New Zealand Food Safety

Haumaru Kai Aotearoa

FOOD SAFETY

GOOD GOVERNANCE GUIDE FOR DIRECTORS, EXECUTIVES AND BUSINESS OWNERS

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FOREWORD

The safety of our food is critical. It is critical to the health of New Zealanders and to the viability of businesses dealing with food. New Zealand consumers, and consumers overseas, expect New Zealand food to be safe at all times, and food companies must be proactive in delivering on that expectation.

New Zealand has an enviable track record and reputation for food safety and food quality built up over many years, and our prosperity is tightly bound to maintaining this reputation.

A report into dairy industry capability (December 2015[1]) recognised that industry food safety capability is in good shape but that we must continue to work to ensure that our food safety capability remains world class. The report identified two principal areas of focus – developing food safety capability and capacity, and building food safety culture. If New Zealand is to retain and enhance its reputation for food safety, board leadership is essential. Boards of directors have a key role in leading food safety culture and capability.

This holds true for the New Zealand food industry generally, encompassing other primary products and broader food production, processing, retail, hospitality and food service sectors. Food safety is of paramount importance where our production, processing and export of food products are the basis of a productive, sustainable and inclusive economy.

This publication *Food Safety: Good Governance Guide for Directors*, *Executives and Business Owners* aims to provide foundation food safety material for directors and boards, and inform the first stage on the journey to best practice food safety.

I commend this guidance to you with the personal challenge, "What can I do to support excellence in food safety governance to ensure the safety of our consumers, and to sustain and grow our reputation in this vital area?"

Bryan Wilson, Head of New Zealand Food Safety,
Deputy Director-General, Ministry for Primary Industries, Regulation and Assurance

"A thriving food industry underpins New Zealand's economy and our future prosperity. Food safety is critical to trust and confidence in our products and services. Boards and directors have a key role in driving excellence in food safety governance to ensure the long term sustainability of their organisations and industries. I encourage directors to make sure food safety is on the board agenda and to use this guide to help ensure we raise food safety standards in New Zealand".

Liz Coutts ONZM, CFInstD, President, Institute of Directors

1 Dairy Capability Working Group (2015) *It's our future: building food safety capability in the dairy sector.* Dairy Capability Working Group, commissioned by the Director-General of the Ministry for Primary Industries; Wellington. www.foodsafety.govt.nz/elibrary/industry/dairy-capability-working-group-report.htm. Accessed 10 October 2018.

INTRODUCTION

Food safety has always been important for New Zealand's food producers, manufacturers and marketers. Our consumers have a legitimate expectation that our food is safe, and our local and international reputations depend upon excellence in food safety outcomes. We have an enviable reputation and track record, features that we must protect, nurture and enhance.

Food safety, similar to workplace health and safety, is now a business essential. Once seen as a cost burden, the reality is that the cost of having unsafe food is greater.

Food safety failures can be costly in terms of direct costs, such as lost production time and product recalls, but other costs such as loss of business focus, reputation and consumer trust can weigh more heavily. Collectively, they can lead to company failure. The efficient response is to develop organisation-wide systems and organisational culture that can recognise, evaluate and prevent or mitigate these issues. Done well – food safety can lead to a competitive advantage. Done poorly – it is a disaster waiting to happen.

The business environment in which the food sector operates is changing. The Animal Products Act 1999[2] (APA) and more recent Food Act 2014[3] have moved from prescription-based to risk-based legislation, and now companies are required to set out and implement their strategies for achieving safe food.

The legislation also applies to many hospitality, institutional and food service businesses, including tourism and travel operators where food is prepared and sold.

Other changes, such as evolving international market requirements, improving analytical technology and testing sensitivities and the recognition of new hazards, are affecting food safety risk profiles. In response, leading food companies are continually building and developing food safety capability to keep pace with change and to remain competitive.

The ground is shifting. Food safety expectations continue to grow, food supply chains are becoming longer and more complex. There is an increasing array of food products with ingredients not thought of a decade ago and food safety incidents quickly attract international attention. And there is the shadow of difficult-to-predict, malicious behaviour targeting foods.

The changed market environment and increased legal responsibilities mean that boards of directors must also increase their collective and individual oversight of food safety in their company.

This document will help directors to understand the importance of food safety governance, their responsibilities and role in assuring food safety performance. It will also discuss the tools to monitor and verify food safety system performance; the essentials of good food safety governance. This document, while largely written for directors and boards, is equally relevant to senior executives and business owners in the wider food industry.

This guidance document is set out in two parts.

Part I: **Food safety – the board's role** – sets out the case for food safety governance, the legislative requirements, and the leadership role that boards of directors must play in the governance of food safety.

Part II: **a Director's briefcase** – includes a director's food safety checklist, sets out the legal environment, key roles in food safety regulation, what comprises a food safety system, examples of food safety performance measures, and an introduction to food safety risk.

2 Animal Products Act 1999. www.legislation.govt.nz/act/public/1999/0093/105.0/DLM33502.html. Accessed 10 October 2018.

3 Food Act 2014. www.legislation.govt.nz/act/public/2014/0032/75.0/DLM2995811.html. Accessed 10 October 2018.

PART I: FOOD SAFETY – THE BOARD'S ROLE

Food safety – the issues and the risks

Why is food safety an issue today?

Food safety has always been an important issue, but similar to workplace health and safety its profile is growing. Assuring food safety, has become more complex with new consumer-ready products being sold in many new international markets, new production technologies, lengthening supply chains, multiplicity of ingredients and suppliers, and growing potential for malicious behaviour. The immediacy of media and social media mean that a local incident can become global overnight.

Company reputations can be quickly damaged by a food safety incident, and restoring reputation and trust in the marketplace can be a lengthy and costly task. Food safety, once the domain of technical and production functions, has become a company-wide, end-to-end business responsibility and consequently must become part of board oversight of company activities and performance.

Positives arising from excellence in food safety

While the headlines may focus on a few high profile food safety events, the New Zealand food industry has a sound history of producing and marketing safe foods. Safe food and our known food safety systems are part of the New Zealand story – a competitive advantage – and this brings many opportunities for international trade. It also allows New Zealand to work cooperatively with its many customers and efficiently resolve any issues that arise.

What do we mean by unsafe food?

Changes in our food supply and lifestyle have led to a broader range of causes for, and consequences of, unsafe food. Unsafe food takes many forms but is generally recognised as food where a biological, chemical or physical hazard is present and where that hazard could lead to an adverse health effect. Biological hazards include microbiological contamination such as pathogenic bacteria (e.g. *Salmonella*), fungi or naturally occurring toxins (e.g. tutin or marine biotoxins) and parasites. Chemical hazards include naturally occurring food allergens (e.g. peanut, milk), chemical contaminants and undeclared food additives or introduced contaminants such as agricultural residues.

Physical hazards include foreign matter such as glass or metal.

For an unsafe food to cause illness or an adverse health effect there must be **exposure** to the hazard, usually through consumption of the food, **sufficient to cause an adverse effect**. Conversely, where the hazard is present at non-significant levels and/or the food consumption is low, adverse effects are less likely.

RISK

The combination of hazard and exposure to the hazard is called risk. Without exposure, a hazard remains a hazard.

For example, in summer, midday sun is a hazard, but if you stay inside and there is no exposure, it is not a risk.
(Refer to page 25 for more on risk).

Food safety – a risk that can bring lasting harm to consumers and families

Foodborne illness or adverse health effects can cause lasting harm to consumers and to families. There are many local and international incidents that have resulted in serious harm, some leading to fatalities.

In 2008, melamine adulteration of infant foods in China resulted in more than 50,000 children being

hospitalised and six deaths.[4] Many children who were hospitalised face ongoing medical care. In Australia, in 2012–2013 *Listeria* contamination in cheese was linked to three deaths.[5]

In New Zealand (July 2012) *Listeria* contamination of food supplied to a hospital was linked to two deaths and two other people were affected.[6]

Food allergen incidents can occur rapidly and without warning, and have resulted in several deaths in Australia and New Zealand over the last decade[7].

Food safety – a risk that can bring lasting damage to companies

Food safety incidents can also bring lasting damage to companies. Recalls, legal proceedings, penalties and the ensuing publicity can result in loss of earnings, loss of reputation and loss of consumer trust in brands or local authorities. There are many instances around the world where food safety failures have led to business failure.

The New Zealand *Campylobacter* contamination of a town water supply (2016)[8] resulted in large numbers of residents seeking medical attention, loss of trust in local authorities and worldwide media attention. (Not strictly classed as a food safety event, drinking water is covered under the Health Act 1956 and the Health (Drinking Water) Amendment Act).

SANLU

This milk powder contamination scandal caused 290,000 consumers to be affected around the world, more than 50,000 hospitalisations and six deaths in China. (Jiani Yan, Lincoln University, 2011.)

In Australia in 2015, frozen berries were linked to hepatitis A contamination, and the brand was discontinued soon after the incident.[9]

The melamine incident in China resulted in bankruptcy and business failure of Sanlu.

The fallout from food safety incidents is not readily contained and can have flow on effect on other operators in a particular sector, and more broadly a whole industry or country. This was demonstrated in an outbreak of pathogenic *E. coli* in bean sprouts in Europe (summer 2011) which resulted in more than 3,000 infections and 50 deaths. The health, social and economic consequences were tragic to those people affected.

Following this event, there was a significant loss in confidence in the supply of perishable foods and consequential economic loss to the food service sector and producers in that region.[10]

The manner in which companies respond can play a significant role in public and consumer perception. Company responses and responsiveness can result in reputations being enhanced, or severely damaged in the event of a food safety crisis. The first 24 hours are critical in this regard.

4 Yan, J (2011) *Fonterra in the San Lu milk scandal – a case study of a New Zealand company in a product-harm crisis*. Dissertation; Lincoln University, Canterbury. http://researcharchive.lincoln.ac.nz/handle/10182/4200. Accessed 10 October 2018.

5 ABC News (11 February 2013) Third listeria death linked to Jindi cheese. www.abc.net.au/news/2013-02-10/third-death-linked-to-cheese/4510440. Accessed 10 October 2018.

6 Stuff (26 June 2015) Napier company guilty of supplying Listeria-infected meat to hospital. www.stuff.co.nz/dominion-post/news/69728964/napier-company-guilty-of-supplying-%20Listeriainfected-meat-to-hospital. Accessed 10 October 2018.

7 Stuff (1 June 2009) Man dies after restaurant meal. www.stuff.co.nz/national/2457419/Man-dies-after-restaurant-meal. Accessed 10 October 2018.

8 TVNZ OneNews (20 August 2016) Hastings, Flaxmere water supply found contaminated as infections rise. https://www.tvnz.co.nz/one-news/new-zealand/hastings-flaxmere-water-supply-found-contaminated-infections-rise. Accessed 10 October 2018.

9 ABC News (8 December 2015) Patties Foods takes first steps to drop its frozen fruit brands after Hepatitis A berry scandal hits profits. www.abc.net.au/news/rural/rural-news/2015-12-07/patties-foods-drops-creative-brands-berries/7006966. Accessed 10 October 2018.

10 Burger, R (2012) EHEC O104:H4 in Germany 2011: Large outbreak of bloody diarrhea and haemolytic uraemic syndrome by shiga toxin–producing *E. coli* via contaminated food. *Institute of Medicine (US). Improving food safety through a one health approach: workshop summary*. National Academies Press (US); Washington, DC. www.ncbi.nlm.nih.gov/books/NBK114499/. Accessed 10 October 2018.

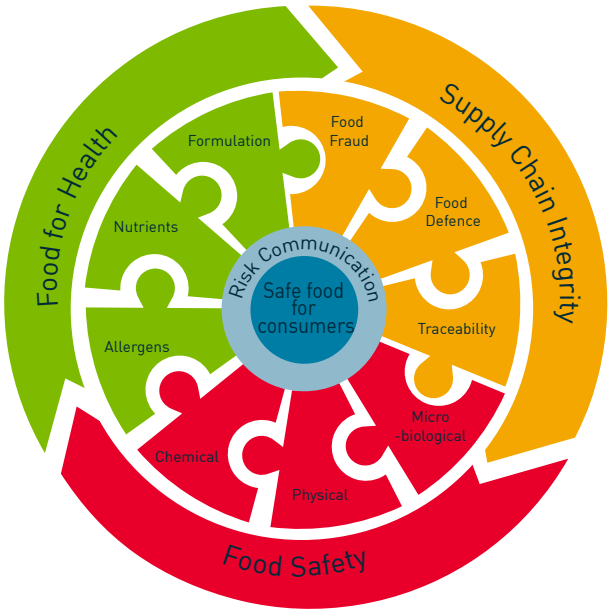
A recall can be one step away from a serious food safety event

Recalling food is one way of reducing risk, through reducing consumers' exposure to the hazard. Recalls are "after the fact" and consumers may have already been exposed to harm.

Each food safety event has the potential to cause serious harm to consumers. In 2016 there were 25 food recalls in New Zealand, with undeclared allergens and microbiological contamination being the leading causes. Efficient recalls are dependent on good traceability and usually a high percentage of foods being recalled are removed from the market, thereby avoiding further consumer harm. But recalls are not always 100 percent effective and there is always an elevated risk to consumers until the recall is completed.

During a recall, the company's reputation is at risk and crisis management and communications processes during this event are critical in protecting consumers, and in protecting the business. This is a high risk situation for the business – a situation that boards should consider as a key risk and develop risk management strategies accordingly.

Figure 1. Food safety model: Producing safe food and protecting consumers



REASONS FOR FOOD RECALLS IN NEW ZEALAND 2016 (25 RECALLS)

10 undeclared allergen

10 microbiological (pathogens)

4 foreign matter

1 unapproved processing aid

Source: MPI website

Findings from the dairy industry capability study

The Dairy Capability Working Group was charged with assessing current and future food safety capability needs across the dairy value chain and making recommendations to ensure that those needs are fully met.

The Dairy Capability Working Group reported back in December 2015. The study concluded that the best companies:

- put **consumers** at the centre of food safety;
- recognise and lead **culture** as a key determinant of food safety;
- **separate** food safety decisions from the commercial imperative;
  know how to respond to difficult decisions – the **"grey area"**;
- know that with the right culture in place – the **right decisions** get made;

and recognise that:

- food safety continues to **evolve** – from HACCP to risk management programmes, to food security and now food defence.

It is MPI's view that these findings can be applied to the other primary products and broader food industries in New Zealand.

New Zealand legislation

New Zealand's food industry is primarily governed by the APA (primary industry focus) and the Food Act 2014 (focused on food for sale), along with secondary legislation including food standards, orders in council, regulations and notices issued under those Acts. There are also food safety provisions in industry specific legislation including the Wine Act 2003 and the

Agricultural Compounds and Veterinary Medicines Act 1997.

Legal obligations under the APA are:

- to produce and sell foods that are fit for intended purpose;
- to develop, register and operate an end-to-end or through-chain RMP, and have it independently verified.

Legal obligations under the Food Act 2014 are similar:

- to produce and sell foods that are safe and suitable;
- to develop and use risk-based measures (usually a Food Control Plan (FCP) or National Programme) to ensure food is safe and suitable. Where larger, complex food businesses choose to develop and operate an end-to-end or through-chain FCP that plan must be registered and independently verified.

Penalties under the APA and Food Act can be up to $500,000 for a company and up to $100,000 and five years imprisonment for individuals, including executives and directors.

Directors' liability

Under the APA and Food Act, directors and senior managers can be held to account for failures in food safety, such as a product safety event that has caused harm, or failure to meet requirements of the Acts. Further detail can be found in Part 2 of this document.

Figure 2. Governance model

OBLIGATION AND ACCOUNTABILITY

Unsafe food is bad for consumers and bad for business.

As food producers, we are morally, ethically and legally obliged to produce and sell safe food, always. Obligations fall on the body corporate and extend to directors and senior management.

Directors and executives may face legal action following a serious food safety event. Penalties under the APA and Food Act can be up to $500,000 for a company and up to $100,000 and five years imprisonment for individuals, including Directors.

The food safety governance model (Figure 3, page 8) describes how boards of directors can take an active and productive role in assuring food safety in their company.

Governance, risk and its relationship with food safety

Risk is one of the key matters that boards of directors are required to address (refer to Figure 2).

The New Zealand Institute of Directors publication *The Four Pillars of Governance Best Practice 2017* identifies both culture and risk management as a key focus for board. [11] It defines risk management as a process of identifying and prioritising risk, establishing a risk management plan and monitoring implementation. It also notes the importance of a culture that values ethical behaviour.

The purpose of food safety risk management is to protect consumers (and users) of food products through identifying and managing risk. This will be familiar to directors because risk and risk management is a core activity of boards. Risk just comes in different forms.

11 Institute of Directors in New Zealand (2017) *The four pillars of governance best practice*. www.iod.org.nz/FourPillars. Accessed 10 October 2018.

Food safety has its own language and methodologies.

- Food safety risk is present when a foodborne **hazard** (biological, chemical or physical) is combined with **exposure** to the hazard, usually through consumption of food containing the hazard.
- Current legislation and industry best practice require that risk-based measures are developed to ensure food is safe and suitable or fit for purpose, in which:
  - food safety risks are assessed and controls developed using a structured process HACCP, and that controls are implemented and records are maintained;
  - the HACCP process is applied through-chain,that is, throughout all operations that can impact directly and indirectly on product safety;
  - systems effectiveness is verified. Auditing is part of that process.
- A wide array of technical, social and environmental factors can affect risk. Risk is ever **evolving** and food safety systems must be refreshed on a regular basis.

Food safety governance: Assuring that food safety risks are identified, understood and controlled, and that this occurs within in a supportive organisational culture.

- The best RMPs or FCPs take a **broader approach** where as well as product manufacture and supply chain processes, key relevant activities in business support functions such as sales and marketing, research and development, human resources management and finance are also considered as valuable contributors to food safety, and are brought into the risk-based programme.
- Food production and processing is inherently **variable**. Raw materials vary, climatic conditions vary in turn influencing processing conditions. Product specifications vary, staff responses may vary, and so on. Producing safe and consistent product is an ongoing challenge to staff, processing equipment and to food safety systems. Design of control systems must recognise and cater for that inherent variability.
- A **culture** supportive of food safety is an essential element of sustainable food safety where "being proactive about food safety is the way we do things around here!" The board has an important role in leading food safety culture.

Introducing the food safety governance model

A food safety governance model (Figure 3) has been developed to help boards in their food safety activities. In this model, the board has two principal roles in governance of food safety.

The **first** role is that of creating the right environment in which food safety can operate successfully. The **second** is that of holding management to account for implementation of

Figure 3. Food safety governance model

the food safety system.

Creating the food safety environment

Directors have the responsibility to create the right environment through **committing** to food safety governance, and **leading** food safety culture. These are the foundations of food safety governance and there must be clearly articulated expectations of directors and management, and of system performance outcomes.

Holding management to account – exercising due diligence

In holding management to account, directors are required to assure that risk is actively assessed and managed and that system design and company performance is satisfactory.

These two principal roles have been developed further as an expanded food safety governance model presented in Figure 4.

Step 1 – Commit to food safety governance – sets the policy foundation or framework for food safety governance in the food business.

Step 2 – Lead food safety culture – is about creating a supportive environment, one in which food safety can become part of the company "DNA".

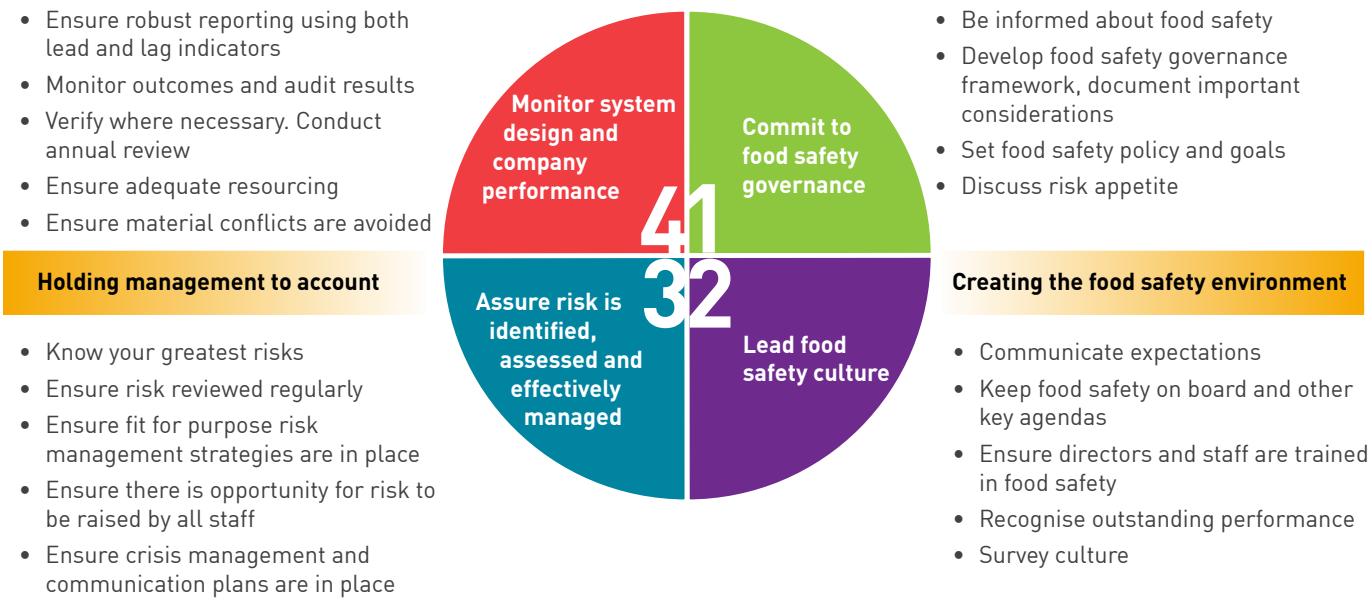
Step 3 – Assure food safety risk is identified, assessed and managed – covers the practical steps required to assure that risk is being assessed and mitigation or management measures are developed and applied to reduce risk. Risk is always evolving and it is essential that directors recognise the need for regular review of risk to ensure that the risk-based measures are maintaining pace with change.

Step 4 – Monitor system design and performance – comprises the ongoing processes of assuring that the system design is fit for purpose and that the food safety system is responsive to the information and data generated from the risk management activities.

Cyclic activity – The food safety governance cycle should be continued as boards and companies seek continual improvement in food safety governance and outcomes and respond to changing business conditions.

In the following pages, the 4 step food safety governance model (refer Figure 4) is expanded to provide more detail for directors to consider.

Figure 4. Food safety governance model (expanded)



STEP 1: COMMIT TO FOOD SAFETY GOVERNANCE

Commitment can be demonstrated through:

- ensuring directors are informed about food safety;
- including food safety in the Board Charter;
- considering food safety from a consumer's perspective and potential impacts on health and wellbeing in personal and family settings;
- developing a food safety governance framework that provides a template and guidance for directors in discharging their food safety responsibilities, including "turning one's mind to matters of food safety" and documenting outcomes;
- preparing business-wide food safety policy and goals, and setting clear expectations such as progress in implementing food safety programmes, audit results and company food safety culture.

Commitment can be reinforced by the board by:

- having food safety as a standing item on the important **agendas** with consumer focus in mind;
- expecting **constancy** from senior management in handling food safety matters;
- understanding the **appetite for risk** (e.g. what will we never do; what will we always do, how do we want the difficult issues to be handled such as the "grey zone" where product is only "just outside" or "just inside" the rules). While management will make the calls in most cases, directors should be aware of the importance and nature of these important decisions, and the risk being taken on their behalf;
- **holding management to account** for implementing food safety strategy and driving food safety implementation and improvement initiatives;
- ensuring organisational **strategy** and **capital programmes** include initiatives that can improve food safety outcomes; and
- **communicating** commitment widely to staff.

QUICK QUIZ

Q1. Do I feel conversant with food safety principles and current issues?

Q2. Do I feel confident in discussing food safety matters with management, staff, auditors?

Q3. Is there adequate reporting on food safety matters?

STEP 2: LEAD FOOD SAFETY CULTURE

Leading food safety culture is a critical element of creating the right environment for food safety.

Culture is the underlying set of values and beliefs that underpin everyday behaviours and decisions.

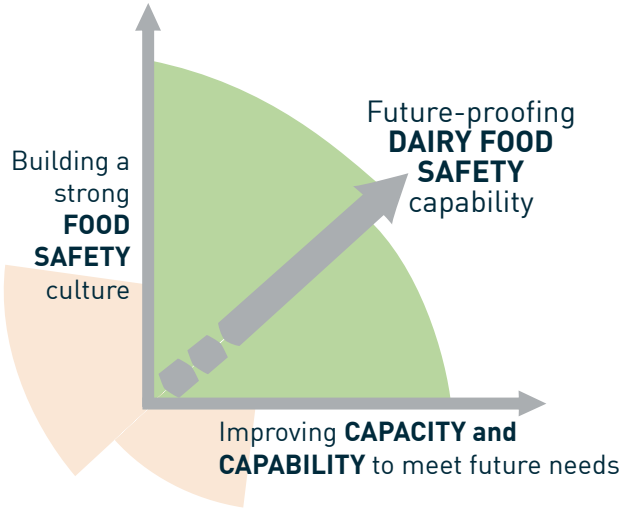
It is recognised that directors can have a profound influence on culture and this is fundamental to how food safety is perceived and addressed within companies. The dairy industry capability study was clear – that culture is a critical element of the food safety system, and directors have a clear and direct role in leading food safety culture.

Having the right culture and training means that directors and management can have confidence that the right decisions will be made at all times, in all aspects of company operations, essential in a 24/7 operational environment. Yiannas[12] makes it clear that **food safety = behaviour** – and that leadership should focus on behaviour in leading food safety culture.

Figure 5 from the dairy industry capability report shows the relationship between a strong food safety culture and improving food safety capacity and capability leads to future-proofing overall food safety capability.

12 Yiannas, F (2010) *Food safety culture: creating a behavior-based food safety management system.* Springer; New York.

Figure 5. Dairy food safety capability, preparing for the future



Food safety culture relies on strong and consistent role modelling including unequivocal support for food safety and constancy of decision making – throughout the organisation – top to bottom – side to side.

The food safety **Charter**, statement of expectations and policy are the foundations of food safety culture. Once these have been set, directors can **lead food safety culture** through:

- expecting unequivocal support for food safety and requiring adherence to the food safety system;

enabled by:

- ensuring all directors and staff are inducted, trained and regularly updated in food safety;
- expecting constancy of food safety decisions, and constancy of messaging from the board and senior management;
- keeping food safety on the agenda, "walking the talk" at all levels and all occasions e.g. board meetings, site visits, customer visits. When directors engage with staff, suppliers and vendors on matters of food safety it provides a tangible recognition and reinforcement of its importance;
- ensuring culture is assessed on a regular basis, and results acted upon; and
- where outstanding food safety performance is found, it is recognised and celebrated.

FOOD SAFETY CULTURE

Food safety culture can be described as an alignment of values and behaviours with respect to food safety, from senior management through to front-line staff. Food safety culture is led from the top and driven down throughout the organisation. A strong food safety culture is supported through collaborative partnerships across the sector including regulators, industry, education organisations, research institutes and consumers. (Source: Dairy Industry Capability 2015).

STEP 3: ASSURE FOOD SAFETY RISK IS IDENTIFIED, ASSESSED AND EFFECTIVELY MANAGED

As a board, this step is about holding management to account for designing and implementing the food safety system, assuring that the food safety system design is fit for purpose and that your company's food safety risks are controlled and managed.

A working knowledge of food safety principles and practices is valuable in providing directors with the understanding to evaluate and contribute to effective food safety governance discussions.

Boards can achieve this by:

- members acquiring and updating their knowledge of food safety practice;
- knowing the company's greatest risk(s). Boards should keep key risks in focus and a risk "heat map"[13] can be useful in representing relative risk;
- including key food safety risks on the company risk register;
- ensuring fit for purpose processes are in place and operating for the business to assess, manage and report on food safety risk and events;
- ensuring a framework is in place for matters relating to risk to be raised and addressed including considering a secure, independent channel for staff participation;
- ensuring a regular review of risk is conducted, that is, recognising that risk changes and asking what new risks are emerging or have emerged?
- assuring that incident and crisis response and communications plans are prepared and rehearsed;
- asking questions such as "has the possibility of malicious attack been considered?" or "has the entire supply chain been considered?".

Risk can occur in any stage of the company's operations and risk identification, assessment and management processes should be applied throughout the organisation where there can be an impact on food safety. While much of the obvious risk can be assigned to manufacturing and operations, food safety risk can be found and mitigated elsewhere.

For example, sales and marketing risks can arise from tight production scheduling and new product-market introduction. Supply chain risk can arise from improper storage conditions or lapses in security of product control and product data.

Similarly human resource activities, including recruitment, training, leadership and development, can all play a role in food safety risk management capability development and decision making.

Additional material in the Director's Briefcase section in Part 2 (see page 16) cof this guidance provides information on food safety system design and scope.

13 Chartered Global Management Accountant (11 June 2013) *Risk heat map*. www.cgma.org/resources/tools/essential-tools/risk-heat-maps.html. Accessed 10 October 2018.

QUICK QUIZ

Q4. Do I know and understand our greatest risk(s) and our new and emerging risks?

Q5. Are they included in the risk register?

Q6. Have we considered risk arising from malicious behaviour, that is, consideration of food defence?

STEP 4: MONITOR SYSTEM DESIGN AND COMPANY PERFORMANCE

This step has two main elements. The first element is ensuring that the food safety system is able to **function and perform as designed**, and there are no obvious or material conflicts. Boards may consider the following:

- Ensure the Chief Executive role specification and performance measures include food safety, and encourage food safety to be considered ahead of production imperatives.
- Recognise and address possible conflict between food safety outcomes and production output measures in executive performance incentives.
- Consider food safety responsibility and reporting lines. Does food safety information get to the right level and place, in time? Does food safety have a voice? Are reporting lines conflicted?
- Ensure system capacity is balanced with current (and evolving) requirements. There may be imbalance between food safety demands and system capacity e.g. when significant food safety issues call upon additional product sampling and testing, raising and investigation of non-conformance reports. Unrelenting overload can lead to errors and may be an indicator of core process capability deficiencies.
- Have audit findings been considered and incorporated in refreshed risk management procedures?

The second element is that of **monitoring system outcomes** and assuring the system is effectively managing food safety throughout the business. Boards will be focused on exception reporting, and should be clear in what reporting they would like to see. Suggestions regarding scope are listed below, and further examples are given in the Directors Briefcase (page 16).

- Ensure performance management reporting includes food safety system reporting using both lead (capacity building) and lag (performance or outcome) indicators such as:
  - meeting legislated requirements set down in the APA and Food Act;
  - building company-wide food safety capability, including culture, to reduce risk;
  - involving all aspects of the business essential for embedding food safety throughout the business;
  - reviewing company RMP performance such as serious non-conformances and the remedial action taken;
  - reviewing the number of serious non conformances outstanding and why.
- Review outcomes from third party and customer audit activities – ensure these have been actioned, and that they are reflected in an updated RMP or FCP.
- Recognise that risk profiles change as company activities and food safety techniques and requirements change. Ensure that there is:
  - regular review of system effectiveness; and
  - periodic system refreshment.

QUICK QUIZ

Q7. Do performance measures incentivise food safety?

Q8. How often does the board hear from the senior food safety manager?

Q9. Is the business constantly under pressure with food safety issues?

In discharging their duty of care, directors should take the opportunity to "verify" what is being reported on key matters.

- Verify through taking a "deep dive" into a small number of specific important issues, asking for verbal reports or more information, to ensure adequate analysis and response has taken place.

Review and reset goals

It is recommended that periodic review and resetting of goals is undertaken as normal practice. This then renews the governance cycle and is the opportunity to refresh all elements of the food safety governance model.

Reviewing capacity to respond to a food safety event

The way in which a business responds to a food safety event has a major influence on how the event affects the company. Companies that have prepared effective crisis response and communications plans and have tested or rehearsed these plans periodically are better prepared if, and when, a food safety event occurs.

Where consumer health and safety concerns are present, the initial decisions and communications are critical. Informing consumers is vital. Media enquiries become immediate and urgent. Social media can trend within minutes. It is essential that media spokespersons (directors and executives) are trained for such events.

While typical product recalls can be rehearsed, not all scenarios can be planned for. Infrequent, high impact events, sometimes termed "Black Swan" events, can be overwhelming (see box). Building generic capability to respond is highly beneficial.

Boards should review response capacity as part of their performance monitoring activities.

BLACK SWAN EVENT

A low-frequency, high-impact event that can cause significant damage, e.g. food safety events. Not all Black Swan events can be prepared for, but critical response capability can be developed, e.g. crisis response and communication plans. In the absence of an effective response plan, damage to product brand equity, consumer trust and reputation can build rapidly.

QUICK QUIZ

Q10. Have we rehearsed our crisis management and communications plans?

Q11. Can we provide initial media response within 1 hour or less?

Q12. Are we able to monitor and use all media channels?

PUTTING IT ALL TOGETHER

The food safety governance model has two principal roles for boards of directors.

The first is **creating the right environment** in which food safety can operate successfully. Directors have the responsibility to create the right environment through committing to food safety governance and leading food safety culture. These are the foundations of food safety governance and must be clearly documented, detailing expectations of directors and of management.

The second role is that of **holding management to account** for implementation of the food strategy and food safety system. In holding management to account, directors are required to ensure that risk is proactively assessed and managed and that system design and company performance is satisfactory. In doing so, directors should understand the status of food safety in the company, key issues and actions being taken to resolve them.

If directors are uncertain or dissatisfied with current performance or trends in food safety performance, they should engage constructively and delve further to ensure that appropriate action is taken. In doing so Directors ensure they discharge their duty of due diligence. As with any significant area of risk or exposure, external advice may be helpful if these concerns are not able to be resolved.

Use of a director's checklist

There is a substantial amount of information and subject matter for questions in the preceding material. A director's checklist has been prepared to help directors and boards. This can be found on page 16.

Food safety – an Institute of Directors perspective

The following points have been adapted from the joint Worksafe NZ and Institute of Directors publication *Health and Safety Guide: Good Governance for Directors*.[14] The points have been adapted, with permission, to the subject of food safety:

- Be **proactive** and actively engage in food safety matters (for example, by understanding the business and the associated hazards and risks).
- Be **informed and involved** with regard to food safety risks – bear in mind that risk changes as the business changes.
- Ensure there is **robust reporting** on food safety issues, audit outcomes and investigations, and that action is taken.
- **Trust, but verify.** Check systems are operating the way intended.
- Ensure there are **appropriate resources** and processes for dealing with food safety and that there are staff participation practices in place.
- **Refresh** board food safety governance **training** regularly.
- Ensure food safety is **on the agenda** at board, audit and risk sub-committee level.

Final points

Food safety – similar to Workplace Health and Safety – is an investment in Enterprise Risk Management, leading to:

- protecting the health and safety of your customers and consumers;
- protecting and building your business reputation and brand value;
- ensuring the ongoing success and enterprise value of your business;
- performing your duties as a director; and
- sustaining the reputation and commercial success of NZ Inc.

14 Institute of Directors in New Zealand and WorkSafe New Zealand (2016) *Health and safety guide: good governance for directors*. www.iod.org.nz/healthandsafety. Accessed 10 October 2018.

PART 2: DIRECTOR'S BRIEFCASE

This section comprises information and support tools that may be helpful when developing food governance capacity:

- Director's checklist;
- the legal environment;
- key roles in food safety regulation;
- what the food safety system comprises;
- examples of food safety performance measures;
- introduction to food safety risk;
- principles and examples of HACCP;
- food defence;
- glossary of terms;
- references.

DIRECTOR'S CHECKLIST

1. Commit to food safety governance

- Do I understand my food safety obligations and liabilities?
- Do I have sufficient understanding about food safety basics and the risk management programme (RMP) and food control plan (FCP) structure to enable informed and productive engagement?
- Is food safety in the Board Charter and are expectations established. Are these known by all staff?
- Is food safety a standing item on our board agenda, and is there true engagement about issues, performance, capacity building? How do we listen to customer feedback including audits?
- Does food safety feature in our strategy and capital works programme?

Policy and goals

- Is there a company food safety policy and are goals established? Are these known by all staff?
- Has the board discussed risk appetite? Has the executive team been involved?

Documentation

- Do our board minutes reflect our commitment to, and consideration of, food safety?

2. Lead food safety culture

- How confident am I about the depth and breadth of commitment to food safety in our company?
- How does food safety fare when difficult decisions have to be made?
- When I do site visits, does food safety come up in discussion? Do I feel confident to raise it?
- Do we assess food safety culture through a staff survey? Are we acting on the findings?
- What is the status on food safety training across the business?

3. Assure risk is assessed and managed

- Do I understand our key food safety risks? Does the Risk Register include food safety risk?
- Has there been a review of food safety risk recently? Does it reflect changes in risk profile?

- Am I assured that there are adequate business-wide food safety management processes, controls and reporting in place?
- Does food safety involvement extend across the whole business? Have we considered upstream and downstream activities provided by other parties?
- Have incident and crisis response and communication plans been prepared and rehearsed?
- Does the communication plan identify who can say what? Is there a back-up spokesperson?

4. Monitor system design and performance

Design

- Does the senior food safety manager have ready access to the Chief Executive Officer (CEO)?
- Has the senior food safety manager reported to the board recently?
- Does food safety have a place in CEO performance incentives? Is there conflict between food safety and other performance measures?
- Is system capacity balanced with requirements?
- How do we address tension between food safety and other objectives e.g. production throughput, sales and marketing or research and development?
- Have we thought about malicious or criminal attacks on our business?

Performance

- Is reporting balanced with a mix of lead and lag indicators coupled with performance reporting on specific matters?
- Do I have a clear picture of our food safety status and issues, and how they are being handled?
- Have we considered benchmarking our performance?
- Do I know what types of food safety decisions will be referred to the board?
- How are we performing in verification and customer audits? Are we learning from them?

Incident and crisis response

- Has our crisis management and communications plan been rehearsed recently?
  - — Did we learn from it?
  - — Was it truly testing?
  - — Were there independent observers?
- Am I confident that our media response will be appropriate? Do we have a trained alternate if the primary media person is unavailable?

Types of food safety decisions that the board may consider

- Setting the board Charter food safety statement.
- Setting food safety expectations including culture and key performance measures.
- Contributing to food safety policy.
- Setting risk appetite for food safety:
  - — things that we will always do;
  - — things we will never do; and
  - — a process where issues are not clear cut – the "grey areas".
- Reviewing food safety situations where decisions are not clearly covered by the risk appetite statement.
- Setting strategy with respect to food safety.
- Authorising and approving capital investment and major maintenance decisions where food safety is a decision factor.

THE FOOD SAFETY LEGAL ENVIRONMENT

New Zealand's food safety legislation is set out primarily in two Acts, the Animal Products Act 1999 (APA) (primary industry focus) and the Food Act 2014 (focused on food for sale), along with secondary legislation including food standards, orders in council, regulations and notices issued under those Acts. There is also supporting guidance such as codes of practice.

There are also food safety provisions in industry specific legislation including the Wine Act 2003 and the Agricultural Compounds and Veterinary Medicines Act 1997.

The Acts are similar in that they require companies to develop and use risk-based measures to ensure where foods are produced and sold they are "fit for purpose" (APA) or "safe and suitable" (Food Act).

The Ministry for Primary Industries (MPI) administers these Acts including implementation and enforcement.

In the following paragraphs a number of excerpts have been taken from the Acts to illustrate their requirements. As excerpts they are incomplete and are not intended to interpret or summarise the Act(s). Where necessary boards should seek independent legal advice to ensure compliance.

Animal Products Act 1999

The APA makes it clear that foods must be "fit for intended purpose". This is a broad term comprising:

- using a registered RMP for animal products such as dairy, meat and seafood processing, packaging, and distribution;
- applying any relevant standards or regulations; and
- ensuring that the product including packaging and labelling is suitable for the purpose for which the product is specifically stated.

An RMP must:

- set out the procedures the business operator will use for identifying, controlling, managing, eliminating, or minimising risk factors;
- describe the steps the business operator will take to confirm that the programme is working effectively;
- provide for appropriate corrective actions (including recall of product) to be undertaken where the product may not be fit for intended purpose or not in accordance with its labelling or identification;
- set out appropriate and auditable documentation and record keeping; and
- make appropriate provision for verification activities.

Offences involving endangerment of human or animal health include:

- failing to comply with the APA knowing that the contravention or failure would or is likely to endanger the lives or health of the public, or the life or health of any individual;
- where an operator of a risk management programme or a regulated control scheme, contravenes or fails to comply with any provision of this APA knowing that the contravention or failure:
  - may create, directly or indirectly, a risk to human or animal health; or
  - may, directly or indirectly, increase the likelihood of an existing risk to human or animal health.
- sale of non-complying animal material or product (abridged):
  - failure to meet specification;
  - failure to be processed in accordance with an RMP or regulated control scheme.

Penalties (depending on the offence)

- Corporations – up to $500,000 fine.
- Individuals – up to five years imprisonment, and up to $100,000 fine.

Liability

Where the body corporate is found guilty of an offence the liability may flow on to senior managers and directors.

Food Act 2014

Food sold in New Zealand is subject to the Food Act. MPI administers this legislation. The Food Act takes a similar risk-based approach to the APA.

Legal obligations under the Food Act 2014 are similar:

- to produce and sell foods that are safe and suitable;
- to develop and use risk-based measures (usually a FCP or National Programme) to ensure food is safe and suitable. FCPs must be registered and independently verified.

The Food Act applies to food sold in New Zealand and covers food manufacturing and retail, catering, quick service restaurants, food service, hospitality and tourism and some logistics businesses.

Safe means a condition in which food, in terms of its intended use, is unlikely to cause or lead to illness or injury to human life or public health.

Suitable includes matters not related to food safety but that could make food unacceptable e.g. mislabelling, faulty packaging, composition issues.

Penalties (depending on the offence)

Liabilities and penalties are similar to those of the APA in that corporations can be fined, individuals and directors fined and/or subject to a term of imprisonment:

- corporations – up to $500,000 fine;
- individuals – up to five years imprisonment and up to $100,000 fine.

Companies operating in other countries

While many countries are moving to risk-based food safety requirements there are differences in structure and application. Directors, executives and business owners should be aware of and respond to specific country requirements.

Companies Act 1993

The Companies Act includes relevant provisions for directors' behaviour and conduct – including clauses related to "acting in good faith and in best interests of company", "reckless trading" and "duty of care". While risk analysis and risk management are not specifically mentioned or defined in the Companies Act, board practice typically includes active consideration of risk, and the development and management of a company risk register. Food safety risk is increasingly being included in the risk register.

Ministry for Primary Industries website

The MPI website has a great deal of information relating to the APA and the Food Act. There are many threads to follow once you have "landed" on the opening pages:

www.mpi.govt.nz – use keywords such as:

- Animal Products Act;
- Food Act .

WHAT ARE THE MAIN ROLES IN FOOD SAFETY REGULATION?

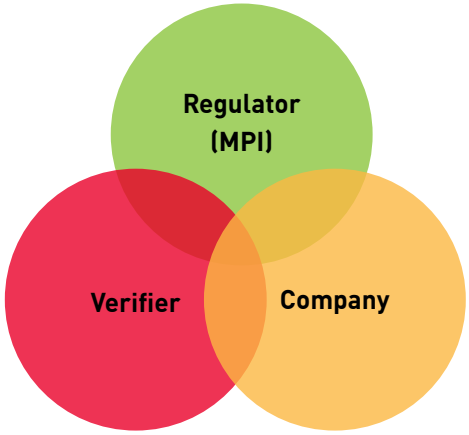
The current legislation is based on companies taking responsibility for managing their food safety risks. This is done using a systematic process of risk assessment, risk mitigation and risk management including validation and verification of the risk-based plans, that is, it is up to the company to identify and manage risk.

The regulator's role is to provide information on how the legislation works, to ensure food companies are using a recognised risk management scheme, to oversee verification activities and carry out enforcement activities.

Verification is typically carried out by a third party within a regulatory framework that is developed by the regulator. The regulator has power to intervene where food safety risk is considered to warrant special and immediate action.

There are three main roles in food safety regulation as shown in Figure 6. The roles of each party are described below.

Figure 6. Main roles in food regulation



Regulator (NZ Ministry for Primary Industries)

- Provides policy advice to the Government.
- Administers law.
- Issues codes of practice and guidance.
- Supports and monitors implementation.
- Undertakes audits of the system.
- Undertakes enforcement.

Company

- Prepares and validates through chain risk based systems e.g. an RMP required by the Animal Products Act 1999 and/or an FCP required by the Food Act 2014.
- Obtains verification that the RMP and/or FCP is compliant with legislation (through an independent registered verifier).
- Registers the RMP and/or FCP with the regulator.
- Operates the RMP and/or FCP.
- Reports specified product non-compliances to verifier and regulator.
- Arranges ongoing third party verification activities and close out of the RMP and/or FCP non-conformances.

Verification (third party verifier)

- Verifies RMPs and/or FCPs are compliant with the law.
- Responds to product non-compliances and verifies corrective actions.
- Maintains recognition or accreditation as a verifier.

WHAT COMPRISES A FOOD SAFETY SYSTEM?

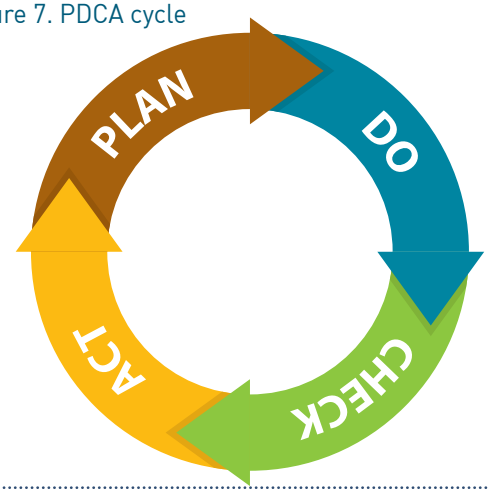
Meeting legislative requirements

The first step is to develop a control system that meets legislative requirements. New Zealand food legislation requires businesses to develop and operate risk-based systems. The APA requires an RMP; the Food Act requirements can be met by an FCP or National Programme.

The APA and Food Act describe what is required. The main points are summarised below:

- Identify, control and monitor hazards preferably by using HACCP (Hazard Analysis Critical Control Points) seven step method.
- Use a through-chain (or end-to-end supply chain) approach (e.g. supply of all ingredients, utilities, processing, services, logistics, laboratory services) and extend into the marketplace where appropriate.
- Apply good processing practices or codes of practice. These should be documented or referenced in the RMP or FCP.
- Include specific procedures such as:
  - traceability and recall procedures;
  - calibration of critical instrumentation;
  - product sampling and testing (compliance checks);
  - staff training to be undertaken;
  - review of non-conformance events plus corrective action; and
  - record keeping.

Figure 7. PDCA cycle



An effective food safety system requires the combining of a well designed risk-based programme with an organisational culture that supports and drives food safety outcomes.

- Use continuous improvement activities such as the PDCA (plan>do>check>act) cycle. (refer to Figure 7).
- Ensure consideration is given to the regulations and notices that form part of the regulatory environment.

Beyond legislation – Building capacity to reduce risk

Food safety is often seen as a technical and operations function. It is better to see it as the responsibility of the whole organisation. The whole business should be engaged.

Consider food safety opportunities beyond core technical and operations functions including, for example:

- Governance – setting the company risk appetite and food safety policy, approving investment decisions, signing off on strategy and leading culture.
- Sales and marketing – new product development – where commitment to new products or product delivery schedules can affect food safety.
- Learning and development – including staff training – can affect food safety. Trained staff make better decisions leading to reduced risk which is especially important in 24-hour operations.
- Finance – identifying food safety and quality costs can support opportunities to improve food safety and quality through supporting investment analysis.
- Information Technology Departments – these can contribute to food safety by avoiding or

mitigating issues arising during business interruption or a cyber attack, where loss of data or corruption of data can affect food safety outcomes.

- Food Safety HACCP – conducting food safety HACCP on capital works and major maintenance presents an opportunity to improve the risk profile.
- Food safety to food defence – look beyond food safety to food defence against malicious attack e.g. vulnerability of milk and water supply, logistics outside of site and digital systems.

The role of international standards such as ISO 9001, FSSC 22000

A number of international standards are relevant to the food industry. ISO 9001 and FSSC 22000 are two examples.

While these standards are widely recognised and may form part of commercial arrangements they are not requirements of the APA or Food Act 2014.

ISO 9001 is the international standard that specifies requirements for a quality management system (QMS). Organisations use the standard to demonstrate the ability to consistently provide products and services that meet customer and regulatory requirements.

FSSC 22000 is a Food Safety Management System Certification Scheme. FSSC 22000 was designed to provide companies in the food industry with an ISO-based food safety management system certification that is recognised by the Global Food Safety Initiative (GFSI). Recognition by GFSI provides worldwide recognition and acceptance by food manufacturers and retailers. FSSC 22000 defines requirements for integrated processes that work together to control and minimise food safety hazards.

Building capacity to reduce the impact of a food safety incident

Food incidents happen even with the best systems, processes and culture. The incident may have arisen from external sources. Whatever the cause, the way in which an incident is handled, particularly in the first 24 hours, is critical to the outcome.

For example, affected product must be traced, quarantined and if necessary a recall ordered. Production processes must be reviewed and potentially stopped. Communications must be prepared for customers, staff, suppliers and the media. Regulators may be involved and require the attention of management and staff.

Many companies have crisis management and communications plans prepared and these should be rehearsed and refreshed at regular intervals. It is recommended that at least one major event rehearsal is conducted annually and that it is independently observed. Building response capacity by rehearsing or practising is essential.

The board should ensure that recommendations from these rehearsals are implemented.

Should a food safety event occur, external media interest is likely and it is essential that there are media-trained executives (and directors) available to front the media early on during an event. Your reputation depends on it!

Low-frequency, high-impact ("Black Swan") events are of particular concern. Events can escalate, e.g. as cases of illness proliferate and can have the best companies stretched. Events such as this cannot be planned for in detail, but building and rehearsing generic response capacity can serve to improve response and limit the effects of such events.

Crisis and communications plans should consider all stakeholders including those in the immediate situation but also international suppliers and customers. Communications are particularly important from a customer's viewpoint. If there is a problem, "they should hear it from you rather than the media".

CULTURE – THE ESSENTIAL ELEMENT

Having good technical systems is simply not enough – food safety must be embedded in organisational culture, throughout all company operations and into the marketplace so that:

"It's the way we do things at our company. Always!"

Culture is recognised as the underpinning of behaviour and ultimately performance and with the right culture in place, the right decisions get made, 24/7. Food safety culture relies on unequivocal support and consistency of decision making – throughout the organisation – top to bottom, side to side.

Creating the right environment and framework

- Committing to food safety in the Board Charter and communicating expectations.
- Developing food safety policy and goals to deliver on expectations.
- Inducting, educating and training staff (including directors) in food safety – monitoring progress in training.
- Setting food safety KPIs.
- Measuring and reporting.
- Communicating progress.
- Recognising and celebrating achievement.
- Surveying culture and acting on findings.

Leading by example

Directors and management actions have a huge impact on how staff react and behave in matters of importance of food safety. Directors have a clear leadership role in this area and can reinforce their commitment to food safety by:

- putting food safety on the board and risk sub-committee agenda;
- talking about it regularly and seeking feedback from staff;
- taking care when making decisions that food safety is not overtaken by financial or production expediencies;
- consistency in decision making; and
- recognising outstanding performance.

Surveys

Many organisations survey organisational culture on a regular basis. Food safety culture should be included as a part of surveys, with clear and obvious follow up on findings and actions arising from the survey.

INDICATORS OF FOOD SAFETY CULTURE

My company cares about food safety... I know that because...

- I feel I am trained in food safety;
- I am encouraged to speak up about food safety issues;
- Food safety is on my supervisor's agenda;
- I feel confident when asked to talk about my role in food safety in my team: to management, to directors, to auditors and to customers;
- I feel confident that my team members follow food safety practices;
- In our company food safety is in good hands – 24/7;
- Food safety issues are fixed;
- Food safety decisions are separated from commercial decisions;
- I feel I understand our customers' needs and expectations.

EXAMPLE FOOD SAFETY PERFORMANCE MEASURES

KPIs – Lag (assessing outcome)

- Food safety system performance:
  - Food safety reports from current production – full supply chain exceptions and trends reporting; "near misses".
  - Outstanding non-conformance reports or incident reports, trends in resolution time.
  - Audit performance – non conformances (severity, number) and close out time, tracking verification outcomes.
  - Crisis response and communication plan review outcomes. Customer food safety complaints – nature, resolution, trends.
  - Evidence of continuous improvement.

KPIs – Lead (improving capacity)

- Building capacity to reduce risk and impact:
  - Breadth of the food safety plan throughout the business.
  - Acting on results from crisis and communication plan rehearsals including media training.
- Culture, learning and development:
  - Progress on issues arising from culture survey.
  - Progress with learning and development and training programme, including Directors food safety and risk.
  - Progress on learning opportunities arising from audits.
  - Senior staff external exposure to external food safety learning opportunities and experiences.
- Preparedness for unpredictable events:
  - "Black Swan" scenario(s) developed and response plan prepared.
  - Response plan rehearsed and findings documented.

INTRODUCTION TO FOOD SAFETY RISK

Risk

Food safety risk is seen as a combination (or function) of the likelihood of suffering illness or harm and the impact or severity of the illness or harm. In Figure 8, increasing consumption or exposure increases the likelihood of suffering illness or harm if there is a food hazard present. The increasing severity of hazard increases the impact when affected food is consumed.

High risk arises from a combination of a serious hazard and ample opportunity for exposure. Eating unsafe food provides that exposure.

Figure 8 shows a range of risks associated with *Listeria*.

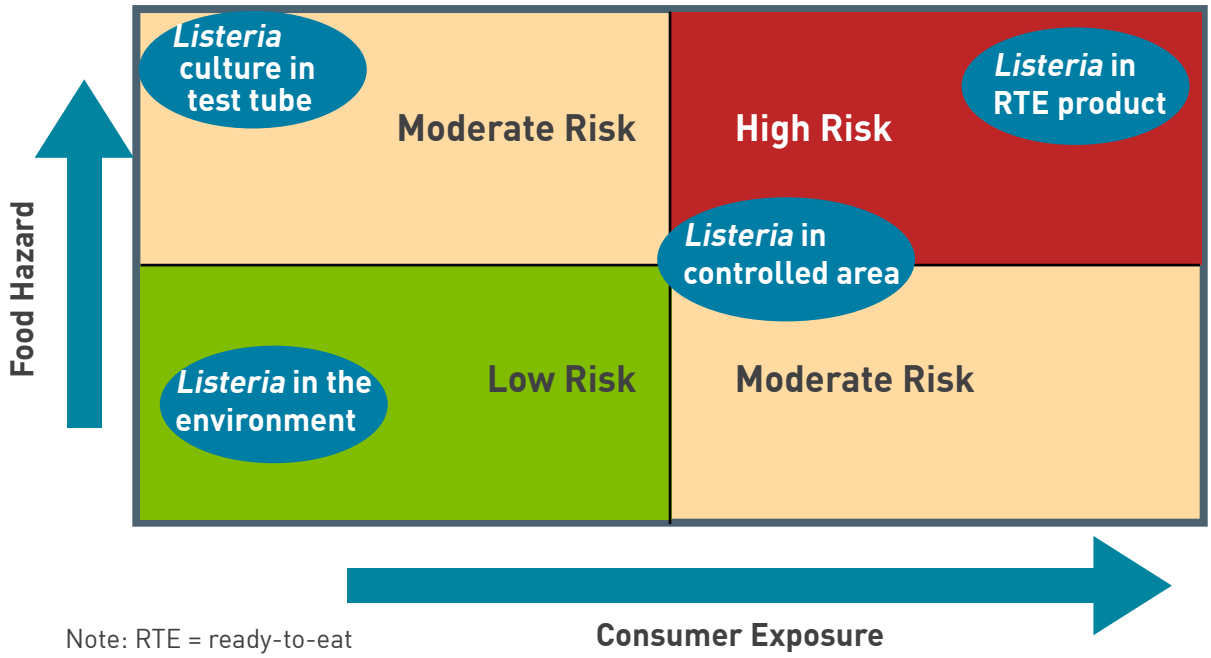
- *Listeria* is a serious hazard, but safely contained in a test tube, even though the numbers of bacteria might be high, there is no human exposure and is considered be low to moderate risk.
- *Listeria* is everywhere in the environment at low levels and is a hazard, but at low levels and with low exposure it is considered to be low risk.
- *Listeria* found in a food processing environment is one step away from human exposure through food. It is moderate to high risk – and immediate action should be taken e.g. stopping production, cleaning, quarantining and testing of recent production.
- *Listeria* in a ready-to-eat (RTE) final product is a serious hazard and human exposure occurs when the food is eaten without further cooking. It is a high risk! Immediate action should be taken. Actions may include stopping production, cleaning, initiating traceback, quarantining and testing of recent production. Product recall may be required. RMPs and FCPs will require advising the verifier or MPI.

Risk is dynamic

Effective risk processes recognise hazards and control risk by applying a combination of processing steps and controls aimed at avoiding, eliminating or reducing the hazard and/or exposure to the hazard.

But things do not stay the same for long. Materials, processes, market demands and human behaviour are variable, and risk requires constant revision, assessment and management.

Figure 8. Risk is a function of hazard and exposure



Note: RTE = ready-to-eat

Principles of HACCP

HACCP or hazard analysis critical control point is a structured process for identifying and controlling hazards in order to reduce risk.

Originally developed for foods used in the American space programme it is used widely in primary products and food industries.

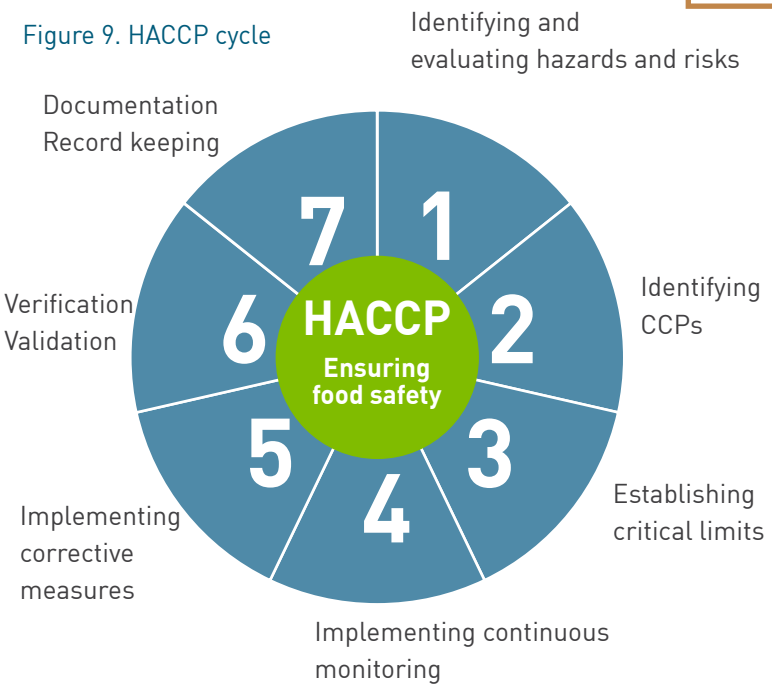
At the heart of HACCP is a seven step method:

1. Conduct a hazard analysis, that is, identify biological, chemical and physical hazards of significance at each process step.
2. Determine the critical control points (CCPs) and control measures.
3. Establish critical limits for each CCP.
4. Establish a system to monitor the control of the CCP.
5. Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.
6. Establish verification procedures to ensure the control system is working.
7. Establish documentation concerning all procedures and records relevant to the HACCP principles and their application.

HACCP WORKED EXAMPLES

- A number of worked examples have been prepared to give an illustration of the HACCP process.
- These examples do not set out to be fully accurate and complete. Refer to MPI for industry best practice .
- The examples, from a range of industries, show just one CCP for each product type, and one solution.
- In some product and processes there may be more than one CCP and more than one solution for each CCP.
- Some processes may not have a CCP for each hazard, e.g. minimally processed chilled products, but instead rely on non-critical control points, Good Agricultural Practice (GAP), or industry-specific codes of practice (COPs) to mitigate risk at a number of process points.
- Once a risk mitigation measure has been put in place, it is important to avoid reintroducing the hazard e.g. microbiological recontamination. Specific processing measures may be required.
- Where CCPs are exceeded or not met, many RMPs and FCPs will include corrective action measures. Consistent with the APA and Food Act, RMPs and FCPs will often require that the verifier or MPI is advised when a CCP is breached. It is important to follow the RMP or FCP.

Figure 9. HACCP cycle



HACCP WORKED EXAMPLE 1 - DAIRY

Process step: Milk reception

1. **Hazard:** Raw milk may contain hazardous pathogens, e.g. *Salmonella*.
2. **Critical control point:** A heat treatment primary process step, e.g. pasteurisation or equivalent, followed by rapid chilling, is a control method able to reduce or control the hazard sufficiently.
3. **Critical limits:** Set time-temperature limits known to kill pathogens of interest, e.g. 72˚C /15 seconds, then reduce product temperature to <5˚C.
4. **Control system:** Temperature probe plus data logger and control system, controls and monitors processing. Routine evaluation of records undertaken.
5. **Corrective action:** Milk is bypassed if temperature falls outside limits, alarm sounds.
6. **Verification:** Includes routine checks on bypass and alarm system (method set by MPI) and system performance.
7. **System documented:** System specification written into RMP and Standard Operating Procedures (SOPs). Records retained.

The HACCP methodology is applied to all hazards whether they occur in manufacturing, logistics, plant utilities and service or ingredients supply. The same thinking can be used when considering support functions such as human resources and sales and marketing where opportunities to reduce risk can be found.

HACCP WORKED EXAMPLE 2 - POULTRY

Process step: Immersion chilling of chicken carcasses

1. **Hazard:** Microbiological contamination of immersion chiller water leading to contaminated chicken (e.g. *Campylobacter*).
2. **Critical control point:** Chilled water quality (temperature, pH, bactericide (acidified sodium chlorite)) concentration, flow rate.
3. **Critical limits:** E.g. water exit temperature 2-4˚C at specified flow rate, pH 2.5-3.2, sodium chlorite 50-150 mg/l.
4. **Control system:** Temperature probe and data logger monitor temperature, with audio visual alarm system to indicate deviation. Routine operator monitoring of pH and sodium chlorite concentration, e.g. half hourly.
5. **Corrective action:** If chilled water solution is outside limits, immediately correct deficiency. Quarantine product from last satisfactory test until the next satisfactory test for further evaluation. Refer RMP for further information.
6. **Verification:** Includes routine maintenance checks on temperature monitoring system, independent (once daily) checks on pH and sodium chlorite concentration, checks on chicken temperatures (ingoing, outgoing).
7. **System documented:** System specification written into RMP and Standard Operating Procedures. Records retained.

HACCP WORKED EXAMPLE 3 - MEAT

Process step: Pre-cooking hamburger patties

1. **Hazard:** Potential pathogens in consumer packs of pre-cooked hamburger patties.
2. **Critical control point:** Heat treatment at cooking/grilling.
3. **Critical limits:** Set time-temperature limits known to kill pathogens of interest (e.g. internal pattie temperature 68°C for 15 seconds).
4. **Control system:** Cooking procedure standardised and validated using temperature probe and data logger. Process parameters monitored continuously, plus evaluation of batch records.
5. **Corrective action:** Deviations and exceptions are notified by alarm. Records review, then quarantine suspect product – that is, where time-temperature requirement not met. Stop production until fault identified and remedied. Consider alternatives, e.g. reprocess or dispose of affected product. Advise MPI or verifier.
6. **Verification:** Includes revalidation checks on cooking procedure and periodic microbiological test on product.
7. **System documented:** Written into RMP and Standard Operating Procedures (SOPs). Records retained.

HACCP WORKED EXAMPLE 4 - HORTICULTURE

Process step: Receiving of raw vegetables for processing – raw material acceptance

1. **Hazard:** Chemical residues e.g. pesticides, fungicides.
2. **Critical control point:** Raw material inspection (prior to processing) to ensure chemical residues are within specifications.
3. **Critical limits:** Compliance with ACVM Act conditions of registration (e.g. correct rate of application, pre-harvest withholding periods and correct spraying practices) to ensure compliance with maximum residue limits (MRLs).
4. **Control system:** Supplier provides documentary evidence of compliance to regulatory measures.
5. **Corrective action:** Quarantine raw materials where documentation is inadequate or indicates non-compliance. Refer to FCP for instructions regarding disposition or destruction.
6. **Verification:** Periodic check by plant quality control (QC) staff. Periodic samples submitted for residues analysis by independent laboratory. Non-compliance may result in increased testing, at suppliers cost, until confidence is restored. In extreme cases – refer to FCP for further instructions e.g. product trace back and withdrawal.
7. **System documented:** Written into FCP and Standard Operating Procedures (SOPs). Records retained.

HACCP WORKED EXAMPLE 5 - SEAFOOD

Process step: Hot smoking salmon

1. **Hazard:** *Listeria monocytogenes* in RTE (ready-to-eat) packaged hot smoked salmon.
2. **Critical control point:** Hot smoking process.
3. **Critical limits:** Salmon reaches an internal temperature of 70°C for 1 minute and 7 seconds (to give a 6 $\log_{10}$ reduction).
4. **Control system:** Internal temperature of the slowest heating product monitored continuously throughout the process for each batch.
5. **Corrective action:** Restore control. Quarantine product where hot smoke cycle compromised, assess process applied and whether other batches may be affected. Where safe to do so, reprocess non-compliant product or consider alternative. Investigate cause of problem and take action to prevent recurrence.
6. **Verification**: Check of CCP monitoring equipment set up and hot smoking programme, review cooking records prior to product release, temperature probe calibration checks, periodic microbiological tests, internal and external audit.
7. **System documented:** Written into RMP and Standard Operating Procedures. Records retained.

HACCP WORKED EXAMPLE 6 – FMCG

Process step: Packaging of dry blended powders in pouches

1. **Hazard:** Metal fragments in pouch packs.
2. **Critical control point:** Post-filling metal detection.
3. **Critical limits:** Absence of metal fragments in product (e.g. less than 1.00 mm diameter ferrous metals).
4. **Control system:** All product passes through in-line metal detector.
5. **Corrective action:** Product rejection where metal detected. Plant stopped if more than X packs rejected. Source of metal traced. Earlier product sampled and rechecked. Refer RMP and advise MPI or verification agency.
6. **Verification:** Detector calibration checks conducted at specified intervals by operators (e.g. per shift) and maintenance technicians (e.g. weekly).
7. **System documented:** Written into RMP and Standard Operating Procedures. Records retained.

FOOD DEFENCE – DEFENDING AGAINST INTENTIONAL HARM – AN EMERGING THREAT

Food defence – what is it?

Food defence is the protection of food products from **intentional** contamination or adulteration by biological, chemical, physical or radiological agents. Food defence is an emerging area of threat, where the threat is **intentional** and is perpetrated by an "insider" or "external agent".

Types of intentional harm include:

- **Adulteration** – using a substance in some ways similar to the food product. Melamine in baby food is an example of adulteration, where the nitrogen in melamine was erroneously determined as protein resulting in low protein infant food being sold with "typical" protein levels. There was a severe food safety outcome as well.
- **Malicious** contamination such as the threat of the poison 1080 in dairy products.
- **IP theft** – espionage – such as unlawfully obtaining formulations or processing technology.
- **Counterfeiting** – where a cheaper alternative product is put onto the market and represented as the original or another similar higher value product.
- **Cyber or systems attack** – where food safety risk can be brought about for example by altering processing conditions or records, corruption of quality and grade data or logistics records.

The motivation for causing intentional harm can be:

- economic;
- ideological, extremism; or
- personal – revenge, opportunist satisfaction.

Risk assessment and mitigation

Reducing risk from malicious or intentional attack is challenging and requires a different mindset when applying risk analysis processes.

One approach applies a methodology called Threat Assessment Critical Control Point (TACCP),[15] a risk management methodology similar to HACCP. This approach is applied throughout the supply chain and business operations, asking:

- Who might want to attack us?
- How might they do it?
- Where are we vulnerable?
- How can we stop them?
- How can we prepare for an event, that is, business continuity, crisis management and communications planning?

TACCP can help in:

- reducing the chance of a successful attack;
- demonstrating due diligence; and
- providing confidence to national and international customers.

15 BSI (2017) PAS 96:2017 – *Guide to protecting and defending food and drink from deliberate attack*. BSI; London. www.food.gov.uk/sites/default/files/media/document/pas962017.pdf. Accessed 10 October 2018..

GLOSSARY OF TERMS

APA	Animal Products Act 1999.
ACVM	Animal Compounds and Veterinary Medicines Act 1997.
Black Swan event	A low-frequency, high-impact event that can cause significant damage. In a business context it is difficult to plan for such events, but organisations can build generic capability to respond to low-frequency, high-impact events in order to minimise their impact. See also: en.wikipedia.org/wiki/Black_swan_theory
CCP	Critical control point – a point, step or procedure at which controls can be applied and a food safety hazard can be prevented, eliminated or reduced to acceptable levels e.g. heat treatment of raw materials to control microbiological hazards.
COP	Codes of practice. See link: www.mpi.govt.nz/food-safety/risk-management-programmes
FMCG	Fast-moving consumer goods.
Food defence	The protection of foods from intentional contamination or adulteration.
Food safety system	A generic title or descriptor for food safety systems. Risk management programmes and food control plans are specific and defined elements of a food safety system.
FCP	Food Control Plan – a specific term under the Food Act 2014 – "a food control plan is a plan designed for a particular food business to identify, control, manage, and eliminate or minimise hazards or other relevant factors for the purpose of achieving safe and suitable food". The Act specifies a number of additional generic requirements, e.g. lot coding and traceability, plan registration and verification.
FSSC 22000	A Food Safety Management System (FSMS) Certification Scheme. Refer to: www.fssc22000.com/documents/home.xml?lang=en
GAP	Good Agricultural Practice. Refer to link: http://www.newzealandgap.co.nz/
HACCP	Hazard analysis critical control point – a seven step methodology for identifying and evaluating hazards, establishing, implementing and documenting controls. See: www.mpi.govt.nz/food-safety/food-safety-codes-and-standards/hazard-analysis-and-critical-control-point/
ISO 9001	The international standard that specifies requirements for a quality management system (QMS). See: https://www.iso.org/iso-9001-quality-management.html
Maximum residue limit	The maximum permitted level of agricultural compounds in foods, beyond which the food is not permitted to be sold.
PDCA	Plan, Do, Check, Act – a four step model for continuous improvement. Refer to http://pdcahome.com/english/267/pdca-cycle-continuous-improvement/
QC	Quality control – the operational techniques and activities used to fulfil

	requirements for quality. Refer: www.qualitygurus.com/download/DifferenceBetweenQualityAssuranceAndQualityControl.pdf
Risk	The Codex Alimentarius definition of risk is: "A function of the probability of an adverse health effect and the severity of that effect crisis, e.g. related to a hazard(s) in food".
RMP	Risk management programme – a programme designed to both (a) identify; and (b) control, manage, and eliminate or minimise hazards and other risk factors in relation to the production and processing of animal material and animal products in order to ensure that the resulting animal product is fit for intended purpose". The APA specifies a number of additional generic requirements e.g. lot coding and traceability, programme registration and verification.
TACCP	Threat assessment critical control point – a methodology, similar to HACCP, used to protect food from intentional contamination or adulteration (see page 33).

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