Characterization of the sickness response in Bovine Respiratory Disease

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Introduction- Bovine Respiratory Disease (BRD)

- Multi-factorial (immunosuppressive factors + viral + bacterial pathogens), range of outcomes
- Disease with highest incidence in feedlot population
- Single greatest cause of cattle mortality in the US
- Economic *and* animal welfare concern - mitigate by improving preventative, diagnostic and treatment strategies
The sickness response – what is it, and why study it?

Generalized sickness response: Constellation of physiological and behavioral changes, including:

- Fever
- Anorexia
- Lethargy
- Increased pain sensitivity
- Decreased grooming

Targets for:

1. **Improving diagnostic accuracy**
2. Evaluating treatment outcome
Standard BRD diagnostic regimen – “DART”

D = Depression
A = Appetite Loss
R = Respiratory changes
T = Temperature elevation

DART: Sensitivity and specificity of only 62 and 63%, respectively.
Objective

Determine timing and nature of BRD-induced sickness response, including potential targets for a **better** detection system, to improve diagnostic accuracy and animal welfare.

Hypothesis

Challenge will result in clinical BRD accompanied by fever, anorexia, increased lying, increased pain sensitivity, and decreased grooming.
Experimental Design

- Clinically healthy beef steers (average BW = 300 kg)
- Randomized to BRD or Control (n = 10/treatment)
- Singly housed with visual isolation
d 0 = BRSV (virus)

d 5 = Histophilus Somni (bacteria)
Timeline

All days: Feed intake, clinical exam, continuous lying behavior

Days 3-10: Continuous rectal temperature

Days -1, 4, 6, 7, 8, 9, 10, 11, 13: Grooming behavior and pain testing
3-pronged approach to determining successful infection

1. Clinical score
2. Serology
3. Viral shedding
Increases in clinical score beginning on d 2
BRD have peak fever on d 5; no difference by d 7
BRD decrease DMI starting d 2 through d 11
BRD increase lying time, d 3 and 4

![Graph showing total daily lying time, hours/day, against day relative to viral challenge. Healthy and BRD lines are shown. * p < 0.05.]
Tendency for increased pain sensitivity in BRD; methodological issues remain
Significantly more brush grooming in healthy cattle
Take-home message

Several changes are promising tools to improve BRD diagnosis:

• Feeding behavior
• Fever
• Possibly grooming behavior

What do we need?

Expansion of automated monitoring to other aspects of sickness response -> a practical, cost-effective solution to improve diagnostic accuracy and animal welfare
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