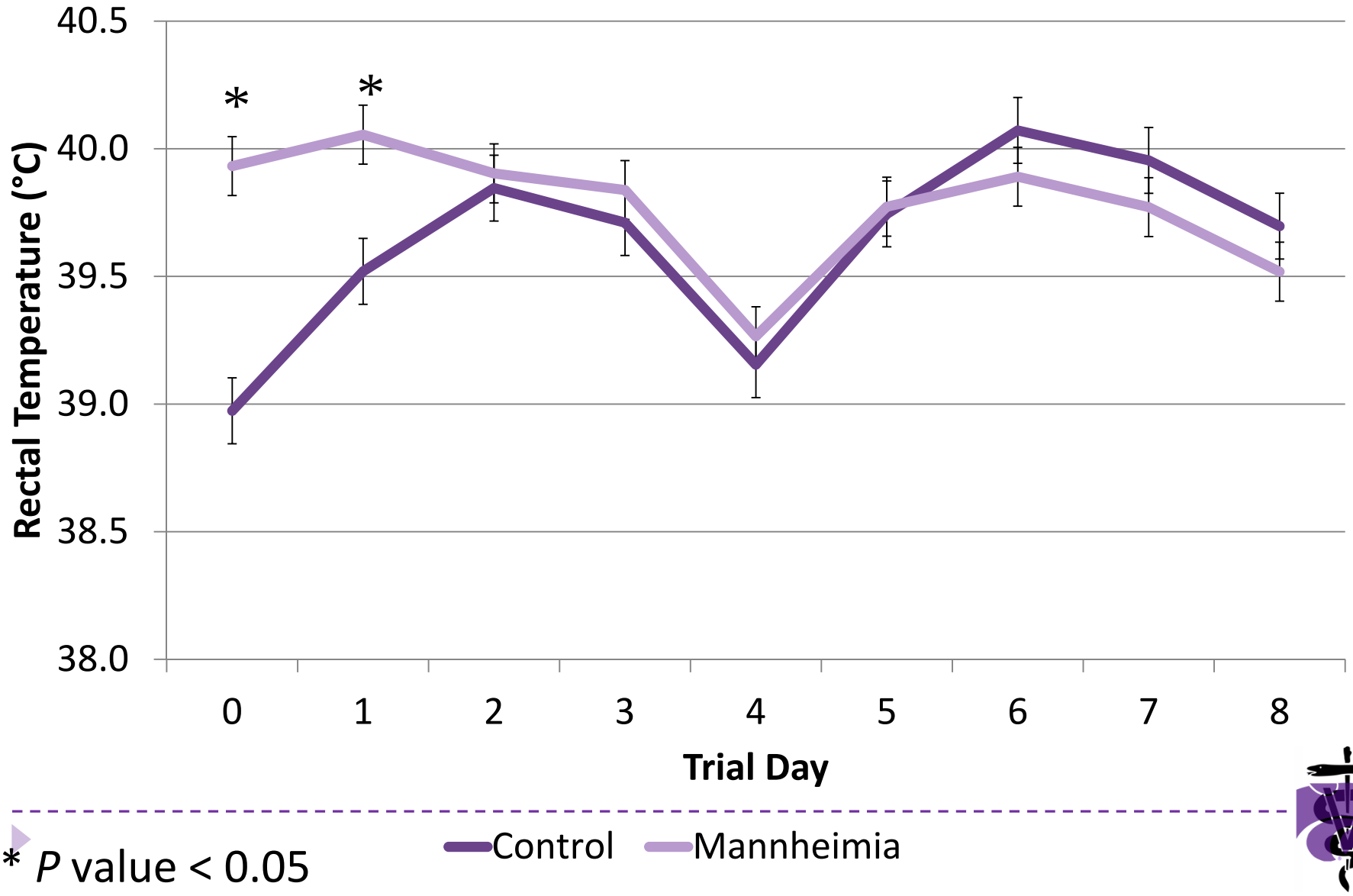
- **Note: a CON calf classified CIS=2 on d 5 PM/6 AM (n=2)**

Rectal temperature: first 24 hours



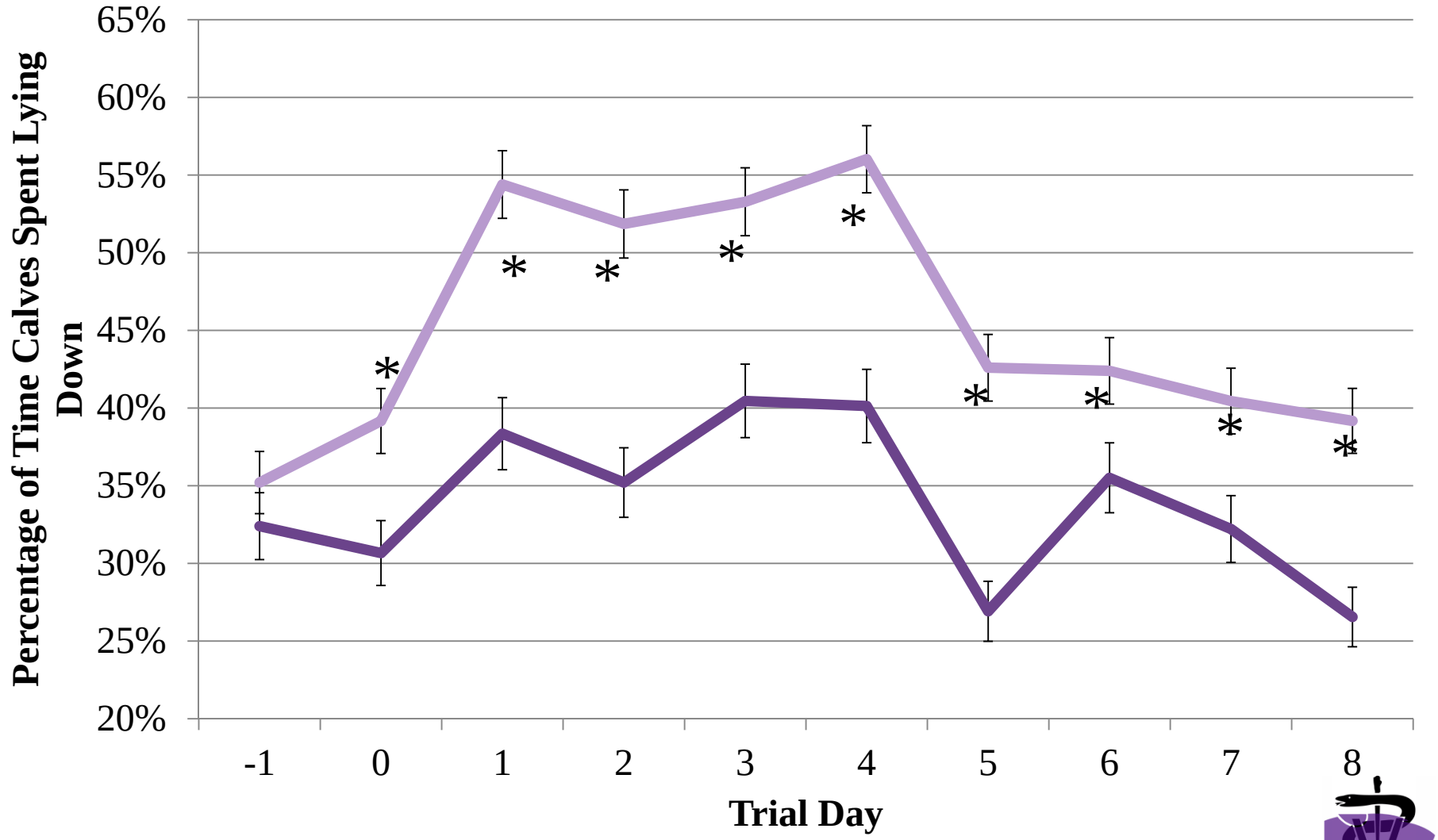
* *P* value < 0.05

Rectal temperature by trial day

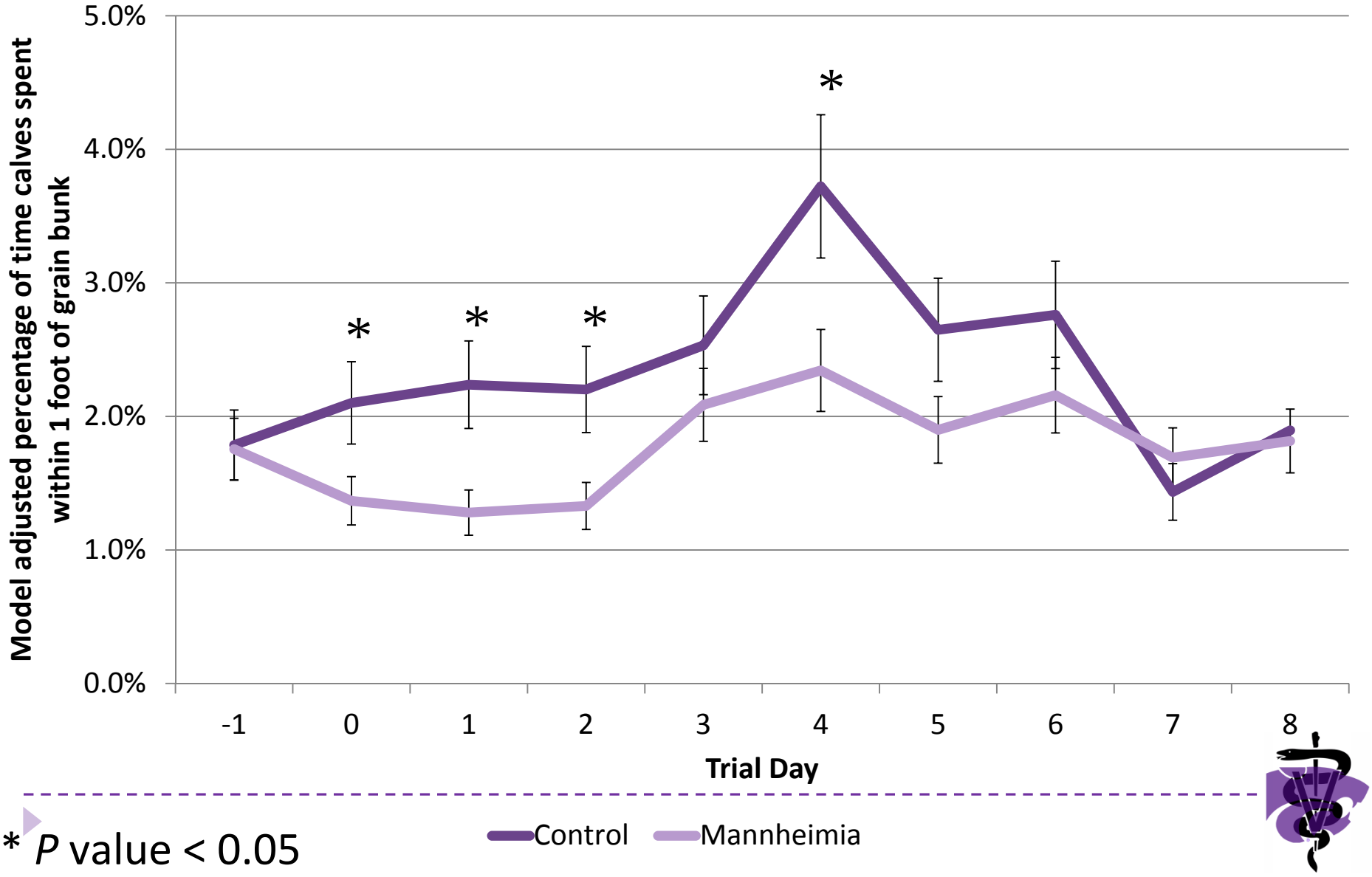


* *P* value < 0.05

Percent time calves spent lying down



% Time spent within 1 foot of grain bunk



* *P* value < 0.05

Summary

- Rectal temperatures in MH calves extremely high early
- Few clinical signs of BRD; lung lesions mild
- MH calves spent more time lying down, less time at grain
- MH calves had an initial shrink in body weight

Behavior following *Mycoplasma bovis* challenge in calves

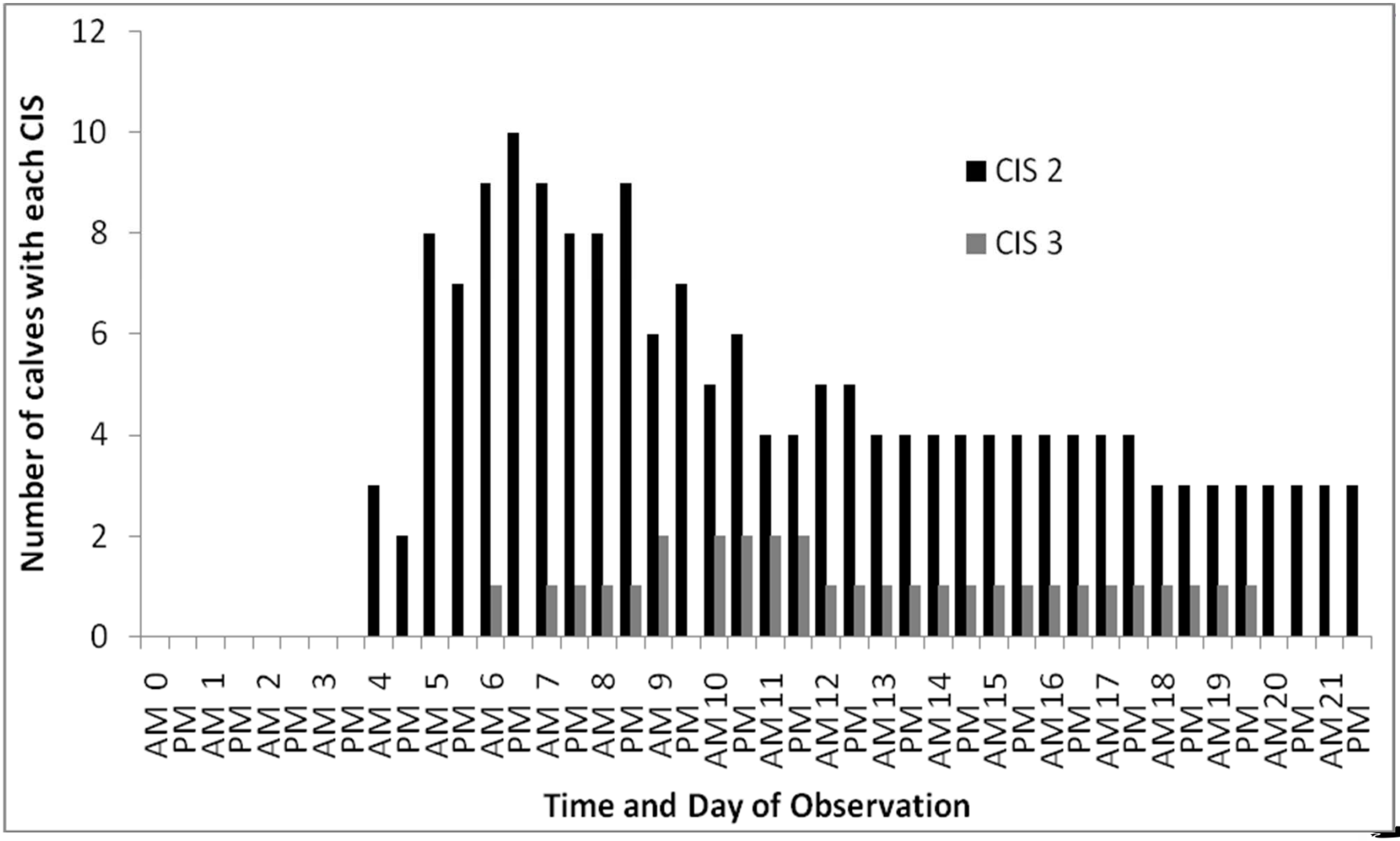
B. White, D. Anderson, D. Mosier, D. Renter, R. Larson, L. Kelly,
B. Robert, M. Theurer

2012 AJVR
Research sponsored by CEVA Biomune

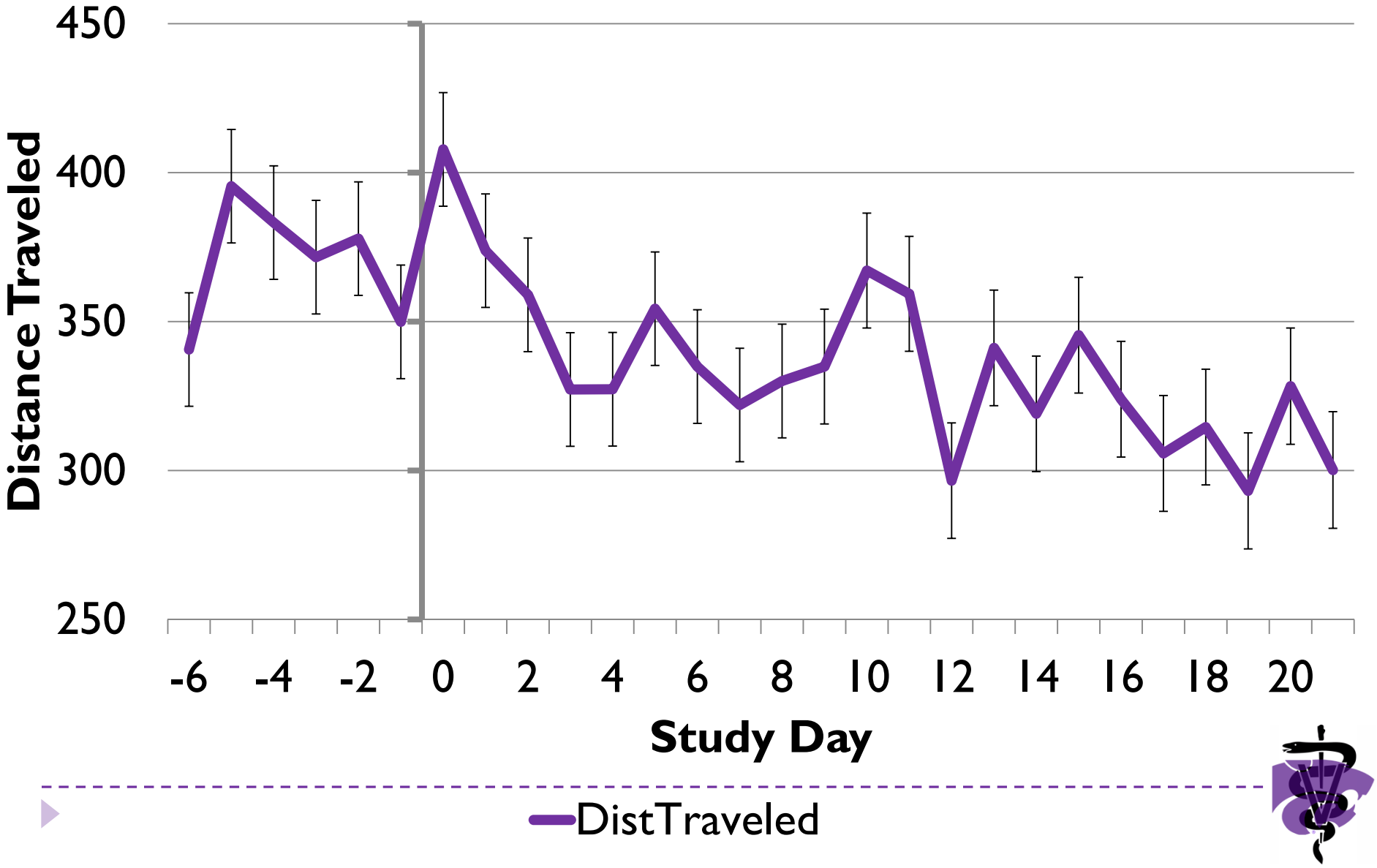
Behavioral Observations

- Calves equipped with a Ubisense ear tag to monitor behavior and activity during the trial
- Monitored to see if activity level is an indicator of illness
- Looked at calves proximity to water, feed, and shed

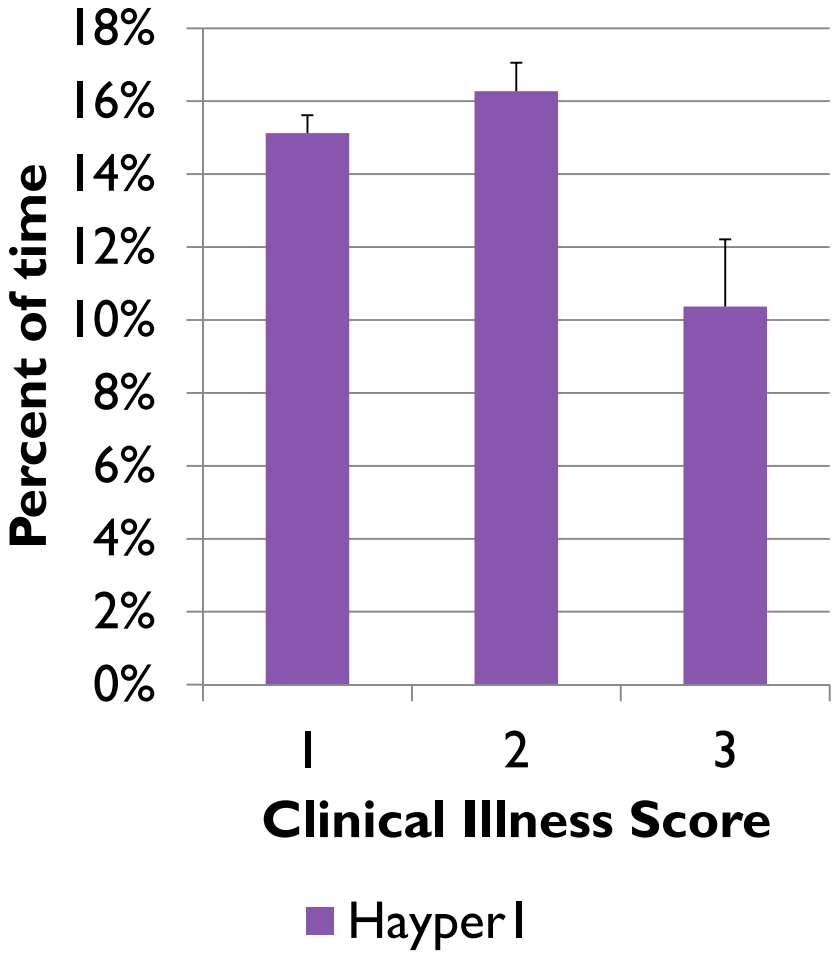
Clinical illness scores

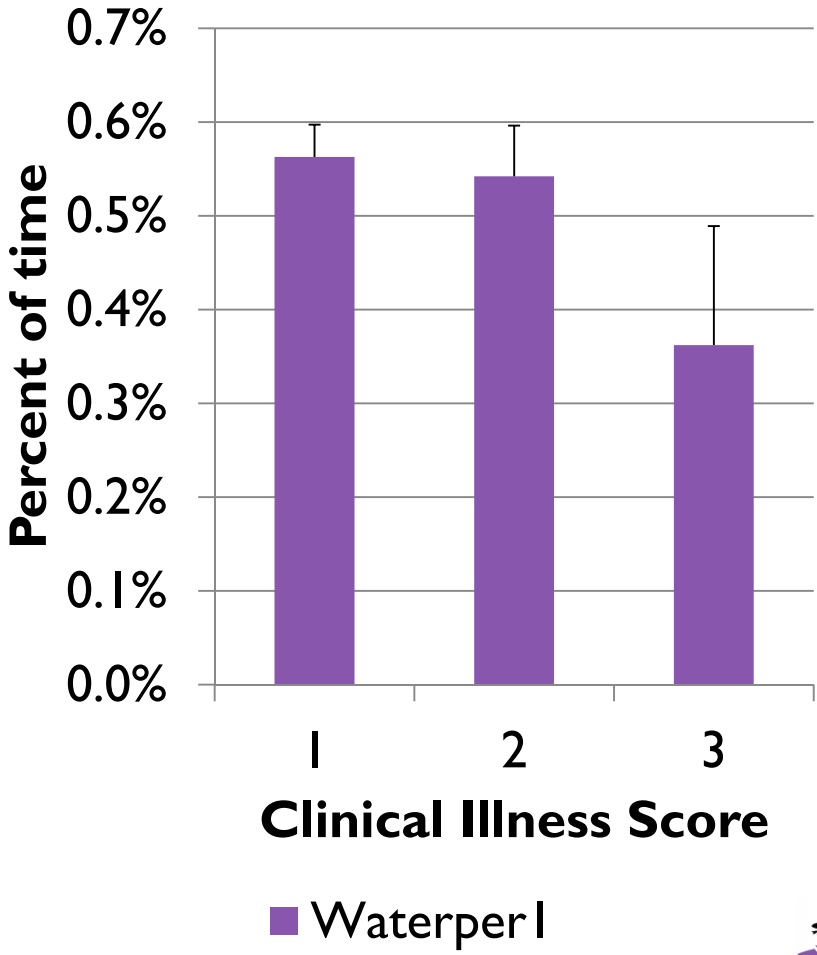


Distance Traveled



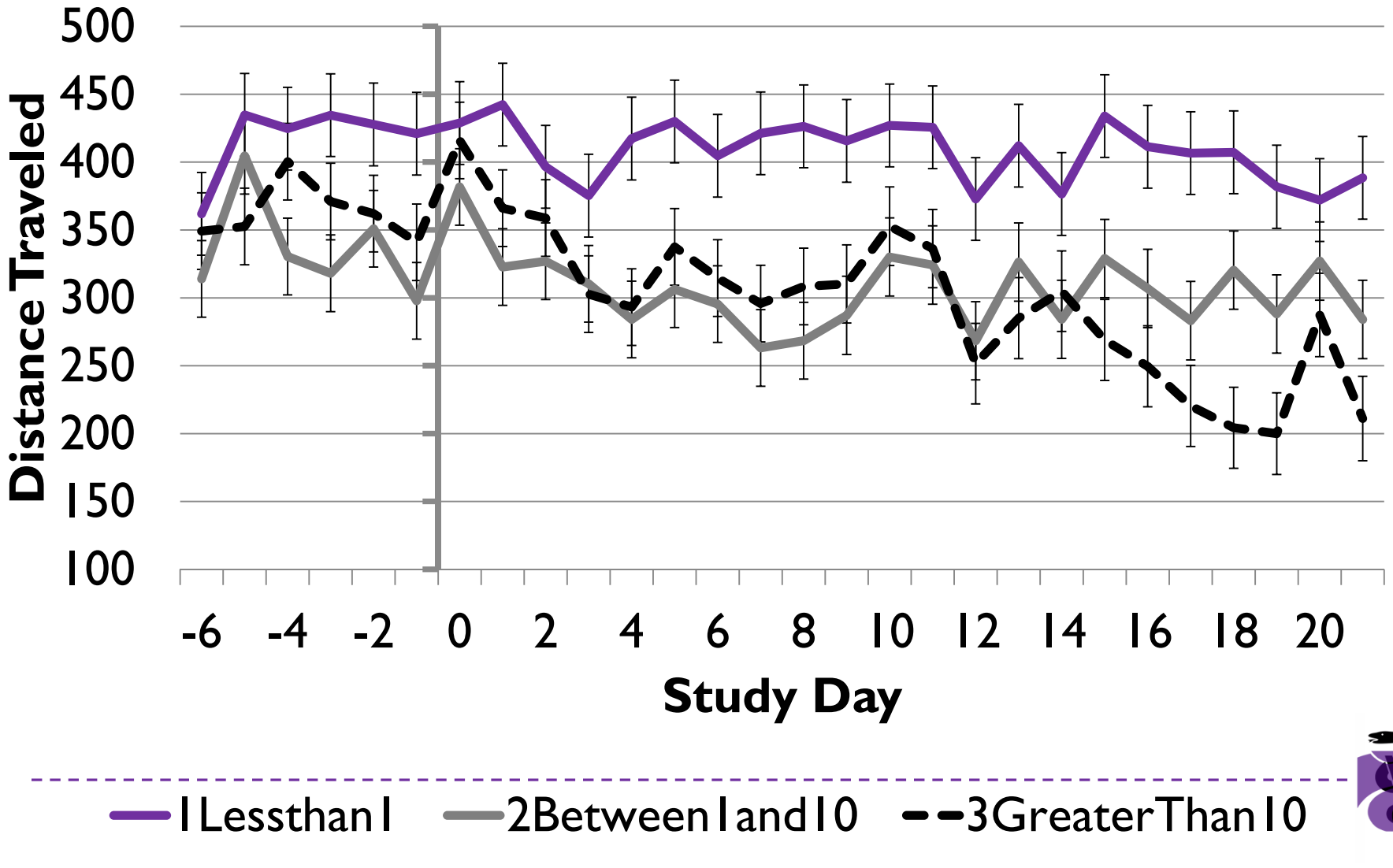
Comparison to Clinical Illness Scores





Distance traveled and lung score

- Significant interaction: LS by trial day



Diagnostic Accuracy of BRD Event Identification

- No perfect method to defining "cases"
- ***Low specificity ->*** treat unnecessarily
- ***Low sensitivity ->*** miss cases; resulting performance low
- *Prevention key to limiting losses*

BRD: Data based evaluation

1. **Refined classification of BRD events**
   a) Individual animal diagnosis
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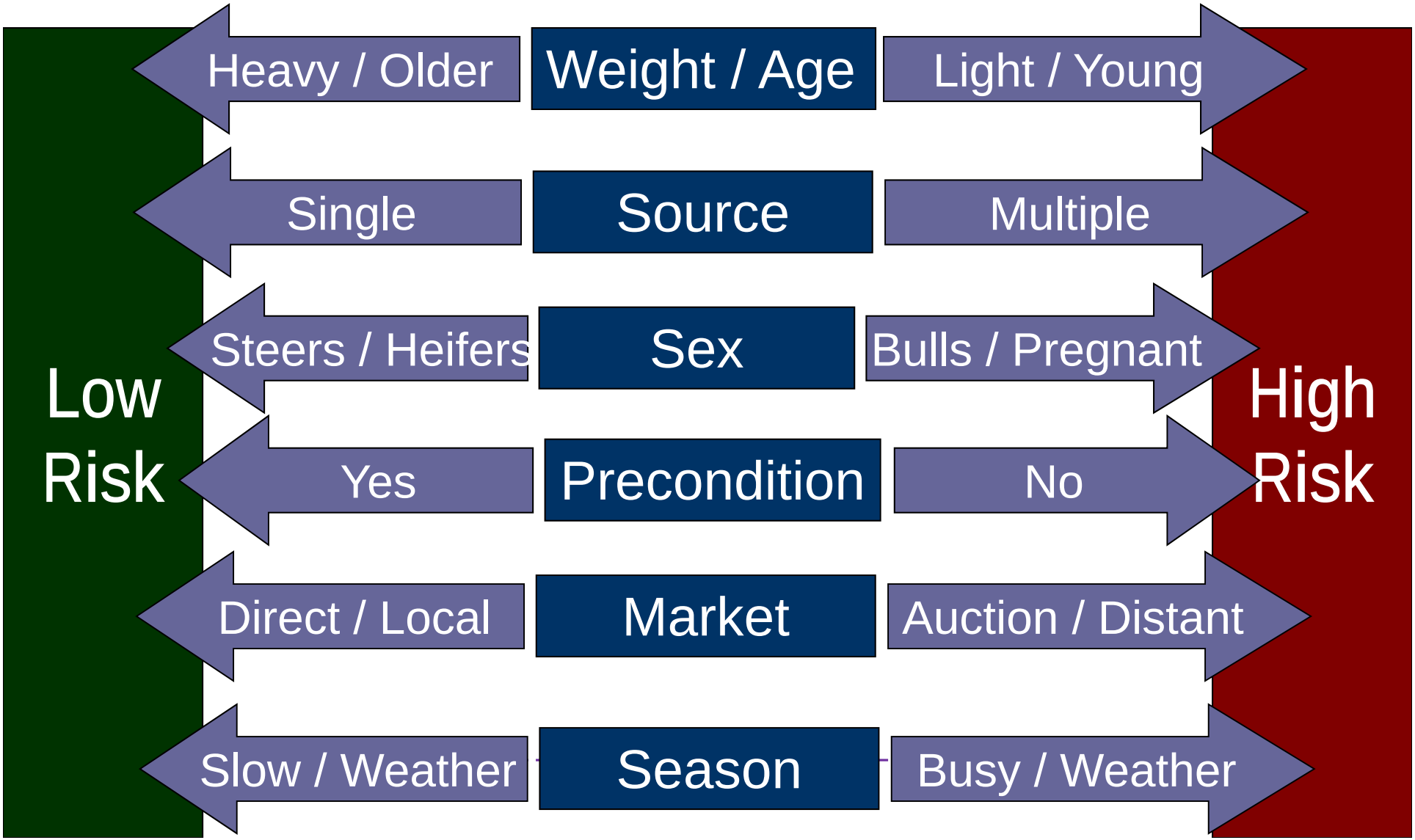
2. **Managing BRD**

Pen-level BRD Events

- Magnitude influences interventions
- Performance impact influences interventions
- Irsik et al. 2006 Bovine Practitioner
  - Feed conversion: Increase 0.27 lb for each % death loss
  - Average Daily Gain: Decrease 0.08 lb for each % death loss
  - Added costs: Increase $1/hd for each % death loss
  - Mortality: Estimate by multiplying percent treated by 0.14

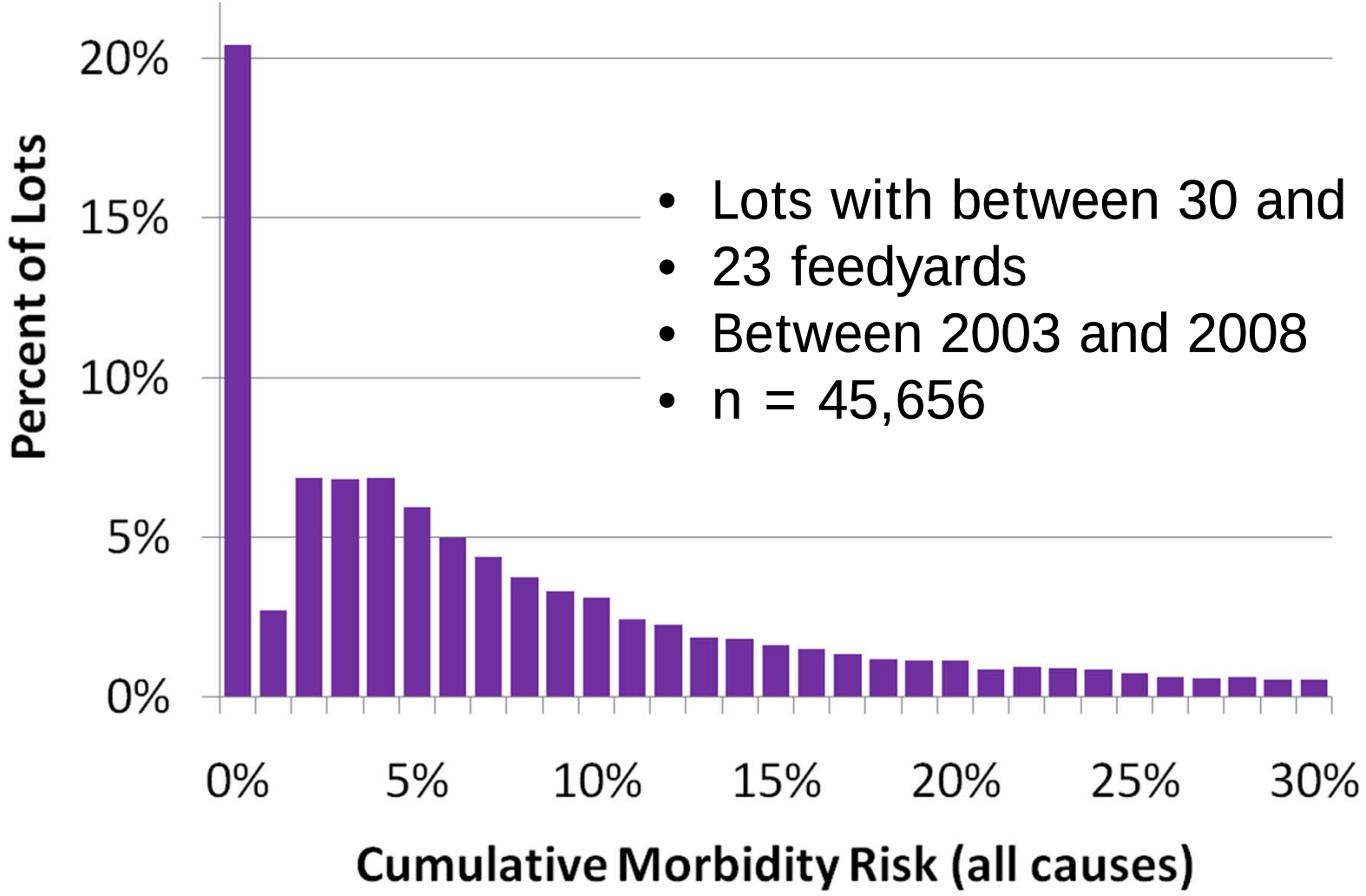
Risk Classification



Lot Level Risk factors

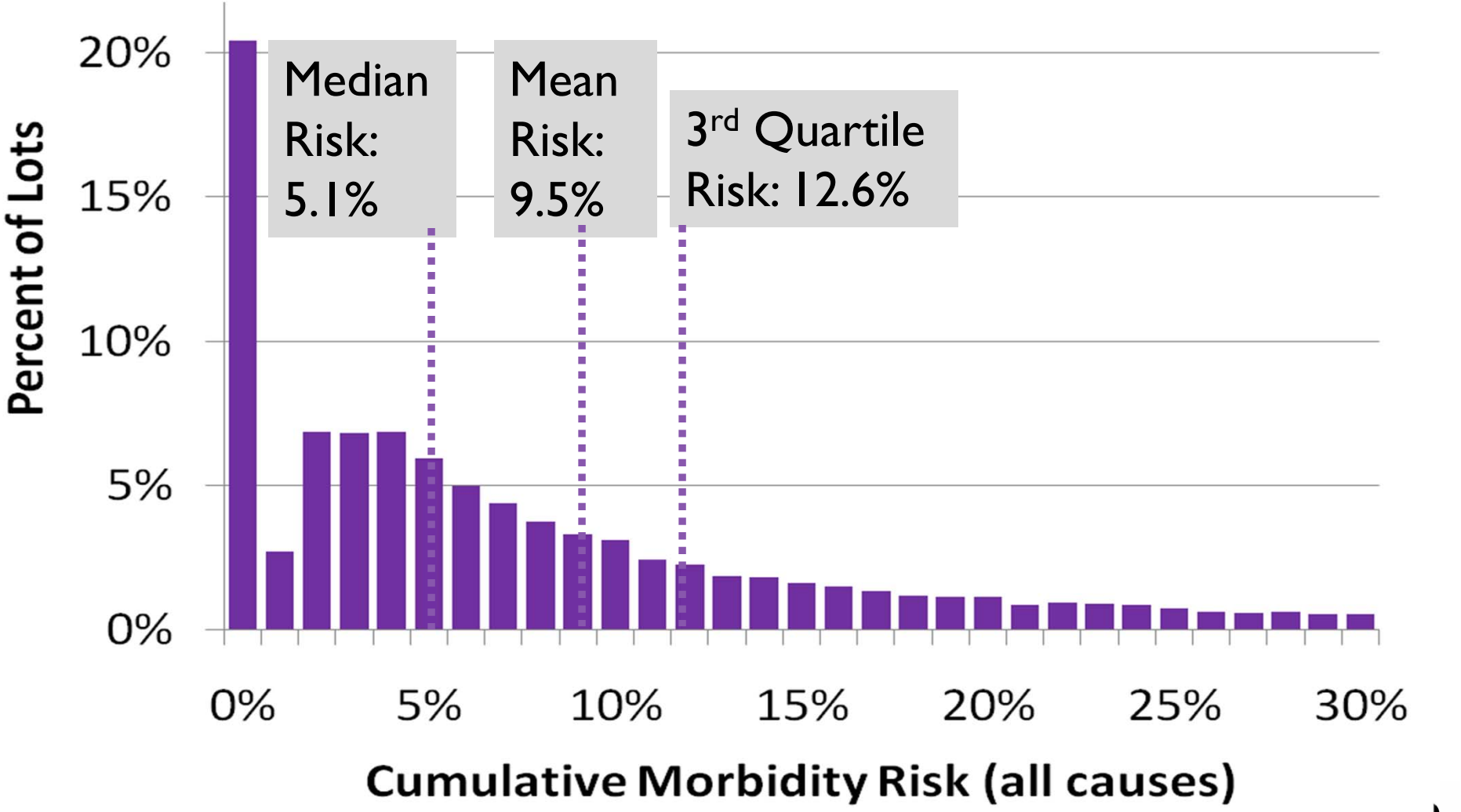
- Transportation characteristics
  - Distance traveled: entire period BRD morbidity / mortality
    - Cernicchiaro et al. J ANIM SCI 2012, 90:1929-1939
  - Shrink: increased BRD incidence / performance losses
    - Cernicchiaro et al. J ANIM SCI 2012, 90:1940-1947
- Weather conditions influence BRD risk
  - Max wind speed, mean wind chill, temperature change
    - Cernicchiaro et al J ANIM SCI 2012, 90:1328-1337

Lot-level cumulative morbidity risk



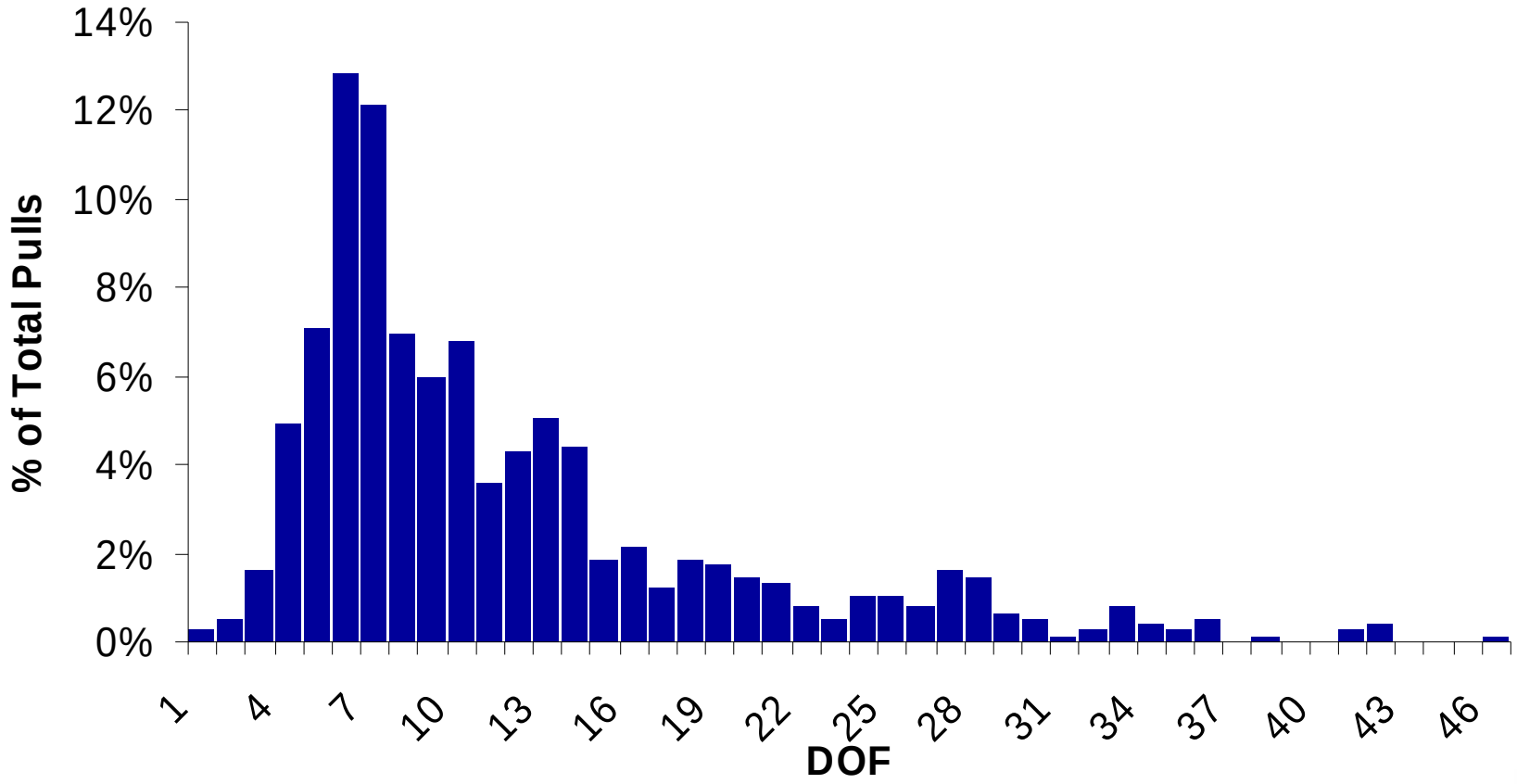
- Lots with between 30 and 500 hd
- 23 feedyards
- Between 2003 and 2008
- n = 45,656

Lot-level cumulative morbidity risk



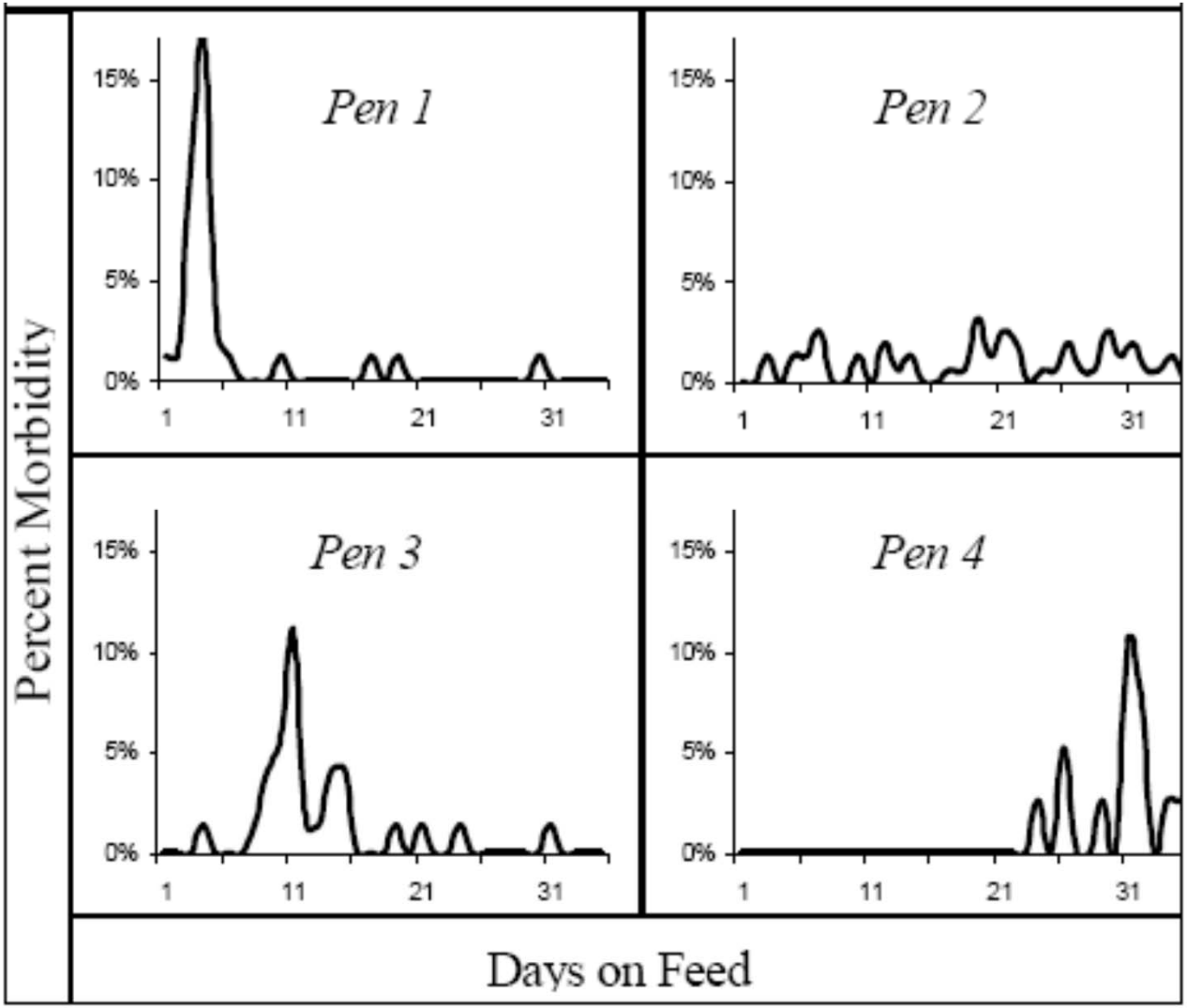
Population Dynamics

- **Morbidity evaluation by lot**



Population Diagnosis

- Example data:
  - 40% morbidity
  - Calves, 1st 45 DOF
- Differences by:
  - Population
  - Etiologic Agent



Summary

- Individual BRD Events
  - Costly
  - Challenging to accurately diagnose
  - Prevention important
- Lot-level BRD events
  - Economically important
  - Known, preventable risk factors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