KEYNOTE ON: CONTROLLING JOHNE’S DISEASE – LEARNING FROM THE PAST 15 YEARS

Kennedy DJ

National Johne’s Disease Control Program, Animal Health Australia, Canberra, Australia

Johne’s disease control …people applying technology

Introduction

The International Association for Paratuberculosis (IAP) is a “scientific organization devoted to the advancement of scientific progress on paratuberculosis and related diseases.” The primary functions are clearly directed at supporting this endeavour by encouraging scientific knowledge, collaboration, scientific freedom and achievement (1). The colloquia and the scientific literature bear testimony to the success of this Association and its members in fulfilling the purpose over the 23 years since it was founded. The advances in the understanding of the biology of *M. paratuberculosis* have been astounding and have resulted in many useful technologies, especially diagnostics. We have learned more about how the host and environment interact with the organism and what potential lies in manipulating these (2).

In the end however, the real value of improved understanding and technological developments must be judged against the resulting improvements in prevention and control of paratuberculosis. How have we performed in this area? Manning and Collins posed the following question in 2010: “Given the large scale efforts to control MAP in many countries and the continuing expansion of the epidemic in those same countries, is MAP control possible?” (2). I think that the evidence shows that it is; but we have to be committed, clever and comprehensive in our approach. Presentations in sessions at this colloquium outline some novel approaches to the challenges of effective control.

There is not simply one “Johne’s disease” and there is no single objective or approach to controlling it. Firstly, in many parts of the world, we are dealing with different types of the organism across several different livestock sectors; for instance, the cattle and sheep types in Australia.

Secondly, control programs may be directed at different priorities with one or more of the following objectives:

- Preventing infection *per se*
- Reducing the impacts of infection on animal welfare and survival
- Reducing subclinical effects on growth and production
- Reducing contamination of farm products and the farm environment
- Assuring markets on the status of animals and products

Thirdly, the size of the arena in which control is attempted also varies from the individual animal and farm level through to regional and national levels, and even the international level. Finally, a major factor is what people want to achieve and what they are prepared to invest to do this. People’s perceptions of what constitutes a risk vary, as does their risk aversion. These differences are especially evident between those whose herds or flocks are infected with paratuberculosis and those who think that they are “free” from infection.

The Association recognises the importance of this human wildcard in the epidemiology of paratuberculosis, listing among its functions “to advance professional and lay education in paratuberculosis... and to increase public understanding and appreciation of the importance and promise of the methods of science in animal health” (1).

The components that should be in place before a major control program is undertaken have been outlined by Thrusfield (3):

- Understanding the aetiology, pathogenesis and epidemiology of the disease
- Veterinary infrastructure and capability
- Diagnostic feasibility
• Adequate surveillance
• Availability and identification of non-diseased replacement stock
• Producers’ views and cooperation
• Public opinion
• Public health significance
• Adequate legislation and compensation
• Possible ecological impacts
• Economic costs
• Availability of funds

For various reasons, these are not always in place at the beginning of a program but they do provide a useful framework of technical and socio-economic factors against which current and proposed Johne’s disease programs should be assessed.

Australia
Australia’s National Johne’s Disease Control Program commenced in 1995, under the auspices of the National Farmers’ Federation. From modest beginnings, the scope of the program has grown to involve all the affected farming organisations and the national and state government animal health services, under the banner of Animal Health Australia. As both cattle and sheep type infections are unevenly distributed across livestock industries and regions in Australia, the program has a strong interest in prevention of infection at the herd and regional level.

The program has been supported technically by a productive local research program and the results of overseas research and programs, but has largely developed through reviewing and responding to the experience in Australia. Many of these lessons have broader application as more countries attempt prevention and control of paratuberculosis and will be highlighted in the Industry Special Focus Day at this colloquium.

Under the banner of the Australian national program, there is evidence of success in:

• long term prevention and eradication of incursions of Cattle-type infection (bovine Johne’s disease, BJD) in Western Australia, the Northern Territory and Queensland
• elimination of infection in many beef herds in south-eastern Australia
• prevention and control of infection in sheep flocks in large parts of NSW and Queensland
• reduction in the flock level incidence and prevalence of OJD in South Australia
• prevention of new infections in the alpaca industry.

Less remarkable has been the ongoing spread of OJD in south-eastern and south-western Australia. Some factors associated with these and lessons drawn are outlined below.

Lessons
As in life generally, equity (or being given “a fair go” in Australia) is a major driver for cooperation; and perceived or real inequity is a major disincentive. The increasing incidence of OJD in New South Wales and its detection in different regions of south-eastern Australia in the mid-1990s, precipitated attempts to control the epidemic. As we found in the early stages however, implementing the available legislative capacity to enforce quarantine and movement restrictions on known infected flocks was ineffective and counterproductive, largely because the program did not include many of the attributes outlined by Thrusfield (3). There were very few technical tools to identify infected flocks and to help affected producers prevent losses or manage infection. Trials into the effectiveness of destocking as a means of eradicating OJD found that apparently disease free replacement sheep reintroduced infection. The national sheep producers’ organisations could not reach agreement on providing assistance from national levies to owners of known infected sheep flocks to help them deal with the negative social and economic effects on their businesses. Furthermore, infected flocks that were not known officially to be infected remained free from restrictions. These inequities discouraged other producers from cooperating with surveillance to detect infection and OJD spread between flocks largely unhindered.
In contrast, since 2004, the smarter use of better diagnostic tests, the availability of low risk replacements and the provision of social counselling and financial support to owners of beef cattle herds that are detected to be infected with bovine Johne’s disease, have contributed to more successful control in that industry.

In the last decade, the Australian National Johne’s Disease Control Program has moved towards emphasising voluntary risk assessment and management in the southern regions and livestock industries where paratuberculosis is endemic. The aim has been to educate producers and advisers to a point where they would change their behaviour to manage the risk that Johne’s disease presented to their own business. For instance, the owner of a large beef breeding herd may stand to lose access to markets for bulls and heifers if the herd is infected. The program encourages such producers to manage their herds’ biosecurity and only buy replacement cattle that are assigned a high level of assurance that the risk of infection with Johne’s disease is low. In turn, other beef producers are encouraged to buy their replacements from herds that can also provide similar assurance, such as through the Beef Only declaration, thus educating the market and gradually building demand.

In the absence of obvious market drivers, it has been difficult to encourage producers to voluntarily protect their herds and flocks. Two risk assessment schemes were implemented in Australia in the mid-2000s: the Assurance Based Credit (ABC) Scheme for sheep (4) and the National Dairy BJD Assurance Score for dairy cattle (5). The former was based on a quantitative risk assessment model and described the risk score as a single number, with each additional point reflecting an approximate four-fold reduction in risk. Designed to simplify risk assessment and communication, it has largely failed as a tool for most farmers as there is little market demand, except where high scores were legislated for movements into and within regions that were trying to protect their flocks.

Within some infected regions, the ABC score was rarely used or used only to meet a low minimum movement standard. Promoting a minimum ABC score for movements not only confused the message of trying to prevent the spread of infection by buying high score replacement sheep but effectively encouraged the selling and buying of sheep that had a high probability of being infected. Abattoir surveillance, conducted under the national program, has demonstrated steadily rising flock prevalence in these regions, and vaccination has recently been increasingly used to reduce mortalities and production losses (Pfizer, personal communication, 2011).

In a heavily infected region of South Australia, however, producers, government and veterinarians have worked together to implement a program, with technical and financial assistance to help producers and neighbours control and prevent OJD. Recent surveillance has found many formerly infected flocks testing negative and fewer new infected flocks.

Business and Trade
Controlling animal diseases can both be driven by trade seeking assurance and be constrained by “business as usual” practices. The potential risk that Johne’s disease presents to a business may not be appreciated as the impacts do not occur within the usual business time-horizon. For many farmers and in many countries, sales of livestock are key businesses and income earners. Where control programs are seen to be threatening “business as usual”, strong opposition can be expected. Not surprisingly also, in conducting business, the seller will also generally favour his or her own selling potential, so unapparent faults, such as paratuberculosis infection, are unlikely to be declared to potential purchasers unless there are strong incentives, or other compliance pressures, within the trading environment.

Unless the socio-economic environment is also favourable, technical advances will have little opportunity to be effectively utilised in disease control. An illustration of the relative weight given to technology and to trade pressures in decision making has been the OIE’s ongoing reluctance to agree on providing guidance to its members on paratuberculosis control in its Terrestrial Animal Health Code. In 2009, the OIE’s Scientific Commission for Animal Diseases decided that “considering the lack of reliable diagnostic procedures for paratuberculosis, it would not be advisable to develop such a guidance document. The Commission was also not in favour of the OIE getting involved on the perceived public health issues if there was no clarity on reliable and recommended control measures and diagnostic procedures in
animals”(6). This effectively consigned paratuberculosis to remain a largely hidden ‘fault’ in livestock traded internationally. This may also affect domestic control programs. A trade protocol based on “no known infection” discourages producers from finding out the true disease status of their own herd or flocks; a serious constraint on disease prevention and control.

The Challenge
A real challenge for the IAP is changing people’s understanding, priorities and behaviour so that they want to use the accumulated knowledge and tools to implement sound and effective prevention and control of paratuberculosis at the various levels for which they have responsibility. Getting the biological science and tools right is one aspect of the challenge, but possibly more important for success is to better understand people’s priorities and needs so as to influence them to move away from the status quo and to adopt new business models that include better prevention and control.

This colloquium features some interesting work on human behaviour and the socio-economic aspects of paratuberculosis control. Successful control of Johne’s disease may well depend on people who have complementary expertise in social sciences actively engaging in control programs and sharing their experience and knowledge with the Association at future colloquia.

References