Factors Affecting BRD Outbreaks In Stocker Cattle

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Bovine Respiratory Disease Complex

A Disease of Management

Some things you have control over and some you have no control.

*Receiving Programs and Treatment Programs you have control over and they can greatly affect you profitability!*
Disease is the result of complex interactions

Host
- immune status
- parasite load
- nutrition

Agent
- bacteria
- viruses
- toxins

Environment
- fomites
- vectors
- soil
- waste
- climate
- air
- management

The science of healthier animals

Confidential
Host Factors

Parasites
Hydration Status
Nutritional Status
Vaccination Status
Stress
Stress

**Acute Stress** - Enhanced Immune Response

*Chronic Stress* – Immunosuppression
Decreased Immune response to disease and vaccinations

*Chronic Stress* - Kills production
Effect of Internal Parasites on Calves

Reduce feed intake
Reduce daily gain
Impair immune function
Parasites Suppress Appetite

Appetite Suppression

Dewormed Cattle

Parasite-Infected Cattle

(Lou Gasbarre, USDA)
Changes in Size of Draining Lymph Nodes after Infection with *Ostertagia*

14 Days Post Infection

> 20 fold increase in size

(Lou Gasbarre, USDA)
Parasites Redirect the Immune System Response

Viral Infections

Parasite Infections

An Immune Response against Parasites

macrophage activation

antibody, including IgE

inhibits proliferation

inhibits production

IL-10

IL-4

IL-5

IFN-γ
Host Factors

**Hydration Status** - Dehydration of 7-8 % increased Morbidity and Mortality

**Nutritional Status** - Mineral deficiencies, Poor Body condition can equal less than optimal vaccination and/or disease response
Nutrition

Microbiome-Gut Flora
Protein- % in feed and quality
Microbiome and health

New evidence shows that the bacteria in the gut also interact with the immune systems, and might even influence the body’s immune reaction to vaccines. Evidence suggests that a balanced and diverse microbiome might contribute to better health overall, and a less diverse or less balanced microbiome can have a negative impact on health.
We can feed some WEIRD stuff!!
Cereal, Candy, Yogurt, Potato Chips, Veggies, Whiskey Slop, Gin Trash, Wet Distillers, Dried Distillers, Honey buns,

Can We Say “Ruminal Acidosis”

One consequence of feeding excessive amounts of rapidly fermentable carbohydrates in conjunction with inadequate fiber to ruminants is subacute ruminal acidosis, characterized by periods of low ruminal pH, depressed feed intake, and subsequent health problems
Ruminal epithelial cells are not protected by mucus, so they are vulnerable to chemical damage by acids. Low ruminal pH leads to rumenitis, erosion, and ulceration of the ruminal epithelium. Once the ruminal epithelium is inflamed, bacteria may colonize the papillae and leak into the portal circulation. These bacteria may cause liver abscesses, which may eventually lead to peritonitis around the site of the abscess. If the ruminal bacteria clear the liver (or if bacteria from liver infections are released into circulation), they may colonize the lungs, heart valves, kidneys, or joints. The resulting pneumonia, endocarditis, pyelonephritis, and arthritis are often difficult to diagnose antemortem.
Environment

Pen Space
Bunk Space
Water Access &
Quality
Working Facilities
Environment

**Pen Space** - 300-500 sq ft/per calf

**Bunk Space** - 18-22 inches/calf

**Feed on a Schedule** - within 15 min of scheduled time every day

**Water Access & Quality**

Make sure calves have Access to Water

Check Water quality

Do not share waters between pens

Clean Troughs as needed weekly daily
Environment

*Working Facilities-* Poor facilities or poorly kept facilities increase stress and stress kills production.

   See more lameness, stiff cattle – which leads to decreased feed intake.

Walk daily and repair as needed.
Environment-(Over Crowding)

Every operation has an optimal # of calves that can be handled in a day/week.

Limiting Factors-Labor, Pen Space, Facilities

Over Crowd or Exceed That Number, and Chances of a Self Induced BRD WRECK are Greatly Increased
Disease Agents

*IBR, BRSV, BVD I&II,*- actually cause clinical disease

*PI3, Corona virus, Influenza D* – *Primary infection allows other pathogens to colonize the lung*

*Pasteurella, Histophilus Mycoplasma*- can be primary agent but most of the time secondary to viral infection

Need to Routinely Necropsy Deads

Acute deads more valuable than chronic for Dx information
Designing a Vaccination Program

Goal: Provide enough immunity for disease challenge & not kill production
Vaccination Programs

Design using the KISS program

Allow animals to rest, fill and rehydrate before vaccination
  Few hours to 48 hrs. depending on the stress and hydration status of the calf

Handle Vaccine properly;
  Check & Monitor refrigerator temp
  Mix only what you will use in hour
  Use cooler chute side to keep vaccine cool and in the dark

Use Vaccines labeled for SubQ administration
Vaccination Programs

Use a MLV viral vaccine that has trial work done in stocker cattle

Use Clostridial (Blackleg) vaccines designed to be low stress- Can reduce feed intake 30 days or more

Limit Gram negative vaccines in receiving programs

Endotoxins
BRD OR Endotoxins

Clinical signs
Increased temp
Increased respiration rate
Depression
Weakness
Anorexia
Frothing +/-
Diarrhea +/-
Common Gram Negative Diseases

E. Coli
Salmonella
Moraxella Bovis
Pseudomonas
Pasteurella Multocida
Fusobacterium
Necrophorium
Haemophilus

Leptospirosis
Campylobacter
Actinobacillus
Mannheimia Hemolytica
Klebsiella
Brucellosis
Endotoxin Sources

Gram neg. diseases
Gram neg. vaccines
Any product with fetal calf serum.
Clostridial vaccines
Viral Vaccines
Environment-dust from pens
Endotoxins & Stress

Higher stress level → greater effect of endotoxin on the animal

• Weaning & processing
• Dehydration
• other infections present (viral or bacterial)
• Vaccinations
• temperature extremes
• high humidity

Endotoxin stacking-environment (dust), pasteurella pneumonia, vaccines
Endotoxins

If animal survives the initial episode
• neutrophil function may be reduced for several hours to days
• animal is actually immunocompromised. Immunocompromised animal may then develop an infection secondary to this episode
• or an incubating infection may be allowed to explode to a fatal infection.

Many of these animals become chronics.
Endotoxins In Vaccines

Temperature can also affect adjuvants
• which can affect endotoxins in vaccine

ALOH-tends to bind endotoxin
• However when frozen it clumps and binding effect is decreased and more free endotoxin is released.
Endotoxins

Rules of Thumb

Dairy cattle: no more than two gram negative vaccines given at one time

Beef: no more than three at one time if not stressed

Stressed cattle or stockers: one or no gram negative vaccines at processing.
Endotoxins

Rules of thumb

Do not give vitamin shots with gram negative vaccines

• carriers may emulsify vaccine adjuvant
• cause quicker or larger release of endotoxins leading to adverse events.

When dealing with gram negative vaccines always error on the side of caution.
### Product Endotoxin Levels

<table>
<thead>
<tr>
<th>Sample Identifier</th>
<th>Endotoxin Concentration</th>
<th>Percentage Change from Base</th>
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<tbody>
<tr>
<td>Once PMH® IN</td>
<td>40,900 EU/mL</td>
<td>base</td>
</tr>
<tr>
<td>Vista Once® SQ</td>
<td>46,600 EU/mL</td>
<td>+14%</td>
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<tr>
<td>Product A</td>
<td>63,450 EU/mL</td>
<td>+55%</td>
</tr>
<tr>
<td>Product B</td>
<td>238,250 EU/mL</td>
<td>+583%</td>
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<tr>
<td>Product C</td>
<td>387,000 EU/mL</td>
<td>+946%</td>
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From Once PMH® IN: Endotoxin TSB - 2014 under approval review
Developing Treatment Protocols

Antibiotic Drug Classes
ANTIBACTERIAL DRUG ACTIONS

A. BACTERICIDAL.
   BACTERIA ARE KILLED.

B. BACTERIOSTATIC.
   BACTERIAL MULTIPLICATION IS INHIBITED.

C. POST ANTIBIOTIC EFFECT (PAE).
   BACTERIA ARE CRIPPLED.
   allow immune system to more efficiently clean it up
Chemical Classes of Approved Veterinary Antibiotics

**Beta Lactams** - penicillins and cephalosporins (Exceede)

**Tetracyclines** - chlortetracycline, oxytetracycline (LA300)

**Macrolides** - erythromycin, tilmicosin, tulathromycin (Zueprovo, Draxixin, Zactran)

**Sulfonamides** - sulfadimethoxine, sulfachlopyridazine, trimethoprim and combination sulfas

**Aminoglycosides** - gentamicin, neomycin

**Aminocyclitols** – spectinomycin,

**Lincosamides** – lincomycin, clindamycin,

**Fluoroquinolones** – (Baytril, Adovcin,)

**Phenicol** – florfenicol (Nuflor, Resflor)
Treatment Protocols

Base on Science
Work with your Veterinarian to develop and monitor
   Necropsies, Culture and Sensitivities, Response to treatments
Use drugs with broad spectrum of activities
Use Banamine at 1\textsuperscript{st} pulls
Bovine Respiratory Disease Complex

The Most Common Finding of BRD Wrecks?
Getting Behind in Pulling and Treatment of BRD in the Cattle?
Temp and Treat

Temp and Treat at Processing

If the temp is 104°F or greater then move to 1st line treatment drug and skip Metaphylaxis drug.

Goal is to Identify sick cattle early in the disease process

Feed and Pull cattle 1st thing in the morning. Observing cattle for fill and watching cattle rise and come to feed can be very instrumental in identifying sick calves. **Treat as soon as possible after pulling.**
“You don’t know where you are going if you don’t know where you have been”

“You can’t measure what you don’t record”

A lot of us have CRS Syndrome and/or selective memory

Records that need to be kept

Source: or origin of cattle

Treatments: pen or group and individual:
  - best if recorded at chute side

Drug Tracker Software
# PROCESSING RECORD

<table>
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<tr>
<th>Date</th>
<th>Cattle Group</th>
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*All records should be maintained for at least two years.*

<table>
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<tr>
<th>Site*</th>
<th>Product</th>
<th>Lot#</th>
<th>Exp. Date</th>
<th>Company</th>
<th>Dose</th>
<th>R O A**</th>
<th>WD Time</th>
<th>Initials of Processor</th>
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* = Location from map  
** = Route of Administration

Producer’s Name: __________________________
Address: _________________________________
City/State/Zip: ___________________________ Phone: ____________________________

Comments: ________________________________
Diagnostics

Necropsies-
  The dead can be very telling
  not just the bug but the age of the lesion
  Pyers patches
  tracheal lesions
  mycoplasma lesions

Nasal Swabs
  Before Antibiotic Treatment Best
  Deep Nasal Swabs

Culture and Sensitivity
ANTIMICROBIAL THERAPY

MATCH:
"THE DRUG TO THE BUG";
IS RELATIVELY EASY.

MATCH:
THE PROPER DRUG AND TX REGIMEN TO THE SICK ANIMAL(S);
PTI’s
Ancillary TX’s (Something more than a shot and a prayer)
IS THE REAL CHALLENGE.
Thank you Questions