

Controlling Contagious Mastitis

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Quiz



Objectives

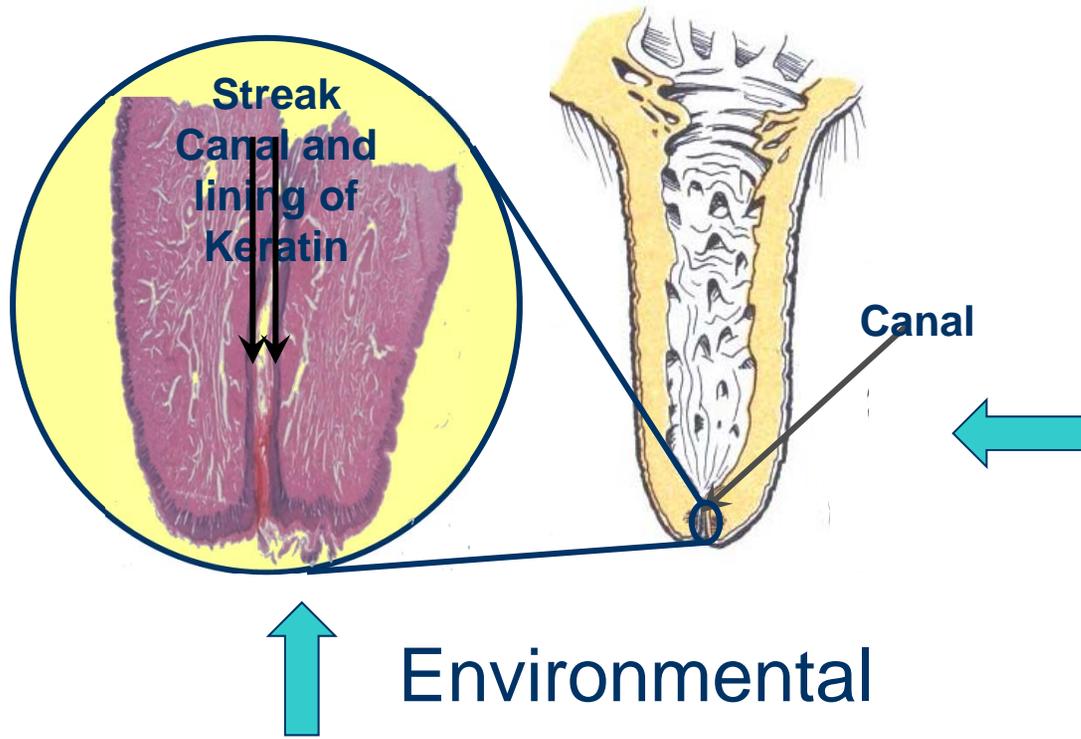
- Definitions
- Causes
- Detection/Diagnosis
- Control
- Treatment
- Conclusion



Definitions

- Clinical manifestations
 - *Subclinical mastitis*
 - Clinical mastitis
 - Subacute
 - Acute
 - Peracute (Toxic)
- Nature of Pathogen
 - Contagious
 - Environmental





Contagious



Contagious Pathogens

- Reservoir: Mammary gland of infected cows
- Transmission
 - At time of milking
 - Fomites (Milking equipment)
 - Cow-to-cow
 - Milker's hands
 - Reverse jetting; machine malfunction



Have ya washed your hands?

Here ya go Pal!

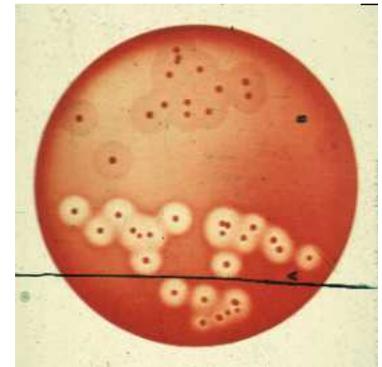
Got Milk?

ARMO'S SOAP BAR
25¢

Ron Colbert © 99

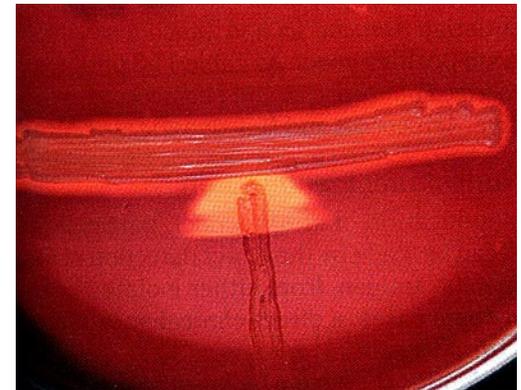
Contagious Pathogens

- *Staphylococcus aureus*
 - Most prevalent contagious pathogen
 - Most often subclinical
 - Strain differences in contagiousness & effect on mammary gland
 - Chronic infections with intermittent clinical flare-ups.
 - Fluctuating SCC and bacteria counts
 - Occasional peracute (Toxic) mastitis
 - Variable response to treatment



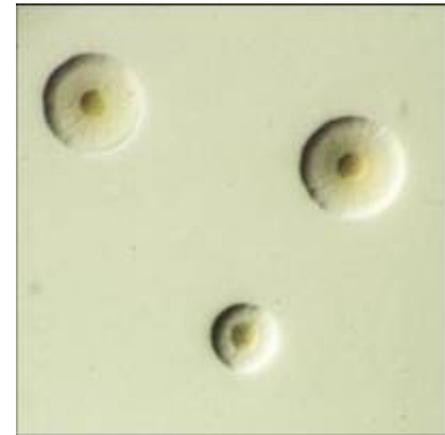
Contagious Pathogens

- *Streptococcus agalactiae*
 - Primarily subclinical
 - Systemic signs infrequent
 - Persistent high SCC and bacteria counts
 - Obligate pathogen of bovine udder
 - Responds well to treatment



Contagious Pathogens

- *Mycoplasma spp.*
 - Multiple quarters
 - Arthritis; Respiratory disease
 - Decreased milk production
 - High SCC
 - Emerging pathogen
 - Large herd size
 - Not treatable



Contagious Pathogens

- *Corynebacterium bovis*
 - Primary streak canal colonizer
 - Mild increases in SCC
 - Indicator of teat dip efficacy
 - Control with post-dip



MU Coagulase Negative Staphylococci Data

Species	No. of IMIs (%)	Median Geometric Mean SCC x 10 ³ cells/ml (Range)*	Median Duration of IMI in Months (Range)**	No. of PFGE Types (No. of IMIs typed)
<i>S. chromogenes</i>	30 (33)	207 (16-1806) ^{a,c}	2 (1-16) ^{a,b,c}	6 (27)
<i>S. cohnii</i>	14 (15)	13 (1-1137) ^{c,d,e}	1 (1-2) ^{b,d,f}	7 (12)
<i>S. epidermidis</i>	14 (15)	139 (7-2116) ^d	1 (1-10) ^d	5 (9)
<i>S. simulans</i>	11 (12)	272 (5-3029) ^{b,e}	1 (1-10)	5 (9)
<i>S. haemolyticus</i>	7 (8)	63 (1-638)	1 (1-5)	3 (5)
<i>S. hominis</i>	4 (4)	36 (9-127) ^{a,b}	1 (1) ^{a, e}	3 (3)
<i>S. arelettae</i>	4 (4)	127 (11-304)	1 (1) ^{c,g}	2 (4)
<i>S. xylosus</i>	3 (3)	98 (31-702)	1 (1-5)	3 (3)
<i>S. equorum</i>	2 (2)	41 (38-44)	1 (1)	2 (2)
<i>S. capitis</i>	1 (1)	273	7 ^{e,f,g}	1
<i>S. auricularis</i>	1 (1)	12	1	1

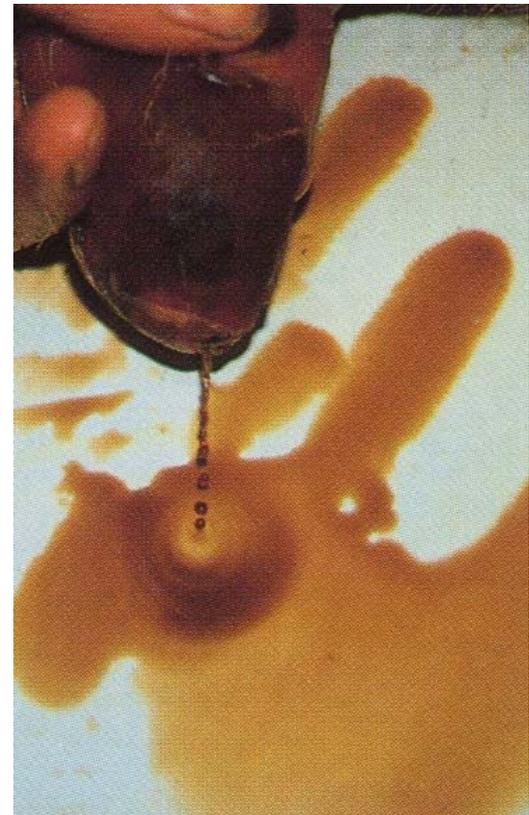
Like superscripts differ from each other. *P = 0.023; **P = 0.047.

Detection and Diagnosis



Detection

- Physical Manifestations
 - Inflammation
 - Altered secretion
 - Dripping milk
 - Gangrene (rare)
 - Emphysema
 - Only works for CLINICAL MASTITIS



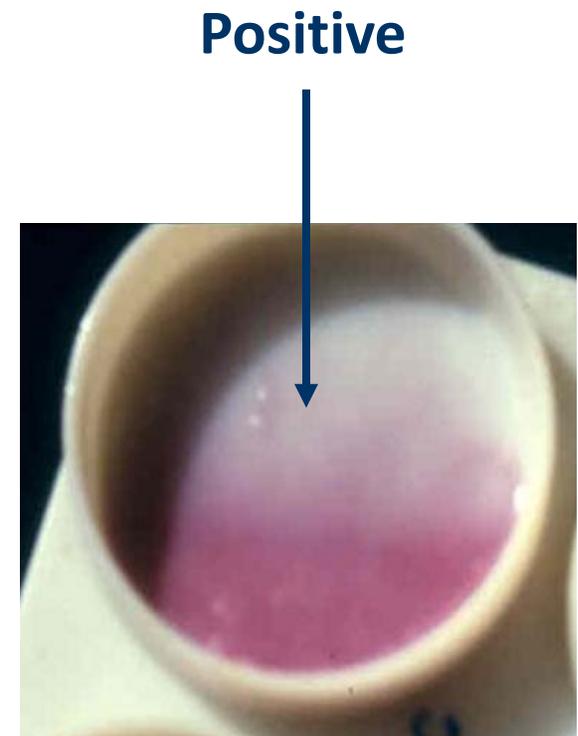
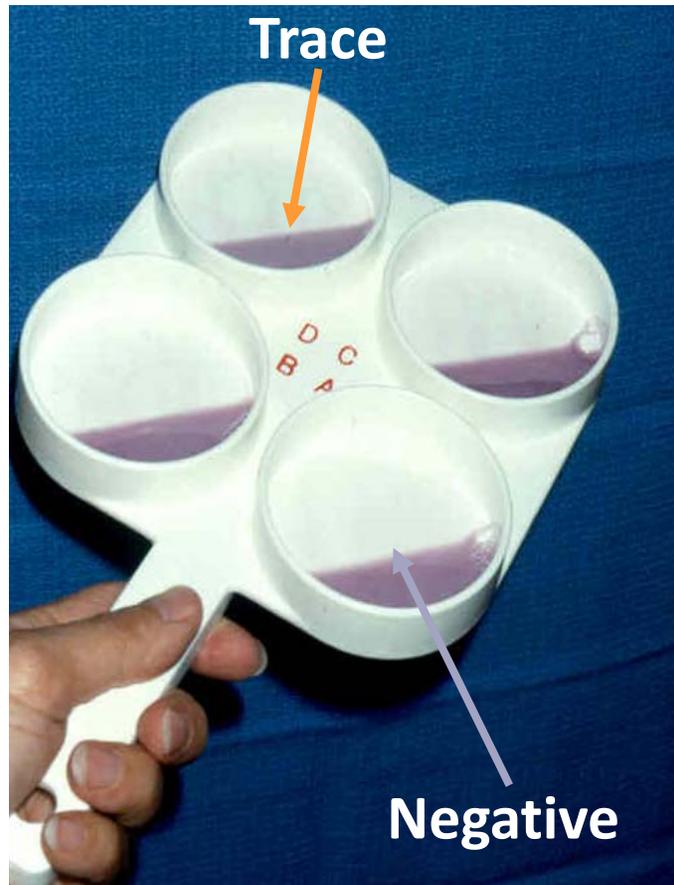
Strip Cup



Somatic Cell Count (Subclinical)

- Nucleated host cells (White blood cells)
- Normal Value (200,000 cells/ml)
- Increased
 - Intramammary infection
 - Non-septic inflammation
 - Trauma
 - Low production

California Mastitis Test (CMT)



CMT

CMT Score	SCC cells/ml
Negative	0-200,000
Trace	150,000-500,000
1	400,000-1,500,000
2	800,000-5,000,000
3	>5,000,000

Utility of CMT as a Screening Test to Select Cattle for Culture

CMT \geq Trace	All	CNS	CPS (<i>S. aureus</i>)	SNA
Se	0.61	0.50	0.86	0.86
Sp	0.80	0.80	0.80	0.80
PPV	0.58	0.43	0.21	0.21
NPV	0.82	0.84	0.99	0.99
% Correctly Classified	74	73	80	80

SCC Goals

- Bulk Tank <200,000 cells/ml
- 90% of herd: <300,000 cells/ml
- <5% of herd: >800,000 cells/ml



Examine The Herd

- Milking parlor (During milking)
 - Overall hygiene
 - Milking procedures (milking hygiene)
 - Machine function
 - Evaluate udders, teats, and teat ends

Contagious mastitis

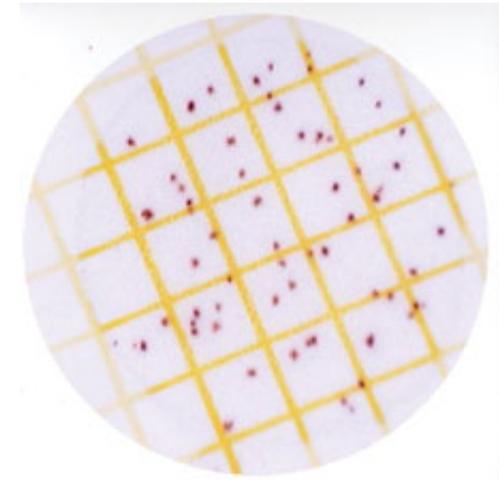
Identify The Problem Cattle

- Individual cow milk cultures
 - Composite vs. Quarter
 - Which cows?
 - All
 - Random sample
 - Targeted sampling based on other indicators (e.g., SCC, CMT, clinical mastitis)
 - “Gold Standard”
 - Identify pathogen-type
 - Target control strategies
 - \$\$\$

Milk Culture – Definitive Diagnosis

- Lab vs. On-farm

- Biplate
- Triplate
- Petrifilm



- Goal of on farm culture: Differentiate G+ from G- to make treatment decisions.



Control & Prevention

NMC 10 Point Plan

1. Establish goals for udder health
2. Proper milking procedures
3. Maintenance of a clean environment
4. Proper maintenance and use of milking equipment
5. Appropriate treatment of clinical mastitis during lactation
6. Effective dry cow management
7. Maintenance of biosecurity for contagious pathogens and culling of chronically infected cows.
8. Good record keeping
9. Regular monitoring of udder health status
10. Periodic review of mastitis control program

Milking Procedures

- Goals
 - Efficiently & consistently harvest milk in a clean, low stress environment
 - Detect mastitis
 - Milk a clean, dry teat
 - Ensure adequate milk let-down and flow
 - Minimize trauma
 - Minimize pathogen transmission
 - Manage post-milking phase

Step-by-Step Milking Procedure



Réseau canadien de recherche
sur la mastite bovine
Canadian Bovine Mastitis
Research Network

- All operators responsible for milking should always follow a consistent routine and go through the recommended steps in the proper order.
- First, wash and disinfect your hands thoroughly and put clean gloves on.
- Disinfect your hands regularly during milking to avoid contamination.
- Provide a clean, low-stress environment for the animals.



Step 1.

Observation

Examine all quarters and teats by hand to detect early signs of mastitis (redness and warmth) or other lesions. Make sure to identify cows that must be milked last or that are receiving treatment (e.g. those identified with a leg band).

Suggested milking order to avoid the spread of mastitis-causing bacteria:

- 1- Healthy cows.
- 2- Cows with a questionable health status. (recent purchase, fresh, post-treatment)
- 3- Cows with chronic mastitis.
- 4- Cows with an infection caused by a contagious pathogen.



Step 2.

Forestripping

This step is essential for detecting the early signs of mastitis. It flushes out bacteria from the teat canal and stimulates the milk flow. In tie-stall barns, use a strip cup to have a better chance of detecting the presence of clotty, stringy or watery milk. The strip cup must be cleaned and disinfected after each milking. In the milking parlour, the foremilk can be discarded on the ground, but never into the hand since this can promote further contamination. Forestrip all quarters.



Step 3.

Cleaning the teats

Use a disinfectant solution approved by Health Canada and adjust the cleaning time depending of how dirty teats are. To be effective, the pre-dip solution must remain in contact with the teats for 30 seconds. Only the teats should be wetted and then thoroughly wiped with a dry single service towel. Pay particular attention to teat ends. Alcohol swabs may also be used.

Step-by-Step Milking Procedure



Step 4.
Attaching the milking unit
 The milking unit should be attached within 60 to 90 seconds (2 minutes at the most) after first stimulation, i.e. Step 2 (fore-stripping). This time allows the milk letdown reflex to occur and maximizes milking performance.



Step 5.
Adjusting the milking unit
 Observe the position of the claw on the udder and quickly correct any teat cup liner that is seated too high or slipping.



Step 6.
End of milking
 Complete milking may take from 5 to 10 minutes per cow. Observe the milk flow carefully or use milk flow indicators to determine the ideal moment for shutting off the milking unit. Avoid overmilking.



Step 7.
Milking unit removal
 If the claw is removed manually, always shut off the vacuum before attempting to remove the milking unit. When using automatic detachers, make sure that they are properly adjusted.



Step 8.
Disinfection
 Once milking is completed, dip the teats fully in a disinfectant solution approved by Health Canada. Teat dip cups must be clean. Discard any unused solution, clean the container thoroughly and prepare fresh solution at each milking.

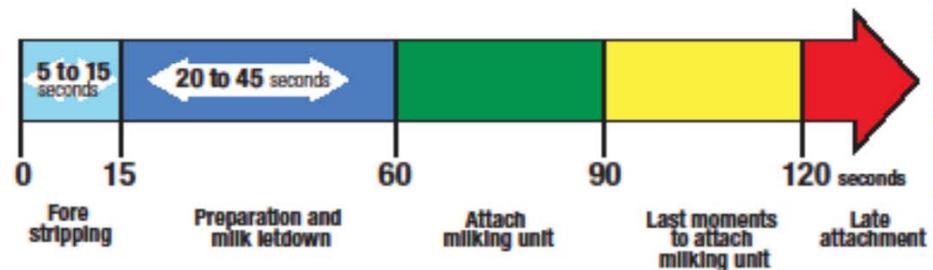
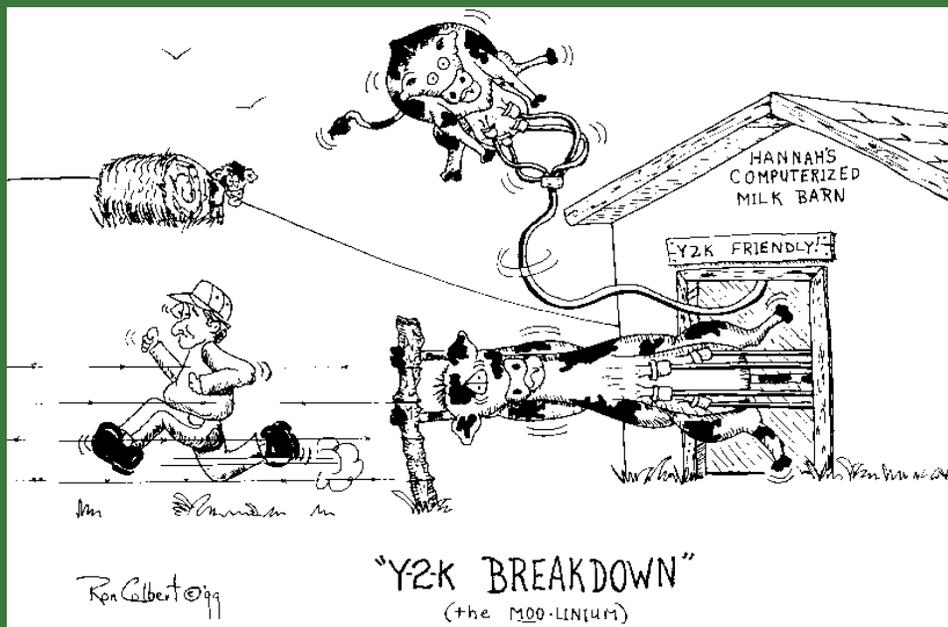


Photo credits: Taken from the book "Lactation: Dairy Cows" (2004), distributed by Health Dairyman (www.dairyman.com). © 2014, Faculty of Veterinary Medicine, University of Montreal.

Milking Procedures - Summary

- Forestrip to detect mastitis
- Pre-dip (remain on teat skin for 30 sec)
- Dry teats (single-use towels)
- Wear clean gloves
- Attach units squarely minimizing air inlet (within 60-120 sec)
- Avoid machine stripping
- **Post-dip**
- **Milking order based on infection status**



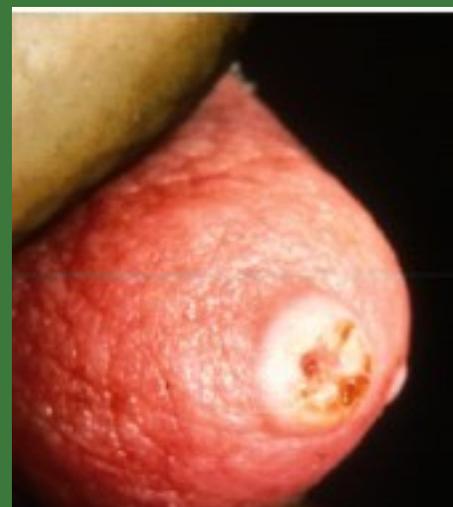
Score 1 or N

No ring, Teat-end is smooth



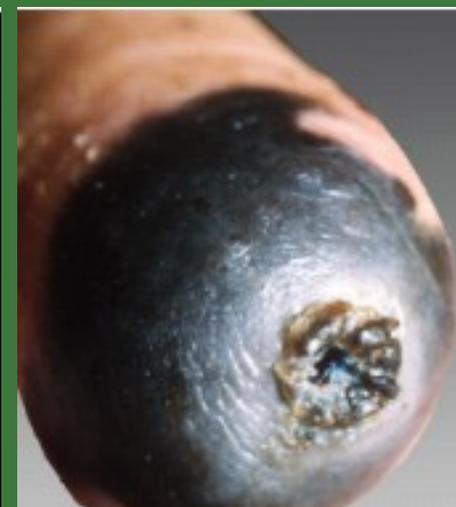
Score 2

Smooth or slightly rough ring



Score 3

Raised, roughened ring

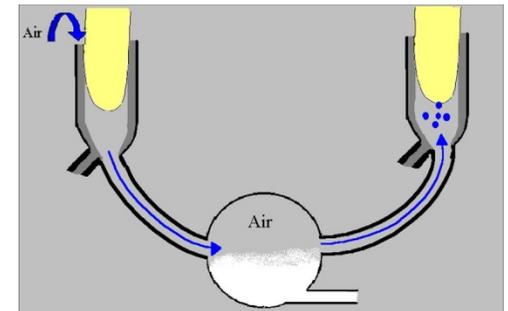


Score 4

Very raised, roughened ring

Control – Contagious Pathogens

- Properly functioning milking equipment
- Gloves*
- Decrease potential for transmission
 - Milking order
 - Milking time hygiene
 - Treatment of *Strep. agalactiae*
- Post-milking teat dip
- Dry cow therapy
- Cull chronics
- Avoid purchase of older cattle
- Pre-purchase screening (Biosecurity)



Treatment



Subclinical Mastitis Treatment

- Cost versus benefit
- Lactating versus non-lactating
 - Withdrawal times
 - Dumped milk
 - Type of bug

Subclinical Mastitis Treatment

- *S. aureus*
 - Strict segregation/culling (Middleton et al., 2001)
 - Extended intramammary therapy (Barkema et al., 2006)
- *Streptococcus agalactiae*
 - “Blitz therapy” - 1st third to half of lactation
 - Dry cow therapy
- *Mycoplasma spp.*
 - Cull
- *C. bovis*
 - Teat dip

Bottom Line – Subclinical

- Wait until dry period to treat unless compelling reason to treat during lactation, e.g., excessive bulk tank SCC.
- Milking order

Clinical Mastitis Treatment

- Local versus Systemic Disease
- Local Disease
 - Frequent milk-out (+/- oxytocin)
 - Roberson (1997) = no overall benefit in the treatment of clinical mastitis caused by environmental pathogens.
 - Intramammary Antibiotics
 - Bacteria dependent (Roberson, 1999)

Bottom Line - Clinical

- Local infection
 - Treat Gram-positive
 - Don't treat Gram-negative
 - On-farm culture
- Systemic infection
 - Economic value of cow versus cost of therapy and prognosis for future production
 - Salvage * Prognosis = \$Treatment
 - Aggressive therapy = \$\$

Dry Cow Therapy

- Goals:
 - Prevent new IMI during early dry period (1st 14d)
 - Treat existing infections at dry off
- Products
 - Long-acting antibiotics (Various)
 - External teat sealer (Stronghold[®])
 - Internal teat sealer (Orbeseal[®])



Take Home Points

- Mastitis is generally caused by bacteria
- Bacteria come from
 - Environment
 - Other cows (Contagious pathogens)
- Milking procedures
 - Mastitis detection
 - Teat sanitation (Pre versus Post-dip)
 - Milk let down & flow
 - Prevent contagious pathogen transmission

Conclusion

“Milk quality is dependent on quality attitude and quality application of mastitis control practices. The greatest impact will probably result from the development of a milk quality mind-set through a balanced program of education and encouragement.”

Reneau, et al. 2002 Regional

Meeting of the NMC.

Questions?

