ACM/593

ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD

MYCOBACTERIUM AVIUM SUBSPP *PARATUBERCULOSIS*

1. On 10 April 2002, there was a meeting at Queen's University, Belfast, organised by the Society of Chemical Industry and sponsored by DARD and the Food Safety Promotion Board, on "*Mycobacterium paratuberculosis* : impact on human health and the dairy industry".

2. At the Chairman's request, Mr Kyriakides represented the ACMSF. His report is attached.

Secretariat
June 2002

Mycobacterium paratuberculosis:
Impact on health and the dairy industry

A conference organised by the SCI at the Department of Food Science, Queen's University, Belfast
10 April 2002

Key points of interest to the ACMSF are detailed below. Abstracts are available for all of the talks.

1. Dr B Dixon: Introduction

General introduction on consumer and public concern and the fact that this is a potentially "explosive" public issue.

2. Dr M Collins: Prevalence, diagnosis and control of MAP in animals

Comprehensive presentation on both the disease in cattle and the practical controls that could be put into place to reduce the incidence and spread of MAP in dairy cows.

Johne's disease was reportedly prevalent in dairy / cattle herds throughout the developed world at incidences varying from 8%-60% of herds (US, England, Australia, Belgium, New Zealand, Denmark and Netherlands).

Notwithstanding the debate about the actual link between the organism and the disease, concern was expressed about the implications for the meat safety of the widespread dissemination of the organism throughout the lymphatic system of the animal. Data was shown from a paper by Rossiter (J. An. Sci 79:113, 2001) demonstrating an 11.1% incidence of the organism in tissues of slaughtered 'thin' dairy cows and the implication that this has for the meat safety.

Risk factors were presented regarding the likelihood of infection of cows with young ruminants clearly being recognised to be at greatest risk.

Routes of transmission were indicated as faecal-oral, milk-colostrum, environment, feed and water.

A recommended control strategy to eliminate MAP infection in dairy herds was proposed using a combination of improved hygiene conditions and testing as follows;
a. Rearing controls
Prompt removal of calf from cow.
Feed high quality colostrum in <12h from one cow (tested MAP negative) to one calf
Feed pasteurised milk until weaning.
Operate hygienic rearing system controlling quality of feed and water (free from manure contamination).

b. Testing controls
Test all cows at end of lactation. Never use colostrum or milk from test suspect or test positive cows.
Test positive cows to be visibly identified 'J' in ear tag and sold to slaughter or to an individual with written notification of test positive status.

Applying the test and husbandry programme described above a computer prediction demonstrated it would still take up to 20 years to eliminate infected cattle.

The sensitivity of current test methods and the use of results to guide management decisions was raised as a concern but a scheme had been devised using a serological test to allow the likelihood of infection to be determined and an appropriate level of management action to be applied. For example, those with low ELISA readings would be deemed negative and such animals kept for a further lactation. A sliding scale would then apply depending on how high the ELISA readings were found to be - those with a slightly elevated ELISA readings would be referred to as suspect positives, whilst at the other extreme, those with the highest readings would be defined as high positives. The action associated with each ELISA reading ranged from keeping the animals but not using its colostrum for suspect animals to culling the animal in the event of a high positive being found.

This system was being trialled in Wisconsin on a 1000-dairy cow herd and initial results demonstrate a reduction in MAP infection.

The ultimate objective of this approach is to find the most infectious animals, prevent transmission to the most vulnerable animals and to do this most of the time.

Finally, gaps in our knowledge about survival of the organisms in the environment were expressed and how its survival in wastes and water may subsequently impact on its continued transmission to other animals.

3. Dr I Shafran: Crohn's disease and the role of MAP

A presentation that focussed on some of the more extreme cases of Crohn's disease and the severe debilitation that such a condition causes in many patients. The presenter considered that approximately 40% of Crohn's patients were likely to be associated with MAP. MAP had been found by a variety of techniques including PCR and culture from full thickness specimens.

Treatment with anti-mycobacterial drugs including a combination of rifabutin and biaxin had shown a high (60%) response within 16 weeks and an 80% response after 2 years treatment.

Responses included remission of the disease and healing of previous lesions.

4. Dr M Sharp: Paratuberculosis in wildlife and the environment

Presentation focussed on the widening host range of MAP. Historically considered to be almost exclusive to ruminants the organism has now been found in a wide variety of animals including chicken, donkey, pigs, primates, rodents, kangaroo, etc.
Two types of MAP are apparent, pigmented and non-pigmented and these tend to correlate with distinctive genotypes using RFLP and PFGE.
Typ1 tend to be more specific to ruminants and Typ2 has a more broad host range

Limited information exists about the whether the strains are independent or are linked with cross infection between different animals.

A recent study in Scotland revealed a high incidence of MAP in rabbits (8-60%) and predator species such as fox (85%) and stoat (47%) with a high incidence also in scavenger species such as crows (60%). It was proposed that rabbits could be a significant vector of the organism as high incidence and levels of MAP had been found in the rabbit intestine, faeces and urine. A further concern raised in relation to transmission to cows was the observation that grazing cows did not suffer the same faecal aversion to rabbit pellets that they did to other animal excrement such as cow pats, etc. With an estimated contamination of 10^6 colony forming units per hectare per day from rabbits onto land it was proposed that this may be a significant vehicle for transmission of MAP to cattle. Indeed experiments had shown that MAP isolated from a rabbit pellet was able to cause infection in an inoculated calf.

The wide host range of MAP in a variety of animals was proposed to offer increased evidence of the potential for it also to infect man.

5. Dr I Grant: Efficacy of milk pasteurisation and MAP

The majority of Dr Grant's work has been previously reported to the committee. The key point from this presentation was the preliminary results from a recent commercial scale pasteurisation trial using naturally MAP contaminated milk.

Samples of milk were taken from two farms over a 12 week period and subjected to large scale (2000l/h) turbulent flow pasteurisation. Although the level of MAP in the raw milk was not determined raw milk samples were culture or IMS-PCR positive at a rate of 1-5% over the 12 week period (one occasion 0% and one occasion c.17%).

Milk was pasteurised at 73^0C for 15 or 25 seconds with or without prior pasteurisation.
Milk pasteurised at 73^0C for 15s was found to be contaminated with MAP in 8% samples without prior homogenisation and in c.2.7% with homogenisation.
When pasteurised at 73^0C for 25s the incidence of MAP was c.11% without homogenisation and c.5% with homogenisation.

It is important to note that this study differed from many previous studies in sampling 50ml (as opposed to 25ml previously) and in allowing a 24h recovery phase after pasteurisation before applying the selective treatment. These factors may have allowed greater numbers to be recovered.

Nevertheless the conclusion that commercial scale pasteurisation does not guarantee elimination of MAP remains valid.

6. Prof D Muir: Processing options for reducing risk associated with contamination of raw milk by MAP

The presentation gave an account of the different approaches being considered in a LINK funded study to determine processing options to eliminate MAP from milk. Options including clarification, bactifugation, fat separation and homogenisation are being considered in combination with pasteurisation to improve heat destruction.

No results were presented.

7. Dr P Hammer: MAP in milk: risk considerations

This presentation gave an overview of the current gaps (and there are many) in knowledge with regard to conducting a quantitative risk assessment of this organism to human health.

Under current EU /CODEX definitions MAP has to be regarded as a hazard under the precautionary principle.

It is not possible to conduct a proper risk assessment given the current state of knowledge but it was confirmed that avoidance of milk and milk products did not seem to be justified by current knowledge with the exception of the consumption of raw milk and respective products by high-risk groups.