



**Pathogens 101: Veterinary Manure Borne Pathogens**



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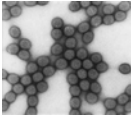
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**Rotaviruses**

- Each animal species has many Rotaviruses
  - Typically become susceptible at 2 weeks-1 month
- Non-enveloped RNA virus
- Second most common cause of diarrhea in calves older than a week (Nebraska)
- Very Diverse, so immunity is variable
  - 7 or more species and multiple serotypes
- Stable in the environment
  - Can persist for months
- Sanitization, Vaccines and Age Segregation



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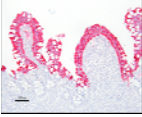
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**Enteric Coronaviruses**

- Cause diarrhea similar to Rotaviruses
- Large enveloped RNA virus
  - Family as SARS
- Usually young animals (1-4 weeks)
  - Most common cause of diarrhea in calves (NE)
- Winter dysentery in adult cows
- Porcine Epidemic Diarrhea Virus (PEDV), Porcine Deltacoronavirus, Transmissible Gastroenteritis Virus (TGEV)
- Biosecurity, Vaccines, Age Segregation



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### **Pestiviruses**

- Bovine Viral Diarrhea (BVD) and Classical Swine Fever (CSF)
  - CSF is foreign animal disease in US
- Enveloped RNA Flavivirus
  - Not very stable in environment/manure
- Cause persistent infection
  - Infected *in utero*
  - Lifelong infection
  - Shed billions of virions in feces/respiratory tract
- Vaccination, Test and Remove PI animals



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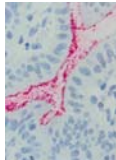
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### **Toxicogenic *Escherichia coli***

- Has acquired virulence factors to cause disease in animals
  - Diarrhea in mammals
  - Respiratory disease in poultry
- Fimbriae
  - Allow for colonization of the intestines
  - Species/Age specific
  - F5 in calves less than 1 week of age
- Toxins
  - Labile and Stable toxins cause increase in secretion of fluid into gut
- Vaccines, Age Segregation



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### ***Salmonella***

- Infects a wide variety of species and ages
  - Cattle, sheep, swine, and horses
- Causes diarrhea
- Asymptomatic, shedding animals
  - Typhoid Mary
- Host adapted strains cause severe invasive and systemic disease including pneumonia
  - *Salmonella choleraesuis*
  - *Salmonella dublin*
- Prevent introduction, limit spread, vaccination



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***Mycobacterium paratuberculosis***

- Johne's Disease.
  - 60% of dairy and 8% beef herds
- Ruminants get infected at or shortly after birth
- Takes years to manifest
- Chronic Diarrhea/Wasting
- Stable for months in manure
- High shedding animals reservoir for infection
- Test/Remove infected animals
- No treatment



<http://www.johne.org/general/guests/paratub> 

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***Clostridium sp.***

- Anaerobic, spore forming bacteria
- Spores are ubiquitous in soil/manure and stable for years.
  - Some farms are heavily colonized
- Blackleg, Tetanus, Botulism, Malignant Edema, Hemorrhagic enteritis
- 7-way or other Clostridium vaccines
- Antitoxins
- Prevent bruising or other trauma



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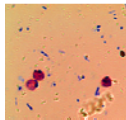
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***Cryptosporidium***

- Apicomplexan Protozoan
- Transmitted from infected food/water
- Resistant to disinfectants like chlorine
- Reproduce in epithelial cells of intestine
- 90% of dairy farms and 40% of beef herds endemically infected
- 1-3 week old calves
- Colostrum and environmental burdens
  - No therapeutic treatments
- Zoonotic



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The archived presentation is available at:  
<http://articles.extension.org/pages/74037/pathogens-101:-manure-and-veterinary-pathogens-of-concern-who-are-they-and-what-do-they-do>

**Coccidiosis**

- Protozoan enteric parasite
- Bloody diarrhea
  - Ruminants, swine, poultry, others
- Affect animals 1 month-1 year
  - If exposed to high numbers of oocysts can cause clinical disease
  - 2 week incubation period
- Oocysts (eggs) are shed from infected animals and accumulate in environment
  - Can survive a year in environment
- Ensure adequate immunity, coccidiostats





Image courtesy of Joel Miller  
<https://upload.wikimedia.org/wikipedia/commons/8/80/Coccidia.JPG>

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**Sandhills Calving System**

- Developed by Dr. Dave Smith to reduce transmission of pathogens in calves
- Designed to break disease cycles and prevent pathogen transmission
- Every two weeks pregnant animals are moved and cow-calf pairs stay in pasture
- Newborn calves are not exposed to pathogens being shed from older calves



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**Swine Operations**

- All in All Out production
- Biosecurity
  - Control People and Animal Movement
- Disinfection of rooms/barns adequate
  - Heat/Dry
- Vehicles/Trailers
  - Trailer baking/heating
- Lines of demarcation
- Isolation and Controlled Exposure



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**Questions?**

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**Website**

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