NATIONAL JOHNE'S DISEASE EDUCATION INITIATIVE

A cooperative effort of the National Institute for Animal Agriculture, USDA, APHIS, Veterinary Services, in association with the National Johne's Working Group & United States Animal Heath Association

Johne's Disease – Beef

First Clue: Fresh Heifers with Scours

Participating in the Johne's Disease Control Demonstration Project helped dispel some myths held regarding Johne's disease for Cass County beef producer Gail Peterson. As one of the owners of the family's 250-head Angus operation, Gail was looking for more information and support to tackle the problem emerging on his farm.

Gail and his wife, Mary Lou, farm with his mother Dorothy, and two of their sons, Alan and his wife, Sarah, and Jeffrey and his wife, Katie. Gail first suspected they had a problem with Johne's disease in 2004 when fresh heifers were developing severe diarrhea and losing weight right after calving. In 2005, they joined the Johne's Disease Control Demonstration Project and conducted a whole-herd test to identify test positive animals.

"I thought you only had to test the younger animals, not the whole herd," Gail says. Working with the MSU team we were able to put new management practices in place to slow the transmission of the disease."

Because the Petersons raise their calves until they are ready for market, the weight reduction associated with Johne's disease has a direct impact on the profitability of the farm.

Having identified the positive animals, Gail was able to segregate the herd into different groups to isolate the test-positive animals. By knowing which animals were positive he is also able to monitor them more closely for weight loss and ship them before they lose too much weight.

"The biggest thing we have done is to remove young calves from the larger group of cows getting ready to calve. We have also divided the calving area so we have more, smaller lots so they are not as concentrated," Gail says.

Because the Petersons rely on selling healthy seed stock, they are culling heavily to reduce the number of test-positive animals in their herd. Since 2005 the number of test positive animals has declined from 7.2 percent to 2.2 percent.

In addition to reducing the incidence of Johne's disease, the Petersons have also seen a reduction in the number of scour problems and overall improved health of the calves.

"We will keep test-positive cows until they are ready to go to market, but we don't breed them back," Gail says. "We separate the cull group from the rest of the herd to minimize transmission of the disease to younger cattle."

"We have seen a lot of positive things just by making a number of small changes. We hope to get to a point where we can become a test-negative herd and sell quality Johne's-negative seed stock. I believe that will give us an advantage when we go to sell cattle," Gail adds.

Test Positive Animals

Controlling Johne's disease in beef operations presents different challenges because of how calves are managed. The Peterson's first noticed clinical disease in their younger cows.

Upon investigation, it was determined that almost all of the Johne's disease test positive cows were in the younger generations, suggesting the disease was introduced recently. High stocking density in the calving area and housing of weaned heifers with cull cows in the fall and early winter, likely led to rapid transmission of the disease.

To control Johne's disease, the most significant change made was how the calving area was managed. The stocking density of the calving area was reduced significantly and new cow-calf pairs were moved to transition pastures as soon as possible.

In addition, the practice of housing weaned heifers with cull cows was stopped. To reduce the disease level in the herd quickly, all test positive cows are not rebred and eventually culled. These simple management changes have led to a significant reduction in disease prevalence in a relatively short period of time.

Lessons Learned:

- ✓ In beef operations, the calving area is the most critical area for managing Johne's disease transmission.
- ✓ Making simple management changes in how the calving area is managed can significantly reduce Johne's disease transmission and prevalence.
- ✓ Housing weaned replacements with cull cows is a risk factor.
- ✓ Culling Johne's disease test positive cattle early is advantageous in that the risk of transmission is reduced and cull prices are higher if sold before clinical disease occurs.

USDA

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NATIONAL INSTITUTE FOR ANIMAL AGRICULTURE

Manure Management & Johne's Disease

How bovine producers manage forages can impact the spread/non-spread of *Mycobacterium avium* subsp. *paratuberculosis*, the organism that causes Johne's disease, reports Everett D. Thomas with the William H. Miner Agricultural Research Institute, Chazy, N.Y.

Because ingestion of manure containing the *MAP* pathogen is the most common way animals become infected, Thomas stresses that manure application to forages "is a potential source of infection."

Here's Thomas' report:

"Every effort must be made to prevent ingestion of manure by calves and young heifers.

"Pastures should not be manured during the season the calves and heifers have access to them.

"*MAP* can live for at least six months under certain field conditions. However, *MAP* is quite susceptible to high pH, and there's evidence suggesting that lime application can kill the pathogen. Therefore, if soil analysis indicates a need for agricultural lime, it should be applied at or near the time you apply manure to pastures grazed by young stock.

Thompson urges producers not allow calves to graze on pastures that were manured during the current growing season.

MAP survival on ensiled forages from fields top dressed with manure

"Two Japanese studies found 100% mortality of *MAP* in properly ensiled alfalfa that was inoculated with the pathogen. While these were laboratory studies with dried alfalfa that was reconstituted to typical silage moistures, the results are encouraging.

"However, some *MAP* survived when alfalfa wasn't properly fermented due to high forage dry matter content: While there was 0% survival at both 25% and 40% DM, 13% of *MAP* survived at 55% DM. Since fermentation often isn't as good in the spoiled silage layer on top of the silo, this is one more reason to remove and discard this material.

"While it would be beneficial to have field-scale trials confirming that proper silage fermentation kills *MAP*, it appears that ensiled forages that were top dressed with manure can safely be fed to cows and older heifers providing these steps are taken:

1. Top dress manure as soon as possible following forage harvest to permit sufficient time for environmental conditions to reduce *MAP* levels. Both sunlight and drying have been found to kill *MAP*.

2. Use care in mowing and raking or combining windrows, to avoid contamination of forage with manure residues.

3. Use good ensiling techniques including proper dry matter content (generally 30%-40% DM), rapid filling, adequate packing, covering as soon as the silo is filled and use of a silage inoculant.

4. Allow sufficient time for complete fermentation before feeding the silage.

MAP survival on forages top dressed with manure and harvested as dry hay

"Less is known about *MAP* survival on forages that are top dressed with manure and then harvested as dry hay.

"While a 30-day interval between manure application and harvest should significantly reduce *MAP* numbers due to the combined effects of drying, sunlight and precipitation that washes some of the manure from plants, there's some question of *MAP* mortality in any manure adhering to the underside of leaves. Until more is known about this, it would be best to avoid feeding to calves and young heifers any dry hay that was top dressed with manure.

"Obviously, the status of Johne's disease on a particular farm will play a significant role in the importance of following these guidelines."

Field Situation	*Animal Class*	*Manure Top Dress?*
Pastures	Calves and young heifers	No
Pastures	Cows	Avoid
Dry hay	Calves and young heifers	Avoid
Legume and grass silage	All	OK
Summer annual silage	All	OK
Summer annual greenchop	All	Avoid

Based on these studies, Thomas encourages bovine producers to follow these guidelines to protect calves and heifers:

- Dry hay from fields receiving livestock manure during the current growing season should not be fed to

(Continued on page 3)

(Continued from page 2)
calves or young heifers. This probably includes baleage since it's often ensiled at a higher DM, and this may result in lower acidity and higher pH. To be safe, don't feed any forage manured during the growing season, either hay or silage, to calves or young heifers.

- Don't pasture calves (and avoid pasturing any bovine animals) on pastures or hay fields that were manured during the current growing season. If you want to manure this land, do so in the fall after the pasture season is over.
- If you manure hay crop fields harvested during that growing season, ensile the forage at dry matter levels that will encourage proper fermentation (generally 30-40 per cent DM) and confirm this by pH test. If at all possible, feed this silage to cows, not young heifers. The safest option is not to make any dry hay from fields manured during that growing season.

Disclaimer: Spreading any manure represents some level of risk of transmission if *MAP* is present.

Research Abstract:

Association between risk-assessment scores and individual-cow Johne's disease-test status over time on seven Michigan dairy herds

Researchers: Pillars RB, Grooms DL, Gardiner JC, Kaneene JB.

To evaluate the effectiveness of management practices implemented to control the spread of Johne's disease, a research team conducted a five-year observational study (January 2003 to December 2007) on seven Michigan dairy herds containing cows infected with *Mycobacterium avium* subsp. *paratuberculosis*. The Johne's disease incidence and prevalence was monitored in each herd annually by serum ELISA and/or fecal culture of all adult cows, and a Johne's disease control program was designed specifically for each herd based on the results of an initial risk-assessment.

The risk-assessment was repeated annually and the control program was updated as needed. Herd risk-assessment scores were used to measure compliance with the control program and create Johne's disease-risk profiles for individual cows raised on the farms.

The association between specific risk-assessment scores and the Johne's disease-test status of individual cows was evaluated using logistic regression. The researchers accounted for clustering of cows within herds using generalized estimating equations (GEE). Multivariable models were built with purposeful selection of risk factors assessed on univariable analyses.

The dataset analyzed consisted of 3,707 cows raised on the respective farms, of which 616 were classified as infected with *MAP* based on testing positive on fecal culture or serum ELISA. Of the cows that were not exposed to the control program, 20% were classified as infected while only 7% of cows that were exposed to the control program were infected. The final multivariable model consisted of two factors: exposure to adult cows other than dam at birth (OR=1.09, 95% CI: 1.06, 1.13), and feeding colostrum from one cow to multiple calves (OR=1.10, 95% CI: 1.09, 1.12).

Based on this study, implementing practices that minimize the exposure of newborn calves to *MAP* being shed by infected adult cows should take priority.
Prev Vet Med. 2011;98(1):10-8. Epub 2010 Oct 28.

To learn more about Johne's disease prevention and control, please contact your state Designated Johne's Coordinator. A list of state DJCs is available online at *www.johnesdisease.org*.

The following pages—*"Johne's Disease—Descriptive Guidelines for Scoring Risk Factors for Beef Herds"*—have been adapted from the recently updated "How to Do Risk Assessments and Develop Management Plans for Johne's Disease," (Fourth Edition, 2011). Beef producers are encouraged to use this information to perform a risk assessment on their farm or ranch. The lower the score, the better. Risk factors receiving a "moderate" or "high" should serve as a signal for action—a management change—that could help prevent/control Johne's disease in the herd.

Johne's Disease—
Descriptive Guidelines for Scoring Risk Factors for Beef Herds

(Adapted from "*How to Do Risk Assessments and Develop Management Plans for Johne's Disease - 2011 Edition*")

Calving Area		Risk	
Risk Factors	**Scoring Guidelines**	**Level**	**Score**
Is the calving area (corral or pasture) used for more than one calving cow at a time?	**Single pen use.** **Calving area with moderate cow in calving areas.** **Heavy cow concentration in calving area.**	**Low** **Moderate** **High**	**0-1** **4-6** **8-10**
Does manure build-up in the calving area pose a risk for calf ingestion?	Area always clean and dry. Fair to moderate manure visible. Extensive manure contamination and build up.	Low Moderate High	0-1 4-6 8-10
Are the udders of calving cows soiled with manure?	**80% of udders are clean and dry.** **Moderate amount on udders of 20% - 40% of cows.** **Udders are manure covered on a majority of cows.**	**Low** **Moderate** **High**	**0-1** **4-6** **8-10**
Are high-risk, Johne's disease clinical animals and suspects in calving area?	Almost never. Low-risk suspects in calving area. High-risk or Johne's disease clinicals are in calving area.	Low Moderate High	0-1 4-6 8-10

Nursing Calf Group		Risk	
Risk Factor	**Scoring Guidelines**	**Level**	**Score**
Are cow/calf pairs pastured with Johne's disease clinical or suspect cattle?	**Never or rarely.** **Occasionally.** **Frequently.**	**Low** **Moderate** **High**	**0-1** **4-6** **8-10**
Does manure build-up in the pasture posing a risk for calf ingestion?	Area always clean and dry. Minimal visible manure to area about 50% manure-free. 50% to extensive manure contamination.	Low Moderate High	0-1 4-6 8-10
Can calf's water be contaminated with cow / bull manure any time?	**Never to rarely.** **Occasionally from a few sources.** **Frequently from many sources.**	**Low** **Moderate** **High**	**0-1** **4-6** **8-10**
Can calf's feed be contaminated with cow / bull manure at any time?	Never to rarely. Occasionally. Frequently or always.	Low Moderate High	0-1 4-6 8-10
Are sick calves kept with or near sick cows?	**Almost never.** **Sick calf pen adjacent to sick cow pen.** **Sick calves are penned with sick cows.**	**Low** **Moderate** **High**	**0-1** **4-6** **8-10**

Weaned Calves Group		Risk	
Risk Factor	**Scoring Guidelines**	**Level**	**Score**
Do weaned calves have contact with mature cattle or the manure of mature cattle?	**Never to rarely.** **Occasionally from a few sources.** **Frequently from many sources.**	**Low** **Moderate** **High**	**0-1** **3-4** **6-7**
Is it possible for manure from mature cattle to contaminate the feed?	Never to rarely. Occasionally from a few sources. Frequently from many sources.	Low Moderate High	0-1 3-4 6-7
Is it possible for manure from mature cattle to contaminate water sources?	**Never to rarely.** **Occasionally from a few sources.** **Frequently from many sources.**	**Low** **Moderate** **High**	**0-1** **3-4** **6-7**
Do heifers or young bulls share pasture with mature cattle?	Never to rarely. Occasionally. Frequently or always.	Low Moderate High	0-1 3-4 6-7
Is manure spread on forage then fed to heifers or young bulls?	**Never to rarely.** **Occasionally.** **Frequently or always.**	**Low** **Moderate** **High**	**0-1** **3-4** **6-7**

Bred Heifers and Yearling Bulls		Risk	
Group Risk Factor	Scoring Guidelines	Level	Score
Do heifers or yearling bulls have contact with mature cattle or the manure of mature cattle?	**Never to rarely.** **Occasionally from a few sources.** **Frequently from many sources.**	**Low** **Moderate** **High**	**0-1** **2-3** **4-5**
Is it possible for manure from mature cattle to contaminate the feed?	Never to rarely. Occasionally from a few sources. Frequently from many sources.	Low Moderate High	0-1 2-3 4-5
Is it possible for manure from mature cattle to contaminate the water used by bred heifers or yearling bulls?	**Never to rarely.** **Occasionally from a few sources.** **Frequently from many sources.**	**Low** **Moderate** **High**	**0-1** **2-3** **4-5**
Do bred heifers or yearling bulls share pasture with mature cattle any time?	Never to rarely. Occasionally. Frequently or always.	Low Moderate High	0-1 2-3 4-5
Is manure spread on forage then fed to bred heifers or yearling bulls?	**Never to rarely.** **Occasionally.** **Frequently or always.**	**Low** **Moderate** **High**	**0-1** **2-3** **4-5**

Adult Animals (over 24 months of age)		Risk	
Risk Factor	Scoring Guidelines	Level	Score
Is it possible for feed to be contaminated with manure?	**Never to rarely.** **Occasionally from a few sources.** **Frequently or always from many sources.**	**Low** **Moderate** **High**	**0-1** **2** **3-4**
Is manure contamination of the water possible?	Never to rarely. Occasionally from a few sources. Frequently or always from many sources.	Low Moderate High	0-1 2 3-4
Do cows have access to accumulated or stored manure?	**Never to rarely.** **Occasionally.** **Frequently or always.**	**Low** **Moderate** **High**	**0-1** **2** **3-4**
Is manure spread on forage and grazed or fed the same season?	Never to rarely. Occasionally. Frequently or always.	Low Moderate High	0-1 2 3-4

Additions / Replacements

Additions/Replacements include bulls, ET recipients, other non-dairy cattle and small ruminant additions on the property. All animals added to the herd during, at minimum, the last 12 months should be included. Even though **planned** additions are not scored, a question should also be asked about **planned** additions and replacements from outside sources over the next 12 months. **If the herd is truly closed, this area is given a score of "0".**

	Number of Animals				
Get additions or replacements from. . .	**1-5**	**6-12**	**13-20**	**21-50**	**>50**
1. Level 3-6 classified herds	0	2	4	6	8
2. Level 1 or 2 classified herds	10	11	12	13	14
3. Single source non-tested or non-program herds	20	22	23	26	28
4. Multiple sources, non-tested or non-program herds or markets	30	34	36	38	40