ACM/552

ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD

MYCOBACTERIUM AVIUM SUBSP. *PARATUBERCULOSIS*

REPORT OF A FOOD STANDARDS AGENCY CONFERENCE

1. The results of a Food Standards Agency (FSA)-commissioned survey, which found MAP in approximately 2% of samples of pasteurised milk on retail sale, were presented to the ACMSF in September 2000. The Committee noted that the risk to human health from MAP had not yet been established, and did not therefore recommend any change in the current advice regarding the consumption of milk, ie. on the basis of the current evidence there was no need for anyone to change their dietary habits.

2. However, the Committee recommended that, given differing views on possible links to human illness which were unlikely to be resolved in the foreseeable future, the FSA should convene an expert group of stakeholders to look at ways of preventing MAP entering the food chain. The Agency accepted this recommendation and held a conference as a means of gathering information on the possible controls that could be put in place to reduce or eliminate MAP in milk. The intention was to utilise the output from the conference to help the FSA formulate its future policy in this area.

3. A report on the Conference, which was held in London Docklands on 23 and 24 May 2001, is attached for the information of Members.

Secretariat
November 2001

REPORT OF A FOOD STANDARDS AGENCY CONFERENCE ON CONTROL OF *Mycobacterium avium* subsp. *paratuberculosis* (MAP) IN MILK

Britannia International Hotel, Docklands

23rd and 24th May 2001

BACKGROUND TO THE CONFERENCE

1. MAP is a bacterium that is the cause of a chronic gastrointestinal infection called Johne's disease in cattle, and other ruminants. There have been claims that it also causes Crohn's disease, a chronic inflammatory bowel disease of humans that can be severe, prolonged and debilitating. However, experts differ in their opinion on such a link and worldwide there is no consensus.

2. The results of a Food Standards Agency commissioned survey which found MAP in approximately 2% of pasteurised milk on retail sale were presented to the Advisory Committee on the Microbiological Safety of Food in September 2000. The committee noted that the risk to human health had not yet been established, and did not recommend any change in the current advice regarding the consumption of milk, i.e. on the basis of the current evidence there is no need for anyone to change their dietary habits.

3. The Committee did however, recommend that given differing views on possible links to human illness, which are unlikely to be resolved in the foreseeable future, the Agency should convene an expert group of stakeholders to look at ways to prevent the bacterium from entering the food chain. The Agency accepted this recommendation and instigated this conference as a means of gathering information on the possible controls that could be put in place to reduce or eliminate MAP in milk. The output from the conference would be used to help the FSA formulate its future policy in this area. A draft policy would be introduced to a wider audience for discussion at an open meeting in the autumn.

DETAILS OF THE CONFERENCE

4. **Agenda:** The agenda for the workshop is provided at Annex A. The conference featured key presentations designed to stimulate participation in two discussion group sessions. The discussion groups were made up of a facilitator and 10-12 delegates of varying backgrounds (one of which was asked to act as rapporteur for the group). The first discussion group session focused on establishing the most suitable control measures for introduction into the UK on the farm and the second session concentrated on measures that could be introduced during milking and at the dairy. A plenary session, which included summaries of the discussions within each group as well as an opportunity for general discussion, followed both group sessions.

5. **Delegates:** A list of delegates is provided at Annex B. Attendance at the conference was by invitation and, where appropriate, those who attended were nominated by relevant trade bodies or associations. The FSA, MAFF, ACMSF, farmers, dairy industry, retailers, consumer groups, research community, Crohn's disease charities and veterinarians were all invited to attend.

OUTPUT FROM THE WORKSHOP

6. ***It should be noted that this report describes the general comments and opinions of the delegates. The views expressed still need to be considered by the agency when formulating their future strategy for MAP in milk.***

Introduction

7. In the first session, concentrating on control measures on the farm, each of the five groups was asked to:

- Establish the awareness and importance of Johne's disease to dairy farmers.
- Consider control measures suitable for introduction into the UK, both in the short and long term, and consider which options would be the easiest or hardest to establish.
- Identify areas where gaps in our knowledge need to be filled before decisions need to be made or specific problems need to be overcome.

8. In the second session, looking at control measures during milking and at the dairy, each group was asked to consider:

- Whether sufficient action was being taken during milking and if not what further actions could be introduced.
- Whether present pasteurisation techniques are effective and, if not, what can be done to improve the situation in both the short and long term.
- What are the problems or gaps in our knowledge preventing further progress in this area?

9. Not unexpectedly, there were significant similarities between the outputs from each group. Consequently, the report of the conference is presented as a summary of the main points discussed in the group and plenary sessions.

Control Measures on the Farm

10. Many delegates believed that while it is clear that the majority of dairy farmers are aware of Johne's disease, they do not necessarily perceive it as a major problem. Many reasons were put forward for this, practically all of which come together under the fact that Johne's disease is generally considered more a nuisance than a significant animal health or production issue in dairy herds. Producers have many more immediate concerns to deal with in the day to day running of their farms. It was considered that this would create difficulties in taking forward controls at the farm level, as there will need to be very good reasons put forward to convince producers that action is required. The view was expressed that the current 'theoretical' link between MAP and Crohn's was unlikely to be enough.

11. A number of delegates believed that the current debate over whether or not there was a link was actually sufficient reason to take action now. Quite apart from the fact that new evidence may emerge to confirm a link, this was an issue where the public profile could increase at any time and participants felt that it was better to be proactive than reactive. Some worst case scenarios were mentioned which included a drop in demand for milk (a similarity to the *Salmonella* in eggs issue of the late 1980s was mentioned) or a flood of imports from Johne's free countries. It was also noted that there might be pressure from retailers for milk from guaranteed Johne's free herds should there be a demand from consumers.

12. Overall, there was agreement that there was a need to initiate actions to control Johne's disease on farms. However, in considering what was required, delegates felt that due notice had to be taken of the current economics of milk production in the UK, as some participants believed that the expense of controlling Johne's disease could not be borne by the producer without there being some financial assistance. For example, an increase in the amount they were being paid for their product. In addition, they will also need to be certain that those control measures that are being put forward actually work. Other delegates believed that if farmers were asked to introduce gradual changes over a longer period, such assistance might not be necessary. World-wide there has been a significant amount of work on Johne's control programmes, yet it was noted that there are question marks as to whether any of these approaches would be applicable to the UK as well as some uncertainties about the actual effectiveness of the various programmes.

13. The view was expressed that before any control programmes could be considered for the UK, there is a need for a better understanding of the levels of Johne's disease in the national dairy herd. However, it was noted that to obtain an accurate picture would require improvements to the diagnostic tests currently available. While these are probably acceptable for detection of Johne's at the herd level, they were not considered good enough for detection at an individual animal level. It was suggested that an immunological test would be the most appropriate method to use for obtaining baseline data on Johne's disease in the UK.

14. Another gap in our knowledge that was identified, is the survival of MAP in the environment, particularly possible routes of transmission via wildlife. Research indicates that the organism could be found in a variety of animals, both ruminant and non-ruminant, and the importance of this in relation to Johne's control programmes needs to be better understood. Views were expressed that there seems little point in using a control strategy based on, for example, introduction of Johne's free animals to a farm if these will then acquire MAP from the environment surrounding them. However, delegates believed the need for a broader understanding should not be considered as a reason for delaying the process of developing a control strategy.

15. Despite the fact that there are various gaps in our knowledge concerning the prevalence and spread of this organism it was still thought that preliminary control measures could be introduced. Some are already in place, including various cattle health schemes, limited vaccination and veterinary advice to farmers. The possibility of a Code of Practice for controlling Johne's disease in cattle was also brought up (there is a industry produced Code available for goat producers), although some participants thought there would be questions about incentive for farmers to follow any such guidance.

16. Stakeholders believed that the main options for control fall into either short or long term strategies. It was generally agreed that the eradication of Johne's disease although potentially difficult to achieve where the disease is endemic, should be viewed as a longer term ideal, which would require significant investment and which might not prove possible. However, this should not rule out the identification and implementation of interventions that would target Johne's disease reduction in the shorter term. Participants thought that a strategy should be developed to address the whole picture, and this should take account of issues such as practicability, cost/benefit, timing etc.

17. Two areas were noted to be the easiest and most effective to implement in the short term**; husbandry/hygiene control measures** and **biosecurity**. For the former, calf management was seen as essential as cattle are shown to be more resistant to MAP infection once they pass the first few months of life. Some basic hygiene measures were suggested (provide potable water, keep dairy effluent away from calves, etc.) as well as some more specific actions such as avoiding the use of pooled and bought-in colostrum and removing calves from positive dams. However, it was noted that, while some of these latter measures may have an effect on the control of Johne's, some also go against current husbandry practices, and raise issues relating to animal welfare and prevention of other cattle diseases.

18. Other husbandry measures suggested included avoiding grazing with other ruminants and the rapid removal of clinically infected cows from the herd. Increased annual testing for sub-clinical infection along with the culling of positives was put forward, although it was recognised that this has serious financial implications and would depend on the development of a better test. The development of Johne's management plans based on Hazard Analysis and Critical Control Point (HACCP) principles and tailored to individual farms was also suggested.

19. Leaving aside the uncertainty over transmission via a wildlife reservoir, delegates thought there were other **biosecurity** measures that could be considered. For example, avoiding buying higher risk breeds and untested animals. The wider use of a 'closed herd' policy such as that used in Northern Ireland could also be considered. The possibility of making Johne's a reportable disease with subsequent slaughter was discussed, but it was thought that this would be ineffective on a voluntary basis, and if

introduced, it would have to be an effectively enforced legal requirement (possibly with appropriate compensation).

20. In relation to long term options for control of Johne's disease in cattle, vaccination was viewed as the most important. However, potential problems such as interference with bovine TB tests, vaccinated animals being 'MAP positive' and financial implications were identified. In addition, while there was a current vaccine available there were questions over its efficacy and the fact that it does not reduce shedding. Hence, research into development of a new vaccine was felt necessary. Other options suggested included the development of genetic markers to identify animals resistant to Johne's, chemoprophylaxis and probiotics.

Control Measures during Milking

21. It was widely agreed that significant improvements in reducing faecal contamination during milking have been made in the past two decades. Yet views were expressed that further improvements could be made and it was clear that many delegates saw this as an obvious area to concentrate on in reducing exposure to MAP. Some delegates believed that any reduction in the number of organisms present in the raw milk should reduce the likelihood of MAP being present after pasteurisation. In addition, action at this part of the milk production chain may be simple in comparison to elsewhere. Certain measures that would reduce faecal contamination can be implemented, for example, by a change in milking patterns and procedures.

22. Some participants suggested that if additional control measures need to be put in place for MAP, the financing of these would be an issue. There is currently a move towards bigger herds and this may create problems. For example, there is less time available to prepare animals prior to milking. One fundamental point made was that the milking parlour and the milking process are part of primary production, and while actions can minimise faecal contamination of the milk, they will never eliminate it totally (i.e. milk is not a sterile product).

23. In considering where improvements could be made, a number of ideas were put forward. Most related to general good hygiene practice before and during the milking process (such as teat cleaning and cleaning of equipment), indicating that what is required is perhaps training and education rather than any more novel solutions.

24. It was recognised that certain milkers in the industry hold certificates of milking practice, but it was generally believed that more education and training was needed and that any such initiatives should focus on promoting best practice to minimise faecal contamination. It was suggested that the introduction of a HACCP-based system tailored to individual farms would be helpful. Another alternative (which is used in Denmark) would be to have a core group of 'experts' trained in milk

hygiene who could visit farmers and their staff to give one-to-one training and detailed advice.

25. Although there was agreement that teat cleaning prior to milking was a critical point in minimising faecal contamination, it was difficult to reach a consensus on best teat cleaning practice. Delegates thought that the more time available for cleaning, the teat the better, however the various methods had advantages and disadvantages. For example, washing without sufficient drying could lead to problems with equipment, whilst the use of disinfectant impregnated wipes is expensive. There was also the issue of udder hygiene versus udder health where teat cleaning methods could actually exacerbate mastitis. Some participants believed that this specific area might benefit from further investigations, perhaps moving towards a Code of Practice on cleaning. Such a Code could extend to other aspects of the milking process, such as cleaning between cows, maintenance of equipment, etc., and would serve to avoid contradictory advice being given to farmers.

26. There was some discussion as to whether it would be possible to introduce a financial reward system for producing milk with low levels of MAP, but it was judged that the methodology could not yet support such a system. This led on to the idea of developing some way of comparing design, construction and use of milking parlours, perhaps based on the publication of microbiological results. The perceived benefit would be that the milk producer, and other interested parties, would be able to see how different milking parlour set-ups and operations impact on faecal contamination levels.

Effectiveness of Pasteurisation and Possible Improvements to Eliminate MAP

27. A number of issues were raised that are relevant to the possible presence of MAP in pasteurised milk, the most important being seen to be control of the pasteurisation process. Effective pasteurisation is particularly important to eliminate major human pathogens of concern such as *Salmonella* and *E. coli* O157, and, it was thought that effective control of the process would have knock-on benefits in controlling MAP in milk. Any pasteurisation failures would consequently be of concern, although it was thought that such failures would be unlikely in larger dairies and, if they did occur, would be identified quickly. There was more uncertainty about smaller dairies, especially those where pasteurisation was carried out on-farm. Although there had been campaigns seeking to provide advice to on-farm pasteurisers, it was judged that they still posed a potential problem meriting attention.

28. Regardless of the size of the dairy, the need for regular checks on the pasteurisation equipment was seen as vital. It was also suggested that an industry standard to which qualified engineers checked such equipment on a regular basis would be useful. Comments were also made that the use of fluorimetric or chemiluminescent methods for testing for phosphatase may

have some additional benefits over other methods, specifically in that they may be sensitive enough to be used to assess trends in the effectiveness of pasteurisation, and perhaps give early warning of a problem.

29. The question of post-pasteurisation contamination was considered, with some suggestions that this might have been responsible for the MAP positive samples of pasteurised milk found in the FSA's milk survey. While the other information collected on these samples made this unlikely, such contamination could be another route by which MAP could enter the food chain. It was noted that the coliform test may not be the most sensitive indicator of post-pasteurisation contamination and that a gram negative test may be more effective.

30. Since the FSA milk survey provided evidence that MAP survives pasteurisation even for 25 seconds at 71.7°C, delegates thought that there is a benefit in considering whether adaptations to the process could further reduce the likelihood of survival. Research has previously been funded by the Agency in this area and this will be built on by work recently started at the Hannah Research Institute (jointly funded by MAFF (now DEFRA) and the dairy industry). The project will investigate the pasteurisation regimes required to eliminate MAP and the thermal stability and clumping behaviour of MAP. This work should provide information on options for the control of MAP in milk, perhaps using techniques and equipment that are either already in common use or have recently become commercially available. Examples include; high pressure homogenisation, double pasteurisation, microfiltration, bactofugation.

31. Some participants believed that there were other issues to consider in relation to changing pasteurisation procedures. Not least potential cost implications, the impact on organoleptic qualities, and consumer acceptance of the product.

32. Participants felt that until the work on pasteurisation is completed (or information becomes available from other sources) the value of possible measures to control MAP during pasteurisation has to be regarded as speculative. However, some delegates suggested that, in the meantime, the precautionary increase in pasteurisation time to 25 seconds that many dairies put in place in 1998 should be maintained. While there may still be survival of MAP at this extended time, it was considered likely that it would be less than with the conventionally practised 15 seconds.

General Comments

33. Against the background to the conference (paragraphs 1-3) in particular that, as currently acknowledged, there is no proven link between MAP and Crohn's disease, there were a number of recurring themes, which will need to be borne in mind when considering possible action. The first, which was stressed by a number of delegates, was that it was important to recognise that in general the quality of milk sold in the UK is very high. There is no doubt that improvements are possible, however the issue of MAP in milk

should not detract from the work that has been put in place in the last couple of decades to improve the overall quality of pasteurised milk.

34. It was also judged that there was a need to find suitable opportunities to communicate to the consumer that milk is not a completely sterile product. It does contain bacteria although it should not contain pathogens. The issue of the current economics of milk production in the UK was highlighted a number of times and it was clear that this would impact on the introduction of any additional control measures relating to MAP.

35. There was overall agreement about the need to focus on the main problem, namely that MAP has been found in pasteurised milk. There was also a strong measure of agreement that action to reduce MAP entry to the food chain is an important, if not immediate concern. The aim is to reduce human exposure and this should be done through a balanced strategy embracing shorter and longer term elements. It is important not to get diverted away from this aim, for example, by concentrating on long term options at the expense of those short term options, which could have an immediate effect.

36. It was noted that a hypothesis has been suggested that dead cells of MAP could be a problem, as these could elicit an immune response in the gut. Although there is no firm evidence to support this hypothesis, it did illustrate the importance of reducing MAP load at the farm and during milking.

The Way Forward

37. The next step will be for the Food Standards Agency to consider the output from the conference, along with information gathered from other sources, and to produce a draft strategy for the control of MAP in milk. Stakeholders will have the opportunity to comment on this strategy at an open meeting to be held in the autumn of 2001.

ANNEX A

Food Standards Agency's MAP workshop

Britannia International Hotel, Docklands, London – May 23-24th 2001

AGENDA

Day One

11.00 – 11.30	Arrival and registration
11.30 – 11.40	Introduction to workshop – Dr Jonathan Back (Chairman)
11.40 – 12.00	Presentation 1: FSA milk survey, MAP results – Dr Sonia Molnar
12.00 – 12.30	Presentation 2: Review of evidence linking MAP with Crohn's disease – Dr Eileen Rubery
12.30 – 13.00	Presentation 3: Johne's disease/MAP in animals – Dr Michael Sharp, Moredun Research Institute
13.00 – 14.00	Lunch
14.00 – 14.30	Presentation 4: MAFF project on surveillance and control of Johne's disease in farm animals in GB – George Caldow, Scottish Agricultural College
14.30 – 16.30	Group session 1: Control measures on the farm.
16.30 – 17.00	Break
17.00 – 18.30	Discussion of output from group session 1
18.30	Close of day 1
19:30	Dinner

Day Two

8.25 – 8.30	Introduction to day 2
8.30 – 9.00	Presentation 5: Hygiene issues during the milking of cattle – Clive Cook, Farming and Rural Conservation Agency
9.00 – 9.20	Presentation 6: Pasteurisation of milk; the present technology – Dr Ed Komorowski, Dairy Industries Federation
9.20 – 9.40	Presentation 7: Pasteurisation of milk; new technologies for the future – Claus Heggum, Danish Dairy Board
9.40 – 10.00	Presentation 8: LINK project on pasteurisation conditions required to eliminate MAP – Prof. Donald Muir, Hannah Research Institute
10.00 – 10.30	Break
10.30 – 12.30	Group session 2: Control measures during milking and at the dairy.
12.30 – 13.30	Lunch
13.30 – 15.00	Discussion of output from group session 2
15.00	Close of Workshop

ANNEX B

Delegate list

Delegate	Organisation
Ms Sarah Appleby	Food Standards Agency - LAES Division
Dr Jonathan Back	Food Standards Agency - Microbiological Safety Division
Mr Keith Baker	British Veterinary Association
Mr Steve Batchford	J Sainsbury plc (British Retail Consortium)
Dr Sheila Benson	Uniq plc (Food and Drink Federation)
Ms Rosemary Brook	National Dairy Council
Mr Bradley Brown	National Association for Colitis and Crohn's Disease
Dr Ken Burgess	Dairy Crest Ltd (Dairy Industry Federation)
Dr George Caldow	Scottish Agricultural College
Dr Kathryn Callaghan	Food Standards Agency - Microbiological Safety Division
Mr Clive Cook	Dairy Hygiene Inspectorate - England & Wales
Mr M Cranwell	VLA Starcross
Dr Kirsten Dunbar	Food Standards Agency - Northern Ireland
Mr John Gazzard	ADAS Consulting
Mr Paul Gayford	MAFF (now DEFRA)
Professor Douglas Georgala	ACMSF
Mr Robert Gosling	National Farmers Union
Dr Irene Grant	Queen's University Belfast
Mr Claus Heggum	Danish Dairy Board
Professor John Hermon-Taylor	St George's Hospital Medical School
Dr Judith Hilton	Food Standards Agency - Microbiological Safety Division
Mr Tony Hitching	MAFF (now DEFRA) - Animal Disease Control
Mr David Hopkin	Scottish Dairy Association
Mr Mike Johnston	Dairy Council for Northern Ireland
Dr Phil Jones	Institute for Animal Health (ACDP)
Mr Alan Kennedy	Paratuberculosis Awareness and Research Association
Mr John Kerr	National Dairymen's Association
Dr Kate Kerr	SERAD
Dr Ed Komorowski	Dairy Industry Federation
Miss Hannah Lewis	Department of Health
Ms Eva Lewis	ACMSF
Mr Jim Macauley	Ulster Farmers' Union
Professor C McMurray	Department of Agriculture & Rural Development - Northern Ireland
Professor Kenton Morgan	University of Liverpool
Professor Donald Muir	Hannah Research Institute
Mr Colin Mylchreest	Food Standards Agency - Microbiological Safety Division
Mr Derek Pattison	Midlands Co-op Society (Dairy Industry Federation)
Mr B D Peacock	Milk Development Council
Mr John Pearson	Marks & Spencer plc (British Retail Consortium)
Mr Chris Pratt	Food Standards Agency - Microbiological Safety Division
Delegate	**Organisation**
Dr Susan Pryde	Food Standards Agency – Scotland
Dr Debby Reynolds	Food Standards Agency –Veterinary Director
Dr Eileen Rubery	Judge Institute of Management Studies
Dr Michael Sharp	Moredun Research Institute
Dr Norman Simmons	Consultant

Dr Roger Skinner	Food Standards Agency - Microbiological Safety Division
Professor W C S Smith	(ACMSF) University of Aberdeen - Department of Public Health
Mr Robert Voyle	Farmers Union of Wales – Aberystwyth
Mr Bill Wadsworth	Express Dairies plc (Dairy Industries Federation)
Mr Alan Walker	(LACOTS) Preston Borough Council - Environmental Health Section

Conference Facilitators/Organisers

Ms Marion Castle	Food Standards Agency - Microbiological Safety Division
Dr Kevin Hargin	Food Standards Agency - Microbiological Safety Division
Ms June Lock	Food Standards Agency - Microbiological Safety Division
Ms Catrin May	Food Standards Agency – COMS
Dr Sonia Molnar	Food Standards Agency - Microbiological Safety Division
Ms Florence Opesan	Food Standards Agency - Microbiological Safety Division
Ms Liz Stretton	Food Standards Agency - Microbiological Safety Division