Standard Definitions Rules and Guidelines

for the Management of

Ovine Johne's Disease in Sheep and Goats

to support the

National Ovine Johne's Disease Management Plan

2013-2018

1st Edition, Interim version
May 2013

This document has been agreed to by the technical working group comprised of Animal Health Committee representatives, Animal Health Australia, and Industry.

Animal Health Committee agreed to this interim version at their face to face meeting in November 2013 (AHC24).

Endorsement of the document by Animal Health Committee will be sought following finalisation and inclusion of the PCR test guidelines. It is anticipated that this process will not change the definitions that underpin the National Sheep Health Statement or the regional biosecurity guidelines.

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Source Documents

The text for sections in these SDR&Gs has been sourced or adapted from the following approved documents which are indicated in the text:

A. *National OJD Management Plan 2013 – 2018*. Sheepmeat Council of Australia and WoolProducers Australia. April 2013.

B. *Guidelines for the Implementation of Assurance Based Ovine Johne's Disease Management in Sheep*. 4th Edition. October 2009.

C. *Standard Definitions and Rules* for Ovine Johne's Disease 5th Edition. August 2003.

Introduction

This document comprises nationally accepted standard definitions and guidelines for the management and control of ovine Johne's disease (OJD) in Australia for sheep and goats.

The National Standard Definitions, Rules and guidelines (SDR&Gs) provides guiding principles and practices upon which industries and state and territory governments can formulate disease control and management programs to suit their circumstances.

The SDR&Gs is designed to assist disease control and management in a nationally coordinated manner. The document has evolved from the National Guidelines for the Management of OJD and earlier standard definitions and rules (SD and Rs) which were developed to support the implementation of the Assurance Based Credits Scheme and the multiple prevalence areas of earlier OJD Management Plans.

The OJD Management Plan 2013-2018 (the Plan) confirms the national objectives and describes the tools available for producers to manage and control OJD. It complements the Australian Sheep Johne's Disease Market Assurance Program (SheepMAP), that has been designed to

provide a degree of assurance for the sale and movement of sheep from flocks which have a low risk of infection.

The Plan refers to other authoritative documents including the Australia and New Zealand Standard Diagnostic Procedures (ANZSDPs) and the SheepMAP. The relevant definitions used in the SheepMAP have been incorporated.

Note: These SDR&Gs supersede the 4th edition of the *Guidelines for the Implementation of Assurance-based OJD Management in Sheep October 2009*.

Objectives

- To minimise the risk of infection by *Mycobacterium paratuberculosis* (Mptb) spreading to properties and regions that currently appear disease free.

- To reduce the financial impact and adverse animal health and welfare effects of the disease on individual flocks, and on the sheep industry as a whole

Definitions

1. Ovine Johne's disease (OJD)

Infection with sheep strain(s) of the organism *Mycobacterium paratuberculosis*.

2. Susceptible species

Sheep, deer (other than fallow deer) cattle and goats are susceptible to infection with ovine strains of *M. paratuberculosis*.

3. Animal status

3.1 Infected animal

An animal may be classified as infected if it has:

- Clinical signs consistent with a diagnosis of Johne's disease and resides in an infected flock, and/or
- Gross post mortem lesions consistent with Johne's disease and resides in an infected flock, and/or
- Histopathological changes consistent with Johne's disease and where acid fast organisms have been demonstrated, and/or
- [Sheep Strain] *M. paratuberculosis* confirmed by culture.

3.2 Suspect animal

An animal may be classified as suspect if it has:

- Clinical signs consistent with a diagnosis of Johne's disease, and/or
- Gross post mortem lesions consistent with Johne's disease, and/or
- Histopathological changes suggestive of Johne's disease, but where no acid-fast organisms have been demonstrated, and/or
- Been in direct contact with an infected animal, and/or
- Been in direct contact with contaminated land/facilities, and/or
- Reacted to a test but not been subject to a follow-up definitive test in accordance with these SDR&Gs; and/or
- Originated from an Infected or Suspect of being infected flock.

3.3 Terminal 'T'-tag lamb

A lamb which is to be slaughtered before it cuts its first permanent teeth and is identified by an NLIS (sheep) 'T' tag.

3.4 Approved vaccinate

A sheep that is identified by an NLIS (sheep) 'V' tag and is:

- vaccinated with an approved OJD vaccine by 16 weeks of age, or
- vaccinated with an approved OJD vaccine after 16 weeks of age, when the flock:
    - was in the SheepMAP, or

- had undertaken a negative Faecal[1] 350 test in the two (2) years preceding the vaccination, or
- had a Negative Abattoir 500 status at the time of vaccination.

4. Flock

A flock is a group of animals of a susceptible species, which is maintained as a separate and discrete unit in terms of physical contact with other susceptible species by an approved fence or barrier. Where susceptible animals on a property have shared the same facilities such as yards or other holding facility, or have grazed or run together at any time in the previous 12 months on the same area of a property, they are considered to belong to the same flock, unless specific exemption is provided by the CVO.

4.1 Closed flock

A flock where there have been no introductions, including rams and strays, in the preceding 5 years.

A flock will be considered to be equivalent to a closed flock if all sheep introduced within the preceding 5 years were from:

- SheepMAP flocks **OR**
- Flocks that had a negative Faecal[1] 350 or Abattoir 500 test within the preceding two years

4.2 Flock status

The status of a flock is determined by the animal with the lowest status in the flock, except as otherwise stated in the Australian Johne's Disease Market Assurance Program for Sheep (SheepMAP).

Where a new flock is assembled from other flocks, it has the status of the originating flock that has the lowest status except as otherwise stated in the Australian Johne's Disease Market Assurance Program for Sheep (SheepMAP).

4.2.1 SheepMAP accredited

An audited quality assurance program incorporating a property biosecurity plan, animal health risk assessment, testing, and movement controls that provides a source of low risk animals. Refer to SheepMAP Manual available at http://www.animalhealthaustralia.com.au/programs/johnes-disease/market-assurance-programs-maps/sheepmap-manual/)

4.2.2 SheepMAP status

A flock that has a current Monitored Negative (MN) status in the Australian Johne's Disease Market Assurance Program for Sheep.

[1] Faecal 350 has replaced the previously used PFC350. This approach has been adopted in the expectation of the introduction of the PCR test. As both the PFC and PCR tests are based on faecal samples it is possible that a generic term such as "faecal" may be more appropriate as a long term descriptor of this testing regime. However, such a determination will not be made until the PCR test is adopted for OJD diagnosis. For this reason square brackets have been used to identify the definition of Faecal 350 (definition 8.2) yet to be finalised.

4.2.3 Approved OJD vaccinated flock

A flock comprising entirely of Approved Vaccinates, except for Terminal 'T'-tag lambs which are not required to be vaccinated.

4.2.4 Non Assessed flock (NA)

An NA flock is one which:

- Has no official history of Johne's disease, OR
- Any suspicion of infection has been resolved to the satisfaction of the CVO, and which has not been assigned any other status.

4.2.5 Infected flock (IN)

A flock which contains one or more sheep infected with OJD, and there is evidence of, or likely potential for, transmission of infection within the flock and the flock has not met the requirements for resolution of infection in accordance with the current National OJD Standard Definitions and Guidelines (as per Rules, Section 4.1).

4.2.6 Suspected of being an infected flock

A flock is suspected to be infected with OJD if there are reasonable grounds to believe that it has been exposed to OJD infection or that OJD may exist in the flock, based on:

- Trace back or trace forward contact with an infected flock
- Contact with OJD contaminated land or facilities
- A positive Johne's disease flock screening test, eg abattoir monitoring, or blood (ELISA) test
- Is a neighbour of an infected flock unless there is an effective biosecurity barrier;
- Clinical signs of OJD, or
- Advice from the relevant state agricultural department,

AND the flock has not met the requirements for resolution of suspicion (as per Rules, Section 4.2).

4.2.7 Tested to PFC 350 status (Tested to MAP status)

A negative test of 350 representative sheep over two years of age (or all sheep over two years of age in smaller flocks), from a flock which is not currently identified as infected or suspected of being an infected flock, by Pooled Faecal Culture in pools of up to 50 sheep within the last 24 months. The sheep must have been on the property for at least two years.

For this testing to be recognised as part of the National OJD Control Program 2013-18, the collection of samples (as per Appendix 3) must be performed by either a registered veterinarian or a stock inspector/animal health officer under the guidance of a registered veterinarian.

4.2.8 Abattoir 500

At least 500 sheep, over two years of age, have been submitted to an abattoir in the past 24 months, in one or more lots, have been examined (as per definition 6 and Appendix 1) and all found negative for OJD. The sheep must have been on the property for at least two years.

4.2.9 Abattoir 150

At least 150 sheep, over two years of age, have been submitted to an abattoir in the past 12 months, in one or more lots, have been examined (as per definition 6 and Appendix 1) and all found negative for OJD. The sheep must have been on the property for at least two years.

5. Biosecurity Plans

Agreed actions and activities of farms and/or producers to prevent the incursion of animal disease(s) into a flock or onto a property. It may outline measures including (but not limited to) conditions on sheep movements into the area, vaccine policy and response to disease detection. These plans can be at a property or regional level and can cover a range of diseases, including OJD.

5.1 Property plan

Actions and activities farms and/or producers take to prevent the incursion of animal disease into their flock or properties. The National Farm Biosecurity Reference Manual for Grazing Livestock Production provides information for doing this. This is available at www.farmbiosecurity.com.au .

5.2 Regional biosecurity plan (RBP)

An RBP is a set of agreed actions that a group of producers in a geographic region with common goals implement to prevent the incursion of disease(s) into a flock or onto a property. It may outline measures including (but not limited to) conditions on sheep movements into the area, OJD vaccine policy and response to disease detection.
A regional biosecurity plan should be identified by a name agreed by the group of producers who will maintain the plan e.g. Western division Exclusion Area.

Guidelines for the development of a regional biosecurity plans are available at www.ojd.com.au (NEW)

6. Abattoir Monitoring

Abattoir monitoring is the examination of the intestinal tract and associated tissues during meat processing between carcass dressing and offal recovery for gross lesions consistent with OJD and the collection of tissue samples as required and recording of data. See Appendix One.

6.1 Direct line

A group of sheep consigned directly from one property of origin (PIC) to an abattoir and killed as one or more identifiable groups.

6.2 Indirect line

A group of sheep from one or more properties of origin that has not been consigned directly to an abattoir and is not killed as one or more identifiable groups.

7. Area flock prevalence

7.1 Area flock prevalence estimate

Area flock prevalence is estimated using the national standard model (see Resources and Links) using abattoir monitoring data.

The following procedures will be used in abattoir monitoring for the purpose of area prevalence estimation.

- Only direct lines comprising 25 or more sheep will be used in the analysis of abattoir surveillance data for area prevalence estimation.
- Data from multiple lines from each individual PIC will be aggregated and used as a unit of data for the Prevalence Area calculation.
- Only sheep aged two years or older will be inspected.
- Up to three sheep will be sampled from all lines with gross lesions consistent with Johne's disease and samples submitted for laboratory investigation.

7.2 Known flock prevalence

In small regions and groups where flocks are subject to active surveillance and disease control under a regional biosecurity plan, the known flock prevalence is the proportion of the area's or group's flocks that have an Infected status.

8. Approved tests

A test which may be used for flock tested assurance, to confirm the presence of OJD infection in a flock, to remove an Infected status (as Rules, Section 4.1), or to resolve suspicion of OJD infection (as per Rules, Section 4.2), will be approved by the Subcommittee on Animal Health Laboratory Standards (SCAHLS) and included in the Australian and New Zealand Standard Diagnostic Procedures (ANZSDPs). Laboratory testing must be performed at an approved laboratory.

8.1 Definitive test

A test which when positive provides a definitive result confirming Johne's disease infection in a susceptible animal. The definitive tests for ovine Johne's Disease are:

- Histopathological changes consistent with Johne's disease and where acid fast organisms have been demonstrated
- Bacterial culture of tissues, and/or
- Bacterial culture of faeces, including PCR testing and culture on solid medium conducted in accordance with the ANZSDPs, or
- Any other test or combination of tests approved as a definitive test by AHC.
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[8.2 Faecal[1] 350 Test

A test of 350 representative sheep over 2 years of age (or all sheep over 2 years of age in smaller flocks) by Pooled Faecal Culture (PFC) or equivalent test in pools of up to 50 sheep. The sheep must have been on the property for at least 2 years.**]**

For this testing to be recognised as part of the National OJD Control Program 2013-18, the collection of samples (as per Appendix 3) must be performed by either a registered veterinarian or a stock inspector/animal health officer under the guidance of a registered veterinarian.

8.2.1 PFC 350 Test

Test of 350 representative sheep over 2 years of age (or all sheep over 2 years of age in smaller flocks) by Pooled Faecal Culture in pools of up to 50 sheep. The sheep must have been on the property for at least two (2) years.

9. National Sheep Health Statement (SHS) (B modified)

A declaration by the owner, vendor or person responsible for the husbandry of sheep that provides health information on a consignment of sheep, and their flock of origin, that can be found at:

http://www.farmbiosecurity.com.au/toolkit/declarations-and-statements/

10. Property Disease Management Plan / Program (PDMP) (C)

A program to manage Johne's disease in an infected flock, with the purpose of reducing within-flock prevalence and minimising the risk of spread to other flocks, which is approved by the CVO and is in accordance with the guidelines detailed in Appendix two.

Rules

1. Abattoir Monitoring

Appendix One describes the abattoir monitoring process.

2. Movement requirements

2.1 Interstate movement requirements (A modified)

Movements between states have a regulatory basis and are determined by the Chief Veterinary Officer (CVO) of the receiving jurisdiction.

2.2 Other movement requirements (NEW)

The regional biosecurity plan may include the minimum requirements for introductions into the area.

2.3 Terminal T-tag lambs (A)

Where terminal lambs have been introduced to a flock and are removed before cutting any adult teeth the flock's status remains unchanged.

3. Approved Vaccination (C)

The use of OJD vaccine in any jurisdiction may be subject to approval by the CVO.

All Approved Vaccinates must be permanently identified by a vaccination tag which is a NLIS (sheep) ear tag with the letter 'V' stamped on the tag.

4. Resolution of status

4.1 Resolution of Infected status

Flocks that are infected with OJD are no longer regarded as infected when:

- The whole flock consists of Approved Vaccinates and has undertaken a Faecal[1] 350 Test with negative results, at a minimum of 2 years after the last known detected infected animal has been removed; or
- A destocking /decontamination program approved by the CVO of the jurisdiction has been completed.

4.2 Resolution of Suspected of being an infected flock

Flocks that are suspected to be infected with OJD are no longer suspected when

- Suspicion has been removed to the satisfaction of the Chief Veterinary Officer; or
- The whole flock has been submitted to a Faecal[1] 350 test with negative results, at a minimum of 2 years after the last known suspected of being infected or detected infected animal has been destocked; or
- A destocking /decontamination program approved by the CVO of the jurisdiction has been completed.

Resources and Links

1. National Sheep Health Statement template:
   http://www.farmbiosecurity.com.au/toolkit/declarations-and-statements

2. Regional biosecurity guidelines:
   http://www.ojd.com.au/

3. Gudair® vaccine - Zoetis Animal Health:
   https://www.zoetis.com.au/products/236/gudair-vaccine.aspx

4. **Appendix One -** Protocol for the Use of Abattoirs to Monitor for Ovine Johne's Disease
5. **Appendix Two –** Guidelines for management of OJD using property disease management plan / program, including guidelines for use of vaccine.

APPENDIX ONE

Note: Due to changes to management of abattoir monitoring this protocol is currently under review.

PROTOCOL FOR THE USE OF ABATTOIRS TO MONITOR FOR OVINE JOHNE'S DISEASE (revised I Links 2004)

1. INTRODUCTION

Objectives of abattoir monitoring

To use abattoirs as the primary form of surveillance for OJD:

1. As a means to monitor a broad cross section of a region's sheep flocks for evidence of OJD infection, to demonstrate low prevalence or freedom;
2. As a means to detect individual infected flocks
3. To screen large numbers of sheep flocks in a region to determine the prevalence of infection at a flock level;
4. As a means of assessing flock status for assurance purposes.

Advantages of the method

- it enables very large numbers of sheep and flocks to be screened over time at relatively low cost;
- it assists with the detection of foci of infection independent of current known infection;
- is a method which can be used with lower costs compared with broad scale on-farm farm surveys;
- wide scale monitoring in abattoirs provides an important message to producers;

Description of the method

Abattoir monitoring involves the post mortem inspection, using a systematic methodology, of the intestinal tracts of sheep at slaughter for signs of gross pathology suggestive of OJD. Samples of suggestive pathology are tested using histopathology to confirm or rule out infection.

2. MATERIALS AND METHODS

Training of personnel undertaking inspection

The training should be delivered by a veterinary pathologist or veterinarian experienced with OJD in the field and appropriately trained OJD abattoir inspectors. Trainees are to be provided with an explanation of the comparative differences between normal and abnormal intestines and intestinal lymph nodes, and the features that distinguish OJD affected viscera

from normal viscera. In the first instance, photographic material and overhead transparencies may be used to illustrate the relevant features of OJD, in the absence of fresh or preserved specimens. However training is not complete without fresh or preserved tissues with known lesions of OJD being used to illustrate the gross appearance of OJD.

Training of inspectors from historical low prevalence areas will require travel to an area where the disease is historically prevalent in order to ensure an opportunity to autopsy infected sheep and view fresh lesions.

Trainees should be familiarised with the anatomy of the intestinal tract on inspection trays on the actual abattoir chain. This assists to demonstrate the technique for locating the relevant sites for inspection, as the most important part of the procedure is the correct orientation of the intestines on the inspection tray.

During the training sessions, the significant changes that occur with OJD are emphasised. The important features that create suspicion of OJD are:

- thickening of the wall of the terminal ileum and/or caecum;
- thickening and increased visibility of serosal lymphatic vessels and (particularly), their beaded appearance;
- roughening and irregularity of the mucosa of ileum and/or caecum;
- enlargement and/or fibrosis of the mesenteric lymph nodes

The clinical features of OJD should be explained and inspectors familiarised with the procedure for appraising sheep and their body condition score as a means of finding suspicious lines of sheep for close inspection on the abattoir chain. While preference may be given to the selection of lots of older aged sheep and those in light condition, it is now recognised that the majority of infection in an infected flock is present sub-clinical otherwise healthy animals and that sub-clinical infection is readily detected in the abattoir. Lots which include lambs or sheep younger than 2 years old are generally excluded from surveillance in the abattoir. Inspectors are required to determine the source of the lines of sheep consigned for slaughter each day and record the saleyard of origin or, in the case of direct consignments, the vendors and vendors' locality Daily kill sheets used by the abattoir operators are a primary source of this information.

Eligible sheep

While preference may be given to the selection of lots of older aged sheep and those in light condition it is important to recognise that infection is frequently confirmed in 2 and 3 year old sheep following their exposure as lambs. Similarly, infection is commonly detected in lines with no evidence of clinical disease. Lots which include lambs or sheep younger than 2 years old are generally excluded from examination in the abattoir. Note: hoggets may be examined for lesions for early detection of infection in high risk situations but negative monitoring of hoggets does not qualify for assurance credits.

Opportunities to undertake ante-mortem inspection of sheep in the yards should be used by inspectors as much as possible. The clinical features of OJD, namely wasting of sheep to form

a distinct tail in a mob, can be used as a means of finding suspicious lines of sheep for closer inspection on the abattoir chain however , in general all eligible lines, including mixed saleyard lines should be examined where there is an inspector present on the shift.

Suspicious post-mortem lesions

Lesions which are characteristic of OJD infection are found in the ileum, mesenteric lymph nodes and the mesenteric lymphatic vessels.

Ileum: - thickening of the wall of the terminal ileum and/or caecum;

Lymphatics: thickening and increased visibility of serosal lymphatic vessels and (particularly), a beaded or corded appearance;

Lymph nodes: the caudal mesenteric and ileocaecal lymph nodes are often enlarged.

Method of specimen appraisal and selection

The most important part of the procedure is the correct orientation of the intestines on the inspection tray. The first step is to find the caecum, take it in the left hand and the loops of small intestine in the right hand, lift and place back with the bottom most parts of the intestine towards the inspector. The aim is to place the caecum to the top left of the tray, thus exposing the terminal ileum immediately below the caecum and leaving the loops of small intestine correctly orientated with the mesenteric lymph nodes exposed and readily identifiable.

Having orientated the viscera on the tray, inspection staff are required to:

- closely examine and palpate the ileum for signs of thickening; a comparison with mid-small intestine is recommended as a method of gauging changes to the thickness of the ileum;
- look for obvious lymphatic vessel thickening and beading of the ileal and caecal serosa along with an inability to move chyle (lymphatic) fluid along lymphatics which is considered highly suggestive of OJD; these changes mandate sampling of the specimen; and
- examine the ileo-caecal & mesenteric lymph nodes. These are quite variable in size and increased size alone is not a good criterion of OJD. Where enlargement is found in conjunction with other features of OJD, sampling is required. Enlarged lymph nodes are often the most visible change that can be seen at a glance on the inspection tray and this necessitates closer inspection of the ileum and caecum.

Intestinal tracts displaying any of these features are to be taken from the inspection trays and set aside for closer inspection and sampling away from the abattoir chain.

3. PROCEDURES IN THE ABATTOIR

1. Intestinal tracts are examined for lesions that are consistent with those caused by OJD, as described above. The speed of the chain will determine whether every animal or every n^{th} animal is examined. The number of animals killed and the number inspected must be recorded for each line monitored.
2. When suspicious lesions are seen at slaughter, put samples aside for further examination.

3. An examination is made away from the abattoir chain of any samples taken to determine if the sample warrants submission, or there is a likely alternative cause.
4. Note that a maximum of 3 samples per line should be submitted for laboratory examination.
5. Samples for submission to the laboratory (as listed below) should be preserved in formalin for histopathology, after a thorough examination of the intestine and associated lymph nodes:

    a) a piece of terminal ileum (always)

    b) ileocaecal lymph node (always)

    c) ileal (also called caudal mesenteric or caudal jejunal) lymph node (always)

    d) any other tissues with gross lesions suggestive of Johne's disease (only if terminal ileum is not obviously affected).

    Samples should be placed in one container with adequate formalin (minimum 140mls - approx. 10x volume of tissues) to ensure rapid preservation

6. A description of gross changes seen by the inspector should be recorded on a sequential sheet. This allows a comparison of the laboratory diagnoses against the description of pathological changes found in the intestines, and provides useful feedback to inspectors.
7. Details of the origin of the sheep should be obtained and submitted with the samples. The ideal situation is where the sheep can be traced to the property of origin, though this information will not always be available.

Records to be kept

The following information is to be recorded <u>for each line examined</u>:

- number of sheep in the line;
- breed, sex/class, and/or age group;
- number of viscera examined
- number of viscera detected with gross lesions;
- number of samples submitted to the laboratory (max. of 3 per line)
- the property of origin, or vendor, saleyard or region of origin.

A pro-forma record sheet is available from the National Abattoir Surveillance Coordinator.

In the case of lines with no lesions detected, it is still necessary to attempt to identify properties of origin for sheep purchased through saleyards. For lines where samples have been collected, tracing to property of origin should be initiated. (Experience has shown that the sooner this process is commenced the more chance there is that tracing will be successful). The assistance of district animal health staff is often required for tracing.

APPENDIX TWO

GUIDELINES FOR MANAGEMENT OF OJD USING PROPERTY DISEASE MANAGEMENT PROGRAMS, INCLUDING GUIDELINES FOR USE OF VACCINE

1. Introduction

In situations where destocking/decontamination is not able to be implemented under an approved Property Disease Eradication Programs (PDEP), owners of infected flocks are encouraged, or in some regions required, to implement a Property Disease Management Program / Plan (PDMP).

A PDMP should comprise appropriate measures with the purpose of:

- reducing pasture contamination on the infected property,
- controlling or reducing the level of infection on the infected property,
- minimising or removing risk of transmission to neighbouring properties,
- establishing lines of low risk sheep for production and trading purposes.

In some circumstances, a PDMP may be used to attempt to eliminate infection from an infected property. At this stage, there is no evidence to support the likelihood of disease elimination from an infected property without total destocking.

2. Guidelines

2.1 Flock Isolation

In addition to the disease minimisation and management strategies listed below, it is important that measures are instituted which minimise the risk of spread of infection to unaffected flocks. An appropriate 'barrier', incorporating both physical and management factors, must separate the infected flock from neighbouring flocks and land.

Examples of physical barriers include unstocked land (eg crops), double fencing, tree plantations, laneways or roadways, contour banks, stone walls or other physical separation which minimises the risk of sheep straying or environmental spread of infection to neighbours. Management

procedures may include grazing cattle or low-risk sheep such as lambs or vaccinated adults adjacent to boundaries.

2.2 Infected Flock Profile (IFP)

Before implementing a PDMP, knowledge of the apparent prevalence, and age/mob distribution, of infection in the flock/property will be helpful.

An infected flock profile (IFP) involves a progressive assessment of apparent distribution and prevalence of infection based on flock history, property management, on-farm testing results, abattoir surveillance, abattoir monitoring (requested abattoir surveillance), tracing investigations and other measures as approved by the CVO.

In some cases the flock history, and the original investigation on the property to confirm infection, will give a good indication of prevalence and distribution. In other cases, further testing and investigation will be required.

2.3 Options for PDMPs

Consideration needs to be given to enterprise type, property design and facilities, resources, alternative enterprises, environmental conditions, and the situation on neighbouring properties, before selecting appropriate options for disease management/reduction.

Options for PDMPs include:

- selective culling,
- land segregation,
- breeding strategies,
- segregating test-negative sub-flocks,
- grazing/watering strategies,
- vaccination.

2.3.1 Selective Culling

Clinical cases: monitoring of all mobs and culling of clinical cases should be mandatory in all PDMPs, both on disease control and welfare grounds.

Test-positive mobs: where on-farm testing indicates the presence of both shedding and non-shedding mobs, it should be advantageous to selectively cull any mobs with evidence of shedding.

Age-related resistance: current indications are that adult sheep are relatively resistant to low/medium challenge. Strategic culling of sheep which may have been exposed to any level of infection as lambs or weaners is recommended.

It is reasonable to expect that culling of the highest risk groups may provide a reduction in overall flock challenge within 12 months. By combining selective culling with other disease reduction measures, it may be possible to significantly reduce on-property challenge, and provide options for successful implementation of further disease reduction measures.

2.3.2 Land Segregation

The provision to segregate portions of a property or enterprise immediately offers an infected producer flexibility, and the option of undergoing progressive land decontamination.

Progressive area destocking and decontamination within properties, or between separate land parcels comprising a property, may be combined to advantage with other disease reduction measures.

2.3.3 Breeding Strategies

Susceptibility to infection appears to be highest in very young animals, and appears to be related to degree of challenge and amount of stress to which the lambs/weaners are exposed. These factors are interrelated eg early weaning may reduce exposure but increase stress and susceptibility. Challenge to young animals may be reduced by lambing onto decontaminated or low contamination pastures, and/or by removing lambs as quickly as possible from infected ewes. Stress may be reduced by providing adequate nutrition and shelter, worm control, prevention of other diseases.

Various specialist breeding techniques can be used to reduce exposure of young animals to contamination eg Multiple Ovulation Embryo Transfer (MOET), Juvenile In-Vitro Embryo Transfer (JIVET), lamb snatching, but most of these are resource intensive and may not be available in many situations.

Disease elimination and genetic recovery may be able to be effected in one generation by using artificial breeding techniques combined with culture and MAP accredited recipient stock and land.

2.3.4 Segregating Test-Negative Sub Flocks

Animals from infected flocks that are at least four years of age and are serial faecal test negative and/or biopsy negative are unlikely to be infected. Segregating such animals from subsequent exposure eg moving onto decontaminated land or into sheds, will provide a nucleus of low-risk animals which may be used as a breeding sub flock. Preliminary observations in NSW indicate that by establishing a test negative breeding sub flock and applying further minimal disease breeding strategies, it may be possible to re-establish an uninfected age group within two generations.

2.3.5 Grazing/Watering Strategies

All PDMPs should include sound advice on strategies for pasture management, especially the provision of lower risk pastures for more susceptible young stock. In addition, prevention of nutritional stress, fencing-off of swampy ground, parasite control and reduction of other sources of stress should all be standard components of any PDMP. Where possible, provision of reticulated low-risk above ground water supplies should be implemented.

Particular care should be taken when recommending pasture management for JD control. Many of the recommendations may jeopardise parasite control programs. Producers need to consider implementing strategies to optimise concurrent control of both JD and internal parasites.

2.3.6 Vaccination

Vaccination is considered likely to provide an important tool for the strategic control of disease. A significant proportion of animals vaccinated as lambs under 16 weeks of age should demonstrate reduced shedding and mortality rates. Similar efficacy may occur in older lambs and adult sheep vaccinated pre-exposure. However, producers need to be aware that:

- vaccination will not prevent all animals from becoming infected or shedding infective organisms,
- accidental self administration of vaccine may have serious health implications,
- vaccine administration can result in lesions at site of vaccination which may downgrade a carcass at slaughter,
- vaccination may delay the expression of disease and consequent recognition of infection in a flock.

Whilst evidence from other countries indicates that vaccination of young animals in JD infected flocks will reduce progression of the disease, with the effects manifested as significantly (>90%) reduced mortality rates and significantly (>90%) reduced shedding of bacteria in faeces, long-term efficacy of vaccination in Australia is yet to be demonstrated. However, vaccination of young lambs in heavily infected flocks has been demonstrated to reduce shedding of organisms and mortalities for up to 12 months post-vaccination under Australian conditions.

2.3.6.1 Strategic Use of Vaccine

Vaccination of lambs at marking or weaning is recommended as a preventative measure. Successive vaccination of each year's drop will result in a fully vaccinated flock within 4-5 years.

2.3.6.2 Supply of Vaccine

An imported vaccine is registered for use in Australia.

2.3.6.3 Conditions and Requirements for use of Vaccine

Conditions and requirements for use of vaccine are detailed in the rules of this document.

3. Documentation of a Property Disease Management Program

A PDMP is an officially approved written program which documents all relevant details regarding flock history and management, testing details, property layout, neighbours, and disease management/reduction proposals.

4. Implementation of a Property Disease Management Program

A PDMP is developed and monitored in consultation with an approved veterinarian.

5. Conclusion

By implementing a PDMP quickly, a producer can potentially:

- minimise losses and improve productivity,
- reduce overall farm challenge,
- access trading concessions for low-risk mobs,
- reduce risk of spread of the disease to neighbours.

Determining the prevalence of infection prior to implementing a PDMP, and monitoring progress by on-farm testing and abattoir surveillance, will ensure that the PDMP is likely to provide both short and long-term benefits to both the infected property and the surrounding district.

APPENDIX THREE

SHEEP SELECTED FOR PFC TESTING[2]

INSTRUCTIONS

1. List all mobs present which are 2 years of age and older in the table below.
2. List the number of sheep in each mob in column A.
3. Calculate total number of sheep 2 years and older in the flock: _____(B)
4. Calculate the **proportion** of sheep required from each mob (350/B) _____(C)
5. Calculate the number of sheep required from each mob (A x C) _____(D)
6. Fill in Column D, indicating the number of sheep which must be tested from each mob.
7. Select sheep for testing in each mob by drafting every "nth" sheep that comes up race (n = 1/C). In this example, every 7th sheep.
8 Complete columns E and F on actual numbers selected from each mob, and numbers tested.

MOB ID	AGE	COLOUR/ OTHER ID	PADDOCK	A NUMBER IN MOB	D NUMBER REQUIRED	E* NUMBER SELECTED	F NUMBER TESTED
1	2yo	Blue	Smiths	550	78	80	78
2	3-4yo	Red	One-oak	960	137	140	138
3	5-6yo	Green	Creek	740	106	110	107
4	6+yo	Mixed	Hill	200	29	33	30

* Extra sheep may be selected to ensure sufficient sheep are tested (ie if a faecal sample cannot be collected from some selected animals).

TESTING STRATEGIES[3]

[2] **SHEEPMAP** | The Australian Johne's Disease Market Assurance Program for Sheep ***December 2005*** **page 59**

[3] **SHEEPMAP** | APPENDIX 1 The Australian Johne's Disease Market Assurance Program for Sheep ***December 2005*** **page 73**

Procedures must be implemented to test a representative sample of the flock to ascertain the status of the flock prior to accreditation as a SheepMAP flock, and to provide regular ongoing monitoring of the status of the flock.

FLOCK TESTING – INFORMATION FOR VETERINARIANS

1. Sampling Technique for Pooled Faecal Culture submissions

• One faecal pellet is required from each sheep selected for sampling. If no pellet can be collected, the animal should be identified and collection attempted when the remaining sheep in that pool have been sampled. Alternatively, a substitute sample from an additionally selected sheep may need to be collected.

• Collect one pellet from each sheep into a sterile plastic jar with a maximum of 50 and a minimum of 20 pellets per jar. Keep count of the number of pellets per jar and do not exceed 50. In flocks with less than 350 adult sheep, ensure all pools have faecal material from a minimum of 20 sheep/pool (eg if there are 251 sheep to sample, submit 4 pools of 50, & 2 pools of 20-31).

• Change gloves for collection of faeces between each pool to prevent cross contamination of pools.

• To avoid contamination of a pool from a sheep from which a sample cannot be collected (and which therefore will not be identified with the pool), change gloves after attempting to sample such animals.

• If a sheep has soft/watery faeces, collect an amount similar to a normal pellet.

• Ensure proper labelling of each pool to enable identification of sheep which have contributed to that pool. Record ear tag number/colour or brand details for each group of 50 sheep contributing to a pool.

• Keep samples cool in an esky with ice bricks. Send to the laboratory as soon as possible so that samples reach the laboratory within three days of collection. Keep samples at 4°C in a domestic refrigerator if there is likely to be a delay in transport.

A Sample Identification Form for PFC Testing is provided in the *Resources and Forms* section of this manual and is also available on the accompanying CD. It is not compulsory to use this form and veterinarians may wish to use an alternative recording format.