

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



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

This handbook has been approved for distribution and use by the National Johne's Working Group a subcommittee of the United States Animal Health Association, Johne's Committee

Preface

In April 2002, the Federal Government issued a document entitled, "Uniform Program Standards for the Voluntary Bovine Johne's Disease Control Program." The Program was developed in conjunction with the National Johne's Working Group, a subcommittee of the Johne's Committee of the United States Animal Health Association. The Program was approved by the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services. The Program is to be administered by the State and supported by Industry and the Federal government.

The objective of this Program is to provide minimum national standards for the control of Johne's disease (JD). The Program consists of three basic elements:

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 separate test-positive herds from test-negative herds.

The management element

Producers may participate in the management element as an intermediate step in the Program. The following components 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 of management practices that allow *M. paratuberculosis* to spread throughout the herd.
- Herd Management Plan. A Johne's certified veterinarian or an animal health official, in conjunction with the herd owner, will develop a herd management plan to prevent the introduction of JD 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 certified veterinarian must annually repeat the risk assessment and make appropriate changes to the herd management plan.
- A copy of the management plan and risk assessment must be submitted to the DJC for final approval.

Required information for a risk assessment and management plan were contained in the manual entitled, "Johne's Disease, a Plan for Pathogen Reduction: Manual for Veterinarians: 1st Edition."

Herd testing and classification element

The purpose of this element is to publicly recognize producers in the Program for putting approved management practices and plans into place, as well as for separating test-negative herds from test-positive herds. Herds at this stage will continue undergoing herd risk assessments and be subject to herd management plans that were developed under the management element. After initial testing, participating herds may enroll in either the test-positive or test-negative component of this element according to the test results. Herds enrolling in the herd testing and classification element must have completed a risk assessment and developed a herd management plan using the guidelines described in the management element.

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 that will guide them in performing risk assessments and completing herd plans for the Voluntary Johne's Disease Program. They 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 Johne's Disease 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 Third 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 two smaller handbooks; an instructional booklet explaining how to complete a risk assessment and management plan entitled, "How to Do Risk Assessments and Management Plans for Johne's Disease" and two information collection documents entitled, "Handbook for Veterinarians and Dairy Producers" and "Handbook for Veterinarians and Beef Producers."

The "Handbooks" contain the minimum information and data required for Program participation. State DJCs are allowed to modify the format used to collect information to fit the needs of their state.

How to do risk assessments and 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 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 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 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 assessing an operation and developing a standard comprehensive management plan.

Information and data gathering requirements are provided in the booklets entitled, "Handbook for Veterinarians and Dairy Producers" and "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.

See page 1 in dairy and beef handbooks for essential information and data collection.

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 JD infections on the incidence of other herd diseases (e.g., metritis, foot rot, etc.).
3. When drafting the Johne's management plan, information collected in this step offers the veterinarian an opportunity to tie certain management practices, directed at controlling or preventing Johne's, back to address some of the owner concerns and existing practices discovered by filling out page 1 in the guideline handbook.
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 herd information, owner goals and biosecurity data.

See page 2 in dairy and beef handbooks for essential questions and data collection.

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

This step is to collect basic information about the herd inventory, available human resources and some biosecurity practices. It also 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.

Step 3. Begin the risk assessment - Collect history and estimate Johne's prevalence.

See page 3 in the dairy and beef handbooks for essential questions and data collection.

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

The risk assessment begins by collecting information about the herd's history with and potential exposure to Johne's disease. 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 vague personal recall. An assessor will need to take the quality factor into account when applying information to the operation and plan. The initial visit can focus on the big picture, i.e., note recent JD cases and fill in specific details like animal ID, exact date of onset and age at a later time.

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 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 on the bottom of page 3 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, 2, and 3 of the dairy or beef handbook can be sent to the client to fill out in advance of the scheduled visit to finish the risk assessment and herd plan.*

Step 4. Assess risks for transmitting Johne's among specific animal groups.

See pages 4 - 6 in dairy and beef handbooks for essential 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 and other fecal-oral and colostrum-milk transmitted pathogens. Potential risk factors for the major management areas are listed on pages 4 through 6. They begin with the maternity area and follow a calf's development to bred heifer. 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 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 is an important step in designing a herd plan that is effective and realistic to implement. *Consider the estimated JD 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 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 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* ss *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.

Risk Factors	Scoring guidelines
Is the area used for more than one calving cow at a time?	Lowest risk = single pen use (0-1). Moderate risk = general maternity area with moderate cow concentration (4-6). Highest risk = very crowded maternity area used by all cows (8-10).
Does manure build-up in the calving area pose a risk for calf ingestion?	Lowest risk = area always clean and dry (0-1). Moderate risk = area has little manure visible to area more manure-free than manure-contaminated (4-6). Highest risk = area is more manure-contaminated than manure-free to extensive manure contamination (8-10)
Are sick cows kept in the calving area?	Lowest risk = almost never (0-1). Moderate risk = hospital pen adjacent to maternity area (4-6). Highest risk = sick cows are in maternity area (8-10).
Are high risk / JD clinical and suspects in calving area?	Lowest risk = almost never (0-1). Moderate risk = low risk suspects in maternity area (4-6). Highest risk = high risk / JD clinicals are in maternity area (8-10).
Are calving cow's udders soiled with manure?	Lowest risk = 90% of udders are clipped, clean and dry (0-1). Moderate risk = moderate amount of manure on udders of 20% - 40% of cows (4-6). Highest risk = udders are manure covered on a majority of cows (8-10).
Are calves born in other areas that hold cows, i.e., outside of calving area?	Lowest risk = almost never occurs (0-1). Moderate risk = occurs 15% to 25% of all calvings (4-6). Highest risk = occurs more than 40% of the time (8-10).
Do calves stay with their dams for >60 minutes?	Lowest risk = almost never (0-1). Moderate risk = most calves stay 1-4 hrs (4-6). Highest risk = most calves stay more than 6 hrs (8-10).
Are calves allowed to nurse their dams?	Lowest risk = almost never (0-1). Moderate risk = most calves stay 1-4 hrs (4-6). Highest risk = most calves stay more than 6 hrs (8-10).

B. Pre-weaned calf group 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 manure or MAP from mature cattle. 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.

Risk Factor	Scoring guidelines
Is colostrum pooled from multiple cows and fed to calves?	Lowest risk = never done or only from cows with several negative JD tests (0-1). Moderate risk = from cows with single negative JD test or from low risk group (4-6). Highest risk = from cows with unknown JD status in an infected herd (8-10).
Is colostrum fed from individual cows to calves?	Lowest risk = from likely JD negative dams to their own calves (0-1). Moderate risk = colostrum from single cow with negative test to several calves (4-6). Highest risk = from cows with unknown JD status fed to several calves (8-10).
Is unpasteurized milk pooled and fed to calves?	Lowest risk = from low risk cows (several neg. tests) (0-1). Moderate risk = from cows with one negative JD test (4-6). Highest risk = from cows with unknown JD status in an infected herd (8-10).
Can calf's colostrum and/or milk be contaminated with cow manure any time?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (4-6). Highest risk = frequently from many sources (8-10).
Can calf's feed or water be contaminated with cow manure any time?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (4-6). Highest risk = frequently from many sources (8-10).
Are calves able to come in contact with cows or cow manure in their housing?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (4-6). Highest risk = frequently or always (8-10).

C. Post-weaned heifer group 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 manure or MAP from mature cattle. 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.

Risk Factor	Scoring guidelines
Do heifers have contact with cows or their manure?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (3-5). Highest risk = frequently from many sources (6-7).
Is it possible for manure from cows to contaminate the feed?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (3-5). Highest risk = frequently from many sources (6-7).
Is it possible for manure from cows to contaminate heifer water sources?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (3-5). Highest risk = frequently from many sources (6-7).
Do heifers share pasture with mature cattle?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (3-5). Highest risk = frequently or always (6-7).
Is manure spread on pasture then used by or fed to heifers?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (3-5). Highest risk = frequently or always (6-7).

D. Bred heifer group This group of cattle is usually over 12 months of age and is believed to be substantially less susceptible to Johne's 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 manure or MAP from mature cattle. 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.

Risk Factor	Scoring guidelines
Do heifers have contact with cows or their manure?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (3). Highest risk = frequently from many sources (5).
Is it possible for manure from cows to contaminate the feed?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (3). Highest risk = frequently from many sources (5).
Is it possible for manure from cows to contaminate the water used by heifers?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (3). Highest risk = frequently from many sources (5).
Do heifers share pasture with mature cattle?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (3). Highest risk = frequently or always (5).
Is manure spread on pasture then used by or fed to heifers?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (3). Highest risk = frequently or always (5).

E. Cow group Even though cattle over 24 months of age are believed to be less susceptible to JD, 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.

Risk Factor	Scoring guidelines
Is it possible for feed to be contaminated with manure?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (2-3). Highest risk = frequently or always from many sources (4).
Is manure contamination of the water possible?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (2-3). Highest risk = frequently or always from many sources (4).
Do cows have access to accumulated or stored manure?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (2-3). Highest risk = frequently or always (4).
Is manure spread on pasture and grazed or fed the same season?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (2-3). Highest risk = frequently or always (4).

F. Additions and replacement group Animals acquired from outside sources may pose a significant risk for many diseases including Johne's. 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. The assessment for this policy is found on page 6 of the dairy handbook.

Summarize risk assessment and list most important factors A summary table is provided in the dairy handbook, page 6, for convenience and assistance in comparing risk scores between different management areas of risk. Filling it out is optional. The final step in the risk assessment is to list the most important factors identified by the assessment. Space is provided on page 7 in the dairy handbook. Listing them by importance will help prioritize which should be included in the management plan.

Descriptive guidelines for scoring risk factors for beef herds

A. Calving area 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* ss *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.

Risk Factors	Scoring guidelines
Is the area used for more than one calving cow at a time?	Lowest risk = single pen use (0-1). Moderate risk = general calving area (corral or pasture) with moderate cow concentration where calves are born (4-6). Highest risk = heavy cow concentration where calves are born (8-10).
Does manure build-up in the calving area pose a risk for calf ingestion?	Lowest risk = area always clean and dry (0-1). Moderate risk = area has fair amount of manure visible but more manure-free than manure-contaminated (4-6). Highest risk = area is more manure-covered than manure-free to extensive manure contamination (8-10).
Are calving cow's udders soiled with manure?	Lowest risk = 90% of udders are clean and dry (0-1). Moderate risk = moderate amount of manure on udders of 20% - 40% of cows (4-6). Highest risk = udders are manure covered on a majority of cows (8-10).
Are high risk / JD clinical and suspects in calving area?	Lowest risk = almost never (0-1). Moderate risk = low risk suspects in calving area (4-6). Highest risk = high risk / JD clinicals are in calving area (8-10).

B. Nursing calf group Risk factors for this group should be assessed for the potential of a calf to ingest manure or MAP from mature cattle. 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.

Risk Factor	Scoring guidelines
Are cow/calf pairs pastured with JD clinical or suspect cattle?	Lowest risk = never or rarely (0-1). Moderate risk = occasionally. Highest risk = frequently (8-10).
Does manure build up in the pasture posing a risk for calf ingestion?	Lowest risk = area always clean and dry (0-1). Moderate risk = area has little manure visible to area about 60% manure-free (4-6). Highest risk = area is < 50% manure-free to extensive manure contamination (8-10).
Can calf's water be contaminated with cow / bull manure any time?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (4-6). Highest risk = frequently from many sources (8-10).
Can calf's feed be contaminated with cow / bull manure any time?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (4-6). Highest risk = frequently or always (8-10).
Are sick calves kept with or near sick cows?	Lowest risk = almost never (0-1). Moderate risk = sick calf pen adjacent to sick cow pen (4-6). Highest risk = sick calves are penned with sick cows (8-10).

C. Weaned calves group 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 manure or MAP from mature cattle. Considerations include ground and pen surfaces, water or feed. Consider all sources.

Risk Factor	Scoring guidelines
Do weaned calves have contact with mature cattle or their manure?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (3-5). Highest risk = frequently from many sources (6-7).
Is it possible for manure from mature cattle to contaminate the feed?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (3-5). Highest risk = frequently from many sources (6-7).
Is it possible for manure from mature cattle to contaminate water sources?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (3-5). Highest risk = frequently from many sources (6-7).
Do heifers or young bulls share pasture with mature cattle?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (3-5). Highest risk = frequently or always (6-7).
Is manure spread on forage then fed to heifers or young bulls?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (3-5). Highest risk = frequently or always (6-7).

D. Bred heifer and yearling bull group This group of cattle is usually over 12 months of age and is believed to be substantially less susceptible to Johne's 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
Do heifers or yearling bull have contact with mature cattle or their manure?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (3). Highest risk = frequently from many sources (5).
Is it possible for manure from mature cattle to contaminate the feed?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (3). Highest risk = frequently from many sources (5).
Is it possible for manure from mature cattle to contaminate the water used by bred heifers or yearling bulls?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (3). Highest risk = frequently from many sources (5).
Do bred heifers or yearling bulls share pasture with mature cattle any time?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (3). Highest risk = frequently or always (5).
Is manure spread on forage then fed to bred heifers or yearling bulls?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (3). Highest risk = frequently or always (5).

E. Cow group Even though cattle over 24 months of age are believed to be less susceptible to JD, 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.

Risk Factor	Scoring guidelines
Is it possible for feed to be contaminated with manure?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (2-3). Highest risk = frequently or always from many sources (4).
Is manure contamination of the water possible?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally from a few sources (2-3). Highest risk = frequently or always from many sources (4).
Do cows have access to accumulated or stored manure?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (2-3). Highest risk = frequently or always (4).
Is manure spread on forage and grazed or fed the same season?	Lowest risk = never to rarely (0-1). Moderate risk = occasionally (2-3). Highest risk = frequently or always (4).

F. Additions and replacement group Animals acquired from outside sources may pose a significant risk for many diseases including Johne's. 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. The assessment for this operation policy is found on page 6 of the beef handbook.

Summarize risk assessment and list most important factors A summary table is provided in the beef handbook, page 6 for convenience and assistance in comparing risk scores between different management areas of risk. Filling it out is optional. The final step in the risk assessment is to list the most important factors identified by the assessment. Space is provided on page 7 of the beef handbook. Listing them by importance will help prioritize those to include in the final plan.

Step 5. Build the elements of a testing strategy.

See page 7 in dairy and beef handbooks for essential questions and data collection.

This step needed for the Management Element but is optional for the Herd Testing Element.

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. Collecting the information on page 7 in the dairy and beef handbook will help clarify how testing will be used to enhance management efforts and accomplish goals of the plan.

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 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 suspects, acquired cattle, etc.
 - ii. 30 (or more) older cattle at random to assess herd risk.
 - c. Useful strategies for control might include a whole herd or statistical sample at preg-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 include: Segregate or cull ASAP, do not breed, etc.

Step 6. Select critical management practices to include in the management plan

See page 7 in dairy and beef handbooks for information to be included and page 8 for plan format.

This step should be completed for the Management and Herd Testing Elements

Include owner's objectives The objectives should reflect owner's goals and the relative impact of Johne's 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 11 of this handbook, has suggestions for least, moderate and most aggressive objectives and plans.

Elements of the Plan Page 8 in the dairy and beef handbooks may be used to write out plan elements. Management actions are prioritized based on the JD 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: keep it clean and dry.*

b. *Suggested procedures 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: avoid contact with infectious material or environments.*

b. *Suggested procedures:*

- Use colostrum from JD-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, keep calves in separate facility or location from cows.
- On dairies, minimize manure transfer from cows to calves, i.e., feed calves first, separate equipment, clean boots, etc.
- Minimize manure exposure from JD-suspect cows to calves in beef herds.

C. Weaned heifers and retained yearling bulls

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

b. *Suggested procedures:*

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

b. *Suggested procedures:*

- Segregate, test and cull all animals with clinical signs of JD as soon as possible.
- Manage asymptomatic animals with positive JD test to reduce premise contamination.
- Cull when economically feasible.
- Consider removing offspring from cattle with positive Johne's fecal culture results.

E. Acquired animals

- a. *Management objectives: not to purchase or bring back Johne's infected cattle.*
- b. *Suggested procedures:*
 - Know identity, health history and hygiene of herd(s) of origin.
 - Evaluate Johne's risk in other species besides cattle, such as goats and sheep
 - Investigate any known JD history, clinical case rate/yr, JD testing results in herd(s) of origin.
 - Avoid buying animals from herd with JD 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 fecal culture results.
 - Segregate and/or prevent contact with young stock until test status is known.

F. Herd testing

- a. *Management objectives: determine presence and/or prevalence of disease; identify infected animals; monitor progress of herd management plan.*
- b. *Suggested procedures:*
 - 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 awareness and prevention activity.
 - Use results as part of a management plan.

Step 7. List how JD management efforts will benefit and integrate with other health and performance issues. Include on page 8, in the dairy and beef handbooks.
This step should be completed for the Management and Herd Testing Elements

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.

Some beef herd examples might be:

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 1st calf heifers

- More frequent observations of 1st calf heifers in or near labor (for quick new-pair removal) allows early detection of periparturient diseases.

Some dairy herd examples might be:

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 1st calf heifers

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

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 JD 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 premise 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 mos 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 mos 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 <i>positive</i> test	Clinical suspects immediately Prioritize subclinical animals by test result and performance criteria Consider culling offspring of clinical dams	Clinical suspects immediately, segregate until leave Subclinical animals before advanced disease Consider offspring of infected dams
Manage animals w. positive tests	Monitor for clinical signs Use as one culling criteria	Identify Segregate or group Do not breed higher risk animals	Consider not raising any replacements until low prevalence Other actions more aggressive than moderate Single animal calving pens
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
Management in dairy herds	Prevent overcrowded calving areas Clean, dry, good sanitation Remove newborn calves ASAP Prevent young stock contact with adults & manure Minimize manure contamination of feed and water, especially for young stock	Keep calving area density low Clean, dry, good sanitation Remove newborn calves immediately Separate immature from adults with barriers or buffers Feed low risk colostrum & milk, or milk replacer Eliminate manure contamination of feed, water & equipment used for young stock	Raise all replacements or acquire from low risk source Superior calving management. and sanitation Feed colostrum from test- <i>negative</i> animals to offspring of test- <i>positives</i> , if raised Feed replacer or milk from <i>negative</i> cows only Other management actions same as 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 8. Do a reality check. Will the plan work? Plan to monitor it.
This step should be completed for the Management and Herd Testing Elements.

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 JD prevalence estimate into account for setting realistic goals.
- c. It should be practical and feasible to implement. It may be implemented in phases.
- d. Integrated with other farm management priorities and available resources.
- e. 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.

Acknowledgements

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

The First Edition of the Dairy and Beef Herd Manuals were designed and edited by:

C. A. Rossiter Burhans, Poulin Grain Inc., Newport, Vermont
D. Hansen, Oregon State University
L. J. Hutchinson, The Pennsylvania State University
R. H. Whitlock, University of Pennsylvania

The Second Edition of the Dairy Herd Manual was designed and edited by

C. A. Rossiter Burhans, Poulin Grain Inc., Newport, Vermont
D. Hansen, Oregon State University
R. H. Whitlock, University of Pennsylvania
S. Wells, University of Minnesota
Centers for Epidemiology and Animal Health, NAHMS Staff

The Second Edition of the Beef Herd Manual was designed and edited by

C. A. Rossiter Burhans, Poulin Grain, Inc., Newport, Vermont
D. Hansen, Oregon State University
R. H. Whitlock, University of Pennsylvania
Centers for Epidemiology and Animal Health, NAHMS Staff

The Third Edition 2003 was designed, edited and reviewed by members of the USAHA Risk Assessment, Herd Management and Education Standards Task Force for the Voluntary Bovine Johne's Control Program. They were appointed by the Co-Chairs of the National Johne's Working Group as a subcommittee of the United States Animal Health Association.

Don Hansen, Oregon State University (Chair)

Members listed in alphabetical order

Christine Rossiter Burhans, Poulin Grain, Inc., Newport, Vermont
Michael Carter, National JD Program Coordinator, USDA, APHIS, VS
Michael Dalrymple, USDA, APHIS, VS, CEAH
Karen Jordan, Private Practice, Silver City, North Carolina
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