

A laboratory-associated outbreak of Cryptosporidiosis

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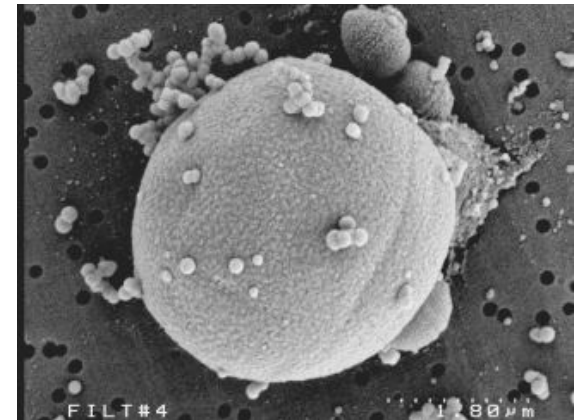
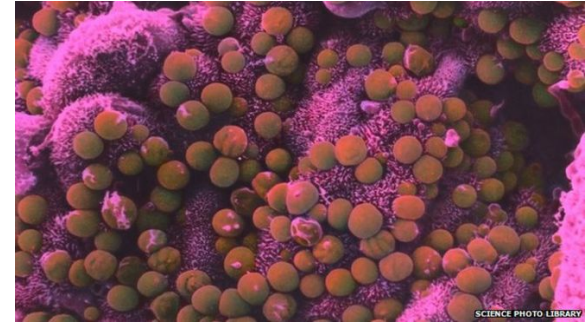
² Benton County Health Department

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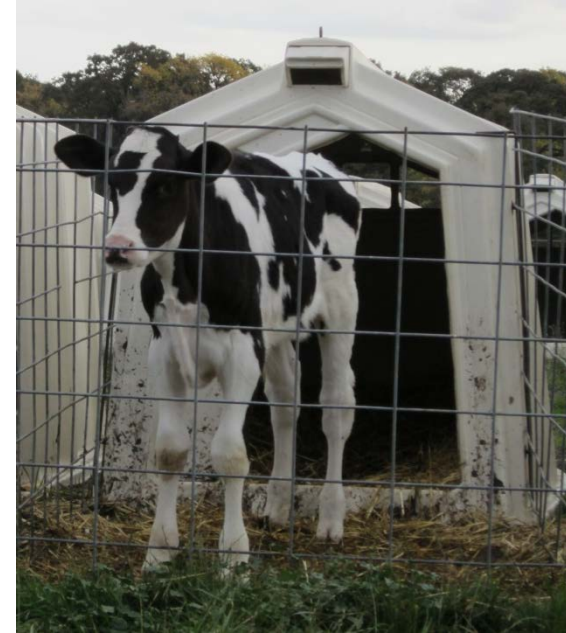
Characteristics of *Cryptosporidium* spp.

- Zoonotic protozoan parasites that can complete lifecycle in a single host.
- Common in many animals; transmitted by fecal / oral cycle.
- Many species in the genus, but most species are host restricted; a few have broader host range.



Cryptosporidium parvuum

- Most common species that causes infections in humans in the U.S.; dairy calves are the main reservoir.
- Infectious stage is the oocyst.
- Infectious dose for humans:
 - 1-10 oocysts ingested.
- Oocysts are extremely resistant to chemical disinfectants.



Cryptosporidium parvuum in calves

- Over 90% of dairies in U.S. are infected; usually causes clinical disease in calves.
 - One infected calf sheds approximately 10^{10} oocysts / day.
- Most common way that veterinarians and farm workers become infected.

Image courtesy of Dr. Anthony Knight, Colorado State University



Outbreak Background

- Oregon State University is a Land-Grant university with significant agricultural programs and a College of Veterinary Medicine.
- Outbreak occurred among 3rd year veterinary medical students in fall of 2011.



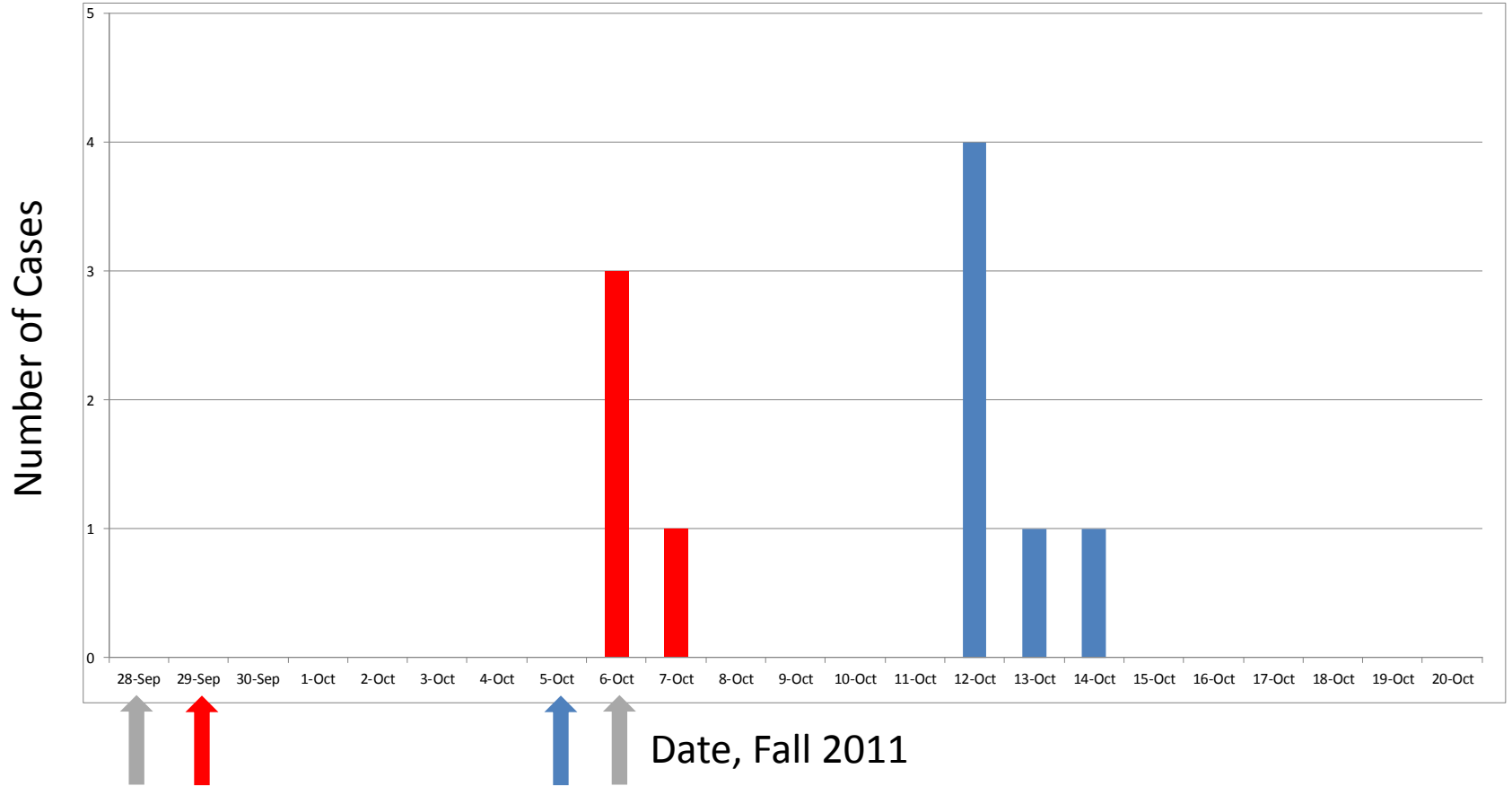
Investigation

- Initial reports came from Student Health Services.
- Benton County Health Dept. / OSU Biosafety collaborated on initial investigation.
 - Interviews (students, instructors), questionnaires
- State Public Health declared an outbreak, sent a team to investigate.
 - Collection of specimens, met with Dean and other members of university leadership.

Epidemiology

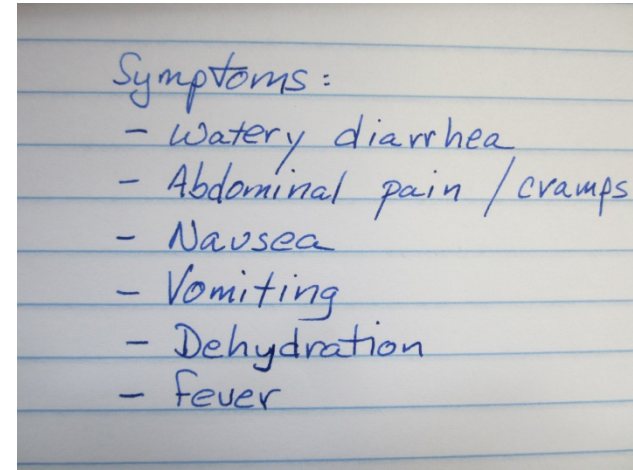
- All ill students were quickly linked to an obstetrics lab exercise.
- The lab was taught in four sections, on September 28 & 29, October 5 & 6
 - Students attending 2 of the labs became ill.

Documented Cases



Illnesses

- 10 / 44* students had documented, clinical illness.
 - Some missed up to 2 weeks of classes.
- Several others are believed to have become ill also.
 - Including one household contact.



Symptoms:

- Watery diarrhea
- Abdominal pain / cramps
- Nausea
- Vomiting
- Dehydration
- Fever

* Class size is 56; other students did not respond to interview / questionnaire request.

The Obstetrics Laboratory

- Students practice dystocia birth manipulations using euthanized dairy calves and “synthetic bovine uterus,” or “mock cow.”



Obstetrics Laboratory

- Newborn calves (<1 week) obtained from two dairies, euthanized and placed in mock cow with water.
- Students reach into mock cow and manipulate the calves, attempt to extract them.
- Students also practice fetotomy.



Root Causes of the Outbreak

- Calves obtained from both dairies were infected.
- PPE was not sufficient to reduce the risk of exposures.
 - Faculty did not enforce the use of PPE.
- Facility lacked handwashing sink.
 - Garden hose was provided.
- Students left the lab and went to another building or home wearing contaminated clothing.

Other Findings

- Fluids and fecal material had splashed onto clothing, faces during the lab exercises.
- Students were not advised to wash hands.
 - Facility lacked handwashing sink, soap.
- Gloves and sleeves were available, but some students removed them and manipulated the calves with bare hands; PPE use not enforced.
- No eye, face or head protection available.

Laboratory Findings

- Calf stool specimens were collected from one of the dairies that provided the calves.
- Species and subtype matched 4 available student specimens (testing by CDC):
 - *Cryptosporidium parvum* type IIaA15G2R1

Interventions: Administrative Support

- Systemic problem with safety culture in the CVM, and a need for administration support.
- Series of meetings with CVM Dean and department heads to collaborate on a plan to improve the safety of student, staff and faculty.

Interventions: First Steps

- CVM Safety Advisory Committee tasked with formulating a plan going forward.
- Opportunity to address biosafety college – wide.



Interventions: Class Specific

- Animals to be pre-screened for *Cryptosporidium*
- Move lab to more suitable location.
- Personal protective equipment:
 - Faculty to model PPE and instruct students on proper use.
 - Protective clothing, gloves + sleeves, face/hair protection.
 - Coveralls either Tyvek or laundered on-site after removal.
- Exit procedures / Hand Hygiene:
 - PPE to be removed inside out at exit of lab, immediate handwashing in anteroom of lab, clothing change in adjacent locker rooms.



Previous Lab Location



Handwashing sinks in new lab location

Students in new lab location listen to safety information prior to beginning lab in October, 2012.



Interventions: College – Wide

- Safety Policy adopted.
 - Responsibility and accountability for safety
 - Mandatory safety training and annual inspections
 - Biosafety training for students in years 1, 2 and 3
 - Attire and PPE appropriate to all tasks
 - Safety SOPs for all classes; template provided
 - No food / drink policy in labs or animal areas

Conclusions

- Inadequate safety measures probably led to the outbreak.
- 10 or more students exposed to *Cryptosporidium parvuum* during a laboratory exercise became clinically ill.
- This incident became an opportunity to collaborate with leadership to implement changes with the goal of ultimately changing the safety culture in OSU's CVM.

Acknowledgements

OSU Student Health Services

Benton County Health Department

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Dean Cyril Clarke, College of Veterinary Medicine

College of Veterinary Medicine Safety Advisory Committee

