Antibiotics on the Dairy
Dr. Steven Parish

Conditions where antibiotics may be indicated on a dairy
- Calf hood and replacement heifer diseases

Antibiotics and other Medications used on dairies are Management tools

Conditions where antibiotics may be indicated on a dairy
- Lactating and Dry cows
Mastitis Treatment and Control

Mastitis Definition:

IMI
Mastitis (intramammary infection) occurs when bacteria enter the teat orifice, multiply within the mammary gland, and elicit an inflammatory response (SCC).

Result:
- Decreased milk quality & yield
- Adversely affects animal health
Micro organisms associated with the two main types of mastitis

**Contagious Mastitis Organisms**
- Streptococcus agalactiae
- Staphylococcus aureus
- Streptococcus dysgalactiae
- Mycoplasma sp

**Environmental Mastitis Organisms**
- Streptococcus sp.
- Streptococcus uberis
- Escherichia coli
- Klebsiella sp
- Enterobacter sp.
- Serratia sp.
- Proteus sp.
- Pseudomonas sp.
- Corynebacterium sp.
- Yeasts, Mold and Fungi
- Prototheca
Basic Support of the Sick Ruminant

- Place animal in a comfortable environment
- Meet that animals basic needs
  - Free access to water
  - Free access to palatable feeds
- Monitor frequently
- Specific therapies as indicated

NADIS

Mastitis Treatment Protocols

Approved intramammary antibiotics

- β-lactams (amoxicillin, ceftiofur, cepharpirin, cloxicillin, hetacillin, and penicillin)
- lincosamide (pirimycin)

While several products have been withdrawn from the U.S. market, no new intramammary antibiotics for lactating cows have been approved since 2006.
Systemic antibiotics

- In the United States, there are no antimicrobials that are labeled for systemic treatment of mastitis; however, extralabel use of some antibiotics (approved for dairy cattle for other diseases) is allowed under veterinary supervision.

- Systemic antibiotics to treat cows with severe mastitis are recommended as many of these cows are septicemic (bacteria in the blood)
  - However, systemic use of drugs such as penicillin, ampicillin (Polyflex®) will not reach therapeutic concentrations in the udder and their use is not recommended for mild or moderate clinical cases.

Many sick ruminants are dehydrated

**Mild dehydration:**
Slight eyeball recession, skin tent slightly prolonged (2 to 4 seconds).

**Moderate dehydration:**
Eyes obviously sunken, skin tent obviously prolonged (4 to 8 seconds).

**Severe dehydration:**
Eyes severely sunken into orbit, skin remains tented indefinitely

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<td>重度脱水：</td>
<td>眼球严重凹陷，皮肤持续伸展，皮肤保持伸展。</td>
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Please note: Use these guidelines as a template for developing a program for your herd with your veterinarian. Adapted from NMC Regional, 1993.

### Guidelines for Clinical Mastitis Treatment

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### Oral Drenching

- Oral drenching

NADIS
Homemade Oral Fluid

• A simple non-alkalinizing oral solution would include 140g NaCl, 25g KCl, and 10g CaCl2 in 5 gallons of water.

Hypertonic saline

IV therapy with hypertonic saline will improve the hemodynamic and circulatory situation considerably faster and more effectively than continuous infusion with isotonic saline.

Cattle: 50 to 100 mL per 100 lb bodyweight. Warm to body temperature and administer slowly by intravenous

Adult cows will generally consume 5-10 gals of water within 30 minutes of administration of hypertonic saline.

Potential risks to humans from drug residues

• Direct poisoning by drug residue
  – Toxicity
  – Pharmacologic effect
• Cancer
• Mutations
• Change gut bacteria
• Bacterial drug resistance
• Allergy
• Effects on food processing
Illegal Drugs

- Drugs banned from use in dairy animals
  - Sulfamethazine (except under 20 months)
  - Other sulfonamides (esp. sustained release products)
  - Tetracyclines as feed additives
    - But now labeled for dairy as therapeutic drug eg LA-200

Illegal drugs

- Banned in any food animal
  - Chloramphenicol
  - Clenbuterol (Ventipulmin)
  - Diethylstilbestrol (DES) & estradiol
  - Dimetridazole
  - Ipronidazole
  - Other nitroimidazoles (e.g. metronidazole (Flagyl))

Illegal drugs

- Banned in any food animal
  - Furazolidone
  - Nitrofurazone
  - Fluoroquinolones (e.g. Baytril, A180) except approved use
  - Glycopeptides (e.g. Vancomycin)
  - Dipyrone (Metamizole)
  - Phenylbutazone (dairy >20mths)

How do antibiotics end up in the bulk tank?

- Fresh cow — cows treated with dry cow antibiotics calve early and are milked into the tank before the withholding period has ended.
- Dried off cows — a surprising number of recently treated dried off cows somehow return to the main herd unnoticed by the milkers and are milked into the tank.
- Other antibiotic treatments — most antibiotics have a withholding period. Many enter the bloodstream so foot rot treatments and even small injected doses for pinkeye can lead to antibiotic residues in the milk.
- Weekend milking — many violations occur on a Monday because the weekend milker is not aware that one of the cows has been treated with antibiotics and her milk should be withheld from the vat. This may occur because the cow was not identified, the markings were lost, the identification system was not explained clearly or the milker was not paying attention.
Preventing antibiotic residues in milk

Lactating cows
• Follow instructions
• Before administering antibiotics to an animal, it is essential that you read the details on the label. It is important to make sure that the:
  • drug is appropriate for the ailment
  • drug is administered via the recommended route;
    – intramuscular — directly into the muscle
    – intravenous — into a vein
    – intramammary — into the teat
    – intrauterine — into the uterus
  • correct dosage is given at the right frequency
  • withholding period is noted and recorded every time a drug is used — never assume that two similar types of antibiotics have the same withholding time.

Clearly identify treated cows

Dry cows
• Treatment
• Before treating an animal with dry cow therapy, ensure that the time between drying off and expected calving is greater than the withholding period of the drug used. There may be times when you know that the animal will calve within the withholding period but you decide to treat her anyway. If you make this decision, take great care to make sure that her milk is withheld from the tank after calving until the withholding period ends. The milk should be tested to ensure it is ready to be included in the tank

Animal Medicinal Drug Use Clarification Act (AMDUCA)
• The Animal Medicinal Drug Use Clarification Act of 1994 (AMDUCA) provides veterinarians acting within a veterinarian-client-patient relationship (VCPR) with greater prescribing and dispensing options so that animals can receive the medications they need when they need them
• Keep in mind that AMDUCA does not give veterinarians “carte blanche” for ELDU.
  – AMDUCA allows ELDU only on the lawful order of a licensed veterinarian in the context of a valid veterinarian-client-patient relationship.
  – ELDU is limited to circumstances when the health of an animal is threatened, or suffering or death may result from failure to treat.
  – U.S. Food and Drug Administration (FDA) regulations addressing ELDU are covered in 21 CFR 530.
  – FDA maintains a list of drugs that are prohibited for ELDU for food-producing animals (21 CFR 530.41)
Derbyshire Veterinary Services Ltd

**Veterinarian/Client/Patient Relationship (VCPR)**

- The veterinarian has assumed the responsibility for making clinical judgments regarding the health of the patient and the client has agreed to follow the veterinarians' instructions.
- The veterinarian has sufficient knowledge of the patient to initiate at least a general or preliminary diagnosis of the medical condition of the patient.
- The veterinarian is readily available for follow-up evaluation or has arranged for the following: veterinary emergency coverage, and continuing care and treatment.
- The veterinarian provides oversight of treatment, compliance, and outcome.
- Patient records are maintained.

**OTC or Legend Drug**

- "Caution: Federal law restricts this drug to use by or on the order of a licensed veterinarian."

**Extra Label Use (ELU)**

- There is no approved animal drug that is labeled for such use and that contains the same active ingredient in the required dosage form and concentration, except where a veterinarian finds, within the context of a valid VCPR, that the approved animal drug is clinically ineffective for its intended use.
- Before prescribing or dispensing an approved animal drug or approved human drug for an extralabel use in food animals, the veterinarian must: Make a careful diagnosis and evaluation of the conditions for which the drug is to be used;
  - Establish a substantially extended withdrawal period prior to marketing of milk, meat, eggs, or other edible products supported by appropriate scientific information, if applicable;
  - Institute procedures to assure that the identity of the treated animal or animals is carefully maintained; and
  - Take appropriate measures to assure that assigned time frames for withdrawal are met and no illegal drug residues occur in any food producing animal subjected to extra-label treatment.
FARAD
FARAD - Food Animal Residue Avoidance Databank
For Extra-Label Drug Use (ELDU) Consultation
For FDA Approved Food Animal Drugs
For FARAD Withdrawal Recommendations

WARNING!
Extra Label Use of this drug is permissible under AMDUCA only if such use is by or on the lawful written or oral order of a licensed veterinarian.

Below are the WDI recommendations for the various route and dosage combination(s) for extra-label administration of LA-200 Liquamycin (short-acting) - Bovine.

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<th>Frequency</th>
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<th>Milk WDI</th>
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<td>IV</td>
<td>10 - 20 mg/kg</td>
<td>up to 4 doses</td>
<td>144 hours</td>
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Warnings:
also recommend testing due to variability

Reference(s):
Extralabel use of oxytetracycline

LA-200 Liquamycin and generics

LIQUAMYCIN LA-200 is approved for the treatment of pneumonia and shipping fever complex associated with Pasteurella spp. and Hemophilus spp.; infectious bovine keratoconjunctivitis (pink eye) caused by Moraxella bovis; footrot and diphtheria caused by Fusobacterium necrophorum; bacterial enteritis (scours) caused by Escherichia coli; wooden tongue caused by Actinobacillus lignieresii; leptospirosis caused by Leptospira pomona; and wound infections and acute metritis caused by strains of staphylococci and streptococci organisms sensitive to oxytetracycline.

96-hour milk and 28-day slaughter (Contrast to FARAD)

Reference(s):
Pharmacokinetics of lidocaine in serum and milk of mature Holstein cows

Route Dosage Frequency Meat WDI Milk WDI

Epidural up to 15 ml of 2% solution single and multiple doses 1 day 24 hours

Reference(s): Pharmacokinetics of lidocaine in serum and milk of mature Holstein cows

Infiltration up to 2g in 100 ml single administration (intradermal L block) 4 days 72 hours

Reference(s): Pharmacokinetics of lidocaine in serum and milk of mature Holstein cows

Approved for use in lactating dairy cows
**Procaine Penicillin G**

**Cattle & Calves:** For the treatment of shipping fever syndrome, wound infections, navel infections, foot rot, bacterial infections associated with pneumonia, as well as for bronchitis and tracheitis when caused by or associated with penicillin sensitive organism.

Administer 1mL per 100 lbs of body weight IM once daily.

There is a 48-hour milk withdrawal and a 14 day slaughter withdrawal.

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**Banamine**

**INDICATIONS:** Banamine Transdermal pour-on is indicated for the control of pyrexia associated with bovine respiratory disease and the control of pain associated with foot rot in steers, beef heifers, beef cows, beef bulls intended for slaughter, and replacement dairy heifers under 20 months of age.

**Most Common Causes of Ab Residues - NW Dairy Assoc.:**

- Nuclear
- ELID
- Poor ID
- Poor Communication
- Poor Documentation
- No Time Corrected - Hospital
- Dry Cows
- Other

Only for Intravenous Use in Beef and Dairy Cattle. Not for Use in Dry Dairy Cows.

36 hour milk withdrawal and 4 day slaughter.
Records, Records, Records
The best way to stay out of trouble

1. Identify treated animal
2. Diagnosis
3. Identify the drug
4. Date drug given
5. Dosage and route
6. Written prescription by licensed veterinarian with valid patient/client relationship (ELU)
7. Person giving drug
8. Withdrawal times/dates for milk and slaughter