



# **Johne's Disease in Cattle Definitions and Guidelines**

**On behalf of the BJD Steering Committee**

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## BACKGROUND

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With the implementation of the BJD Framework – *A fresh approach to the management of JD in cattle* in July 2016, the previous *Bovine Johne's Disease Standard Definitions, Rules and Guidelines* (BJD SDR&Gs) were revoked. However, it was felt that the SDR&Gs contained useful information for technical advisors about the management of JD in cattle, and this has been captured in this reference document.

The document has been endorsed by the BJD Steering Committee.

Minor revisions were made in April 2017 for recommendations that were endorsed by Cattle Council of Australia.

## Acronyms and Abbreviations

AHC	Animal Health Committee
ANZSDPs	Australian and New Zealand Standard Diagnostic Procedures
CattleMAP	Australian Johne's Disease Market Assurance Program for Cattle
CVO	Chief Veterinary Officer
DNA	deoxyribonucleic acid
ELISA	enzyme-linked immunosorbent assay
HEC	Herd environmental culture
HT-J	High-throughput- Johne's
JD	Johne's disease
MAP	Market Assurance Program
Mptb	<i>Mycobacterium paratuberculosis</i>
NLIS	National Livestock Identification System
PCR	polymerase chain reaction

## DEFINITIONS

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### 1. **Johne's disease in cattle**

Johne's disease in cattle is an infection with *Mycobacterium paratuberculosis* (Mptb), regardless of strain type.

### 2. **Infected animal**

An infected animal is one confirmed as infected with Mptb by histopathological investigation or culture of faeces or tissues or other definitive tests conducted in accordance with the ANZSDPs for Johne's disease.

### 3. **Suspect animal**

An animal may be classified as suspect if it has:

- clinical signs consistent with a diagnosis of Johne's disease, which haven't been investigated
- gross post mortem lesions consistent with Johne's disease
- reacted to a screening test but has not been subject to a follow-up definitive test. See Section 11 for details on resolution of serological or HT-J reactors.

### 4. **Clinical Case**

An infected (or presumed infected in a known infected herd) animal with chronic diarrhoea and weight-loss that does not respond to treatment.

### 5. **High-risk animal**

An animal assessed as exposed to infection when age-susceptible.

### 6. **Low-risk animal**

An animal assessed as unlikely to have been exposed to infection when age-susceptible.

### 7. **Progeny**

Progeny is an animal physically born of a dam. A dam includes a surrogate mother (i.e. an embryo recipient) but excludes an embryo donor.

### 8. **Contaminated land**

Land, including yards, cattle sheds, loading ramps etc., that has been contaminated or likely to have been contaminated with the faeces of an infected animal or herd and which has not been decontaminated.

### 9. **Decontaminated land**

Contaminated land, which has been decontaminated according to the procedures described in section 7.

### 10. **Approved veterinarian**

A registered veterinarian who has completed the Approved Program for Australian Veterinarians course and has completed the approved Johne's disease MAP training program to the satisfaction of the CVO in the state or territory of primary registration.

### 11. **Approved laboratory**

A veterinary laboratory approved by the CVO to carry out diagnostic tests for the identification of Johne's disease in livestock.

## **12. Susceptible species**

Cattle, deer, goats, sheep and camelids are all considered to be susceptible to infection with Mptb. Sheep strain of Mptb preferentially infects sheep, but can also infect cattle and should be considered in areas where cattle co-graze with potentially infected sheep.

## **13. Susceptible animals**

Cattle are usually infected as calves and cattle over the age of 12 months are considered to be at low risk of becoming infected unless exposed to a high level of environmental contamination.

## **14. Herd**

A group of animals that is maintained as a separate and discrete unit, in terms of physical contact with other susceptible species, by an appropriate fence or barrier.

## **15. Suspect herd**

Suspect herd is where there is epidemiological evidence to suspect the presence of Mptb infection, such as where:

- a herd containing susceptible animals has been grazed on contaminated land, or
- there is evidence of contact with an infected herd or animals, or
- reactors have been detected but have not been investigated, or
- a herd contains animals with clinical signs consistent with Johne's disease that remain unresolved, or
- an infected animal has been introduced and there has been potential for transmission of infection. The slow rate of spread of infection may require resolution testing be deferred until suspected disease is established at detectable levels.

## **16. Infected herd**

An infected herd is one in which:

- an infected home-bred animal has been found, or
- an infected animal has been introduced and there is a high risk that age-susceptible animals have been exposed to infective doses of Mptb.

## **17. Chief Veterinary Officer**

The person appointed as the Chief Veterinary Officer or Chief Inspector of Stock or other equivalent title as the case may be under legislation for the control of animal disease in that state or territory, or the person having the delegated authority of that office.

## **18. Notification**

Advice by the owner or persons in charge of cattle and other susceptible species, meat inspectors, veterinarians or approved laboratories of infection or suspicion of infection with Mptb, to jurisdictions in accordance with the legislative requirements of the state or territory concerned. A producer may also advise clients of changed risk.

## **19. Reactor**

An animal which has a positive reaction to an approved screening test for Johne's disease.

## **20. Biosecurity plan**

A herd-specific management protocol for protecting a herd against the introduction or transmission of Mptb and other diseases.

**21. Screening test**

A test that is used, mainly on a large number of animals, to identify animals that are to be tested by a definitive test. An approved screening test may detect immunological or molecular evidence of infection.

**22. Definitive test**

A test that provides a definitive confirmation of Johne's disease infection (usually histology or culture).

## GUIDELINES

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### 1. Testing for Johne's disease

#### Performance of tests

Laboratory testing must be performed at an approved laboratory.

#### Reporting of tests

Laboratory interpretation and reporting of tests will be done according to the ANZSDPs.

Test results must be reported to the CVO for the relevant jurisdiction according to state laws.

Field interpretation and reporting of laboratory test results will take into account the epidemiological context of the sampling.

#### Retesting of reactors

Retesting of reactors with the same immunological test should **only** be considered:

- when the laboratory reports inconclusive results, or
- when a further sample is specifically requested by the laboratory, or
- when conducted in association with follow-up definitive testing of the reactor, or
- to clarify the identity of reactors, or
- as part of a test validation or quality assurance program.

#### Initial diagnosis

When an animal is being slaughtered to establish a diagnosis in a herd in which Johne's disease has not been previously confirmed, fixed and fresh tissues as specified in [Appendix 1](#) should be collected and submitted for laboratory examination. If Mptb infection is detected, strain typing may be undertaken, if considered relevant to enhance epidemiological interpretation.

### 2. Approved tests for Johne's disease in cattle

The approved laboratory tests for Johne's disease in cattle are immunology, histology, molecular biology and bacteriology.

#### Clinical examination

The assessment of the history and clinical features necessary to make a presumptive diagnosis or a possible differential diagnosis.

#### Post-mortem examination

The examination of a carcass for Johne's disease as prescribed in the [Appendix 1](#).

#### Histopathology examination

The microscopic examination of tissue samples as prescribed in the [Appendix 1](#).

#### Approved immunological test

The approved immunological test for Johne's disease in cattle is the absorbed ELISA conducted within an approved laboratory.

Note: This does not constitute approval for all manufacturers' or distributors' ELISA tests. Each particular proprietary test must be specifically approved and meet the requirements of the ANZSDPs and Australian National Quality Assurance Program.

#### **Faecal culture**

The culture of faeces with a test protocol in accordance with the ANZSDPs.

#### **Pooled faecal culture**

The culture of faeces, in pools of five cattle each, with a test protocol approved in the ANZSDPs.

#### **High Throughput-Johne's (HT-J) faecal PCR**

Testing of faeces either as individual samples or in pools of five cattle each with the HT-J assay protocol, as specified in the ANZSDPs. Confirmation of infection in a herd not previously known to be infected requires confirmation by a definitive test (either (i) faecal culture, or (ii) post mortem and histological examination and/or culture of tissue) in accordance with the ANZSDPs

#### **DNA detection using polymerase chain reaction (PCR)**

Examination of bacterial culture media, faeces, tissues, blood, milk or other material to detect the presence of the DNA insertion sequence according to methods as prescribed in the ANZSDPs, or approved by AHC pending inclusion in the ANZSDPs.

#### **Herd Environmental Culture (HEC)**

A test of a dairy cattle herd involving culture of an aggregated sample of faecal slurry from the highest proportion of the herd practicable, which is collected from a solid floored yard (for example the milking yard) after either milking or a reasonable period of confinement (not less than 2 hours).

### **3. Testing of herds**

#### **Sample Test**

Screening of the adult herd or a large representative sample of the adult herd by an approved test (ELISA, (pooled) faecal culture or (pooled) HT-J faecal PCR), with follow-up faecal culture or tissue culture and histopathological investigation of any reactors (if appropriate). The cattle to be tested are selected from the herd in accordance with [Appendix 2](#) of this document. Where a Sample Test comprises a screening test, the test is not complete until any reactors have been further investigated using a definitive test to establish the infection status of the herd (i.e. once infection is confirmed in one animal on one definitive test, it is not necessary to continue testing all reactors with definitive tests).

A Sample Test is positive only if infection is confirmed in the herd.

#### **Check Test**

A Check Test is either:

- 50 adult animals in the herd (or all eligible animals in a herd of less than 50 adult animals) biased to increase the probability of detecting infection, tested by ELISA, (pooled) faecal culture or (pooled) HT-J faecal PCR; or
- a HEC test in dairy herds that comply with the requirements above.

A Check Test is positive only if infection is confirmed in the herd.

## **Diagnostic tests**

Testing of one or more animals in a herd for Johne's disease in connection with the investigation of a disease problem.

## **4. Herd status**

The following self-declared assurance scores may be used by producers to declare the status of their herd:

### **JD Beef Assurance Score (J-BAS)**

The J-BAS is a risk profiling tool. It provides a ranking of herd risk based on history of infection and/or disease in the herd, the implementation of a biosecurity plan to prevent the introduction of JD and to manage disease should it occur, and testing history of the herd. Scores range from 0 (lowest assurance/highest risk) to 8 (highest assurance/lowest risk) and have been designed to allow comparability with the National Dairy Bovine Johne's Disease Assurance Score (see [below](#)). More details on the specific requirements for each score and for maintenance and/or progression are provided in [Appendix 3](#).

### **National Dairy Bovine Johne's Disease Assurance Score**

The Australian dairy industry has implemented the National Dairy Bovine Johne's Disease Assurance Score which is a risk management tool to facilitate risk-based trading and to provide guidance to farmers about the measures they can take to improve the Johne's disease status of their cattle.

Farmers are encouraged to declare the National Dairy Bovine Johne's Disease Assurance Score for their cattle on the National Vendor Declaration form or Cattle Health Declaration. More details on the specific requirements for each score and for maintenance and/or progression are provided at [www.dairyaustralia.com.au/bjd](http://www.dairyaustralia.com.au/bjd).

## **5. Documentation of score and risk management practices**

### **Cattle Health Declaration**

A declaration by an owner, or person responsible for the management of stock, of the health status of the stock. The health status of any animal on it is that of the property/herd of lowest status that the animal has been on/in while at a susceptible age.

## **6. Clinically affected animals**

Animals showing clinical signs consistent with Johne's disease should be humanely euthanased and should not be slaughtered for human consumption. Suspected clinical cases must be notified in accordance with State legislation for the relevant jurisdiction.

## **7. Destocking, decontamination and restocking land**

Land which may have been contaminated by infected animals may be decontaminated by destocking and allowing *M. paratuberculosis* on the land to die off due to the effects of heat, light and desiccation.

## **Destocking**

All susceptible species in an infected or suspect herd must be removed from the land before the decontamination period begins.

However:

- animals which are assessed as low-risk of being infected (not exposed to infection when less than 18 months old) may be retained during and after the decontamination period; and
- animals which cannot be assessed as low-risk of being infected (born on potentially contaminated land or introduced to potentially contaminated land when less than 18 months old) may be retained during the decontamination period for a maximum of 12 months since first potential exposure to infection.

## **Decontamination of land<sup>1</sup>**

Land will be deemed to be no longer contaminated if it remains destocked of all susceptible species for a minimum of 12 months.

During the decontamination period, susceptible animals may be introduced for short-term grazing for a maximum of 12 months.

Manageable areas such as feedlot pens may be decontaminated by scraping and disposing all manure and a layer of topsoil and cleaning all watering and feeding troughs.

## **Restocking**

Restocking with a new herd of susceptible species may occur once the land has been decontaminated.

# **8. Disease notification**

## **Suspicion of infection**

Suspicion or confirmation of infection must be notified to the CVO in accord with the statutory disease notification requirements for that state or territory.

## **Notification of tracing**

It is recommended that the owner of a herd in which JD is detected should undertake a risk assessment of trace forward and trace back animals and notify connections to the herd of the detection of infection and any relevant information on likely risk to the source/destination herd.

# **9. Animal identification**

## **Tested animals**

Any animal subject to a test for Johne's disease should be individually identified at the time of sample collection, and until all testing is completed. Permanent identification by an NLIS device is preferred.

## **Infected animals**

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<sup>1</sup> Producers wanting to do this for official certification purposes should check with their relevant state/territory department as to what decontamination procedures are likely to be acceptable for official certification.

Infected animals should be permanently identified and prioritised for early culling.

Other animals in the herd, particularly siblings, cohorts and progeny of infected animals, should be assessed for infection risk.

### **Vaccinated animals**

Vaccinated animals should be permanently identified in accordance with label requirements and the NLIS database.

## **10. Investigation of reactors**

### **Investigation of ELISA or HT-J reactors<sup>2</sup>**

The history of the herd should be taken, including any clinical signs suggestive of Johne's disease and the previous movement history of animals into the herd, in particular the reactors and introductions from herds and areas. Further investigation may be unwarranted in some circumstances.

In general, reactors should be investigated by faecal culture twice at an interval of three to six months or by post-mortem and histopathological investigation.

### **Disposal of infected animals**

Infected animals should be disposed of by slaughter through:

- destruction on the property, or
- consignment direct to an abattoir or knackery for slaughter.

Clinical cases of Johne's disease should not be slaughtered for human consumption. In addition, animals must not be transported to an abattoir or knackery unless they are fit to travel.

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<sup>2</sup> Producers wanting to do this for official certification purposes should check with their relevant state/territory department as to what may be required.

## **Appendix 1: Collection of Specimens**

The following is a list of tissues that should be collected using aseptic techniques. Each tissue should be divided into two equally representative portions for submission to the laboratory; one refrigerated in a sterile leak-proof container (for culture) and the other in 10% buffered formalin (for histopathology). Samples for histopathology should be stored and shipped at ambient temperature. Sample jars for bacteriology must be refrigerated after collection. Specimens should be refrigerated for transport to the laboratory (using at least a chiller brick in an insulated box). Fresh tissues should remain in an adequate cold chain for movement of samples to a lab, as per lab submission guidelines.

Recommended specimens to collect for culture and/or histopathology:

- Entire ileocaecal valve (ICV),
- Ileocaecal lymph nodes,
- Ileal (caudal jejunal) lymph nodes,
- Two (10 cm) pieces of ileum (one proximal and one distal (terminal))
- One (10cm) piece of proximal colon.

## Appendix 2 Sample Test Protocol

The principles of Sample Testing are as follows:

1. At the first Sample Test the sample to be tested must be selected from all cattle 2 years of age and older.
2. At subsequent Sample tests, the sample to be tested must be selected from all cattle 4 years of age and older, except in herds that do not have at least 50 animals of that age. In these herds, 3 and then 2-year-old cattle will be included to make a sample of at least 50 head.
3. In addition to the selected sample, all introduced bulls 2 years of age and older will be tested in all Sample tests.
4. In addition to the sample, any breeding cattle that have been introduced to the herd from a herd of a lower assurance score must also be tested, unless it is more than 4 years since they were introduced, or unless the herd of origin has since achieved the same herd assurance score.

The veterinarian must select the cattle to be tested as follows:

- List each mob of cattle and the number of testing-age cattle in each mob.
- Calculate the total number of cattle of testing age (including bulls bred in the herd).
- From Table A1 below, determine the sample size required for a herd of that size.
- Calculate the proportion of the testing age herd represented by each mob.
- For each mob, calculate the number to be sampled by multiplying the proportion of the total herd that it represents by the total number of cattle to be sampled.
- Within each mob, the cattle to be sampled should be selected to include any in poor condition, and then the balance selected systematically from the mob by drafting off every nth cow that comes up the race in the cattle yard.

**Table A1: The number of cattle to be sampled from a large herd**

Number of cattle of testing age	Number of cattle to test	Number of cattle of testing age	Number of cattle to test
210 or less	*ALL	1200	282
220	217	1400	284
240	223	1600	286
260	228	1800	287
280	232	2000	289
300	236	2200	290
350	244	2400	290
400	250	2600	291
450	255	2800	292
500	259	3000	292
550	262	3500	293
600	265	4000	294
700	270	5000	295
800	273	10000	297
900	276		
1000	278	Maximum per herd	300

\*In herds with fewer than 210 cattle of testing age, all cattle of testing age must be tested.

Note: The testing age of cattle is 2 years of age and over for the initial test and 4 years of age and over for subsequent tests.

### Appendix 3: Johne's Beef Assurance Score (J-BAS)

The table below shows what elements are necessary at each score.

Score	JD History	Biosecurity Plan	Veterinary Advisor and Annual review	Testing required	To maintain score	Requirements to progress to higher score
8	No clinical cases for at least 5 years	On-farm biosecurity plan implemented for at least 5 years	Required	Two negative sample tests, two years apart	<ul style="list-style-type: none"> <li>Continue to maintain biosecurity plan</li> <li>Annual review of plan by veterinary advisor</li> <li>Triennial Check test</li> <li>Investigation of all suspect cases</li> <li>No clinical cases confirmed</li> </ul>	<ul style="list-style-type: none"> <li>Not applicable</li> </ul>
7	No clinical cases for at least 5 years	On-farm biosecurity plan implemented for at least 5 years	Required	One negative sample test	<ul style="list-style-type: none"> <li>Continue to maintain biosecurity plan</li> <li>Annual review of plan by veterinary advisor</li> <li>Triennial Check test</li> <li>Investigation of all suspect cases</li> <li>No clinical cases confirmed</li> </ul>	<ul style="list-style-type: none"> <li>Continue to maintain biosecurity plan</li> <li>Annual review of plan by veterinary advisor</li> <li>Second negative sample test 2 years after first</li> <li>Investigation of all suspect cases</li> </ul>
6	No clinical cases for at least 5 years	On-farm biosecurity plan implemented	Not required	No testing required	<ul style="list-style-type: none"> <li>Continue to maintain biosecurity plan</li> <li>Investigation of all suspect cases</li> </ul>	<ul style="list-style-type: none"> <li>Continue to maintain biosecurity plan</li> <li>Appoint veterinary advisor</li> </ul>

		for at least 5 years			<ul style="list-style-type: none"> <li>No clinical cases confirmed</li> </ul>	<ul style="list-style-type: none"> <li>Undertake veterinary review of plan</li> <li>Investigation of all suspect cases</li> </ul>
<b>4</b>	No clinical cases for at least 2 years AND Any high-risk animals identified and removed	On-farm biosecurity plan implemented for at least 2 years	Not required	No testing required	<p>Transitional score only – herds should either:</p> <ul style="list-style-type: none"> <li>progress to Score 6 after 5 years, or</li> <li>revert to Score 2 if clinical case(s) are confirmed</li> </ul>	<ul style="list-style-type: none"> <li>Maintain biosecurity plan for 5 years</li> <li>No additional clinical cases confirmed</li> <li>Investigation of all suspect cases</li> </ul>
<b>2</b>	Clinical cases (if any) removed	On-farm biosecurity plan implemented	Not required	No testing required	<ul style="list-style-type: none"> <li>Maintain biosecurity plan</li> <li>Investigation of all suspect cases</li> <li>Cull any clinical cases that occur</li> </ul>	<ul style="list-style-type: none"> <li>Maintain biosecurity plan for 2 years</li> <li>No additional clinical cases confirmed</li> <li>Investigation of all suspect cases</li> </ul>
<b>0</b>	Known or suspected to be infected, or are of unknown status	None		No testing required	Continue to do nothing – not engaged with the Program.	<ul style="list-style-type: none"> <li>Cull all clinical cases</li> <li>Implement a biosecurity plan</li> </ul>

### **Transitional arrangements for former CattleMAP and JD zone herds until 30 June 2017**

- CattleMAP MN1, MN2 & MN3 herds to Level 8
- CattleMAP herds with a history of clinical disease due to sheep strain go to an appropriate level depending on the time since the last clinical case was recorded
- Free Zone herds to Level 8\*\*
- Protected Zone herds to Level 7\*\*
- *Beef Only* to Level 7\*\*
- Beef Protected Area beef herds to Level 7\*\*
- Victorian TCP beef herds to enrol according to how long since their last clinical case.
- Herds in the Management Area that do not qualify above to Level 0.

\*\* Herds in these areas are considered to have had property biosecurity plan equivalence through zoning, i.e. once the property plan is implemented they are considered to have had a biosecurity plan in place for the required period.

Producers should see the *JD in Cattle Biosecurity Checklist* for information on co-grazing with sheep and exposure to dairy cattle, and also ask further questions of the vendor to assess risk. The initial Check Test must be referenced in the Biosecurity Plan, with the initial test occurring by 30 June 2018.

### **Events that affect Assurance level:**

1. A clinical case is confirmed:
  - Score reverts to 0, or 2 once the clinical case has been removed,
  - then progresses according to the table above
2. Levels 7 & 8 where testing confirms infection in an animal with no clinical signs:
  - Drop to Level 6, provided other elements of Level 6 are met
  - Are eligible to retest 2 years after the last high risk animal(s) removed to progress to Level 7

### **Formation of a herd:**

- If Johne's disease has previously been diagnosed on the holding and undergoes decontamination prior to the introduction of susceptible animals, takes the lowest J-BAS of introduced stock
- If the holding prior to the formation of the herd was of J-BAS 0, the new herd would be J-BAS 0 unless approved to enter at a higher level by Industry. This can be no higher than the lowest J-BAS of introduced stock