



Food Sector
Risk Ranking
and Prioritisation Models
The Methods
Domestic Food Review



March 2006

Te Pou Oranga Kai O Aotearoa

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1 Introduction

This project forms part of the Domestic Food Review (DFR), a review of government involvement in the domestic food sector. The DFR is a significant long-term project that is likely to run over at least five years. Its purpose is to put in place a food regulatory programme¹ across all sectors of New Zealand's domestic food industry that promotes and delivers safe and suitable food in New Zealand.

This is only the second time in the last 30 years that the government's role in the New Zealand domestic food sector has been critically examined at an official level. The last review was undertaken in the late 1980s, and led to the Food Amendment Act 1996 and eventually the establishment of the New Zealand Food Safety Authority (NZFSA).

The Domestic Food Review Position Paper publicly released in February 2006 proposes that all food businesses should have Food Control Plans (FCPs) in place, except where other equivalent regulatory programmes are in place, or where educational guidance has been identified as the most appropriate food safety measure. As part of the implementation of Food Control Plans across the food sectors, the timing of the implementation needs to be determined. The following were considered as possible implementation timing strategies:

- a) All food businesses to have a FCP implemented by the same date. This approach is transparent and 'fair' in the eyes of food business owners, but is difficult for the regulator to resource. All food businesses will be requiring the resources supplied by government at the same time.
- b) Implementation time frames are developed on a risk based approach i.e. the highest risk businesses must meet the FCP requirements first. This ensures that resource is placed in the most 'problem' areas. However, the disadvantages may include; resource spent on determining the risk² (usually based on foodborne illness data and consumption data), resource on determining food categories and lastly, the biggest challenge; supplier specifications (ie persons being able to obtain food that has been determined as safe and suitable food when their supplier is not yet required to operate a food control plan to ensure safe and suitable food). If food service is identified as high risk, and therefore one of the first groups to implement the FCP approach, they will need to require controls from their suppliers. This may not be achievable if their buying power is poor.

- c) Farm to fork approach is taken. In this case, FCPs would be introduced to the first link of the food chain, such as the farmer who grows the produce, with implementation down the supply chain overtime, ending with implementation at the retail of the food, such as the restaurant, which would require a FCP at a later stage. This manages the issue outlined above with regards to supplier specifications.

NZFSA decided that the risk based approach should be used, with the addition of prioritisation strategies to manage the issues associated with this approach. Therefore, as a basis for developing a transition and implementation strategy, risk ranking and prioritisation models are required. A risk ranking model would rank the food safety risks in the food sector. The prioritisation model would take into account other important considerations such as at which part of the supply chain a hazard was most effectively managed, public interest, and the level of skill/competency for implementation. The model is intended to provide a process to determine which food sectors should be placed in the risk ranking model and the risk of a range of categorised food sectors and to assist in determining the transition programme for businesses being required to have FCPs and the work programme for FCP implementation.

Food sectors offshore that deliver food to New Zealand as imports are excluded as they are covered by a separate review. Consideration of factors affecting *individual* food businesses is excluded. For example, a specific business may include products from a number of food sectors or categories and the differing sectors/categories may have differing implementation requirements.

¹ The food regulatory programme is the overarching food programme in New Zealand for which NZFSA is accountable, and within which the decisions on the type of involvement (regulatory and non-regulatory) are made.

² Risk: A function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard(s) in food.

Hazard: A microbiological, chemical or physical agent present in food which has the potential to cause an adverse health effect in the human population.

2 Executive summary

Food control plans are intended to be introduced to New Zealand's domestic food sector within the next five or so years as part of NZFSA's Domestic Food Review.

This paper sets out the risk ranking and prioritisation models NZFSA has developed for the transition to and implementation of these food control plans.

Food businesses are classified into 30 food sectors. The risk ranking model then ranks food sectors according to the food safety risks posed by the sector. The risk ranking model is divided into two parts. Part one covers the inherent risks associated with foods such as the type of food and the intended use by customer (assuming availability of a reasonable level of scientific or factual information). Part two relates to sector organisation or business practice factors that have an impact on food safety and suitability such as food safety systems/structures in place (this information is less scientific).

Sector organisation or business practice factors considered in this model include: the ability of a food sector to effectively implement regulatory change, determining the best place in the supply chain for effective risk control, public interest in regulation. The models used together will form the basis of recommendations for transition to and implementation of food control plans. It is recognised that NZFSA will make the management decisions required to make the final decision on transition and implementation issues.

3 Background

Other countries' approaches to using risk ranking or programme implementation models were researched. Risk ranking models for specific food and hazard combinations were common. Ireland has a model to determine the frequency of inspections. Other countries' approaches were largely on a food business rather than food sector basis.

Canada has developed a risk ranking model to "provide a framework for the development of more specific provincial and territorial risk categories which can be adapted to local inspection programmes".

Australia was the only country of the countries reviewed with a model to develop a priority ranking for implementation of food safety programmes. This model included ranking risk, coupled with prioritisation based on cost/benefit ratios and included determination of frequency for initial external verification.

The Australian and Canadian models were selected to use as a starting point for the development of the NZFSA risk ranking and Prioritisation Models.

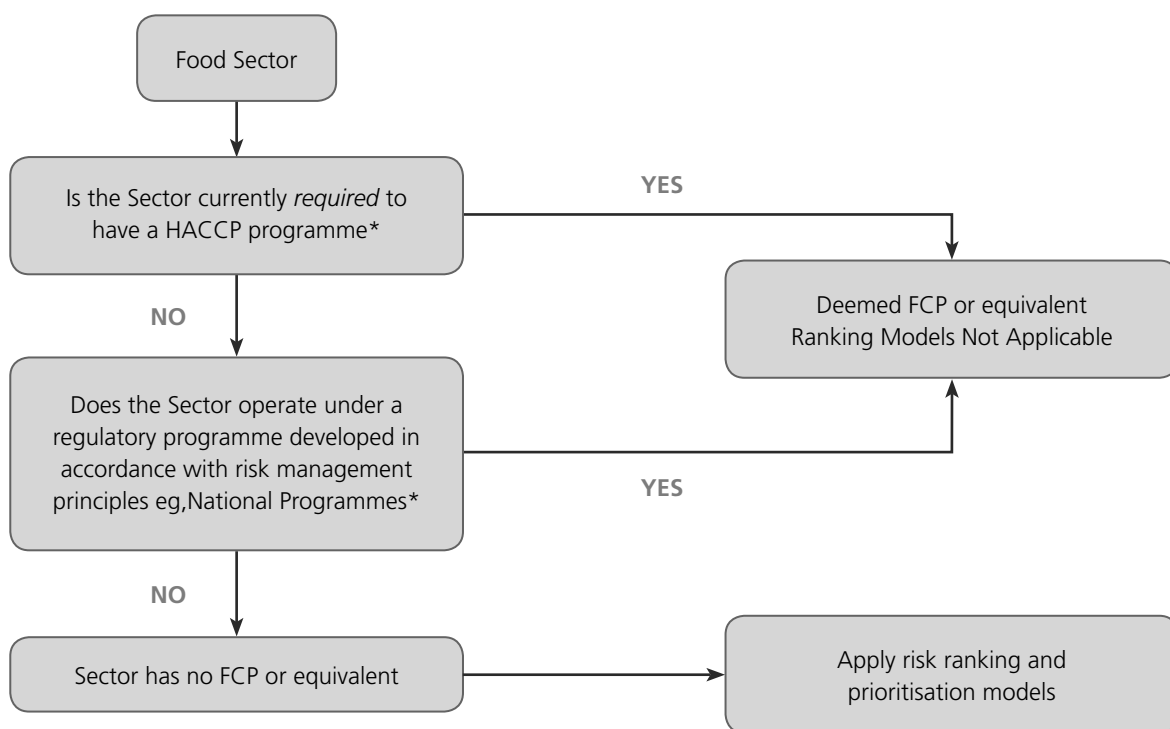
4 Scope of application of the risk ranking and Prioritisation Models

Development of Food Sector Categories:

NZFSA business groups provided a list of sector groupings currently used in regulatory or non-regulatory settings in New Zealand. This is intended to provide the basis for the food sector categories for food businesses in New Zealand.

Determination of Application of the risk ranking and Prioritisation Models:

Food sectors that are already adequately controlled by alternative regulatory regimes will not have the risk ranking and prioritisation models applied to them. This will be determined through the application of the following decision tree to each food sector.



* For example, HACCP programmes are currently required under the following pieces of legislation: the Food Act provides for Food Safety Programmes, the Animal Products Act requires Risk Management Programmes, the Dairy Industry Act had for many years required Product Safety Programmes (now Risk Management Programmes under the Animal Products Act) and the Wine Act makes provision for Wine Standards Management Plans.
 * National programmes are initiated and developed by regulation. For example, the existing Bivalve Molluscan Shellfish Regulated Control Scheme and the Limited Processing Fishing Vessels Regulated Control Scheme.
 3 Crawford-Brown, D.J. and Cothorn, C.R. (1987) #1570. A Bayesian analysis or scientific judgement of uncertainties in estimating risk due to 222RN in U.S. public drinking water supplies. Health Physics, 53, 11-21.

5 Risk and Prioritisation Ranking Model Structure

In order to determine a priority list for implementation of Food Control Plans there are a number of factors to be taken into consideration. The government's objectives require that risk to human health be a primary factor in determining priority for regulatory change to a food sector. However, as previously discussed, an implementation plan based on risk alone may present challenges that impact on a food sector's ability to effectively implement an appropriate control mechanism. Therefore, any implementation ranking model also needs to consider factors other than risk. As a result NZFSA decided two models were required:

Risk ranking model: A model developed in order to rank and categorise business sectors in New Zealand with respect to the potential food safety risk posed by that sector to New Zealanders. This model considers scientific parameters that may affect this risk and comprises two parts:

Part one (sections 1 to 4),
applying the best available scientific information to provide an initial estimation of food safety risk associated with a food sector.

Part two (sections 5 to 7),
using Part one as a base, consideration of the sector organisation and business practice factors that have an impact on food safety and suitability.

Prioritisation model: (sections 8-12)

a model developed to further disaggregate business sectors within a category, following the implementation of the risk ranking model, which takes account of subjective inputs used in decision-making, for example, societal values. The prioritisation model incorporates factors associated with a food sector that impact on the ability to implement regulatory change effectively.

These models used together will form the basis of recommendations for transition to and the implementation of food control plans. It is recognised, however, that risk ranking and prioritisation models alone will not determine the transitional arrangements and implementation plan. NZFSA will make the management decisions required to finally determine the transition and implementation plan and this will include consideration of other significant factors, such as regulatory resources and desired transition and implementation timeframe, to develop an appropriate work programme for regulatory transition.

5.1 Important overall considerations

5.1.1 Data Limitations

It is well recognised that the need for developing policy is often far ahead of the scientific data that are available and often those data that are available are imperfect and incomplete, (Crawford-Brown & Cothorn, 1987³). As such, it is often the case that risk models developed in order to inform policy-makers include parameters for which appropriate data are not available. In this situation, the use of expert opinion is an accepted means of parameterising the model.

Within this model, where robust data were not available, opinion from recognised experts was elicited and used to parameterise parts of the model where empirical data were absent. This expert opinion was elicited using robust standardised peer-reviewed methodologies (Gallagher, 2002⁴, MAF, 2002⁵, OIE, 2004⁶).

5.1.2 Sector Variability

The models are designed to rank food business sectors, rather than individual food businesses. It is recognised that within any given sector there will be individual businesses that present greater or lesser risks than others. Unless otherwise stated, when selecting a rating within any risk ranking category the rating applied was selected as an approximate average for all businesses within the sector, rather than selecting the weighting based on highest or lowest risk businesses.

5.1.3 Safety and Suitability

Food safety and suitability are both areas of NZFSA responsibility. When considering the application of food business risk factors for use in this model, suitability factors (eg, composition, labelling) were also considered. However, it was considered that not all safety and suitability factors are applicable in a model designed to differentiate sectors on the basis of risk to human health. That is, many safety and suitability factors are applicable equally to all or most food sectors, therefore do not provide a point of differentiation and so do not add value if they were to be included in the ranking model. Factors determined to provide a point of differentiation are summarised in the ranking categories to which they are applicable.

4 Gallagher, E., Ryan, J., Kelly, L., Leforban, Y., and Wooldridge, M. (2002). Estimating the risk of importation of Foot-and-Mouth Disease into Europe. *Veterinary Record*, 150, 769-772.

5 Ministry of Agriculture and Fisheries (2002). *Import risk analysis: Animals and Animal Products*. New Zealand Ministry of Agriculture and Forestry, Wellington, New Zealand.

6 World Organisation for Animal Health (OIE) (2004). *Handbook on import risk analysis for animals and animal products. Volume 1. Introduction and qualitative risk analysis*. World Organisation for Animal Health, Paris, France.

6 Risk ranking Model

6.1 Risk ranking

Part one of the risk ranking model was developed using the Australia New Zealand Food Authority (ANZFA) priority classification system⁷ and Canadian “Risk Categorizing Model for Food Retail /Food Service Establishments” as a basis.

Each food sector is assigned a numerical value based on the weighting of risk (provided in each section below). This part of the risk ranking model assumes availability of a reasonable level of scientific or factual information in order to provide a robust estimation of risk associated with a food sector.

The numerical values were selected giving consideration to a range sufficient to separate sectors on the basis of risk. The relative risk weightings between sections are comparable and reflect the approximately equivalent impact of each section on overall food safety risk.

Part two of the risk ranking model also draws on some factors considered in the Australian and Canadian ranking models. However as the New Zealand information available for inclusion is not easily measured in scientific terms, or hasn't been measured, a more subjective analysis is applied (refer to section 5.1.1).

As the factors considered in Part two relate to sector organisation or business practices it is useful to have the flexibility to consider these risks separately from the inherent risks associated with foods as determined in Part one.

The values assigned to each section in Part two are lower than those applied in Part one, to reflect the more subjective nature of the data. That is, ultimately the overall risk assigned to a sector will be more strongly influenced by factors in Part one of the risk ranking model than Part two of the model.

Once each food sector has an overall numerical value based on risk, it is possible to determine an initial priority of the food sector with regards to implementation of Food Control Plans.

7 Use of the risk ranking and Prioritisation Models

It is intended that the risk ranking model be run to provide initial risk ranking, the results from each part (1 and 2) to be viewable separately to allow visualisation of the relative risk weightings between inherent food characteristics and organisation/business practice factors. The prioritisation model will be run as an overlay, and may provide a method to further separate sectors of equal risk in the prioritisation process. The findings from the application of the risk ranking and prioritisation models will provide the basis for the transition and implementation plan, however other management factors may influence the final transition and implementation plan.

The models described in this document have been developed for the purpose of assisting the establishment of the transition process and the setting of the implementation work programme. Other uses may be possible but the models may need to be used differently, or have additional relevant factors added.

7.1.1 Section One – Food type and intended use by customer

Purpose of this Section:

This section is designed to capture the inherent risks associated with types of food.

Factors Considered:

- the potential for any of the three types of hazards (microbiological, chemical, physical) to occur in any of the foods produced by a food sector, recognising that epidemiological evidence suggests that microbiological hazards occur more frequently and cause more severe foodborne illnesses than many chemical and physical hazards. It was also considered that chemical and physical hazards did not provide a good point of differentiation for the purpose of risk ranking between food sectors
- whether the food supports the growth of micro-organisms
- whether or not the food is sold ready to eat
- any available foodborne illness, food complaint and monitoring data, from New Zealand, or from international trend analysis, highlighting specific or inherent risks associated with food types. These may include risks for food safety and/or suitability.

⁷ Australia New Zealand Food Authority, Not dated. Food safety: The priority classification system for food businesses.

⁸ Note: The Imported Food Review (IFR) defines 'High Risk Food' as food for which there is a Prescribed Food Standard. Discussion will be necessary to determine whether the definitions in the IFR and the DFR can be aligned.

Key definitions used in this section:

High risk food⁸: For the purposes of this ranking model high risk food is:

- food that is associated with Group 1 biological hazards (see Appendix 1). Examples are raw meat, raw poultry, raw milk, fresh vegetables, sesame seeds, spices
- food that is associated with greater than 10% of Complaints lodged in FoodNet since 1997 (see Appendix 1)

Medium risk food: For the purposes of this ranking model medium risk food is:

- food that is associated with Group 2 pathogenic microorganisms or toxins (see Appendix 1). Examples are peanuts, milled grains, seafood, bivalve molluscan shellfish, food in sealed containers (canned, vacuum packed etc), long shelf-life ready-to-eat (RTE) foods, dairy products
- food that is associated with between 1% and 9.99% of Complaints lodged in FoodNet since 1997 (see Appendix 1).

Low risk food: For the purposes of this ranking model low risk food is:

- food associated with Group 3 pathogenic microorganisms or toxins (see Appendix 1), examples are starchy foods, alcohol, fats and oils
- foods not captured in the high or medium risk categories above.

Ready-to-eat food: means food that is ordinarily consumed in the same state as that in which it is sold.

Assumptions made:

- where a number of foods are made within a sector, the highest risk food is used to determine the score for ranking
- ready-to-eat foods are more likely to cause foodborne illness if they contain an uncontrolled hazard. Ready-to-eat foods are therefore given a higher numerical weighting than foods that either are unlikely to contain an uncontrolled hazard or are expected to undergo a risk reduction step (eg cooking) immediately before consumption
- no food is considered completely without risk, therefore even low risk foods attract a risk weighting value.

Risk Weighting:

Category	Weighting
High risk foods that are ready-to-eat	20
Medium risk foods that are ready-to-eat	15
High risk or Medium risk foods that are not ready-to-eat	10
Low-risk foods that may or may not be ready-to-eat	5

7.1.2 Section Two**– Food Preparation and Processing****Purpose of this Section:**

This section is designed to capture the additional risks introduced through food processing and handling

Factors Considered:

- the number of processing steps that could add risk to food
- the amount of direct food contact with people or the general environment that occurs in the production of the food type
- whether the food undergoes physical or chemical changes that affect its safety risk
- whether the final processing step effectively controls any risks associated with prior processes.

Assumptions made:

- as the amount of processing and exposure of food to the processing environment increases, so does the likelihood of a food contamination event occurring. Therefore the highest risk value is assigned to food sectors with the greatest number of preparation and processing steps
- any business undertaking a hazard mitigation function as the final step in processing is given a reduction in the score as this final step reduces the risk
- if food has no preparation or processing steps (eg distribution or sale of shelf-stable pre-packaged items) no additional risk is introduced, therefore a nil value can be attributed.

Risk Weighting:

Category	Weighting
Extensive level of preparation/processing	20
Moderate level of preparation/processing	15
Low level of preparation/processing	10
No preparation/processing steps	0
Hazard reduction/elimination step at last point of process	-10

7.1.3 Section Three – Food targeted for vulnerable (YOPI) populations

Purpose of this Section:

This section is designed to capture the additional risk food poses to vulnerable populations.

Factors Considered:

- whether the food is made specifically for vulnerable populations

Definition:

Vulnerable Populations: defined for these purposes as children under the age of five, adults aged over 65, the sick and immunocompromised, and pregnant women. YOPI: Acronym for Young, Old, Pregnant, Immunocompromised

Assumptions made:

- people in vulnerable populations can become very ill from consuming food that is contaminated with pathogenic bacteria below levels that would affect the rest of the population
- people within vulnerable populations may be susceptible to bacteria known not to affect the majority of the population (eg, *E. sakazakii* affects only immunocompromised infants).

Risk Weighting:

Category	Weighting
Food targeted for vulnerable populations	20

7.1.4 Section Four – Community Reach

Purpose of this Section:

This section is designed to account for the impact a food sector would have on the community if unsafe food was produced.

Factors Considered:

- the proportion of the population regularly consuming the food type (based on the 2003-2004 NZ Total Diet Survey Food List, see Appendix 1)
- the volume of food produced by the food sector.

Assumptions made:

- foods consumed by the majority of consumers, or food distributed widely would have a negative effect on more people if contaminated, therefore attracts a higher risk weighting
- foods with limited distribution and/or available only to a minority of consumers have a less serious effect, however they still present appreciable risk, so a positive score is assigned.

Risk Weighting:

Category	Weighting
Commodity/ Wide Community Reach	20
Mid-range/ Moderate Community Reach	10
Specialty food/ Restricted Community Reach	5

7.1.5 Section Five – Food Safety Systems/Structure in Place

Purpose of this Section:

This section is designed to indicate the level of business systems used within the food sector and the level of structure the food sector is operating within.

Factors Considered:

- whether the food sector has a co-operative or industry association active in areas of food safety and, if so, the proportion of membership from within the sector
- whether the food sector operates a voluntary food safety Code of Practice, or similar tools and, if so, the proportion of businesses within the sector that have adopted the Code/tools
- whether the voluntary systems in place have been validated and verified for effectiveness in controlling food safety risks.

Assumptions made:

- where a food sector has recognised food safety risks within the sector and has voluntarily applied a structure and/or systems in order to self-regulate and control these risks there will be lower risks to food safety
- sectors will attract a 'good' risk weighting for systems/structure if voluntary systems and structures for food safety are in place and adopted by a high proportion of businesses within the sector.

Risk Weighting:

Category	Weighting
Poor systems/structure	10
Some systems/structure	5
Good systems/structure	0

7.1.6 Section Six – Appropriate Skill/Competency Levels within the Sector

Purpose of this Section:

This section is designed to indicate the level of skill/competency of people operating within the food sector.

Factors Considered:

- the approximate average level of skill/competency of people working in the food sector
- whether NZQA unit standards are available for training in appropriate skills for the food sector, and approximate proportions of attendance at such training courses.

Assumptions made:

- food sectors actively participating in food safety training, or in recruiting highly trained individuals, have a greater awareness and understanding of food safety requirements, therefore a lower food safety risk
- in some food sectors the level of food safety skill/competency required to effectively produce safe food is high. Where this is required and available an appropriate (good) rating is applied, however if required and not available a poor rating is applied
- in some food sectors the food safety skill/competency required to produce or maintain safe food is low. Where the required skills/competencies are present in the sector an appropriate (good) is rating applied, however if absent a low rating is applied (recognising the lower impact on food safety absence of such skill has).

Qualitative Values:

Risk Weighting:

Category	Weighting
Poor skill/competency	10
Low skill/competency	5
Appropriate (good) skill/competency	0

7.1.7 Section Seven – Regulatory Starting Point

Purpose of this Section:

This section is designed to indicate the level of regulation that is currently actively applied to the food sector.

Factors Considered:

- this section considers how relevant the regulation is for the sector, and also takes into consideration operational or administrative decisions in relation to application of that regulation. For example the Food Hygiene Regulations 1974 apply to the majority of food businesses in New Zealand, however, some sectors have legislative exemption from part or all of those Regulations or, through administrative decision-making, have not been subject to strict enforcement of some or all of the Regulations.

Assumptions made:

- where there are active, co-operative relationships between the regulator and the food sector there is a greater awareness and understanding of food safety requirements, therefore it is considered the food sector is likely to have a lower food safety risk
- in today's food safety environment previous exemptions, legislative or administrative, may no longer provide appropriate food safety assurance
- regulatory starting point is considered poor if current regulations are not sufficient to provide food safety assurance, particularly if that sector has been exempt from active enforcement of the Regulations
- regulatory starting point is considered irrelevant for businesses with a level of exemption from the Regulations, if the active enforcement of these Regulations would have had negligible impact on food safety assurance
- regulatory starting point is considered good if the sector is currently actively regulated, and the Regulations provide a reasonable level of food safety, although recognises that food safety may be improved by application of different or more appropriate regulatory requirements.

Risk Weighting:

Category	Weighting
Poor regulatory starting point	10
Irrelevant or Good regulatory starting point	0

8 Prioritisation Model

8.1 Prioritisation Ranking

Part two of the risk ranking model included several factors based on business or organisational factors that have an impact on food safety. These same factors can also provide an indication as to the ability of a food sector to effectively implement regulatory change. These, along with factors relating to the best place in the supply chain for effective risk control to public interest in regulation of particular sectors, are included in the Prioritisation Model.

Weighting values in this Part are scaled relative to initial judgement of the relative importance of each of the sections to implementation prioritisation. It was considered that the position a sector occupies in the supply chain has the greatest impact on priority for implementation, therefore this section (8) carries the highest value rating.

Section 9 (public interest) is considered to have the least impact on prioritisation. There is considerable variety in public opinion or expression of expectations, sometimes with approximately equal numbers of opinions for as against a particular idea or proposal. In some situations, public opinion may be based on a perception of food safety risk that is contradicted by scientific risk assessment. Therefore, while acknowledging and recognising the value of public interest, it is not the intention that public interest should outweigh food safety risk factors or key implementation factors.

8.1.1 Section eight – Part of supply chain where hazard is most effectively managed

Purpose of this Section:

This section is designed to indicate whether application of regulation within the food sector will have a positive effect on food safety, or whether such an effect may be dependant on regulation having previously been applied to a contributing food sector.

Factors Considered:

- whether the food sector will rely on supplier specifications (or procurement policy) to manage food safety risks
- whether the food sector is being relied on to manage food safety risks (would be subject to supplier specifications)
- whether the food safety practices within the sector are primarily Good Operating Practice (GOP) or contain Critical Control Point's (CCP's)
- Whether subsequent processes contain CCP's that will manage the majority of hazards.

Assumptions made:

- it is often more effective for a supplier providing products to many small businesses to manage their hazards than for each of the small businesses to specify product specifications for each supplier
- many businesses may also have hazards best managed within their sector and it is expected these will be identified and managed, in addition to those hazards identified as being best managed elsewhere.

Priority Weighting:

Category	Weighting
Hazard best managed here + pre-requisite for other sectors	15
Hazard best managed here, not pre-requisite for other sectors	10
Some hazard best managed here, but also relying on pre-requisites	5
Hazard best managed elsewhere	0

8.1.2 Section Nine – Public Interest

Purpose of this Section:

This section is designed to take account of public opinion, interest and expectations with respect to regulation of particular food sectors.

Factors Considered:

- feedback on both current regulatory systems and proposals for future regulation.

Assumptions made:

- it is in the interests of both the regulator and the food sector to meet, wherever possible, the expectations of the customer/stakeholder
- this section is not to be used to reflect any pressure or lobbying from industry or food sector groups.

Priority Weighting:

Category	Weighting
Strong Interest/High Expectations in regulation of the sector	3
No strong feedback either way	0
Against regulation of the sector	-3

There are two options for the impact on priority that Sections 10-12 in this Model can have:

Option One is to place a higher priority on sectors that have higher levels of implementation infrastructure and skill/competency for implementation, and where the regulatory impact of implementing regulations will be lower. This option is crafted on the experience gained by NZFSA with the implementation of other regulatory regimes. It has become evident that it is more effective to begin to implement regulatory change in sectors that have a greater ability and readiness to put into operation the new approaches required. An advantage with this option is that a sector that has been able to readily implement change can provide some measure of leadership and lessons for other sectors. A potential disadvantage with this option is that, due to sectors having already implemented food safety measures, the food safety environment (including levels of foodborne illness) in New Zealand may show little change until late in the implementation timeframe.

Option Two is to place a higher priority on sectors that have lower levels of implementation infrastructure and skill/competency for implementation, and where the regulatory impact of implementing regulations will be higher. This option is crafted on the assumption that businesses that have not voluntarily adopted risk management tools are likely to pose a greater food safety risk. Therefore to improve the food safety environment in New Zealand it is important to address these sectors as early as possible. Possible advantages with this option include significant improvement in the food safety environment earlier in the implementation timeframe and less impact if the implementation timeframes are extended (because businesses left towards the end of the timeframe are mostly those already managing food safety risks). A potential disadvantage with this option is that, as the sectors have few systems in place, there will be a large resource required to build regulatory relationships and systems from a negligible baseline, which may also result in higher on-going resource requirements in order to closely monitor implementation to ensure it is effective.

NZFSA has not determined the option to pursue at this stage and may proceed with neither. This would affect Section Ten: Implementation Infrastructures, Section Eleven: Skill/competency for Implementation and Section Twelve: Regulatory Impact. Weightings for these sections are therefore yet to be determined.

8.1.3 Section Ten – Implementation Infrastructure

Purpose of this Section:

This section is designed to indicate the level of organisational infrastructure in place that will support implementation of regulatory requirements.

Factors Considered:

- whether the food sector has a co-operative or industry association or established committees or groups engaging with the regulator, and whether the membership of those groups is representative of the sector
- whether the food sector has developed, or is in the process of developing, sector-wide systems for control of food safety risks (eg a Code of Practice, or similar tool), and the proportion of businesses within the sector participating in such initiatives.

Assumptions made:

- where a food sector has voluntarily applied a structure and/or systems in order to self-regulate various aspects of the sector there will be a stronger basis on which to begin to implement change
- where co-operatives and associations exist it is easier for the regulator to contact, consult with and initiate regulatory change in a greater proportion of businesses within the sector.

Priority Weighting:

Category	Weighting to be determined
Poor systems/structure	
Some systems/structure	
Good systems/structure	

8.1.4 Section Eleven

- Skill/Competency for Implementation

Purpose of this Section:

This section is designed to indicate whether the level of skill/competency of people operating within the food sector will support implementation of regulatory measures.

Factors Considered:

- the approximate average level of skill/competency of people working in the food sector
- whether NZQA unit standards are available for training in appropriate skills for the food sector, and approximate proportions of attendance at such training courses.

Assumptions made:

- food sectors actively participating in food safety training, or in recruiting highly trained individuals, have a greater awareness and understanding of food safety requirements, therefore a stronger basis on which to begin to implement change
- in some food sectors the level of food safety skill/competency required to effectively implement a FCP is high, and some specialist knowledge may be required. Where this is required and available a good rating is applied, however if required and not available a poor rating is applied
- in some food sectors the food safety skill/competency required to effectively implement a FCP is low. Where the required skills/competencies are present in the sector a good rating applied, however if absent a low rating is applied (recognising the lower impact on implementation efficiency absence of such skill has).

Priority Weighting:

Category	Weighting to be determined
Poor skill/competency	
Low skill/competency	
Good skill/competency	

8.1.5 Section Twelve – Regulatory Impact

Purpose of this Section:

This section is designed to indicate the level of regulation that is currently actively applied to the food sector.

Factors Considered:

- this section considers how relevant the regulation is for the sector, and also takes into consideration operational or administrative decisions in relation to application of that regulation. For example, the Food Hygiene Regulations 1974 apply to the majority of food businesses in New Zealand, however, some sectors have legislative exemption from part or all of those Regulations or, through administrative decision-making, have not been subject to strict enforcement of some or all of the Regulations.

Assumptions made:

- where there are active, co-operative relationships between the regulator and the food sector there is a greater awareness and understanding of food safety requirements, therefore a stronger basis on which to begin to implement change
- in today's food safety environment previous exemptions, legislative or administrative, may no longer provide appropriate food safety assurance
- regulatory impact is considered high if significant change is expected to be applied to the sector because current regulations are not sufficient to provide food safety assurance, particularly if that sector has been exempt from active enforcement of the Regulations
- regulatory impact is considered moderate if the sector is expected to be required to undergo some changes in order to implement a FCP but these are likely to be predominantly in the area of strengthened Good Operating Practice (GOP) requirements
- regulatory impact is considered low if the sector is currently actively regulated, and the Regulations provide a reasonable level of food safety, and recognises that implementation of change is more effective when regulatory relationships are already established.

Priority Weighting:

Category	Weighting to be determined
High regulatory impact	
Moderate regulatory impact	
Low regulatory impact	

9 Transition and Implementation Planning Factors

While the intention is to structure the FCP transition and the work programme for FCP implementation on risk and prioritisation factors relevant to food safety, it is recognised that other factors may influence effective implementation. These factors may change from time to time, and there may be different factors that affect implementation for a specific business or sector, or any point in time. These factors therefore cannot be effectively quantified, or assigned a qualitative value in advance.

Examples of factors that have potential to influence the final transition and implementation work programme are shown below, however this should not be considered an exhaustive list. These factors have not been incorporated into the coded model. It is envisaged these and other factors will be considered, as appropriate, by those making transition and implementation management decisions.

Factor	Possible Considerations/Consequences
<p>Transition and Implementation Timeframe</p> <ul style="list-style-type: none"> • how many food sectors will need to undergo implementation each year? 	<ul style="list-style-type: none"> • in order to implement approximately equal numbers each year there may be situations where sectors of equal risk are implemented in different years.
<p>Regulator Resources</p> <ul style="list-style-type: none"> • are sufficient people available to complete the proposed work programme? • do the available people have the appropriate skills and experience relevant to the sector/s being implemented? • are there other regulatory priorities that impact on resource availability? 	<ul style="list-style-type: none"> • allocation of resources may mean that similar sectors drawing on common resources are implemented in different transition timeframes to ensure relatively even workload over time • unavailability of people with particular skills or experience may require a delay in implementation to allow appropriate resource to be acquired or developed • implementation planning will need to consider linkages or resource competition with other regulatory programmes to ensure appropriate coverage of all areas.
<p>Planning for success</p> <ul style="list-style-type: none"> • in order to provide regular milestones of achievement, should the implementation plan provide for a mix of greater and lesser implementation challenges? 	<ul style="list-style-type: none"> • it may be a more effective use of resources and provide greater impetus/motivation if some lower risk or more easily implemented sectors are actioned early, along with some higher risk or more difficult sectors to implement

Appendix 1:

Definition Support Data

An expert elicitation exercise was run by NZFSA in May 2005 in order to rank pathogens and food combinations with respect to their risk to human health. Biological Hazards were grouped with consideration to the results from that exercise and are listed below.

Note: The hazards and associated foods/processes listed below are as used by the expert elicitation panel which, for the purposes of that exercise, considered international considerations, which may relate to imported foods (outside the scope of the risk ranking project), as well as those relevant to the New Zealand environment. When using this data for the purposes of the risk ranking exercise consideration was given only to the combinations relevant to the New Zealand environment, ie items highlighted were considered primarily relevant internationally (including imports) and not of significance to New Zealand produced food, or were not related to food for sale in New Zealand.

Where mollusca are indicated in the below table, the risk ranking team considered bivalve molluscan shellfish only.

Group 1 Biological Hazards (High Risk)

Hazard	Associated foods/processes
<i>Campylobacter</i> spp.	Poultry, red meat, water used in food production, processing or preparation
<i>Cryptosporidium</i> spp.	Water used in food production, processing or preparation
<i>E. coli</i> (ETEC)	Vegetable crops, water used in food production, processing or preparation
<i>E. coli</i> (STEC)	Raw meats, raw milk, water used in food production, processing or preparation
<i>G. lamblia</i>	Water used in food production, processing or preparation
<i>Salmonella</i> spp. (non-typhoid)	Raw meats, sesame, spices, food handling
<i>Y. enterocolitica</i>	Pork, venison, sheep meat

Group 2 Biological Hazards (Medium Risk)

Hazard	Associated foods/processes
Aflatoxin	Peanuts, milled grains
<i>C. botulinum</i>	Food in sealed containers (canned, vacuum packed), home preserved food
<i>C. perfringens</i>	Meat
Ciguatera	Seafood
<i>E. sakazakii</i> (in the neonatal population)	Infant formula
Hepatitis A	Food handling, mollusca
<i>L. monocytogenes</i> (in the YOPI population)	Long shelf life RTE foods
<i>M. avium</i> spp. <i>paratuberculosis</i> (if assuming that it is the aetiologic agent of Crohn's disease)	Milk, water used in food production, processing or preparation
<i>M. bovis</i>	Raw milk, wild foods
Norovirus	Food handling, mollusca
<i>S. paratyphi</i>	Food handling, spices, seafood
<i>S. typhi</i>	Food handling
<i>Shigella</i> spp.	Food handling, water used in food production, processing or preparation
<i>T. spiralis</i>	Pork
<i>Vibrio</i> spp	Personally imported seafood

Group 3 Biological Hazards (Low Risk)

Hazard	Associated foods/processes
<i>Aeromonas</i>	Water used in food production, processing or preparation
<i>Arcobacter</i> spp.	Poultry
<i>Bacillus</i> spp.	Starchy foods, milk powder, dairy
Biotoxin	Seafood
Histamine	Seafood
<i>S. aureus</i>	RTE meats, dairy
<i>T. gondii</i>	Meat, venison
Viruses (other than Norovirus)	Food handling

Complaint Data

The NZFSA complaints database in FoodNet was analysed by 'Food Premises Involved' and 'Food Category' to determine the total number of complaints in each category between the

years 1997 and 2005. This data has not been further analysed to separate types of complaints (labelling, causation of illness, foreign matter contamination etc).

Sector Category	Complaint Data	
	Total Number	Percentage
Retail bakery - bakery products	922	13.57
Manufactured/fermented meats – RTE	922	13.57
Food service	815	11.99
Cereal/Bakery – Bread	522	7.68
Cereal product manufacturer - shelf-stable	421	6.20
Confectionary manufacturer	355	5.22
Commercially sterilised products	342	5.03
Fresh fruit/vegetables	321	4.72
Raw meats (meat, poultry, fish)	288	4.24
Chilled meals manufacturer	248	3.65
Manufactured/fermented meats - non RTE	218	3.21
Grain processor	150	2.21
Dry mix (powder) manufacturer	136	2.00
Carbonated and uncarbonated drink manufacturer	130	1.91
Juice manufacturer	122	1.80
Chilled sauces, spreads, dips, soups manufacturer	96	1.41
Nut processor	92	1.35
Dried fruit and vegetable manufacturer	85	1.25
YOPI providers – manufacturers	73	1.07
Fresh salad manufacturer (RTE)	69	1.02
Cereal product manufacturer – perishable	68	1.00
Sugar/Honey processor	57	0.84
Brewery / Distillery / Vinegar manufacturer	53	0.78
Fruit drink manufacturer	52	0.77
(Dried) Herb and spice manufacturer	43	0.63
Oil and fat manufacturer	42	0.62
Shelf-stable condiments manufacturer	40	0.59
Crisp manufacturer	32	0.47
Iced confectionary manufacturer	28	0.41
Food additives/processing aids manufacturer	18	0.26
Egg primary processing (<100 hens)	14	0.21
Egg further processing	11	0.16
Soy product processor – SSL	5	0.07
Soy product processor – ESL	5	0.07
Total number of complaints:	6795	

New Zealand Total Diet Survey Food List

The NZ Total Diet Survey Food List was developed to identify the foods most commonly eaten by the New Zealand population in its entirety. Additional foods were then added to the list for specific population groups such as children and infants. The food list also includes a number of foods identified as high risk for contaminants and pesticides. This list comprises a total

of 110 foods that are most frequently consumed by the general New Zealand population. A further ten foods were added to this list, these being specific meats and shellfish, child and infant foods. The foods from the Food List are indicated against the relevant Food Sector category below.

Food Sector Category	Foods included in NZTDS Food List	
Brewery / Distillery / Vinegar manufacturer	91	Beer
Juice manufacturer (short shelf life 100% juice)		
Juice manufacturer (short shelf <100%juice)		
Juice manufacturer (extended shelf 100% juice)	77	Orange juice
Juice manufacturer (extended shelf <100%juice)	68	Apple-based juice
Carbonated and uncarbonated drink manufacturer	111	Water
	104	Carbonated drink
	103	Caffeinated beverage
Dry mix (powder) manufacturer	110	Tea
	108	Fruit drink, powdered
	107	Coffee, instant
	106	Coffee, ground
	105	Chocolate beverage
Horticultural producer		
Horticultural packing operations	83	Strawberry
	81	Pineapple
	78	Pear
	76	Orange
	75	Nectarine
	74	Melon
	73	Kiwi fruit
	72	Grapes
	71	Banana
	70	Avocado
	67	Apple
	64	Tomato
	63	Taro
	62	Silverbeet
	61	Pumpkin
	59	Potatoes, with skin
	58	Potatoes, peeled
	57	Peas
56	Onion	
55	Mushrooms	
54	Lettuce	

Food Sector Category	Foods included in NZTDS Food List	
Horticultural packing operations (cont)	53	Kumara
	52	Cucumber
	51	Courgette
	49	Celery
	48	Carrot
	47	Capsicum
	46	Cabbage
	45	Broccoli/Cauliflower
	44	Beetroot
	42	Beans
Apiarist/Beekeeper		
In-shore fishing vessel		
Egg primary processing (<100 hens)	34	Egg
Egg further processing		
Grain processor	15	Rolled oats
	14	Rice, white
Cereal product manufacturer - shelf-stable	88	Snack bars
	17	Weetbix
	13	Plain sweet biscuit
	12	Pasta, dried
	10	Muesli
	9	Mixed bran flake cereal
	8	Instant noodles
	7	Cracker biscuit
	6	Cornflakes
	5	Chocolate biscuit
Cereal product manufacturer - perishable	11	Muffin/Scone
	4	Cake
	3	Bread, white
	2	Bread, wheatmeal
	1	Bread, mixed grain
Retail bakery - bakery products	98	Meat pie
Retail bakery - bread products		
Crisp manufacturer	60	Potato crisps
Confectionary manufacturer – wholesale	85	Confectionary
	84	Chocolate, plain milk
Confectionary manufacturer – retail		
Iced confectionary manufacturer		
Fresh salad manufacturer (RTE)		
Frozen fruit and vegetable manufacturer		
Dried fruit and vegetable manufacturer	82	Raisin/Sultana
	79	Prune
Nut processor	102	Peanuts
(Dried) Herb and spice manufacturer		
Sugar/Honey processor	89	Sugar
	86	Honey

Food Sector Category	Foods included in NZTDS Food List	
Food additives/processing aids manufacturer		
Chilled sauces, spreads, dips, soups manufacturer	41	Soup
	28	Salad dressing
Commercially sterilised products	87	Jam
	80	Peaches, canned
	69	Apricot, canned
	66	Tomato sauce
	65	Tomatoes in juice
	50	Corn, canned
	43	Beans, baked
	35	Fish, canned
	16	Spaghetti in sauce, canned
Shelf-stable condiments manufacturer	101	Peanut butter
	90	Yeast extract
Oil and fat manufacturer	27	Oil
	26	Margarine/Table spread
Soy product processor – SSL		
Soy product processor – ESL	109	Soy milk
Manufactured/fermented meats – RTE	37	Ham
Manufactured/fermented meats - non RTE	40	Sausages, beef
	32	Corned beef
	29	Bacon
Retail butcher (no RTE)		
Retail butcher (including RTE meat)	39	Pork chop
	38	Lamb/Mutton
	33	Chicken
	31	Beef, rump
	30	Beef, mince
Chilled meals manufacturer		
Frozen meals and meal components manufacturer		
YOPI providers – manufacturers		
YOPI providers - retailers/food service		
Food retailer (retails only)		
Food retailer (handles and retails)		
Food retailer (makes, handles and retails)		
Food service (general food service)	100	Potato, hot chips
	97	Hamburger, plain
	96	Fish in Batter
	95	Chinese dish
	94	Chicken nuggets
	99	Pizza
Food service (mobile food service)		
Food service (caterers)		
Single event catering (sausage sizzle)		
Distributors and transporters		
Raw milk (farmgate sales)		





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