

Zoonotic disease risk— protecting Australia from BSE or mad cow disease

Adams uses the example of BSE to examine risk assessment

Abstract

Australia is free of bovine spongiform encephalopathy (BSE or mad cow disease). However, it provides a contemporary and compelling case study in the application of risk assessment in designing appropriate responses to an emerging disease where uncertainties abound and where decisions have to be made on the basis of the best available knowledge. Risk assessment can channel knowledge on key questions such as 'how do we know when a new animal disease will escalate into an epidemic or pandemic and when could it affect people'. Risk assessment sets out procedures for assembling and analyzing the available evidence relating to risk and then presenting the results in a form that is easy to understand and to act upon fairly and effectively.

Overview of BSE

It has several distinctive characteristics and is simultaneously a zoonosis (a disease of animals that affects people), a major food safety concern and a major disease of cattle in its own right. BSE is also a classic example of an emerging disease. It is a disease that was previously unknown to science and which came about as a result of a web of particular events and circumstances at a particular place and time in history. Some specific factors in the husbandry of cattle allowed the emergence of BSE and it is doubtful that the disease could have originated anywhere else but in the United Kingdom and in the



last two decades of the twentieth century (UK BSE Inquiry, 2000a).

A quick picture of BSE sets the scene. It is a transmissible, but not infectious or contagious, degenerative disease of the central nervous system of cattle and belongs to the class of diseases known as the transmissible spongiform encephalopathies (TSEs). BSE has a long incubation period, usually about six years, which provides some problems for management of the disease and mandates lifelong identification of individual cattle in the 21st century. BSE does not spread from cow to cow as occurs in the usual infectious or contagious diseases. Transmission only takes place when cows consume rendered tissue, meat and bone meal, derived from other cows with the disease. The infectious agent for BSE is a prion, a modified form of a protein that occurs naturally in most vertebrate animals. Prions are highly resistant to degradation by heat and

modifications to the rendering process in the UK involving the use of relatively low temperatures are likely to have contributed to the emergence of BSE in that country (Taylor and Woodgate, 2003). Contaminated meat and bone was and remains the only source of transmission of BSE and live cattle with the disease spread BSE to other countries when these animals enter the feed chain.

Prion diseases, like BSE, are complex and present scientists with great intellectual and technical challenges (Lasmegas, 2003). On the other hand, the cardinal control measure for BSE is simple and straightforward. Do not feed contaminated meat and bone meal and, as a failsafe, do not feed meat and bone meal of any sort to ruminant animals (Prince et al., 2003). Australia is recognised as being free of BSE. Australia has not imported meat and bone meal from any country except New Zealand since 1966

and rigorous border control is in place. Australia banned imports of live cattle from the UK in 1988 and the few remaining live animals are in lifetime quarantine. Similar bans and management have been placed on cattle from Europe, Canada, the USA and Japan. At the same time Australia has stringent and audited bans on the feeding of cattle and other ruminants with meat and bone meal from any vertebrate. These measures are supported by a national surveillance program on nervous disorders in cattle.

Risk assessment and BSE

Why discuss BSE in a journal on emergency management?

The answer is that experience with BSE has demonstrated the indispensability of risk analysis for guiding a rational approach to disease control. The continuing saga of BSE provides an object lesson on risk analysis as a vital backroom activity for Australia's responses to any disease. Risk assessment is especially valuable in situations of uncertainty and where control measures have to be based on the best knowledge available at the time. How can we know when a new animal disease will escalate into an epidemic or pandemic and may or will affect people? The best judgment is available through risk assessment, which sets out a rational framework for assembling and analysing the available evidence relating to risk and then presenting the results in a form that is easy to understand and to act upon fairly and effectively.

To be effective, risk assessment requires a special set of disciplines. For example, advocacy for one viewpoint about a disease over another is disallowed. Each viewpoint must be considered in relationship to disease control and the ultimate truth is determined by pragmatism; by effectiveness in action. This issue of intellectual discipline has been vital for the control of BSE. Hypotheses other than the prion hypothesis (for

example, those related to mineral nutrition; Purdey, 1996) could have disrupted key control measures and allowed the disease to act like wildfire, had they been heeded.

Hindsight suggests that the approach to BSE in the UK would have benefited from the more vigorous application of risk assessment and the use of public policy processes that foster it. The policy aspects of the BSE experience deserve further reflection on the benefits it can bring to disease and emergency management in Australia. Why repeat errors if a similar situation were to occur? BSE has compelled the UK and EU to make more effective use of scientific advice in policy (UK BSE Inquiry, 2000c). The UK Office of Science and Technology has produced some insightful papers on the subject (Office of Science and Technology; 1997, 2000a and 2000b).

Risk management

As background to the responses Australia has made to BSE, it is worthwhile considering the disastrous impact of this disease. The BSE epidemic in the UK and in other countries in Europe has clearly receded and entered an extended elimination phase. BSE has been detected in 16 other countries and has prompted some unparalleled actions to protect human and animal health. Nevertheless, the effects continue to reverberate throughout the world. The single cases of BSE in cattle in Canada and the USA have led to the allegation that the disease has taken root in North America; a possibility that is unlikely to be true, but only time will tell.

The point now is that BSE has degenerated into a disease of trade and current irrationalities have become a source of economic danger for Australia's red meat industry. The key concern is to make the necessary responses to maintain trade without compromising disease control principles, especially that

of 'proportionality', which requires some explanation. The simple idea is that management of disease should be proportional to the risk involved and that risk assessment should be kept separate from risk management as far as possible (May, 2001). The European Commission has produced some excellent guidelines and advice on the harmonisation of risk assessment for various purposes in response to the BSE experience (Scientific Steering Committee, 2003).

As for the animal health impacts of BSE, figures to the end of 2003 show that 183,496 cases have been reported in the UK since records commenced in 1987 and that the epidemic peaked in 1992 with 37,280 cases in that year. Other figures for incidence to the end of 2003 are Ireland (1297), France (841), Portugal (788), Switzerland (443), Spain (300) and Germany (264). The economic costs and trade impacts have been enormous and have resonated in countries like Australia that do not have the disease. The UK BSE Inquiry (2000b) stated that total net cost of the BSE crisis to the Exchequer would be £3.7 billion by the end of the 2001/02 financial year and that the complete collapse of the beef and cattle export market, at one point worth £720 million a year, occurred after the European Commission banned the export of UK beef and cattle in March 1996.

The human cost of BSE has been tragic. There is a virtually inescapable link between BSE and variant Creutzfeldt-Jakob disease (vCJD), which is similar to Creutzfeldt-Jakob disease (CJD) but has the unhappy distinction of occurring in younger people. Up to April 2004, 140 deaths have resulted from definite or probable vCJD. Fortunately, only one death has been recorded in 2004. Six deaths from vCJD have occurred in France and one each in Ireland, Italy, Canada and the United States as a result of exposure in the UK (WHO, 2004).



Fear of vCJD has had other potentially dire consequences, which reflect just how dependant the world is on bovine products other than meat. For example, bovine products like fetal calf serum are essential for the manufacture of some important vaccines and other pharmaceuticals and BSE has cast a pall over their production and use. Furthermore, the BSE epidemic has compromised the supply of human blood. People resident in the UK during the peak years of the epidemic are not allowed to be blood donors. Whether there is any real risk remains to be seen.

Conclusions

BSE does not occur in Australia and the pathways for entry into Australia have been blocked. Given the consequences of the disease on the red meat industry and the balance between risk and consequence, the layered defences in place in Australia can be considered essential for the foreseeable future. Continuing risk assessment is necessary to make sure they remain adequate.

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