



**ENVIRONMENT AND NATURAL RESOURCES COMMITTEE**

**CONTROL OF OVINE JOHNE'S DISEASE IN VICTORIA**

**DISCUSSION PAPER**

**April 2000**

## **SUBMISSIONS ARE INVITED**

The Committee welcomes written submissions in response to the issues raised in this Discussion Paper or on any matter related to the Terms of Reference of the Inquiry.

To assist interested parties in making submissions a number of questions have been posed throughout the Discussion Paper.

Details of how to make a submission are included in the insert. Note that the Committee requires all submissions to be signed, hard-copy originals.

**Please take up the opportunity to make a written submission All submissions of any size are welcome.**

Send all submissions to:  
Victorian OJD Inquiry  
Environment and Natural Resources Committee  
Level 8, 35 Spring Street  
Melbourne Victoria 3000

**THE CLOSING DATE FOR SUBMISSIONS IS  
Friday, 9 June 2000**

The Committee records its appreciation to those who have contributed to the development of this Discussion Paper. Background information was provided by Mr Matthew Flugge, Mr Jeremy Maloney, Dr Hugh Millar and Dr Stephen Prowse. The cover photograph was supplied by the Department of Natural Resources and Environment. The cover was designed by Luke Flood of 'actualsize', with printing by 'acuprint'. The report was drafted by Dr Andrea Lindsay, Research Officer, with the assistance of Mr Brad Miles, Executive Officer; administrative support was provided by Ms Kathy Karlevski.

Environment and Natural Resources Committee (2000)  
Control of Ovine Johne's Disease in Victoria - Discussion Paper  
ENRC, Parliament of Victoria.

ISBN: 07311 5511 4

### **Environment and Natural Resources Committee**

Level 8, 35 Spring Street  
Melbourne Victoria 3000  
Phone: (03) 9651 3533  
Fax: (03) 9651 3537  
Email: [enrc@parliament.vic.gov.au](mailto:enrc@parliament.vic.gov.au)  
Website: <http://www.parliament.vic.gov.au/enrc>

© State of Victoria

|  |
|--|
| <b>ENVIRONMENT AND NATURAL RESOURCES COMMITTEE</b> |
|--|

**MEMBERS**

|                         |              |
|-------------------------|--------------|
| Mr George Seitz, MP     | Chairman     |
| Hon. Graeme Stoney, MLC | Deputy Chair |
| Mr Hugh Delahunty, MP   |              |
| Ms Joanne Duncan, MP    |              |
| Mr Craig Ingram, MP     |              |
| Ms Jenny Lindell, MP    |              |
| Mr Terry Mulder, MP     |              |
| Hon. Bob Smith, MLC     |              |

**FUNCTION**

Extract of the *Parliamentary Committees Act 1968*:

Section 4EA: The functions of the Environment and Natural Resources Committee are to inquire into, consider and report to the Parliament on –

- (a) *any proposal matter or thing concerned with the environment;*
- (b) *any proposal matter or thing concerned with natural resources;*
- (c) *any proposal matter or thing concerned with planning the use, development or protection of land-*

*if the Committee is required or permitted so to do by or under this Act.*

## INQUIRY TERMS OF REFERENCE

### Parliamentary Committees Act 1968

#### REFERRAL OF MATTER TO THE ENVIRONMENT AND NATURAL RESOURCES COMMITTEE

“The Governor in Council under Section 4F of the *Parliamentary Committees Act 1968* issues the following terms of reference to the Environment and Natural Resources Committee for inquiry into ovine Johne’s disease control in Victoria:

- a) Assess the economic and social impacts of strategies implemented from December 1996 for the management and control of ovine Johne’s disease on individual producers, the sheep industry in Victoria and Victorian regional communities.
- b) In the light of scientific knowledge of ovine Johne’s disease and the national control and evaluation program, consider and assess the costs and the economic and social impact of any alternative strategies for management in Victoria.
- c) After consideration of the outcomes from the CSIRO review, recommend future management strategies for OJD in Victoria.
- d) Report by 30 September 2000.

Responsible Minister: Keith Hamilton MP, Minister for Agriculture”.

*Referred to the Environment and Natural Resources Committee by Order in Council of Tuesday, 22 February 2000, as gazetted on Friday, 25 February 2000.*

*Also referred to the Committee by resolution of the Legislative Assembly on Tuesday, 14 March 2000.*

The Committee resolved to commence the inquiry on 20 March 2000.

## TABLE OF CONTENTS

|   | <b>Page</b> |
|---|-------------|
| Environment and Natural Resources Committee | iii         |
| Inquiry Terms of Reference                  | iv          |
| Table of Contents                           | v           |
| Summary                                     | vi          |
| <br>  |             |
| 1 Introduction                              | 1           |
| <br>  |             |
| <b>PART A - SETTING THE SCENE</b>           |             |
| 2 The Disease                               | 2           |
| 3 The Sheep Industry                        | 6           |
| 4 Who is Doing What                         | 7           |
| <br>  |             |
| <b>PART B - TECHNICAL ISSUES</b>            |             |
| 5 Managing Stock Disease                    | 11          |
| 6 Technical Approaches to OJD Control       | 14          |
| 7 Diagnosis and Research                    | 17          |
| <br>  |             |
| <b>PART C - CONTROL STRATEGIES</b>          |             |
| 8 Current Management Strategies             | 20          |
| <br>  |             |
| <b>PART D - THE IMPACTS</b>                 |             |
| 9 Impact Assessment                         | 27          |
| 10 Impacts of OJD and OJD Control           | 29          |
| 11 Support Programs                         | 34          |
| <br>  |             |
| <b>PART E - POTENTIAL FUTURE DIRECTIONS</b> |             |
| 12 Ways Forward                             | 35          |
| <br>  |             |
| <b>Appendices</b>                           |             |
| I References                                | 38          |
| II End Notes                                | 41          |

## SUMMARY

1. The Inquiry is subject to defined Terms of Reference.
2. OJD control has created anguish to an increasing number of sheep farmers and rural communities.
3. The Inquiry will consider scientific, economic and social issues. It will review the past but look to the future.
4. OJD is an infectious disease of sheep that is incurable.
5. The disease has spread across the world over the past 100 years.
6. OJD appears to be expanding across temperate Australia.
7. The sheep industry is an important contributor to the economy of Victoria and any disease that threatens the industry is thus of direct economic consequence to the State.
8. A number of national bodies are working on OJD.
9. The Victorian control program is overseen by the Victorian Sheep and Goat Compensation Advisory Committee and implemented by the staff of the Department of Natural Resources and Environment.
10. Management of stock disease is a normal part of farming.
11. Stock diseases can usually be controlled and, in some instances, eradicated.
12. A number of technical options are available for the control of OJD.
13. OJD is a notifiable disease.
14. Techniques for diagnosing the disease in individual animals are poor and remain a major focus of research.
15. Much research is still under way, including the study of infection and the evaluation and development of vaccines.
16. Overseas, disease management approaches are varied but, where OJD is endemic, eradication is not generally considered a practical control option.
17. Containment is the current national control strategy, with a decision on long-term strategies deferred until 2003 when further research results will be available.
18. Control is a State responsibility. Each State is part of the national program, but may supplement this with its own programs.
19. Controls in NSW are a mixture of containment and voluntary local eradication. These controls were put in place after the disease had become well established.
20. Current Victorian controls aim at eradication. They were put in place while the disease outbreak appeared localised and included a compensation package (until Nov 1999).
21. The evaluation of the economic and social consequences of OJD is complex.
22. Direct economic impacts of OJD may include lost production, increasing mortality in flocks, restrictions on market access and sales, loss of bloodlines and lower prices.
23. Social impacts have to do with how people feel - they are real, sometimes overwhelming and often unacknowledged.

# 1. INTRODUCTION

## THE REQUIRED TASK AND PROCESS

**The Inquiry is subject to defined Terms of Reference.**

- 1.1 The Inquiry is being undertaken by the Environment and Natural Resources Committee of the Parliament in response to Terms of Reference issued under the *Parliamentary Committees Act 1968*. The Terms of Reference are included on page iv.
- 1.2 The following process has been adopted for the Inquiry:
- advertise the Terms of Reference and prepare and publish a discussion paper;
  - call for written submissions;
  - undertake inspections;
  - conduct hearings;
  - prepare Inquiry report; and
  - publish Inquiry report and present it to Parliament.

## BACKGROUND TO THE TASK

**OJD control has created anguish to an increasing number of sheep farmers and rural communities.**

- 1.3 Ovine Johne's Disease, or OJD, is an incurable, and ultimately fatal, disease of sheep. It is insidious as symptoms may not appear for several years after animals become infected. This, and its resistance to treatment, make OJD a difficult disease to manage.
- 1.4 While OJD has been found in sheep flocks around the world for many years, it is only recently that it has been recorded in Australia. The disease was detected in Victoria in December 1995.<sup>1</sup> In an attempt to limit the spread of the disease a control program was devised and rapidly put into place. The control program involved quarantining infected properties so that sheep or goats on them could only be removed from the properties for direct consignment to slaughter. An associated eradication program involved destocking properties of all sheep and goats. Producers were paid the slaughter value of the animals plus compensation based on the number and types of animals slaughtered.
- 1.5 By the end of 1999 it had become evident that the level and spread of OJD was greater than first anticipated. Infected flocks now occur through central Victoria and South Gippsland, with the infection also identified in sheep in other parts of the State. Costs of the control program have escalated and considerable distress is being experienced by farmers who have been affected directly by the control program.
- 1.6 The Victorian Government, in November 1999, placed a moratorium on compensation for farmers who choose to destock under the (existing) OJD eradication program pending a review of the entire program. The moratorium is subject to honouring compensation commitments made prior to 8 November 1999. This Inquiry is the primary vehicle for the envisaged review.

## SCOPE

**The Inquiry will consider scientific, economic and social issues. It will review the past but look to the future.**

- 1.7 The object of the Inquiry is to recommend future management strategies for OJD in Victoria. In accordance with the terms of reference, any such recommendations need to be sound from a scientific perspective as well as take account of economic and social impacts.
- 1.8 The Inquiry will review the previous control program and its rationale, but the emphasis of the recommendations will be on identifying future control strategies, which include an adequate social component.
- 1.9 A CSIRO review commissioned by the Government late last year compiled available scientific information on OJD.<sup>2</sup> Consequently the Inquiry process does not anticipate undertaking its own research into primary scientific data. The Committee will, however, take into account any other relevant scientific material that may become available through evidence presented to the Inquiry.
- 1.10 State legislation and associated regulations and Orders in Council affect the management of OJD, as do a number of national programs and processes. These will all be taken into account, with the Committee's recommendations likely to be focussed upon, but not necessarily be restricted to, Victorian laws and programs.

## THE DISCUSSION PAPER

- 1.11 The purpose of this Discussion Paper is to assist those wishing to make submissions to the Inquiry. It provides background and explains the relationship of this Inquiry to other work being done on OJD in Victoria and nationally, and summarises material compiled as part of the CSIRO's scientific review of OJD. Submissions can, however, address any issue related to the Terms of Reference whether specifically raised in the discussion paper or not.

### DISCUSSION POINTS

**Q1.1 Are there any issues relevant to the control of OJD in Victoria that fall outside the Inquiry terms of reference?**

## 2. THE DISEASE

### OVINE JOHNE'S DISEASE

**OJD is an infectious disease of sheep that is incurable.**

- 2.1 OJD is a slow-developing wasting disease present in virtually all temperate sheep producing countries in the world including New Zealand, the USA, Spain, South Africa and Iceland. It affects flocks grown mainly for wool as well as the predominantly meat breeds. The infection is not treatable, whereas other causes of poor condition are likely to respond to drenching or better feed.<sup>3</sup>

- 2.2 Sheep with OJD effectively starve to death. They are unable to absorb nutrients because their intestines become thickened and inflamed. In infected flocks production is decreased and there is increased mortality. The flock will usually show a distinct 'tail' of animals in poor condition. These animals do not recover when moved to better feed or drenched. Death of animals usually occurs six to twelve weeks after they start to show signs of severe wasting.
- 2.3 Symptoms are usually not evident for months or years after infection occurs. Consequently signs of the disease are generally seen only in sheep that are two years or more old. High stress and poor nutrition will accelerate the progression of the disease, although careful flock management cannot guarantee that there will not be substantial losses from OJD.<sup>4</sup> OJD appears to progress through a flock with the mortality rate increasing as the infection builds up in the flock. In the end the viability of an operation may be affected.
- 2.4 Death rates from OJD have been reported to vary from less than 1 percent in flocks where the disease is in early stages of development to as high as 15 percent where exacerbated by circumstances of severe stress. In the absence of a co-ordinated control program, death rates in flocks appear to be around 4 to 7 percent. Lower mortality rates may be achieved by a management program that maintains a low age structure in the flock; that is, where sheep are sold before the disease is likely to develop.<sup>5</sup>

## CAUSE OF OJD

- 2.5 OJD is caused by a distinct strain of the bacterium, *Mycobacterium paratuberculosis*. A different strain of the bacterium is responsible for Johne's disease in cattle.
- 2.6 *M. paratuberculosis* belongs to a group of bacteria that are very common in the environment but are generally harmless. This is one of the factors that have made it difficult to develop simple tests for OJD infection.
- 2.7 The disease appears to be spread primarily through the movement of infected stock. There is also a possibility of spread between adjacent properties via run-off of infected water. Heavily infected animals can excrete very high numbers of bacteria in their faeces. Other sheep contract the disease through ingesting pasture or water that is contaminated by infected faeces. Lambs at foot may also become infected from their mother's milk, or possibly in utero.
- 2.8 Sheep can become infected regardless of age, sex or breed, although there are some reports that the disease may be more severe in merinos than British breeds.<sup>6</sup> According to the NSW Agriculture, young animals also appear to be more susceptible than older ones, although this has not definitely been established.<sup>7</sup>
- 2.9 Although *M. paratuberculosis* cannot multiply outside an animal, it can survive for months or years in cool moist conditions. Heat, desiccation and ultraviolet light will hasten the death of the bacteria. It is for this reason that decontamination of pastures is hastened by hot, dry summers. It is also probably the reason why OJD is a disease of temperate climates and why damp, shady areas may remain as pockets of infection after the rest of a property is clean.<sup>8</sup>

## SPREAD OF THE DISEASE

**The disease has spread across the world over the past 100 years.**

- 2.10 Johne's disease was first described in cattle by two German scientists in 1894.<sup>9</sup> Subsequently a sheep strain of the disease was identified.

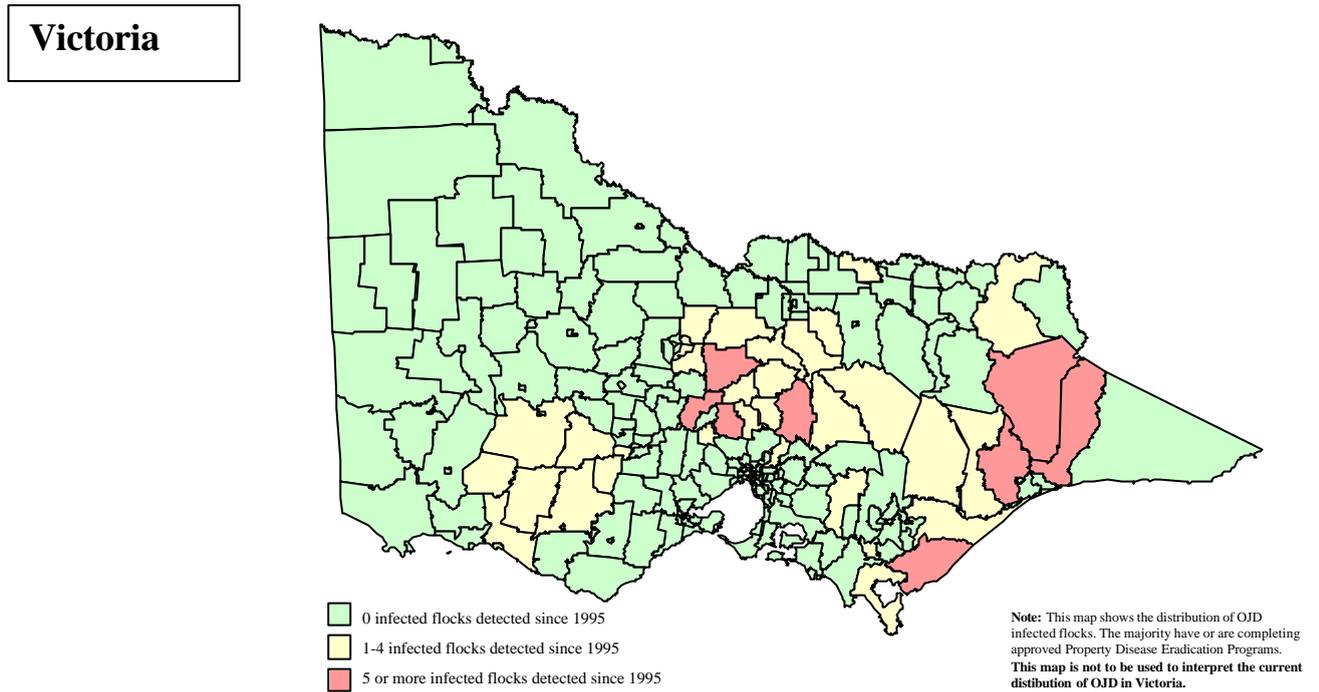
- 2.11 OJD was introduced into Iceland in 1933 through sheep imported from Germany. Five years later it had spread to 20 to 30 percent of farms in the main sheep production areas. OJD has been present in other European countries for many years. In Spain estimates for the level of OJD range from 10 to 88 percent of the country's flocks.
- 2.12 New Zealand first identified OJD in a flock on the South Island in 1952 although the disease had probably been there for some years before that time. It has since spread throughout New Zealand and now is essentially endemic. It is difficult to establish the exact level of infection as there is no national control or surveillance program in place. OJD has been confirmed by positive identification in at least 6.4 percent of flocks, with the level of infection across the country estimated to be up to 70 percent.<sup>10</sup>
- 2.13 The number of identified infected flocks in New Zealand has grown at an increasing rate since the disease was first recognised. This suggests that OJD will continue to spread at an increasing rate in Australia too if no control measures are taken.<sup>11</sup>
- 2.14 It was initially diagnosed in Australia in 1981 in central New South Wales, though the disease may have been present for some years before that.<sup>12</sup> By late 1999, there were 700 known infected flocks detected across four States of Australia.<sup>13</sup>

## DISTRIBUTION OF OJD IN AUSTRALIA

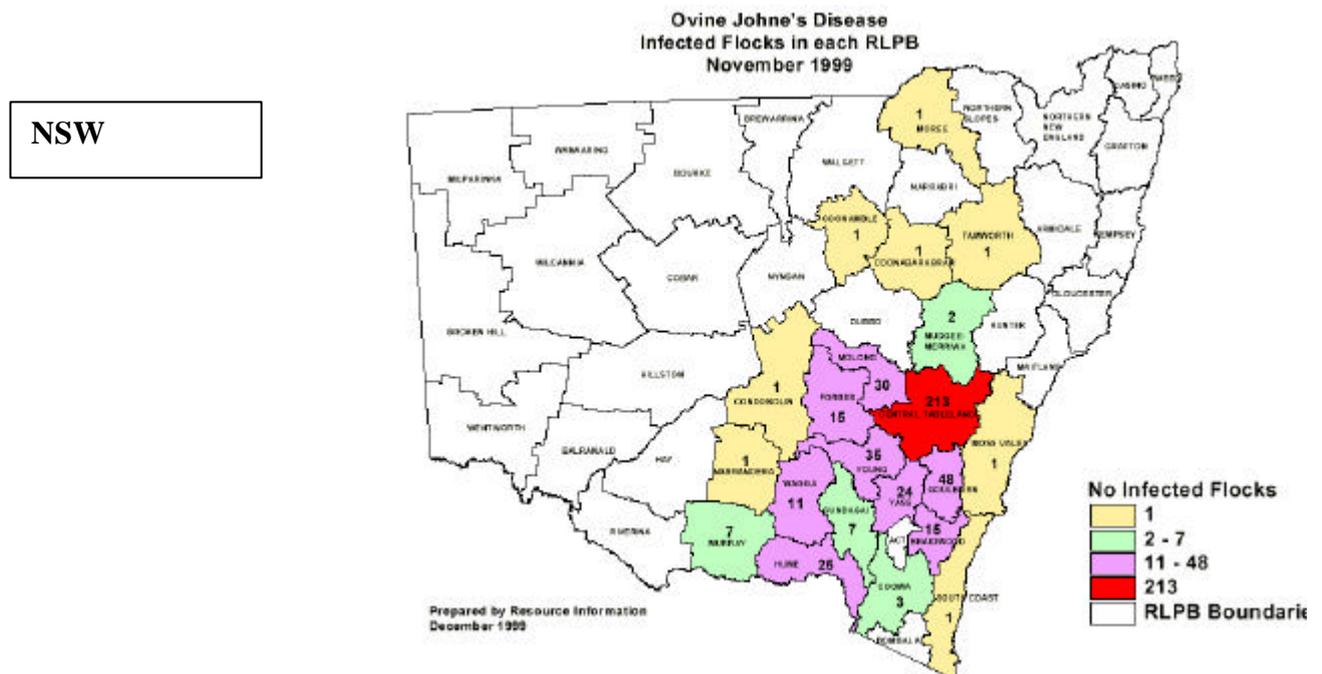
|  |
|--|
| <b>OJD appears to be expanding across temperate Australia.</b> |
|--|

- 2.15 As in other parts of the world, OJD in Australia is confined to the better-watered, temperate regions. It is concentrated in southern New South Wales, Victoria, Flinders Island (Tasmania) and Kangaroo Island (South Australia).<sup>14</sup> It has not been identified in other parts of Australia, though in the absence of extensive testing it cannot be concluded that these areas are free of the disease.
- 2.16 It is thought that OJD was first introduced to Australia by infected sheep imported from New Zealand. It appeared to be confined to the central tablelands of NSW where it was first found for more than ten years.<sup>15</sup> However, the number of properties and districts reporting the disease has increased, with approximately 500 infected flocks identified.
- 2.17 OJD was detected in East Gippsland in December 1995.<sup>16</sup> The original source of infection was suspected to be stock bought from NSW, although introduction of infected sheep from New Zealand cannot be ruled out. It has since been found in the Kyneton district and South Gippsland, with isolated infected sheep also identified in the north east of the State and in the western District. Of the State's approximately fourteen thousand flocks, some 1287 flocks have been investigated and 175 infected flocks detected.<sup>17</sup> The most recently identified node of infection was detected in 1999 in the Yea district. Though earlier sources of infection appears to have been mostly infected sheep imported from NSW, there is now evidence of the infection being spread through sheep movement within Victoria.
- 2.18 Thirty infected properties have been detected on Kangaroo Island (South Australia) with a further 50 under investigation. OJD has also been detected on Flinders Island (Tasmania).
- 2.19 Locations where OJD has been detected in Victoria and NSW are shown on Figures 1 and 2. There appears to be a correlation between the trading patterns of a district and the prevalence of the disease.

**Figure 1. Municipalities in Victoria where sheep flocks with OJD were detected between 1995 and October 1999\***



**Figure 2. Regional Land Protection Board districts in NSW where sheep flocks with OJD were detected between 1995 and October 1999\***



\* Source Prowse (2000a), pp. 11, 13.

## DISCUSSION POINTS

**Q2.1 Scientific studies indicate that, if OJD is left uncontrolled, the mortality rate in infected flocks may be around 5 to 7 percent in a quarter of infected flocks, and can be as high as 8 to 15 percent.<sup>18</sup> What is a manageable mortality rate in a flock? Does this vary from district to district and between fat lamb and wool sectors ?**

**Q2.2 The spread of the disease appears to be directly related to the movement of livestock. Do most farmers in a given district predominantly trade with the same group of farmers from a different district? If so, what are the trading patterns?**

**Q2.3 Are there cases known in Australia where the disease has been spread other than by introducing infected sheep? If so, how did the spread occur?**

**Q2.4 There are many hobby farmers in Victoria who trade small numbers of sheep. Are hobby-farms likely to present a particular risk of spreading OJD? If so, why?**

## 3. THE SHEEP INDUSTRY

### THE SHEEP INDUSTRY

**The sheep industry is an important contributor to the economy of Victoria and any disease that threatens this industry is thus of direct economic consequence to the State.**

3.1 Sheep contribute substantially to the economic well being, social structure and character of Australian society. Victoria is Australia's third largest wool producing State and the largest producer of sheep meat. The size and value of the industry in the regions within Victoria that are most affected by OJD are indicated in Table 1. By way of comparison, the Gross State Product of Victoria was \$151,200 million in 1997/98. The industry's contribution to the State's export production is greater than its proportional contribution to the Gross State Product - around 6 percent of exports.

**Table 1 Numbers of sheep and value of sheep products in Australia and Victoria (1998 figures)**

|                  | Number of sheep (thousand) | Number of Properties stocking sheep | Gross Annual Value of Sheep Products (wool and meat) | Gross Annual Value of Products per Animal | Gross Annual Value of Products per Property |
|------------------|----------------------------|-------------------------------------|--|---|---|
| <b>Australia</b> | 117,494                    | 54,718                              | \$3,772m   | \$32.10                                   | \$68,933                                    |
| <b>Victoria</b>  | 21,122                     | 13,682                              | \$860m   | \$40.70                                   | \$62,849                                    |

Source: Australian Bureau of Statistics (1996-97), p 13.

- 3.2 The sheep industry operates throughout Victoria, with the Western District the main centre. As at March 1997, the number of sheep in the major regions of Victoria were:
- |                     |           |
|---------------------|-----------|
| a) East Gippsland   | 989,100   |
| b) Gippsland        | 213,500   |
| c) Goulburn         | 2,427,700 |
| d) Western District | 6,681,800 |
| e) Wimmera          | 3,376,000 |
- 3.3 The number of sheep in Australia has been falling in the last ten years. There were approximately 170 million sheep in Australia in 1990 and just under 120 million in 1999.<sup>19</sup> This change has particularly reflected falling wool prices over the period. However, the Victorian trend has differed from that of the rest of Australia. There were approximately 30 million sheep in 1990 and numbers dropped until 1995. Since then the number of sheep has actually increased, possibly reflecting the larger proportion of the Victorian flock grown primarily for meat.<sup>20</sup> The current season is seeing improved prices for wool.<sup>21</sup>
- 3.4 Trends in other products are also relevant to the management of sheep. Diversification is common. This permits farmers to manage fluctuations in prices and production. A combination of sheep and a range of crops (cereals and canola in particular) is common on flatter land; sheep may be run with beef cattle on a wider range of country. Between 1990 and 1999 there has been a rise of 30 percent in the number of dairy cattle and a 9 percent increase in the number of beef cattle. Areas sown to cereal crops have fluctuated considerably, but have shown a general tendency to increase during the same period.
- 3.5 Even with use of strategies such as diversification, many rural communities are experiencing difficulties. Numbers of farmers are declining. They are also ageing. Costs of production are increasing, while prices paid for most products are falling in real terms. Services to many rural communities are poorer than in the past. In addition to these longer-term trends much of the State has experienced three years of considerably below-average rainfall.

## DISCUSSION POINTS

**Q3.1 Profitability of sheep farming has been falling in Australia irrespective of any affect of OJD. Is this the case in all regions of Victoria? Are there differences between districts? If so, what are these? Are other farming options open to farmers in all areas?**

## 4. WHO IS DOING WHAT

- 4.1 Although control of stock disease is a State responsibility, the States and industry have also agreed that a nationally co-ordinated approach to OJD is needed.<sup>22</sup> There is less agreement, however, on what should actually be done.

### NATIONAL LEVEL ACTIVITY

**A number of national bodies are working on OJD.**

### ***The Australian Animal Health Council***

- 4.2 The Australian Animal Health Council is a private company whose shareholders comprise State and Federal government agencies and national commodity groups. Its primary work is to act as a broker for national programs of animal health.
- 4.3 In 1997, following two years of discussion and debate, the Australian Animal Health Council, together with other bodies involved in animal health developed, a proposal for a nationally funded program to assist owners of infected sheep to eradicate OJD from their flocks. However disagreement about compensation and funding and concerns about the true extent of the disease led to the proposal not being adopted.<sup>23</sup>
- 4.4 Early in 1998 the Commonwealth Minister for Primary Industries and Energy commissioned a study by Denis Hussey and Roger Morris to provide guidance on an approach to OJD. Their report identified key information needed to control, or possibly eradicate, OJD and potential strategies to gain such information.<sup>24</sup> The recommendations were subsequently adopted and funded. They were incorporated into a six-year operational program known as the National Ovine Johne's Disease Control and Evaluation Program.<sup>25</sup> This Program commenced in the latter part of 1998. The Australian Animal Health Council through its National Ovine Johne's Disease Committee, oversees the program.
- 4.5 During the short period in 1998 while the National Ovine Johne's Control and Evaluation Program was being set up, an Interim Surveillance and Research Program was undertaken.

### ***The National Ovine Johne's Disease Control and Evaluation Program***

- 4.6 The purpose of the National OJD Control and Evaluation Program is two fold - it addresses research as well as initial containment. Its defined purposes are to:
- a) provide, through an effective research program, sufficient information to allow an informed decision to be made on the national management of OJD, including particularly the feasibility and cost-effectiveness of eradication; and
  - b) control OJD during the research period.
- 4.7 The program's specific objectives are to:
- a) evaluate existing and potential methods for detecting, controlling and eliminating *M. paratuberculosis* in infected sheep flocks, and from regions within Australia;
  - b) evaluate and define the extent of infection of OJD nationally;
  - c) minimise further spread of OJD during the evaluation period;
  - d) implement an effective and efficient management structure for the program; and
  - e) communicate effectively and efficiently the objectives, processes and outcomes of the Program to ensure that the Program achieves its objectives.
- 4.8 The Program is funded jointly by industry and government. Victoria is part of the Program and is an active supporter of it.
- 4.9 Reports on progress of the Program are made regularly. Its first three years of research surveillance, monitoring and analysis are due to be completed at the end of this year. The full program is due for completion in 2003.

### ***The Senate Inquiry***

- 4.10 At the time of debate about the desirability and nature of a national program of OJD control, the Senate Rural and Regional Affairs and Transport Committee commenced an Inquiry into OJD in Australia. The Terms of Reference of the Senate Inquiry are in two parts. The first relates to the level of OJD in the Australian sheep flock, with particular reference to the problems in identifying the disease and the effectiveness of the current

research effort into the identification and management of the disease, including four defined options to manage OJD:

- a) appropriate management practises by individual producers;
- b) a voluntary eradication program without compensation;
- c) progressive eradication with compensation; and
- d) immediate eradication of all affected flocks with compensation.

4.11 The second part of the Terms of Reference relate to appropriate levels of funding to undertake control programs, the establishment of a market assurance program and strategies to overcome the social impacts.

4.12 The Committee commenced its Inquiry in November 1997. It has received submissions and heard evidence at hearings in Tasmania, NSW, the ACT and Victoria. It presented a first report to the Federal Parliament in July 1998.<sup>26</sup>

4.13 Since the tabling of its first report the Committee has been diverted to other tasks, but has recently recommenced the Inquiry. There is no defined final reporting date.

4.14 Although the Senate Inquiry has a national focus it complements the present Inquiry being undertaken by the Environment and Natural Resources Committee. It provides a national perspective and useful material on which the present Victorian Inquiry can build. It identified social and economic concerns being expressed at a particular time about OJD control programs in both Victoria and NSW. This information will give the Environment and Natural Resources Committee an indication of issues that need to be explored and a base line of information against which to assess recent developments.

### ***The Agriculture and Resource Management Council of Australia and New Zealand***

4.15 This Council provides a forum for consultation on issues affecting agriculture, land and water industries between the relevant Ministers at State and national level. It operates a number of standing committees to provide advice and develop policy.

4.16 Of particular relevance to the control of OJD is its Veterinary Committee. It works closely with the Australian Animal Health Council. Amongst other things, the Veterinary Committee has developed a set of minimum standards for use by the States in the development of disease-control programs. These are known as the *Standard Definitions and Rules for Ovine Johne's Disease* and have been adopted as part of the National Ovine Johne's Disease Control and Evaluation Program. They are described in Section 8 of this discussion paper.

4.17 Victoria participates on the Council and is represented on its Veterinary Committee.

### ***Other Relevant Federal Bodies***

4.18 The Australian Quarantine and Inspection Service 'provides quarantine services which facilitate the importation of food, animals, plants and related products while ensuring the maximum practical protection against the entry and spread of exotic pests and diseases. The importation of live sheep and the consequent risks of disease introduction are the responsibility of the Service.

4.19 The Bureau of Rural Sciences, which provides independent scientific analysis of issues affecting rural industries and the Australian Bureau of Agricultural and Resource Economics (known as ABARE) which provides economic analysis and conducts research are two other relevant bodies who have undertaken OJD related work.

## STATE LEVEL ACTIVITY

**The Victorian control program is overseen by the Victorian Sheep and Goat Compensation Advisory Committee and implemented by the staff of the Department of Natural Resources and Environment.**

### *The Victorian Sheep and Goat Compensation Advisory Committee*

4.20 A primary task of the Sheep and Goat Compensation Advisory Committee, which operates under the *Livestock Diseases (Control) Act 1994*, is to provide advice to the Minister for Agriculture on the levels of compensation to be paid.

4.21 In response to representations from farmers of the Victorian sheep industry, the Minister for Agriculture and the President of the Victorian Farmers Federation's Pastoral Group agreed on a program aimed at eradicating OJD from affected Victorian flocks and properties. The program commenced in December 1996. The control program aims to eradicate the disease from infected flocks and control spread to unaffected flocks. The program is further explained in Section 8 of this discussion paper. An integral part of the program is the payment of compensation for slaughtered sheep.

4.22 A Committee comprising the various affected organisations was created to define and oversee the program. The Committee was formally established under legislation in May 1997. The Committee comprises representatives from:

- a) Victorian Stud Sheep Breeders Association
- b) Sheepmeats Committee, Pastoral Group, VFF;
- c) Wool Committee, Pastoral Group, VFF;
- d) Quarantine and Animal Health Committee, VFF;
- e) Victorian Stock Agents Association;
- f) National Meat Association, Victorian Division; and
- g) Department of Natural Resources and Environment.

### *The Department of Natural Resources and Environment*

4.23 The Department is responsible for the monitoring and control of livestock disease in Victoria. Its primary legislative powers are defined in the *Livestock Disease Control Act 1994*. This legislation provides, amongst other things, authority to define notifiable diseases, establish quarantine areas, order the destruction or disposal of livestock and provide compensation for losses caused by certain livestock diseases.

4.24 The on-ground delivery of the Department's responsibilities under the Act are carried out by 'inspectors of livestock' - being mostly District Veterinarians and Animal Health Officers operating out of the Department's regional offices across the State. A head office group including a Chief Veterinary Officer and a Manager of Animal Health Operations define and oversee the delivery of the program.

4.25 At the time of placing a moratorium on the compensation program, the Minister for Agriculture indicated that a scientific review would be undertaken. The CSIRO was contracted to undertake this review.

### *Other Victorian Government Agencies*

4.26 The Office of Rural Affairs has had the task of finding out the circumstances and needs of rural communities. The task of setting up support networks to take particular account of the needs of OJD-farmers was placed in the hands of the Office of Rural Affairs in late 1999. That Office contracted the company Community Connections to provide additional personal counselling services across Victoria.

### ***The Victorian Farmers Federation***

4.27 The Victorian Farmers Federation (VFF) is the State's largest farmer organisation. It is concerned with political, economic, industrial and other issues affecting agriculture and has approximately 19,000 members. In addition to 280 local branches through out the State, it has eight autonomous commodity groups. One of the commodity groups is the Pastoral Group which is the one directly involved with the sheep industry. It represents about 5000 farming businesses - perhaps around two thirds of those involved in the sheep industry.

4.28 During 1996 the Victorian Farmers' Federation was involved in extensive consultation with the Department of Natural Resources and Environment, and supported the collection of a Victorian stamp duty on sheep sales to fund a Sheep Compensation Fund for the specific purpose of eradication of OJD in Victoria. The Federation is represented on the compensation advisory committee that was subsequently established. More recently the Federation has called for a review of the OJD program to ensure that the program meets its objectives, has sought increased levels of compensation and called for social support for affected farmers.

#### **DISCUSSION POINTS**

**Q4.1 There appear to be well-established coordination and cooperative arrangements in place. Is there a need to improve coordination and communication channels and, if so how? Is there also a need for those directly affected to have a greater say in the control programs?**

**Q4.2 Is part of the problem that the issue requires a national response, but the responsibility lies with the States? Or should the total responsibility for control of OJD rest with the farmer?**

**Q4.3 How did the disease get through Australia's quarantine systems? What could be done to prevent a similar introduction of other stock diseases (including ones like OJD that are hard to detect) in the future?**

## **5. MANAGING STOCK DISEASE**

### **TYPICAL APPROACHES TO THE MANAGEMENT OF STOCK DISEASE**

**Management of stock disease is a normal part of farming.**

5.1 How a stock disease can best be managed is partly a technical question; that is, it is concerned with what is possible given the nature of the disease and the tools available. A range of approaches is typically used to manage the infection of stock. The applicability of each approach to a particular disease depends a number of factors.

5.2 In addition to technical variables, the management of stock disease also depends on economics. These may include how well a particular approach will pay, given current circumstances of the farm manager, the ease with which the control approach can be fitted into the day-to-day farm program, and a plethora of other considerations, including available skills and labour and questions of ethics.

5.3 The main control approaches available are described below.

### ***Do nothing***

5.4 This approach involves de-regulating the disease and making no changes in the management of infected flocks. It is mostly applicable if the disease incurs little cost and/or is unlikely to spread to other properties.

### ***Exclusion***

5.5 Where a locality, whether a nation, region or individual property, is free of a disease, it may be possible to prevent the disease from entering. This will depend on many factors, such as:

- a) how the disease is spread;
- b) whether it can reproduce in soil or water (for instance organisms causing tetanus);
- c) how practicable it is to breed all replacement stock within the locality or ensure that new animals are free of the disease;
- d) the strength of barriers to introduction of sources of infection (be they property fences or quarantine laws); and
- e) the confidence with which infected animals can be identified.

### ***Quarantine***

5.6 Quarantine of infected properties or localities can be used to prevent escape of disease to the disease-free areas. This may be undertaken by ensuring that no infected stock or other agent of infection is permitted to leave the quarantine area.

### ***Eradication***

5.7 Eradication is an approach used where:

- a) the disease has a limited, known distribution and cannot multiply or survive for a long period outside infected animals;
- b) where infection results from direct contact between animals; and
- c) where it is easy and cheap to detect an infected animal.

5.8 Eradication ordinarily involves the identification and destruction of all infected stock, removal of disease vectors, and/or the application of an effective vaccine. If a vaccine is used as part of the eradication program it must not interfere with the detection of diseased animals.

5.9 If the disease has the potential to infect humans there is an added incentive for farmers to comply with the eradication programs and for governments to pay an acceptable compensation. For example, both bovine brucellosis and bovine TB can infect humans. Both have been eradicated from Australia.

### ***Vaccination***

5.10 Vaccination can assist in an eradication approach (as with bovine brucellosis) or be used to control a disease that cannot be eradicated (for example pulpy kidney in sheep – a soil-born disease). The approach relies on the availability of an effective, cheap and easily administered vaccine being available.

### ***Changed Husbandry Practices***

5.11 Healthy animals tend to be more resistant to most infections or the symptoms of infection. Hence one of the main approaches used to prevent disease is good husbandry.

5.12 Infection in a flock can be minimised by limiting the source of infection, even where it is not excluded. For example, tetanus infection is minimised by avoiding injury to animals and keeping them in clean environments.

### ***Test-and-Cull and Drug Treatment***

5.13 A 'test-and-cull' approach involves testing all animals in an infected flock and culling all that have a positive reaction. The approach is used to reduce ovine brucellosis infection - rams are inspected regularly, with any infected animals culled and replaced by new rams obtained from accredited, brucellosis-free flocks.

## **EXAMPLES OF CONTROL STRATEGIES USED FOR STOCK DISEASES**

**Stock diseases can usually be controlled and, in some instances, eradicated.**

5.14 Examples of control strategies used for a range of types of stock diseases are given in Table 2. Factors relevant to the choice of the particular strategy are also listed.

**Table 2** Examples of Control Strategies for other Infectious Animal Disease

| <b>Disease</b>                             | <b>Management Strategy / Strategies</b>   | <b>Major Factors affecting Choice of Strategy</b>   |
|--|---|---|
| Bovine tuberculosis and bovine brucellosis | National eradication with on-going monitoring (successful by 1997).   | <ul style="list-style-type: none"> <li>• Available test to identify infected animals easily and accurately.</li> <li>• Test cheap compared with value of animals.</li> <li>• Infecting organism is short-lived outside animal.</li> <li>• Vaccines available (for brucellosis).</li> <li>• Farmers can continue part of the enterprise with TB and most of it with brucellosis.</li> <li>• Compensation generally seen as reasonable.</li> <li>• Known serious risk of disease transfer to humans.</li> </ul> |
| Ovine brucellosis (sheep)                  | Minimisation (for non-accredited or stud flocks); exclusion from accredited brucellosis-free (high value) flocks. | <ul style="list-style-type: none"> <li>• Spread through mating.</li> <li>• Identification of infected rams is cheap and accurate.</li> <li>• Low value of individual animals renders vaccination too expensive but cull of suspect rams and ewes practical.</li> <li>• Closed flock breeding is practical.</li> <li>• Vaccination and accurate testing allow development of accredited disease-free flocks for replacement rams.</li> </ul>   |
| Canine heart worm                          | Resistance through regular drug treatment.  | <ul style="list-style-type: none"> <li>• Disease endemic in certain parts of Australia.</li> <li>• Spread by widespread vector - mosquitoes.</li> <li>• Individual animals can be protected by chemical treatment.</li> <li>• Animals regarded as being of high value relative to treatment.</li> </ul>   |

**Table 2 cont.**

| <b>Disease</b>  | <b>Management Strategy / Strategies</b>  | <b>Major Factors affecting Choice of Strategy</b>   |
|---|--|---|
| Mastitis in dairy cows                                | Minimisation through hygiene, surveillance and treatment.                              | <ul style="list-style-type: none"> <li>• Causal organisms widespread in environment.</li> <li>• Causes substantial loss of milk production.</li> <li>• Infection transmitted through milking machinery.</li> <li>• Detection is cheap and can be incorporated into milking routine.</li> <li>• Treatment with antibiotics effective and cheap relative to milk production.</li> </ul> |
| Clostridial diseases (eg tetanus, botulism, blackleg) | Minimisation through attention to hygiene, nutrition, avoiding injury and vaccination. | <ul style="list-style-type: none"> <li>• Caused by ubiquitous organisms found in soil or rotting carcasses and bones.</li> <li>• Enter through wounds or by ingestion.</li> <li>• Cheap and effective dead vaccines available.</li> <li>• Well nourished animals least likely to eat carcasses.</li> </ul>  |
| Cheesy gland of sheep                                 | Vaccination.   | <ul style="list-style-type: none"> <li>• Disease widespread and causing substantial consumer resistance.</li> <li>• Infected animals cannot be treated.</li> <li>• Effective vaccine available at low cost.</li> </ul>  |

Source: Reid (1981).<sup>27</sup>

## **6. TECHNICAL APPROACHES TO OJD CONTROL**

**A number of technical options are available for the control of OJD.**

6.1 The following brief assessment of the typical approaches for dealing with stock disease as they apply to OJD is based on the fuller discussion in the CSIRO Scientific Review.<sup>28</sup>

### **DO NOTHING APPROACH**

6.2 The New Zealand and New South Wales experience indicates that this approach would lead to spread of the disease throughout infected flocks and the State. This strategy avoids the costs of controls, but incurs costs from the disease itself.<sup>29</sup> The approach would also require the deregulation of OJD as a notifiable disease.

**OJD is a notifiable disease.**

### **EXCLUSION**

6.3 Exclusion is one of the main management strategies proposed for OJD in localities and States presently believed to be free of the disease. It aims to prevent the disease entering an area by restricting trade and undertaking market assurance programs. It may be possible to achieve exclusion of OJD by running a closed flock, with new genetic material introduced only via rams from certified clean flocks, artificial insemination or embryo transplant.<sup>30</sup>

## QUARANTINE

- 6.4 Use of quarantine to control spread of OJD aims to keep infected stock within infected areas. It essentially involves the application of restrictions on trading from properties known to harbour the disease. Difficulties arise from proving the presence or, more importantly, the absence of the disease on suspect properties under investigation. Exemptions for trade from properties under quarantine are sometimes considered appropriate and have been provided, for instance for live animals sold to abattoirs for slaughter.
- 6.5 Any quarantine program is reliant on good fences, enforceable regulations and market forces. Reliability of testing, and consequent uncertainty concerning the length of time that trading restrictions need to be applied, have been described as presenting difficulties.

## ERADICATION APPROACH

- 6.6 Destocking is apparently the only quick way to eliminate OJD from a property. Eradication of OJD may be achieved by culling the whole flock where the disease is identified by testing sample animals from the flock.<sup>31</sup> The property must then be kept free of infected animals for a sufficient time for the property to become decontaminated. Excluding sheep and related animals from the property for at least two summers before restocking with clean stock is thought to be adequate.<sup>32</sup> Follow-up surveillance is needed to ensure that the program has been successful and no new introduction of the disease has occurred. Inaccuracy of current tests, risks of cross-species infection and uncertainty of the survival time of the bacteria on pasture present problems for eradication.
- 6.7 Obtaining sheep that can be relied upon to be free of OJD for restocking is reported to be a problem. Whether it is feasible to eradicate OJD from the whole of Australia has yet to be determined.<sup>33</sup>

## VACCINATION APPROACH

- 6.8 Vaccines for OJD are available overseas and have recently been introduced into Australia for use in a pilot study.<sup>34</sup> There are two types of vaccine currently available, one containing live bacteria and a second consisting of whole killed bacteria.
- 6.9 Several problems arise from the use of the vaccines. First, they can cause severe swelling at the injection site and in lymph nodes. These can reduce carcass quality and interfere with surveillance for tuberculosis. Vaccines also interfere with testing for OJD. Furthermore, though the vaccination suppresses symptoms of the disease a vaccinated animal may still carry OJD infection. There is evidence that a vaccinated sheep can also shed bacteria at a low level onto pasture. Whether this would contaminate the pasture sufficiently to allow infection of other sheep is uncertain. In New Zealand, Spain and Iceland the evidence is that vaccination reduces pasture contamination to a level where reinfection of sheep becomes insignificant.<sup>35</sup> However there have been no studies to confirm that vaccination will have the same effect under Australian conditions. Vaccination may also be considered too expensive and time-consuming to use routinely with normal flocks.
- 6.10 At present no vaccines are permitted for commercial use in Australia.
- 6.11 None the less, widespread use of vaccination in Iceland is holding out the hope of eradicating OJD from that country. The use of the vaccines may also be a cost-effective approach for stud animals.

## CHANGED HUSBANDRY PRACTISES

- 6.12 OJD infected animals may remain healthy for several years if they are protected from other physical stresses. Although freedom from stress cannot guarantee that infected animals will remain healthy, it is widely believed that good management can reduce the impacts of the disease on a flock.<sup>36</sup> The aim is to ensure that animals are well fed, sheltered from extremes of weather and free of physical burdens such as worms or mineral deficiencies. Lambing, unfortunately, is a stress on ewes that cannot reasonably be avoided, and may precipitate development of the disease.
- 6.13 Other management actions may be aimed at reducing the risk of the infection being passed from one animal to another. The level of pasture contamination can be minimised by isolating and culling animals that are scouring or unthrifty. Damp areas that are likely to harbour residual infection can be fenced off.<sup>37</sup> Culling suspect ewes may reduce transmission of the disease from ewes to lambs.
- 6.14 Such careful management may reduce the impact of OJD, but will not eliminate or exclude the infection.<sup>38</sup>

## MINIMISATION, INCLUDING TEST-AND-CULL AND DRUG TREATMENT

- 6.15 Test-and-cull is not appropriate for OJD, as current tests are inadequate to guarantee detection of all infected individuals.<sup>39</sup> There is no obvious way to make general use of this approach with OJD because of the high proportion of animals that test negative during the early stages of infection and the high cost of testing (\$4-15/test depending on the type of test used).
- 6.16 Drug or antibiotic treatment is also unsuitable for controlling OJD as the disease is caused by one of a group of bacteria that are notoriously resistant to antibiotics and disinfectants.<sup>40</sup> At present antibiotics or other drugs do not appear have any practical application to the control of OJD.

### DISCUSSION POINTS

**Q6.1 Should additional approaches to those listed above be explored? If so, what are these?**

**Q6.2 Should more than one approach be used within Victoria and/or Australia? If so, how would you decide which approaches to use?**

**Q 6.3 If *Mycobacterium paratuberculosis* lives longer in cool, damp areas, what practical options are there for these areas to be isolated so that restocking of other areas might proceed earlier? Do these options, and their feasibility, vary with district?**

**Q6.4 Are there particular difficulties in some localities as far as providing fencing that is proof against straying sheep, or other animals that could be carrying OJD? If so, what are they?**

**Q 6.5 Might feral animals (e.g. goats, deer) pose a threat to control of OJD in some districts? If so, which districts? What options are there to reduce this threat?**

## 7. DIAGNOSIS AND RESEARCH

- 7.1 A substantial need for more information if control of OJD is to be placed on a sound footing has been identified.<sup>41</sup> The National Ovine Johne's Disease Control and Evaluation Program aims to fill the important gaps in knowledge by the year 2003.
- 7.2 Prowse, in his Scientific Review, described gains in knowledge at the beginning of 2000, information still needed, and work being done to acquire this knowledge. His key findings are summarised below.

### DIAGNOSING OJD

**Techniques for diagnosing the disease in individual animals are poor and remain a major focus of research.**

- 7.3 The first physical evidence that a flock may be infected can come from the presence of sheep that are showing signs of irreversible wasting. As the disease may not show obvious symptoms in its early stages, 'trace-forward' and 'trace-back' methods are also used to identify flocks at risk. 'Trace-forward' involves tracing properties to which animals have been sold from an infected property; 'trace-back' identifies properties that have sold sheep to an infected farm. These traces are followed by testing of flocks on the 'at-risk' properties.
- 7.4 Diagnosis of OJD depends on finding the actual *M. paratuberculosis* bacterium in faecal or body tissue samples, detecting responses within sheep to the infection or observing changes to the gut caused by infection.
- 7.5 The bacteria have to be cultured to identify their presence in faeces or body tissue. The ovine strain of *M. paratuberculosis* is difficult to culture and is slow growing. The numbers of similar bacteria that occur naturally in the environment have made it difficult to devise a culture method that specifically identifies *M. paratuberculosis*. These factors make direct identification of infection slow and expensive. In addition, methods based on culturing the bacterium are only 30 to 50 percent sensitive; that is they will fail to detect infection in at least half of infected samples tested. Consequently the tests are not reliable for use in testing individual animals. A sizeable number of sheep or faecal samples from an infected flock need to be tested to provide high probability that a positive result will be returned from the flock.
- 7.6 The two responses in sheep to infection that can be used to detect infection are the build up of antibodies to *M. paratuberculosis* in the blood of infected animals (a blood test) and the response of white blood cells to the infection (cell-mediated immune response). The white blood cell response is generally the first response of an animal to infection. If the infection is present, injection of a tiny amount of extract from the bacterium under the skin of an animal should trigger swelling and redness at the injection site. This works well for related infections such as tuberculosis in humans, but has not proved successful for Johne's disease.<sup>42</sup>
- 7.7 A test using the blood response has been developed. It has the advantage of being quick and highly specific to OJD. However it will detect no more than 50 percent of infected animals. Again a fairly large number of sheep in a flock need to be tested to ensure a high probability that infection in a flock is detected.<sup>43</sup>
- 7.8 Changes to the gut of infected animals can only be observed at post mortem. The method consequently has limited application. However the development of a rapid and low-

cost technique for surveying animals in the abattoir is offering the potential for more extensive and regular assessment of the level of OJD.<sup>44</sup>

7.9 The methods currently used to test a flock for OJD involve either testing a sample of sheep from the flock, or testing samples of faeces from the paddock where the sheep have been grazing. A positive test from one animal is strong evidence that a flock is infected but not conclusive because of the approximately 0.5 percent risk of false positives. A single positive result provides warning that further testing is needed.<sup>45</sup> Animals testing positive are subject to a post mortem inspection for evidence of diseased intestines. This, if present, provides conclusive evidence of infection.

7.10 It is much more difficult to establish that a flock is free of OJD. Animals that appear healthy and test negative may be carrying the infection. They may then test positive at a later date. Consequently the best that current tests can offer is a level of probability that a flock is free of OJD. If more animals are sampled and sampling is repeated over a number of years the probability that a flock testing negative is indeed free of OJD will be increased.<sup>46</sup>

7.11 No available tests have yet been shown to detect infection early in the course of the disease. This makes eradication difficult because it is not yet possible to identify infected animals before they shed bacteria in their faeces and contaminate their environment. Research is currently being done in an attempt both to improve the accuracy of diagnosis and to reduce its cost. A test that is accurate enough to allow test-and-cull of infected animals is not anticipated.

## **INFESTATION OF OTHER SPECIES BY OJD**

7.12 Many species of animals can be infected with *M. paratuberculosis*. They are not likely to exhibit severe symptoms when infected by a strain associated with a different species, but it has been suggested that they could provide a source of infection to a susceptible species. Infection of cattle with the ovine strain has been reported in both Australia and Iceland. Whether this could lead to contamination of pastures and, as a result, to infection of sheep with OJD needs to be investigated.<sup>47</sup>

7.13 There are also overseas reports of rabbits, foxes and stoats being infected.<sup>48</sup> At this stage it is unknown whether cross-species infection will compromise disease control and eradication programs although the potential for this exists. It is currently considered necessary to ensure that pastures that are destocked to eradicate OJD must also be kept free of goats, deer, alpacas and llamas.

7.14 The possibility that *M. paratuberculosis* plays a part in Crohn's disease in humans has also been raised. Symptoms are similar to those of OJD, but there is no conclusive evidence at this time of a link.<sup>49</sup>

## **RECENT ADVANCES IN KNOWLEDGE**

7.15 Research and surveillance is providing answers to many questions about OJD in Australia. CSIRO research has improved testing procedures and is clarifying the potential for advances in testing in the near future.<sup>50</sup> However much of this work is in an early stage. It will be several years before results will be available.

7.16 One significant recent development is in abattoir surveillance. This is a new method which is currently under national evaluation. It involves inspection of the intestines of sheep at the time of slaughter for signs of infection. The method may be useful for widespread monitoring which should enable the detection of the level of infection in a region without a focus on individual producers.

- 7.17 Further advantages of this procedure are that a very large number of sheep can be screened over time at relatively low cost.
- 7.18 Studies co-ordinated by the National Ovine Johne's Control and Evaluation Program are looking at the potential of vaccination.<sup>51</sup> Recent investigations supported the belief that two summers free of livestock is sufficient to decontaminate pastures. There is also some evidence that less than two summers' destocking may, under some circumstances, be adequate, but more research is needed before a shorter period can be considered.
- 7.19 The Australian Bureau of Agriculture and Resource Economics is currently using new data on the distribution and level of OJD to improve its estimates of the cost of the disease and economics of control strategies.

## OTHER INFORMATION NEEDS

**Much research is still under way, including the study of infection and the evaluation and development of vaccines.**

- 7.20 The National Ovine Johne's Control and Evaluation Program is the major program of research into OJD and its control. The Program is particularly addressing the need for knowledge about:
- a) the present distribution and level of OJD in Australia;
  - b) the rate of spread of the disease at present in various regions and factors determining this rate;
  - c) the length of time that pastures and dams remain infested after sheep are removed under a range of site and weather conditions;
  - d) effectiveness of available vaccines; and the possibility of a more effective vaccine being developed, and
  - e) factors that affect the probability that individual animals will contracting the disease.<sup>52</sup>
- 7.21 On the vaccine front, Prowse concluded that:  
The development of new, safer, more effective vaccine is a long term, difficult and complex project which will be very expensive with no assurance of a positive outcome. However such a product would be an important part of a control program.
- 7.22 As well as this technical information more needs to be known about the costs of OJD and the costs and benefits of various control strategies.<sup>53</sup> There is very limited data on the social impacts of either the disease or its control.<sup>54</sup>

## DISCUSSION POINTS

**Q7.1 What should the research priorities be?**

**Q7.2 Is it appropriate to base a control program on imperfect knowledge, or should we await more conclusive research?**

## 8. CURRENT MANAGEMENT STRATEGIES

8.1 In this section, 'management' is used as a term to describe all responses to OJD including doing nothing. The term 'control' is used to describe a form of management encompassing active measures that directly reduce the level and/or spread of the disease. Control strategies range from 'containment' (i.e. stop the disease spreading from known locations/flocks) to 'eradication' (i.e. eliminating the disease). Note that the term 'eradication' may be used to describe the elimination of the disease from a single flock or property as well as from an entire State or country.

### MANAGEMENT STRATEGIES USED IN OTHER AFFECTED COUNTRIES

**Overseas disease management approaches are varied but, where OJD is endemic, eradication is not generally considered a practical control option.**

8.2 For most sheep producing countries where OJD is endemic, the disease appears to be something with which individual producers live and manage as best as they can. The most common forms of management currently applied are:

- f) running a closed flock - to exclude the disease from individual properties;
- g) good husbandry - to reduce the impacts of the disease when exacerbated by other forms of stress;
- h) reducing the age structure of the flock - as the disease usually takes several years to have a marked effect on infected animals;
- i) culling older, unhealthy animals - to minimise the spread of the disease as it is these animals that are most likely to be spreading the infection onto pastures;
- j) fencing off damp areas - the areas where the organism will survive longest on the pasture; and
- k) vaccination using live vaccine - as used in northern America, Europe, Iceland and New Zealand.

8.3 Iceland has initiated several control programs over the 60 years since it was first identified in that country. These have involved several attempts at eradication through destocking and extensive restrictions on stock movement. However, reinfection occurred following destocking. More recently vaccination has been used to control losses. No evidence of OJD has been diagnosed in some regions for 10 years and vaccination may be stopped in the near future if it can be established that OJD has been eradicated.<sup>55</sup>

8.4 In contrast New Zealand has, in effect, no co-ordinated control program. There have been reports that landholders there regret that a vigorous eradication and exclusion program was not undertaken when the disease was first discovered. In recent years vaccination has been introduced in some areas as a form of control. The vaccination of ewe lambs and rams has been found to be a cost-effective control strategy in areas where the disease affects more than 50 percent of properties.<sup>56</sup>

### NATIONAL CONTROL STRATEGIES

**Containment is the current national control strategy, with a decision on long-term control strategies deferred until 2003 when further research results will be available.**

8.5 OJD appeared to be confined to the original area in the tablelands of NSW for more than ten years after OJD was first identified in Australia.<sup>57</sup> However by 1995 the spread of OJD was recognised to be of sufficient importance for a Steering Committee to be set up to develop a plan for the control of OJD in NSW. At about the same time OJD was first identified in Victoria. A Victorian program of control commenced twelve months later in December 1996. These two initiatives stimulated the Australian Animal Health Council to explore options for a national approach to the control of OJD.

8.6 By mid-1997 a National Market Assurance Program had been set up and, at the beginning of 1998, agreement was reached on a set of 'Standard Definitions and Rules' (published in January 1998). These two initiatives were intended to provide a consistent basis for further developments in OJD management. Concurrent discussions of the desirability of a national eradication program (of destocking and payment of compensation) did not lead to agreement. Following further discussion and study, the National Ovine Johne's Control and Evaluation Program was adopted by the Australian Animal Health Council. This program commenced in the latter part of 1998.<sup>58</sup> While this last program is focussed on research, it also incorporates an interim containment policy, reflects and assists the application of the *Standard Definitions and Rules* and includes funding support for the Market Assurance Program.

### ***The National Market Assurance Program***

8.7 The OJD National Market Assurance Program (MAP) aims to provide "a degree of assurance for the sale and movement of sheep from flocks which have a low risk of infection".<sup>59</sup> This is done through an on-going program of flock testing on properties that enter into the program. Care is also taken on these properties to avoid introducing potentially infected animals. Testing must occur over several years, assurance can only be given of a low probability of infection and absence of disease can not be guaranteed.

8.8 It is a voluntary program, with the cost of participation between \$1,000 and \$4,000 every two years, depending upon the number of sheep tested.<sup>60</sup> Recent modifications to the testing procedures are bringing down the cost of participation. There are almost 700 MAP certified flocks and anecdotal evidence that higher prices are starting to be paid for sheep from flocks in the MAP.<sup>61</sup>

### ***Standard Definitions and Rules***

8.9 Nationally agreed Standard Definitions and Rules were published in January 1998. They comprise:

Minimum national standards upon which the States and Territories formulate disease control programs to suit their circumstances [in order to] assist disease control in a nationally coordinated manner.<sup>62</sup>

8.10 The standards are based on a policy of containment. The key component of the standards is the definition and application of a series of zones and a series of rules on the movement of animals between these zones. The zones are, in summary:

- a) Infected - infection endemic, no restrictions on movement into the zone, vaccination may be approved (note that no areas in Australia are currently included under this zoning);
- b) Residual - infection is endemic, OJD is notifiable, movement restrictions apply;
- c) Control - OJD is notifiable. It may be present at a manageable level, monitoring is in place, tracing and investigation is undertaken of all known or suspected infection, movement restrictions apply;
- d) Protected - OJD occurs sporadically, OJD is notifiable, a monitoring program is in place, tracing and investigation is undertaken of all known or suspected infection, movement restrictions apply, an advisory program is in place, and all infected or suspect flocks are in quarantine with infected flocks subject to eradication; and

- e) Free - no OJD or suspected OJD exists, OJD is notifiable, monitoring in place, tracing and investigation is undertaken of all known or suspected infection, movement restrictions apply, an advisory program is in place, and any properties where OJD has been identified or suspected are quarantined with infected flocks subject to eradication.

8.11 These zones are declared by the 'Veterinary Committee' of the Joint National-State ministerial Agriculture and Resource Management Council of Australia and New Zealand and given legal effect under State legislation. Western Australia is the only State (together with the Northern Territory) currently included in the Free Zone. Residual zones encompass three areas in NSW including the Central Tablelands area, and Flinders Island. The remainder of Australia is included within the Control Zone.<sup>63</sup>

8.12 The application of each zone does not necessarily give a categorical statement of the presence or absence of disease. Within a Residual or Control zone there may be properties that are infested, under quarantine or investigation, destocked, have never been tested, or have undergone testing and appear to be free of OJD. Within a Free zone there may be flocks that have been tested and others that have not been tested.

8.13 The standards also deal with the destocking and decontamination of land, disease testing, tracing, and notification, and flock registration and monitoring.

## OVERVIEW OF MANAGEMENT POLICIES IN THE STATES

**Control is a State responsibility. Each State is part of the national program, but may supplement this with its own programs.**

8.14 As a notifiable disease, OJD is subject to government control in all States.<sup>64</sup> All States support the national approach as set out in the *Standard Definitions and Rules*. Participation in the Market Assurance Program is encouraged. The National Ovine Johne's Disease Control and Evaluation Program now provides a national framework for evaluation, research and development as well as a funding mechanism to implement this framework. Within Victoria all tracing, investigations and surveillance are carried out under the auspices of the national program.<sup>65</sup> Considerable effort has been put into identifying infected flocks as well as accrediting flocks under the market assurance program.

8.15 In addition to imposing restrictions on the movement of flock between the defined zones, both NSW and Victoria have included control by eradication in their programs. Table 3 provides an overview of the numbers of properties in the States where OJD has been detected and that have attempted eradication by destocking up to December 1999. The differences between States in the level of destocking reflect the major variations in the way this control is applied.

## CONTROL PROGRAMS IN NEW SOUTH WALES

**Control in NSW is a mixture of containment and voluntary local eradication. These controls were put in place after the disease had become well established.**

8.16 As at December 1999, a total of 494 infected flocks had been identified in NSW with 443 still having the infection. A further 575 flocks are suspect and under investigation for various reasons. There are an additional 1298 flocks under surveillance that are apparently free of OJD after initial testing, but subject to further testing to confirm their status.

**Table 3 Detection and Destruction of Infected Flocks**

| State                               | Number of Identified Infected Flocks |                | Number of Infected Flocks Destocked |                             | Percentage Destocked |                |
|-------------------------------------|--------------------------------------|----------------|-------------------------------------|-----------------------------|----------------------|----------------|
|                                     | As at 31/3/98                        | As at 31/12/99 | As at 31/3/98                       | As at 31/12/99 <sup>#</sup> | As at 31/3/98        | As at 31/12/99 |
| <b>Victoria</b>                     | 75                                   | 175            | 67                                  | 168*                        | 89%                  | 96%            |
| <b>NSW</b>                          | 243                                  | 499            | 15                                  | 51**                        | 6%                   | 10%            |
| <b>Tasmania</b>                     | 8                                    | 21             | 1                                   | 3                           | 13%                  | 14%            |
| <b>SA</b>                           | 1                                    | 31             | 1                                   | 8                           | 100%                 | 39%            |
| <b>Other States and Territories</b> | 0                                    | 0              | N/A                                 | N/A                         | N/A                  | N/A            |

Notes: # Some properties were only partly destocked as at 31/12/99.

\* 66 of these destocked properties are now certified as clear for restocking.

\*\* 34 of these destocked properties are now certified as clear for restocking.

Source: National Ovine Johne's Disease Control and Evaluation Program (1999), p. 7.

8.17 The key elements of the NSW approach are currently:

- a) voluntary destocking (to achieve eradication at a property level); and
- b) confining the disease through obligatory restrictions on stock movement, with the severity of restriction varying according to the zone.

8.18 Zoning was implemented on 1 July 1999. Parts of NSW with high levels of infection are zoned as 'Residual Zone' (with the least restrictive controls of stock movement within and into the zone, but highly restrictive controls on stock movement out of the zone); the remainder of the State (primarily the drier inland areas) is within a 'Control Zone'.<sup>66</sup>

8.19 A subsidy is available for Market Assurance Program testing of sheep flocks and goat herds for those who wish to trade from Residual to Control Zones. The subsidy is funded 50 percent from the NSW State Sheep Industry (raised by a statutory Voluntary Contribution Fund/Compulsory Levy Fund) and 50 Percent from the National Ovine Johne's Disease Control and Evaluation Program.<sup>67</sup>

8.20 In marked contrast with Victoria, destocking is voluntary and no compensation is paid for destocking. However, in NSW the controls were put in place after the disease had become well established.

## THE VICTORIAN APPROACH

**Current Victorian control aims at eradication. They were put in place while the disease outbreak appeared localised and included a compensation package (until November 1999).**

### *Before 1996*

8.21 Prior to December 1996 there were no particular controls on the movement of sheep within Victoria or between Victoria and other States, except that properties identified as infected with OJD were quarantined.

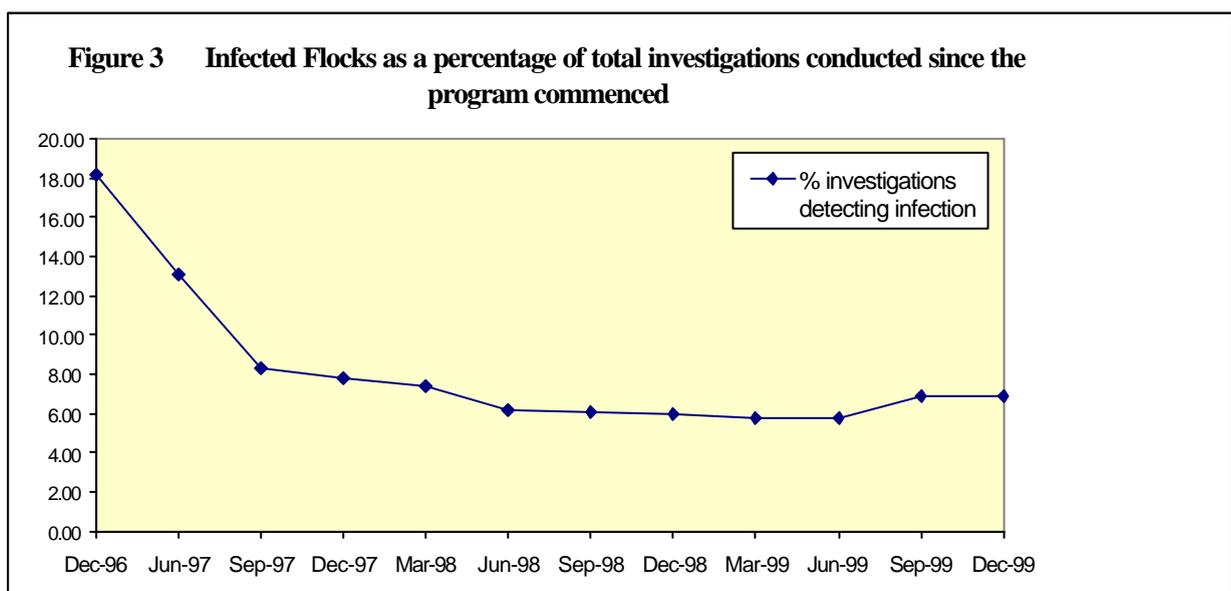
### ***Between 1996 and November 1999***

- 8.22 In the year following the detection of OJD in Victoria extensive investigations identified 33 infected flocks. At that stage it appeared that the infestation was confined to east Gippsland. The Pastoral Group of the Victorian Farmers Federation, in consultation with its Quarantine and Animal Health Committees, and the Victorian Government agreed that it would be in the best interests of the sheep industry to control OJD, with a view to achieving eradication of the disease from the Victorian flock.
- 8.23 In December 1996, a control program aimed at eradicating the disease from infected flocks and preventing spread to unaffected flocks was agreed to and put in place. The program involved eradication by destocking. It was to be funded by an initial Government grant and the collection of a Victorian stamp duty on sheep sales. It was intended that the compensation scheme be suspended either when OJD was eradicated from the State or if a nationally funded control and compensation program was adopted.
- 8.24 The Victorian control approach was formalised in 1997 by the preparation and adoption of the *Strategic Plan for the Control of Ovine Johne's Disease in Victoria* by the Sheep and Goat Compensation Advisory Committee. The "strategic goal" of the Plan is:  
to progressively eliminate OJD infection in Victoria through the eradication of OJD on known infected sheep properties, to ensure a market assurance process is available to the industry in Victoria, and thereby, to minimise the impact of Johne's disease on the Victorian sheep industry.<sup>68</sup>
- 8.25 The six 'strategic objectives' of the plan are:
- a) to define the extent of flock infection and detect and control spread where this has occurred;
  - b) to progressively reduce the reservoir of OJD infected animals and infected properties in Victoria;
  - c) to ensure a source of low risk replacement sheep for producers generally, and for producers restocking their properties following a property eradication program;
  - d) to promote the use of voluntary vendor declarations which are meaningful and based on veterinary assessment of flocks, or preferably, the Market Assurance Program;
  - e) to ensure the availability to all sectors of the sheep industry of accurate and sound advice on the disease, controlling its spread, the Victorian Control Program, and the Australian Sheep Johne's Disease Market Assurance Program; and
  - f) to meet the criteria for declaring Victoria a Protected Zone for OJD, in accordance with the national Standard Definitions and Rules, at the earliest possible date.
- 8.26 Under the control plan, eradication from individual properties was achieved primarily by destocking properties of all sheep, goats and camelids (i.e. camels, lamas, alpacas) and deer on affected properties, and consignment of animals to slaughter. Producers receive the slaughter value of the animals and, until November 1999, the compensation based on the number and type of animals slaughtered.
- 8.27 The rate of compensation specified on 26 June 1997 was \$100 per ram, \$25 per ewe, \$15 per lamb, \$18 for lambs too light for slaughter and \$15, per wether and per lamb that can be used for slaughter. A Departmental economic analysis undertaken in 1998 indicated that the levels of compensation were not adequate, a circumstance commented on by the Senate Committee's Inquiry - which recommended that "the Victorian Government review the level of compensation paid to growers who were required to destock their properties in 1997".<sup>69</sup> The levels of compensation paid were increased on 2 September 1998 to \$180 per ram, \$45 per ewe, \$32 per lamb too light for slaughter, \$27 per wether and lambs that can be sold for slaughter.<sup>70</sup>

8.28 Producers who chose not to destock were, and continue to be, subject to strict quarantine measures. Quarantine is enforced in Victorian by the Department of Natural Resources and Environment on properties that have been identified as infected with OJD.<sup>71</sup> Live animals from these properties can only be sold to abattoirs for slaughter. Suspect properties under investigation have similar restrictions on trading. Properties rated as under surveillance are in the process of testing to establish that they are free of disease. Trading restrictions may be less limiting for them. The legal basis for the restrictions of livestock trade and movement were put in place by an Order in Council of 2 December 1997 made under the *Livestock Disease Control Act 1994* (since replaced by an Order in Council, dated 21 March 2000, which adds restrictions on sheep trading with properties in the 'Residual Zone' in NSW).

8.29 All destocking is subject to the signing of agreements (under Section 17 *Livestock Disease Control Act 1994*) by the owner of the stock. Different interpretations have been described concerning whether or not farmers were compelled to sign these agreements and participate in the destocking program. Many farmers involved claimed to have thought that destocking as compulsory even if this was not actually state. Others described options to destocking (i.e. quarantine and the potential to be prosecuted if infection spread from their properties) as so threatening as to be no option at all. Agreement documents presented by the Department of Natural Resources and Environment to owners of infected flocks emphasised the responsibility of farmers for testing of suspect flock and their liability if this were not done and they sold sheep that transmitted the disease.<sup>72</sup> One producer indicated that, when he chose to enter quarantine rather than destock, the agreement offered to him only specified "quarantine prior to destocking".<sup>73</sup>

8.30 In conjunction with the control programs there has been intensive tracing and testing activities in Victoria.<sup>74</sup> By December 1999, 1287 'high-risk' flocks had been identified and tested. Several had been tested more than once, so that a total of 2535 flock investigations had been done. This involved conducting over 173,000 blood tests and 3685 post mortems. The result has been the detection of 175 infected properties, all but seven of which had destocked by the end of 1999.<sup>75</sup> Figure 3, below, indicates that the proportion of investigations that are identifying infection in flocks has generally been declining since 1997, except for an increase in late 1999 when a new cluster of infection was detected near Yea.



Source: Millar (2000b), p8

### ***After November 1999***

- 8.31 By the end of 1999 not only had it had become evident that the level and spread of OJD was greater than first anticipated but the costs of the control program had escalated and some farmers were experiencing considerable stress.
- 8.32 In November 1999, the Victorian government placed a moratorium on the compensation program. Other aspects of Victoria's OJD control program continue - that is tracing, testing and restriction of movement of infested or 'at-risk' sheep, in line with Victoria's commitment to the national program.

### ***Social Support***

- 8.33 Several forms of support for farmers facing stressful situations have been offered for many years. Relevant agencies included the Office of Rural Affairs, which was established in 1986. Its task was to find out the circumstances and needs of rural communities, provide these communities with information on available resources to meet these needs and advise government concerning other resources required to meet community needs.<sup>76</sup>
- 8.34 Hussey and Morris wrote, in early 1998, of the distress that both OJD and control actions were causing some producers.<sup>77</sup> In mid-1999 the Victorian Farmers' Federation called for the formation of a support group for farmers affected by OJD. The Victorian Farmers' Federation itself appointed an agricultural consultant to support its members and to provide confidential advice to farmers affected by OJD. This consultant assessed support services available and the needs of these farmers, and provided advice concerning their support needs to the Office of Rural Affairs.
- 8.35 The task of setting up support networks to take particular account of the needs of OJD-affected farmers was placed in the hands of the Office of Rural Affairs in late 1999. That Office contracted the company Community Connections to provide additional personal counselling services across Victoria. It also set in place funding assistance through other support services and contacted the 1300-1400 farmers affected in some way by OJD to advise them of assistance available.

### ***Scientific Review***

- 8.36 The State Government commissioned a scientific review of the OJD program within Victoria to be finalised by the end of March 2000. The review was undertaken by Dr Stephen Prowse, Program Manager, Infectious Diseases and Food Safety with CSIRO's Australian Animal Health Laboratories, Geelong.<sup>78</sup> It considered all existing information on the spread of OJD and strategies for its treatment, containment and eradication. It also reviewed current knowledge of the prevalence and distribution of OJD in Victoria and looked at production losses and human health links. The Review is intended to provide up to date and comprehensive information on relevant scientific research for use by the Committee in its Inquiry. A summary of information in the Review has been included in this Discussion Paper. The full CSIRO report is available from Department of Natural Resources and Environment.<sup>79</sup>

### **OTHER STATES**

- 8.37 Infected stock identified in South Australia is limited (with the exception of one infected animal identified on the mainland) to properties on Kangaroo Island. Likewise infected Tasmanian flocks are restricted to an island (Flinders Island). While both States recognise and have adopted the national *Standard Definitions and Rules*, it is understood that these States are still considering control options - although South Australia eradicated the flock where the infected animal was found on the mainland.

8.38 Western Australia and Queensland are concentrating their efforts on excluding the disease. They have instituted strict restrictions on movement of sheep from other States across their borders to protect their OJD-free status.<sup>80</sup> Western Australia has had, since 1996, stringent testing requirements on all imported sheep, vendor declaration program (of OJD flock status), a major extension campaign and a policy of eradication if OJD was detected.<sup>81</sup> It also conducted a tracing program of all high-risk sheep imported prior to import restrictions being put in place.

### **DISCUSSION POINTS**

**Q8.1 What overseas approaches to OJD control may be useful for Victoria? What approaches would not be suitable? Why?**

**Q8.2 What evidence is there that the Market Assurance Program is leading to higher prices for sheep?**

**Q8.2 Is the Market Assurance Program too costly or complex? Could it be improved? If so, how?**

**Q8.3 How useful is the current zoning approach established under the national *Standard Definitions and Rules* for limiting the spread of OJD? Could the zoning scheme be modified to work better? If, so how? Could the process of allocating zones be improved? If so, how?**

**Q8.4 Is NSW's program of voluntary eradication without compensation relevant to Victoria, or parts of Victoria? If so, under what circumstances might it be relevant?**

**Q8.5 Is the 'Strategic Goal' of the 1997 Victorian Strategic Plan for the Control of OJD still relevant for Victoria?**

**Q8.6 Is the declared objective of meeting the criteria for declaring Victoria a 'Protected Zone' achievable? Or desirable? If not, what level of zoning should Victoria aspire to? What would be the advantages of the whole of Victoria being classified as a 'Protected Zone'? Is it better to upgrade smaller areas where we can, rather than retain all of Victoria in the one (lower) zone?**

**Q8.7 Is a new cluster of infection likely to be found in Victoria?**

**(Questions relating to Social Programs are included in section 11.)**

## **9. IMPACT ASSESSMENT**

**The evaluation of the economic and social consequences of OJD is complex.**

9.1 An evaluation of the social and economic consequences of OJD is complex. Impacts of OJD can be considered from the perspective of individual farmers, local communities or regions, or the whole industry. The impacts of the disease need to be separated from the impacts of control strategies. Witnesses to the Senate Inquiry also gave the impression that

the way in which the eradication program in Victoria was implemented was as much an issue as the control strategies themselves.<sup>82</sup> Similar comments have been made about quarantine and investigation of suspect properties in NSW.<sup>83</sup>

9.2 Impacts of OJD also need to be distinguished from the effects of other things going on in some rural districts, such as declining and ageing of farming communities, fluctuating prices for stock, or adverse weather conditions.

## **THE NATURE OF ECONOMIC AND SOCIAL IMPACT ASSESSMENT**

9.3 A difficulty with recognising the assessment of impacts of any event is that those things that are easy to measure tend to be given prominence. Aspects that are hard to quantify are likely to be under-rated or ignored. Social impacts such as emotional stress and loss of morale fall into this category. Even an affected person finds it difficult to place a value on these things. With OJD there is evidence that this in no way diminishes the importance of the social impacts of the disease.<sup>84</sup>

9.4 Economic impacts appear somewhat easier to assess. Quantitative measurements can be made. None the less there can be difficulties in gaining a clear picture of the financial circumstances of individuals and communities. Some people may be reluctant to provide details of their business or to admit to financial difficulty. Reporting of impacts in terms of averages says little about the circumstances of individual people. The views of both farming and other businesses need to be considered if impacts on a community are to be determined.

9.5 Cost/benefit analysis gives information on the over-all economic effect of an action. Analyses of farm businesses for profitability and cash flow indicate more immediate impacts and possible difficulties for a farm business. Farm business analysis for properties affected by OJD has included such things as changed values or numbers of stock for sale, costs of increased mortality and effects of changing the farm enterprise for two years.<sup>85</sup>

9.6 Social impact assessments determine emotional impacts, as well as effects on community morale and relationships between people. The Bureau of Rural Sciences indicated that social impact assessment can include:

- a) identifying important issues in relation to an event or action – e.g. fear of infecting neighbours' properties;
- b) identifying positive and negative impacts of relevance to the people concerned – e.g. effects on blood-lines of a control option;
- c) identifying and measuring variables for the social analysis - expressions of anxiety or changed involvement in community activities;
- d) describing the changes that have occurred over time to individuals' sense of well being and community interactions – e.g. the extent to which neighbours share work and spend time in community activities; and
- e) analysing effects of current circumstances in the community and likely impacts of future changes.<sup>86</sup>

9.7 Methods used include surveys and group discussions. According to the Bureau of Rural Sciences a range of methods should be used if social impact is to be understood.<sup>87</sup> In addition care needs to be exercised to obtain a full range of opinions; quiet people need to be heard as well as those who are used to expressing their views.

## 10. IMPACTS OF OJD AND OJD CONTROL

### ECONOMIC IMPACTS OF OJD AND ITS CONTROL

- 10.1 Assessments of the potential economic costs of OJD in Australia and the costs and benefits of control strategies were undertaken by the Australian Bureau of Agriculture and Resource Economics (ABARE) towards the end of 1997.<sup>88</sup> This assessment suggested that eradication (if feasible) might be cost effective. Estimates of the cost of the disease to Australia if unconstrained over 20 years from 1997 ranged from \$13m (slow spread of the disease) to \$117m (rapid spread). Cost of eradication was estimated as \$27m over the same period.
- 10.2 However, the Bureau made it clear that its estimates were based on limited information. Prediction of costs, particularly of eradication, were to be taken as indicative only.<sup>89</sup> These original estimates are being revised in the light of information obtained over the last two years and new estimates should be available soon.<sup>90</sup>

#### *Direct Economic Impacts of OJD*

**Direct economic impacts of OJD may include lost production, increasing mortality in flocks, restrictions on market access and sales, loss of bloodlines and lower prices.**

- 10.3 Costs that may arise directly from OJD include lost production and increasing mortalities that are likely to increase as the disease spreads through the flock. There may be restrictions on access to markets, shows and sales and restriction on trade of sheep from Victoria into other States (outside Residual Zones).<sup>91</sup> Producers may also face legal liability if they fail to disclose known infection or the lack of disease testing when they sell stock. The value of infected properties may be reduced.
- 10.4 One estimate of the cost of deaths from OJD is \$500 per thousand head of sheep per year.<sup>92</sup> However, for the individual farmer it is not the average that matters, but the costs on his or her particular property. These may vary a great deal.
- 10.5 Prowse calculated that the cost to Victoria from OJD over the next 50 years if no steps were taken to control it would be \$30,400,000 at today's values (i.e. using a 5 percent per year discount on future costs incomes and expenses).<sup>93</sup>

#### *Effects of Control Strategies*

- 10.6 Both economic benefits and costs have been attributed to the control actions taken in Victoria. One of the costs of controlling OJD is that of testing an adequate number of flocks. Prowse estimated that the cost of tests alone (without expenses involved in collecting samples) could range as high as \$1.7 m. Abattoir surveillance could be as low as \$62,000 per year<sup>94</sup> - however, without a method of identifying the source of sheep at the abattoir, it does not identify infected flocks. If market assurance and eradication remain as the control objectives, the more expensive flock tests have to be used. In addition to testing costs there are compensation, administrative and operational costs.
- 10.7 Prowse, in his Scientific Review, assessed the likely costs and benefits of a range of management options.<sup>95</sup> His calculations are based on a representative farm for each of three types of enterprises. These are sheep/crop, sheep only and sheep/beef. Data from the Australian Bureau of Statistics was used to describe an average enterprise of each type with respect to number and type of stock carried. The final figures for costs and benefits of

different management regimes were based on several clearly stated assumptions and an average of costs and benefits for the different types of enterprises.<sup>96</sup> Based on these assumptions Prowse calculated likely benefits and costs of various control options. These are described in the next sections.

10.8 Prowse noted that many factors are specific to a given property. He indicated that, because of the broad assumptions used, his calculations give an indication only of control options that may prove economic for an individual farmer. In some cases a control strategy may benefit the industry as a whole, but be uneconomic for the individual producer.

### ***Destocking***

10.9 For the individual producer the cost of eradication by destocking was calculated by Prowse to be slightly greater than its benefits if no compensation were paid, unless losses from OJD were unusually high. From an industry perspective, if OJD could be eradicated from the whole of Victoria, the gain to the sheep industry would be considerable as it would cost between \$14 m and \$26 m less than the cost of uncontrolled OJD.<sup>97</sup>

10.10 The main costs of destocking have been described as including::

- a) reduced returns for animals sold at short notice for meat rather than for other uses or at a later date;<sup>98</sup>
- b) lost returns from wool on sheep when sold;
- c) loss of a blood lines developed to suit the particular farm enterprise;
- d) loss of opportunity to take advantage of variations in markets;
- e) expenditure associated with setting up a new enterprise for a short period;
- f) running a new enterprise, especially when a farmer is not experienced with it; and
- g) purchasing OJD-free replacement sheep at a later date.<sup>99</sup>

10.11 Costs to the individual producer may be off-set by:

- a) compensation payments (in Victoria) on a per-animal basis;
- b) income from the replacement enterprise;
- c) avoiding lost production and mortalities from OJD; and
- d) opportunity eventually to enter the Market Assurance Program and gain higher prices for stock.

10.12 In 1998 an analysis was undertaken of the net costs to a group of Victorian farmers of destocking.<sup>100</sup> Given differences between properties, the condition of sheep when slaughtered and ease of finding suitable replacement stock, the compensation offered covered the costs of some farmers and not others, with some facing significant losses. The burden and benefits of destocking thus was found to fall very unevenly on individual farmers.

10.13 According to Hussey and Morris:

While some affected producers have realistic ways of working through flock eradication, others have few options and cannot easily recover financially from the flow-on consequences of the control measure.<sup>101</sup>

10.14 One option that has been suggested to reduce inequities is to pay compensation at a 'fair market price' based on the condition and quality of animals. This was done for cattle during the bovine brucellosis eradication program.

10.15 Within Victoria, as at March 2000, \$15.3m has been paid out in compensation for destocking. To date, however, the income available (from Government grants and the proceeds of a slaughter levy paid by producers into the Sheep and Goat Compensation Fund) to fund this outlay is only \$3.2 million. The remaining outlay is an unfunded liability on the

fund. More over, if additional affected flocks are identified, further compensation payouts will be required.

10.16 The benefits of destocking that have been suggested include confining OJD to a small number of properties and maintaining the whole of Victoria within the 'Control' zone. Without destocking, parts of Victoria may have been included within a Residual Zone and farmers would be bearing the burden of greater restriction on trading.<sup>102</sup>

### ***Vaccination***

10.17 Commercial sale of vaccination is not permitted in Australia at present.<sup>103</sup> Prowse calculated that it could be a profitable option for many growers if OJD cannot be eradicated.<sup>104</sup>

10.18 Its potential benefits have been described as:

- a) reducing losses from mortalities and lower production;
- b) avoiding the cost of other types of controls.

10.19 Disadvantages, are:

- a) reduced carcass value - arising from damage at the site of vaccination;
- b) costs of the vaccine (approximately \$2/dose) and the need for it to be administered by a qualified person;<sup>105</sup> and
- c) medical costs incurred as a result of accidental self-injection by those administering the vaccine.<sup>106</sup>

10.20 Cost to the community and industry of vaccination would relate to problems that vaccination introduces into other control and eradication programs.

### ***Quarantine and Investigation***

10.21 Benefit to the sheep industry result from restrictions of the spread of OJD. Prowse calculated that the benefits are more than three times the costs.<sup>107</sup> However he also calculated that, for the individual producer whose property is under quarantine, the benefits are considerably outweighed by the costs. These are properties where OJD had been identified and where owners have chosen not to destock, or suspect properties under investigation. Production of wool or meat is still possible but sale of live animals is not permitted except to abattoirs. No compensation is offered to producers in these circumstances in any State.

10.22 Costs of these control measures relate to:

- a) restrictions on trading and ability to take advantage of best markets;
- b) uncertainty as to the duration of these restrictions and consequently restrictions on the producers' capacity to plan the farm business.<sup>108</sup>

## **SOCIAL IMPACTS OF OJD AND ITS CONTROL**

**Social impacts have to do with how people feel - they are real, sometimes overwhelming and often unacknowledged.**

10.23 Social impacts have to do with how people feel. They have been described as: Uncertainty, stress, anger, a sense of loosing personal control over life and despair. These feelings can build up over time. They impact in turn on the way in which individuals behave and whole communities thrive or decline.<sup>109</sup>

10.24 Witnesses to the 1998 Senate Inquiry hearings spoke of social as well as financial difficulties connected with OJD.<sup>110</sup> These difficulties were being experienced by both individuals and communities.

### ***Impacts on Individuals and Families***

10.25 At this time it appears to be difficult to separate the emotional impacts of OJD itself from the impact of actions taken to control the disease. It can also be difficult to separate social from economic issues. For example, one witness to the Senate Inquiry spoke of the problems of farmers with properties under quarantine if farmers were at retirement age or had student children. He described them as unable to sell their farms or obtain Social Security support because of the assessed value of their properties. Another witness described:

the devastation that people feel when they are told that they have this disease  
... The rug has been pulled from underneath us. We are back where we started  
33 years ago.<sup>111</sup>

10.26 Other emotional difficulties faced by farmers have been described as a sense of losing control and being unable to make proper provision for their families, of being regarded as a poor neighbour or a failure at the enterprise to which they have committed their lives.<sup>112</sup>

10.27 At the same time some farmers supported the eradication program.<sup>113</sup> They regarded the slow wasting of their animals as intolerable. Whether it is OJD or the control actions that are of greatest concern to farmers appears to depend partly on how far the disease has advanced in their flocks.

10.28 As well as farmers, other individuals have been experiencing considerable stress as a result of OJD. Mention has been made of emotional strain and overwork experienced by government staff required to implement the control program.<sup>114</sup>

### ***Impacts on Communities***

10.29 According to the Senate Report:

It has not only been the primary producers and their families that the disease has impacted on but the communities in which they live.<sup>115</sup>

10.30 A study in NSW found that, where farming people experience a sense of loss or betrayal, there is likely to be a resounding impact on the societies in which they live.<sup>116</sup> Businesses servicing local farmers' needs may be affected. If farming families move from the district schools may lose students and community organisations the support of some members.

10.31 Farming communities have described the stigma that attaches to the whole community once OJD is identified within it.<sup>117</sup> There are reports of animosity developing between neighbours where some have destocked and others had chosen quarantine. Perhaps, while there is sympathy for affected farmers, there may also be fear that they could cause a spread of the infection.

10.32 Uncertainty that the eradication program will prove effective has been described as adding to the direct impacts of destocking.<sup>118</sup>

10.33 At the same time many rural communities do show considerable resilience in the face of challenging circumstances.<sup>119</sup> Community and individual resilience has been shown to depend on underlying strengths already present.<sup>120</sup> This can be undermined by the assault of many difficulties but strengthened by past success in rising above adversity. There is evidence that social support services can help communities to tap this resilience. The key appears to be that these services assist communities and individuals to regain control of their lives.<sup>121</sup>

## IMPACTS ASSOCIATED WITH PROGRAM DELIVERY

- 10.34 The initial destocking program in Victoria was put in place quickly by the Department of Natural Resources and Environment to take advantage of the summer of 1996/7 as part of the decontamination period. There was also a hope that quick action would prevent the spread of OJD.<sup>122</sup> Be that as it may, witnesses to hearings for the Senate Inquiry in 1998 gave the impression that the way in which destocking was managed exacerbated problems experienced by farmers.<sup>123</sup> Consultation and information about OJD was described as poor to absent. They claimed that destocking orders were issued with insufficient time for farmers to prepare themselves (e.g. shear sheep before they were sent for slaughter) and presented in threatening terms.<sup>124</sup> Information provided by one farm business consultant suggest that there has been more opportunity for farmers to plan orderly destocking since 1998.<sup>125</sup>
- 10.35 Many farmers appear to have thought that destocking was compulsory, at least in the first year or two. There appears to still be confusion and a lack of communication on this point.<sup>126</sup>
- 10.36 Quarantine has also been described as an unattractive and hazardous option. Some producers certainly said that the threat of financial liability, should the OJD spread from their property, appeared to place farmers with infected stock in a financially dangerous position.
- 10.37 One difficulty may have been the language in the agreements that were offered by the Department of Natural Resources and Environment to producers. These, whether for destocking or quarantine, are couched in legal language that could be unfamiliar and daunting to many farmers. Some witnesses to the Senate Inquiry also suggested that part of the problem with implementation could be due to inadequate training of staff and too few staff to handle the job - that is, to a lack of resources.

### DISCUSSION POINTS

#### *Impact of OJD on Stock*

**Q10.1 Have the prices of sheep been affected by the identification of OJD in any districts? If so, by how much?**

**Q10.2 What mortality rates are being experienced directly from OJD? How have these affected farmers?**

#### *Impacts of Control Programs*

**Q10.3 What has been the effect of destocking on farmers' cash-flow and future financial outlook?**

**Q10.4 What enterprises have farmers been running while they were destocked? How successful were these?**

**Q 10.5 What effects are quarantine and surveillance having on farmers' financial situation?**

**Q 10.6 What effect have OJD and control programs had on neighbours of properties with OJD or under surveillance?**

#### *Other Issues*

**Q10.7 Does vaccination have a place in managing OJD in Victoria at present or in the future? If so, what would be its value?**

**Q10.8 How do farmers in areas not affected by OJD feel about bearing the cost of eradication, quarantine and/or surveillance programs?**

**Q10.9 What effect has OJD had on rural communities and individuals apart from farmers?**

***Implementation of OJD Control Programs***

**Q10.10 Has the manner in which the destocking and quarantine programs were delivered created additional impact? If so, what could be done to improve their delivery?**

## 11. SUPPORT PROGRAMS

- 11.1 Ideally all costs associated with a control program would be borne equally by all those affected, including those who benefit from the program. However, this is rarely the case. More over, even if costs are equally distributed, the ability of any given individual or family to cope with such costs will, given everyone's unique circumstances, not be equal. Appropriate support has been shown to play a useful part in helping rural people to deal with costs arising from unusual circumstances and the associated stress.<sup>127</sup>
- 11.2 In its pamphlet entitled *Support Services for Families Affected by Ovine Johne's Disease*, released in February 2000, the Department of Natural Resources and Environment describes social and financial support services that are being provided under its recent initiative.<sup>128</sup> Although the initial part describes families affected by destocking, support is available to all producers affected by OJD, including those who have properties under quarantine or investigation.
- 11.3 Most of the specific support programs described deal with the farmers' financial problems. An example is the FarmSmart program. This is offered by the Department of Natural Resources and Environment in association with the Victorian Farmers Federation. It gives farmers the skills to analyse their farm business, examine future farming options and prepare farm plans. Improving farmer's financial position may enhance the social wellbeing of farming families. This may be the direct result of reducing financial stress and may also be a product of farmers regaining a sense of control over their lives.<sup>129</sup>
- 11.4 In addition to any compensation paid for destocking, a special 'Ovine Johne's Loan Scheme' is now available to farmers who have destocked as a result of OJD. Families that have been affected by OJD can also obtain assistance towards the costs of developing farm business plans or undertaking a course in farm business skills. The cost of FarmSmart courses is waved for producers who are affected by OJD.<sup>130</sup>
- 11.5 It seems however that some farmers may be unwilling to use these services. According to the Victorian Farmers' Federation it is not enough to offer support to people when they seek it. Support needs to be taken to those affected and offered by independent and experienced people that they trust.<sup>131</sup>
- 11.6 The experience of Landcare and other rural groups suggests that locally based groups may offer effective support for both individuals and the community.<sup>132</sup> These groups need not be focused specifically on OJD or farming. They could be church, service or social clubs. In Queensland rural women's groups and other groups that support the School of the Air

and the Flying Doctor Service play an important part in fostering mutual support.<sup>133</sup> In South Australia a rural women's group, faced with drought and low wool prices, initiated a fine-craft program that has been effective in attracting funding and providing a new rural enterprise.<sup>134</sup>

- 11.7 Perhaps similar initiative and community good-will can be tapped to assist producers and communities adversely affected by OJD.

### **DISCUSSION POINTS**

**Q11.1 What sorts of support programs are likely to be most helpful to individuals or communities experiencing difficulties with OJD and its control?**

**Q11.2 Has the support being offered by the Office of Rural Affairs and its contractor Community Connections been useful to farmers affected by OJD?**

**Q11.3 If some farmers are not using these services, is this because:**

- a) they don't know about them?
- b) the services are not felt to be needed?
- c) the services do not appear suitable?
- d) farmers are embarrassed to be seen seeking such help?
- e) some other reason?

**Q11.4 Would it be helpful if the full range of issues facing farmers and others in their community were dealt with together? If yes, how could this best be done?**

**Q11.5 The sheep industry has rallied behind OJD-affected farmers to provide financial support via a levy. Would in-kind support, such as providing low-cost agistment so that a replacement flock could be built up during the destocking period, also help? Where else might support for control of OJD be obtained?**

## **12. WAYS FORWARD**

- 12.1 There are an array of technically feasible options available which have broadly been described as:

- a) do nothing until more information is available;
- b) continue with either a compulsory or a voluntary eradication program along the lines of the one that was suspended late in 1999;
- c) contain infestation through quarantine of properties that have been identified as infected whilst also restricting trading from suspect properties or regions. This could be with or without compensation;
- d) variations that allow for progressive destocking and decontamination of properties; and
- e) the use of techniques such as artificial insemination or embryo transplant to maintain blood lines.

- 12.2 Similarly, there may be a range of approaches to funding and implementation aimed at dealing with the economic and social impacts of OJD.

- 12.3 Sources of funds include levies on sheep-related transactions (a contribution by industry) and federal and State government (payment by the wider community). There are differences

of opinion on whether levies should be the same on sheep in all regions and States, and what contributions the various governments should make.

12.4 There is also a range of views concerning financial support to affected farmers. It has been suggested that compensation should relate to the actual costs to a producer of a control program rather than to sheep slaughtered. This could include costs of quarantine as well as destocking. Others have seen considerable difficulty in such an approach.

12.5 There has been less discussion of the most useful way to approach the social aspects of OJD. In other situations where large social impacts were likely consulting the people concerned and planning ahead to deal with these impacts has proved valuable.<sup>135</sup> With OJD there is a need to deal with both past and future impacts

12.6 Criteria that could be considered in making decisions about any program of OJD control could include:

- a) the control method is technically feasible, that is scientifically possible;
- b) the benefits of the methods outweigh its costs;
- c) the method is economically feasible, i.e. the people who have to carry out the program have the resources to undertake the work needed;
- d) the social gains outweigh social costs of the control approach;
- e) the control approach is equitable, i.e. gains and pain are spread fairly; and
- f) the control method is the most technically practical, fairer and cost-effective method available to achieve the particular control objective.

12.7 Other factors that might also influence decisions could be:

- a) what is known about technical, economic and social aspects of the management options – do these suggest that there might be significant changes to options in the future?
- b) what else is affecting the sheep industry and rural communities – are there other more important matters that restrict options to deal with OJD or alter its significance?

12.8 It has been suggested that, while the national OJD program is still in progress, Victoria should be undertaking only interim measures for controlling the disease. In another three to four years there should be a better scientific basis from which to decide upon longer-term management. Others suggest that any delay in vigorous action will jeopardise the possibility of future eradication of OJD.

12.9 The Committee welcomes advice on all the matters raised in this Discussion Paper, but particularly seeks suggestions concerning the best way forward in the control of OJD.

## **DISCUSSION POINTS**

### ***The Way Forward***

**Q12.1 Knowledge of OJD and its control is continually improving. Is it sensible to develop different management strategies for OJD in Victoria; one for the immediate future and/or for the short term (next two or three years) and a separate strategy for the longer term?**

**Q12.2 Should any Victorian control program be tailored to OJD or should an attempt be made to create a response that will apply to any similar disease?**

**Q12.3 Should Victoria simply become part of a national control program without adding any State-based programs?**

***A Fair and Effective Approach***

**Q12.4** Criteria that might be considered when making decisions about any OJD control program are listed in the text above. Are these criteria appropriate? Should others be added?

**Q12.5** Some people are likely to gain and others lose from any approach to managing OJD, whether it be 'do nothing', quarantine, zoning, voluntary or compulsory eradication, or the recent moratorium on compensated eradication. What is the best way to choose between management options?

**Q12.6** Compensation, testing, administration, research and surveillance all cost money. What are the best and fairest ways to raise and allocate this money?

**Q12.7** Any approach to the control of OJD will have impacts on people. What steps can individuals, communities or Government take to forestall or cushion the undesirable impacts and maximise the desirable effects of control strategies chosen? How can future control programs be made fair?

## APPENDIX I. REFERENCES

- Allworth, M. B. and Kennedy, D. J. (1998), 'Ovine Johne's Disease - the National Perspective', *Animal Health Surveillance Quarterly*, vol. 3 (1), pp. 1-3.
- Allworth, M. B. and Kennedy, D. J. (1999), 'Progress in National Control and Assurance Programs for Ovine Johne's Disease in Australia', *Proceedings of the 6th International Colloquium on Paratuberculosis*, "Talooby", Holbrook, NSW.
- Anon. (2000), 'Rising Wool, Southern Region Weekly Closing Prices', *Weekly Times*, 5 April 2000, p. 3.
- Australian Animal Health Council Ltd. (1998), *National Ovine Johne's Disease Control and Evaluation Program (NOJDCEP) Business Plan*, Annex to the NOJDP Deed of Agreement, Canberra.
- Australian Bureau of Agriculture and Resource Economics (1997), *Ovine Johne's Disease Evaluation of Control and Eradication Strategies*, Report to the Australian Animal Health Council, Canberra.
- Australian Bureau of Statistics (1996-97), *Principle Agricultural Commodities, Victoria*, No. 7111.2, Australian Bureau of Statistics, Canberra.
- Australian Bureau of Statistics (1998-99), *Principle Agricultural Commodities*, No. 7111.0, Australian Bureau of Statistics, Canberra.
- Bailey, G. (2000), Senior Research Officer, Australian Bureau of Agriculture and Resource Economics, Canberra, personal communication, 14 March 2000.
- Coakes, S. (1999a), *Consulting Communities, A policy Maker's Guide to Consulting with Communities and Interest Groups*, Bureau of Rural Sciences, Canberra.
- Coakes, S. (1999b), *Social Impact Assessment, A policy Maker's Guide to Developing Social Impact Assessment Programs*, Bureau of Rural Sciences, Canberra.
- Counsell, D. (1999), 'Ovine Johne's Disease - A Consultant's Perspective', *Proceedings of the Australian Sheep Veterinary Society Conference, Addendum*, 16 - 21 May 1999, Hobart.
- Department of Natural Resources and Environment (1997), *Johne's Disease in Sheep; Facts for Farmers*, Pamphlet, Department of Natural Resources and Environment, Melbourne.
- Department of Natural Resources and Environment (2000), *Support Services for Families affected by Ovine Johne's Disease*, pamphlet, Department of Natural Resources and Environment, Melbourne.
- Fisch, B. (1998), Acacia Downs, Muttaborra, Queensland, personal communication, 12 December 1998.
- Flugge, M. (2000), Executive Director, Pastoral Group, Victorian Farmers Federation, Melbourne, personal communication, 29 March 2000.
- Galvin, J. (2000), Manager Animal Health Operations, Department of Natural Resources and Environment, Bendigo, personal communication, 29 March 2000.
- Hall, R. (1999), 'Representing the Dynamic Nature of Social Impact in Communities in an Accessible Way', *Proceedings of the Country Matters Conference*, 20-21 May 1999, Canberra.
- Higgs, T. (1997), 'Sheep Johne's Disease - Keeping it out of WA', *WA Journal of Agriculture*, vol. 38, pp. 77 - 80.
- Hussey, D. and Morris, R. (1998), *Ovine Johne's Disease: a Report to the Minister for Primary Industry and Energy*, ACIL Economics and Policy Pty. Ltd., Canberra.

- Johne's Information Centre (2000a), *Biology of M. paratuberculosis*, Internet site <http://www.vetmed.wisc.edu/pbs/johnes/biology.html>, 8 March 2000.
- Johne's Information Centre (2000b), *Epidemiology of Johne's Disease*, Internet site <http://www.vetmed.wisc.edu/pbs/johnes/epi.html>, 8 March 2000.
- Johne's Information Centre (2000c), *History of Johne's Disease*, Internet site <http://www.vetmed.wisc.edu/pbs/johnes/history.html>, 8 March 2000.
- Millar, H. (1999), *National Ovine Johne's Disease Control and Evaluation Program*, unpublished report, Department of Natural Resources and Environment, Werribee.
- Millar, H. (2000), Acting Chief Veterinary Officer, Department of Natural Resources, Attwood, personal communication, 14 March and 14 April 2000.
- Moloney, J. (2000), Rural Affairs Advisor, Department of Natural Resources and Environment, Warrnambool, personal communication, 29 March 2000.
- National Ovine Johne's Disease Control And Evaluation Program (1999), *Surveillance Report No. 3, 1 October 1999 to 31 December 1999*, National Ovine Johne's Disease Program, Canberra.
- National Ovine Johne's Disease Control and Evaluation Program (2000), *Quarterly Operations Coordinator's Report*, Canberra.
- NSW Agriculture (1997), *Johne's Disease of Sheep: Reducing Losses on Infected Properties, Agnote DAI/33*, Internet site <http://www.agric.nsw.gov/Sheep/Health/ojd/dai33.htm>, 9 March 2000.
- NSW Agriculture (1998), *Johne's Disease of Sheep*, Internet site <http://www.agric.nsw.gov.au/Sheep/Health/ojd/a3944.htm>, 17 February 2000.
- Patterson, A. (1998), *Financial Impact of Destocking for Ovine Johne's Disease on Victorian Farms*, Department of Natural Resources and Environment, Hamilton.
- Prowse, S. (2000a), *Ovine Johne's Disease*, A Scientific Review prepared for the Hon. Keith Hamilton MP, Minister for Agriculture, Victoria, Australian Animal Health Laboratories, CSIRO, Geelong.
- Prowse, S. (2000b), Program Manager, Infectious Diseases and Food Safety, Australian Animal Health Laboratories, CSIRO, Geelong, personal communication, 17 March and 18 April 2000.
- Reeves, J. (1999), 'The Effect of Farm Debt on Farm Families', *Proceedings of the Country Matters*, 20-21 May 1999, Canberra.
- Reid, R. L. ed. (1981), *A Manual of Australian Agriculture*, Edition Fourth, William Heinemann, Melbourne, Victoria.
- Roth, I. (2000), Program Leader Sheep, NSW Agriculture, Orange, personal communication, 19 April 2000.
- Senate Regional and Rural Affairs Reference Committee (1998), *The Incidence of Ovine Johne's Disease in the Australian Sheep Flock*, First Report, Canberra.
- Senate Rural and Regional Affairs and Transport Reference Committee (1998a), *Uncorrected Proof Committee Hansard. Reference: Prevalence and Incidence of Ovine Johne's Disease, Public Hearing Wednesday 3 April 1998, Canberra*, Internet site <http://searchpdf.adobe.com/proxies/1/92/44/25.html>, 3 April 2000.
- Senate Rural and Regional Affairs and Transport Reference Committee (1998b), *Uncorrected Proof Committee Hansard. Reference: Prevalence and Incidence of Ovine Johne's Disease, Public Hearing Wednesday 10 February 1998, Melbourne*, Internet site <http://searchpdf.adobe.com/proxies/0/23/88/28.html>, 10 February 2000.
- Senate Rural and Regional Affairs and Transport Reference Committee (1998c), *Uncorrected Proof Committee Hansard. Reference: Prevalence and Incidence of Ovine Johne's Disease, Public*

- Hearing Wednesday 11 February 1998, Bairnsdale*, Internet site  
<http://searchpdf.adobe.com/proxies/1/73/85/93.html>, 11 February 2000.
- Senate Rural and Regional Affairs and Transport Reference Committee (1998d), *Uncorrected Proof Committee Hansard. Reference: Prevalence and Incidence of Ovine Johne's Disease, Public Hearing Wednesday 11 February 1998, Hamilton*, Internet site  
<http://searchpdf.adobe.com/proxies/1/47/1/15.html>, 11 February 2000.
- Senate Rural and Regional Affairs and Transport Reference Committee (1998e), *Uncorrected Proof Committee Hansard. Reference: Prevalence and Incidence of Ovine Johne's Disease, Public Hearing Wednesday 24 February 1998, Canberra*, Internet site  
<http://searchpdf.adobe.com/proxies/0/23/38/78.html>, 24 February 2000.
- Sheep and Goat Compensation Advisory Committee (1997), *Strategic Plan for the Control of Ovine Johne's Disease in Victoria*, Sheep and Goat Compensation Advisory Committee, Melbourne.
- Silberbauer, G. (1989), Senior Lecturer, Department of Sociology, Monash University, Clayton, unpublished seminar presentation.
- Stehlik, S. (1999), 'Partnerships in Sustainability: Human Services and Community Resilience', *Proceedings of the Country Matters*, 20-21 May 1999, Canberra.
- Veterinary Committee (1998), *Standard Definitions and Rules*, National Ovine Johne's Disease Program, Canberra.
- Vizard, A. (2000), Senior Consultant, MacKinnon Project, Melbourne University, Werribee Campus, personal communication, 15 March 2000.
- Webb Ware, J. (2000), Senior Consultant, Mackinnon Project, University of Melbourne, Werribee Campus, personal communication, 15 March 2000.
- Youl, R. (2000), Rural Consultant, Landcare, Melbourne, personal communication, 28 March 2000.

## APPENDIX II. ENDNOTES

- <sup>1</sup> OJD was diagnosed in 1989 in a small flock in Gippsland. Only one ewe, imported from Flinders Island, was found to be infected after intensive testing. No further evidence of the disease was found in Victoria until 1995; Millar (2000b), p. 1.
- <sup>2</sup> Prowse (2000a).
- <sup>3</sup> Prowse (2000a), p. 5.
- <sup>4</sup> Prowse (2000a), p. 6; and also Prowse (2000b), personal communication, 17 March 2000.
- <sup>5</sup> NSW Agriculture (1997).
- <sup>6</sup> Prowse (2000a), pp. 5, 8.
- <sup>7</sup> Johne's Information Centre (2000b); and also Prowse (2000b), personal communication, 12 April 2000.
- <sup>8</sup> Prowse (2000a), p. 31.
- <sup>9</sup> Johne's Information Centre (2000c).
- <sup>10</sup> Prowse (2000a), quoting Brett (1995).
- <sup>11</sup> Prowse (2000a), p. 14.
- <sup>12</sup> Allworth and Kennedy (1998), p. 1.
- <sup>13</sup> Allworth and Kennedy (1999); and also Prowse (2000b), personal communication, 12 April 2000.
- <sup>14</sup> Senate Regional and Rural Affairs Reference Committee (1998), p. 3.
- <sup>15</sup> Allworth and Kennedy (1998), p. 1.
- <sup>16</sup> OJD was diagnosed in 1989 on a property in Gippsland in a single ewe that had been imported from Flinders Island. This animal was destroyed. No further evidence of the disease was found in Victoria until 1995.
- <sup>17</sup> Figures at March 2000 from Prowse (2000a).
- <sup>18</sup> Prowse (2000a), p. 5.
- <sup>19</sup> Australian Bureau of Statistics (1998-99), p. 6.
- <sup>20</sup> Australian Bureau of Statistics (1998-99), p. 6, and also Australian Bureau of Statistics (1996-97), p. 13.
- <sup>21</sup> Anon. (2000).
- <sup>22</sup> Hussey and Morris (1998), p. 3, and also Allworth and Kennedy (1998), p. 1.
- <sup>23</sup> Millar (1999), personal communication, 14 March 2000.
- <sup>24</sup> Hussey and Morris (1998).
- <sup>25</sup> Australian Animal Health Council Ltd. (1998).
- <sup>26</sup> Senate Regional and Rural Affairs Reference Committee (1998).
- <sup>27</sup> Reid (1981), pp. 489-525, 769-777.
- <sup>28</sup> Prowse (2000a).
- <sup>29</sup> Prowse (2000a), pp. 36-37.
- <sup>30</sup> NSW Agriculture (1998).
- <sup>31</sup> Testing of the disease status of the flock, rather than individual animals, is done for two reasons; first, available tests are not accurate enough to indicate if a specific animal has the disease so a substantial sample (20-500 individuals have been suggested) is used to determine if the disease is present in the flock; second, cost and time to test all animals is excessive as the value of individual animals is usually low.
- <sup>32</sup> NSW Agriculture (1998).
- <sup>33</sup> Senate Rural and Regional Affairs and Transport Reference Committee (1998d), evidence presented by Dr David Hucker, pp. 135-149; and also Senate Rural and Regional Affairs and Transport Reference Committee (1998c), evidence presented by Mrs Jeanette Commins, pp. 165-173.
- <sup>34</sup> NSW Agriculture (1998); and also Prowse (2000b), personal communication, 12 April 2000. The pilot study is being undertaken in the 'Residual' zone in the NSW tablelands.
- <sup>35</sup> Prowse (2000b), personal communication, 18 April 2000.
- <sup>36</sup> NSW Agriculture (1998).
- <sup>37</sup> NSW Agriculture (1997).
- <sup>38</sup> Prowse (2000a), p. 6.
- <sup>39</sup> NSW Agriculture (1998).
- <sup>40</sup> Johne's Information Centre (2000a).
- <sup>41</sup> Hussey and Morris (1998).
- <sup>42</sup> Prowse (2000a), p. 24.
- <sup>43</sup> Prowse (2000a), p. 23.
- <sup>44</sup> Prowse (2000a), pp. 24-26.
- <sup>45</sup> Prowse (2000a), p. 18.
- <sup>46</sup> Prowse (2000a), pp. 17-19.
- <sup>47</sup> Prowse (2000a), pp. 28-30.

- <sup>48</sup> There has also been one report from Kangaroo Island of *Mycobacterium paratuberculosis* bacteria present in the gut of a wallaby.
- <sup>49</sup> Johne's Information Centre (2000c).
- <sup>50</sup> Prowse (2000a), pp. 20-25.
- <sup>51</sup> National Ovine Johne's Disease Control and Evaluation Program (2000).
- <sup>52</sup> Johne's Information Centre (2000b).
- <sup>53</sup> Australian Bureau of Agriculture and Resource Economics (1997).
- <sup>54</sup> This is indicated by the basic work that had to be undertaken by both the Australian Bureau of Agriculture and Resource Economics and the Senate Committee in these areas; Australian Bureau of Agriculture and Resource Economics (1997); and also Senate Regional and Rural Affairs Reference Committee (1998).
- <sup>55</sup> Prowse (2000a), pp. 39-40.
- <sup>56</sup> Senate Rural and Regional Affairs and Transport Reference Committee (1998b), evidence presented by Dr David Hucker, pp. 88-103.
- <sup>57</sup> Allworth and Kennedy (1998), p. 1.
- <sup>58</sup> Australian Animal Health Council Ltd. (1998).
- <sup>59</sup> Veterinary Committee (1998), p. 6.
- <sup>60</sup> Galvin (2000), personal communication, 29 March 2000.
- <sup>61</sup> Prowse (2000b), 12 April 2000.
- <sup>62</sup> Veterinary Committee (1998), p. 3.
- <sup>63</sup> National Ovine Johne's Disease Control and Evaluation Program (1999).
- <sup>64</sup> Department of Natural Resources and Environment (1997).
- <sup>65</sup> Millar (1999).
- <sup>66</sup> National Ovine Johne's Disease Control and Evaluation Program (1999).
- <sup>67</sup> Roth (2000), personal communication, 19 April 2000.
- <sup>68</sup> Sheep and Goat Compensation Advisory Committee (1997).
- <sup>69</sup> Senate Regional and Rural Affairs Reference Committee (1998), p. xiii.
- <sup>70</sup> Department of Natural Resources and Environment (1997).
- <sup>71</sup> Veterinary Committee (1998), p. 13.
- <sup>72</sup> Department of Natural Resources and Environment (1997).
- <sup>73</sup> Webb Ware (2000).
- <sup>74</sup> Millar (2000b), pp. 6-8.
- <sup>75</sup> National Ovine Johne's Disease Control and Evaluation Program (1999).
- <sup>76</sup> As of March 2000, the Office of Rural Affairs has become the Office of Rural Communities, based in the Department of State and Regional Development. It is now responsible for social development of whole rural communities, including rural towns.
- <sup>77</sup> Hussey and Morris (1998), p 4.
- <sup>78</sup> Prowse (2000a).
- <sup>79</sup> The Review may be seen at the internet site [www.nre.vic.gov.au/farming](http://www.nre.vic.gov.au/farming).
- <sup>80</sup> Millar (2000a), personal communication, 14 March 2000; and also Higgs (1997) and Hussey and Morris (1998), p 2.
- <sup>81</sup> Higgs (1997).
- <sup>82</sup> Senate Regional and Rural Affairs Reference Committee (1998), p. 55.
- <sup>83</sup> Senate Regional and Rural Affairs Reference Committee (1998), p. 58.
- <sup>84</sup> Senate Regional and Rural Affairs Reference Committee (1998), pp. 10-12; and also Hussey and Morris (1998), p. 4.
- <sup>85</sup> Counsell (1999).
- <sup>86</sup> Coakes (1999b), pp. 3-4.
- <sup>87</sup> Coakes (1999b), pp. 9-10.
- <sup>88</sup> Australian Bureau of Agriculture and Resource Economics (1997).
- <sup>89</sup> Australian Bureau of Agriculture and Resource Economics (1997).
- <sup>90</sup> Bailey (2000), personal communication, 14 March 2000.
- <sup>91</sup> Prowse (2000a), p. 26.
- <sup>92</sup> Prowse (2000a) quoting Higgs (1997). p. 26.
- <sup>93</sup> Prowse (2000a), Appendix 4.
- <sup>94</sup> Prowse (2000a), pp. 35-36.
- <sup>95</sup> Prowse (2000a), Appendix 4.
- <sup>96</sup> Assumptions used included that:
- a) flocks would be self-replacing, with ewes culled after four seasons and wethers after five seasons;
  - b) OJD would continue to spread at an increasing rate if no controls were implemented;
  - c) mortality rate from OJD in infested flocks would rise to an average of 4 percent;
  - d) cost of mortalities could be estimated by the cost of retaining extra replacements;

- e) destocking for two summers incurs costs of setting up a new enterprise – finishing steers was taken to be the replacement enterprise for these calculations; and
- f) exclusion of the disease will incur costs of testing sheep to be purchased.
- <sup>97</sup> Prowse (2000a), Appendix 4, p. 6.
- <sup>98</sup> NSW Agriculture (1997).
- <sup>99</sup> Patterson (1998).
- <sup>100</sup> Patterson (1998).
- <sup>101</sup> Hussey and Morris (1998), p. 3.
- <sup>102</sup> Millar (2000a), personal communication, 14 March 2000.
- <sup>103</sup> Millar (2000a).
- <sup>104</sup> Prowse (2000a), Appendix 4, p. 4.
- <sup>105</sup> Prowse (2000a), p. 41.
- <sup>106</sup> Accidental self injection occurs at an average rate of 1 per 1,000 doses and requires hospital treatment; Prowse (2000a), p. 41.
- <sup>107</sup> Prowse (2000a), Appendix 4, p. 1.
- <sup>108</sup> Prowse (2000b), personal communication, 17 March 2000.
- <sup>109</sup> Hall (1999), p. 2.
- <sup>110</sup> Senate Regional and Rural Affairs Reference Committee (1998), pp. 10-12.
- <sup>111</sup> Senate Regional and Rural Affairs Reference Committee (1998), p. 11.
- <sup>112</sup> Many of those who gave evidence to the Senate Committee Hearings reported distress associated with both OJD and destocking; for example Senate Rural and Regional Affairs and Transport Reference Committee (1998c), evidence presented by Mrs Jeanette and Mr Christopher Commins, pp165-173; and also Vizard (2000), personal communication, 15 March 2000, and Webb Ware (2000), personal communication, 15 March 2000.
- <sup>113</sup> Senate Rural and Regional Affairs and Transport Reference Committee (1998c), evidence presented by Mr Evan Newcomen, pp. 174-183.
- <sup>114</sup> Senate Rural and Regional Affairs and Transport Reference Committee (1998e), evidence presented by Mr William Johnson, pp. 355-356.
- <sup>115</sup> Senate Regional and Rural Affairs Reference Committee (1998), p. 10.
- <sup>116</sup> Reeves (1999).
- <sup>117</sup> Senate Regional and Rural Affairs Reference Committee (1998), p. 12.
- <sup>118</sup> Senate Rural and Regional Affairs and Transport Reference Committee (1998a), evidence presented by Mr Peter Franklin, p 504.
- <sup>119</sup> Stehlik (1999).
- <sup>120</sup> Stehlik (1999); and also Silberbauer (1989), unpublished seminar presentation.
- <sup>121</sup> Stehlik (1999).
- <sup>122</sup> Millar (2000a), personal communication, 14 March 2000; and also Prowse (2000b), personal communication, 17 March 2000.
- <sup>123</sup> Senate Rural and Regional Affairs and Transport Reference Committee (1998c), evidence presented by Mrs Heather Livingstone, pp. 152-157.
- <sup>124</sup> Senate Regional and Rural Affairs Reference Committee (1998), p. 55.
- <sup>125</sup> Counsell (1999).
- <sup>126</sup> Senate Rural and Regional Affairs and Transport Reference Committee (1998c), evidence presented by Mr William Bolitho, p. 158; and also Webb Ware (2000), personal communication, 15 March 2000.
- <sup>127</sup> Stehlik (1999).
- <sup>128</sup> Department of Natural Resources and Environment (2000).
- <sup>129</sup> Department of Natural Resources and Environment (2000).
- <sup>130</sup> Department of Natural Resources and Environment (2000).
- <sup>131</sup> Flugge (2000), personal communication, 29 March 2000.
- <sup>132</sup> Moloney (2000), personal communication, 29 March 2000; and also Youl (2000), personal communication, 28 March 2000.
- <sup>133</sup> Fisch (1998), personal communication, 12 December 1998.
- <sup>134</sup> The Riverland – Mallee Cottage Industry has contributed to community growth and tourism in the South Australian Riverland. Other groups that play a part in a resilient and vigorous community are the Riverland Youth Theatre and the Bookmark Biosphere Program.
- <sup>135</sup> For example in relation to changes to fisheries management in Queensland and the Australian Regional Forest Agreement; Coakes (1999b); and also Coakes (1999a)

