



# GOATMAP

## JDMAP (JOHNE'S DISEASE)

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Protecting you, your property, your animals, your industry

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A U S T R A L I A

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## Protecting you, your property, your animals, your industry

GoatMAP is a multi-disease market assurance program for goats. The current modules are General Biosecurity (GOATBIO), **Johne's Disease (JDMAP)** and Caprine Arthritis Encephalitis (CAEMAP).

Version 1.1, January 2023

**ACKNOWLEDGEMENT**

GoatMAP is the Market Assurance Program for important endemic diseases of goats, it contains three modules: General Biosecurity (GOATBIO), Johne's Disease (JDMAP), and Caprine Arthritis Encephalitis (CAEMAP). GoatMAP has been developed by members of the Goat Industry Council of Australia and associated industry organisations, jurisdictions and Animal Health Australia (AHA). Advice has also been received from the state and territory government animal health authorities. This document has been revised to be consistent with the Livestock Production Assurance Program and the Market Assurance Program for sheep, taking into consideration recommendations of goat breeders.

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- Property name
- Postal address
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- Status
- Breed
- Expiry date
- Year that current status was achieved.

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# JDMAP

## INTRODUCTION TO JDMAP

This introduction will give you useful background on JDMAP and describe how it fits within the national effort to control Johne's disease (JD). Read this along with the GoatMAP biosecurity module (GOATBIO) to ensure you understand how the program works and how you can be an effective participant in JDMAP.

The original Australian Johne's Disease Market Assurance Program for Goats was developed in 1999 in response to calls from the Australian fibre, meat, and dairy goat industries for a herd classification scheme to assure goat breeders and their clients that participating herds have been objectively assessed as having a low risk of being infected with JD. It is important to remember that JDMAP does not guarantee that a herd is free of JD, but the higher the status a herd achieves and the longer the herd maintains that status, the greater the assurance that it is not infected.

### JDMAP AND JOHNE'S DISEASE CONTROL

The JDMAP is an essential component of JD control. The role of JDMAP is to:

- provide a source of low-risk replacement goats
- allow herds to demonstrate their status in a transparent way so that they can sell breeding or herd replacement goats with confidence
- reduce the risk of JD being spread at events such as shows and sales.

### JD IN GOATS

JD is a slowly progressive wasting disease that may infect a herd for many years prior to being detected. Affected goats may appear weaker and fail to thrive and have intermittent scouring until the final stages of disease. There is no treatment for the disease and death may occur within months of the first clinical signs. It is important to remember that JD infected animals can be contaminating land and pasture with the bacteria *Mycobacterium avium ssp paratuberculosis* for months or even years before the development of symptoms. Goats of any age may be infected with JD, but younger goats are especially susceptible. Goats in Australia have been infected with both cattle and sheep strains of *M. paratuberculosis*, although most recorded cases of JD in goats are due to the cattle strain.

More information about JD in goats may be found on the AHA website:

[www.animalhealthaustralia.com.au/johnes-disease/](http://www.animalhealthaustralia.com.au/johnes-disease/)

### LEVELS OF ASSURANCE FOR JD

The JDMAP aims to identify, protect, and promote herds at low risk of being infected with JD. It is based on a testing regime and property and herd biosecurity management that minimises the risk of introducing JD into the herd. The GoatMAP Veterinarian will assess these management strategies, test the stock and assign herd status accordingly.

Herd testing is used to assess the risk of infection being present in the herd. It comprises either a Pooled Faecal Culture (PFC) test or a serological test of all or a sample of goats in the herd. Reactors are investigated with more definitive tests. The status allocated to a herd that tests negative is ‘Johne’s Disease Monitored Negative’ (JDMN). Depending on how long a herd has participated in the program and the number of times negative herd testing has been undertaken, it is allocated a JDMN<sub>x</sub> status, where x is the year that the herd first attained JDMN1 status (or regained JDMN1 status), i.e. JDMN1<sub>x</sub>, JDMN2<sub>x</sub> or JDMN3<sub>x</sub> status (Table 1).

**Table 1. JDMAP assurance levels**

ASSURANCE LEVEL	HOW ACHIEVED	RELATIVE MERIT
Monitored Negative 1 (JDMN1 <sub>x</sub> ) and Monitored Negative 1 vaccinated (JDMN1-V <sub>x</sub> )	1 negative test of herd and a Herd Management Plan in place	Moderate assurance level
Monitored Negative 2 (JDMN2 <sub>x</sub> ) and Monitored Negative 2 vaccinated (JDMN2-V <sub>x</sub> )	2 negative tests of herd over a period of at least 1 to 2* years, and a Herd Management Plan in place.	High JD assurance level
Monitored Negative 3 (JDMN3 <sub>x</sub> ) and Monitored Negative 3 vaccinated (JDMN3-V <sub>x</sub> )	3 negative tests of herd over a period of at least 3 to 4* years, a Herd Management Plan in place and Annual Veterinary Reviews	Highest assurance JD level

NOTE: The year that JDMN1 status is first attained provides extra information on the confidence that a herd is low risk for presence of JD. For example, a herd that first attained JDMN1 status ten years ago is likely of lower risk for presence of JD than a similarly sized herd that first attained JDMN1 status last year.

\* The shorter period may apply where herds are tested at a shorter interval to bring goat testing in line with testing for another MAP on the property.

## TESTING AND MANAGEMENT

### VETERINARY MANAGEMENT

The responsibilities of your veterinarian are outlined in the checklists available on the AHA website. In addition, the veterinarian should obtain a copy of the *Guidelines for GoatMAP Veterinarians* which provide further detail. The Guidelines and checklists are available from the AHA website:

<https://animalhealthaustralia.com.au/goatmap/>

Your GoatMAP Veterinarian is responsible for testing. In most JDMAP herds, all goats of the appropriate age will be tested. In large herds, only a sample of the herd needs to be tested. As testing is not 100% sensitive, even testing all animals would not guarantee that the herd was free of

JD. The JDMAP requires the testing of sufficient animals to provide a high level of assurance that goats from a JDMAP assessed herd have a low risk of being infected with JD.

As herd sizes increase, the sample required to provide a high level of assurance plateaus (Details of the required sample size for different sizes of herds can be found in Element 6). Providing that the herd is managed to prevent the introduction of disease, the more testing that occurs over time, the greater the level of confidence that a herd is not infected. Goats which show signs suggestive of JD must be investigated. These animals must have a faecal sample collected for culture for *M. paratuberculosis*, or they may be examined post-mortem with the required specimens submitted to a laboratory to exclude JD.

The blood tests are not 100% specific, and this means a small number of false positive reactions ('reactors') may occur. Reactors must be investigated promptly to determine if the result is a true positive or not. Where PFC is used, positive pools must be followed-up promptly. If follow-up tests are negative, the herd test is classed as negative. The herd maintains the previous status whilst follow-up tests are conducted.

## PROPERTY MANAGEMENT

You must comply with the basic biosecurity requirements of GoatMAP to enter JDMAP. This is described in the GOATBIO module. There are extra requirements for JDMAP membership. These relate to the long incubation period of JD, the high bacteria excretion rates of infected goats, the long survival of *M. paratuberculosis* in the environment and the modest sensitivity of diagnostic tests (especially in early disease) and require an extension of basic biosecurity provisions to control for these JD-specific factors.

## THE JDMAP MODULE

This module outlines the extra requirements (those beyond the biosecurity requirements of GOATBIO).

### STRUCTURE

As well as this introductory section, the module contains seven Elements and one appendix. These describe JDMAP-specific requirements that build on GOATBIO requirements.

Always refer to the GOATBIO manual for the basic, universal requirements for herd and property biosecurity. Read the GOATBIO requirements alongside the JDMAP biosecurity (additional) requirements.



# DEFINITIONS

## ADULT ANIMAL

A goat 12 months of age and over.

## ANNUAL VETERINARY REVIEW

A review undertaken every year by the veterinarian to ensure that the herd has met the management requirements of the program. It includes examination of records, individual identification of animals at testing and records of goat movements on and off the property.

## APPROVED LABORATORY

A veterinary laboratory that is NATA accredited to ISO 17025 and is approved by the Chief Veterinary Officer of the State/Territory to carry out diagnostic tests for JD.

## APPROVED TEST

A test approved by the Sub-Committee on Animal Health Laboratory Standards (SCAHS) on behalf of Animal Health Committee.

## APPROVED VACCINATE GOAT

An approved vaccinate goat is identified by an NLIS vaccination tag and is either:

- vaccinated with an approved vaccine by 16 weeks of age, or
- in the written opinion of a veterinarian, vaccinated before any known exposure to JD infection.

## BARRIER

A physical separation which minimises the risk of environmental spread of infection. Suitable barriers include unstocked land, land grazed by non-susceptible species, tree lots, contour banks, solid walls or electric fence outriggers (capable of preventing nose-to-nose contact through the fence).

## CHECK TEST

A test to provide a low level of assurance that a herd is not infected with JD. Check Tested herds are **not** JDMAP assessed herds.

## CONTAMINATED LAND

Land that has been contaminated by the faeces of infected animals or herds and has not been satisfactorily decontaminated in accordance with a program that has been approved by the GoatMAP Administrator of the jurisdiction.

## **CULTURE**

Culture of tissues or faecal material by a method approved by the SCAHLS for the detection of *M. paratuberculosis*. The list of specimens to be submitted is found Appendix 1.

## **DISEASES OF CONCERN**

A disease of concern is the list of all goat diseases that have individual disease accreditation modules in GoatMAP. Currently this is Johne's disease and Caprine Arthritis and Encephalitis. GOATBIO accredited herds must not allow contact between their goats and goats from infected or suspect herds or eligible species with these diseases.

## **ELIGIBLE SPECIES**

While this program is primarily intended for goats, other species which can become infected with JD are classified as eligible species. For the JDMAP, other eligible species are cattle, deer, sheep and camelids. Where these species are run together or on the same land as goats, they must not be from herds known or suspected of being infected with JD. This should be recorded on the species equivalent of a National Goat Health Declaration.

## **FAECAL CULTURE**

Individual animal faecal culture or pooled faecal culture (PFC), conducted at an approved laboratory, may be used as the test for screening goats for the JDMAP module as an alternative to serological (blood) testing.

## **FOREIGN ANIMALS**

Foreign Animals are any Eligible Species (goats, sheep, cattle, deer) that may enter the property which originate from another herd or property of origin. These animals are subject to restrictions, quarantine and testing. Specifics are described in the relevant sections of this module.

## **GOATMAP ADMINISTRATOR**

A state department representative who is charged with administration of GoatMAP within the state according to the rules of the program and in line with animal health legislation in that state. A national representative may act where a state coordinator is not available.

## **GOATMAP VETERINARIAN**

A veterinarian who has signed an agreement accepting the responsibilities of and to undertake duties as required and described in the GoatMAP. Only a contracted veterinarian can provide veterinary services required by GoatMAP.

## **HERD**

The group comprising all goats and/or other eligible species that have grazed the land during a 12-month period and/or that have shared facilities, such as yards or a shearing shed. A herd may be run

on separate blocks of land that are not adjoining, however the movement of eligible animals between these blocks must be undertaken to comply with GoatMAP.

Where a new herd is established, it may enter the GoatMAP JDMAP module when it satisfies the requirements outlined in Element 1.

### **HERD STATUS CERTIFICATE**

A certificate issued to the herd owner by the GoatMAP Administrator. It describes the status of the herd following its most recent assessment by the veterinarian and is valid for 12 months or may be revoked at any time for non-compliance.

### **HISTOPATHOLOGICAL EXAMINATION**

An examination of a range of tissues in accordance with the Australian and New Zealand Standard Diagnostic Procedures (ANZSDPs) for Johne's Disease or as determined by the Sub-Committee on Animal Health Laboratory Standards (SCAHLs) in the meantime using procedures recommended and documented by SCAHLs. The list of specimens to be submitted is found in Appendix 1.

### **INFECTED ANIMAL**

An animal which has had JD confirmed by faecal culture, tissue culture or histopathology.

### **LAND**

The area of land including yards and other facilities on which the herd is run.

### **MAINTENANCE TEST**

A test undertaken on fifty (50) goats in the herd to maintain the current herd status (See Element 6). This may be undertaken as an alternative to a Sample Test in an JDMAP accredited herd. The selected goats are chosen to maximise the probability of detecting infection if it is present in the herd; this is not a random sample of the herd but a targeted sample of goats.

### **MATING AREA**

An area of land, separate to the quarantine area, described in the herd management plan that is used only for the purposes of supervised mating with visiting goats. This land will not otherwise be used by the herd.

### **MOB**

A discrete group of goats, often of similar age or sex that are run together within a herd.

### ***Mycobacterium avium ssp paratuberculosis***

The scientific name of the bacteria that causes Johne's disease. Sometimes shortened to *M. paratuberculosis*.

### **NEIGHBOURING PROPERTY**

Any landholding which adjoins land on which an assessed herd is run.

### **POOLED FAECAL CULTURE (PFC) TEST**

The pooling of faecal samples from 25 goats into a single pool that is then cultured to detect infection. The PFC is used within the Sample Test which tests a statistically significant sample of sheep over two years of age in the flock. A positive pool test is followed by appropriate individual testing to determine the flock status.

### **PROPERTY DISEASE MANAGEMENT PLAN (PDMP)**

A plan conducted by the owner in conjunction with a veterinarian, to eradicate JD in an infected herd.

### **QUARANTINE AREA**

An area of land or a building in which animals entering the herd can be held in isolation from the herd. This site is not accessed by the resident herd

### **REACTOR**

An animal which is positive to an approved serological test.

### **SAMPLE TEST**

Testing of all or of a representative sample of the adult herd (large herds) using an approved blood serological test or by pooled faecal culture (PFC) test, that is promptly followed by confirmatory testing of any reactors or positive pools. A Sample Test is used to establish or progress herd JDMAP status. The goats to be tested are selected from the herd in accordance with Element 6. A sample test is positive only if infection is confirmed in the herd.

### **SEROLOGICAL TEST**

The approved (by the SCAHLS on behalf of Animal Health Committee and conducted at an approved laboratory) JDMAP serological screening tests for goats are the agar gel immune-diffusion (AGID) and enzyme-linked immunosorbent assay (ELISA), adapted for goats.

# ELEMENT 1: ENTRY REQUIREMENTS, HERD STATUS AND PROPERTY/HERD RISK ASSESSMENT

The herd's eligibility to participate in and remain in the JDMAP must be established and reviewed regularly.  
Procedures must be put in place to minimise the risk of infection of the JDMAP herd from introduced or neighbouring stock or contaminated water or faeces. These procedures need to be reviewed regularly.

Refer to **GOATBIO Element 1** for more details on the fundamental biosecurity requirements of GoatMAP.

Specific components relevant to JDMAP are described below.

## BIOSECURITY ONGOING RISK ASSESSMENT

In addition to meeting the requirements of GOATBIO, there are specific additional requirements for JDMAP. You must also consult with your GoatMAP Veterinarian, for the conduct of ongoing testing and to participate in an Annual Veterinary Review to meet the requirements of GOATBIO and JDMAP specifics listed within your Herd Management Plan. The tasks that you and your GoatMAP Veterinarian need to undertake for your accreditation can be found on the [AHA website](#).

The list of Eligible Species (species susceptible to Johne's disease) within JDMAP includes farmed and feral goats, deer, sheep, cattle, or camelids.

The minimum required stock-free period for land grazed by eligible species of unknown or lower JDMAP status is 12 months. Property in cooler climates should consider remaining stock-free for two consecutive summers.

## 1. DETERMINING HERD STATUS

When your herd has met GOATBIO requirements, you may apply for entry into GoatMAP. If successful, you can then seek to obtain an initial JDMAP herd status. Your GoatMAP Veterinarian will determine herd testing requirements by reference to the program guidelines. Considerations for your specific testing requirements will include whether the herd is:

- new to JDMAP
- assembled from existing JDMAP-accredited herds
- re-entering JDMAP

## ALLOCATING THE INITIAL STATUS OF NEW JDMAP HERDS

When your herd first enters JDMAP it's status will be Non-Assessed (NA) unless the herd was recently tested with negative results and has a status such as Check Tested (CT). Figure 1 describes how herd status is assigned.

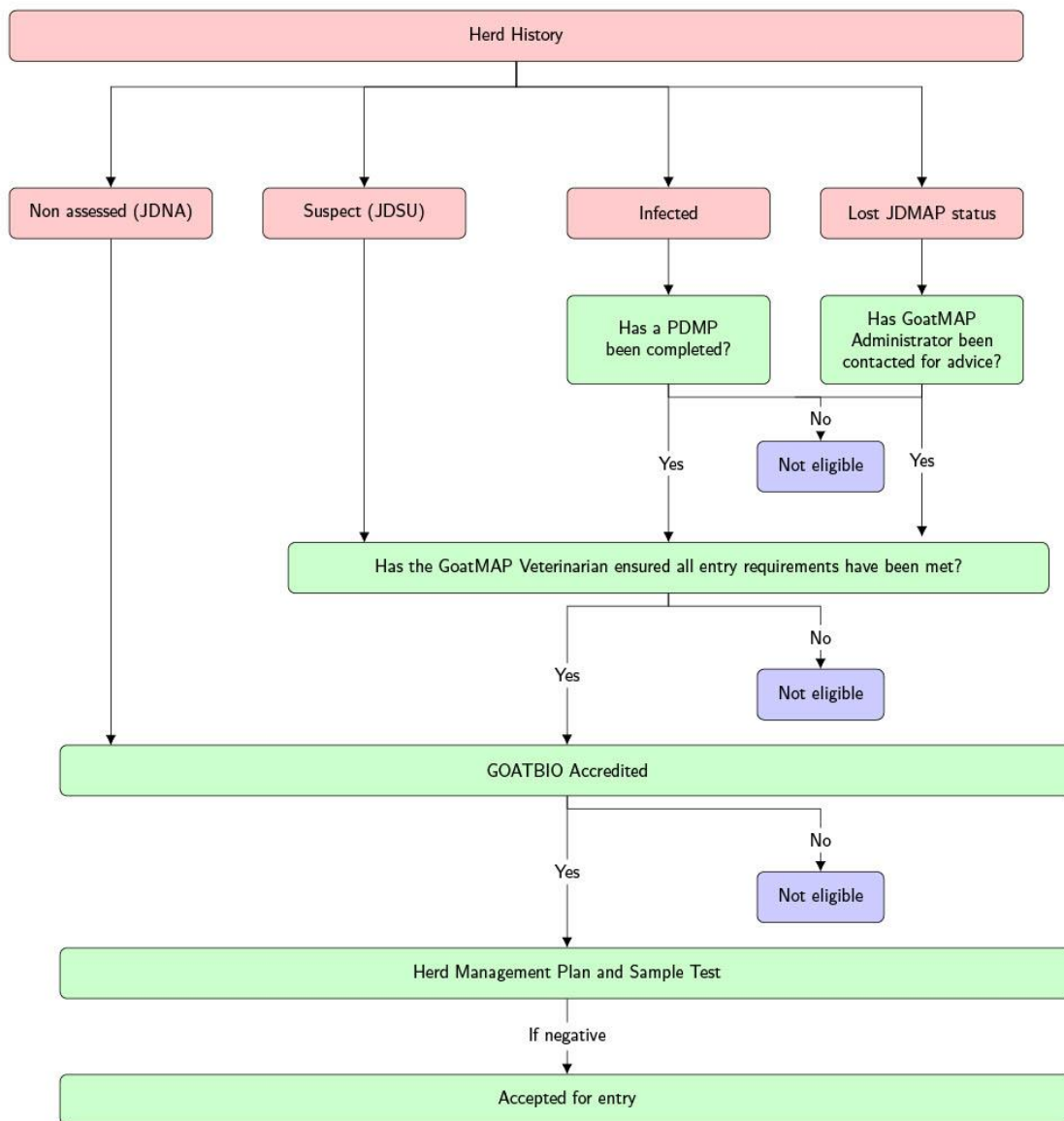


Figure 1. Assigning JDMAP herd status.

**MAINTAINING HERD STATUS**

You may choose to maintain your herd status at the current level. All herds must undertake an Annual Veterinary Review to maintain their status.

To remain in JDMAP the standard interval for testing to progress from JDMN1<sub>x</sub> to JDMN2<sub>x</sub> is two years (22-26 months). However, if you need the testing to coincide with the testing of a herd or herd of another eligible species in another MAP, sample testing between 10 and 26 months is permitted to progress to JDMN2<sub>x</sub>.

Further negative testing three to four years after the initial test and conducting an Annual Veterinary Review is required for the herd to progress to JDMN3<sub>x</sub>.

**UNVACCINATED HERDS**

To maintain JDMN1<sub>x</sub> or JDMN2<sub>x</sub> status in an unvaccinated herd, a Maintenance Test must be undertaken 22-26 months after the previous negative Sample or Maintenance Test.

To maintain JDMN3<sub>x</sub> status in an unvaccinated herd, a Maintenance Test must be undertaken 34-38

months after the previous negative Sample or Maintenance Test.

These conditions also apply in JDMNn-V<sub>x</sub> herds where not all goats are vaccinated.

### **VACCINATED HERDS**

A herd in which some or all goats have been vaccinated using Gudair® vaccine is identifiable by its JDMNn-V<sub>x</sub> status

A herd in which **all** goats are Approved Vaccinates can maintain its current herd status by undertaking vaccination of all kids before they reach 16 weeks of age and undertaking an Annual Veterinary Review. In these herds all long-term introductions to the herd must also be Approved Vaccinates. Non vaccinated goats may become Approved Vaccinates if they originate from a JDMAP herd and are then vaccinated when greater than 16 weeks of age.

### **EVENTS AFFECTING STATUS**

If you become aware of anything that may affect the status of your JDMAP herd, such as the entry of strays from infected neighbours or movement of goats from or to a herd that subsequently tests positive for JD, you must immediately advise the GoatMAP veterinarian. They will advise you on testing requirements and will advise the GoatMAP Administrator who will initiate an investigation into the potential effect on the herd's status.

The veterinarian must notify the GoatMAP Administrator promptly of any events or test results that adversely affect the MAP status of the herd.

Figure 2 below outlines how your herd can progress or maintain its JDMAP status.

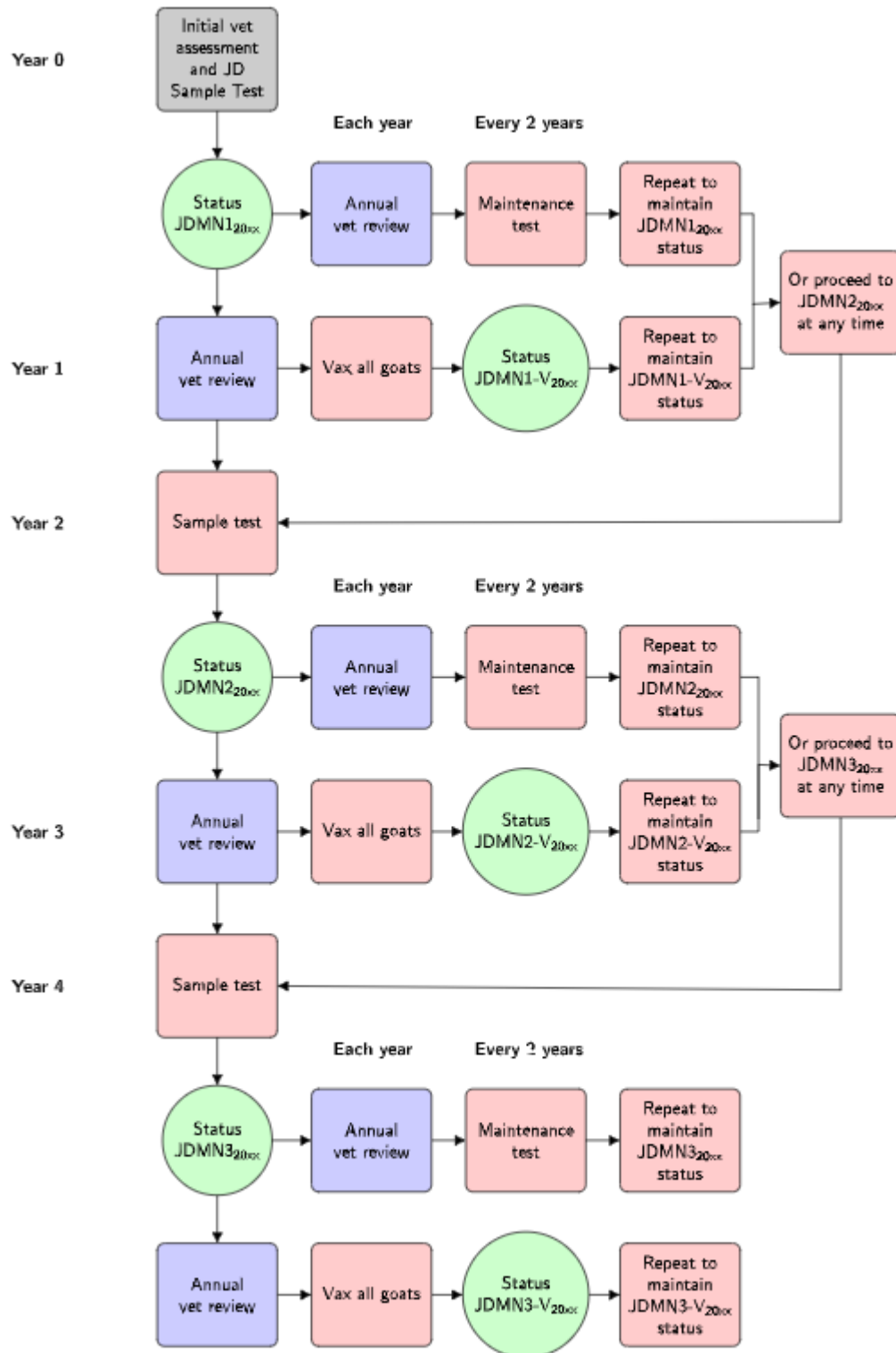


Figure 2. Steps to maintain or progress your JDMAP status



## ELEMENT 2: INTRODUCED LIVESTOCK (INCLUDING STRAYS)



You must follow the GoatMAP biosecurity requirements described in GOATBIO when you introduce susceptible animals into your herd. Introduced animals must be appropriately identified and recorded and the records kept that allow tracing.

General requirements for introduction of livestock are presented in **GOATBIO Element 2**. Specific extra requirements as they pertain to JDMAP are presented below.

### 1. WHICH ANIMALS CAN BE INTRODUCED?

In addition to GOATBIO requirements for introduction, it should be noted that *Mycobacterium avium ssp paratuberculosis* can be secreted into semen and uterine fluids of animals with advanced JD. Such goats should not be used for semen collection and all embryos should be washed according to international standards. Embryo recipients must not be introduced to a herd unless they comply with movement requirements.

#### INTRODUCING GOATS

In addition to GOATBIO requirements for introduced goats all introduced adult goats (over 12 months) must be tested prior to introduction as follows:

Table 1. JDMAP Testing requirements for introduced goats.

YOUR HERD'S STATUS	ORIGINATING HERD'S STATUS	TEST
JDMN3 <sub>x</sub>	JDMN2 <sub>x</sub>	Negative ELISA, AGID <b>or</b> individual or pooled faecal culture. If ELISA or AGID is positive, follow-up by negative faecal culture.
JDMN2 <sub>x</sub>	JDMN1 <sub>x</sub>	Negative ELISA, AGID <b>or</b> individual or pooled faecal culture. If ELISA or AGID is positive, follow-up by negative faecal culture.
JDMN1 <sub>x</sub>	Check Tested (JDCT)	Negative AGID or ELISA <b>and</b> negative individual or pooled faecal culture (i.e., in parallel).

x is the year that the herd first attained JDMN1 status

The introduced goats must be retested (in addition to the selected sample) at the first Annual Veterinary Review or Sample or Maintenance Test whichever falls 12 months or more after the introduction.

If introduced goats are under 12 months of age, they are not tested prior to introduction. The tests described above must be done when they are 12-18 months old. They are then retested (in addition

to the selected sample) at the first Annual Veterinary Review or Sample or Maintenance Test which falls 12 months or more after the introduction.

### SHORT TERM INTRODUCTION OF YOUNG GOATS

You can introduce any number of young animals (under 18 months of age) for a limited period if you have the prior written approval of your GoatMAP veterinarian and the goats originate from:

- JDMAP assessed herds (including those of a lower JDMAP status)
- herds that are Check Tested
- And there is no evidence for the presence of a Disease of Concern within the source herd.

These animals must leave the land:

- before kidding
- before reaching 18 months of age, or
- if there are no reliable records of age before the eruption of any permanent incisor teeth.

Whichever occurs first.

Herd goats must not graze land on which these short-term introductions have grazed for at least 12 months after the introductions have been removed.

Short term introductions may use the same handling yards as the JDMAP herd but must use separate holding yards.

### INTRODUCING YOUNG CATTLE FOR SHORT-TERM REARING OR FINISHING

You can introduce young cattle (under 2 years of age) for a limited period if:

- you have the prior written approval of your GoatMAP veterinarian
- the cattle are not suspected of being infected
- the cattle are from a J-BAS 6 or greater herd or
- the cattle entering a JDMN1 or JDMN2 goat herd are from cattle herds that are JD Dairy Score 7 or greater.

These cattle must leave the land before:

- calving
- reaching two years of age, or
- eruption of any permanent incisor teeth in the absence of reliable age records.

Whichever occurs first.

Goats under 12 months of age in the assessed herd must not graze the land grazed by the above low risk cattle introductions for at least 3 months after their removal.

These young cattle may use common handling yards but must use separate holding yards.

Short-term introductions of **sheep** of an equivalent or higher Johne's disease MAP MN status are allowed under this program. There is no camelid equivalent, but Herd managers should ask for assurance with any camelids introduced, e.g. a National South American Camelid Declaration and Waybill.

## SHORT-TERM INTRODUCTIONS FOR HAND-MATING

You must comply the with GOATBIO **Element 2 biosecurity** requirements.

## 2. RECORD KEEPING

You must comply the with GOATBIO **Element 2** biosecurity requirements.

Remember to take necessary actions and make records if any goats that are not part of the JDMAP herd or any deer, sheep, cattle, or camelids enter the land (e.g., strays or neighbours' stock).

Herds which have feral goats and deer roaming onto the property must consider the risks posed by these animals. Their risk can be assessed indirectly using test results for the domestic herd and by the status of any neighbouring herds, including herds that neighbour the property through which they stray.

## ELEMENT 3: MOVEMENT OF ASSESSED ANIMALS



Management must minimise risk of infection in goats from JDMAP herds when they are moved to, or from the property, if the JDMN<sub>x</sub> status of the animals is to be retained, either for return to the herd, or onward sale or movement.

You must follow the general **GOATBIO Element 3** requirements for movement of assessed animals. While goats from the JDMAP herd are being moved, you must ensure that their access to grazing and drinking from potentially contaminated sources is minimised.

The minimum required stock-free period for land grazed by eligible species of unknown or lower JDMAP status is 12 months. Properties in cooler regions should consider remaining stock-free for two consecutive summers.

You must obtain written statement from the owner/manager of the land your goats will be moved to that it has not been stocked with eligible species of lower status during the past 12 months and that the land is not contaminated land.

## ELEMENT 4: LIVESTOCK IDENTIFICATION



Livestock identification and recording systems must be implemented in JDMAP herds so stock can be traced both within the herd and following dispatch from the herd. Livestock identification requirements have been described previously and are common to all disease modules

See GOATBIO **Element 4** for these general biosecurity requirements.

JDMAP testing requires that individual animals are identifiable, at least between sample collection and when test results become available. If individual permanent identification of all animals in the herd is not used, every tested animal must be individually identified at least until test results have been processed and acted upon.

## ELEMENT 5: HERD MANAGEMENT PLAN



A Herd Management Plan must be prepared for each herd enrolled in the JDMAP according to GoatMAP.

See GOATBIO **Element 5** for these biosecurity requirements.

You must specifically manage the exposure of your goat herd to other Johne's disease-bearing species. The list of Eligible Species (susceptible to Johne's disease) for JDMAP includes farmed and feral goats, deer, sheep, cattle, or camelids. Exposure can be by:

- agistment of your goats to other properties and exposure to susceptible species/contacted land
- Introduction of susceptible species to your herd or land
- Feral animal movements, strays or neighbours' stock (susceptible species).

The exposure risk from Eligible Species contact must be assessed independently as being low risk for introduction of Johne's disease. This can be in the form of a Health Declaration relevant to the species.

Your GoatMAP Veterinarian may give an exemption if there are three (3) or fewer animals of another Eligible Species if:

- these animals are not sold or moved off the land with a declared or implied JDMAP status
- the introduction, management, and monitoring of these animals complies with all requirements of GOATBIO, and specifically JDMAP
- they are tested using an approved test for control of the disease in the species at the same time as the goat herd is tested to maintain or progress status. Consult with your GoatMAP Veterinarian to ensure an appropriate testing regime is used (module specific).



## ELEMENT 6: TESTING STRATEGIES

You must test a representative sample of the herd before it gains a status as a JDMAP herd (Sample Test). Further testing is required (Maintenance Test) to provide ongoing monitoring of the status of the herd.

### 1. GETTING STARTED

It is your responsibility to arrange for the veterinarian to test goats in the herd at the times required by JDMAP.

Well ahead of the date you have agreed for testing:

- ensure your yards are adequate for conducting the tests
- ask your veterinarian which goat classes (and any other relevant species) are required for testing
- arrange the initial test requirements with your veterinarian – date, time, number of mobs to be sampled, number of animals in each mob to be sampled.

On the day(s) the samples are to be collected, ensure your goats are yarded in time and ready for sampling.

When your herd is first enrolled in JDMAP a representative sample (Sample Test) of the goats in the herd is undertaken. Once the herd has been given a JDMAP status it requires ongoing testing and an Annual Veterinary Review to maintain herd JDMAP status or to progress to a higher status. There are two types of testing in JDMAP:

- **Sample Test.** Sample Testing is done when a herd enrolls in the JDMAP. A Sample Test is also required for the herd to progress to a higher status
- **Maintenance Test.** Maintenance Testing monitors the ongoing disease status of a JDMAP herd so that it can maintain its current status.

Table 2 summarises the testing program.

You must ensure that adequate goat handling facilities are available for herd testing and that a suitable livestock identification system is in place to record the identities of the goats tested.

Table 2. JDMAP types of testing and requirements for status.

CURRENT STATUS	REASON FOR TEST	TYPE OF TEST
Non-Assessed (JDNA)	Enrol in JDMAP	Sample test
Check Tested (JDCT)	Enrol In JDMAP	Sample test
Suspect (SU), approved by GoatMAP Administrator	Enrol in JDMAP	Test of all goats 12 months of age or older
JDMN1 (-V) <sub>x</sub>	Progress to JDMN2 (-V) <sub>x</sub>	Sample test
JDMN2 (-V) <sub>x</sub>	Progress to JDMN3 (-V) <sub>x</sub>	Sample test
JDMN1 <sub>x</sub>	Maintain JDMN1 <sub>x</sub> status	Maintenance Test
JDMN2 <sub>x</sub>	Maintain JDMN2 <sub>x</sub> status	Maintenance Test
JDMN3 <sub>x</sub>	Maintain JDMN3 <sub>x</sub> status	Maintenance Test
JDMN1-V <sub>x</sub> with all goats Approved Vaccinates	Maintain JDMN1 <sub>x</sub> status	Continuing approved vaccination program
JDMN2-V <sub>x</sub> with all goats Approved Vaccinates	Maintain JDMN2 <sub>x</sub> status	Continuing approved vaccination program
JDMN3-V <sub>x</sub> with all goats Approved Vaccinates	Maintain JDMN3 <sub>x</sub> status	Continuing approved vaccination program
x is the year the herd first attained JDMN1 status		

## 2. SAMPLE TESTING

A Sample Test involves testing all the adult herd or, in very large herds, a representative sample (that is a number large enough to accurately represent the herd). A negative Sample Test provides a high level of assurance that the goats have a low risk of being infected with JD.

Sample Testing is required when a herd enrolls in the JDMAP and when you want the herd to progress to a higher MAP status.

### HOW IS THE TESTING DONE?

Sample tests can be done using Pooled Faecal Culture (PFC) Tests or a serological screening test (ELISA or AGID) on blood. See Appendix 1.

### POOLED FAECAL CULTURE (PFC)

The PFC test is approved for Sample and Maintenance Tests in JDMAP. A PFC comprises screening of the pooled samples in liquid culture (M7H9C) with additional testing of any positive pools. The status of all animals contributing to a positive pool must be clarified before herd status can progress.

## SEROLOGICAL SCREENING

Testing involves a serological screening test (ELISA) on blood. The test is unlikely to detect infection in animals younger than 12 months so only goats over that age are tested. Any animal that returns a positive result on the ELISA (called reactor) is investigated either by culturing of a faecal sample or by slaughter and a laboratory examination of samples collected at a post-mortem.

## INITIAL SAMPLE TEST

The Initial Sample Test is the test conducted when the herd first enrolls in JDMAP. Test samples are collected from all goats at or older than 12 months of age, no matter how long they have been part of the herd. All introduced bucks 12 months of age or older must be tested. Where the testing is done by PFC, these bucks must be tested as a separate additional pool. If the Sample Test returns any positive results, they are investigated further.

How many animals are tested depends on two factors:

- **The size of the herd**  
Herds with fewer than 450 animals over 12 months of age (if using PFC) or fewer than 425 animals (if using serology testing) must submit all eligible goats for testing. In larger herds, a sample of eligible goats are selected and tested up to a maximum of 500 for serology and 450 for PFC. The number of animals to be selected and the method of selection are covered in Appendix 1.
- **The status of the herd**  
In a Suspect herd, **all** animals over 12 months of age must be included in the initial Sample Test, irrespective of the size of the herd.

## SUBSEQUENT SAMPLE TESTS

The first negative Sample Test determines the herd's initial JDMAP status. Subsequent (negative) Sample Tests are required to progress to higher JDMAP status. To move to the next higher herd status, you must arrange a Sample Test 22–26 months after the previous Sample Test or Maintenance Test.

## SELECTING THE GOATS TO BE TESTED

It is the owner's responsibility to arrange for veterinary sampling at a suitable time.

The selection of goats for both pooled faecal culture and serological testing must conform with the following:

- The sample is selected from all goats that are 12 months of age and older
- All goats over 12 months of age are tested in herds with fewer than 450 adult goats
- A sample of goats over 12 months of age are tested in herds with more than 450 adult goats. The actual number required depend on herd size. This is described in **Appendix 1**.
- All introduced bucks 12 months of age and older are to be included in the sample (as a separate pool)
- Any breeding goats introduced to the herd from a herd of a lower status must be tested unless it is more than 4 years since they were introduced, or the herd of origin has since achieved the same herd status.

If using serological testing, you should **not** include females if they are expected to kid in the next 30 days or have kidded in the last 30 days (Serological tests during this period may be unreliable). Seek veterinary advice on appropriate tests for vaccinated herds.

You should select the goats to be sampled to include any in poor condition and then select the remainder systematically. A procedure and form for selecting and recording goats for testing is available electronically on the [AHA website](#). It is not compulsory to use this form. Remember, if you choose to use an alternative format, all the required information must be recorded.

The goats selected must be individually identified prior to the collection of samples and **must remain individually identifiable**. An example of a format for keeping these records is available electronically on the [AHA website](#). It is not compulsory to use this form. Remember, if you choose to use an alternative format, all the required information must be recorded.

Your GoatMAP Veterinarian will assist with selecting goats to be tested (see **Appendix 1** on selecting goats for Sample Tests).

### 3. MAINTENANCE TESTING

Maintenance Testing is used to monitor the ongoing disease status of your JDMAP herd if you do not wish to progress to a higher JDMAP status. Table 3 sets out how often you must undertake Maintenance Testing.

Table 3. JDMAP maintenance testing requirements.

CURRENT STATUS	TESTING REQUIRED*
JDMN1 <sub>x</sub> or JDMN2 <sub>x</sub>	Maintenance Test every 2 years after the previous Sample Test or Maintenance Test
JDMN3 <sub>x</sub>	Maintenance Test every 3 years after the previous Sample Test or Maintenance Test

\* Remember whether your herd is maintaining or progressing in JDMAP status an Annual Veterinary Review must be undertaken each year

The Maintenance Test is conducted on 50 goats from the herd that are selected to maximise the chance of including animals most likely to be infected and most likely to react to the test. This includes:

- animals in poor condition
- older animals
- introduced animals, taking into consideration the herd and the zone/region they came from, their contact with other potentially infected herds and any other relevant information.

If you do not have any goats in these high-risk groups, the sample should be selected systematically from all mobs in the herd.



You should select the goats to be tested in consultation with your veterinarian. **Appendix 1** gives an example of a selection method.

A Maintenance Test is deemed to be negative if:

- All selected goats test negative with either the PFC, or the ELISA, or AGID or individual faecal culture.

Any positive serological test is followed up with further testing and found to be negative.

## 4. TESTING INTRODUCED GOATS

If you introduce goats into your JDMAP herd from a herd with a lower JDMN status, or to JDMN1 herds from a herd not in JDMAP as permitted in Element 2, you should follow the testing protocols set out above in Element 2

## 5. TESTING OUTCOMES

**NOTE:** You cannot dispose of tested goats until test results are confirmed as negative by follow-up investigations. Where possible, sampled goats should be run as a group separated from the rest of the herd until the test results are known.

### WHAT CONSTITUTES A NEGATIVE TEST?

A Sample or Maintenance Test is deemed to be negative if:

- all goats tested are negative, or
- all reactors (animals which test positive) are followed up by faecal culture and test negative or slaughtered for post-mortem examination and histopathology (with tissue culture) are found to be negative.
- A Sample or Maintenance Test conducted using PFC is deemed to be negative if:
  - all pools are negative on liquid culture (M7H9C) (PFC negative)
  - all positive liquid culture (M7H9C) pools are negative on Polymerase Chain Reaction (PCR) and solid media subculture, or
  - all positive liquid culture (M7H9C) pools which are PCR positive but negative on solid media subculture are negative on follow up testing.

### WHAT MUST YOU DO IF YOU GET A POSITIVE TEST RESULT?

If the blood or PFC tests done as part of herd Sample or Maintenance test yield a positive result, you must undertake the follow-up investigation with your GoatMAP Veterinarian within one month of the date of the laboratory results, unless the GoatMAP Administrator agrees to a different timeframe. Any goat with a positive result should be quarantined in a special area until the investigation is completed. The procedures are outlined in **Appendix 1**. Provided this follow-up occurs, the status of the herd will not change until the follow-up investigation is completed. However, if these timeframes are not met, the herd status will become Suspect (JDSU).

### EFFECTS OF TEST RESULTS ON HERD STATUS

The outcome of the combined results of the **serological** (blood) screening test and positive test follow-up investigation requirements on herd status is presented in table 4.

Table 4. JDMAP serological results and corresponding herd status.

SEROLOGICAL SCREENING TESTING	INDIVIDUAL FAECAL CULTURE OR POST MORTEM EXAMINATION (including tissue/faecal culture)	RESULT	HERD STATUS
Negative	Not required	Negative	Progress status (if Sample Test) Maintain status (if Maintenance Test)
Positive	Negative	Negative	Progress status (if Sample Test) Maintain status (if Maintenance Test)
Positive	Not conducted	Suspicious test (SUSPECT)	Suspect
Positive	Positive	Positive test (INFECTED)	Infected

The outcome of the combined results of the **PFC** screening test and repeat faecal culture tests on herd status is presented in table 5.

Table 5. JDMAP PFC results and corresponding herd status.

POOLED FAECAL CULTURE	REPEAT FAECAL CULTURE	RESULT	HERD STATUS
Negative liquid culture (M7H9C)	Not required	Negative test	Progress status (if Sample Test) Maintain status (if Maintenance Test)
Positive liquid culture (M7H9C); positive PCR; negative on solid media i.e., 'DNA consistent with <i>M. ptb</i> '	Negative liquid culture (M7H9C)	Negative test	Progress status (if Sample Test) Maintain status (if Maintenance Test)
Positive liquid culture (M7H9C); positive PCR; negative on solid media i.e., 'DNA consistent with <i>M. ptb</i> '	Positive liquid culture (M7H9C); positive PCR; negative on solid media i.e., 'DNA consistent with <i>M. ptb</i> '	Suspicious test (JDSUSPECT)	Suspect
Positive liquid culture (M7H9C); positive PCR;	Positive liquid culture (M7H9C); <i>M. ptb</i> isolated on solid	Positive test (JDINFECTED)	Infected

negative on solid media i.e., 'DNA consistent with <i>M. ptb</i> '	media subculture; PCR positive (to either radiometric culture or subculture)		
Positive liquid culture (M7H9C); <i>M. ptb</i> isolated on solid media subculture; positive PCR (either M7H9C or subculture)	Not required	Positive test (JDINFECTED)	Infected

If an infected goat is detected at any stage of the testing process, the herd status will become 'Infected', and the herd is withdrawn from JDMAP.

If a herd is withdrawn from JDMAP, all animals which were serological reactors must be permanently identified. You and your GoatMAP Veterinarian must notify the GoatMAP Administrator and investigate all reactors according to the requirements of the policy in your state.

### TESTING AS PART OF THE ANNUAL VETERINARY REVIEW

Your JDMAP herd must undergo an Annual Veterinary Review each year to remain in the program. Sample or Maintenance testing is undertaken in conjunction with the Annual Veterinary Review in non-vaccinating herds. In all herds you should contact your veterinarian as soon as possible to investigate and test any animals that show signs of JD. Do not wait until the Annual Veterinary Review.

JDMAP herds must investigate any goat that shows clinical signs of JD and dies or requires euthanasia. Investigation should be by post-mortem with the full range of specimens submitted to a laboratory for histopathology and tissue/faecal culture.

## ELEMENT 7: VACCINATION



To help protect the herd, approved vaccination may be undertaken using Gudair® vaccine. JDMAP herds that are fully vaccinated can maintain their current JDMAP status by Annual Veterinary Reviews and approved vaccination of young kids and introduced unvaccinated goats. To advance an JDMN-V status, herds must undertake a Sample Test with negative results.

**CAUTION:** *Gudair® can cause chronic inflammation and should be handled and used with care. Avoid accidental self-inoculation and seek medical attention immediately should this occur. See the vaccine package for further information and contact details.*

### 1. BACKGROUND INFORMATION

As a means of providing further assurance, you can vaccinate kids and goats in your JDMAP herd. If your JDMAP herd is at risk of infection from strays or animals from neighbouring herds, you are

encouraged to consider the added protection provided by vaccination with the killed vaccine, Gudair®.

If you vaccinate kids annually, in addition to complying with JDMAP, your herd will be assigned the relevant JDMAP status with a V added to it (e.g., JDMN1-V<sub>x</sub>, JDMN2-V<sub>x</sub>) followed by the year in which the herd first attained JDMN1 status. For example, JDMN2-V<sub>2007</sub> indicates a Monitored Negative 2 herd which first attained JDMN1 status in 2007 and subsequently all eligible goats have been vaccinated and all kids are vaccinated annually. Once vaccination commences in a herd, advances in status can only be achieved using PFC. A plan needs to be developed and documented with your veterinarian about how long the vaccination is going to continue in the herd.

You can maintain the JDMNn-V<sub>x</sub> status of your approved vaccinated herd by:

- initial approved vaccination of all goats and
- Annual Veterinary Reviews and
- annual vaccination of kids and
- only Approved Vaccinates being introduced to the herd
- Only approved introductions for mating.

If all eligible goats in the herd are Approved Vaccinates you do not need to undertake Maintenance Testing to maintain herd status. However, you must investigate any animals that display signs of JD.

## 2. VACCINATION REQUIREMENTS

If you choose to vaccinate your existing JDMAP herd, you must carry out the following steps to comply with the program:

- Vaccinate all goats in the herd initially if you intend to maintain the MN status of the herd by Annual Veterinary Reviews and vaccination (i.e., no need for Maintenance Testing)
- Vaccinate all kids born on the property each year before the oldest kids are 16 weeks of age
- Ensure all introductions to the herd are Approved Vaccinates
- Tag all vaccinated animals with an Approved Vaccination tag (if available)
- Maintain vaccination records detailing the number and type of goats vaccinated and the method of identification. A suggested format is available electronically on the [AHA website](#). It is not compulsory to use this form. Remember, if you choose to use an alternative format that all the required information must be recorded
- Retain copies of all Vendor Declarations that state that goats sold or moved to and from the herd have been Gudair™ vaccinated.

## ELEMENT 8: MAINTAINING YOUR JDMAP SYSTEMS



Record keeping requirements have been described in GOATBIO Periodic internal reviews are required to verify ongoing compliance with JDMAP.

See **GOATBIO Element 8** for these biosecurity details.

## APPENDIX 1: TESTING STRATEGIES

Testing is to be done by the GoatMAP Veterinarian. Testing must occur on a representative sample of the herd to ascertain the status of the herd prior to accreditation as a JDMAP herd, and to provide regular ongoing monitoring of the status of the herd.

The goats to be tested in the herd must be selected so that there is 95% confidence of detecting disease if it is present in 2% of the goats aged 12 months and over in the herd.

The goats selected must be individually identified prior to the collection of blood or faecal samples and **must remain individually identifiable until final results are obtained** (i.e. the system must persist for at least three months). An example of a format for keeping these records is available electronically on the [AHA website](#). It is not compulsory to use this form. Remember that if you choose to use an alternative format, all the required information must be recorded.

In a Suspect herd, **all** animals over 12 months of age must be included in the Initial Sample Test, irrespective of the size of the herd.

### 1. SEROLOGICAL SCREENING

The selection of animals for these tests needs to be made as follows:

- The sample is selected from all goats that are 12 months of age and older.
- In a herd with fewer than 425 over 12 months of age, all goats must be tested.
- In larger herds, a sample is selected and tested according to **Table A1**. The maximum number of animals in very large herds that are screened by serology is 500.
- All introduced bucks 12 months years of age and older are to be included.
- Females that are expected to kid in the next 30 days or have kidded in the last 30 days should **not** be included (serological tests during this period may be unreliable.) If the herd has fewer than 425 adult goats it may be appropriate to test these animals later.
- In addition to the calculated sample size, any breeding animals introduced to the herd from a herd of a lower status (e.g. in an JDMN2<sub>x</sub> herd from an JDMN1<sub>x</sub> herd) must be tested unless it is more than 4 years since they were introduced, or the herd of origin has since achieved the same herd status.
- Calculate the proportion of the herd represented by each mob.
- For each mob calculate the number to be sampled by multiplying the proportion of the herd that it represents by the total number of goats to be sampled. For example, in a herd with 900 goats over 12 months old, a total of 460 goats must be sampled. The herd includes a mob of 300 aged does. As these represent one-third of the herd, the number of aged does to sample from this mob would be  $0.333 \times 460 = 153$ .
- Within each mob the goats to be sampled should be selected by an unbiased method unless there are obviously unthrifty animals in the mob in which case the sample should be biased to include them. These low condition animals should be chosen first and the balance of the mob selected systematically by drafting off every  $n^{\text{th}}$  goat that comes up the race.

In the above example, assume that there were 11 unthrifty does in the mob. These are included in the sample of 153, leaving 142 to select from the remaining 449 does i.e., about one in every three

does. To select the first doe to sample, select a number at random between one and three (inclusive). Sample that doe and then every third doe that follows up the race. Repeat a similar procedure in the other mobs to sample the total number of 460 goats.

Table A1. The number of goats (over 12 months of age) to be sampled from a herd using serology (i.e., the AGID or ELISA test) to provide 95% confidence of detecting infection at a prevalence of at least 2%.

NO OF GOATS OVER 12 MONTHS	SEROLOGY
425 or fewer	ALL
450	425
500	431
550	437
600	442
700	449
800	455
900	460
1000	464
1200	469
1400	474
1600	477
1800	479
2000	481
2200	483
2400	484
2600	485
2800	486
3000	487
3500	489
4000	490
5000	492
10000	496
Maximum	500

## 2. POOLED FAECAL CULTURE

The selection of animals for these tests needs to be made as follows:

- The sample is selected from all goats that are 12 months of age and older.
- Pools comprise single faecal pellets from each of 10 to 25 goats.
- The maximum number of animals in very large herds that are screened by PFC is 450.
- In a herd with fewer than 450 goats over 12 months of age, all these animals must be tested.
- All introduced bucks 12 months of age and older are to be included (as a separate pool).
- Any breeding animals introduced to the herd from a herd of a lower status (e.g. in an JDMN2 herd from an JDMN1 herd) must be tested unless it is more than 4 years since they were introduced, or the herd of origin has since achieved the same herd status.

The goats to be sampled should first include any in poor condition and then the remainder selected systematically. A procedure and form for selecting goats and recording those selected is available electronically from the [AHA website](#). It is not compulsory to use this form. Remember if you choose to use an alternative format that all the required information must be recorded.

## 3. FAECAL SAMPLE COLLECTION FOR POOLED FAECAL CULTURE SUBMISSIONS

- One faecal pellet is required from each goat selected for sampling. If no pellet can be collected, the animal should be identified, and collection attempted when the remaining goats in that pool have been sampled. Alternatively, a substitute sample from an additionally selected goat may need to be collected.
- Collect one pellet from each goat into a sterile plastic jar with a maximum of 25 and a minimum of 10 pellets per jar. Keep count of the number of pellets per jar and do not exceed 25. In herds with less than 450 adult goats, ensure all pools have faecal material from a minimum of 10 goats/pool. (For instance, if there are 358 goats to sample, collect 13 pools of 25 from 325 goats and two pools of between 10 and 25 from the remaining 33).
- Change gloves for collection of faeces between each pool to prevent cross-contamination of pools. Any lubricant that is used should ideally not be bactericidal or bacteriostatic, e.g. glycerine.
- To avoid contamination of a pool from a goat 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 goat has soft/watery faeces, collect an amount like a normal pellet.
- Ensure proper labelling of each pool to enable identification of goat which have contributed to that pool. Record ear tag number/colour or brand details for each group of goats 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 available online on the [AHA website](#).

It is not compulsory to use this form and veterinarians may wish to use an alternative recording format.

## 4. DISPOSAL OF TESTED ANIMALS

No tested goats may be disposed of until test results are confirmed as negative, or follow-up investigations are completed. Where possible, sampled goats should be run as a group separated from the rest of the herd until the test results are known.

## 5. INVESTIGATION OF SEROLOGICAL REACTORS

Sample or Maintenance Testing using serology involves screening, using the AGID or ELISA test. Reactors to these tests must be investigated to determine if the result is a true positive or a false positive.

The status of all reactors must be clarified before a herd's status can progress. No reactor may be disposed of, or slaughtered, unless it is done as part of a follow-up investigation by the GoatMAP Veterinarian.

Reactors must be identified and held in a secure quarantine area, preferably isolated, as soon as possible and must either be slaughtered for follow-up investigation (histopathology and tissue/faecal culture) or have a faecal culture undertaken within one month of the date of the positive serological result being reported.

A 'Test Results – Handling of Reactors Form' is available electronically on the [AHA website](#). It is not compulsory to use this form and veterinarians may wish to use to record the results in another format.

## 6. INVESTIGATION OF POSITIVE LIQUID CULTURE (M7H9C) POOLS

Sample or Maintenance Testing using PFC includes screening using liquid culture (M7H9C) and additional testing of any M7H9C positive pools.

The status of all animals contributing to a M7H9C positive pool must be clarified before a herd's status can progress. Pools are considered positive to the screening test if growth is detected in M7H9C culture. Positive pools require additional testing using:

- Polymerase Chain Reaction (PCR) on the M7H9C culture
- Subculture from the M7H9C sample onto solid media, and if necessary, additional PCR testing.

Pools which are confirmed positive on solid media, and which are PCR positive on either the M7H9C culture or the solid media subculture are definitive for *M. paratuberculosis* and result in a positive sample test (i.e., Infected).

If samples are positive on PCR or the M7H9C culture but negative on subculture on solid media, goats contributing to those pools must be identified and held in a secure quarantine area, preferably isolated, as soon as possible and must be subjected to a Faecal Culture Follow-up test, as set out below, within one month of the notification of a positive result, or within a timeframe agreed to by the program administrator.



No tested goats are to be disposed of or slaughtered unless it is done as part of a follow-up investigation by the GoatMAP Veterinarian, or the Sample Test has been completed.

## 7. FAECAL CULTURE FOLLOW-UP TEST

The Faecal Culture Follow-up Test must be carried out as follows:

### **PCR +ve, Solid media –ve, All goats present**

Where one or more pools are positive on PCR of M7H9C culture but negative on subculture on solid media and ALL goats which contributed to the relevant PFC pools are present:

- Collect blood and faecal samples from all goats in PCR positive/solid media subculture negative pool(s) and submitted for serology and PFC testing. Faecal samples must be submitted in pools of up to 25 (in the same groupings as occurred at the initial sampling).
- If any serological reactors are found in this test, the animals must be subject to autopsy and histological examination (and tissue/faecal culture) as set out in "Specimens to be Collected for Follow-up of Serological Reactors" below. Reactors may be sacrificed and examined immediately but if they can be held in isolation from the resident herd within the quarantine area, the autopsy may be delayed until natural death or subsequent euthanasia.
- If no serological reactors occur or all reactors are negative on histology AND the repeat faecal culture, the result will be considered as a negative Sample Test.
- If no serological reactors occur or all reactors are negative on histology AND the repeat faecal culture result is positive on PCR of M7H9C culture but negative on subculture on solid media, the result will be considered inconclusive and additional monitoring as determined by the GoatMAP Administrator will be required.
- If a goat is confirmed as positive on histological examination, tissue culture OR the repeat faecal culture results in the confirmation of *M.ptb* on solid media subculture AND by PCR, the Sample Test will be considered positive.

### **PCR +ve, Solid media –ve, All goats NOT present**

Where one or more pools are positive on PCR of M7H9C culture but negative on subculture on solid media and all goats which contributed to the relevant PFC pools are NOT present the Faecal Culture Follow-Up Test must be carried out as described above plus additional pools must be tested as detailed below:

- If one or two goats in a pool are unable to be located, one additional pool from the same mob(s) as the missing goat(s) must be tested as part of the Faecal Culture Follow-up Test.
- If between three and five animals in a pool are missing, two additional pools derived from the same mob(s) as the missing goat(s) must be tested as part of the Faecal Culture Follow-up Test.
- If the composition of the mob(s) which contributed to the PCR +ve, Solid Media –ve pool(s) containing missing goat(s) has changed, or if more than five animals in a pool are missing, a full Pooled Faecal Culture Sample Test (i.e., testing on seven pools of 25 goats) must also be conducted as part of the Faecal Culture Follow-up Test.
- The GoatMAP Veterinarian must ensure that where possible any deaths of sampled animals prior to results being available or a Faecal Culture Follow-up Test being initiated are investigated. It is important that adequate records are kept allowing further sampling of

goats from the appropriate mob if any animals are subsequently missing from follow-up testing.

Note: Where vaccinated animals are present in groups of goats that require a Faecal Culture Follow-Up Test, serological testing cannot be used.

## 8. SPECIMENS TO BE COLLECTED FOR FOLLOW-UP OF SEROLOGICAL REACTORS AND INVESTIGATION OF SUSPECT CASES

The standards for diagnosis of Johne's disease are determined by the Sub-committee on Animal Health Laboratory Standards (SCAHLs). The diagnostic techniques for Johne's disease are improving and, as necessary, SCAHLs will advise approved laboratories of changes to standard procedures and specimens to be examined. Follow up investigations must be conducted for:

- any goat that reacts to a serological test (reactor)
- goats that are members of a pool that is positive on culture and require further investigation as outlined above
- suspect clinical cases.

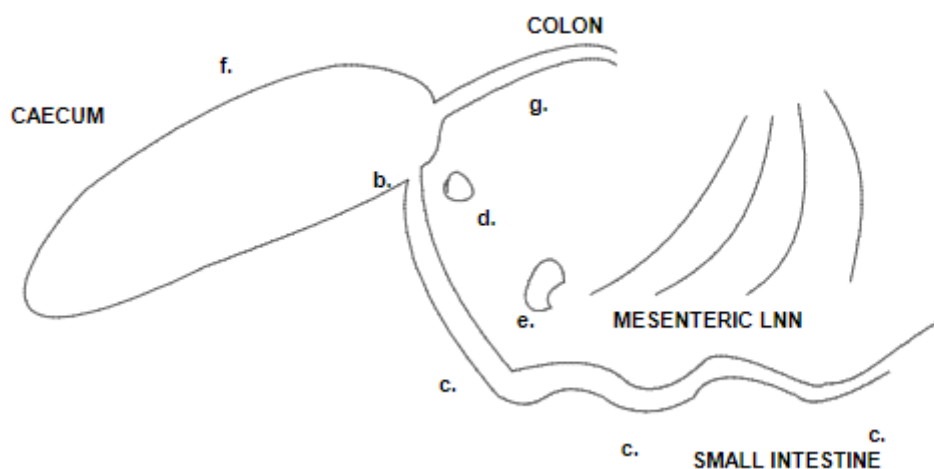
Where faecal culture is required, the following must be submitted to an approved laboratory:

1. fully completed specimen advice form, with full details of the history and post-mortem findings
2. faecal sample collected directly from the rectum of the goat using a clean glove into a sterile container. Submit the sample chilled but not frozen to the laboratory within 24 hours.

Where post-mortem examination is required, the following must be submitted to an approved laboratory:

1. fully completed specimen advice form, with full details of the history and post-mortem findings
2. blood sample
3. fresh samples for tissue culture and preserved samples for histopathology, after a thorough examination of the intestine and associated lymph nodes:
  - a) any tissues with gross lesions suggestive of Johne's disease
  - b) the entire ileo-caecal valve including the 5cm of ileum immediately adjacent to it
  - c) three additional 5cm pieces of small intestine taken at about one metre intervals anterior to the ileocaecal valve
  - d) ileocaecal lymph nodes
  - e) ileal (also called terminal mesenteric or caudal jejunal) lymph node
  - f) piece of caecum
  - g) piece of proximal colon
4. faeces for faecal culture as above.

## SITES FOR TISSUE SAMPLING



## TEST RESULTS

The following details must be retained by the GoatMAP Veterinarian:

- The name of the testing laboratory
- Details of all samples submitted for laboratory testing
- The laboratory test results.

The GoatMAP Veterinarian must provide the herd manager with a copy of the test results.

A 'Test Results Form' is available in the Resources and Forms document and on the [AHA webpage](#). It is not compulsory to use this form. The GoatMAP Veterinarian may use a different format to record results, provided that all the required information is included.

## INVESTIGATION OF GOATS WITH CLINICAL SIGNS

If animals are showing clinical signs consistent with Johne's disease, a thorough post-mortem examination of the intestine and associated lymph nodes is required. The samples collected should be biased towards tissues with gross pathological changes consistent with JD. Faeces and fresh tissues should be submitted for culture. Full details of the animal's history and a complete description of any gross pathology observed must be included on the specimen advice form.