



JOHNE'S DISEASE – DAIRY

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Sound Management the Ticket to Beating Johne's Disease

Alan and Sharon Kozak, Clover Patch Dairy, Millersburg, Ohio, entered the dairying business almost 20 years ago with 156 registered Jerseys purchased from 20 different herds in six states. In the beginning, they were an optimistic dairy couple. Then Johne's disease was confirmed in the herd, and the couple contemplated tossing in the towel.

Between 1996 and 2001, 28% of the dairy's culls were clinical with Johne's disease. Promising heifers that were 3,000 lbs. over herdmates in their first lactation dropped to 3,000 lbs. below herdmates as second-calf heifers and then became clinical with their third calf. Using conservative figures, Kozak estimates that Johne's disease cost the dairy more than \$250,000 due to lost production, early culling and low cull value.

"Because tests weren't nearly as good back then as they are today, I wouldn't have been surprised if 75 percent of our animals had been infected," Kozak states. "And, while we considered giving up, it wasn't the option either of us wanted."

Today, 15 years since the first cow was diagnosed with Johne's disease, Kozak is pleased that they stayed in the game. Their herd has tested fecal negative for three straight years and has not had any clinicals for several years. The dairy even ranks among the Top 20% in the Jersey breed, and Kozak is confident regarding the Johne's disease status of the animals he sells to others.

The difference between 1996 and today is the Kozaks' obsession with battling Johne's disease including vigilant, intensive culling coupled with implementing numerous management changes. Their adjustment in management practices particularly targeted

newborn calves—known to be most susceptible to MAP.

Management Changes

Before tackling Johne's disease head on, the Kozaks fed calves pooled colostrum and pooled dump milk. Kozak says a calf might have received milk from 30 or more different cows by the time it was weaned. Today, the dairy makes certain a calf receives colostrum only from its test-negative dam or from a first-calf heifer. If this is not available, a colostrum replacer is used.

The Kozaks also zeroed in on the potential of human and equipment transmission of MAP to calves—and this focus remains today. Although the herd—which now numbers 400 head—has been test negative for three years, the Kozaks still aren't taking any chances of moving potentially MAP-contaminated manure to where calves might ingest it. Thus, no one walks across cow lanes to feed calves.

The Kozaks and their employees have two sets of work boots that they wear on the dairy. One set is worn while working with the calves, and the other pair is worn while working with the cows.

Because Clover Patch Dairy owners and employees know equipment can be MAP-transmission culprits, they are big on pressure washing equipment when needed. For example, since a road splits the farm, nothing goes from one side to the other side without being pressure washed. The tractor and mower are pressure-washed before mowing calf pastures.

Clover Patch Dairy also has two skid steers. One skid steer is used to scrape the cow barn while the second skid steer is reserved strictly for feeding. Their ATV is used only in adult pastures.

Aware that some of their previous grazing practices mostly likely helped spread MAP, Kozak says young stock and adults are now kept in separate pastures and in separate facilities.

Clover Patch Dairy collects fecal cultures once a year, at 30 to 60 days fresh, and a whole-herd ELISA test is performed every January before freshening begins. Suspicious cows are tested throughout the year. And the Kozaks constantly evaluate their management and make changes as necessary.

"We spent a lot of time and money integrating practices that prevent the spread of Johne's disease," Kozak states. "But, you know, we are better managers today because of it."

Recommendations from Kozak

- *Learn all you can about Johne's disease, then educate and remind your employees about Johne's disease and its impact.*
- *If you think you have a problem, don't let others convince you that you don't. Get a second informed opinion.*
- *Know the Johne's disease status of your herd.*
- *If Johne's disease is found, implement a control plan with the help of your local and/or state veterinarians or DJC.*



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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.

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

"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*

<i>Field Situation</i>	<i>Animal Class</i>	<i>Manure Top Dress?</i>
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

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.

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."

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 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
(Continued on page 3)

Manure Management (Continued)

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.



To lessen possible ingestion of *MAP*, research shows that manure should not be spread on pastures the season the calves and heifers have access to them.

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.

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The following pages—"Johne's Disease—Descriptive Guidelines for Scoring Risk Factors for Dairy Herds"—have been adapted from "How to do Risk Assessments and Management Plans for Johne's Disease," and dairy producers are encouraged to use this information to perform a risk assessment on their dairies. 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 Dairy Herds

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

Risk Factor	Calving Area Scoring Guidelines	Risk	Score
Is the calving area used for more than one cow at a time?	No. Calving occurs in a single-use pen. Yes. There is a general maternity area with low cow concentration. Yes. There is a general maternity area with high cow concentration.	Lowest Moderate Highest	0-1 4-6 9-10
Is manure build-up in the maternity area a risk for calf ingestion?	No. The area is always clean and dry, with no manure visible. Yes. There is minimal manure visible. Yes. There is extensive manure contamination.	Lowest Moderate Highest	0-1 4-6 9-10
Are sick cows kept in, or adjacent to, the maternity area?	Never or very rarely. Yes. The hospital/sick pen is adjacent to the maternity area. Yes. Sick cows are often kept in the maternity area.	Lowest Moderate Highest	0-1 4-6 9-10
Are high-risk, clinical or suspect Johne's disease cows kept in the maternity area?	Never or very rarely. Yes, low-risk suspects may be kept in or near the maternity area. Yes, high-risk/clinical Johne's disease cases/suspects are kept in the maternity area.	Lowest Moderate Highest	0-1 4-6 9-10
Are the udders, legs and/or flanks of calving cows soiled with manure?	No. 90% or more of the cows are clipped, clean and dry. Yes. A moderate amount of manure is visible on 20%-40% of the cows. Yes. A majority of the cows have manure on udders, legs, flanks.	Lowest Moderate Highest	0-1 4-6 9-10
Are calves born outside of the designated maternity area?	Never or very rarely. Yes. Occurs 15%-25% of all calvings. Yes. Occurs more than 40% of the time.	Lowest Moderate Highest	0-1 4-6 9-10
How long do calves stay in the maternity area after birth?	Calves routinely stay in the maternity area less than 30 minutes. Most calves stay in the maternity area for 1 to 4 hours. Most calves stay in the maternity area for more than 6 hours.	Lowest Moderate Highest	0-1 4-6 9-10
Are calves able to nurse their dams or other cows?	Never or very rarely. Yes. Most calves are with their dam or other cows for 1 to 4 hours. Yes. Most calves are with their dam or other cows for more than 6 hours.	Lowest Moderate Highest	0-1 4-6 9-10

Additional factors that can result in calves being exposed to adult cow manure include:

- Are calves moved from the maternity area to calf housing area without being exposed to adult cow manure?
- Are people and equipment manure-contaminated when working in the maternity area?

While these factors are not scored, they must be considered and, if necessary, addressed in the herd plan.

Pre-Weaned Heifers			
Risk Factor	Scoring Guidelines	Risk	Score
Is colostrum pooled from multiple cows and fed to calves?	Never or only from cows with several negative Johne's disease tests.	Lowest	0-1
	Yes, from cows with a negative Johne's disease test or from a low-risk group.	Moderate	4-6
	Yes, from cows with unknown Johne's disease status.	Highest	9-10
Is colostrum fed from individual cows to calves?	Yes, only from likely Johne's disease-negative dams to their own calves.	Lowest	0-1
	Yes, from a single cow with a negative Johne's disease test to several calves.	Moderate	4-6
	Yes, from cows with unknown Johne's disease status to several calves.	Highest	9-10
Is unpasteurized milk pooled and fed to calves?	No, or only from cows with several Johne's disease negative tests.	Lowest	0-1
	Yes, milk from cows with one negative Johne's disease test.	Moderate	4-6
	Yes, milk from cows with unknown Johne's disease status.	Highest	9-10
Can colostrum/milk/milk replacer be contaminated with cow manure?	Never or very rarely occurs.	Lowest	0-1
	Yes. May occur occasionally.	Moderate	4-6
	Yes. May occur frequently from multiple sources.	Highest	9-10
Can calf feed or water be contaminated with cow manure?	Never or very rarely occurs.	Lowest	0-1
	Yes. May occur occasionally from limited sources.	Moderate	4-6
	Yes. May occur frequently from multiple sources.	Highest	9-10
Can calves come in contact with cows or cow manure?	Never or very rarely.	Lowest	0-1
	Yes. May occur occasionally.	Moderate	4-6
	Yes. May occur frequently.	Highest	9-10

Post-Weaned Heifers			
Risk Factor	Scoring Guidelines	Risk	Score
Do heifers have contact with cows or cow manure?	Never or very rarely occurs.	Lowest	0-1
	Yes. May occur occasionally.	Moderate	3-4
	Yes. Occurs frequently.	Highest	6-7
Can heifer feed become contaminated with cow manure?	Never or very rarely occurs.	Lowest	0-1
	Yes. May occur occasionally.	Moderate	3-4
	Yes. Occurs frequently and/or from multiple sources.	Highest	6-7
Can heifer water sources be contaminated with cow manure?	Never or very rarely occurs.	Lowest	0-1
	Yes. May occur occasionally.	Moderate	3-4
	Yes. May occur frequently from multiple sources.	Highest	6-7
Do heifers share pasture with mature cows?	Never or very rarely occurs.	Lowest	0-1
	Yes. May occur occasionally.	Moderate	3-4
	Yes. May occur frequently.	Highest	6-7
Is manure spread on forage that is grazed or fed in the same year?	Never or very rarely occurs.	Lowest	0-1
	Yes. May occur occasionally.	Moderate	3-4
	Yes. May occur frequently.	Highest	6-7

Risk Factor	Bred Heifers		Risk	Score
	Scoring Guidelines			
Do bred heifers have contact with cows or cow manure?	Never or very rarely occurs. Yes. May occur occasionally. Yes. Occurs frequently.		Lowest Moderate Highest	0-1 2-3 4-5
Can bred heifer feed become contaminated with cow manure?	Never or very rarely occurs. Yes. May occur occasionally. Yes. Occurs frequently and/or from multiple sources.		Lowest Moderate Highest	0-1 2-3 4-5
Can bred heifer water sources be contaminated with cow manure?	Never or very rarely occurs. Yes. May occur occasionally. Yes. May occur frequently from multiple sources.		Lowest Moderate Highest	0-1 2-3 4-5
Do bred heifers share pasture with mature cows?	Never or very rarely occurs. Yes. May occur occasionally. Yes. May occur frequently.		Lowest Moderate Highest	0-1 2-3 4-5
Is manure spread on forage that is grazed or fed in the same year?	Never or very rarely occurs. Yes. May occur occasionally. Yes. May occur frequently.		Lowest Moderate Highest	0-1 2-3 4-5

Risk Factor	Mature Bulls and Cows Scoring Guidelines	Risk	Score
Can cow feed become contaminated with manure?	Never or very rarely occurs. Yes. May occur occasionally. Yes. May occur frequently and/or from multiple sources.	Lowest Moderate Highest	0-1 2 3-4
Can water sources of cows/bulls become contaminated with cow/bull manure?	Never or very rarely occurs. Yes. May occur occasionally. Yes. May occur frequently and/or from multiple sources.	Lowest Moderate Highest	0-1 2 3-4
Do mature animals have access to accumulated or stored manure?	Never or very rarely occurs. Yes. May occur occasionally. Yes. Occurs frequently or always.	Lowest Moderate Highest	0-1 2 3-4
Is manure spread on forage that is grazed or fed in the same year?	Never or very rarely occurs. Yes. May occur occasionally. Yes. Occurs frequently.	Lowest Moderate Highest	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 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".					
Get additions or replacements from. . .	Number of Animals				
	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