Baseline microbiological studies, seeking to take a “snapshot” of the quality or safety of product produced across the nation at a point in time, are a valuable adjunct to other sources of information on quality or safety of foods. They have been used by the Australian red meat industry as a point of reference, to promote trade, and as a starting point for further research.

Australia is amongst the world’s largest exporters of beef and sheep meat, exporting more than half of production with the total industry valued at over $10 billion. The Australian red meat industry has conducted four baseline surveys (beef and sheep meat) since 1995 through Meat & Livestock Australia, the industry’s research and development corporation. They are called a ‘baseline’ because they provide a baseline, or benchmark, against which the performance of individual processors, or the quality of individual samples may be judged. Baseline studies became prevalent in the USA in the 1990s, around the time of introduction of the pathogen reduction and Hazard Analysis Critical Control Point (HACCP) rules by the US Department of Agriculture.

Baseline studies provide an opportunity to examine meat for microorganisms not routinely examined. Routine testing includes Total Viable Count (same as Standard Plate Count, except that incubation is performed at 25°C for 4 days), E. coli and Salmonella. Baselines have provided the opportunity to survey for the prevalence and concentration of microbes that may be significant to food safety (such as Clostridium perfringens, Staphylococcus aureus) or are potential issues in trade (Listeria monocytogenes).

The type of sample collected has shifted in the most recent survey towards packed product. Previous surveys had always tested chilled carcasses; which is only part way through the process (carcases are subsequently cut into smaller pieces, or primals), but of great interest to veterinarians, and of importance in quality control. Reliable data for carcasses are now available for export establishments through the Department of Agriculture Fisheries and Forestry, which reduces the need to collect these data in a baseline survey. In the last survey, for the first time, primals were sampled, which represent the product that is exported, or often shipped to retailers in Australia, for final cutting.

Baseline studies of Australian red meat have demonstrated that Australian beef and sheep meat has a high level of microbiological

Having data that can be compared to those of major trading partners is one very good reason for conducting baseline studies. All over the world (including Australia) there is a continuing suspicion that imported food products are inferior to domestic product, so providing a comprehensive data set can allay those fears. In effect, a well-conducted baseline study provides validation that the entire system (for example, sourcing of animals, processing methods, quality assurance and regulatory oversight) is resulting in microbiological quality (and therefore, safety) that is acceptable to the importing country. These data should be accepted as a basis for determining that World Trade Organisation rules on technical barriers to trade are not being breached.

However, there is great difficulty in conducting a survey that is comparable to other surveys due to differences in design, sampling and testing methods. The approaches taken in these surveys have attempted to align with international approaches, but there is not always a consensus. There has been a high degree of consistency taken through the four Australian surveys but, for various reasons, there has been a change in the microorganisms examined, and in the most recent surveys, there has been a change in the products sampled.
quality and therefore, safety. There is a trend towards setting regulatory limits for microorganisms in food, especially for meat, and these studies provide valuable data for assessing risks, considering how control should be exerted, and how industry and regulators should use microbiological criteria to control processes.

Baselines have provided data sets that provide answers in other projects or suggest further research and development activities. The relationship between the counts of various indicators has been evaluated. The 2004 survey data were used as the basis for investigating differences in processing factors that contributed to high or low microbial counts on beef carcases, and a process assessment tool was developed to assist processors who wished to improve their process hygiene. The surveys for Campylobacter and Cl. perfringens in the 2004 survey were essential in assessing foodborne disease risks from beef and sheep meat products. The 2011 survey found that some indicators had deteriorated compared to the previous survey and investigations strongly suggested an association with rainfall – el Niño, la Niña, which needs to be further investigated.

Despite the complexity, and the expense, of conducting periodic baseline studies, the collection of data from well-designed surveys, provides tremendous value to trade, avoids complacency and provides an ability to respond to issues that may arise.

References

Biography
Ian Jenson holds a B.Sc. in Microbiology and Biotechnology and a M.Sc. in Bioprocess Engineering, both from University of New South Wales. He is a Fellow of the Australian Society for Microbiology and a Professional Member of the Australian Institute of Food Science and Technology. Ian has worked as a microbiologist and food safety specialist in the food and fermentation industries throughout his career, working for Australian companies with international operations and markets. He has experience in fermented dairy products, beverages and bakery products, as well as quality management, including systems, standards and process control. He has published widely in risk assessment, meat microbiological quality and risk management, as well as actively participating in international food safety activities.