Monitoring success of paratuberculosis programs
Proceedings of 2\textsuperscript{nd} Paratuberculosis Forum, Minneapolis, August 2009
VIEW THE UPCOMING IDF EVENTS AT: http://www.fil-idf.org/EventsCalendar.htm

Bulletin of the International Dairy Federation 441/2009
© 2009, International Dairy Federation

GENERAL TERMS AND CONDITIONS FOR USING THIS ELECTRONIC PUBLICATION

Introduction
Use of the material provided in this publication is subject to the Terms and Conditions in this document. These Terms and Conditions are designed to make it clear to users of this material what they may and may not do with the content provided to them. Our aim has been to make the Terms and Conditions unambiguous and fair to all parties, but if further explanation is required, please send an e-mail to info@fil-idf.org with your question.

Permitted Use
The User may make unlimited use of the Content, including searching, displaying, viewing on-screen and printing for the purposes of research, teaching or private study but not for commercial use.

Copyright
Site layout, design, images, programs, text and other information (collectively, the “Content”) is the property of the International Dairy Federation and is protected by copyright and other intellectual property laws. Users may not copy, display, distribute, modify, publish, reproduce, store, transmit, create derivative works from, or sell or license all or any part of the content obtained from this publication. Copyright notices must not be modified or removed from any Content obtained under the terms of this licence.

Any questions about whether a particular use is authorized and any requests for permission to publish, reproduce, distribute, display or make derivative works from any Content should be directed to info@fil-idf.org

Availability
Although the International Dairy Federation publications are developed in view of maximum user-friendliness, the International Dairy Federation cannot guarantee any of these products to work on or with any particular computer system.

Liability
Although the International Dairy Federation has taken reasonable care to ensure that the information, data and other material made available in its publication is error-free and up-to-date, it accepts no responsibility for corruption to the information, data and other material thereafter, including but not limited to any defects caused by the transmission or processing of the information, data and other material. The information made available in this publication, has been obtained from or is based upon sources believed by the International Dairy Federation to be reliable but is not guaranteed as to accuracy or completeness. The information is supplied without obligation and on the understanding that any person who acts upon it or otherwise changes his/her position in reliance thereon does so entirely at his/her own risk.

Send any comments or inquiries to:
International Dairy Federation (I.N.P.A.)
Diamant Building
Boulevard Auguste Reyers 80
1030 Brussels
Belgium
Phone: + 32 2 733 98 88
Fax: + 32 2 733 04 13
E-mail: info@fil-idf.org
Web: www.fil-idf.org

Send any comments or inquiries to:
International Dairy Federation (I.N.P.A.)
Diamant Building
Boulevard Auguste Reyers 80
1030 Brussels
Belgium
Phone: + 32 2 733 98 88
Fax: + 32 2 733 04 13
E-mail: info@fil-idf.org
Web: www.fil-idf.org
Monitoring success of paratuberculosis programs
Proceedings of 2nd Paratuberculosis Forum, Minneapolis, August 2009


2. The Canadian Johne’s Disease Initiative
R. Barker
2.1. Background
2.2. Purpose and long term objectives

3. Ontario Johne’s Education and Management Assistance Program
D. Kelton, U. Sorge, A. Godkin
3.1. 2005
3.2. 2006-07
3.3. 2007 – JULY 2009
3.4. Preliminary results of follow-up study
3.5. Outlook and success

4. Parameters used to assess the efforts to control paratuberculosis in Denmark
S.S. Nielsen
4.1. Abstract
4.2. Introduction
4.3. Reasons for participation
4.4. Parameters of importance
4.5. Other issues for future consideration
4.6. Discussion

5. Measures of progress in Australia’s Johne’s disease programs
L. Citer, D. Kennedy
5.1. Introduction
5.2. A. Engagement of major stakeholders
5.3. B. Farmer participation and compliance
5.4. C. Measures of disease occurrence
5.5. D. Performance against program objectives

6. Progress in Australia – Section Two, Evaluation of Dairy Industry BJD Extension and Training Initiatives in Australia
A.M. Padula, R.J. Condron
6.1. Introduction
6.2. Aims of the BJD communication and training program
6.3. Dairy industry BJD management tools
6.4. Training and communication activities
6.5. Supporting resources
6.6. Evaluation of communication strategy and adoption of control measures
6.7. Evaluation of training activities
6.8. Conclusions

7. Progress in Australia – Section three, Managing Bovine Johne’s Disease in South Australia using a Dairy Scoring system
J. Rogers
7.1. Introduction
7.2. The “DAIRY ManaJD” program
7.3. Results

8. Measuring the Impact of the National Johne’s Disease Control Program: The U.S. Experience
M. Carter, S. Wells, M.T. Collins
8.1. Introduction to the National Johne’s Disease Control Program
8.2. Defining success
8.3. Judging the National Johne’s Disease Control Program’s impact
8.4. Conclusion

9. List of Participants – 2nd ParaTB Forum
Monitoring success of paratuberculosis programs
Proceedings of 2nd Paratuberculosis Forum, Minneapolis, August 2009

Foreword

This issue of the Bulletin of IDF comprises the papers presented at the Forum, covering the paratuberculosis control and eradication programs in a selection of countries in which the dairy sector operates under different market management conditions. The different approaches to management policy have important implications for the respective roles of authorities, veterinary specialists and farmers, yet the dairy farmer, of course, is the central figure in the success of each of the different programs described.

The Forum is an initiative of the Action Team on Infectious Diseases of the IDF Standing Committee on Animal Health and this second forum is a further step towards the goal of creating synergy between paratuberculosis control programs in different countries, operating at national or regional level.

IDF wishes to thank all speakers for their contributions to the Forum and to the University of Minnesota as host. Special thanks go to the two organizers of the event, Dr Michael A Carter (USA) and Dr Søren Saxmose Nielsen (Denmark). Dr Nielsen is also thanked for his work in compiling these Proceedings of the Forum.

Christian Robert
Director General of IDF

December 2009
Preface

The ParaTB Forum is an initiative of the International Dairy Federation (IDF). This forum serves as a platform for
- presentations of national / regional control or eradication programmes on paratuberculosis in dairy herds (goals, type of programme, methods and mechanisms involved);
- feedback on programmes that are established or under establishment;
- analyses on how well the programme is pursuing the goals set.

Visions are that the ParaTB Forum provides an internationally accepted code on paratuberculosis control and eradication programmes, aiming at global control of paratuberculosis.

The 2nd ParaTB Forum was held at University of Minnesota, Minneapolis, USA on August 8, 2009, as follow-up to the successful 1st ParaTB Forum, held in Shanghai in October 2006. At the 1st ParaTB Forum, programmes on paratuberculosis in different countries were presented and discussed (proceedings of the meeting published in Bulletin of IDF No. 410). Convenors of this meeting were Dr. Michael A. Carter from USDA-APHIS-VS and Dr. Søren Saxmose Nielsen from University of Copenhagen.

The theme of the 2nd ParaTB Forum was “Monitoring success of paratuberculosis programmes”. These proceedings provide presentations within this theme.

The 3rd ParaTB Forum is planned to take place in conjunction with the 11th International Colloquium on Paratuberculosis, which will take place at University of Sydney, Australia, in February 2012. The theme of this meeting will be: Lessons learned: “Which strategies work, and which have failed?”

I would like to acknowledge the support of Michael Carter for co-organising this meeting, Scott Wells, University of Minnesota for hosting the meeting, and to the IDF for their support as the framework for these meetings and for publishing the proceedings.

Søren Saxmose Nielsen
University of Copenhagen
Denmark

December 2009

P. Mullowney¹, D. Barrett¹, R. Fallon¹, J. Egan¹, S. More¹, P. Whyte¹, M. Good²

Johne’s Disease (JD) was included in the pilot herd health programme because of its increasing incidence worldwide and the possibility that it might be a zoonosis had potential to increase consumer concerns. This was of major concern to the dairy industry in Ireland. Thus, the industry and farm organisations agreed there was need for action. However diagnostic tests for Johne’s were poor and control programmes that had been established in the Netherlands, USA and Australia had met with varying degrees of success. One of the concerns of the stakeholders was who would pay for the scheme. The key drivers in the Herd Health Pilot Programme were veterinary practitioners including those in private practice, state employment and academia. The Department of Agriculture gave initial financial support. Other diseases of concern to participants included in the pilot programme were Bovine Viral Diarrhoea (BVD) & Infectious Bovine Rhinotracheitis (IBR).

The prevalence in Ireland of Johne’s disease was unknown at that time, but results from a serum survey conducted in 2005 would indicate an approximate prevalence of 10% in dairy herds (Good et al., 2009).

JD had been increasing in incidence in Ireland in recent years. There had been ninety-two cases diagnosed and compensation paid as a consequence between 1932 and 1982, but there were one hundred and fifty such cases in 2003. Much of this increase was due to the large number of cattle that were imported in the intervening years.

There were a total of fifty-two thousand cattle imported between 1992 and 1996, sixteen thousand from each of France Germany and Netherlands, almost three thousand from Denmark and smaller numbers from Belgium, UK and Italy. A survey of sixteen herds with imported animals showed that of 226 animals tested, eight were positive on the ELISA test and nine positive on faecal culture. 25% of herds were ELISA positive and 37.5% faecal positive (O’Doherty et al., 2000).

The initial communication in setting up the pilot project was with farmers, veterinary practitioners, industry and farming organisations. A specific Johne’s Disease booklet was distributed to all dairy and beef farmers in 2003 and made available on the Department of Agriculture website. Seminars were held to highlight the need for herd health in the changing EU farming environment. The economic impact of the disease was stressed and a herd which showed marked

¹ Department of Agriculture, Kildare Street, Dublin 2, Ireland.
reduction in milk yield and profit per cow during the period of infection, was used as a case study (Barrett et al., 2006).

The initial communication with veterinary practitioners consisted of a specific Johne’s Disease booklet distributed to all veterinary practitioners, regional Scientific Seminars and regional training courses for all interested veterinary practitioners. At the training courses lectures were given on Johne’s, IBR, BVD and Epidemiology and Risk Analysis. Four different workshops on risk analysis for Johne’s Disease in dairy herds, Johne’s Disease in suckler herds, IBR and BVD were held. The lectures were recorded on video and distributed to the participants on a CD. Relevant articles on the three diseases were also given to participants. The risk assessment templates were designed in text and spreadsheet format and follow up workshops were held twelve months after commencement of the scheme to review progress. The Herd Health Programme was subsidised by the Department of Agriculture which paid a fee to practitioners for the risk assessment on three to four chosen herds each. Laboratory testing was free to farmer participants. Thirty-five veterinary practitioners attended the course and twenty-two enrolled clients. Sixty-eight risk analyses were carried out on herds. Sixty-three of these herds decided to participate in a Johne’s Disease control programme, nineteen in BVD and six in IBR. Following the initial farm visit and risk assessment, a sampling strategy and disease control plan was put in place. Most participants found that the Risk Analysis Template took longer to complete than they expected but that they found it useful in comparing with the next year’s results and that the farmer client had agreed targets. The scheme aimed to establish pilot herds in each veterinary practice, which could be used to extend a similar scheme to other herds in the practice, and where the disease control procedures could be used as examples for other diseases.

The industry and farming organisations were given regular updates on progress of the pilot project and reports were submitted to the Irish Farmers Journal.

A day long seminar on Johne’s Disease was held in August 2005. All participating veterinary practitioners and farmers and other interested parties were invited and about 120 attended. International experts speaking included Drs Mike Collins and Jeannette McDonald of the University of Wisconsin and Dr Bob Whitlock of the University of Pennsylvania.

A further day-long seminar on Johne’s Disease and BVD for participating veterinary practitioners and farmers was held in December 2007. This was followed by a day long workshop where individual problems on each herd were addressed by the main speakers, Prof. Joe Brownlie of the Royal Veterinary College, London and Dr Søren Nielsen of University of Copenhagen.

Sixty-three of the sixty-eight herds participating in the pilot project tested for Johne’s Disease. Some herds wanted to establish that they did not have a Johne’s problem and therefore only took faecal samples for fear of false positives on the ELISA test. Of the twenty herds that carried out faecal sampling fourteen herds had all animals negative and further sampling was not carried out in these herds. Six herds had positive animals on the faecal test. Unfortunately because of problems encountered during the relocation of the diagnostic laboratory shortly after the start of the scheme there was a delay in reporting faecal culture findings. This resulted in most practitioners using the ELISA test afterwards and of the fourteen herds with negative faecal herd tests, seven subsequently had positive animals on ELISA tests. Twenty of the twenty-nine herds that had only one ELISA test done had positive animals. Twelve of these herds sampled in 2005, of which seven were positive and these herds may have dropped out of the programme or at least have not submitted samples since then. Of the sixteen herds that have only had one test in subsequent years, twelve were positive. Of the thirty-four herds that had more than one ELISA herd test carried out all except four herds had positive animals. Some herd owners may have been of the mistaken opinion that one test would have indicated freedom from the disease. Some were looking for a certification programme of freedom. Others were attempting to determine if management changes were prudent to avoid spread. Of the forty six dairy herds participating in the Johne’s programme, only thirteen had not bought in any cattle in the previous twelve months and eight had only bought in a bull and, of these twenty one herds, fifteen had a positive test result. A herd would need to be closed to new animals in order to have meaningful certification. If a suitable number of closed herds were interested in participating in a certified freedom programme, the Danish milk ELISA test, made four times a year, might be a more convenient way of monitoring. We are in the process of setting up an online training system for participating farmers and veterinarians (http://moodle.org). An organisation, Animal
Health Ireland, has recently been set up whose goals are, through superior animal health and welfare:
- To enhance the quality image and the competitiveness of Irish livestock and food in the market place.
- To enhance the profitability and sustainability of individual livestock farms.
- To enhance the profitability of the food processing industry.

In setting up the organisation, a poll of 803 farmers was conducted as to what priorities they would like to see addressed in a herd health programme. The first five priorities were infertility, BVD, diseases of young calves, udder health / milk quality and lameness. This was mirrored in a survey of seventy-four experts, who had the same priorities, but in a different order. Johne’s did not rank high with either group. Nevertheless, it is understood that Johne’s Disease will be one of the diseases addressed under the biosecurity category.

An evaluation of the pilot project was carried out by submitting questionnaires to the thirty-one veterinary practitioners initially participating in the scheme and their herd owners. Veterinary practitioners were also asked to repeat the risk analysis for each herd. Sixteen replies were received, one practitioner did not participate because of other commitments and two had become employed by the Department of Agriculture and were no longer in practice.

**Veterinary practitioners were asked the following 12 questions in the evaluation of the scheme.**

1) How many clients did you enrol in the control programme?

2) If you have stopped participating in the scheme, why did you stop?
   - The funding has stopped and most of the herds were disease-free.
   - Herds had sold out.

3) Would you have enrolled more clients in a subsidised programme if you could have had more than three?
   - Yes (13)
   - No (1)

4) Did any of your other clients participate in a non-subsidised Johne’s control programme?
   - Yes (5)
   - No (9)

5) Which diseases were included in herd health programmes?

6) If you did not enrol clients for all three diseases, why not?
   - 1) Dairy herds with no sale of bulls and one suckler herd with no previous pneumonia problems joined when the funding was foreseeably going to end.
   - 2) At the time I felt Johne’s disease control was a priority.
   - 3) Little clinical evidence. Lack of farmer demand.
   - 4) Did not know the level and severity of IBR and BVD at the time.
   - 5) JD was the primary concern in all three herds.
   - 6) Farmers/vet “awareness” of IBR & BVD has increased over last year. Bulk milk and yearling blood sentinels offer “neat” introduction to BVD and JD health programmes.

7) Samples taken
   - Five took blood samples and ten took both blood and faeces.
8) If you did not take faecal samples, why did you decide not to?

1) On the three farms a low number of Johne’s ELISA positive animals were revealed. The farmers undertook to cull these at the time regardless of how the faecal samples would have come back.
2) Bad experience from previous sampling. Concentrated resources on heifer rearing and management.
3) Results not very accurate and too slow.
5) Took mostly bloods for two reasons: a) Faecal sampling is a very messy process; b) Farmer unwilling to be “culture positive” vs. antibody positive with legislative issues.

9) What did you do if you got a positive on a blood sample?

Almost all veterinary practitioners recommended culling, some reviewed previous titres before deciding and others confirmed with a faecal sample. One vet said he recommended management change at calving time on positive animals and culling as early as possible.

10) What did you do if you got a positive on a faecal sample?

Again most veterinary practitioners recommended immediate culling but one monitored animals and culled some, another recommended culling at an economically viable time.

11) Information day attendance

Eleven attended the information days in Abbeyleix and two did not.

12) What is your overall evaluation of the scheme and how could it be improved?

1) It is a great incentive to encourage herd owners to be aware of diseases. The free lab fees were a good source to get them started so I would not change these. The risk assessment was somewhat slow to get started but turned out quite well. The prevalence of Johne’s disease is very low in my practice so it was a little hard to convince farmers of the importance of it.
2) The scheme is a very good idea. Herd health is an important idea, particularly with regard to the control of Johne’s and BVD. I already had experience of dealing with respiratory disease outbreaks, but the scheme gave me the knowledge to deal with Johne’s and BVD in my clients’ herds.
3) The scheme was very worthwhile. The way it emphasised husbandry rather than diagnostic testing was good in my opinion. I believe that the cost or potential cost of disease should be communicated to clients in order to convince.
4) Good concept. Farmers need a simple message with regard to Johne’s Disease Control owing to labour shortages.
   a) Annual testing.
   b) Replacement heifer rearing protocol.
5) Scheme was excellent. It raised awareness of Johne’s and the simple and low cost measures to control spread.
6) This is a very good scheme. It helps to raise the awareness of these diseases in the farming community and encourages other farmers to do something about Johne’s. Opening the scheme to more farmers would have a positive effect on Johne’s control.
8) The scheme generally is very good; however the lab can be very slow to return results. At the time of the diagnostic laboratory’s move to Backweston faecal samples took 9 – 10 months to come back. Serology results seem to be inconsistent and this creates doubt in the minds of all involved.
9) There is no protocol for suckler herds. I recognise the difficulty in producing this; however it is something that needs addressing. Many pedigree herds would wish to participate in a JD eradication programme but all of these with the exception of Friesian/Holstein would be suckler herds. JD could be better controlled by having a mandatory blood test for all breeding animals offered for sale. Bulk tank testing for BVD antigen should be encouraged.
10) More farmer meetings to monitor progress and motivate them more.
11) The scheme is excellent. Continue meeting to assess progress and swap stories and monitor participating veterinary practitioners. Email updates/articles/news on diseases in scheme i.e. bulletin updates to keep up momentum and interest.
12) Initial “facilitated” learning in small groups was very effective. Could expand this to train all veterinary practitioners and advisors. Probably need simple templates for practitioner/advisor/farmer to follow. Need to regularly measure performance of practitioner/advisors/farmer. Deal with issue of “disclosure” of disease on farms (Johne’s in particular).
Farmers were asked the following 16 questions in the evaluation of the scheme

One client stopped participating in scheme following herd dispersal and so had no interest in completing questionnaire.

1) Herd type

No. of Herds

<table>
<thead>
<tr>
<th>Dairy</th>
<th>Reef</th>
<th>Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

2) Twenty four included Johne’s in their Herd Health Programme; none included IBR and three BVD

3) How many years have you been participating?

No. of herds

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

4) If you have stopped participating in the scheme why did you stop?

1) All positives removed, these only occurred in the pedigree animals and it never got into the dairy herd.
2) No time
3) Not relevant to my farm

5) Thirteen herds took blood samples eleven herds took both blood and faeces.

6) If you did not take faecal samples, why did you decide not to?

1) Bloods all negative
2) Results too slow
3) Only cow positive was due for culling anyway
4) No time
5) Too much trouble

7) How many positive samples did you get?

Response varied from 0 to 85 on blood and 0 to 35 on faecal.

8) Almost all said they culled if they got a positive on a blood sample either immediately or at end of lactation. One herd owner isolated cow at calving but did not get rid of her. Five herd owners took faecal samples and culled depending on the result. One herd owner stated that “eventually positive cows got sick and I culled them as soon as possible.”

9) Two herd owners said they culled immediately if they got a positive on a faecal sample. Others were not as proactive, if cows were in calf they allowed them to calve, if any have symptoms they were culled immediately. One monitored and considered when choosing culls at the end of the year. One herd owner said cow was dead by the time we got result. Another said all positive faecal animals were slaughtered and all progeny of all those cows slaughtered also.

10) Would you have participated in the scheme if you had to pay €5 for a blood sample and €10 for a faecal sample?

No. of herds

<table>
<thead>
<tr>
<th>Yes</th>
<th>Maybe</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>
11) **What changes have you made in management of calves since joining scheme?**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Bulls and heifers are separated. Heifers removed from dams immediately. Fed dam’s colostrum for 3 days then fed milk replacer for 8 – 10 weeks. No pooling of heifers’ milk.</td>
</tr>
<tr>
<td>2)</td>
<td>Cows removed from calves within 24 hours of calving.</td>
</tr>
<tr>
<td>3)</td>
<td>Friesian replacements kept separate from birth and fed milk replacer throughout.</td>
</tr>
<tr>
<td>4)</td>
<td>No more pooled colostrum to calves.</td>
</tr>
<tr>
<td>5)</td>
<td>Rearing calves in hutches and moving them to a clean out farm. Milk replacer and only two colostrum feeds given.</td>
</tr>
<tr>
<td>6)</td>
<td>Changed from rearing Friesian replacement calves to beef calves.</td>
</tr>
<tr>
<td>7)</td>
<td>Friesian heifers reared on milk replacer only, calf taken from the cow straight away, also Friesian Heifers reared in separate shed.</td>
</tr>
<tr>
<td>8)</td>
<td>Insistence on individual calving. No JD positive colostrum fed to individual calves. Milk replacer fed to all calves from 24 hours. No calf grazing on home farm.</td>
</tr>
<tr>
<td>9)</td>
<td>No longer pool colostrum.</td>
</tr>
<tr>
<td>10)</td>
<td>No fresh milk fed to heifer calves. Heifer calves removed from cow after calving.</td>
</tr>
<tr>
<td>11)</td>
<td>Try to keep bedding area clean, water etc. Power hose to clean sheds.</td>
</tr>
<tr>
<td>12)</td>
<td>No mixing of sucklers with dairy herd.</td>
</tr>
<tr>
<td>13)</td>
<td>Once calves have received colostrum from their own mother they are removed. Improved hygiene in calving area. Calves only fed milk from mother.</td>
</tr>
<tr>
<td>14)</td>
<td>Greater hygiene care was taken. As we have a suckler herd it was more difficult to isolate calves from cows. Stock were kept in smaller batches to decrease infection and cross infection.</td>
</tr>
</tbody>
</table>

12) **What changes have you made in management of heifers (6 mo. – 18 mo.) since joining scheme?**

Three herd owners said they made no changes to this group, others said they reared them separately from other cattle and made sure no slurry was spread on pasture. All progeny of infected animals were culled. Heifers kept in groups of age order and not mixed with older animals.

13) **What changes have you made in management of cows and heifers older than 18 mo. since joining scheme?**

Five respondents said they had made no changes in this group. One farmer had built six calving pens, which are disinfected and cleaned regularly. Another said he cleaned and disinfected calving pens and tried to keep in-calf heifers away from cows until they had calved.

14) Of the twenty-three farmers ten attended the information days in Abbeyleix.

15) Five considered the JD status of their herd the same as before while seventeen thought it was better.

16) **What is your overall evaluation of the scheme and how could it be improved?**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Happy with scheme. Would like to take more samples if possible. I feel I have Johne’s under control.</td>
</tr>
<tr>
<td>2)</td>
<td>Satisfied with knowledge that screening clear.</td>
</tr>
<tr>
<td>3)</td>
<td>I bought bull in to herd that died of Johne’s – hope no spread to cows has taken place.</td>
</tr>
<tr>
<td>4)</td>
<td>Would like to do another herd blood.</td>
</tr>
<tr>
<td>5)</td>
<td>Happy with the scheme but it is what effort you put in yourself that counts.</td>
</tr>
<tr>
<td>6)</td>
<td>Would like to see more consistency to blood results. Faecal sampling takes too long.</td>
</tr>
<tr>
<td>7)</td>
<td>Great scheme has worked well in my herd.</td>
</tr>
<tr>
<td>8)</td>
<td>Aware of the effect of pooling colostrum has on herd.</td>
</tr>
<tr>
<td>9)</td>
<td>Mandatory blood testing of breeding animals for sale.</td>
</tr>
<tr>
<td>10)</td>
<td>Very useful and beneficial scheme to health of herd.</td>
</tr>
<tr>
<td>11)</td>
<td>Scheme has helped improve the Johne’s status of herd.</td>
</tr>
<tr>
<td>12)</td>
<td>This scheme has helped us greatly. As we have a large herd it would not be financially possible to test the entire herd. Due to testing entire herd it was possible to take a strict culling policy. I have got excellent advice from my vet in relation to prevention and the overall disease problem.</td>
</tr>
<tr>
<td>13)</td>
<td>I think that the scheme has been a great success as it has slowed down the cross contamination in the herd. I think that every herd should be tested for Johne’s to raise people’s awareness and to try and control the disease before it gets a grip on the national herd.</td>
</tr>
<tr>
<td>14)</td>
<td>Nearly cost us our reputation as pedigree breeders.</td>
</tr>
<tr>
<td>15)</td>
<td>I need to improve Johne’s problem in herd and need financial assistance for testing.</td>
</tr>
</tbody>
</table>
Veterinary practitioners were asked the following questions in the evaluation of farmer participation in the scheme.

1) If this farmer did not participate in all three diseases why did he not?
   1) Johne’s was a priority in 2005, to establish how widespread the disease was in the herd.
   2) Farmer only interested in dealing with Johne’s disease, which was a huge problem on farm.
   3) Decided to keep it simple and concentrate on one.
   7) Johne’s was seen as the most critical of the three.
   9) Was already vaccinating for BVD and decided to concentrate on one problem at a time and had a lot of clinical Johne’s on farm.
   10) Johne’s was present on farm and IBR and BVD were less relevant or not understood at the time.
   11) Johne’s very important at time, IBR not known to be a problem in herd, started BVD in 2008.
   12) IBR not perceived to be a problem
   13) At the start of the scheme focus seemed to be on Johne’s, so ran with that first.
   16) Johne’s was clinical issue.

2) If this farmer stopped participating in the scheme why did he stop?
   2) ELISA positives were removed from the herd.
   3) Cost.
   4) Results too slow - problem with laboratory in the middle of scheme.
   6) Too messy and did not want culture positive tagging herd as positive Johne’s herd.
   8) There was only one positive cow; she was old and due to be culled anyway.
   9) Too much time.
   10) Not practical when doing TB test on herd of this size and would not get co-operation or payment to do it at any other time.
   17) No interest in IBR or Johne’s. Had not heard of either of them before.

3) Did this client make all the management changes you suggested?
   Of the twenty herds evaluated, veterinary practitioners responded that clients had made all recommended changes in seventeen herds, most changes in two herds, in one of which the calving area was still a concern and in two herds recommended changes had not been made.

4) Veterinary practitioners had thought prior to starting the programme that fifteen herds were infected with Johne’s and eight were not.

5) Did you take blood or faecal samples for Johne’s?
   Blood (11), Faecal (1), Both (12)

6) If you did not take faecal samples, why did you decide not to?
   1) ELISA positives were removed from the herd.
   2) Cost.
   3) No positives found.
   4) Results too slow - problem with laboratory in the middle of scheme.
   5) Some faeces samples were taken initially but the delays in getting the results made them meaningless.
   6) Too messy and did not want culture positive tagging herd as positive Johne’s herd.
   8) There was only one positive cow; she was old and due to be culled anyway.
   9) Too much time.
   10) Not practical when doing TB test on herd of this size and would not get co-operation or payment to do it at any other time.

7) Five clients would and eighteen would not have participated in the scheme if they had to pay €5 for a blood sample and €10 for a faecal sample.

8) The JD status of the herds was considered the same in six herds and better in seventeen. One herd has been sold.

References

2. The Canadian Johne’s Disease Initiative

R. Barker

Dairy Farmers of Canada (DFC) and the Canadian Cattlemen’s Association (CCA) have recently launched the Canadian Johne’s Disease Initiative (CJDI) to help reduce the prevalence of Johne’s Disease (JD) in Canada. JD is a costly production-limiting disease of ruminant animals and a potential trade barrier that affects the sustainability of livestock agriculture in Canada. JD in cattle is caused by *Mycobacterium avium* subspecies *paratuberculosis* (MAP), which may also have significant human health implications. The CJDI and JD prevention programs in Canada are targeted farm management assistance approaches, not regulatory programs.

The CJDI is a collaborative activity involving provinces, industry, governments, and veterinary schools, led by DFC, CCA and the Canadian Animal Health Coalition (CAHC). All provinces are considering or are implementing their own JD control programs. The CJDI commenced in July, 2009, and initially will focus on:

- Education and awareness - Develop and deliver coordinated educational information and communications about JD to industry, government and other target audiences.
- Provincial coordination - Facilitate communications amongst provincial JD working groups, share JD awareness and extension messages, as well as recommend minimal program standards.
- Research - Scan international JD programs and research activities, as well as facilitate collaborations to enable priority Canadian research and cost-effective JD program delivery.

The CJDI supports the provincial delivery of JD programs, including herd veterinarian training, risk assessment and recommended best management practices, initially focused on dairy herds. Quebec, Prince Edward Island, Nova Scotia and New Brunswick have initiated their own provincial JD programs. Other provinces are studying the CJDI recommendations and earlier JD project results and considering program options.

2.1. Background

Recent government and industry projects that have addressed Canadian JD control include:

- Ontario and Western Canadian dairy herd milk ELISA MAP testing and veterinarian JD training (CanWest DHI project, 2004-7);
- Definition of elements of the Canadian Voluntary Johne’s Disease Prevention and Control Program, including i) prevention (herd management) and ii) status (certification) pathway options (CAHC project, 2005-6); and
- Planning for a future national herd-management–based JD control initiative to coordinate provincially-delivered JD programs, i.e. the CJDI (CAHC project, 2008-9).

Over 60% of Canada’s practising dairy veterinarians have received training in the standard risk assessment approach to JD prevention. The trained veterinarian works with the herd owner to gather herd history information related to JD. Then the herd owner and the veterinarian develop a plan to implement cost effective Best Management Practices (BMPs) to minimize JD in the herd. Confidentiality of results is strictly maintained.

2.2. Purpose and long term objectives

The CJDI will highlight the importance of JD prevention at the national level and coordinate key activities beneficial to provincial JD programs, such as: working group networking, interaction with other national initiatives, educational forums, Map research priority-setting and the study of a future certified herd program for breeder herds. The CJDI will also investigate opportunities to efficiently and effectively merge JD control with the management of other calf, production-limiting or trade-linked diseases, as part of a comprehensive on-farm animal health bio-security program.

1 Canadian Animal Health Coalition, Guelph, Ontario, Canada
3. Ontario Johne’s Education and Management Assistance Program

D. Kelton¹, U.Sorge¹, A. Godkin²

3.1. 2005

In 2005 CanWest DHI became the first milk recording organization in Canada to offer a Johne’s Disease (JD) milk ELISA test, using preserved test day milk samples, to their clients in Ontario and Western Canada. To educate their clients about the correct interpretation of test results and effective ways of JD control, CanWest DHI partnered with veterinarians of the Ontario Ministry of Food, Agriculture and Rural Affairs (OMAFRA) to develop an educational program. Funds were granted by a federal government program administered provincially, called CanAdapt. During the first year, a pilot project was initiated for 80 veterinary practitioners and one each of their client herds in Ontario. The program was advertised in producer magazines and veterinary newsletters and offered a small incentive ($400) to producers for their participation. Veterinary practitioners were reimbursed for the time spent with the client conducting a herd Johne’s risk assessment and discussing test results. This visit was conducted with one of the two OMAFRA veterinary “trainers”. The objectives of this applied program were to inform producers and veterinarians about JD, utilization of the Johne’s risk assessment document, test interpretation at the herd level, and effective management practices for JD prevention. In addition, the objective was to reduce the prevalence of JD in known Johne’s problem herds. The utilization of the herd veterinarians was to endorse the veterinarians’ broader role in conducting infectious disease control programs for their clients. Herd veterinarians selected clients for this program and were asked to solicit herds suspected to have JD based on clinical disease and testing history. All milking cows in the 80 herds enrolled were tested on one CWDHI test day for JD, a general management and health pre-visit survey was completed by the herd owner prior to the visit for background and the risk assessment (RA) was conducted during a herd visit with the herd owner by the two veterinarians following receipt of the herd test results. Interest was significant – eventually the program was expanded to include the training of 118 veterinarians in the RA-based JD control program. Subsequently the training module has been incorporated into the final year program for graduating veterinary students from the Ontario Veterinary College with an interest in cattle practice. The Ontario RA questionnaire was based on the RA used previously in US programs.

3.2. 2006-07

The first pilot project was well received by producers, and more producers and veterinarians inquired about participating. In addition, CanWest DHI wanted to offer this test and program to clients in Manitoba, Saskatchewan, Alberta and British Columbia. Therefore, after receiving additional funding from the federal government (CanAdapt Collective Outcomes), the program was also offered to veterinary practitioners in those provinces. The funding was allotted to allow up to 15% of dairy producers per province to enrol and receive a $400 incentive towards their involvement (same amount regardless of herd size). In Ontario, enrolment was limited to 10%, because the province had already participated in the initial pilot scheme. Veterinarians trained in the initial pilot became eligible to enrol up to 10 additional clients each. After further advertising in producer magazines and newsletters, 606 additional herds enrolled voluntarily in 2006 through 2007. As expected the majority of producers were from Ontario (n=383) with additional herds added from Manitoba (n=53), Saskatchewan (n=35), Alberta (n=72) and British Columbia (n=63).

¹ Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada.
² Ontario Ministry of Food, Agriculture and Rural Affairs, Elora, Ontario, Canada.
3.3. 2007 – JULY 2009

Subsequent to the two veterinary practitioner “pilot projects”, a follow-up study was initiated at the Ontario Veterinary College to investigate the longer term impacts and activities. A PhD student contacted 499 producers of 627 original participants for their interest. To be eligible dairy producers had to be continuing to operate and to have tested their entire milking herd in their herd test in the pilot project. Some producers had neglected to test all first lactation animals. Therefore, to make sure that all producers had tested all first lactation animals, an additional inclusion criterion, that at least 20% of cows tested for the initial program had to be first lactation animals, was applied. In the end 240 producers (48%) agreed to participate in this follow-up study. The follow-up study included a telephone survey, a second whole lactating herd test and a second, veterinary-practitioner-conducted RA. Analysis of the follow-up study is ongoing. The aim is to evaluate the practicality and costs of the program on a day-to-day basis, to assess which management practices are associated with the spread or prevention of spread of JD on the farm and to evaluate the utility of the RA questionnaire. The Dairy Farmers of Canada and Dairy Farmers of Ontario support this project financially.

3.4. Preliminary results of follow-up study

As part of the follow-up two surveys (a mail and a telephone survey) have been conducted.

The mail survey assessed the beliefs of veterinarians surrounding JD and their attitude towards the risk-assessment-based JD prevention program. All veterinarians (n=180) who were trained in 2005 through 2007 were contacted per mail once. The 43 responding veterinarians believed MAP could have zoonotic potential, generally liked the risk assessment based program and thought it could also lead to the prevention of other on-farm diseases.

The second survey (a telephone survey) asked the 238 enrolled dairy producers about their perception of the impact of JD, the RA process and suggested management strategies. Most producers reported enrolling in the program because they were concerned that MAP could be perceived by consumers as a cause for Crohn’s disease in humans, leading to a drop in sales for milk and milk products. Generally the producers liked the program and found the recommendations made to them by their veterinarian reasonable and feasible. However, on average only two of six suggestions that were made specifically to them had been implemented by the time they were surveyed. The recommendation with the highest compliance was the culling of JD test positive cows. The main reasons for non-compliance with recommendations generally were that the dairy producer did not believe a change of management practices was necessary, or, the available barn setting or space did not allow the change. Producers were generally uncomfortable estimating time and monetary expenses for management changes, but reported that several suggested management practices actually saved time and money. In addition, 39% of the producers who implemented at least one recommendation thought their overall calf and herd health had improved subsequently. This suggests that the communication of the range of benefits associated with a Johne’s prevention program needs to be improved. This should be helpful in increasing the compliance of producers with recommended management practices.

The herd veterinarian was identified as the crucial link between emerging science and the dairy producer. If the herd veterinarian reported being convinced of the usefulness of the program, then it was more likely that they would convince their clients to participate.

Furthermore, the preliminary results of the association of the RA results from 2005-07 and herd level test results of 2008-09 are promising. The risk assessment seemed to identify risky management practices (MP) correctly. Maintaining a high level of hygiene throughout the dairy herd, not just in the calving pen, seems to be an important risk factor for the spread of JD within Ontario herds.

Several management practices that were assessed in the pre-visit survey, but not included in the RA, will have to be included in future versions of the RA. For example, questions regarding the cattle purchasing behavior of the producer are proving to be important for increasing the risk of being a Johne’s positive herd.

Ultimately a net positive effect of the overall Johne’s projects was found - the apparent rate
of test positive cows dropped in the enrolled herds between their initial test 2005 and their follow-up herd test in 2007.

3.5. Outlook and success

The program has made producers more aware of JD throughout Canada. To continue the efforts a group was formed in May 2007 in Ontario that included representatives of the dairy producers Dairy Farmers of Ontario (DFO), various dairy breed organizations, government (OMAFRA), milk recording (CanWest DHI), beef cattle (Ontario Cattlemen’s Association), dairy processors (Ontario Dairy Council), research (OVC) and dairy veterinary practitioners (Ontario Association of Bovine Practitioners, OABP). This group wanted to promote JD prevention to producers and veterinarians. The working group brings all involved parties together and facilitates a uniform approach to the control of JD in Ontario.

The first success of this working group is the acceptance of the prototype RA-based, JD control program as the industry standard for producers in Ontario by the DFO. Starting in October 2009, all dairy producers will be required to conduct a RA annually as part of their eligibility to sell milk in Ontario. Beyond this mandatory component, DFO has provided funding for each herd owner who wishes to do so, to test their entire milking herd once using the milk ELISA or equivalent test. Herd owners who identify a high test positive cow (a cow with a milk ELISA optical density score of 1.0 or greater, or an equivalent result on an alternative test) will be required to remove that cow permanently using an acceptable method within 45 days of testing (i.e. “retire the ear tag”), to receive testing reimbursement. Funds have also been made available to support an extended educational program for producers and veterinarians and to conduct applied research relevant to the Ontario program and situation. Ultimately DFO will assist the working group to provide a comprehensive program with over $2 Million. Ontario has about 4200 dairy herds.
4. Parameters used to assess the efforts to control paratuberculosis in Denmark

S.S. Nielsen

4.1. Abstract

Key parameters used to assess the efforts to control *Mycobacterium avium* subsp. *paratuberculosis* (MAP) in dairy cattle in Denmark are summarised. These parameters are discussed at national, programme and herd level. The primary aim of the control programme is to reduce the prevalence of MAP infections nationally. Therefore, monitoring of the prevalence is important. Many farmers are thought to be only partly active in MAP transmission management. They are not expected to control or eradicate MAP from their herds and therefore do not contribute to the reduction of MAP nationally. Hence, “active participation” is considered another key parameter. Tools and information to motivate farmers to participate are continuously being developed. Lastly, farmers in the programme expect to be certified “free of paratuberculosis” within 4-10 years. Hence, a certification module must be added to the existing control programme.

4.2. Introduction

A voluntary control programme on bovine paratuberculosis was initiated in Denmark in March 2006 (Nielsen et al., 2007). The scheme is administrated by the Danish Cattle Federation (DCF), and has these objectives:

1) to provide tools to farmers to control paratuberculosis, and
2) to reduce the overall prevalence of paratuberculosis in Denmark.

There are currently no options for certification of herds or animals free of MAP infection, and “free of paratuberculosis” at both cow and herd level is considered not to exist.

The target condition in the programme is all animals infected with *Mycobacterium avium* subsp. *paratuberculosis* (MAP), because all infected animals are at risk of becoming infectious and affected by MAP, resulting in long-term and short term losses to farmers. The herd-level prevalence has been estimated at approximately 80-85%, and the animal-level prevalence at 20-30%, although these estimates are subject to a great degree of uncertainty.

The programme is run as a risk-based control programme where frequent testing (4 herd screenings per year) is carried out to divide animals into high-risk and low-risk groups (Nielsen, 2009). Animals are tested using an ELISA for detection of MAP specific antibodies in milk. Samples are obtained via the milk recording scheme. Farmers should establish management procedures to reduce MAP transmission from high-risk animals. Low-risk animals require less attention with regard to transmission of MAP. Specific animals (“Red cows”, i.e. cows with repeated positive test-results) are recommended to be slaughtered prior to next calving.

Vaccination against MAP infections has been prohibited in Denmark since January 1, 2008. Prior to this, vaccination could occur with permission from the veterinary authorities. Approximately 24 existing farms hold permission to vaccinate and can therefore host vaccinated animals. All these herds have been or are participants in the programme, and 13 of the herds have false-positive results due to vaccination.

This paper describes parameters that are considered important to meet the objectives of the Danish control programme on paratuberculosis.

4.3. Reasons for participation

Reasons for not participating in the programme are only partly known. Among 167 farmers not participating in the programme on the island Funen, 100 were contacted in a telephone inter-
view in February 2009. Only 49 wished to participate in the interview, and the 51 non-participants typically stated that they did not have paratuberculosis on their farm and therefore considered it pointless to participate in an interview regarding lack of participation in a paratuberculosis control scheme.

Among the 49 responders, 5 only gave a partial response. The responders expressed:

- 7/44: test costs are too high;
- 13/44: too many changes in housing facilities are required;
- 4/44: insufficient advice on how to control MAP infections had been received;
- 24/44 were awaiting experiences of other farmers in the control programme;
- 8/44 expected to leave cattle farming within 1-5 years;
- 24/44 thought the financial gain in controlling MAP was too small;
- 23/44 considered their herd to be “free of paratuberculosis”.

Among the farmers participating in the control programme, the predominating reason for participation is that control of *Mycobacterium avium subsp. paratuberculosis* (MAP) infections improve animal health and avoids production losses. Only 45% believe they have actually experienced production losses related to MAP infections (Table 1). Certification “free of MAP” within 4-10 years is also desired by the majority.

### Table 1: Summary of reasons for participation in the Danish control programme on paratuberculosis based on questionnaire sent to 1170 participants of the programme in December 2008-March 2009. A total of 1013 (87%) responded to the questionnaire. Each farmer could provide multiple reasons for participation

<table>
<thead>
<tr>
<th>Reasons for participation in programme</th>
<th>Yes</th>
<th>(%)</th>
<th>No or do not know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herd certification within 1-3 years</td>
<td>245</td>
<td>(24%)</td>
<td>768</td>
</tr>
<tr>
<td>Herd certification within 4-10 years</td>
<td>796</td>
<td>(79%)</td>
<td>217</td>
</tr>
<tr>
<td>Herd certification to provide animals</td>
<td>488</td>
<td>(48%)</td>
<td>525</td>
</tr>
<tr>
<td>Control following production losses</td>
<td>454</td>
<td>(45%)</td>
<td>559</td>
</tr>
<tr>
<td>Control to avoid production losses</td>
<td>822</td>
<td>(81%)</td>
<td>191</td>
</tr>
<tr>
<td>Control to improve animal health</td>
<td>882</td>
<td>(87%)</td>
<td>131</td>
</tr>
<tr>
<td>Control to improve food safety</td>
<td>553</td>
<td>(55%)</td>
<td>460</td>
</tr>
</tbody>
</table>

### 4.4. Parameters of importance

A number of parameters for measuring the efforts against MAP infections are being considered in the administration of the programme. DCF has an obligation to provide farmers, if possible, with cost-effective means to manage relevant veterinary issues. MAP infections are costly in the view of the DCF both in short and long term perspectives. Because MAP is widespread, it is for the individual farmer to decide if she/he will take the risk of not controlling MAP infections through the scheme recommended by the DCF. However, if the prevalence is low and eradication from the country is deemed feasible, DCF could decide to take steps that would effectively make a programme compulsory.

“Successful management of MAP infections” can therefore differ at different levels and in different populations: the national herd, the herds in the programme and within the individual herd.

**National level**

**A. Participants**

The ultimate aim is to include all herds with MAP infected animals in the control programme, and all herds in a future certification programme. Non-participating herds are a potential source...
of MAP, because their status is unknown and they should therefore be included in the future, and in a potential eradication programme.

However, only herds with established management procedures to reduce transmission from high-risk animals should be included in the control programme. Farmers that do not have such procedures implemented will not experience success, and may reflect poorly on the programme and may also blame the tools and recommendations provided by the programme.

There are currently (June, 2009) 1255 dairy herds enrolled in the Danish control programme on bovine paratuberculosis. The national herd consists of approximately 4294 dairy herds and 500 000 cows (average herd size = 116 cows). The average herd in the programme is approximately 160 cows. Approximately 29% of all herds and 40% of all cows are enrolled in the programme.

To enrol farmers, there has been two "recruitment periods": February-March 2006 and September-December 2006. Information material was distributed to all farmers to actively recruit farmers in those two periods only. Since its inception in March 2006, 256 herds have left the programme, with 103 (40%) citing cessation of milk production.

B. Communication.

Communication with participants in the programme and non-participants is considered vital. The aim is to provide communication tools for

- Motivation of continued efforts to control MAP;
- Efficient risk-based management of MAP infected animals;
- Monitoring of the development of MAP in the programme;

and to provide up-to-date information that clarifies uncertainties regarding specific problems experienced by farmers and herd health advisors.

Communication of management strategies, test results and other information found to be vital to the programme is done via the DCF. An advisory board consisting of herd health advisors, programme managers and scientists address issues that are of concern to farmers.

Test reports developed by the DCF should be the standard for communication of test-results. Newsletters are published 6 times per year and issued to farmers and herd health advisors. Continuous close contact through e-mail with herd health advisors is used to be “present” in the “field” work related to the control programme.

Figure 1. Number of participants in the Danish control programme of bovine paratuberculosis. The percentages given are the proportion of herds in the programme among all dairy herds in Denmark.
C. New options and opportunities.

There is continuous focus on developing new options and features that will keep farmers motivated. Establishment of a certification module in the paratuberculosis programme is a high priority, partly to meet the reasons for participation (Table 1) and to attract new participants who believe they do not have MAP in their herd. So far, no herds are considered “free of MAP”. However, options for gradually increasing the probability of freedom is being investigated in order to a) keep farmers motivated for staying in the programme; b) attract new participants; and c) facilitate purchase of animals with a low risk of being infected with MAP.

Recently, a “reduced sampling scheme” for herds with 2 years in the programme has been launched. The objective is to reduce testing costs without concurrently compromising the risk-based management scheme. All cows are automatically identified at the laboratory if they do not have a “valid” test-result. Under the reduced scheme, cows fulfilling specific criteria can be skipped for a certain period of time.

Programme level
I. Development in the apparent prevalence

A specific aim of the programme is to reduce the prevalence of MAP infections in Denmark. Therefore, a key parameter is monitoring the prevalence in participating herds to determine if the prevalence is actually reduced. Estimation of the true prevalence is a challenge because of inaccurate diagnostic tests and because culling of test-positive animals can greatly affect the test prevalence without a simultaneous drop in the true prevalence.

One way of monitoring the overall prevalence is through the test prevalence, if the test is the same over time. In Denmark, the previous ELISA test was replaced in October 15, 2008. Therefore, the test prevalences before and after this date are difficult to compare. Results primarily based on the new test are shown for 4 different cohorts in Fig. 2. The data suggests that there is a significant reduction in the test prevalence in all 4 cohorts, but the prevalence in herds that have been in the programme longer has dropped slightly more. However, these herds also had a higher prevalence in the first place. These falls in prevalence cannot be achieved only through
changes in management aimed at reducing transmission because such an effect would only be expected to occur after a minimum of 2-3 years. Thus, culling of test-positive animals is also likely to influence the numbers. Furthermore, there may be a seasonal effect that is not yet evident in the graphs shown here. It will be important to monitor the test prevalence continuously to determine if there actually is a reduction in the overall prevalence.

II. Implementation of changes in management to reduce transmission of MAP

Multiple simulation studies have suggested that changes in management to reduce transmission are cornerstones for successful control of MAP, whereas test-and-cull regimens alone will not lead to eradication. Accordingly, farmers in the programme should adhere to the recommendations on MAP transmission management. Recommendations for within-herd reduction of MAP transmission primarily focus on management around calving and use of waste milk and colostrum for calves. Table 2 contains data, which show the apparent ability of farmers to adhere to the recommendations. It is clear that many of the recommendations are not followed and success can therefore not be expected in many farms.

Table 2: Danish farmers’ ability to implement 5 major recommendations for reduction of within-herd transmission of MAP. Based on data from 1113 questionnaires sent to the 1265 participants in the Danish control programme in December 2008

<table>
<thead>
<tr>
<th>Management routine</th>
<th>No.</th>
<th>Percent</th>
<th>Recommendationb</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Calvings of Reda and Yellowa cows separated from calvings of Green cows</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) No Red calvings; Green separated from Yellow cows</td>
<td>54</td>
<td>5%</td>
<td>R</td>
</tr>
<tr>
<td>b) Greena separated from Red and Yellow</td>
<td>275</td>
<td>25%</td>
<td>R</td>
</tr>
<tr>
<td>c) Green separated from Red, not Yellow</td>
<td>285</td>
<td>26%</td>
<td>(R)</td>
</tr>
<tr>
<td>d) Green, Yellow and Red not separated at calving</td>
<td>499</td>
<td>45%</td>
<td>N</td>
</tr>
<tr>
<td>2. Removal of calves from high-risk dams within 2 hours after calving</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) No Red calvings; Removed from Yellow cows</td>
<td>107</td>
<td>10%</td>
<td>R</td>
</tr>
<tr>
<td>b) Removed from Red and Yellow</td>
<td>645</td>
<td>58%</td>
<td>R</td>
</tr>
<tr>
<td>c) Removed from Red, not Yellow</td>
<td>192</td>
<td>17%</td>
<td>(R)</td>
</tr>
<tr>
<td>d) Not removed</td>
<td>169</td>
<td>15%</td>
<td>N</td>
</tr>
<tr>
<td>3. Cleaning of calving facilities after calvings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) After Red and Yellow cows' calving</td>
<td>285</td>
<td>26%</td>
<td>R</td>
</tr>
<tr>
<td>b) After Red, not after Yellow cows' calving</td>
<td>216</td>
<td>19%</td>
<td>(R)</td>
</tr>
<tr>
<td>c) Not cleaned after Red or Yellow cows' calving</td>
<td>612</td>
<td>55%</td>
<td>N</td>
</tr>
<tr>
<td>4. Use of colostrum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Only from Green cows, not from Red and Yellow</td>
<td>598</td>
<td>54%</td>
<td>R</td>
</tr>
<tr>
<td>b) Used from Yellow, not from Red</td>
<td>282</td>
<td>25%</td>
<td>(R)</td>
</tr>
<tr>
<td>c) Used from Red, not from Yellow</td>
<td>112</td>
<td>10%</td>
<td>N</td>
</tr>
<tr>
<td>d) Used from Red, Yellow and Green</td>
<td>121</td>
<td>11%</td>
<td>N</td>
</tr>
<tr>
<td>5. Use of waste milk and milk from cows with high somatic cell count</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Only from Green cows, not from Red and Yellow</td>
<td>745</td>
<td>67%</td>
<td>R</td>
</tr>
<tr>
<td>b) Used from Yellow, not from Red</td>
<td>219</td>
<td>20%</td>
<td>(R)</td>
</tr>
<tr>
<td>c) Used from Red, Yellow and Green</td>
<td>149</td>
<td>13%</td>
<td>N</td>
</tr>
<tr>
<td>Total responders</td>
<td>1113</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Cows are separated into “Red”, “Yellow” and “Green” cows based on repeated milk antibody ELISA tests. Red cows have repeated positive results. Green cows repeated negative, and Yellow cows’ results fluctuate or have recently become positive. Each herd is tested 4 times per year.

b R=Follow recommendation by Danish Cattle Federation. (R) = partly follow the recommendation. N = do not follow the recommendation.
If success cannot be expected, the differences in prevalence reduction between herds following recommendations and those that do not should be demonstrated. Given the challenges in monitoring the prevalence and the different management schemes used, it is also difficult to make such comparisons. So far, only univariable analyses have been feasible with the Danish data, and the results may not reflect the effect of a specific management factor. In Figure 3 the effect of removing the newborn calf within 2 hours from High-Risk dams is shown. It is evident that if "Red" (See Table 2.) cows do not calve again, there might be a significant reduction in the test prevalence, but removing the calves from High-Risk animals ("Red" and "Yellow") may also result in a reduction. Doing nothing may increase the prevalence.

**Figure 3.** Apparent effect of removing the calf from High-Risk cows within 2 hours after calving.

**Figure 4.** Apparent effect of feeding calves with milk from High-Risk cows with high somatic cell count.

These results are consistent with the expectations of farmers following the recommendations, but it cannot be determined if there are important confounders. Yet, the results can easily be
used to support the recommendations, although they cannot be used to prove them. However, not all results support the recommendations. In Figure 4, there seems to be no difference in the prevalence reduction between the three groups of herds following three different milk feeding regimens. The perceived high-risk behaviour (feeding calves milk containing high levels of high somatic cells from “Red” and “Yellow” cows) does not appear to be a risk factor. All herds have a reduced prevalence, which could be because they take other measures to reduce the prevalence, or an artefact, e.g. seasonal trends in test-prevalences.

Herd level

At herd level, the same considerations apply as at programme level, but it is important that the individual farmer is able to monitor progress, to determine early that she/he is not doing enough to reduce transmission, and to decide whether it is cost-effective to stay in the programme. Accordingly, efforts have been put into

i. educating farmers about the importance of different transmission routes for MAP
ii. educating farmers about interpretation and use of test results for control of MAP
iii. educating farmers about interpretation and use of test results for certification in relation to MAP infections
iv. provision of tools to check if management routines reducing transmission of MAP in the herd have been implemented
v. provision of tools to estimate whether there has been a reduction in the prevalence of MAP overall in the herd and in age-specific groups.
vi. development of a certificate – where "free of MAP infection" can be expressed with greater confidence when increasing levels of information are available for the herd.

There are no systematic tools to monitor if the above mentioned parameters are reached at herd level. The prevalence tools have been developed, but not implemented yet, and the certification programme is also pending.

4.5. Other issues for future consideration

MAP infections in non-dairy herds, other farmed ruminants, and in free-ranging animals have not yet been considered in the programme. The prevalence in beef cattle appears to be lower than in dairy cattle, although MAP infections do occur among beef cattle. There have been no reports of MAP infections in farmed sheep, goats and other ruminants, but there has not been any systematic testing except from exported animals. Free-ranging animals are likely to have MAP infections, but with a high prevalence among farmed animals, transmission to free-ranging animals is highly likely.

4.6. Discussion

Reduction of the prevalence of MAP infections through active participation is the most important parameter. Furthermore, with increasing number of test data from herds that have been in the programme for 3 to 4 years, it will also be possible to better demonstrate positive and negative effects of following the recommendations. Lastly, it is deemed important that a certification module is established to keep farmers in the programme so that they have a long term goal, and to include farmers who do not consider MAP infections a problem in their herd and therefore do not require a control programme.

References

5. Measures of progress in Australia’s Johne’s disease programs

L. Citer¹, D. Kennedy¹

5.1. Introduction

The biological characteristics of paratuberculosis, limited diagnostic sensitivity and the economic and social impacts of disease control on producers can present significant challenges to measuring success in controlling Johne’s disease. Particular challenges are presented by the length of time between infection and detection and the further spread that may occur during that time. The economic and social impacts of control programs may contribute to the difficulties in detection and measuring progress. In Australia, the differences in the relative occurrence and relative importance of Johne’s disease across different parts of the country and among the various livestock industries further challenge the measurement of progress.

It is proposed to examine the achievements of the Australian program in terms of four criteria:

A. Engagement of major stakeholders.
B. Farmer participation and compliance.
C. Disease control and prevention outcomes.
D. Performance against program objectives.

The paper will also provide additional detail in two case studies to demonstrate how progress has been monitored in the dairy industry through the national dairy industry’s bovine Johne’s disease (BJD) communication program (Section 2) and in the South Australian state-based management program, Dairy ManaJD (Section 3).

5.2. A. Engagement of major stakeholders

Until 1995, when the National Farmers Federation² took a lead in developing a national approach to controlling Johne’s disease, infection with Mycobacterium avium subsp. paratuberculosis (M. ptb.) had been managed unilaterally under the eight different states’ and territories’ constitutional responsibilities for animal disease control. The newly formed Australian Animal Health Council (Animal Health Australia) formally agreed to coordinate a national approach through the National Johne’s Disease Control Program in 1997 to facilitate consistent or complementary approaches across these jurisdictions and across the affected livestock industries.

The program has been successful in progressively engaging all state governments, affected livestock industries and service organisations such as private veterinarians and livestock and property selling agents. Stakeholders share responsibility for the Johne’s disease control program through:

1. Membership of program committees and development and endorsement of program plans.
2. Development and endorsement of national standards for:
   • regulatory disease control, through Standard Definitions and Rules and guidelines for infections with Cattle and Sheep types of M. ptb.
   • herd assurance such as the early Market Assurance Programs and other recently developed risk assessments for cattle, sheep, alpaca and goats.
   • Diagnostic standards through the Australian and New Zealand Standard Diagnostic Procedures.
3. Funding of research, extension and operations.

¹ Animal Health Australia, Canberra.
² The National Farmers’ Federation was formed in 1979 and is the peak national body representing farmers and, more broadly, agriculture across Australia. www.nff.org.au.
Although there are agreed national standards and guidelines, the levels of state government involvement vary depending on the priority allocated to Johne’s disease management and control by the particular state, and on state and complementary industry policies and support. Governments in the Free and Protected Zones for bovine Johne’s disease (Fig. 1), and in areas where ovine Johne’s disease is rare or absent, remain committed to movement controls of stock from higher risk areas, supported by tracing and removal of high risk animals in the event of the disease being introduced.

However, the ability of governments to commit resources to the management of endemic diseases generally has been reduced and they are being redirected towards the identification and management of emerging diseases, trade issues and public health and food safety. This has put pressure on their involvement in Johne’s disease control in the endemically infected regions and this is causing the various parties in the National Johne’s Disease Control Program to review their respective roles and responsibilities to ensure a continuing and sustainable national Johne’s disease program for all affected species.

As some state services have withdrawn, the affected industries have responded by taking a more active leadership role in the following ways:

- The wool and sheepmeat industries fund the collection of surveillance information in abattoirs and provide the results for ovine Johne’s disease detections to individual producers and state departments of agriculture.
- The beef industry is funding the Financial and Non-Financial Assistance Package to assist owners of infected and suspect beef herds to eradicate or resolve suspicion of infection.
- The beef industry is funding surveillance activities through a subsided testing program.
- The dairy industry has established a BJD change management program to improve dairy farmers’ attitudes, understanding and practices with respect to Johne’s disease especially in relation to the Dairy BJD Assurance Score (see below).
- The alpaca industry is managing the Q-Alpaca disease monitoring and assurance scheme.
- The goat industry has developed the Goat Risk Rating for Johne’s disease which is used as the basis for declaring risk on the National Goat Health Statement.

Figure 1. Zones for bovine Johne’s disease in Australia.
The implementation of the national Johne’s disease program in South Australia provides a good example of the complementary roles of industry and government in the management of a risk-based control program. This example brings together a number of stakeholders; national industry, which provides funding for abattoir surveillance, state industry, which funds field extension activities and the provision of monitoring information to producers, and the state department of agriculture which provides a regulatory framework as well as technical advice to individual producers. Together, they have worked diligently, and largely successfully, to reduce the spread of Johne’s disease in all its livestock sectors. Details of the Dairy ManaJD program are included as the third section of this paper.

5.3. B. Farmer participation and compliance

Livestock production enterprises in Australia are identified by a unique descriptor called a Property Identification Code (PIC) which is used for the purposes of tracing stock movements and trading. The PIC is allocated to a parcel of land and links property information (selected health status, ownership) and, more often than not, other activities (stock type and numbers) to cadastral information. However, detailed information about numbers of breeding herds and flocks in the infected regions and farmer uptake of control programs, for the most part, has to be determined by specific surveys and audits. The exception is the dairy industry where all milk producers in addition to having a PIC are registered by the controlling agency.

Whilst the move away from regulation and to voluntary risk-based trading in the endemically infected parts of Australia over the past 5 years has been viewed positively by both producers and state animal health services, it has made the collection of accurate data on program participation and progress difficult. For instance, the dairy and sheep industries encourage the use of voluntary farmer declarations of animals scores under the Dairy BJD Assurance Score or Assurance Based Credit (ABC) scheme at the time of sale. However there is no auditing or recording of the use of such declarations and measures of the use of such key assurance tools and schemes are not currently available.

A notable exception is the South Australian Dairy ManaJD program where participation in the program is audited and herd statuses recorded by the state animal health authority (Table 1).

<table>
<thead>
<tr>
<th>Dairy Score</th>
<th>Number of herds</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8</td>
<td>2.3%</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td>4</td>
<td>37</td>
<td>10.6%</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>3.4%</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>2.9%</td>
</tr>
<tr>
<td>7</td>
<td>224</td>
<td>64.0%</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>1.4%</td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>2.0%</td>
</tr>
<tr>
<td>10</td>
<td>9</td>
<td>2.6%</td>
</tr>
<tr>
<td>Score yet to be allocated</td>
<td>37</td>
<td>10.6%</td>
</tr>
<tr>
<td>Total herds</td>
<td>350</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Distribution of dairy herds in South Australia by Dairy Score, January 2009

The Australian Alpaca Association is also able to report that, in south-eastern Australia, 16% of its members and 30% of its registered animals are enrolled in the Q-Alpaca program in 2008.
Total numbers of herds and flocks enrolled in the Australian Johne’s Disease Market Assurance Programs in each state are reported quarterly by the National Animal Health Information System (NAHIS). At March 2009, there were approximately 130 alpaca herds, 910 cattle herds, 50 goat herds and 535 sheep flocks enrolled in the respective market assurance programs. These numbers are lower than the peaks reached 5-10 years ago; one of the reasons being the availability of a broader range of complementary assurance schemes that have been developed in the past 5 years. An independent review of the market assurance programs is currently being finalised. Relative levels of participation are not estimated as appropriate denominators are not available. Individual sheep and cattle breed societies do not report the proportions of their herds and flocks that are enrolled.

Compliance of those farmers who are participating in risk-based trading is measured by independent audit of the Market Assurance Programs and of major Beef Only cattle sales. Market Assurance Program herds and flocks are subject to external audit every third year. In 2007 of the 630 producers due for external audit 373 producers completed by the due date. A number of producers requested extensions of time due to the extended dry spell which had impacted the farm business whiles some producers elected to leave the program. Auditors reported an extremely high level of compliance with the program.

At Beef Only sales, vendor declarations are checked for all pens of cattle sold and a proportion of farms are visited to check that the declarations are defensible (Table 2.)

Although making a false declaration is an offence under various state animal health legislation, auditing of voluntary assurance declarations is not routinely undertaken in the dairy, sheep and goat industries, other than at key national sales and larger livestock shows. The animal health services that are working most energetically to protect favorable statuses support more rigorous evaluation of producer uptake of risk-based trading as they are expected to accept movements of animals from other states based on such declarations.

5.4. C. Measures of disease occurrence

In regions such as the Free and Protected Zones and in industries like the beef and alpaca industries, where Johne’s disease is rare and investigations and tracing are undertaken to detect and reduce the risk of further spread of infection, the numbers of officially known infected herds and flocks reported quarterly through the National Animal Health Information System (NAHIS) are useful indicators of trends and of the underlying prevalence of Johne’s disease. However, these are not useful in the dairy and sheep industries in endemic regions where the focus is now on voluntary risk-based trading and the reduced application of regulatory interventions.

Since 2002, national sheep farmer levies have been funding the inspection of the intestinal tracts, laboratory examination of suspect lesions and reporting of positive and negative outcomes. These data are used to inform producers if infection is detected in their flocks and to provide negative feedback that can be used to gain credits in the Assurance Based Credit scheme (ABC).
Abattoir surveillance also underpins the annual estimation of regional flock prevalences for ovine Johne’s disease. This surveillance from 2002 to 2007 had indicated that ovine Johne’s disease was continuing to spread in some endemic regions. This necessitated a review of what regions would constitute new Low, Medium and High Prevalence Areas from 2008. These changes make it difficult to compare current estimates of flock prevalence with earlier estimates but Table 3 demonstrates how each region in each state performed against the prevalence criteria in 2008.

Table 3: Estimated flock prevalences (95th percentile) of ovine Johne’s disease by Prevalence Area and State, 2008 (estimates in bold exceed cut-off)

<table>
<thead>
<tr>
<th>Prevalence Area</th>
<th>Cut-off criteria for estimated prevalence (%)</th>
<th>State</th>
<th>Estimate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td>-</td>
<td>NSW</td>
<td>78.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NSW</td>
<td><strong>33.4</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>South Australia</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Victoria</td>
<td><strong>17.4</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tasmania</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td>12.5</td>
<td>Queensland</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NSW</td>
<td><strong>1.3</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Victoria</td>
<td><strong>1.9</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>South Australia</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>0.8</td>
<td>Western Australia</td>
<td><strong>1.7</strong></td>
</tr>
</tbody>
</table>

The 95th percentile estimate of flock prevalence is sensitive to the number of consignments of sheep from each region examined at the abattoirs in each year. However, over recent years, ovine Johne’s disease has continued to infect new flocks in some of the endemically infected regions, while other regions such as South Australia and Queensland appear to have successfully maintained low estimated flock prevalences.

In northern and western Australia where bovine Johne’s disease is absent or rare, governments take regulatory action to protect the Free and Protected Zones through movement controls, investigation of suspicion and stamping out of any detected infection. Western Australia has recently published a scientific assessment of its free status (Martin 2008) and Queensland has also recently conducted surveillance of its dairy herds with funding from the beef industry and did not detect any evidence of Johne’s disease (J Berry, personal communication, 2009). The beef industry attempted a survey in 2000-2001 which, though not completed, indicated that the prevalence of Johne’s disease in the pure beef cattle sector in south-eastern Australia (the precursor to the Beef Only category) was likely to be very low. Of approximately 13 000 cattle tested, only 0.15% reacted to the absorbed ELISA and follow-up testing identified four infected cattle.

5.5. D. Performance against program objectives

**Bovine Johne’s Disease**

Ultimately a program should be evaluated against its objectives so it is important that these are achievable and measurable. The goals of the National BJD Strategic Plan reflect a risk management approach which is broader than disease occurrence and seeks to address the elements of food safety, public health, social equity as well as disease control.

1. Minimise contamination of farms and farm products by \textit{M. ptb}.
   1.1 Minimise contamination of animal products with \textit{M. ptb}.
   1.2 Minimise exposure of humans to \textit{M. ptb} from infected cattle.
   1.3 Minimise contamination of the farm environment.
2. Protect non-infected herds whilst minimising disruption to trade
   2.1 Reduce the spread of BJD between regions and production sectors while minimising
doctrine to trade.

3. Minimise the social, economic and trade impact of BJD at herd, regional and national
   levels
   3.1 Provide assistance to affected producers.
   3.2 Reduce prevalence of BJD in both the dairy and beef sectors.
   3.3 Remove the stigma associated with BJD infection and reduce emotional stress.

The first goal primarily relates to the dairy industry where a ‘whole of milk supply chain’
approach is being taken to manage an endemic infection. A large national survey of raw and
pasteurised bulk milk from processing plants in 2003 did not detect *M. ptb*. and, since then,
the development of the national Dairy Score and the promotion of better calf rearing have been
implemented to put further downward pressure on the spread of Johne’s disease between herds
and to reduce the transmission of infection within herds.

Historically the national program has focussed on the second goal and performance against
this has been discussed earlier in this paper and is regarded as having been met. There is
increasing evidence through large scale surveillance activities and targeted testing programs
that bovine Johne’s disease is still rare or absent in the Protected and Free Zones of northern
and western Australia.

The pure beef sector in south-eastern Australia also still appears to have a very low preva-
lence of Johne’s disease. This sector continues to be closely monitored by the national cattle
industry which has provided financial support for individual investigations and assists owners
of infected herds to eradicate Johne’s disease. The state animal health services recognise
the extremely low prevalence of bovine Johne’s disease in the beef sector and have increased
efforts in tracing infection from known infected beef herds to limit spread to other herds in the
sector.

In NSW and South Australia, the state departments of agriculture and cattle industries (beef
and dairy) have recently initiated policies to reduce the spread of infection among dairy herds
by mandating declaration of the national Dairy Score for cattle offered for sale.

Reducing the social and economic impacts identified in the third goal has been partially
achieved. In the dairy industry, where the majority of herd owners had not engaged with the
regulatory approach, the focus has shifted away from the small percentage of infected herds
that had been formally identified, and through the use of a risk-based scoring system all dairy
herds are now at least nominally involved in the program as each herd can declare a Dairy
Score. Although uptake has been initially slow, it is expected that the great majority of dairy
farmers will eventually become more actively involved in managing or preventing Johne’s
disease. The Dairy Score also provides infected herds with pathways to progress and improve
their scores.

While, on the one hand, the Beef Only assurance classification has freed up movements of
such cattle, there is greater potential for discrimination against known infected beef herds
because of the extremely low incidence of disease. This discrimination results in social and eco-
nomic disadvantage in the beef cattle industry because such herds represent a small minority,
currently under 100 herds nationally from a cattle herd population of 60 000. Therefore the beef
cattle industry has funded an A$3.8 million program to directly assist beef producers whose
herds have been confirmed, or are suspected, to be infected.

An independent review of the Financial and Non-Financial Assistance Package found that its
combination of social, technical and financial support had significantly reduced the stigma and
cost suffered by cattle producers who had taken part in it and had reduced the number of known
infected beef herds in Australia (Table 4).
The goat industry in Australia comprises milk, fibre and meat sectors. Under Australian conditions goats have been shown to acquire infection primarily with the cattle strain of *M. ptb* but have also been infected with the sheep strain in high exposure circumstances. Therefore goat producers have been affected in the past by regulatory controls for both the sheep and cattle sector. With the progressive development of risk-based approaches in other industries the Goat Industry Council of Australia has developed a national Goat Risk Rating that forms the basis of a biosecurity declaration by producers that underpins trading in goats. This should facilitate trading.

**Ovine Johne’s Disease**

The objectives of the national approach to managing ovine Johne’s disease since 2004 have been:

- Minimise the risk to properties and geographic regions which are currently disease free, and control incursions when they occur;
- Reduce the area prevalence in regions where the disease is endemic through the use of vaccine and the implementation of grazing management practices to minimise the exposure of stock to *M. paratuberculosis*;
- Promote the benefits of active biosecurity planning at the individual property and regional level as a means of managing disease risk; and
- Provide improved trading opportunities for producers who actively manage the disease through the use of the ABC Scheme.

In general the first objective is being met but achieving the second is more challenging and abattoir surveillance indicates that it is not being achieved in the more heavily infected regions. Changes in the estimated flock prevalence have been variable between regions and, although some key factors such as lower than expected vaccine efficacy, have been proposed, the reasons for this variation have not yet been investigated. Based on 2008 prevalence estimates, it appears likely that increasing flock prevalence estimates will result in some regions being reclassified into higher prevalence categories in the medium term.

The fourth objective has not been formally measured although there is evidence of price premiums in some regions for low risk stock and, anecdotally, producers with infected flocks appear to have established trading pathways. The level of producer unrest and political interest in the disease can also be used as an indicator of trading opportunities and this has declined markedly in recent years. The national sheep industries have formed the view that the five years operation of the ABC scheme has undoubtedly provided some producers with increased trading options.

**Conclusion**

Since the commencement of a national control and management program some fifteen years ago, there has been a substantial change of approach to the control and management of animal diseases internationally and this is reflected in the current strategies in place for the management of Johne’s disease in Australia. Property or industry risk assessments now form the basis of control programs for each affected industry. Variations in approach are indicative of the differing levels of disease prevalence within each industry sector and regionally across Australia.

The overarching objective of Australian control and management activities is to minimise the risk of disease spread and product contamination with *M. ptb*., whilst at the same time
reducing the impact of disease control on trading opportunities for producers. Past Australian experience had demonstrated that the imposition of inequitable trade restrictions on producers through highly regulated disease control programs leads to non-compliance and disengagement of the sector most likely to pose a risk to the majority of producers whose herds and flocks are not infected. The new approach in the endemically infected southern regions is increasing engagement among producers and should lead to more effective control of Johne’s disease in the longer term.

References

1. For further information on the various assurance tools and other components of the Australian program please refer to Animal Health Australia: http://www.animalhealthaustralia.com.au/programs/jd/jd_home.cfm.
6. Progress in Australia - Section Two, Evaluation of Dairy Industry BJD Extension and Training Initiatives in Australia

A.M. Padula¹, R.J. Condron¹

6.1. Introduction

The Australian dairy industry has a high priority for the management of bovine Johne’s disease (BJD). The industry is committed to managing the spread and impact of BJD by actively engaging all producers in control measures in a less regulated environment. The vision for the dairy industry is to have all farmers adopt practices into everyday farming to reduce their risk of having or spreading BJD. The dairy industry has funded both research and communication and training activities on BJD to develop and implement new tools for BJD management. Industry and government in partnership have agreed to progress with a less regulated approach to BJD management. Key new tools for managing BJD include alternative diagnostic tests, communication and training, and the implementation of calf hygiene and a risk-based trading system. Monitoring and review has been an integral component of these initiatives.

6.2. Aims of the BJD communication and training program

The dairy industry has progressively implemented a national communication and training program on BJD for all sectors of the industry to support change-management. The aims of the communication and training program were developed in conjunction with national stakeholders. The overall goals of the program were: (i) Farmers and other industry stakeholders who are not aware of BJD have increased awareness of BJD and its implications, (ii) Farmers with BJD infected farms take appropriate steps to control BJD, (iii) Farmers consciously consider BJD status as part of their stock purchasing.

Desired communication outcomes

The goals were to achieve: (i) awareness and a positive environment for managing BJD on dairy farms; and, (ii) delivery of a regionally and nationally consistent approach by all those advising/influencing dairy farmers.

Desired training outcomes

Every farmer: (i) is able to understand and communicate their risk of BJD through an assurance score, (ii) is able to identify the benefit to their business from managing BJD; and, (iii) has the skills to implement appropriate management practices such as hygienic calf rearing and biosecurity.

6.3. Dairy industry BJD management tools

To achieve the goals of the dairy BJD program a number of new industry management tools and programs were developed in conjunction with national program stakeholders.

3-Step Calf Plan

The 3-Step Calf Plan is a simple hygienic calf rearing program that encompasses the critical control points for minimising exposure of calves to BJD. The steps are: (1) Calves should be taken off the cow within 12 hours of birth, (2) Management of the calf rearing area should

¹ Dairy Australia, Southbank, Victoria, Australia.
ensure no effluent from susceptible species comes into contact with calves, (3) Calves up to 12 months old should not be reared on pastures that have had adult stock, or stock that are known to carry BJD, on them during the past 12 months.

The dairy industry is encouraging all farmers in Australia, regardless of their BJD status, to implement the 3-Step Calf Plan. Dairy processing companies have included the 3-Step Calf Plan as part of their on-farm quality assurance systems.

**National Dairy BJD Assurance Score (Dairy Score)**

The National Dairy BJD Assurance Score (Dairy Score) was developed to rank the status of cattle based on available information from BJD control measures. The Dairy Score provides guidance about how BJD assurance can be improved and it underpins the voluntary risk-based trading system for farmers to better manage the risk of BJD with herd introductions.

The Dairy Score provides a simple 0-10 scale for describing the risk of BJD. The higher the score the lower the risk. The Dairy Score ranks the existing BJD programs and also provides bonus points for hygienic calf rearing programs. Cattle that have been tested negative on multiple occasions and maintain high biosecurity standards receive the highest score (score ten). The Dairy Score was designed to minimise regulatory restrictions on trade and provide better information for decisions by individual farmers.

**Alternative diagnostic tests**

Alternative, cost effective, bulk diagnostic tests have been evaluated under Australian conditions. These include bulk milk tests for antibodies, DNA, and cultures collected from the environment. Environmental faecal sampling and culture appears to be a relatively inexpensive and efficient test for providing assurance or for detecting infection in a herd.

**6.4. Training and communication activities**

Training and communication programs have an important role to play in facilitating the management of BJD across all levels, including farmers, service providers and national stakeholders. Targeted programs were developed and delivered to the different segments.

Communicating activities to the national program stakeholders was considered an important part of the program. Australia has a national program for the management of BJD that involves representation from both industry and government. This provides for a coordinated and consistent delivery of national initiatives.

**Training programs**

Separate training programs were developed and delivered for veterinarians and herd advisors, factory field staff and stock agents. Veterinarians are an important group for providing detailed and comprehensive animal health advice to farmers. Field service personnel interact closely with farmers on a range of matters relating to milk quality and were recognised as highly influential for farmers to implement changes in practice. The milk processing sector in Australia shares responsibility for management of BJD and hygienic calf rearing recommendations for BJD are included in on-farm quality assurance programs. Stock agents are often in close contact with farmers and are closely involved with purchasing decisions and herd introductions. This group was recognised as very important to have reliable information about the industry BJD management tools, and in particular the risk-based trading system for BJD (Dairy Score).

The training program consisted of a 1 hour interactive presentation and discussion on BJD. Topics covered include key reasons for control, critical control points, and industry BJD management tools. This was reinforced with an on-farm training session to discuss practical aspects of hygienic calf rearing and implementation of the 3-Step Calf Plan. The on-farm session was well appreciated and in most training sessions at least two farms were visited to compare approaches used to achieve the desired program outcomes. The on-farm discussion was oriented around how to implement low cost practical measures to reduce the risk of spreading BJD.
Communications

The dairy industry has communicated with farmers, industry service providers and stakeholders using a range of different media and extension materials.

6.5. Supporting resources

To support the BJD program a number of resources were developed in consultation with the national BJD program stakeholders.

Resources for service providers

An expert technical working group was formed to contribute to a comprehensive technical resource. These materials were distributed to all veterinarians, herd advisors, factory field staff and other industry service providers.

Resources for farmers

A range of printed materials were developed for farmers that closely matched the information produced for service providers. The farmer materials were developed as an abbreviated and less technical version of the service provider materials. The materials were delivered to every dairy farmer in Australia in two mailings about 12 months apart. In the first mailing farmers received information on the Dairy Score in the form of a brochure. In the second mailing, farmers received more detailed information on reducing the risk of BJD on their farm as well as a new Dairy Score calculator brochure.

Online resources

Dairy Australia has maintained a BJD information web site www.dairyaustralia.com.au/bjd. The web site contains downloadable versions of all the printed materials and other resources.

Media

Articles and advertisements were placed in various rural newspapers and in the dairy industry magazine called the Australian Dairyfarmer to create awareness of the BJD program and the recommended BJD management practices.

Industry contact

Dairy Australia has provided telephone technical support via its national office in Southbank, Melbourne. For many dairy farmers their first point-of-call has been to Dairy Australia.

6.6. Evaluation of communication strategy and adoption of control measures

An independent market research company undertook a telephone survey of dairy farmers using a standard structured questionnaire to assess uptake of recommended calf hygiene practices. The survey was conducted in November 2008 to determine awareness and quantify the level of uptake. A series of 300 telephone interviews were conducted from a random sample of dairy farmers. The random sample of farmers was supplemented to ensure some very large farms (>500 cows) were included.

Reaction to BJD information pack

The BJD information packs distributed by Dairy Australia contained information about ways to minimise the risk of BJD. This included information on the 3-Step Calf Plan. Seventy-four percent (74%) of dairy farmers recalled receiving the information packs and approximately two thirds of these people said they found the information useful.

Many farmers reported the information had served as a confirmation of risk management
practices or as a reminder of ‘best practice’. Approximately one in ten dairy farmers said the BJD information pack distributed by Dairy Australia stimulated them into adopting the 3-Step Calf Plan.

**Adoption of the 3-Step Calf Plan**

Sixty-two percent (62%) of respondents were aware of the specific terminology ‘3-Step Calf Plan’ at the time of the survey, ranging from 76% in one state to 53% in another. It is notable that the survey results revealed a subgroup of dairy farmers (12%) not aware of the 3-Step Calf Plan terminology, but when questioned further were actually implementing all the steps outlined in the Plan.

Seventy-six percent (76%) of respondents had adopted all three steps of the 3-Step Calf Plan and in total 90% of all respondents are implementing at least one of the three steps. Although they have not currently done so, a further 7% of all respondents plan to implement the 3-Step Calf Plan soon, with most of this group anticipating adoption by autumn 2009. Adoption of the 3 steps included in the Plan was higher among large and very large herds (91% and 93% respectively) compared to small (66%) and medium herds (78%).

Only 36% of respondents who have adopted the 3-Step Calf Plan document their practices, although notably the proportion is substantially higher among respondents with very large herds (>500 cows) (64%). Among respondents undertaking only one or two steps of the 3-Step Calf Plan, 86% do manage calf rearing areas to ensure calves do not come into contact with effluent from adult cattle, 66% remove calves within 12 to 24 hours of birth and 55% graze calves in a separate paddock.

**Drivers and barriers to 3-Step Calf Plan implementation**

Regardless of herd size, removal of calves within 12 hours of birth was most commonly nominated as the easiest component of the 3-Step Calf Plan to implement (55% overall, including 58% of respondents with small herds, 59% with medium herds, 53% with large herds and 35% with very large herds). Notably however, 46% of respondents with very large herds nominate this step as being the most difficult. Providing a designated calf grazing area was identified as the most difficult to implement by all groups other than very large herds.

Only 10% of the total sample who were aware of the 3-Step Calf Plan failed to adopt it and they were mainly farmers with small herds. The main reasons for not implementing the plan were: BJD not a problem on their farm; satisfied with current practices; lack of land available for a designated grazing area; and, belief that calves do better if left on mothers for longer.

**Perceived change in stigma attached to BJD**

Twenty-nine percent (29%) of respondents believe the stigma of having BJD has decreased over the past two years. This proportion compares favourably to the 14% believing the stigma has increased. Respondents in one state were the exception to this finding, with 25% believing the stigma has increased compared to 23% saying it has decreased. Belief that the stigma associated with BJD has decreased is greatest among respondents aged 18-39 (35%), while belief it has increased was highest among those older than 60 (29%).

**6.7. Evaluation of training activities**

Following the training workshops which provided information on recent changes to the BJD program and the introduction of Dairy Score, an independent survey of service providers was conducted. A series of 20 in-depth interviews was conducted with government animal health staff, private cattle veterinarians, factory field service personnel, and stock agents.

Most respondents who had attended workshops gained a better understanding of the new program and several said the workshops acted as a reminder to them of the importance of managing BJD in dairy herds. Interviewees reported that the new approach to BJD had the potential to raise the awareness of BJD and encourage consistency between farmers. There was an expectation that dairy farmers will realise some economic advantages if they adopt the recommended approaches.
Interviewees thought that there would be a slow initial uptake of the risk-based trading approach until it was well understood and benefits were clearly visible. Few however were actively promoting the Dairy Score, preferring to rely on the industry communication program to raise its awareness and waiting until they were asked before giving advice. Confusion among dairy farmers about how to calculate their Dairy Score was identified as a barrier to adoption. Continued promotion is required to ensure farm advisors remember to include consideration of BJD management in their discussions with dairy farmers.

6.8. Conclusions

Communication and training is a powerful tool for adoption of BJD management practices. The Australian dairy industry has implemented a range of measures to help farmers manage BJD. The dairy industry has encouraged all farmers to implement a simple hygienic calf rearing program called the 3-Step Calf Plan. A survey of dairy farmers has revealed widespread uptake of the program and provided insights into aspects that need clarification and possible further assistance or modification. A risk-based trading system for dairy cattle using the Dairy Score was also communicated widely to industry and was supported by specific training programs.

To date the use of the Dairy Score appears to be much less comprehensive than hygienic calf rearing. Simplification of the Dairy Score will be investigated to facilitate greater use. Australian dairy farmers have adopted hygienic calf rearing measures as a cost effective and easily implemented means of reducing the risk of BJD in their herds as well as achieving other beneficial outcomes. The dairy industry will continue to promote BJD management and build on the outcomes achieved to date, adapting programs in line with the industry and service provider feedback.

References

7. Progress in Australia – Section three, Managing Bovine Johne’s Disease in South Australia using a Dairy Scoring system

J. Rogers

7.1. Introduction

Bovine Johne’s disease (BJD) is endemic in cattle in south-eastern Australia and mainly affects the dairy industry. In Australia dairying is primarily based on irrigated pasture and supplementary feeding of cows, rather than housed cattle.

Historically BJD has been at low herd prevalence levels in South Australia and within-herd prevalence is low: generally between 1-2 % of animals in infected herds react to the ELISA test. Some neighbouring states and regions have a higher prevalence of infection and with the planned growth of the South Australian dairy industry an increasing number of cattle were being sourced from higher prevalence areas resulting in an increase in the prevalence of BJD in South Australia.

Until February 2005, the management of BJD in the South Australian dairy industry involved mandatory reporting and quarantines to control the spread of disease from known infected herds plus within herd measures to control infection; usually a Test and Cull program and improved calf rearing systems. However, reluctance by producers to report or diagnose BJD in their herds meant the disease continued to spread despite these control measures.

The prevalence of BJD in Australian beef herds is very low and beef producers are also concerned about the risk from contact with dairy and dairy cross cattle. The financial consequences of BJD infection in the Australian pasture based beef herds are large, particularly for seed stock producers. In order to resolve the conflicting interests of the two cattle sectors, a new strategy was designed using assurance-based trading principles to replace the regulatory approach.

7.2. The “DAIRY ManaJD” program

A series of workshops and producer meetings were arranged throughout the dairying areas of South Australia in 2005, and a new approach, based on voluntary entry into the program, was promoted. A manual was available to producers, based on the established and respected Australian Johne’s Disease Market Assurance Programs.

"Dairy ManaJD" had 3 main components:

1. **Enrolment** with a (local) trained Veterinarian, with an education process describing BJD, the consequences of herd testing, changes to calf rearing practices and an audit processes.

2. **Testing** herds, either all cattle over 2 years, or all cattle over 4 years (increasing test sensitivity and decreasing cost). The true infection status of ELISA reactors was clarified either using faecal cultures, or by slaughter with histopathology performed on a range of specified tissues, and faecal and tissue culture.

3. **Auditing** herds enrolled in the “Dairy ManaJD” program. All herds are audited annually by their veterinarians, and the South Australian Dairy Authority. The audits look at compliance with improved calf rearing, records of imported cattle, and compliance with Dairy Score declaration to vendors. An audit report is prepared that is sent to the Veterinarian, who reissues a certificate with the appropriate Score, and advises of future testing requirements or management changes.

---

1 Primary Industries and Resources SA, 33 Flemington St, Glenside, South Australia.
7.3. Results

Today over 95% of South Australian dairy producers have enrolled in the Dairy ManaJD program and test results confirm the low prevalence of BJD (18%) in the South Australian dairy sector. Within infected herds the prevalence of BJD is typically 1-2% ELISA positive cattle, and significantly lower in herds undertaking control measures including Test and Cull programs.

One of the main reasons for success of the program has been the strong support of the cattle industry of South Australia, providing funding for the program since 2004. The funding is provided by a levy paid when producers purchase electronic ear tags (required for all cattle sold in Australia). Since beef cattle in South Australia represent 90% of the cattle in the State, the beef industry has therefore funded this management program in the dairy sector, seen as the most effective means of protecting from the incursion of BJD in to this population.

Substantial subsidies have been provided to dairy producers to test the cattle (subsidies also paid to veterinarians to collect samples), laboratory testing fees were paid and compensation amounts paid to farmers for reactor cattle, confirmed infected cattle and high risk cohorts (including the one or two heifer calves of an infected cow).

Farmers have been given two choices for the clarification of ELISA reactors:

1. Faecal culture of the cow, twice at 6 month intervals
2. Slaughter and autopsy, including histopathology and culture of tissues. Cultures progress to identify and strain type Infected cattle, as there have been some detections of sheep strain (S strain) in cattle in Australia, although these are rare.
3. A risk assessment is done with the farmer’s vet, which is based on the likelihood of the cow being a true positive case, and a decision to either slaughter or retain the cow is made.

Every dairy farmer enrolled in "Dairy ManaJD" receives an annual dated certificate from their vet describing the Dairy Assurance Score of the herd and any 'calf credit points' available.

The widespread uptake of the voluntary program has enabled producers to trade cattle using the Dairy Score as a risk assessment tool and declaration of the Dairy Assurance Score is mandatory in South Australia. Higher scores (Tested Negative herds – Score 7 to 10) have attracted higher prices and greater market access both within South Australia and nationally.

The most significant measure of success in South Australia has been an openness to discuss and manage Johne’s disease that was not previously the case. Farmers and veterinary practitioners now have real tools based on test results with which to make risk assessments and South Australian farmers have accepted the logic that Johne’s disease is a herd disease that needs to be managed on-farm if present, and prevented from entering if the farm is not infected. South Australian Dairy Score 7 farmers are proud of their score and the herd negative status, and have demonstrated positive behavior in purchasing low risk cattle. The simple message has been to buy cattle from a score the same or higher than yours, and 'the higher the Score, the lower the risk'.
8. Measuring the Impact of the National Johne’s Disease Control Program: The U.S. Experience

M. Carter\textsuperscript{1}, S. Wells\textsuperscript{2}, M.T. Collins\textsuperscript{3}

8.1. Introduction to the National Johne’s Disease Control Program

In 1993, the United States Animal Health Association (USAHA) adopted a model Johne’s disease (JD) herd certification program (Whipple, 1993). The program was not accepted nationally by cattle producers because of the cost associated with testing all animals above 24 months of age in a herd and other program issues. In 1997, USAHA’s National Johne’s Working Group (NJWG) appointed a committee of Federal, State, university, and industry representatives to design a more affordable and flexible program based on sound scientific knowledge. The result was the U.S. Voluntary Johne’s Disease Herd Status Program for Cattle (VJDHSP; Bulaga, 1998). Instead of trying to certify herds free of JD, the VJDHSP provided minimum requirements to identify herds with a low risk for the presence of \textit{Mycobacterium avium} subspecies \textit{paratuberculosis} (MAP) infection.

The Voluntary Bovine Johne's Disease Control Program (VBJDCP) officially began when the U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), approved the program’s standards based on the USAHA's VJDHSP in April 2002 (USDA-APHIS, 2002). This was the first year that the National Johne’s Disease Control Program became a funded line item in the VS budget. The National Johne's Disease Control Program is the name used to represent all JD activities in which VS is engaged. These activities cover all species of animals, regulations, research, and outreach efforts.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{Overview of the U.S. National Johne's Disease Control Program.}
\end{figure}

\begin{itemize}
\item \textsuperscript{1} USDA-APHIS-VS.
\item \textsuperscript{2} University of Minnesota.
\item \textsuperscript{3} University of Wisconsin-Madison, USA.
\end{itemize}
8.2. Defining success

As with all Federal programs, performance measures with targets were established to monitor the success of the program. Typically, these targets are supported by data that are easy to obtain and are understood by both budget and management personnel. Measures used by the program included the number of herds enrolled in the VBJDCP and the number of herds enrolled as test-negative herds within the VBJDCP. The initial goals of VS were to enroll 8500 herds by 2006, with 30 percent of these herds enrolled as test-negative herds. The USAHA-NJWG goals were further refined to establish 10 percent enrollment for the dairy industry by 2006 and to increase that number by 5 percent each year thereafter. The goals of 8500 total herds enrolled and 10 percent of the dairy herds enrolled (based on licensed dairies) were achieved in 2006. However, further progress on herd enrollments was not made, and none of the test-negative herd number targets were met.

While the national program has not met the performance measures, individual producers have highlighted the value of the program. Therefore, VS began to look for additional ways to evaluate the program’s national impact.

8.3. Judging the National Johne’s Disease Control Program’s impact

Infrastructure

In the early stages of the program, developing the national infrastructure to run the program was critical. Laboratory capacity of competent laboratories was an initial objective to prepare the States for a national program. The VS National Veterinary Services Laboratories (NVSL) conducted its first JD “check test” in 1996. That first year, 16 laboratories participated with inconclusive results for serology tests, and only 7 of 23 laboratories passed the fecal culture check test. By 2003 (the first year Federal dollars were available to the States for JD control), 73 of 76 (96 percent) serology laboratories and 47 of 52 (90 percent) fecal culture laboratories passed the NVSL check test. By 2008, these numbers had risen to 92 of 93 (99 percent) for serology laboratories and 51 of 75 (68 percent) for fecal culture laboratories. The program recently added the testing methods of direct fecal polymerase chain reaction (37 passing laboratories) and milk enzyme-linked immunosorbent assay (36 passing laboratories) to the annual check test. Thus, over the 7 years Federal dollars were available, significant laboratory capacity (number of laboratories and number of assay types) was developed, providing the potential to test a significant proportion of the Nation’s cattle.

Developing the technical expertise in the country to educate producers was another critical aspect of the program. Since 2000, 179 State and Federal field veterinary medical officers (VMOs) and extension veterinarians have gone through the VS basic JD epidemiology training, and 86 of these veterinarians have attended the advanced JD epidemiology training. As a result, each State has a federally trained JD coordinator designated to train the remainder of the State and Area VMOs as well as to coordinate program activities. In addition to the centralized training courses through VS, 2155 private veterinarians have been trained either through local training courses or through online training hosted by the University of Wisconsin using curriculum developed through the basic and advanced courses.

Since 2003, VS has invested approximately $3.7 million to fund 61 developmental and outreach projects. These projects range from novel diagnostic trials to educational materials. These investments are separate from the approximately $11 million devoted to the National Johne’s Disease Demonstration Herd Project (NJDDHP). In 2003, the NJDDHP was initiated to evaluate the long-term feasibility and effectiveness of management-related practices designed to control JD on dairy and beef cattle operations. This project involves 17 States and more than 70 dairy and 25 beef herds. This project has shown that JD can be controlled through management and has resulted in 17 peer-reviewed publications, 183 presentations at local meetings of producers or veterinarians, 119 presentations at national and international scientific meetings, and 15 non-peer-reviewed publications.
**Education**

To be certified as having adequate knowledge to conduct proper risk assessments and design herd management plans, a private veterinarian must attend initial certification training as well as a recertification course every 3 years. In 2008 alone, 317 new JD-certified veterinarians were trained, and 795 veterinarians received recertification training.

In addition to training veterinarians, States administer educational efforts for producers. As an example of these activities, 19 States have websites that convey information on JD, the VBJDCP, and control and testing methods. Over 19,000 copies of 68 publications such as brochures, flyers, and factsheets were distributed in 2008 along with 21 articles or press releases in producer and veterinary periodicals with an estimated combined readership of 30,000.

The impact of these activities is much harder to gauge than the simple program measures for herd enrollments that VS uses. Survey results are typically used to measure results if recent data are available. Three recent surveys with data relating to JD are discussed below.

The VS Centers for Epidemiology and Animal Health (CEAH) conducts national surveys on a rotating basis across livestock species. In 2007, CEAH conducted the National Animal Health Monitoring and Surveillance (NAHMS) 2007 dairy study. The results showed that 94 percent of U.S. dairy producers considered themselves fairly knowledgeable or knew the basics about JD. This compares to 54.8 percent in the NAHMS 1996 dairy study and 87.6 percent in the NAHMS 2002 dairy study, showing significant gains in dairy producer’s understanding of this disease. In addition, producers testing for JD increased from 13 percent in 1996 to 35 percent in 2007. In 2007, 31 percent of U.S. dairy producers participated in a JD control or certification program, an increase from 1 percent in 1996 and 11 percent in 2002. Interestingly, only about 10 percent are officially enrolled in the VBJDCP, indicating that more producers are aware and doing something about JD control than are officially recognized (USDA 1997; USDA 2009).

Another survey conducted by the Johne’s Disease Integrated Program (JDIP; a project funded by the USDA Cooperative State Research, Education, and Extension Service’s National Research Initiative) targeted producers through a mail-in survey to look specifically at dairy producer attitudes about JD and the VBJDCP. The survey included questions to measure producer knowledge of JD, and responding producers knew the correct answer to basic JD questions 74 to 90 percent of the time. The multiple questions about the route of transmission and management and control were answered correctly 45 to 60 percent of the time. According to the producers answering the JDIP survey, 32 percent were testing for JD, and 32 percent were participating in some kind of JD control program, consistent with the results of the NAHMS 2007 dairy study (Olson, 2009).

When the Dairy Farmers of America Cooperative conducted a survey of its members, 65 percent of the 9853 producers who responded had JD control measures in place. Since the focus of the survey was not limited to JD only, the specific control measures or level of control (within-herd prevalence) were not defined (Olson, 2009).

**Management Program**

As stated earlier, individual producers participating in the program see significant benefits that cannot be measured at the national level. To capture these impacts, intensive efforts need to be made. Two examples of States trying to capture this information are an audit by New York for the New York State Cattle Health Assurance Program and the Minnesota Board of Animal Health evaluation of the Minnesota Johne’s Disease Control Program.

As part of its normal activities, the New York State’s Comptroller audits any State program receiving significant State or Federal funds. Therefore, the New York State Office of the State Comptroller (NYSOSC) audited the New York State Cattle Health Assurance Program, which is a State-funded program built upon a core of best management practices such as animal identification, record keeping, and general health. In addition to the core requirements, modules are added such as JD or Salmonella control, animal welfare, and environmental protection. While participants must complete the core requirements, producers may choose which modules, if any, fit their farm’s needs. Most enrolled farms participated in the JD module since subsidized testing costs was a benefit of enrollment.

Results from the audit include a review of 50 farms with a total of 111 annual herd plans. They
show that 86 percent of the reviewed farms were following JD control practices and were able to advance to the next level of their chosen modules, while 11 percent were able to maintain their current plan. Further, 81 percent implemented intervention tactics to limit JD transmission, while an additional 5 percent were making progress toward completing those interventions.

The audit team also surveyed both enrolled producers and producers who had dropped out of the program. Of the 92 producers surveyed who were enrolled, 76 percent felt that they had seen better herd health, 30 percent saw more milk production, and 35 percent felt that they increased profits by being in the program. Of the producers who dropped out of the program, 80 percent stated they did so because they completed their goals. Ninety percent of enrolled producers and 80 percent of producers who dropped out said they would recommend the program. Reasons for dropping out of the program included cost (30 percent of producers) and time commitments (15 percent of producers). Overall, the conclusion of the State Comptroller audit team was that the program is beneficial although performance measures need to be improved (NYSOSC 2005).

In the Minnesota study, the objective was to evaluate the progress, using a retrospective data analysis, of the Minnesota dairy and beef cattle herds in the control of JD through participation in the Minnesota Johne’s Disease Control Program (Wells et al., 2008). A steady increase in voluntary program participation by Minnesota cattle producers was observed over time, with more than 30 percent of dairy producers and 2 percent of beef producers participating by December 2006. Dairy and beef herds in the management program of the Minnesota Johne’s Disease Control Program reduced their on-farm risk assessment scores during the program, indicating a reduction of risk for the transmission of MAP, though risk of introducing JD continued through introduction of cattle from other herds. In addition, dairy and beef herds in the management program reduced their mean within-herd MAP seroprevalence during each of the first 3 years of program participation. Overall, results from this study revealed a reduction in the risk of within-herd transmission and seroprevalence of MAP in dairy and beef herds through time in the management program of the Minnesota Johne’s Disease Control Program.

8.4. Conclusion

The choice of performance measurements is important to capture the scope and the impact of any disease control program. While official measures for the VBJDCP have not been met, successful development of a strong infrastructure to support the program in many States has been observed, including critical components of laboratory capacity and a cadre of trained veterinarians to conduct risk assessments and design effective management plans on cattle operations. In addition, measurable benefits of the effectiveness of educational programs have been noted, as well as continued ongoing development of research-based information of the effectiveness of management control practices. Although producer participation is a common measure of program success, we find that many other measures of VBJDCP impact have been overlooked and not adequately captured in assessing overall program performance. Any analysis of this program must include these other measures to accurately assess the program.

References

### 9. List of Participants – 2nd ParaTB Forum

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrew Padula</td>
<td>Dairy Australia, Australia</td>
<td><a href="mailto:andrewpadula@wideband.net.au">andrewpadula@wideband.net.au</a></td>
</tr>
<tr>
<td>Chris Griffin</td>
<td>Australian Dairy Farmers, Australia</td>
<td><a href="mailto:cgriffin@vff.org.au">cgriffin@vff.org.au</a></td>
</tr>
<tr>
<td>David Kelton</td>
<td>Ontario Veterinary College, University of Guelph, Canada</td>
<td><a href="mailto:dkelton@uoguelph.ca">dkelton@uoguelph.ca</a></td>
</tr>
<tr>
<td>David Kennedy</td>
<td>c/- Animal Health Australia, Australia</td>
<td><a href="mailto:david@ausvet.com.au">david@ausvet.com.au</a></td>
</tr>
<tr>
<td>Douwe Bakker</td>
<td>Central Veterinary Institute, The Netherlands</td>
<td><a href="mailto:Douwe.Bakker@wur.nl">Douwe.Bakker@wur.nl</a></td>
</tr>
<tr>
<td>Ed Komorowski</td>
<td>Dairy UK, United Kingdom</td>
<td><a href="mailto:ekomorowski@dairyuk.org">ekomorowski@dairyuk.org</a></td>
</tr>
<tr>
<td>Hinrich Voges</td>
<td>Livestock Improvement (LIC), New Zealand</td>
<td><a href="mailto:hvoges@lic.co.nz">hvoges@lic.co.nz</a></td>
</tr>
<tr>
<td>Ian MacDougall</td>
<td>Nuffield Scholar, United Kingdom</td>
<td><a href="mailto:imacdou1@aol.com">imacdou1@aol.com</a></td>
</tr>
<tr>
<td>Jeremy Rogers</td>
<td>Primary Industries and Resources , South Australia, Australia</td>
<td><a href="mailto:rogers.jeremy@saugov.sa.gov.au">rogers.jeremy@saugov.sa.gov.au</a></td>
</tr>
<tr>
<td>Lene Trier</td>
<td>Aulum-Vildbjerg Dyrlægerne / Danish Dairy Board, Denmark</td>
<td><a href="mailto:lene.trier.o@gmail.com">lene.trier.o@gmail.com</a></td>
</tr>
<tr>
<td>Lindsay Burton</td>
<td>Fonterra, New Zealand</td>
<td><a href="mailto:lindsay.burton@fonterra.com">lindsay.burton@fonterra.com</a></td>
</tr>
<tr>
<td>Lorna Citer</td>
<td>Animal Health Australia, Australia</td>
<td><a href="mailto:lciter@animalhealthaustralia.com.au">lciter@animalhealthaustralia.com.au</a></td>
</tr>
<tr>
<td>Margaret Good</td>
<td>Department of Agriculture, Fisheries and Food, Ireland</td>
<td><a href="mailto:Margaret.Good@agriculture.gov.ie">Margaret.Good@agriculture.gov.ie</a></td>
</tr>
<tr>
<td>Michael Carter</td>
<td>USDA-APHIS-VS, USA</td>
<td><a href="mailto:michael.a.carter@aphis.usda.gov">michael.a.carter@aphis.usda.gov</a></td>
</tr>
<tr>
<td>Mike Collins</td>
<td>University of Wisconsin-Madison, USA</td>
<td><a href="mailto:mcollin5@wisc.edu">mcollin5@wisc.edu</a></td>
</tr>
<tr>
<td>Peter Mullowney</td>
<td>Department of Agriculture, Fisheries and Food, Ireland</td>
<td><a href="mailto:peter.mullowney@agriculture.gov.ie">peter.mullowney@agriculture.gov.ie</a></td>
</tr>
<tr>
<td>Peter Willemsen</td>
<td>Central Veterinary Institute, The Netherlands</td>
<td><a href="mailto:peter.willemsen@wur.nl">peter.willemsen@wur.nl</a></td>
</tr>
<tr>
<td>Réjean Bouchard</td>
<td>Dairy Farmers of Canada, Canada</td>
<td><a href="mailto:Rejeanb@dfc-plc.ca">Rejeanb@dfc-plc.ca</a></td>
</tr>
<tr>
<td>Robin Condron</td>
<td>Dairy Australia, Australia</td>
<td><a href="mailto:RCondron@dairyaustralia.com.au">RCondron@dairyaustralia.com.au</a></td>
</tr>
<tr>
<td>Ronald Barker</td>
<td>Canadian Animal Health Coalition, Canada</td>
<td><a href="mailto:Ron@animalhealth.ca">Ron@animalhealth.ca</a></td>
</tr>
<tr>
<td>Scott Wells</td>
<td>University of Minnesota, USA</td>
<td><a href="mailto:wells023@umn.edu">wells023@umn.edu</a></td>
</tr>
<tr>
<td>Søren S. Nielsen</td>
<td>University of Copenhagen, Denmark</td>
<td><a href="mailto:ssn@life.ku.dk">ssn@life.ku.dk</a></td>
</tr>
<tr>
<td>Sota Kobayashi</td>
<td>National Institute of Animal Health, Japan</td>
<td><a href="mailto:Sotaco@affrc.go.jp">Sotaco@affrc.go.jp</a></td>
</tr>
<tr>
<td>Ulrike Sorge</td>
<td>Ontario Veterinary College, University of Guelph, Canada</td>
<td><a href="mailto:usorge@uoguelph.ca">usorge@uoguelph.ca</a></td>
</tr>
<tr>
<td>Yasuyuki Mori</td>
<td>National Institute of Animal Health, Japan</td>
<td><a href="mailto:yamori@affrc.go.jp">yamori@affrc.go.jp</a></td>
</tr>
</tbody>
</table>
Paratuberculosis is an infectious disease that is one of the leading causes of economic loss to the cattle and small ruminant industries. The dairy sector (and the beef sector) have studied how to control and reduce the prevalence and spread of this disease for many years. The 2nd ParaTB Forum, held in Minneapolis, Minnesota, USA on 8 August 2009 provided the opportunity to consider national and regional control and eradication programs on paratuberculosis in dairy herds with the emphasis on monitoring the effectiveness of these programs and analysing the factors affecting their degree of success. The programs developed in four different countries, covering a wide variety of dairy regimes, were reviewed and discussed.

Paratuberculosis specialists and farmers' representatives of nine countries participated in the forum.

Keywords: dairy herds, ELISA, farmer communication, Johne’s disease, mastitis, Mycobacterium, paratuberculosis, risk analysis.

41 pp - English only

Bulletin N° 441/2009 - 42 Euro (electronic) - Date: 2009
INTERNATIONAL DAIRY FEDERATION

INSTRUCTIONS TO AUTHORS

Submission of papers
Submission of a manuscript (whether in the framework of an IDF subject on the programme of work or an IDF event) implies that it is not being considered contemporaneously for publication elsewhere. Submission of a multi-authored paper implies the consent of all authors.

Types of contribution
Monographs; separate chapters of monographs; review articles; technical and or scientific papers presented at IDF events; communications; reports on subjects on the IDF programme of work.

Language
All papers should be written in English.

Manuscripts
- Files to be sent electronically on CD-ROM, diskette or by e-mail.
- Final document in Word 2000 or later.
- All tables/figures included in final document to be sent also in separate Word, Excel or PowerPoint files, in colour format. Pictures to be sent in tif or eps format (resolution 300 DPI).
- All files to be named with author’s surname plus title of paper/tables/figures.

References
- References in the document to be numbered and placed between square brackets.
- Reference lists at the end of the document to contain the following:
  - Names and initials of all authors;
  - Title of paper (or chapter, if the publication is a book);
  - If the publication is a journal, title of journal (abbreviated according to 'Bibliographic Guide for Editors and Authors', published by The American Chemical Society, Washington, DC), and volume number; page number or number of pages, and date.
  - If the publication is a book, names of the publishers, city or town, and the names and initials of the editors;
  - If the publication is a thesis, name of the university and city or town;
  - Page number or number of pages, and date.

Abstracts
An abstract not exceeding 150 words must be provided for each paper/chapter to be published.

Address
Authors & co-authors must indicate their full address (including e-mail address).

Conventions on spelling and editing
IDF’s conventions on spelling and editing should be observed. See Annex 1.

ANNEX 1 IDF CONVENTIONS ON SPELLING AND EDITING

In the case of native English speakers the author’s national conventions (British, American etc.) are respected for spelling, grammar etc. but errors will be corrected and explanation given where confusion might arise, for example, in the case of units with differing values (gallon) or words with significantly different meanings (billion).

* Italics: Usually double quotes and not single quotes
? ! ..................................................Half-space before and after question marks, and exclamation marks
± ..................................................Half-space before and after
microorganisms................................Without a hyphen
Infra-red........................................With a hyphen
et al.............................................Not underlined nor italic
e.g., i.e.,........................................Spelled out in English - for example, that is
litre...............................................Not liter unless the author is American
ml, mg,.......................................Space between number and ml, mg,
skim milk......................................One word if adjective, two words if substantive
sulfuric, sulfite, sulfate.................Not sulphuric, sulphite, sulphate (as agreed by IUPAC)
AOAC International........................Not AOAC
programme....................................Not program unless a) author is American or b) computer program
milk and milk product....................rather than "milk and dairy product" - Normally some latitude can be allowed in non scientific texts
-ize, -ization................................No -ise, -isation with a few exceptions
Decimal comma................................in Standards (only) in both languages (as agreed by ISO)
No space between figure and % - i.e. 6%, etc.
Milkfat...........................................One word
USA, UK, GB..............................No stops
Figure........................................To be written out in full
1000-9000..................................No comma
10 000, etc..................................No comma, but space
hours...........................................h
second........................................s
litre............................................l
the Netherlands

Where two or more authors are involved with a text, both names are given on one line, followed by their affiliations, as footnotes
for example 1 A.A. Uthar & B. Prof
          2 University of ........
          2 Danish Dairy Board ..... 

IDF does not spell out international organizations