# Newborn Calf Scours

#### Franklyn Garry, DVM, MS



# **Neonatal Calf Losses**

- Death < 2 days old</p>
  - Typically non-infectious
  - Associated with physiological derangements
     Birthing trauma, difficult postnatal adaptation, etc.
- Death  $\geq$  3 days old
  - Likely infectious in nature
- Potential physiologic problems that don't kill may predispose to infectious problems

# **Calf Infectious Disease**

- Localized / superficial
- Focal / inflammatory
- Septicemic

# Calf Scours

- Rotavirus
- Coronavirus
- Cryptosporidium
- E. coli K99



# **Calf Scours Enteritis**

- Localized infection
- Minimal inflammation
- Minimal invasion
- Disturbed GI function







### Cryptosporidium parvum

- Most common agent causing diarrhea, usually between 7 and 14 days of age
- During average infection
  - •Calves shed oocysts for six to nine days
  - Calves scour for average of three days
  - ◆50 million oocysts per gm feces
  - •Average calf sheds 40 billion oocysts
- Primary infection route is fecal-oral
  - Infective dose is between 10 and 100 oocyts

# Rotavirus

- One of most common agents causing diarrhea
- Usually seen 7 to 14 days of age
- Infectious dose is about 10 particles
- Within 48 hr post-infection, 1 billion viral particles per gm of feces
- Infects and destroys cells of small intestine

# Coronavirus

- Typically causes disease between 7 to 30 Days of Age
- Similar type of damage to intestinal villus as Rotavirus, but more severe
- More severe
  - •More severe damage to intestinal villi
  - •Affects both small and large intestine



### Mechanisms of Diarrhea

- Hypersecretion
- Maldigestion
- Malabsorption





# **Inflammatory Enteritis**

Salmonellosis

Invasive E. coli

Clostridial enteritis



E. coli diarrhea

Attaching and effacing *E. coli*: usually between 3 and 21 days



### **Focal Inflammatory Disease**





# Septicemia

- Distribution through blood
- Multiple organ involvement
- ► Inflammation widespread
- Multiple mediating factors





### Most Scours in Calves are Mixed Infections

- Most common combination of agents are Cryptosporidium and Rotavirus
  - Crypto and rotavirus are the most common mixed agents
- 30% of calves with diarrhea that are systemically ill are septicemic
  - Most septicemic calves have had FPT

## Learning issues

- The most common causes of calf diarrhea are crypto, rota and corona virus = calf scours
- These occur most commonly between 1 and 2 weeks of age
- These hurt or kill calves by causing fluid and electrolyte loss
- Antibiotics do not affect these bugs, and the infection resolves on its own if the calf survives.

### Learning issues

- Bacterial infections Salmonella, E coli and clostridium CAN cause diarrhea, but also invade other tissues
- These occur over a broader time range
   like 4 to 30 days
- These kill calves by invading and causing bad tissue inflammation and damage
- Antibiotics may be useful against these bugs

# Diagnosis

History \* Physical examination Laboratory testing Response to treatment Necropsy

### **Physical Examination**

Skin tent
Strength and Activity
Eyeglobe position
Peripheral perfusion
Diarrhea



evidence of dehydration

### **Physical Examination**

**Diagnosis** 

TPR
M M perfusion
Mentation
Suckle response
Abdominal fill
Extra-GI involvement



# Findings Suggestive of Septicemia

#### **Physical findings**

- Red / inflamed mucous membranes
- Prominent scleral blood vessels
- Depression > dehydration
- Profound depression w/o severe diarrhea

Multiple organ system problems

### Physical diagnosis

- Must compare groups of observations
  - Depression, diarrhea, hydration
  - Diarrhea, extra-GI, inflammation
  - Age, clinical course, history

# Treatment

#### <u>Scours</u>

- Fluid Therapy critical
   Oral, subcutaneous, intravenous
- Antibiotics very limited efficacy
   May be deleterious
- Adjunctive treatments may have value



\* ORS = Oral Rehvdration Solution; amount needed to restore fluid balance in addition to the daily milk allotment for **100 lb calf** 

# Diagnosis

- Physiologic parameters
- Fecal analysis
  - •ELISA, EM, Parasitologic, Bacteriologic Culture
- Hemogram
- Blood culture
- Viral isolation

# Diagnosis

### **Other evaluations**

- Response to treatment
- Necropsy

### Response to treatment

- IF you are treating calves with simple scours, where the main problem is diarrhea and dehydration
- IF you treat scours calves early, when they have mild or moderate fluid loss
- IF you use oral fluids and electrolytes with the right amount and composition
- THEN response to treatment will be very good

### Response to treatment

- IF you use oral fluids and electrolytes with the right amount and composition
- And the calf response to treatment is POOR
- OR---
- IF calves have a more complex problem with bacterial infection
- IF calves are very depressed or have fever and signs of disease besides diarrhea
- ---THEN you need your veterinarian

### Necropsy

- VERY underutilized in cattle medicine
- Most valuable diagnostic step if calves are dying
- Coordinate with your local diagnostic lab
- Provide thorough information to the lab
- Send the right samples for the right reason



# Newborn Calf Oral Fluid Therapy

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# Eye Globe Position



Fig. 1. Calf on the left (A) has a normal hydration status. There is no space between the eyelid and the eyeball. The calf on the right (B) is severely dehydrated. The eye is sunken at least 7 to 8 mm into the orbit. (*Courtesy of* Peter Constable, BVSc, MS, PhD, MRCVS, West Lafayette, IN.) Smith GW. Vet Clin Food Anim 25 (2009)

# **Assessing Hydration Status**

#### Table 1

Guidelines for assessment of hydration status in calves with diarrhea

Dehydration	Demeanor	Eyeball Recession	Skin Tent Duration (s)
<5%	Normal	None	<1
6%–8% (mild)	Slightly depressed	2–4 mm	1–2
8%–10% (moderate)	Depressed	4–6 mm	2–5
10%–12% (severe)	Comatose	6–8 mm	5–10
>12%	Comatose/dead	8–12 mm	>10
Smith GW. Vet Clin Food	l Anim 25 (2009)		







Severity of diarrhea / dehydration vs Loss of base with Scours

Normal	0 - 5	mEq/L
Mild	10	mEq/L
Moderate	15	mEq/L
Severe	20	mEq/L

# Goals of Scours Therapy

Maintain / improve hydration Correct acid - base imbalance Supplement appropriate electrolytes

Judicious antimicrobials Help damaged gut / stop diarrhea ??



Figure 1: Dehydration is the primary cause of death when a calf has diarrhea. \* ORS = Oral Rehvdration Solution; amount needed to restore fluid balance in addition to the daily milk

allotment for **100 lb calf** 





### Fluid Imbalances From Scours

Hypotonic dehydration Metabolic acidosis

> HCO3 Na + Cl -K +

# Oral fluid products

- Need to have sufficient sodium to make up for losses
- Need to also have chloride and potassium
- Need to have alkalinizing ability
- Glucose and glycine promote sodium absorption
- Must continue milk feeding electrolyte products do not have enough nutrition



# Oral fluid products

- Alkalinizing agents
  - Bicarbonate (HCO3)
  - Acetate
  - Propionate

## Alkalinizing agents

- Bicarbonate increases blood pH but also increases pH in abomasum
- Increasing abomasum pH may allow bacteria to move to lower bowel
- Acetate and propionate increase blood pH but do not affect abomasum

# Oral fluid products

### ♦Resorb

- ◆Sodium too low
- No alkalinizing agent
- Poor choice for scours

# Additional products without alkalinizing agent

- Bovine bluelite
- Blue Ribbon
- Renew
- Calf Restart
- Sav-A-Calf
- One Day Response

# Additional poor choices

- Advance Arrest
  - Low sodium, low alkalinizing
- Deliver
  - Low sodium, poor alkalinizing

# Oral fluid products Good choices

- Hydrafeed
- •Entrolyte and Entrolyte HE
- Revitilyte

•All have high levels of Bicarb

### Oral fluid products Very good choices

- Land O Lakes Base plus Add Pack
- Diaque
- HydraLyte
- Epic Calf Electrolyte
- •All have acetate instead of bicarb

# Infectious disease prevention

- Minimize exposure maximize resistance
- Colostrum
- Nutrition
  - Cold weather
  - Physiological 'strength'
- Warm / dry/ protected
  - Thermoneutral zone
- Fresh water
- Low stress