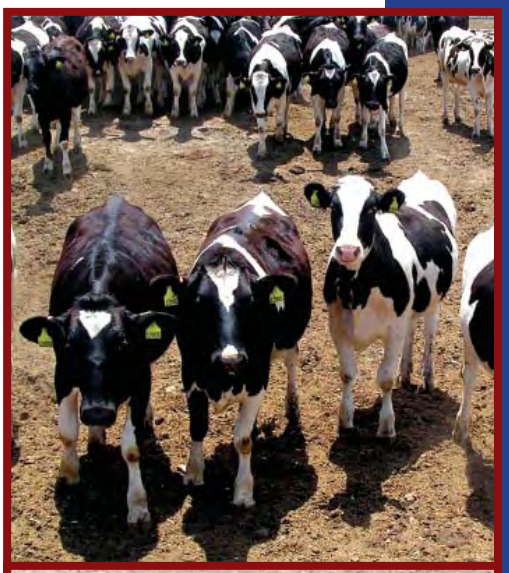
How to Do Risk Assessments and Develop Management Plans for Johne's Disease

(Fourth Edition, 2011)

A veterinary instructional handbook used for cattle herds in the Voluntary Bovine Johne's Disease Control Program to improve biosecurity and reduce pathogens.



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Preface

On September 1, 2010, the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services issued an updated "Uniform Program Standards for the Voluntary Bovine Johne's Disease Control Program." The Program was developed in conjunction with the National Johne's Disease Working Group (a subcommittee of the Johne's Disease Committee of the United States Animal Health Association). The Uniform Program Standards for the Voluntary Bovine Johne's Disease Control Program is to be administered by the State and supported by Industry and the Federal government.

The objective of the Uniform Program Standards for the Voluntary Bovine Johne's Disease Control Program is to provide minimum national standards for the control of Johne's disease.

The Program consists of three basic components:

1. Education – To inform producers about the cost of Johne's disease and to provide information about management strategies to prevent, control and eliminate it;
2. Management – To work with producers to establish good management strategies on their farms;
3. Herd Testing and Classification – To help determine and demonstrate the level of risk of Johne's disease based upon the level of infection identified through testing.

The Management Component

Producers may participate in the management component as an intermediate step in the Program. The following elements must be completed to the satisfaction of each State's Designated Johne's Coordinator (DJC):

- ***Risk Assessment.*** Before developing a herd management plan, a risk assessment must be conducted to identify management practices that allow *M. paratuberculosis* to spread throughout the herd.
- ***Herd Management Plan***. A Johne's disease certified veterinarian or an animal health official, in conjunction with the herd owner, will develop a herd management plan to prevent the introduction of Johne's disease into the herd and to reduce transmission of the disease among animals within the herd. Methods to control risk factors identified in the risk assessment should be included in the herd management plan.
- ***Renewal.*** To continue in the Program, a herd owner and Johne's disease certified veterinarian must repeat the risk assessment and make appropriate changes to the herd management plan every three years.
- A copy of the management plan and risk assessment must be submitted to the DJC for final approval.

Herd Testing, Classification Component

The purpose of **testing** is to determine infection status of a herd or animal. The purpose of **classification** is to identify herds with a low prevalence of Johne's disease. After initial testing, herds will be classified according to testing results. Herds enrolling in the herd testing and classification component must have completed a risk assessment and developed a herd management plan using the guidelines described in the management component.

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.

Table of Contents

How to Conduct Risk Assessments, Develop Management Plans ***Page 4***

Steps for Developing the Plan ***Page 5***

Step 1: Collect information on current herd health status and production ***Page 5***

Step 2: Collect history, owner goals and biosecurity data and estimate Johne's disease prevalence ***Pages 5-6***

Step 3: Assess risks for transmitting Johne's disease among specific animal groups ***Page 6***

Descriptive Guidelines for Scoring Risk Factors for Dairy Herds ***Pages 7-12***

Descriptive Guidelines for Scoring Risk Factors for Beef Herds ***Pages 13-16***

Step 4: Consider how Johne's disease management efforts will benefit and integrate with other health and performance issues ***Page 17***

Step 5: Select critical management practices to include in the management plan ***Pages 18-20***

Step 6: Build the elements of a testing strategy ***Page 21***

Step 7: Do a reality check. Will the plan work? Plan to monitor it. ***Page 22***

Acknowledgements ***Page 23***

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.

Steps for Developing the Plan

The following steps are recommended for conducting risk assessments at an enterprise and developing an individual comprehensive management plan.

Information and data gathering requirements for dairies are provided in the “Handbook for Veterinarians and Dairy Producers” while information and data gathering requirements for beef businesses are provided in the “Handbook for Veterinarians and Beef Producers.”

The guidelines are designed to be used for completing the risk assessment and herd plan in a standard manner. Copies of specific pages or similar information can be sent to the State Designated Johne’s Coordinator (DJC) after completion as requested. Contact your DJC for specific instructions about which pages or information to send.

Step 1: Collect information on current herd health status and production

The first page of the dairy and beef handbooks allows you to collect specific information and data regarding a herd. This step is optional for the Management and Herd Testing Elements.

Collecting and considering the information about a herd’s current health status and owner’s concerns is optional, but it is highly recommended for the following reasons:

1. It will enhance the veterinarian’s understanding of the operation.
2. It provides the veterinarian an opportunity to remark on the potential impact of subclinical and clinical Johne’s disease infections on the incidence of other herd diseases (e.g., metritis, foot rot, etc.).
3. When drafting the Johne’s disease management plan, information collected in this step offers the veterinarian an opportunity to tie certain management practices, directed at controlling or preventing Johne’s disease, back to address some of the owner concerns and existing practices.
4. Current herd health information is important to consider before writing the herd plan because some of the herd’s performance limiting health issues may be principal to the sustainability of the business.

Step 2: Collect history, owner goals and biosecurity data and estimate Johne's disease prevalence

The dairy and beef handbooks' section related to specific information and data collection should be completed for the Management and Herd Testing Elements.

This step allows you to collect basic information about the herd inventory and biosecurity practices. It encourages the producer to articulate major goals for their operation, such as changes in herd size or facilities, management, environmental issues, product quality, etc. Goals dictate what is important to the owner and influence future commitment to any management plan. Biosecurity questions may reveal practices that can be addressed in the final plan to maintain or enhance herd protection from disease.

Information about the herd’s history with and potential exposure to Johne’s disease should be collected. This data could provide useful benchmarks from which to consider the potential impact of Johne’s disease on business profitability and to evaluate changes and progress over time. The quality of the information available can range from accurate written records to personal recall. An assessor will need to take the quality factor into account when applying information to the operation and 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 confidence the assessor has in the client and need to conserve time, Pages 1 and 2 of the dairy or beef handbook can be sent to the client to fill out in advance of the scheduled visit.*

Step 3: Assess risks for transmitting Johne's disease among specific animal groups

The dairy and beef handbooks include sections regarding risk factors and risk score values. This step should be completed for the Management and Herd Testing Elements.

This is a basic requirement for the management and herd testing elements of the Program. The object is to conduct an assessment of the management practices or conditions that promote the risk for spread of Johne's disease and other fecal-oral and colostrum-milk transmitted pathogens. Potential risk factors for the major management areas are listed on pages 3 through 5 of the dairy and beef handbooks. They begin with the maternity area and follow a calf's development to mature cow or bull. They also assess disease risk from herd additions. The listed management practices or risk factors are believed to promote fecal-oral and colostrum-milk transmission of pathogens in particular, but other infections may be transmitted by the same management conditions.

Assessors should consider all factors in each management area.

Scoring risks is a subjective process that is based on the observer's experience and knowledge of disease transmission and Johne's disease epidemiology. As knowledge and experience increase so does the thoroughness of an assessment.

The intended procedure is for both veterinarian and producer to score the risk for each factor listed in each management area independently. Then discuss results and reach agreement on values. Mutual agreement on the importance of risk factors will help establish priorities for the management plan. Identifying each management area's risks and the overall area's estimated risk for transmitting Johne's disease is an important step in designing a herd plan that is effective and realistic to implement. Consider the estimated Johne's disease prevalence in the assessment of management areas. The risk of infection spread in a low prevalence herd may be very different from risk in a high prevalence herd.

Please note that the maximum scores for the specific animal environments have been weighted from the youngest age group to oldest. This weighted score is artificial, but intentional. Since the young are more susceptible to infection, the authors wanted the raw score in those areas to be markedly higher than raw scores for older animals. Suggested guidelines for scoring are provided in the tables below.

To better understand the degree of Johne's disease infection in the current mature herd, it is also important to recognize where current management conditions have changed from the past. For example, if maternity management has changed in the last two years, mature cows that recently developed clinical disease or tested positive were likely raised under different management circumstances, with potentially different exposures.

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 Factor	Scoring Guidelines	Risk Level	Risk 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

D. Bred Heifer Group - Dairy

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 heifer 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.

	Bred Heifers		Risk	
	Risk Factor	Scoring Guidelines	Level	Score
1.	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
2.	Can bred 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 2-3 4-5
3.	Can bred 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 2-3 4-5
4.	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
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

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

F. Additions and Replacement Group - Dairy

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 farm location.

Additions / Replacements

Additions/Replacements include bulls, ET recipients, 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/replacements from outside sources during the next 12 months.

If a herd is truly closed, this area is given a score of "0." Maximum score allowed is 60. If greater then 60, only assign 60 points as a risk score for this area.

Sources of Additions and Replacements Circle the number in each row that reflects management in the past 12 months. Include ET recipients and bulls.	**Number of Animals**				
	1-5	**6-12**	**13-20**	**21-50**	**>50**
1. Get additions or replacements from Level 3-6 classified herds	0	2	4	6	8
2. Get additions or replacements from Level 1-2 classified herds	10	11	12	13	14
3. From single source non-tested or non-program herds	20	22	23	26	28
4. From multiple sources non-tested or non-program herds or markets	30	34	36	38	40

Summarize Risk Assessment

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

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			Risk	
	Risk Factor	Scoring Guidelines	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			Risk	
	Risk Factor	Scoring Guidelines	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

C. Weaned Calves Group – Beef

The age of this group may extend to 16 months. The score values are less than younger calves but higher than bred heifers, yearling bulls 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.

Weaned Calves			Risk	
	Risk Factor	Scoring Guidelines	Level	Score
1.	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.	Lowest Moderate Highest	0-1 3-4 6-7
2.	Is it possible for manure from mature cattle to contaminate the feed?	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.	Is it possible for manure from mature cattle to contaminate water sources?	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 or young bulls share pasture with mature cattle?	Never to rarely. Occasionally. Frequently or always.	Lowest Moderate Highest	0-1 3-4 6-7
5.	Is manure spread on forage then fed to heifers or young bulls?	Never to rarely. Occasionally. Frequently or always.	Lowest Moderate Highest	0-1 3-4 6-7

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.

	Bred Heifers and Yearling Bulls Risk Factor	Scoring Guidelines	Risk Level	Score
1.	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.	Lowest Moderate Highest	0-1 2-3 4-5
2.	Is it possible for manure from mature cattle to contaminate the feed?	Never or **very** rarely occurs. Yes. May occur occasionally. Yes. Frequently and/or from multiple sources.	Lowest Moderate Highest	0-1 2-3 4-5
3.	Is it possible for manure from mature cattle to contaminate the water?	Never or **very** rarely occurs. Yes. May occur occasionally. Yes. Frequently and/or from multiple sources.	Lowest Moderate Highest	0-1 2-3 4-5
4.	Do bred heifers or yearling bulls share pasture with mature cattle any time?	Never to rarely. Occasionally. Frequently or always.	Lowest Moderate Highest	0-1 2-3 4-5
5.	Is manure spread on forage then fed to bred heifers or yearling bulls?	Never to rarely. Occasionally. Frequently or always.	Lowest Moderate Highest	0-1 2-3 4-5

E. Adult Animal Group - Beef

Even though cattle over 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, water from other mature cattle, equipment, traffic splatter or people.

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

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

Additions/Replacements include bulls, ET recipients, 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/replacements from outside sources during the next 12 months.

If a herd is truly closed, this area is given a score of "0." Maximum score allowed is 60. If greater then 60, only assign 60 points as a risk score for this area.

Sources of Additions and Replacements Circle the number in each row that reflects management in the past 12 months. Include ET recipients and bulls.	**Number of Animals**				
	1-5	**6-12**	**13-20**	**21-50**	**>50**
1. Get additions or replacements from Level 3-6 classified herds	0	2	4	6	8
2. Get additions or replacements from Level 1-2 classified herds	10	11	12	13	14
3. From single source non-tested or non-program herds	20	22	23	26	28
4. From multiple sources non-tested or non-program herds or markets	30	34	36	38	40

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 managament 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 clinical cases to 1% within 3 years. The table "Elements of herd plans for different objectives," on page 20 of this handbook, has suggestions for least, moderate and most aggressive objectives and plans.

Components of the Plan
Pages 6 and 7 in the dairy and beef handbooks may be used to indicate management practices to which the producer can commit to reduce the risk of Johne's disease. Space is provided to add recommended practices not already listed. Management actions are prioritized based on the Johne's disease prevalence, risk assessment results, objectives, other health and management priorities and available resources.

Recommendations for management practices that will reduce or eliminate the risk for Johne's disease in most areas of production are outlined below and on the next page. A review of these suggestions should help the process of prioritizing and deciding specific elements to include in the herd plan.

Management applying specifically to dairy or beef herds is noted.

A. Calving area

a. **Management objectives:** To keep it clean and dry.

b. **Suggested practices to achieve objectives:**

1. For inside area:
   - Use area for calving only.
   - Use single-animal pens; assure adequate size area.
   - Always have adequate dry bedding.
   - Remove manure and wet bedding after each use.
2. For outside calving areas:
   - Use adequate area and monitor use to minimize mud and manure accumulation.
3. For both: Clean udders and bellies after assisted births or whenever possible in beef herds. Clip and clean udders before calving and remove calves immediately in dairy herds.

B. Pre-weaned and nursing calves

a. **Management objectives:** To avoid contact with infectious material or environments.

b. **Suggested practices:**

- Use colostrum from Johne's disease test-negative or low-risk cows as applicable to breed.
- Prevent manure contamination of feed and water.
- Feed milk replacer or pasteurized milk in dairy herds.

- 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

a. **Management objectives:** To prevent exposure to infective animals and manure and prevent contamination of feed and water.

b. **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

a. **Management objectives:** To eliminate high-risk animals; manage test-positive animals to reduce risk of exposing susceptible young stock.

b. **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

a. **Management objectives:** To not purchase or bring back Johne's disease infected cattle.

b. **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**

a. **Management objectives**: To determine presence and/or prevalence of disease; identify infected animals; monitor progress of herd management plan.

b. **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.

Control Plan Components	Level of Aggressiveness Desired for Herd Plan Design		
	Least Aggressive	Moderately Aggressive	Most Aggressive
Suggested Objectives	**Preventive Management** • Initially investigate herd status • Minimize existing risks • Maintain prevalence • Minimize/manage introduced infection	**Control** • Reduce prevalence • Reduce clinical disease to <2% • Reduce premises contamination	**Reduce or Eliminate** • Achieve low prevalence • No clinical disease • Eliminate infection • Thorough CMP implementation • Minimal time to reduce/eliminate
Test Choice and Strategy	• Lower sensitivity, less costly test • Initial mature herd screen • Partial herd (high risk animals) • Monitor clinical suspects	• 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	• 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*	• Clinical suspects • High-risk animals with positive test	• Clinical suspects immediately • Prioritize subclinical animals by test result and performance • Consider culling offspring of clinical dams	• 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*	• Monitor for clinical signs • Use as one culling criteria	• Identify • Segregate or group • Do not breed higher risk animals	• Consider not raising replacements until low prevalence • Other actions more aggressive than moderate • Single animal calving pens.
Management in Dairy Herds	• Prevent overcrowded calving areas • Clean, dry, good sanitation • Remove newborn calves ASAP • Prevent young stock contact with adults and manure • Minimize manure contamination of feed and water, especially for young stock	• Keep calving area density low • Clean and dry, good sanitation • Remove newborns immediately • Separate immature from adults with barriers or buffers • Feed low-risk colostrum and milk or milk replacer • Eliminate manure contamination of feed, water and equipment used for young stock	• Raise all replacements or acquire from low-risk source • Superior calving management and sanitation • Feed colostrum from test-negative animals to offspring of test-positives, if raised • Feed replacer or milk from negative cows only • Other management actions same as for moderate but monitored more frequently
Management in Beef Herds	• Prevent overcrowded calving areas • Clean, dry, good sanitation • Prevent weaned stock from contact with adults' manure • Minimize manure contamination of feed and water, especially for young stock	• Keep calving area density low • Clean and dry, good sanitation • Separate weaned stock from adults with barriers or buffers • Eliminate manure contamination of feed, water & feed equipment used for young stock	• Raise all replacements or acquire from low-risk source • Superior calving management and sanitation • Other management actions same as for moderate but monitored more frequently
Coordinate with Other Management Priorities	• Improve general management in priority areas: late gestation cows, calving, heifers, nutrition, etc.	• Focus management to improve performance in related areas: pregnant cow nutrition, calving ease, developing heifers and bulls, etc.	• Optimize management to improve performance in related areas: pregnant cow nutrition, calving ease, developing heifers and bulls, etc.

Step 6: Build the elements of a testing strategy

Testing strategy

Tests for Johne's disease are tools and must work within a management plan to be useful. Thus, producer and veterinarian should develop and begin implementing the management strategy before doing much testing. Testing without a plan and an understanding of how to use results can cause confusion and waste time and money. The key elements to consider in choosing a strategy are listed below.

Decide how to handle the following issues before testing.

1. What is the testing scheme expected to accomplish and how will it help achieve farm and plan objectives?
    a. A common objective for initial testing is finding out if Johne's disease is in the herd.
    b. Common objectives for more advanced schemes include: timely identification of infected animals to manage or cull, screen a herd to determine risk for purchasing replacements and more thorough assessment of prevalence and/or herd status.
    c. Consider the ethical and liability implications in case a positive diagnosis is made.
2. What cattle will be tested and when?
    a. Testing should be timed for immediate management (control) decisions.
    b. Useful initial testing strategies might include:
        i. Target groups, i.e., cattle at higher risk of being exposed or infected, beef cattle between 3 and 6 years old, Johne's disease suspects, acquired cattle, etc.
        ii. 60 (or more) older cattle at random to assess herd risk.
    c. Useful strategies for control might include a whole herd or statistical sample at pregnancy check time or dairy cattle as they reach 150-160 days pregnant. Results are ready for critical management decisions at calving or breeding time.
3. What decisions will be made based on test results?
    a. Herd level decisions such as establish herd-status or assess prevalence.
    b. Management or control decisions on individuals:
        i. Determine high risk and lower risk cattle (often based on multiple test results).
        ii. Control decisions such as segregate or cull ASAP, do not breed, withhold colostrum and milk from calves, keep out of maternity area, etc.

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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