

Johne's Disease Education Program for Dairy Cattle

Dr. Kris Clothier

Iowa State University

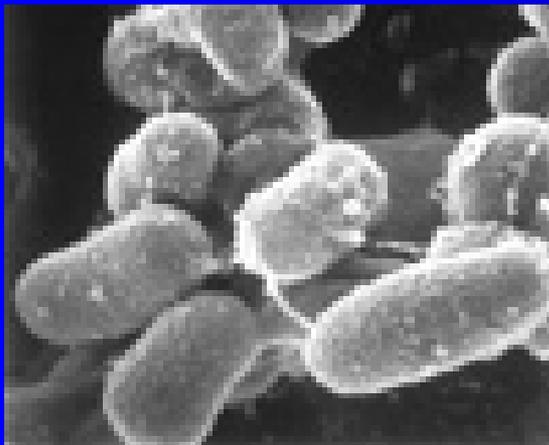
Adapted from USDA guidelines and johnes.org

Johne's Review

- Johne's Disease is caused by *Mycobacterium avium var paratuberculosis* (MAP)
- Causes chronic thickening of intestinal lining resulting in decreased absorption of nutrients, diarrhea, and severe weight loss despite a good appetite in the animal
- Bacteria can survive for long periods in the environment: 8 months in dry feces, 9-12 months in a manure pit/lagoon; 18 months in a water trough; 9-12 months in freezing temperatures; 1-5 years on pasture
- Affects multiple ruminant species: cows, sheep, goats, elk, bison, wildlife

What Causes Johne's Disease ?

- MAP are usually ingested by the calf early in life (< 6 months)
- MAP invade the lining of the intestine where they are absorbed into intestinal cells. They are picked up by white blood cells but avoid being killed by the immune system
- Bacteria that are not absorbed into cells are passed in feces and this further disperses MAP (“pass-through”)
- Absorbed bacteria thrive and multiply in cells; these infected cells cause chronic inflammation and intestinal wall thickening
- The abnormally-thickened wall can not absorb nutrients and eventually protein begins leaking into the gut and out in the feces, leading to diarrhea



Johne's Bacteria



← **Infected**

← **Normal**

Cow Gut

Recognizing the Problem

Chronic Wasting Disease of Ruminants

- Clinical animals are usually easy to ID
- Thin body condition, muscle wasting
- Severe, watery diarrhea; weight loss; little or no production
- Animal maintains a good appetite
- Can shed 1 billion organisms/day
- One dose of 1 million bacteria is enough to infect a calf
- More bacteria in environment → greater chance for more calves to get infected



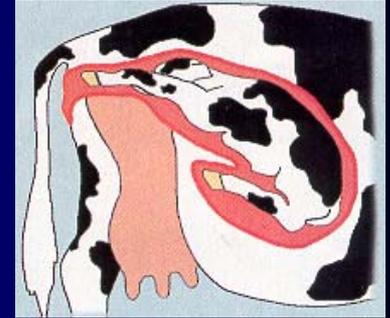
Recognizing the Problem

- Subclinical animals can look like anyone else
- Can shed 200 million Johne's organisms/day
- Most likely to be shedding around freshening
- Testing is now identifying "super shedders"—can shed up to 20 million MAP/day without clinical symptoms
- Act as "Typhoid Marys" spreading disease



How Does An Animal Become Infected?

In the Uterus 10-20%



- Cows shed more MAP when under stress; usually shed most MAP in the weeks before and after calving so bacteria can cross the placenta

Young Calves by Colostrum & Milk: 5-10%

- Clinical and sub-clinical cows shed the bacteria into colostrum and milk
- 1,000 bacteria/ml
 - 1 quart of infected milk → infected calf
 - Don't buy or use colostrum from untested cows



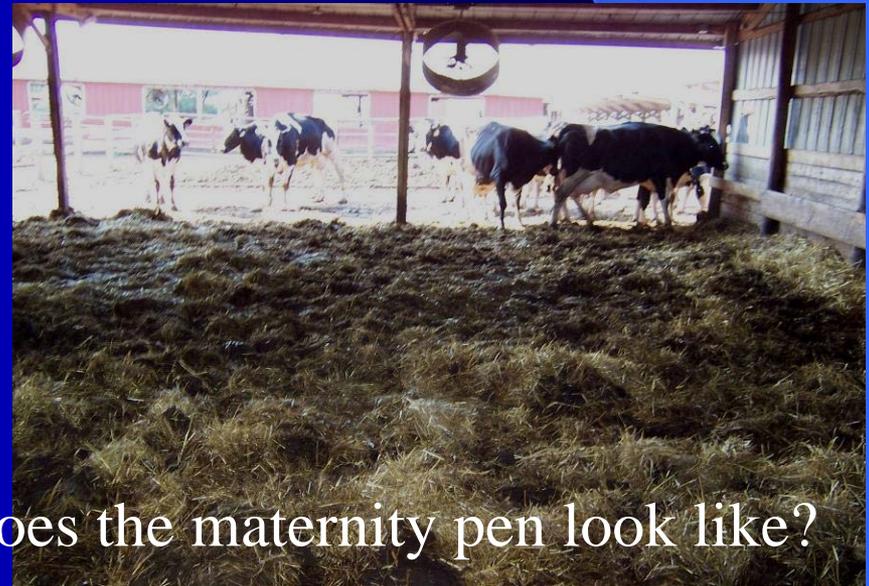
How Does An Animal Become Infected?

Fecal - Oral Infection of Young Calves: >70%

Most Important Route of Infection

- Infected cows shed millions of organisms in manure; greatest shedding around freshening
- Cows produce 20-50 lbs of manure per day
- Manure present on teats (if calf nurses), bedding in maternity pen, anywhere manure collects (especially run-off water)

**Calving Johne's-Infected
Cows SPREADS THE
DISEASE!**



What does the maternity pen look like?

How Long After Infection Will I See The Disease?



Calf infected
shortly after birth

Incubation Period:



2-7 years
(Shedding bacteria)
much of that time



Clinical cow with
wasting and
diarrhea

Why is Johne's so hard to diagnose and prevent?

MAP in cattle is similar to a cross between HIV and Influenza

HIV:

- Infection is forever
- Disease progresses and eventually will lead to death
- Agent hides in the immune system so body can't attack it
- May be years until clinical disease is present

Flu:

- Easily Spread
- Infects susceptible population (young, immune-stressed)
- Many different strains with many different genotypes
- Vaccines can help but are not always effective and must be given early in life

Why should we care?

Economics

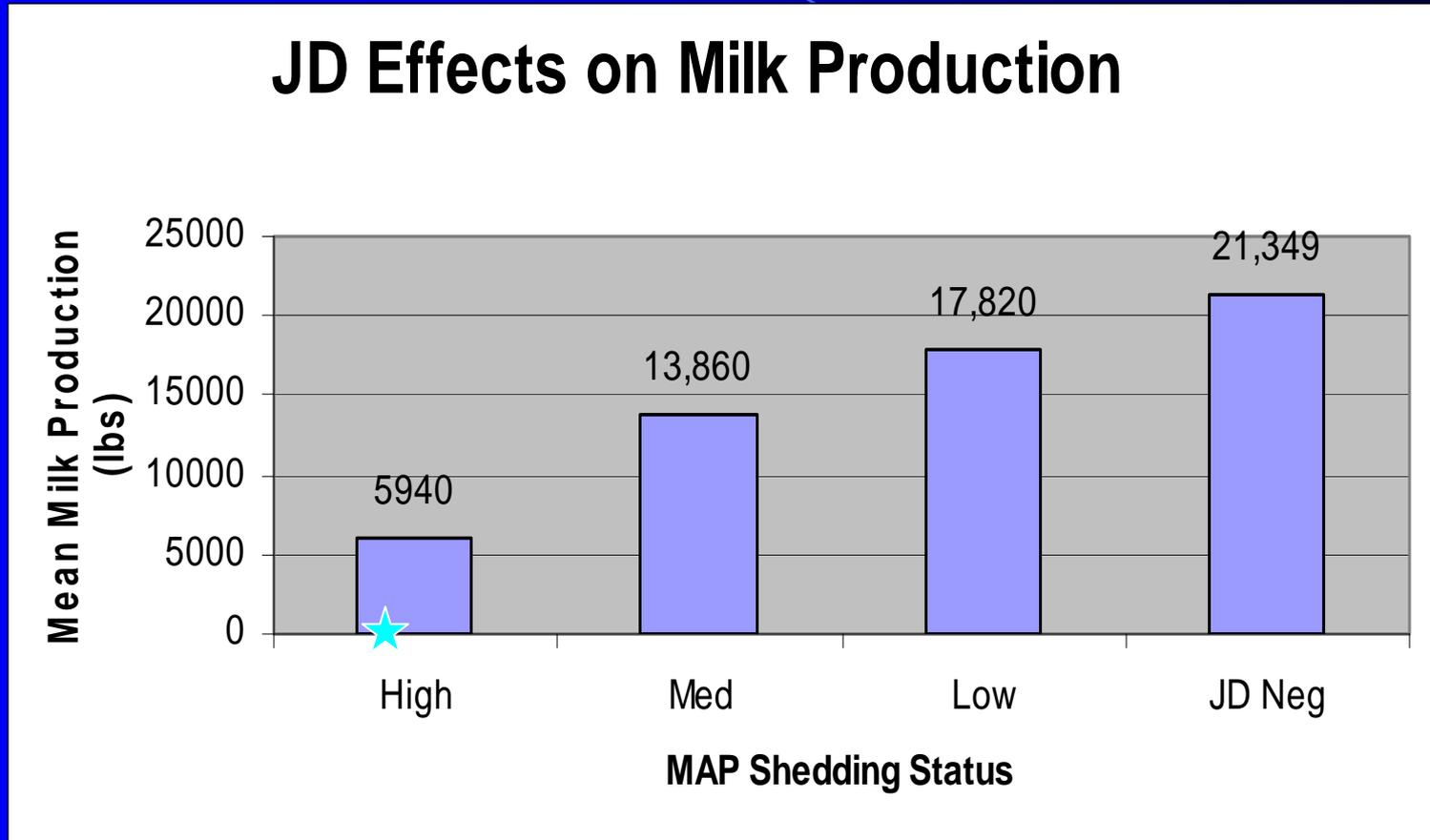
- Cows are less efficient
- More feed is wasted due to decreased absorption of nutrients
- Lower milk production
- Less likely to breed back
- Shedding cows infect their own calves and others in the environment (milk, colostrum, run-off water, maternity pen, etc)
- Culled cows bring less salvage value
- Costs of diagnostics and treatment before culling (antibiotics, deworming, etc.)
- Easily spread: MAP survives for a long time in manure pits & lagoons— is runoff water used for irrigation? Are calf hutches downhill from milk cow pens?

University of Minnesota Study

Raizman, et al, JDIP Annual Conference Proceedings, 2006

- 1052 cows enrolled in study (2 dairies)
- 84 cows (8%) fecal positive (+)
- Fecal + cows had 106-day shorter lactation than fecal – cows
- 66 of 84 JD cows were culled during lactation—stayed in herd 202 days less than cows that completed the study and 49 days less than cows that were culled for other reasons—**POOR PERFORMERS**
- Fecal + cows were less likely to be bred and conceive than fecal – cows

How Much Damage Does this Disease Do to the Bottom Line?



★ These cows are not even paying you back for what they are eating!

Why else should we care?

Public Opinion

- Is there a connection with Crohn's disease?
Equal amounts of data saying yes and no
Some experts say proof is only a matter of time
- Will the media care about the truth?
Sensationalism sells; vegetarian groups will use information supportive of their positions
- Consumers demand safety of their food supply—
if a connection is made, the cattle industry has already been fighting this disease

What Can I Do ?

Voluntary Johne's Disease Control Program

- Designed and sponsored by USDA; implemented by Iowa Department of Agriculture & Land Stewardship (IDALS)
- Divided into 3 phases—any producer can participate in as little or as much of the program as desired

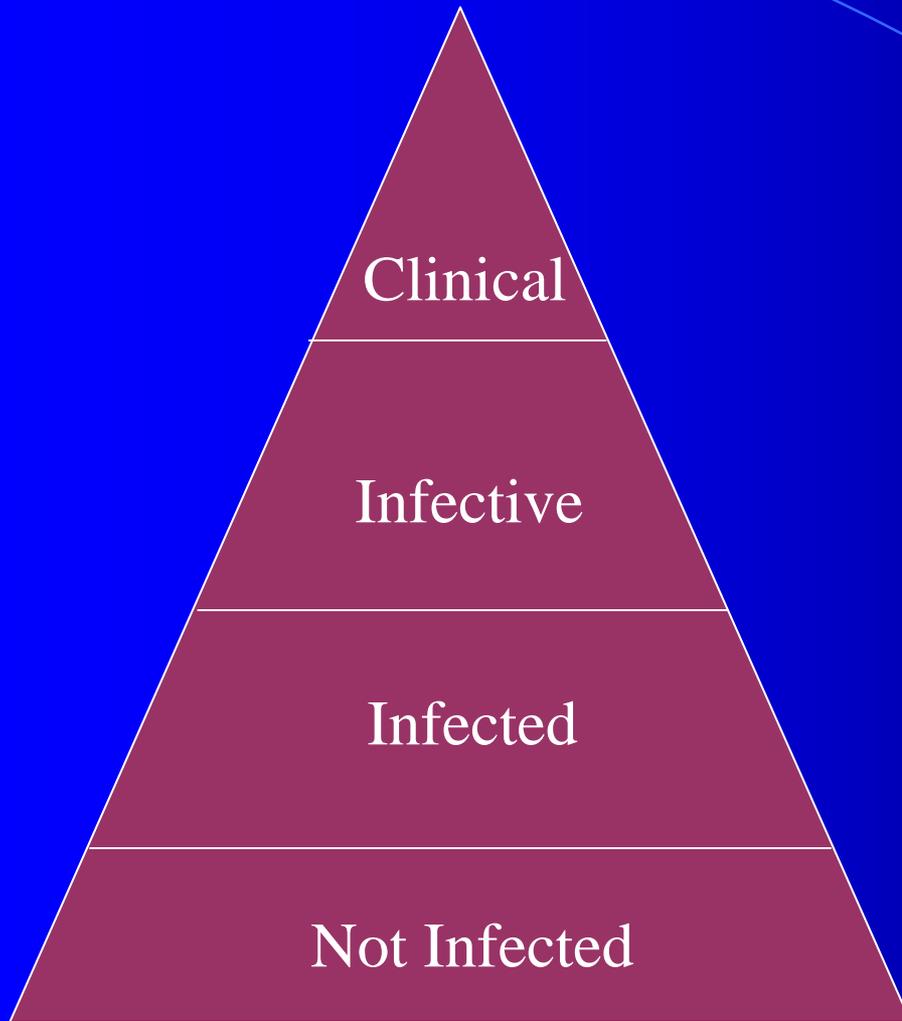
Educational Phase: learn about the disease, cause, symptoms, how to recognize it, how to avoid it

Management Phase: a one-on-one consultation and risk assessment with the State of Iowa Johne's Coordinator or District Vet about your operation, what recommendations will work best for you to decrease risks of Johne's in your herd

Testing Phase: program provides some funds for testing based on what you and the District Vet decide will work for you

Contact Dr. Randy Wheeler at IDALS 515-281-0866 or your District Veterinarian for more details

Johne's Disease in a Nutshell



- Clinical animals are easy to identify but are the “tip of the iceberg”
- Infective (sub-clinical) animals are quietly spreading the disease to susceptible herd mates (mostly calves)
- Infected animals have MAP in their bodies but are not yet shedding
- Goal of any testing program is to find infective and infected cows and bulls before they become clinical

All available tests are accurate at diagnosing positive animals - a positive is a positive, but a negative result may just mean that an animal is not positive yet!

Testing Options at ISU VDL

Necropsy:

- Diseased tissue found at necropsy is the most definitive test (but you can't make money off these animals)!
- Any adult animal that dies should be examined

Serum/Blood/Milk ELISA:

- Used as a screening test but still has limitations— not all infected animals have high antibodies, negative tests may just mean “Not Positive Yet”
- Rapid results and not very expensive

Fecal Testing

- Fecal culturing is **most accurate** way to find infected animals
- Positive cultures are checked with DNA tests so **A POSITIVE TEST MEANS A POSITIVE ANIMAL**
- Requires specialized equipment, so more expensive, results can take 7 weeks (improved from old test which took 4 months!)



Fecal culture incubator used at ISU VDL

What Else Can I Do?

Management Guidelines

Biosecurity is the best way to keep diseases out of your herd and doesn't have to cost a lot: keep boots clean, wash hands frequently, change coveralls before working with young stock, buy low-risk herd additions, cull problem animals and follow a good herd health program with your veterinarian

- These guidelines can also minimize risks for other diseases: Salmonella, Cryptosporidium, *E. coli*, BVD, Rota, Corona, respiratory diseases
- You don't want to be the source of disease spread in your herd!



Management Guidelines

- Monitor cows closely for clinical Johne's, especially before & after freshening (increased stress)
- Use “cleanest” pen for calving (calves are most susceptible to infection)—clean pens often to prevent manure build up
- Remove calf from maternity pen as soon as possible (less risk of contamination & MAP ingestion)
- Freeze colostrum from mature, Johne's-negative cows
- If you don't have test results, don't pool colostrum (more chance of exposing many calves to MAP); consider colostrum pasteurization (special equipment)
- Eliminate run-off/wash water anywhere near where calves are housed; don't irrigate pastures with it
- Do not keep sick or cull cows with or near young stock

Don't Purchase the Problem- BUY SMART!

- Replacement animals can be a risk to your herd—always ask for the Johne's status from the dam or adult animals in the herd before buying
- If they don't have results or don't do any testing, **don't buy from that herd**
- Find source herds that you trust—ask about herd health programs, BVD testing, nutrition programs
- Be cautious when buying clean-up bulls (especially if they are older)
- You want to add productive cattle to your herd—don't buy a lemon!



Johne's – Key Points to Remember

- **Slowly developing disease**
- **Difficult to diagnose and no effective treatment!**
- **Clinical/subclinical animals shed many MAP**
- **Affects production and eventually ends in death**
- **Possible link to Crohn's disease in man**
- **Reduce risk of disease:**
 - **Buy low risk replacements (and bulls) from trusted sources**
 - **Use practices to reduce transmission to young calves**
 - **Develop a testing and management plan with your veterinarian and CULL HARD!**

THE END

