



FOCUS ON FOOD SAFETY

by Prof Elna M Buys

Fulfilling expectations of abundant and safe food supply is a complex process involving plant cultivation, animal husbandry and natural-resource management, including manufacturing, distribution and retailing. These days, raw materials are sourced globally, an increasing number of processing technologies are used, and consumers are spoiled for choice with the range of products available. The consumer also now expects food to be convenient, fresher and less processed.

Ensuring the production of safe, high-quality food has necessitated the development of extensive food-safety assurance systems that should be implemented throughout the supply chain. We have been exploiting the beneficial properties of microorganisms in food production for thousands of years. Early societies discovered that bacteria and fungi, through fermentation processes, could be used to maintain a safe, long-lasting supply of foodstuffs such as cheese. Today, we consume probiotics and expect that they will have beneficial physiological effects through specific microbial actions. There is, however, also a dark side to food microbiology: the spread and evolution of food pathogens is a growing problem for product yield and consumer safety.

Traditional food safety

Traditionally, food safety and quality has been pursued with a reactive approach. Although these strategies have proved effective, their deficiencies in relation to microbial food safety have long been recognised. This, and the successful adoption of proactive HACCP strategies to ensure the safety of food for astronauts in the 1970s, was, however, insufficient to overcome reliance on the flawed strategies of product testing and random premises inspection in pursuit of safe food. Initially, there was resistance in accepting the HACCP principle, to some extent attributable to the resistance of the scientific community to accept the system.

It is difficult to understand the persistence to retrospective protection strategies over such a long time given their obvious limitations. One possible explanation that accumulating evidence was ignored was possibly because it was believed that good hygiene

“ In order to control the outbreaks of foodborne diseases, many countries regulated HACCP and subsequently implemented food safety management systems (FSMS). ”



IT PAYS TO PLAY SAFE



- Food management systems audits
- Food safety consultation
- Food safety documentation

THE DSA VISION

The vision of the DSA is to promote the improvement of the quality and safety of dairy products in the interest of the dairy industry and the consumer.

The DSA is a non-profit company of which the members are from the organised primary and secondary dairy industry, a national consumer organisation and a national voluntary organisation of dairy technical experts. The projects of the DSA are funded by Milk South Africa from levy income (statutory), in terms of regulations issued by the Minister of Agriculture, Forestry and Fisheries under the *Marketing of Agricultural Products Act*, non-statutory user pay projects and other organisations contributing to the DSA Dairy Quality Club.

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The Dairy Quality Club is a forum for suppliers who actively support the objectives of the DSA as an independent, objective institution.

practices were adequate, even though in various food sectors it had been shown that prevention of contamination alone was not sufficient in assuring safe food. The oldest evidence was from the dairy industry where all attempts to produce safe, raw milk had consistently failed.

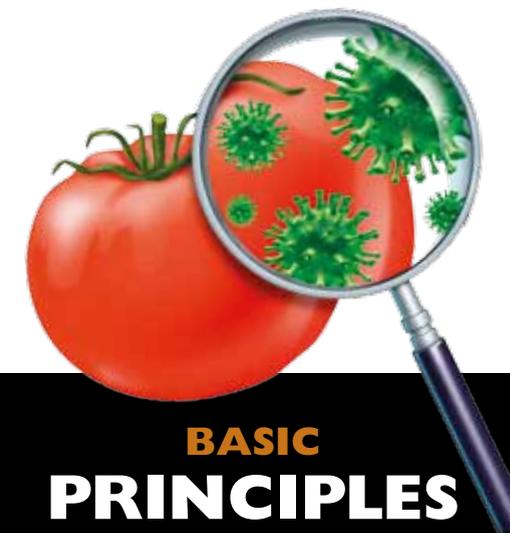
In 1990, four principles were set out that were presented as fundamental to providing safe food for the consumer:

- More rapid adoption of HACCP strategies throughout the entire food chain.
- Implementation of safety assurance measures should become the obligation of the producer at every stage in the industry.
- With a transfer of responsibility to the industry, the role of government agencies would contract to one of responsible verification.
- The consumer would take responsibility too, by seeking relevant information to ensure that safety measures introduced during production were not negated by their own actions.

In order to control the outbreaks of foodborne diseases, many countries regulated HACCP and subsequently implemented food safety management systems (FSMS). An FSMS can be defined as a company-specific system of control and assurance activities to realise and guarantee food safety. Introduction of a HACCP-based system eliminates the fluctuations in microbiological quality and safety intrinsic in uncontrolled practices. Several private quality assurance standards are available, such as ISO 22000 (ISO, 2005b), International Food Standard (IFS, 2007), Global Standard for Food Safety (BRC, 2008) and many others. These standards have been developed for the food processing industries. Once implemented, a company will be able to attain certification, which is mostly demanded by retailers.

The paradox

Microbes can enter the food chain at different stages, are highly versatile and can adapt to the environment allowing survival, growth and production of toxic compounds. Therefore, despite great awareness of food safety internationally, large food safety outbreaks in which microorganisms play a prominent role, continue.



BASIC PRINCIPLES

From my own experience in the South African food industry I have witnessed that there is great emphasis on the implementation of food safety standards. Typically, one could find a range of these implemented in a single processing factory, such as BRC and SANS 10330, as required by different retailers. Many companies have certified systems. As indicated internationally, the focus has been on the system side of the FSMS and there is generally a lack of focus on the underlying scientific food microbiology principles, both with implementation and during auditing. This is of great concern, as HACCP, which forms the core of these standards, is a system based on sound science which reflects on the concerns by scientists when HACCP was first put forward as a proactive food safety assurance system. My experience in the industry has led me to have concerns on the current understanding of the basic principles of food microbiology and safety and has also indicated a need for further education to discuss the latest food safety issues and scientific developments.

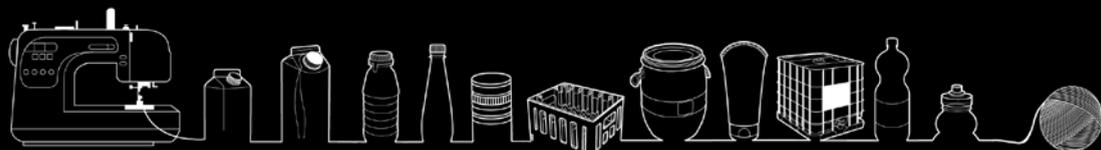
Estimates of the prevalence of foodborne diseases vary greatly, owing to large differences in data sources and surveillance systems. Nevertheless, there is agreement that foodborne disease is one of the principal causes of human morbidity. In industrialised nations, the percentage of people suffering from foodborne diseases each year has



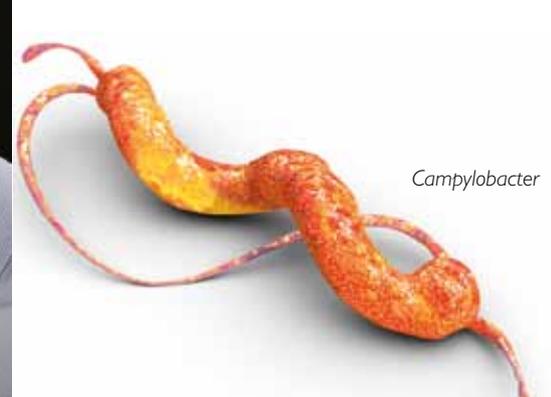
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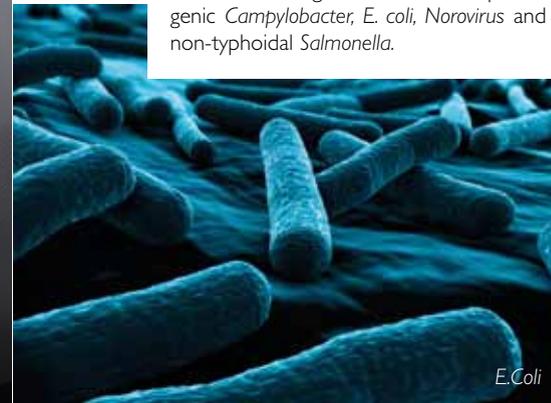


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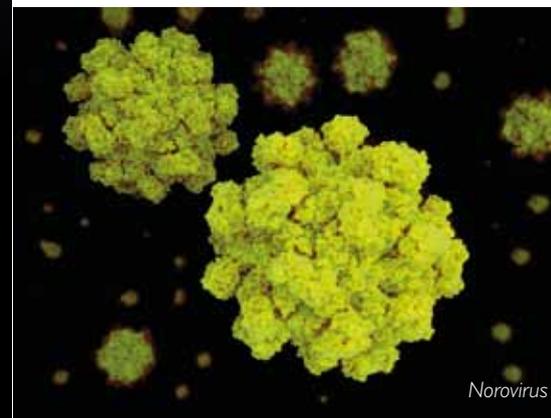


Campylobacter

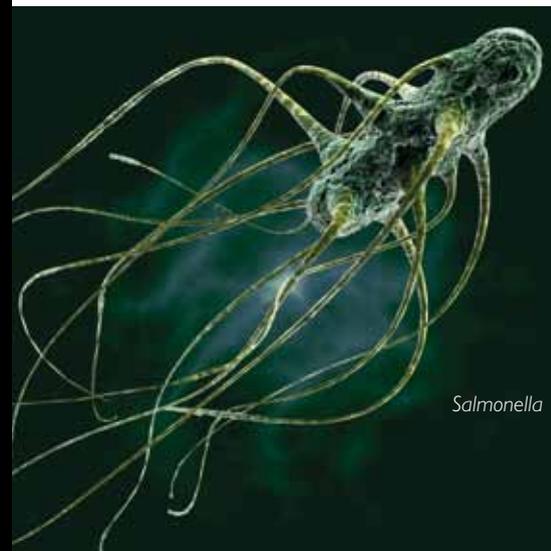
The most common pathogens responsible for foodborne gastroenteritis are pathogenic *Campylobacter*, *E. coli*, *Norovirus* and non-typhoidal *Salmonella*.



E.Coli



Norovirus



Salmonella

PROCESSING

been estimated to be up to 30%. The most common pathogens responsible for foodborne gastroenteritis are pathogenic *E. coli*, *Norovirus*, *Campylobacter* and non-typhoidal *Salmonella*. The rate of new diseases identified is increasing. In 1978, a new disease was identified every 10 to 15 years, in 1988 every eight to nine years and, today, a new disease is identified every 14 to 16 months.

TECHNOLOGY AND CONSUMPTION TRENDS THAT AFFECT MICROBIAL FOOD SAFETY

Factors that may be driving the increase in foodborne diseases:

- doubling of the global demand for food
- significantly increased consumption of certain high-value food commodities such as meat, poultry and fresh produce
- fewer geographical barriers to prevent the spreading of new variants
- the increased demand for convenience foods.

Factors that may contribute to a reduction in the foodborne disease burden:

- ability of governments to take effective regulatory measures
- development and use of new food safety technologies
- development of detection methods may increase the observed risk by the discovery of new pathogens or variants but will ultimately contribute to reduction.

The most important factor in reducing the burden of foodborne disease is our ability to detect and investigate a food safety issue and then to develop effective control measures.

PROF ELNA M BUYS is the head of the Department of Food Science at the University of Pretoria. Contact her at Elna.Buys@up.ac.za for more information relating to this article. **TDM**

