ANTIBIOTICS AND VACCINES FOR BEEF CATTLE

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Kansas State University
ANTIBIOTICS

• Many changes over the years in regulations
• Necessary for public health and animal health
• These tools must not be abused or used in a dangerous manner
• Sustainability
ANTIBIOTICS

- Definition
- Classes of compounds
- How does your veterinarian pick the right drug?
  - Broad spectrum/narrow spectrum
  - Water soluble/fat soluble – tissue penetration
  - Concentration dependent/duration dependent
  - Route of administration
- Ancillary therapy???
- Antibiotic misconceptions
- EDLU
- VFD
ANTIMICROBIALS

- Solubility
  - Lipid
    - Fluoroquinilones, tetracyclines, macrolides, florfenicol,
  - Water
    - $\beta$ lactams, sulfas, aminoglycosides
ANTIMICROBIALS

• Bacteriostatic
  • tetracyclines, macrolides, florfenicol

• Bacteriocidal
  – β lactams, fluoroquinilones, aminoglycosides
ANTIMICROBIAL CONSIDERATIONS

http://www.thepigsite.com/articles/contents/09-07Burch1.gif
# Antimicrobials Labeled for BRD Control

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Route Admin</th>
<th>Dosage</th>
<th>Withdrawl</th>
<th>Estimated Drug Cost ($/cwt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baytril**</td>
<td>SC</td>
<td>3.4 ml/cwt**</td>
<td>28 days</td>
<td>$2.40</td>
</tr>
<tr>
<td>Draxxin</td>
<td>SC</td>
<td>1.1 ml/cwt</td>
<td>18 days</td>
<td>$4.15</td>
</tr>
<tr>
<td>Excede**</td>
<td>SC-ear</td>
<td>1.5 ml/cwt**</td>
<td>13 days</td>
<td>$2.54</td>
</tr>
<tr>
<td>Micotil</td>
<td>SC</td>
<td>1.5-3.0 ml/cwt</td>
<td>42 days</td>
<td>$1.85-$3.71</td>
</tr>
<tr>
<td>Nuflor</td>
<td>SC</td>
<td>6.0 ml/cwt</td>
<td>38 days</td>
<td>$3.15</td>
</tr>
<tr>
<td>Zactran</td>
<td>SC</td>
<td>1.8 ml/cwt</td>
<td>35 days</td>
<td>$2.88</td>
</tr>
<tr>
<td>Zuprevo</td>
<td>SC</td>
<td>1.0 ml/cwt</td>
<td>21 days</td>
<td>$3.54</td>
</tr>
</tbody>
</table>

** This class of drugs is subject to ELDU restrictions by the FDA. Contact your veterinarian for details prior to use.
## Antimicrobials Labeled for BRD Therapy

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Dose</th>
<th>Interval</th>
<th>Duration</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advocin (Multidose)</strong></td>
<td>SC</td>
<td>1.5ml/cwt</td>
<td>2-48 hours apart</td>
<td>4 days</td>
<td>$4.40</td>
</tr>
<tr>
<td><strong>Advocin (Single Dose)</strong></td>
<td>SC</td>
<td>2.0ml/cwt</td>
<td>1</td>
<td>4 days</td>
<td>$2.95</td>
</tr>
<tr>
<td><strong>Baytril (Multidose)</strong></td>
<td>SC</td>
<td>1.1-2.3ml/cwt</td>
<td>3 to 5</td>
<td>28 days</td>
<td>$2.32-$8.10</td>
</tr>
<tr>
<td><strong>Baytril (Single Dose)</strong></td>
<td>SC</td>
<td>3.4-5.7ml/cwt</td>
<td>1</td>
<td>28 days</td>
<td>$2.40-$4.00</td>
</tr>
<tr>
<td><strong>Draxxin</strong></td>
<td>SC</td>
<td>1.1ml/cwt</td>
<td>1</td>
<td>18 days</td>
<td>$4.15</td>
</tr>
<tr>
<td><strong>Excede</strong></td>
<td>SC-ear</td>
<td>1.5ml/cwt**</td>
<td>**</td>
<td>13 days</td>
<td>$2.54</td>
</tr>
<tr>
<td><strong>Excenel RTU</strong></td>
<td>SC</td>
<td>1-2ml/cwt**</td>
<td>**</td>
<td>3 Days</td>
<td>$2.75</td>
</tr>
<tr>
<td><strong>LA 200/Biomyacin</strong></td>
<td>SC/IM</td>
<td>4.5ml/cwt</td>
<td>1</td>
<td>28 Days</td>
<td>$0.40-$5.00</td>
</tr>
<tr>
<td><strong>Micotil</strong></td>
<td>SC</td>
<td>1.5-3.0ml/cwt</td>
<td>1</td>
<td>42 days</td>
<td>$1.85-$3.71</td>
</tr>
<tr>
<td><strong>Naxcel</strong></td>
<td>SC</td>
<td>1-2ml/cwt**</td>
<td>**</td>
<td>4 days</td>
<td>$2.55-$8.50</td>
</tr>
<tr>
<td><strong>Noromycin/Tetradsure</strong></td>
<td>SC/IM/IV*</td>
<td>4.5ml/cwt</td>
<td>1</td>
<td>28 Days</td>
<td>$0.52</td>
</tr>
<tr>
<td><strong>Nuflor</strong></td>
<td>SC/IM</td>
<td>3ml/cwt IM 2x 6ml/cwt once</td>
<td>2-48 hours apart or 6ml once</td>
<td>28 IM 38 SQ</td>
<td>$3.15</td>
</tr>
<tr>
<td><strong>Nuflor Gold</strong></td>
<td>SC</td>
<td>6ml/cwt</td>
<td>1</td>
<td>44 days</td>
<td>$3.15</td>
</tr>
<tr>
<td><strong>Resflor</strong></td>
<td>SC</td>
<td>6ml/cwt</td>
<td>1</td>
<td></td>
<td>$3.53</td>
</tr>
<tr>
<td><strong>Zactran</strong></td>
<td>SC</td>
<td>1.8 ml/cwt</td>
<td>1</td>
<td>35 days</td>
<td>$2.88</td>
</tr>
<tr>
<td><strong>Zuprevo</strong></td>
<td>SC</td>
<td>1.0ml/cwt</td>
<td>1</td>
<td>21 days</td>
<td>$3.54</td>
</tr>
</tbody>
</table>

* Use extreme caution in administering this product IV. IV administration is not usually recommended.

** This class of drugs is subject to ELDU restrictions by the FDA. Contact your veterinarian for details prior to use.
BETA-LACTAMS

Products
- Penicillin – gram positives
- Cephalosporins
  - Excede – TRT/CTL BRD, Foot rot, Metritis
  - Excenel – TRT BRD, Foot rot, Metritis
  - Naxcel – TRT BRD, Foot rot

Characteristics
- Bactericidal – Concentration dependent
- Water soluble
- Concentration dependent
- Good tissue penetration
- As generations increase spectrum broadens
## Tetracyclines

<table>
<thead>
<tr>
<th>Products</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomycin – TRT BRD, Foot rot, Pinkeye, Enteritis, Lepto, staph/strep</td>
<td>Bacteriostatic – Duration Dependent</td>
</tr>
<tr>
<td>LA 200 – Same as Biomycin</td>
<td>Broad spectrum</td>
</tr>
<tr>
<td>Noromycin 300 LA – same as above</td>
<td>Water and fat soluble</td>
</tr>
<tr>
<td>Tetradure 300 – Also CTL BRD</td>
<td></td>
</tr>
<tr>
<td>Products</td>
<td>Characteristics</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Draxxin – TRT/CTL BRD, Pinkeye, Foot rot</td>
<td>Bacteriostatic – Duration Dependent</td>
</tr>
<tr>
<td>Micotil – TRT/CTL BRD</td>
<td>Broad spectrum - Fusobacterium</td>
</tr>
<tr>
<td>Tylan – Liver abscess</td>
<td>Fat soluble</td>
</tr>
<tr>
<td>Zactran – TRT/CTL BRD</td>
<td></td>
</tr>
<tr>
<td>Zuprevo – TRT/CTL BRD</td>
<td></td>
</tr>
</tbody>
</table>
QUINOLONES

Products
• Advocin – TRT BRD
• Baytril – TRT/CTL BRD

• No extra label use of these products

Characteristics
• Bactericidal – Concentration dependent
• Fat soluble
• Broad spectrum
• Good tissue penetration
FLORFENICOL

**Products**
- Nuflor – TRT/CTL BRD, Foot rot
- Nuflor Gold – TRT BRD
- Resflor – TRT BRD

**Characteristics**
- Bacteriostatic – Duration Dependent
- Broad spectrum
- Fat soluble
SULFAS

Products
• Albon – TRT BRD, Foot rot

Characteristics
• Broad spectrum
• Bacteriostatic
• Water soluble
AMINOGLYCOSIDES

Products

• Neomycin – Calf scours
• Ban of gentamicin (18 month withdrawal)

Characteristics

• Bactericidal
• Water soluble
• Effective against gram negatives
VOLUNTARY BANNED DRUGS

• Phenylbutazone 60 day withdrawal

• Aminoglycosides 18 mos. withdrawal
ILLEGAL EXTRALABEL DRUGS IN FOOD ANIMAL MEDICINE

- Imidizoles
  - Metronidazole
- Chloramphenicol
- Clenbuterol
- Nitrofurans
  - Nitrofurazone, furazolidin
- Glycopeptides
- Diethylstilbesterol
- Fluoroquinolones (Enrofloxacin, Danofloxacin)
- Sulfas (except: sulfadimethoxine)
  dairy cows >20 mos of age
- Phenylbutazone dairy cows
PSEUDO-EXTRALABEL BAN

- Cephalosprins

- Can not change the dose, frequency, duration or route of administration within a species

- Can use it for non-labeled diagnosis, just not change anything else
CATTLE DISEASES AND PATHOGENS

- Calf scours
  - *E. coli* K99 (<3-5 doa)
  - Rotavirus (4-14 doa)
  - Coronavirus (4-30 doa)
  - *Salmonella sp. (dublin)* (>10-14 doa)
  - *Cryptosporidium sp.* (1-4 woa)
  - *Eimeria sp.* – Coccidiosis – Older cattle

- Foot Rot
  - *Fusobacterium necrophorum*
  - *Dichelobacter nodosus*
CATTLE DISEASES AND PATHOGENS

• Respiratory disease
  • *Pasteurella multocida*
  • *Mannheimia hemolytica*
  • *Histophilus somnus*
  • *Mycoplasma sp.*

• Central nervous system infections
  • *Listeria monocytogenes*
  • *Histophilus somnus*
  • *Clostridium tetani*
CATTLE DISEASES AND PATHOGENS

• Abscess
  • *Fusobacterium necrophorum* (liver)
  • *Archonobacter pyogenes*
  • *Staphylococcus sp.*

• Septicemia & Septic Arthritis
  • *Histophilus somnus* – heart lesions
  • *E. coli* (baby calves, injected sclera)
  • *Archonobacter pyogenes* – tail tip
  • *Mycoplasma bovis*
  • *Streptococcus sp.*
  • *Staphylococcus sp.*
CATTLE DISEASES AND PATHOGENS

- Mastitis
  - *E. coli*
  - *Klebsiella sp.*
  - *Streptococcus*
  - *Staphylococcus aureus*
  - *Mycoplasma sp.*

- Pink Eye
  - *Moraxella bovis*

- Lump Jaw
  - *Actinobacillus lignersii*
  - *Archanobacter bovis*
EFFECTS OF BRD CONTROL ON BEEF CATTLE HEALTH AND MORTALITY

Risks of treatment, death and liver abscesses

No Metamorb  Meta-morb  No Metamort  Meta-mort  No Tylosin  Tylosin

Wileman, Thomson 2009
### METAPHYLAXIS AND FEED GRADE ANTIBIOTICS

<table>
<thead>
<tr>
<th></th>
<th>Percent responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Metaphylaxis – high risk calves</td>
<td>95.6%</td>
</tr>
<tr>
<td>Metaphylaxis – low risk calves</td>
<td>8.7%</td>
</tr>
<tr>
<td>Feedgrade antibiotics – high risk calves</td>
<td>52.2%</td>
</tr>
<tr>
<td>Feedgrade antibiotics – low risk calves</td>
<td>17.4%</td>
</tr>
</tbody>
</table>

Terrell, Thomson et al. 2009
Antibiotic misconceptions
COMMON QUESTIONS

• Single or combination antimicrobials?
• How long to I wait to treat again?
• When should you switch to the next drug?
• Route of delivery and speed to infection?
• Low dose multiple days or larger dose on one day?
• What is considered normal antibiotic success?
• What about ancillary therapy?
Single verses combination antibiotic therapy

One, two or three AB?

Bactericidal and Bacteriostatic

Pen kicker
Apley’s suggested minimum and maximum times before moving to additional therapy in non-responding BRD cases.

Apley, 2012
<table>
<thead>
<tr>
<th>Antimicrobial</th>
<th>Serum or plasma Tmax - reported range or mean ± SD (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin trihydrate - 7.7 mg/kg IM</td>
<td>1.1 ± 0.63</td>
</tr>
<tr>
<td>Ceftiofur sodium - 2.2 mg/kg SC</td>
<td>0.67 - 3.0</td>
</tr>
<tr>
<td>Ceftiofur hydrochloride - 2.2 mg/kg SC</td>
<td>1 - 5</td>
</tr>
<tr>
<td>Ceftiofur crystalline free acid - 6.6 mg/kg SC in ear</td>
<td>12 ± 6.2</td>
</tr>
<tr>
<td>Danofloxacin - 5 mg/kg SC</td>
<td>1 ± 0</td>
</tr>
<tr>
<td>Enrofloxacin - 5 mg/kg SC</td>
<td>Calves 1.9 ± 0.21</td>
</tr>
<tr>
<td></td>
<td>Adults 3.5 ± 0.46</td>
</tr>
<tr>
<td>Florfenicol - 40 mg/kg SC</td>
<td>4 - 6</td>
</tr>
<tr>
<td>Florfenicol - 20 mg/kg IM</td>
<td>3.17 ± 1.33</td>
</tr>
<tr>
<td>Oxytetracycline (100 mg/ml) - 20 mg/kg IM</td>
<td>4</td>
</tr>
<tr>
<td>Oxytetracycline (200 mg/ml) - 20 mg/kg IM</td>
<td>4 - 8</td>
</tr>
<tr>
<td>Procaine penicillin G - 30,000 IU/kg IM</td>
<td>2 - 4</td>
</tr>
<tr>
<td>Tilmicosin - 30 mg/kg SC</td>
<td>1.0 serum (8 hrs lung)</td>
</tr>
<tr>
<td>Tulathromycin - 2.5 mg/kg SC</td>
<td>0.5 plasma (24 hrs lung)</td>
</tr>
</tbody>
</table>

As a general rule, IVs are done downward, toward animal’s body.
SINGLE DAY VS. MULTIPLE DAY

- Most drugs are labeled for 48 to 72 hrs
- Labor
- Wear and tear on animals
- CFR – no different or worse for single day therapy
NUMBERS TO WATCH

- Dead to pull ratio – 10 to 15%
- Case fatality rate – 5 to 10%
- Treatment success (1st treatment) 75 to 80%
- Treatment success (2nd treatment) 50 to 60%
- Treatment success (3rd treatment) 50%
- Days to retreat 11 to 14 days
- BRD pen death loss rate (never treated) < 10% of BRD deads
- Chronic: Dead ratio – 1:1 to 1:2
ANCILLARY THERAPY

- Banamine
- B vitamins
- Vitamin C
- Dexamethosone
- Recover
- IBR vaccine
- Probiotics
WHICH ANCILLARY THERAPIES DO THE CONSULTING VETERINARIANS RECOMMEND?

Terrell, Thomson et al. 2009
AMDUCA

- Animal Medicinal Drug Use Clarification Act
- Signed into law 10/22/94
- Notice of proposed rulemaking to implement the AMDUCA published in the Federal Register 5/17/96 (75 days for comments)
- Final rule was effective 12/9/96
Antibiotic residue avoidance issues/misconceptions

No extra-label usage of any non-nutritive feed additives!!
No excuses, no authority.
WHAT IS EXTRA-LABEL?

• The use of an antimicrobial:
  • in a species that it isn’t on the label
  • at a dosage above or below the label directions
  • use of a human drug on a food producing animal

Animal Medicinal Drug Use Clarification Act
Signed into law 10/22/94
VETERINARY RECORDS AND BOTTLE LABEL REQUIREMENTS

- Identify the animals
- Animal species treated
- Number of animals treated
- Name of drug and active ingredient
- Dosage prescribed
- Duration of treatment
- Extended withdrawal
- FDA may have access to records
- Name and address of the prescribing veterinarian
- Established name of each drug
- Specified directions including identification of animal or herd or pen, dosage frequency, route of administration and duration of therapy
- Cautionary statements
- Withdrawal

Animal Medicinal Drug Use Clarification Act Signed into law 10/22/94
Decisions by veterinarian to extra label

- Decision to medicate
  - Is a labeled compound effective as labeled?
    - No
    - Is there another food animal compound which could be used in an extra-label manner?
      - No
      - Is there a compound labeled for non-food animals or humans which may be used in an extra-label manner in it's current form?
        - No
        - Alter regimen, know the regs.
        - Yes
        - Determine regimen, know the regs.
      - Yes
      - Determine regimen, know the regs.
    - Yes
    - Alter regimen, know the regs.
  - Yes
  - treat

Adapted from Apley
MEDICATED FEED CLASSIFICATIONS

• Type A - The most concentrated form of a medicated feed additive. It usually consists of a drug source and a carrier ingredient.

• Type B - A medicated feed containing an animal drug and a substantial amount of nutrients including vitamins, minerals, and other nutritional ingredients

• Type C – Medicated feed intended as being sold as complete feed
TWO GUIDANCE DOCUMENTS

• Guidance #209
  • the use of medically important antibiotics in food-producing animals should be limited to those uses that are considered necessary for assuring animal health
  • the use of medically important antibiotics in food-producing animals should be limited to those uses that include veterinary oversight or consultation.

• Guidance #213
  • drug companies to voluntarily revise their product labels to remove growth promotion and feed efficiency claims and provides for moving over-the-counter products to prescription or veterinary feed directive (VFD) status

http://feedstuffs.com/vfd.aspx
WHAT ARE VFD DRUGS?

• VFD drugs:

• Antimicrobials that FDA approved for use in animal feeds

• Antimicrobials used under veterinarian supervision and issued under written veterinary feed directive orders
  • Valid VCPR per state laws

http://feedstuffs.com/vfd.aspx
WHAT WILL CHANGE WITH VFD?

• Growth promotion uses of antibiotics in feed will no longer be allowed (examples: CTC, Aureomycin, virginiamycin),

• The use of “medically important” feed antibiotics will need a VFD and can only be used for treatment, control, or prevention
WHAT WON’T CHANGE

• Use of non-medical feed additives

• Ionophores

• Coccidiostats

http://feedstuffs.com/vfd.aspx
### Unaffected by FDA proposals

<table>
<thead>
<tr>
<th>Animal use only</th>
<th>Human use only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drugs used exclusively in animals:</td>
<td>Drugs used exclusively in humans:</td>
</tr>
<tr>
<td>- Ionophores</td>
<td>- Daptomycin</td>
</tr>
<tr>
<td>- Polypeptides</td>
<td>- Glycylcyclines</td>
</tr>
<tr>
<td>- Carbadox</td>
<td>- Mupirocin</td>
</tr>
<tr>
<td>- Bambermycin</td>
<td>- Mycobacterium anti-infectives</td>
</tr>
<tr>
<td>- Pleuromutilin</td>
<td></td>
</tr>
</tbody>
</table>

### Affected by FDA proposals

<table>
<thead>
<tr>
<th>Shared use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drugs deemed “important for human medicine” and used by both animals and humans, such as:</td>
</tr>
<tr>
<td>- Penicillins</td>
</tr>
<tr>
<td>- Cephalosporins</td>
</tr>
<tr>
<td>- Quinolones</td>
</tr>
<tr>
<td>- Fluoroquinolones</td>
</tr>
<tr>
<td>- Tetracyclines</td>
</tr>
</tbody>
</table>

**Therapeutic uses**
(still allowed under veterinary supervision)
- **Treat** animals diagnosed with an illness
- **Control** the spread of illness in a herd
- **Prevent** illness in healthy animals when exposure is likely

**Production uses**
(No longer allowed)
- **Enhance** growth or improve feed efficiency
VETERINARY FEED DIRECTIVE

• Must have a VCPR as defined by the state

• Each VFD will have a specific VFD form or DVM will have their own form

• 3 copies – Veterinarian, Producer and Feed store

• All parties must maintain copies of the VFD for two years

• Faxes and electronic VFD (including smart phone) but hard copy has to arrive in 5 days
  • No verbal VFDs
THE PULMOTIL CATTLE VFD FORM

Pulmotil® (dimercaprol) Veterinary Feed Directive for use in Cattle

Client: ____________________________
Address: ____________________________
Phone #: ____________________________
Fax #: ____________________________

First Name: ____________________________
Last Name: ____________________________
Address: ____________________________
Phone #: ____________________________
Fax #: ____________________________

Date: ____________________________
Veterinarian: ____________________________
License #: ____________________________
Location: ____________________________
Special Instructions: ____________________________

Minerals: __________, __________

Amount of feed: __________ g

WFD: ____________________________
WFD Expiration Date: ____________________________

Amount of Fe: __________ g

WFD Expiration Date: ____________________________

Date: ____________________________
License #: ____________________________

Slide courtesy of Kerry Keffaber
VACCINES IN BEEF PRODUCTION
VACCINES

• Types of immunology
• Types of vaccines
• How vaccines work
• Anamnestic response
• Immunity verse vaccinating
TYPES OF IMMUNOLOGY

• Innate immunity

• Passive immunity

• Humoral immune response

• Cell mediated immune response
TYPES OF VACCINES

• Modified live vaccine
• Killed vaccine
• Viral
• Bacterin
• Toxoid
• Subunit
The Vaccination Process

Injecting vaccine
A person is injected with a harmless form of the germ, which does not cause the disease.

Antibodies are made
Although the germ is harmless, the body still recognizes it and makes antibodies against it.

Fighting infection
If the body is invaded by the disease-causing form of the germ, the immune system responds immediately with huge numbers of antibodies to destroy the germ.

This type of immunization uses a form of the disease-causing germ that has been slightly altered to stop it from causing the disease. The person receiving it will not become ill, but it or she will produce antibodies against the pathogen that does cause disease. The body will do this every time it is threatened by that germ.

http://www.scienceclarified.com/scitech/images/lsbv_0001_0001_0_img00
ANAMNESTIC RESPONSE?

Amount of antibody in serum (titer)

1st vacc. 2nd Vacc. Or exposure

Anamnestic response

Tizzard, 1996
COMPONENTS FOR AN EFFECTIVE IMMUNE RESPONSE

- Viable vaccine
  - UV, temp
  - Disinfectants

- Calf must have functional immune system

- Proper administration
  - Handling, dosage and route
PROPER INJECTIONS

- Intramuscular verses subcutaneous
  - Don’t train the two hand method

- Clean needles
  - Nolvassen for killed vaccines and other syringes
  - Clean water in tray and sponge for MLV vaccines

- Change needles when they change implant cartridge
Injection Site Management

Injection Triangle
A - Ahead of point of shoulder
B - Above the vertebrae
C - Below Nuchal Ligament
DEWLAP INJECTION (CONTINUED)

- Use no larger than a 5/8” needle
- Tent the skin in the dewlap region and administer a SQ injection
BASIC VACCINE PROGRAMS

• Cows
  • Pre-breeding:
    • IBR, BVD, BRSV, PI3
    • Leptospirosis (5-way)
    • Vibriosis
  • Preg checking
    • Vibriosis

• Calves
  • Marking & Branding Time (60-90 days):
    • Clostridial diseases (7 or 8-way)
    • 5 way MLV viral
  • 2-4 weeks prior to weaning
    • Clostridial disease
    • 5 way MLV viral
  • Weaning
    • 5 Way MLV viral
    • Brucellosis for replacement heifers

BASIC VACCINE STRATEGY

- Breeding bulls
  - Pre-breeding
  - IBR, BVD, BRSV and PI3
  - Vibriosis
- Replacement heifers
  - 30 to 60 days prior to breeding
  - IBR, BVD BRSV and PI3
  - Leptospirosis
  - Vibriosis
# Vaccine Recommendations by 23 Consulting Feedyard Veterinarians

<table>
<thead>
<tr>
<th></th>
<th>High risk calves</th>
<th>Low risk calves</th>
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<tr>
<td>IBR</td>
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<tr>
<td>BVD Type 1</td>
<td>100%</td>
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<tr>
<td>BVD Type 2</td>
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<td>BRSV</td>
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<td>Clostridials</td>
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<tr>
<td>Pasturella</td>
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</table>

Terrell, Thomson et al. 2009
IBR

• Infectious Bovine Rhinotracheitis

• Very common

• You should address this virus every time you put a vaccine into cattle in a respiratory preventive program

• Use an MLV unless there are reproductive concerns
  • cellular immunity is very important for IBR infections
IBR

- Herpes virus
  - Rednose
  - Frothing of muzzle
  - high fever
  - watery eyes
BVD VIRUS

- Member of the Pestivirus genus
- Closely related to Hog cholera in swine and Border disease in sheep
- Enveloped, single strand RNA virus
- Two genotypes = Type I and Type II
- Two biotypes = cytopathic and noncytopathic
BVD AND CLINICAL DISEASE

• BVD infections during gestation
  • Abortion (usually first 4 mos.)
  • Persistently infected calf if fetus is infected before 125 days gestation
• Congenital defects
  • cerebellar hypoplasia
  • cataracts
  • retarded growth
• Weak calf syndrome
MUCOSAL DISEASE

• Persistently infected calves
• Extensive ulceration of the alimentary tract epithelium
• Caused by infection with cytopathic BVD virus
  • mutation of PI noncytopathic strain
  • MLV vaccines
  • acutely infected cattle
  • Other PI with mucosal disease
WHERE AND HOW MANY?

- Estimated that 1% of cattle born in the U.S. are persistently infected with BVD

- Half of these calves die before weaning

- Prevalence on arrival at feedyard = .5 to .3%
  - Based on post-weaning management

- Half of PIs die or are railed at the feedlot
PREVALENCE?

- Loneragan and Thomson 2005  .45% (4 wt.)
- Loneragan and Thomson 2005  .23% (6 wt.)
- O’Connor et al., 2005  .20% (6 wt.)
- Hessman et al., 2005  .31% (5 wt.)
- Hessman et al., 2005  .40% (5 wt.)
- Lindberg and Thomson, 2005  .34% (6 wt.)
BVD and the cow herd

Which one is diseased?

- BVD
- BLV
- IBR
- Johne’s
- LEPTO
WHY WOULD YOU RECOMMEND TO TEST A COW HERD?

• If you have confirmed PI calves in the herd

• Increased abortions or abnormally high percentage of open cows

• Unusual increase in calf morbidity while on the cow
IDENTIFYING PI ANIMALS – HIGH RISK HERD

Test all calves, cows without calves, and bulls

Test-negative

Retain all test-negative animals in herd

Euthanize or sell calves to slaughter

Test dams

Test-negative

Return to breeding herd after removing PI calf

Test-positive

Remove calves & dams from breeding herd

Test-positive calves

Sell PI cattle to slaughter

Test-positive cows and bulls

Test dams

Test-positive

Sell to slaughter

Slide compliments of Dr. Bob Larson
HOW CAN WE SPREAD BVD VIRUS?

• Animal to animal exposure

• Rectal palpation – Lang-Ree et al., 1994

• Nasal secretion contamination

• Environmental exposure
  • Niskanen and Lindberg, 2003
RECTAL PALPATION

Eight out of eight seroconverted by day 13 post-palpation
Five out of eight were positive for virus isolation

The two non-palpated animals were not sero-positive nor viremic.

Lang-Ree et al., 1994
PROCESSING BARN AND HOSPITAL CONCERNS

- Nasal secretion from a PI was smeared on the surface of a vaccine bottle (Trichophyton)

- Allowed to dry until undetectable, then placed in a room for 80 minutes

- Vaccinated and housed in separate rooms
  - Two calves contaminated; one calf from another

Niskanen and Lindberg, 2003
PROCESSING BARN AND HOSPITAL CONCERNS

• Both calves were sero-positive 21 d post-vaccination

• One of the two calves was viremic on d 7

• Control animal was neither

Niskanen and Lindberg, 2003
HOSPITAL PENS

• Two experiments

• Experiment one
  • PI calf placed in a pen for a week
  • 2 h after PI removal, 3 BVD neg. calves were placed in the pen

• Experiment 2
  • Calves introduced 4 d after PI removed

Niskanen and Lindberg, 2003
HOSPITAL PENS

- **Exp 1**
  - 2 of the three calves sero-converted and were viremic by 10 days after introduction to pen

- **Exp 2**
  - None of the animals sero-converted or were viremic throughout the experiment

- Processing areas?
- Hospital systems?

Niskanen and Lindberg, 2003
## The Survival of Bovine Viral Diarrhea Virus on Materials Associated with Livestock Production

Stevens Thomson et al. 2011

<table>
<thead>
<tr>
<th>Material</th>
<th>1h</th>
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<td>16.40%</td>
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Salt blocks kill BVD
BVD PI DECISION TREE

The 4 S’s

Confirmed PI Calf
- Shoot
- Seclude and feed (Restart)

Slaughter immediately
- 850 lb. or more
- Under 850 lb.

Normal packer

Salvage slaughter

Sell
- Full disclosure
- Brand?
CONCLUSIONS

• Utilize your veterinary client relationship for your animals

• Antibiotics

• Vaccinations

• Preventative medicine and more (Precondition)
ACKNOWLEDGEMENTS

• BCI staff
• Dr. Mike Apley
• Dr. Shelie Laflin
• Dr. Guy Loneragan
• Dr. Bob Larson