Large Animal Medicine II.

Food Animal Medicine

Bovine Mammary Gland

I. Normal mammary gland

A. Physiologic udder edema

1. Causes

a. Inheritance

b. Circulatory disturbances -- stasis

of venous blood or lymph flow

c. Diet

d. Other factors

2. Signs

a. Acute

1.] Onset 2-3 weeks before parturition

2.] Peaks at parturition

3.] Gradually dissipates

4.] Swelling of the udder, teats, ventral abdomen, perineal area

b. Chronic

3. Therapy

a. Not usually necessary unless severe

b. Massage

c. Hot and cold water therapy

d. Diuretics

e. Steroids

B. Bloody milk

1. May be a sequel to severe udder edema

2. May result from trauma

3. Usually goes away without specific therapy

4. Not necessarily a sign of infection

C. Mammary gland defense mechanisms

1. Commensal organisms

2. Teat canal

3. Frequent milkings

4. Phagocytes

5. Humoral immune response

6. Cell mediated immune response

7. Lactoferrin

II. Bovine mastitis

A. Introduction

1. Single most common disease syndrome in

adult dairy cows

2. Result of introduction of pathogens into

the udder through the teat, although

systemic infection is possible

3. Clinical course varies with ability of bacteria or pathogen to colonize and thrive in the udder, with virulence, and with host response

B. Types of mastitis

1. Contagious mastitis

a. Transfer of organisms from infected

to health mammary glands

b. Strep. agalactiae, Staph. aureus, and

Mycoplasma are examples

2. Environmental mastitis

a. Associated with contaminated bedding,

water, fecal material or other fomites

b. Coliform bacteria are examples

3. Subclinical mastitis

a. Milk appears grossly normal

b. No sign of inflammation grossly

c. Detected by tests for increased cells

in the milk or by culture

d. Results in decreased milk production

4. Acute mastitis

a. Gross signs of infection and inflammation; fever, anorexia, painful mammary gland

b. Frequently associated with contagious

mastitis

c. Toxic mastitis from coliform infection may result in low calcium and paraplegia

5. Chronic mastitis

a. May have no clinical signs for

prolonged intervals

b. Somatic cell count generally elevated

c. Secretion periodically contains

abnormal milk (flakes, clots, fibrin)

d. Scar tissue replaces secretory tissue

6. Gangrenous mastitis

a. Mostly associated with Staphylococcus

infection

b. Secretion usually thin and watery

c. Cow becomes toxic; sloughing occurs

in about two weeks if cow survives

C. Microbiologic techniques

1. Wash and dry the gland before sampling

2. Each teat end and orifice should be scrubbed thoroughly with a separate cotton ball or gauze soaked in 70% alcohol

3. Tube should be gripped in a horizontal plane during filling with the cap held with its inside facing downwards

4. Sample each quarter into sterile tube after stripping each teat two or three times; collect 5-10 ml.

5. Samples should be cooled to about 40

degrees F. until cultured

6. Task of sampling on a herd basis is

substantially reduced by collection of

composite samples (all quarters in a tube)

7. Testing can be done on the basis of elevated somatic cell counts

8. Herd health status can be monitored by

monthly bulk milk tank sampling

D. Staphylococcus mastitis

1. Introduction

a. Significant problem

b. Usually seen in a subclinical state but may become acute

c. Infection in early lactation often appears in an acute form with gangrene

2. Pathogenesis

a. Pathogenic factors

1.] Alpha toxin

2.] Protein A

3.] Teichoic acid

4.] Leukocidin

5.] Pigments

6.] Extracellular proteins

b. Pathogenesis

1.] Organism must enter the gland

through the teat sphincter

2.] Coagulase positive S. aureus

can normally inhabit the skin

and can be high if the quarter

is shedding the organism

3.] Organism may be deposited on the

teat by dirty wash cloths

4.] Contaminated inflations from previously milked cows can easily transmit the organism

5.] Damaged teat end epithelium can

potentiate infection

6.] Following entry into the teat the subsequent course is determined by the ability of neutrophils to control growth of the organism

7.] Only mild signs may be observed if the neutrophils can control the organism

8.] Repeated cycles of clinical and subclinical infection are common throughout the lactation with S.aureus infection

3. Clinical findings

a. Peracute form occurs usually in the

first few days after calving and is

highly fatal

b. Acute form is most common in early

lactation. Severe swelling, purulent

exudate, thick clots. Extensive

fibrosis and severe loss of function

c. Most important herd losses are associated with chronic subclinical infection

4. Identifying S. aureus as a herd problem

a. Bulk tank somatic cell count greater

than 750,000

b. Standard plate count greater than

12500

c. Bulk tank culture positive for

S. aureus

5. Identifying individual cows

a. California mastitis test (CMT)

b. Pro-staph test (an ELISA test)

6. Treatment

a. Decreased duct lumen size will allow

only minimal success with local

treatment

b. Intracellular location and inability

of an antibiotic to penetrate the

cell wall will provide the organism with resistance

c. Greater treatment success is found when dry cow therapy is used

7. Prevention

a. Routine mastitis control procedures

b. Vaccination

c. Culling affected animals