


How to Do Risk Assessments

This handbook has been approved for distribution and use by the National Johne's Disease Working Group (a subcommittee of the United States Animal Health Association, Johne's Disease Committee) and provided by the National Johne's Disease Education Initiative which is underwritten by USDA/APHIS/VS.



In February 2003, the National Research Council, in its Final Report “Diagnosis and Control of Johne’s Disease,” recommended that veterinarians be supplied with materials to help guide them in performing risk assessments and completing herd plans for the Voluntary Bovine Johne’s Disease Control Program. It was also recommended that the emphasis be on controlling risk factors—management practices—rather than focus on the single etiologic agent.

In May 2003, USAHA formed a Task Force to specifically address these recommendations and to develop a standard Johne’s disease risk assessment and herd plan format that can be used under the Voluntary Bovine Johne’s Disease Control Program. They also recommended that states encompass herd biosecurity and animal and public health risks as well. The standard format should allow uniform data collection throughout the country.

This Fourth Edition of the Manual is the product of that effort. It has been edited and redesigned to be easy and practical for accredited veterinarians, cattle herd owners and DJCs to use. The Manual has been divided into three handbooks: 1) an instructional “How to Conduct Risk Assessments and Develop Management Plans for Johne’s Disease” handbook; 2) a “Handbook for Veterinarians and Dairy Producers”; and 3) a “Handbook for Veterinarians and Beef Producers.”

The “Handbooks” contain the minimum information and data required for Program participation. State Designated Johne’s Coordinators are allowed to modify the format used to collect information to fit the needs of their state.

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How to Conduct Risk Assessments, Develop Management Plans

The purpose of this handbook is to assist and guide veterinarians and their cattle producer clients with the development and implementation of a standard Johne's disease risk assessment and management plan. It is a comprehensive process directed specifically at reducing or eliminating identified risks for the introduction and/or spread of Johne's disease and other fecal-oral and colostrum-milk transmitted diseases. In addition, implementation of management practices directed against Johne's disease will enhance the overall biosecurity of the herd. They can reduce the risk for other pathogens that have significant impact on cattle health and performance.

The step-wise process presented in this handbook will lead to a number of management choices that can be employed to reduce identified risks. The actual content of a final plan is a decision for the owner and veterinarian responsible for the health and production of the herd. However, it should support the owner's goals for the farm, address the impact of Johne's disease and other disease risks, as determined by the assessment, and contain an outline for a testing scheme.

To be successful, the plan should take all health and management priorities or concerns into account, and Johne's disease control practices should blend with ongoing biosecurity efforts. The efficacy of the plan will depend on the returns the owner expects from their effort and what is realistically achievable with their management and resource capabilities. All of these factors must be considered to craft an effective and feasible plan.



Estimating a current prevalence of Johne's disease is a vital part of the assessment. It is basic to prioritizing risks to be included in the management plan and to interpreting Johne's disease test results in this specific herd. If available, whole-herd test results provide a reasonably accurate estimate. If test results are not available, a crude estimate is obtained by coupling historical data with the criteria outlined in the boxes below the prevalence line in the dairy and beef handbooks. This will help to categorize the herd prevalence within a range from low to very high.

Note: *Depending on the confi*

Descriptive Guidelines for Scoring Risk Factors for Dairy Herds

A. Calving Area - Dairy

Since calves are the most susceptible to infection, the score values are higher for risk factors in this area. Risk factors for the maternity or calving area should be assessed for the potential of a newborn to ingest manure or *Mycobacterium avium* subspecies *paratuberculosis* (MAP) from mature cattle. Considerations include ground and pen surfaces, contaminated udders and teats, suckling colostrum from an infected cow or manure contamination on calf's body surfaces.

Calving Area		Risk	
Risk Factor	Scoring Guidelines	Level	Score
1.	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
2.	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
3.	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
4.	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 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
5.	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
6.	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
7.	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
8.	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 plan.

B. Pre-weaned Calf Group - Dairy

Since calves are the most susceptible to infection, the score values remain high for risk factors in this group. Risk factors for this group should be assessed for the potential of a calf to ingest *MAP*-contaminated manure. Considerations include ground and pen surfaces and potentially contaminated colostrum, milk, water or feed. Consider all sources for potential manure contamination including colostrum or milk from infected cows, accidental contamination of any colostrum, milk, feed or pen surfaces from mature cattle, utensils, equipment, traffic splatter or people.

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

C. Post-weaned Heifer Group - Dairy

The age of this group may extend to 16 months. The score values are less than younger calves, but higher than bred heifers or cows. Risk factors for this group should also be assessed for the potential of a calf to ingest *MAP*-contaminated manure. Considerations include ground and pen surfaces, water or feed. Consider all sources for potential contamination, including manure runoff from cow herd, being fed refused feed from cows, sharing pasture or water with mature cattle, accidental contamination of any feed, water or pen surfaces from mature cattle, equipment, traffic splatter or people.

Post-weaned Heifers			Risk	
Risk Factor	Scoring Guidelines	Level	Score	
1.	Do 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 3-4 6-7
2.	Can heifer feed become contaminated with cow manure?	Never or very rarely occurs. Yes. May occur occasionally. Yes. Frequently and/or from multiple sources.	Lowest Moderate Highest	0-1 3-4 6-7
3.	Can heifer water sources be contaminated with cow manure?	Never or very rarely occurs. Yes. May occur occasionally. Yes. Frequently and/or from multiple sources.	Lowest Moderate Highest	0-1 3-4 6-7
4.	Do heifers share pasture with mature cows?	Never or very rarely occurs. Yes. May occur occasionally. Yes. May occur frequently.	Lowest Moderate Highest	0-1 3-4 6-7
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 3-4 6-7



E. Mature Bulls & Cows Group - Dairy

Even though cattle more than 24 months of age are believed to be less susceptible to Johne's disease, infected cattle may shed *MAP* and other pathogens in their feces and add significantly to the overall pathogen load in their environment. One of the primary objectives of a management plan is to reduce the pathogen load in the environment. Risk factors for this group should be assessed for the potential of a cow to ingest significant amounts of *MAP* from the environment over time. Considerations include water or feed. Consider all sources for potential contamination including accidental contamination of any feed or water from other mature cattle, equipment, traffic splatter or people.

Mature Bulls & Cows			Risk	
Risk Factor	Scoring Guidelines	Level	Score	
1.	Can cow feed become contaminated with manure?	Never or very rarely occurs. Yes. May occur occasionally. Yes. Frequently and/or from multiple sources.	Lowest Moderate Highest	0-1 2 3-4
2.	Can water sources of cows/bulls become contaminated with cow/bull manure?	Never or very rarely occurs. Yes. May occur occasionally. Yes. Frequently and/or from multiple sources.	Lowest Moderate Highest	0-1 2 3-4
3.	Do mature animals have access to accumulated or stored manure?	Never or very rarely occurs. Yes. May occur occasionally. Yes. May occur frequently.	Lowest Moderate Highest	0-1 2 3-4
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

Descriptive Guidelines for Scoring Risk Factors for Beef Herds

A. Calving Area - Beef

Since calves are the most susceptible to infection, the score values are higher for risk factors in this area. Risk factors for the maternity or calving area should be assessed for the potential of a newborn to ingest manure or *Mycobacterium avium* subspecies *paratuberculosis* (MAP) from mature cattle. Considerations include ground and pen surfaces, contaminated udders and teats, suckling from an infected cow or manure contamination on calf's body surfaces.

Calving Area		Scoring Guidelines	Risk	
Risk Factor			Level	Score
1.	Is the calving area (corral or pasture) used for more than one calving cow at a time?	Single pen use. Moderate cow concentration in calving areas. Heavy cow concentration in calving area.	Lowest Moderate Highest	0-1 4-6 8-10
2.	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.	Lowest Moderate Highest	0-1 4-6 8-10
3.	Are the udders of calving cows soiled with manure?	90% of udders are clean and dry. Moderate amount of manure on udders of 20-40% of cows. Udders are manure covered on a majority of cows.	Lowest Moderate Highest	0-1 4-6 8-10
4.	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.	Lowest Moderate Highest	0-1 4-6 8-10

B. Nursing Calf Group - Beef

Risk factors for this group should be assessed for the potential of a calf to ingest MAP-contaminated manure. Considerations include ground and pen surfaces and potentially contaminated water or feed. Consider all sources for potential manure contamination, including accidental contamination from mature cattle, traffic spatter or people.

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

D. Bred Heifer and Yearling Bull Group - Beef

This group of cattle is usually over 12 months of age and is believed to be substantially less susceptible to Johne's disease than newborn calves. The score values are less than younger calves but slightly higher than cows. Risk factors for this group should also be assessed for the potential of a yearling animal to ingest manure or *MAP* from mature cattle. Factors include ground and pen surfaces, water or feed. Other sources for potential contamination include manure runoff from cow herd, sharing pasture or water with mature cattle, accidental contamination of any feed, water or pen surfaces from mature cattle, equipment, traffic splatter or people.

Risk Factor	Scoring Guidelines	Level	Score
		Lowest Moderate Highest	0-1 2-3 4-5
		Lowest Moderate Highest	0-1 2-3 4-5
		Lowest Moderate Highest	0-1 2-3 4-5
		Lowest Moderate Highest	0-1 2-3 4-5

F. Additions and Replacement Group - Beef

Animals acquired from outside sources may pose a significant risk for many diseases including Johne's disease. Preventing entrance of pathogens into a herd is a primary biosecurity objective of the management plan. The maximum score for this risk is high because of its potential to introduce a new or maintain an existing pathogen load in the herd. The assessment is based on the source and number of animals that enter the herd or location.

Additions / Replacements
<p>Additions/Replacements include bulls, ET recipients, non-dairy cattle and small ruminant additions on the property.</p> <p>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/replacements from outside sources during the next 12 months.</p> <p>If a herd is truly closed, this area is given a score of "0." Maximum score allowed is 60. If greater than 60, only assign 60 points as a risk score for this area.</p>
Sources of Additions and Replacements

Summarize Risk Assessment

A summary table is provided in the beef handbook for assistance in comparing risk scores between different management areas. Filling out the table is optional but highly recommended.

Step 4: Consider how Johne's disease management efforts will benefit and integrate with other health and performance issues

Management efforts against Johne's disease are often doubly justified because they can be coordinated with and targeted to produce results or improvements in other herd health or management priority areas. Plan how to capitalize on practices that also increase commitment to and return on the producer's overall biosecurity efforts. Include these in the comments section of your management recommendations.

Dairy herd management effort examples:

Calving Area

- Removing calves immediately after birth will increase opportunity to observe other dams in labor and decrease dystocia cases.
- Removing calves immediately after birth will reduce their risk for fecal-oral diseases. Improving sanitation in the calving area will reduce risk for environmental mastitis and metritis.

Pre-weaned and young calves

- Feeding pasteurized milk may improve calf weight gains and decrease morbidity rates.
- Minimizing fecal contamination of feed and water for young calves reduces their disease risk.

Cows and first-calf heifers

- More frequent observations of cows and heifers in or near labor (for early calf removal) allows early detection of periparturient diseases.

Beef herd management effort examples:

Calving area


- Keeping cattle density in calving area low might improve labor observations, decrease dystocia cases and reduce disease risk for newborn calves.
- Moving cow/calf pairs to less crowded area immediately will reduce the risk of newborn calf diseases as well.

Nursing calves

- Continuing to monitor and control manure contamination of feed and water for suckling calves will reduce the risk for other calf diseases.

Cows and first-calf heifers

- More frequent observations of first-calf heifers in or near labor (for quick new-pair removal) allows early detection of periparturient diseases.



Step 5: Select critical management practices (CMP) to include in the management plan

See the dairy and beef handbooks for information to be included and for plan format. This step should be completed for the Management and Herd Testing Components.

Consider owner's objectives

The objectives should reflect owner's goals and the relative impact of Johne's disease on the herd. These objectives are the basis for determining the elements of the management plan and whether a testing strategy (and what type) might be desired to meet them. Short and longer term objectives, achievable with given management and resources and a realistic time frame, should be considered. They can start simple and be modified with time. They should be measurable, such as determine status of herd, establish test-negative status, reduce the number of animals that have positive tests in the herd, reducing the number of

- Manage pasture to minimize calf exposure to manure-contaminated forage in beef herds.
- On dairies, minimize manure transfer from cows to calves, i.e., feed calves first, separate equipment, clean boots, etc.
- Minimize manure exposure from Johne's disease-suspect cows to calves in beef herds.

C. Weaned heifers and retained yearling bulls

- Management objectives:** To prevent exposure to infective animals and manure and prevent contamination of feed and water.
- Suggested practices:**
 - Do not co-mingle or allow direct contact with mature cattle or their manure.
 - Prevent manure drainage from cow to young stock areas.
 - Do not use common feeding areas or water sources for cows and young stock.
 - Use separate equipment to handle feed and manure.
 - Design and maintain feed and water to prevent manure contamination.
 - Avoid traffic from cow areas to young stock.
 - Do not feed refused cow rations to this group.

D. Mature cattle

- Management objectives:** To eliminate high-risk animals; manage test-positive animals to reduce risk of exposing susceptible young stock.
- Suggested practices:**
 - Segregate, test and cull all animals with clinical signs of Johne's disease as soon as possible.
 - Manage asymptomatic animals with positive Johne's disease test to reduce premises contamination.
 - Cull when economically feasible.
 - Consider removing offspring from cattle with positive Johne's disease fecal culture results.

E. Acquired animals

- Management objectives:** To not purchase or bring back Johne's disease infected cattle.
- Suggested practices:**
 - Know identity, health history and hygiene of herd(s) of origin.
 - Evaluate Johne's disease risk in other species besides cattle, such as goats and sheep.
 - Investigate any known Johne's disease history, clinical case rate/yr, Johne's disease testing results in herd(s) of origin.
 - Avoid buying animals from herd with Johne's disease risk higher than your herd.
 - Test acquired animals (pre or post-purchase depending on age); integrate into home prevention plan.
 - Do not buy or retain cattle with positive Johne's disease fecal culture results.
 - Segregate and/or prevent contact with young stock until test status is known.

F. Herd testing

- Management objectives:** To determine presence and/or prevalence of disease; identify infected animals; monitor progress of herd management plan.
- Suggested practices:**
 - Do target testing to determine status.
 - Test suspects to know status and track clinical cull rate.
 - Accumulate herd test data, assess prevalence, target high risk cattle and control efforts.
 - Use routine timely testing schemes to provide current results for control management decisions and stimulate Johne's disease awareness and prevention activity.
 - Use results as part of a management plan.

Elements of Herd Plans for Different Objectives

The aggressiveness of the plan depends on owner goals, prevalence, transmission risks and time frame. Testing strategy depends on Johne's disease prevalence, plan objectives and management capabilities.

Elements of Herd Plans for Different Objectives			
Suggested Objectives	Preventive Management <ul style="list-style-type: none">• Initially investigate herd status• Minimize existing risks• Maintain prevalence• Minimize/manage introduced infection	Control <ul style="list-style-type: none">• Reduce prevalence• Reduce clinical disease to <2%• Reduce premises contamination	Reduce or Eliminate <ul style="list-style-type: none">• Achieve low prevalence• No clinical disease• Eliminate infection• Thorough CMP implementation• Minimal time to reduce/eliminate
Test Choice and Strategy	<ul style="list-style-type: none">• Lower sensitivity, less costly test• Initial mature herd screen• Partial herd (high risk animals)• Monitor clinical suspects	<ul style="list-style-type: none">• 1-2 x/yr >20-24 months of age• Serology w/ selected fecal culture follow-up• Test subgroups (>5 years old)• Whole herd or partial herd• Time results to manage risks at calving• Test clinical suspects early	<ul style="list-style-type: none">• 1-3 X/yr > 18-24 months of age• Whole herd regular intervals• Multiple tests• Maximize sensitivity & specificity• Time results to manage risks at calving• Test clinical suspects early
Test Result Use: Cull	<ul style="list-style-type: none">• Clinical suspects	<ul style="list-style-type: none">• Clinical suspects immediately• Prioritize subclinical animals by test result and performance• Consider culling offspring of clinical dams	<ul style="list-style-type: none">• Clinical suspects immediately-segregate until leave• Subclinical animals before advance disease• Consider culling offspring of clinical dams
Test Result Use: Manage Animals with Positive Tests		<ul style="list-style-type: none">• Identify• Segregate or group• Do not breed higher risk animals	<ul style="list-style-type: none">• Consider not raising replacements until low prevalence• Other actions more aggressive than moderate• Single animal calving pens.
Coordinate with Other Management Priorities			





Step 7: Do a reality check. Will the plan work? Plan to monitor it.

This step should be completed for the Management and Herd Testing Components.

As the plan outline comes together make sure to perform a reality check to confirm there is agreement on the elements and how they will be implemented. It is expected to evolve with time.

An appropriate plan should pass the following criteria:

- a. Strategy should be comprehensive and effective enough to meet management goals.
- b. Plan should take current Johne's disease prevalence estimate into account for setting realistic goals.
- c. It should be practical and feasible to implement. It may be implemented in phases.
- d. It is integrated with other farm management priorities and available resources.
- e. The plan is in line with farm's short and long term business objectives.

Plans help change the way things are done and must be monitored on a regular basis. Agree to routinely review and evaluate the plan, identify problems and adjust as needed.

- a. Evaluate implementation and effectiveness on a timely and regular basis, i.e. monthly or seasonal checklist reviewed by team and veterinarian.
- b. Identify areas not working; re-evaluate and modify as appropriate.

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This handbook is an evolution from previous editions of Veterinary Manuals used to complete Johne's disease risk assessments and develop management plans in cattle herds for the Voluntary Bovine Johne's Disease Control Program.

The First Editions of the Dairy and Beef Herd Manuals were designed and edited by:
C.A. Rossiter Burhans, Poulin Grain Inc., Newport, Vt.
D. Hansen, Oregon State University
L. J. Hutchinson, The Pennsylvania State University
R. H. Whitlock, University of Pennsylvania

The Second Edition of the Dairy and Beef Herd Manuals were designed and edited by:
C.A. Rossiter Burhans, Poulin Grain Inc., Newport, Vt.
D. Hansen, Oregon State University
R. H. Whitlock, University of Pennsylvania
S. Wells, University of Minnesota
Centers for Epidemiology and Animal Health, NAHMS Staff

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Don Hansen, Oregon State University (Chair)
Christine Rossiter Burhans, Poulin Grain, Inc., Newport, Vt.
Michael Carter, National Johne's Disease Program Coordinator, USDA/APHIS/VS
Michael Dalrymple, USDA/APHIS/VS, CEAH
Karen Jordan, Private Practice, Silver City, N.C.
Pepi Leids, Field Veterinarian, NYS Division Animal Industry, New York
Brian McCluskey, USDA/APHIS/VS, CEAH
Brad Peterson, District Veterinarian, Board of Agriculture, Minnesota
Allen Roussel, CVM, Texas A & M University

The Fourth Edition 2011 was designed, edited and reviewed by:
Dean Goeldner, National Johne's Disease Program Coordinator, USDA/APHIS/VS
Michael Carter, Assistant Director for Ruminant Health Programs, USDA/APHIS/VS
Elisabeth Patton, Chair of USAHA Committee on Johne's Disease, Wisconsin Dept. of Agriculture, Trade and Consumer Protection, Animal Health Division
Randy Wheeler, Vice Chair of USAHA Committee on Johne's Disease, Iowa Department of Agriculture & Land Stewardship
Gretchen M. May, Wisconsin Dept. of Agriculture, Trade and Consumer Protection, Animal Health Division
Teres Lambert, National Johne's Disease Education Initiative