

Supporting document 6

Proposal P 1014 – Primary Production & Processing Standard for Meat & Meat Products

Consultation Regulation Impact Statement



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Executive summary

- **Meat production is a large high value industry in Australia which is intensely and extensively monitored and regulated. In 2011, Meat and Livestock Australia (MLA) estimated that the value of the industry was \$16 billion per year.**
- **Food Standards Australia New Zealand (FSANZ) is presently considering amending Standard 4.2.3 of the Food Standards Code to include minimal primary production requirements for traceability, inputs and management of waste for farmed animals. These changes will not apply to wild game animals.**
- **The Australian Standards presently impose obligations on processors relating to on-farm activities but there are no corresponding obligations on producers in food safety legislation. This means that in many States and Territories there is an inability to investigate food safety issues in the primary production sector without activating emergency powers under their respective Food Acts. Consequently, a range of issues are not being investigated and managed, that do not meet the definition of an emergency but, if left, could cause issues in the long term. An example could be the suspected repeated incorrect filling out of documentation provided to an abattoir.**
- **These changes will not alter the regulatory costs for the vast majority of farmers or substantially reduce risks as the meat industry is already managing risk well. However, they are seen as valuable as they will give food safety regulators improved capacity to regulate the industry more holistically across the entire production chain. Incidents still occur and will occur in the future which warrant follow up back to the primary production level. Resources would determine these situations and jurisdictions have indicated that actions would only be on a reactive basis.**
- **Recent research conducted for FSANZ on the cost of major food safety incidents found that FSANZ may have considered costs too narrowly in past and they may, in fact, be much larger than we have previously thought. The research suggests that the cost of averting behaviour and potential macroeconomic effects should be taken into account. This wider conception of costs supports the value of seeking to achieve further, albeit small reductions in risk, providing the cost is likewise small.**
- **This analysis considers two options. The status quo and a regulatory approach.**
- **The regulatory option is the FSANZ preferred option detailed above. It imposes little or no new costs on farmers as the requirements covered in the proposed amended standard are already covered by the Australian Standards. Farmers should already be in compliance with these requirements.**
- **The regulatory option is a low cost refinement which will make the regulation of meat more robust. Consultation to date indicates that this change is supported by regulators and the meat industry. More stringent regulatory options have not been considered because risks are well managed.**
- **The Primary Production and Processing Standard will provide State and Territory regulators with the ability to investigate primary production food safety matters with a view to facilitating industry compliance on an educative**

basis. Punitive measures may only require consideration once clear evidence of unacceptable practice is established.

- **Moreover, the minor adjustment to the regulatory arrangements that would be delivered through this Standard would improve the capacity of food safety regulators to regulate proactively across the entire meat supply chain and maximise the opportunity to avert potential significant economic consequences for industry and the broader Australian community that may arise from food safety incidents associated with meat.**
- **FSANZ invites comments on this Consultation RIS.**

1 The regulatory problem

1.1 Introduction

At the request of the Council of Australian Governments (COAG) Legislative and Governance Forum on Food Regulation¹, Food Standards Australia New Zealand (FSANZ) is considering food safety throughout all parts of the food supply chain for all industry sectors. In accordance with the [Overarching Policy Guideline on Primary Production and Processing Standards](#) (Ministerial Guidelines)², FSANZ is examining food safety management in the primary production and processing stages of the meat supply chain. During the first round of consultation, FSANZ progressed the work under two separate proposals, P1005 (covering cattle, sheep, goats, pigs) and P1014 (covering other animals and wild game). These two proposals are now consolidated into one proposal, P1014.

Under P1014, FSANZ is addressing meat and meat products from major and minor meat species (e.g. cattle, sheep, goats, pigs, buffalo, camels, alpacas, llamas, deer, horses, donkeys, rabbits, crocodiles, ostrich and emu) and wild game. P1014 is also considering rendered products for human consumption and natural casings.

FSANZ is presently considering amending Standard 4.2.3 of the Food Standards Code to include minimal primary production requirements for traceability, inputs and management of waste. These changes will not apply to wild game animals.

Consideration of the appropriateness of further regulation has been influenced by two factors: the existing safeguards and regulation Australia already has in place and the importance of the meat industry to Australia.

This is a Consultations RIS. As such, questions seeking further information from stakeholders are located throughout the text. In addition to this information, we would welcome any general comment, data or information on the proposed option.

1.2 Regulatory environment

1.2.1 Process to date

FSANZ began evaluating food safety management in the meat supply chain in 2009. The first stage of work, undertaken through Proposal P1005, considered meat and meat products from farmed cattle, pigs, sheep and goats using extensive and intensive farming, and harvested goats and rendered products for human consumption. The 1st Assessment Report, released in September 2009 for public consultation, is available at <http://www.foodstandards.gov.au/code/proposals/pages/proposalp1005primary4220.aspx>

A Standard Development Committee is advising FSANZ on this work. Members include major industry associations for the cattle, sheep, goat and pig industries, meat processors, the rendering industry, feedlot industry, stock feed manufacturers, the Australian

¹ Formerly known as the Australia and New Zealand Food Regulation Ministerial Council

² The Ministerial Guidelines are available at <http://www.foodstandards.gov.au/foodstandards/legislativeandgovernanceforumonfoodregulation/policyguidelines.cfm>

Government Department of Agriculture, Fisheries and Forestry, state and territory meat regulators and the Country Women's Association of Australia.

Following discussion with the SDC, FSANZ prepared Proposal 1014 in 2011 to consider risk management measures for those animals not covered under Proposal 1005, including wild game. The 1st Call for Submissions report is available at <http://www.foodstandards.gov.au/code/proposals/pages/proposalp1014primary5331.aspx>

The Meat Minor Species and Wild Game Working Group (Working Group) is advising FSANZ on the minor species and wild game work. Members include producers and processors of minor meat species and wild game e.g. crocodile, buffalo, camel, rabbit, deer, ostrich, kangaroo and emu. The membership of both committees is detailed in SD1.

This RIS is a supporting document to the 2nd Call for Submissions report for P1014 which considers meat and meat products from all meat species and wild game.

Whilst a range of regulatory issues have been considered as part of this process, the only changes that are presently proposed relate to amending Standard 4.2.3 of the Food Standards Code to include minimal primary production requirements for traceability, inputs and management of waste for farmed animals.

1.2.2 Regulatory background

P1014 has examined food safety management during the primary production and processing of meat and meat products.

1.2.2.1 Primary production

Primary production includes the rearing of animals for human consumption, feedlots, saleyards and transporters of animals (to saleyards, between properties, and to the abattoir).

The management of inputs such as the use of agricultural and veterinary chemicals (including in feed and water), the ruminant feed ban and controls on grazing are controlled under various State and Territory Acts and Regulations.

Animal/property identification is mandated in legislation and State and Territory governments require evidence at the point of animal receipt in the form of National Vendor Declarations or equivalent documentation recording management of feed and waste and animal traceability as proof or assurance that the animals have been raised in accordance with good husbandry practices and are traceable.

Legislation to control use of brands and other identification systems has been in place for many years aimed at preventing fraud and to ensure that an animal can be traced back to its owner.

Since the 1960s, a mandatory tagging system known as the Property Identification Code (PIC) has been used throughout Australia based on a unique identification code assigned to each farm or parcel of land. Property identification is required in order to trace livestock for disease control purposes. The PIC identifies the State, region and location of the property. Livestock includes one or more cattle, sheep, goats, pigs, bison, buffalo, camelids (eg alpacas, llamas, camels), equines (horses, donkeys), deer, emus or ostriches but does not include feral animals (e.g. goats, pigs, horses) while they are living in a wild or in an undomesticated state. All livestock business, such as saleyards and abattoirs must also have a PIC. However, once feral animals of a prescribed livestock species are lawfully

captured and confined, the property on which they are held must have a PIC. The intention is that animals are tagged with this number prior to leaving the property of birth.

The AS4696-2007 *Hygienic Production and Transportation of Meat and Meat Products for Human Consumption* requires animals to be sourced from holdings that have a system identify the places of production or saleyards of the animals in the consignment (for sheep, goats, camels, alpacas and llamas) and for other animals, the place of production.

The harvesting and primary processing of wild game animals is addressed by the AS 4464-2007 *Hygienic Production of Wild Game Meat for Human Consumption* and has requirements on field harvesters regarding sourcing and identification of wild game animals.

There are no requirements in the *Australia New Zealand Food Standards Code* (the Code) applying to on-farm production of meat animals but there are requirements applying to dairy cows through the measures to ensure safe dairy products under Standard 4.2.4 – Primary Production and Processing Standard for Dairy Products.

The current Production and Processing Standard for Meat in Chapter 4 (Standard 4.2.3) includes requirements for producing ready-to-eat meat only and does not include primary production requirements.

The Food Acts in the States and Territories contain offences for the production of unsafe and unsuitable food, require compliance with the Food Standards Code and contain provisions to improve safety and manage non-compliance. However, generally speaking, these Acts are not designed to manage hazards that could potentially occur in live animals. Although primary production businesses are not exempt from the general provisions to produce safe food ('food' includes live animals intended for food), primary production is exempt from certain provisions; for example, improvement notices, registration and approval of premises and auditing requirements. Also, for primary production, powers of officers are limited to reactive situations i.e. where an offence is likely to have occurred or enforcing emergency orders. Therefore, food regulators can only investigate problems and enter primary production businesses in extremely limited circumstances.

1.2.2.2 Processing

Processing includes the admission of animals for slaughter, slaughter, dressing, boning, packing and production of meat and meat products. The safety of meat and meat products in Australia is currently implemented through reference to Australian Standards. All States and Territories have legislation that requires businesses operating abattoirs/meat slaughtering facilities to be licensed or accredited and to operate in accordance with approved systems to manage meat safety and suitability. The processing of the major and minor meat species is covered by the following Australian Standards:

AS4696 - 2007 *Hygienic Production and Transportation of Meat and Meat Products for Human Consumption*

AS 4466 - 1998 *Hygienic Production of Rabbit Meat for Human Consumption*

AS 4467-1998 *Hygienic Production of Crocodile Meat for Human Consumption*

AS5010 - 2001 *Hygienic Production of Ratite Meat for Human Consumption*

AS 4464 - 2007 *Hygienic Production of Wild Game Meat for Human Consumption*

Process control is achieved through the application of hazard analysis critical control point (HACCP) methodology. These Australian Standards also require documented systems for the accurate identification of, and the ability to trace and recall, meat and meat products produced by the business. FSANZ acknowledges the role of the Australian Standards but considered that with the disbandment of the Meat Standards Committee in 2007, there was no longer a mechanism to update or review the current standards in the meat processing

sector. This issue is being resolved and therefore these standards, including the animal welfare provisions, will be retained under State and Territory legislation.

1.2.2.3 Regulatory coverage

In summary, all species are currently bound by Australian Standards at processing, with some species also having coverage at the primary production level e.g. game meat.

The Australian Standards impose obligations relating to on-farm activities on processors but there are no corresponding obligations on producers in food safety legislation. For example, AS4696-2007 *Hygienic Production and Transportation of Meat and Meat Products for Human Consumption* AS4696-2007 requires processors to only accept animals that are sourced from holdings where animals are raised according to good husbandry practices and are not fed feedstuffs that could jeopardise the wholesomeness of meat and meat products derived from the animals. The holding must also have a system for identifying disease, abnormality or treatment of animals that could affect their fitness for slaughter. In addition, Clause 6.2 of AS4696-2007 requires that meat processors source animals only from a holding that has a system in place that is capable of reliably providing a list of the place of production or the saleyards of the animals in the consignment, or the place of production of each animal or the areas from which the animals in the consignment were captured. States and Territories require evidence at the point of animal receipt, in the form of NVDs or equivalent documentation, as proof or assurance that the animals have been raised in accordance with the above good husbandry practices and are traceable. Although low in percentage terms, regulators identified incomplete or incorrect documentation as an issue raised at the abattoir level that should be addressed on farm.

One of the principal limitations of current food safety regulatory arrangements in States and Territories is the inability to investigate food safety issues in the primary production sector without activating emergency powers. This is a result of State and Territory Food Acts precluding primary food production from the definition of a food business. This excises all routine investigative powers that may be deployed to food businesses by regulators from being used on primary food production businesses. The only exception is emergency powers, which may be deployed to all businesses. However, the burden of proof required of a regulator to activate such powers is extensive and comes at high cost to both industry and government. It is preferable to implement a consistent means across jurisdictions to provide food safety regulators with the power to investigate food safety issues in primary production when necessary.

The introduction of FSANZ national Primary Production and Processing Standards has provided the means for state and territory regulators to address this gap in statutory powers in a nationally consistent manner, without requiring each jurisdiction to amend its own Food Act to provide this coverage. Primary Production and Processing Standards have been introduced into seafood, egg, poultry, dairy and seed sprouts industries, providing powers to food regulators to investigate appropriate food safety matters in primary production as they arise.

Currently regulatory powers in the meat sector are limited to processing environments only. There have been several incidents over the years where events have occurred in the meat supply chain that have been traced back to primary production environments. Only those incidents that have activated emergency powers have provided the means for State and Territory regulators to investigate. These include nitrofurans in pork and nicarbazins in poultry feed. These incidents related to inputs provided to meat animals in primary production environments and caused significant threat to established export markets. Regulators were not able to investigate these matters until routine testing results from export markets revealed positive detections. This has obvious trade implications that have the

potential to expand will beyond the specific incident. It is established industry practice for meat producers to provide declarations of evidence to meat processors on animals provided for processing regarding acceptability, e.g. withholding periods followed for any agricultural/veterinary chemicals administered to animals so that unacceptable levels of contaminants do not occur in the resultant meat. However, regulators do not have statutory powers to investigate arrangements implemented by meat producers to substantiate statements made on such declarations should meat processors be concerned with animals received. This is a longstanding concern of meat processors which, as stated above, has resulted in events with potential repercussions well beyond the animal concerned.

1.2.3 Preferred regulatory approach

The 2nd Call for Submissions report for P1014 will consider meat and meat products from all meat species and wild game and consult on a draft national standard for meat and meat products.

The preferred option at the 2nd Call for Submissions is amending Standard 4.2.3³ to include minimal primary production requirements for traceability, inputs and managing waste for farmed animals. Standard 4.2.3 would not duplicate or incorporate the Australian Standards for processing (i.e. no additional meat processing requirements would be included in Standard 4.2.3) but include an editorial note stating that processors are required to comply with specified Australian Standards under state/territory law and list the relevant standards. These primary production requirements do not apply to wild game animals.

There are three requirements for the primary production of meat:

- A meat producer must take all reasonable measures to ensure that inputs do not adversely affect the safety or suitability of meat or meat products
- A meat producer must store, handle and dispose of waste in a manner that will not adversely affect the safety or suitability of meat or meat products
- A meat producer must have a system to identify the persons –
 - (a) from whom animals were received; and
 - (b) to whom animals were supplied.

A meat producer is defined as a business, enterprise or activity that involves the growing, supply or transportation of animals for human consumption. This definition is intended to encompass businesses, enterprises and activities involved: in the rearing of animals for human consumption; the operation of feedlots and sale yards for such animals; and the transportation of such animals to and from sale yards, between properties, or to an abattoir. The animals covered by these requirements are listed in the table in the standard and include cattle, sheep, goats, pigs, buffalo, camels, alpacas, llamas, deer, horses, donkeys, rabbits, crocodiles, ostrich and emu. These animals were originally examined under FSANZ Proposal P1005 (cattle, sheep, goats, pigs) and P1014 (buffalo, camels, alpacas, llamas,

³ Standard 4.2.3 (Division 3) contains requirements for the production of ready-to-eat meat. As advised by the Meat Standard Development Committee, and agreed to by FSANZ, the current requirements in Standard 4.2.3 requirements for ready-to eat-meat and additional requirements for uncooked comminuted fermented meat are retained

deer, horses, donkeys, rabbits, crocodiles, ostrich and emu). These animals are the same as those covered under the existing Australian Standards.

These requirements for the primary production of meat would come into effect twelve months after the date of gazettal.

Clause 6.2 of AS4696-2007 requires that meat processors source animals only from a holding that has a system in place that is capable of reliably providing a list of the place of production or the saleyards of the animals in the consignment, or the place of production of each animal or the areas from which the animals in the consignment were captured. States and Territories require evidence at the point of animal receipt, in the form of National Vendor Declarations or equivalent documentation recording management of feed and waste and animal traceability as proof or assurance that the animals have been raised in accordance with the above good husbandry practices and are traceable. The inclusion of minimum primary production requirements for managing inputs and waste and traceability into the Code further add legislative requirements behind what meat producers claim on National Vendor Declarations (NVDs), which is fundamental in enabling meat processors or abattoirs to comply with their requirements.

Regulatory requirements at primary production will enable all food agencies to manage a response with powers to go back on farm. Resources would determine these situations and jurisdictions have indicated that actions would only be on a reactive basis.

This approach is consistent with the principles articulated in the Overarching Policy Guideline on Primary Production and Processing Standards that standards address food safety across the entire food chain where appropriate and deliver a consistent regulatory approach across the primary production and processing standards.

In addition to the consultation detailed below in section 5 below, the specific views on the need and value of the proposed regulatory changes was sought from all affected regulators. The responses received are included in Attachment 2.

In summary, the Primary Production and Processing Standard will provide state and territory regulators with the ability to investigate primary production food safety matters with a view to facilitating industry compliance on an educative basis. Punitive measures may only require consideration once clear evidence of unacceptable practice is established (e.g. feeding of prohibited antibiotics to meat animals such as nitrofurans). However, the fact that regulators will now have the statutory power to conduct such investigations will greatly facilitate compliance at the primary production level. This has clear benefits to all stakeholders and may avoid future events where export markets are informing Australian industry that unacceptable practices are occurring at primary production in the meat industry.

1.3 The Industry

Meat production is a large high value industry in Australia which is intensely and extensively monitored and regulated. In 2011, Meat and Livestock Australia (MLA) estimated that the value of the industry was \$16 billion per year.

The meat industry includes farmers, abattoirs, transporters, meat packing and freezing, animal oil and fat production, the manufacture of products such as bacon, hams, hamburgers, sausages and pate, exporters, live exporters and retailers.

The meat supply chain consists of:

- primary production
 - production of animals
 - transport to sale yards, between properties and to the abattoir
 - holding the animals at the sale yards
- processing
 - lairage, slaughter, dressing and boning
 - further processing into products such as natural casings and rendered products.

A description of the key sectors of Australia’s major meat industries, namely cattle, sheep, goat and pig is provided below. It is followed by a table listing and providing relevant statistics for minor and game meat species.

1.3.1 Production

Current production of meat in Australia is around 3 million tonnes annually.⁴ According to the Australian Productivity Commission, there are around 190,000 farms in Australia that produce animals for meat, about 70 per cent of them supplying red meat. There are about 2,000 meat businesses at the pre-retail stage of the production chain and according to MLA estimates, about 3,000 independent butchers.

In Australia, there are currently about 28 million cattle and 73 million sheep, and the production and consumption of red meat is as follows:

Table 1 Red Meat – 2011 Production⁵

Red Meat	Production (kilotonne)	2,981
	Exports (kt)	1,750
	Domestic consumption (kt)	1,508

In 2011 the domestic consumption of beef and veal was 33 kt, lamb and mutton 9 kt and pig meat 25 kt.⁶ The cattle and sheep industry are concentrated in New South Wales, Victoria and Queensland.⁷

⁴ ABS *Livestock and Meat, Australia*, Report 7218.0.55.001 (Mar 2013)

⁵ ABARES Agricultural Commodity Statistics 2012 Canberra

⁶ ABARES Agricultural Commodity Statistics 2012 Canberra

⁷ www.pc.gov.au/_data/assets/pdf_file/0004/93514/11-chapter9.pdf

Table 2 Cattle and sheep by state in 2011 (in millions)⁸

	Cattle	Sheep
New South Wales	5.710	26.825
Victoria	3.97	15.212
Queensland	12.612	3.653
South Australia	1.252	11.009
Western Australia	2.067	14.0
Tasmania	0.689	2.344
Northern Territory	2.197	-
Australian Capital Territory	0.009	0.054
Total	28.506	73.009

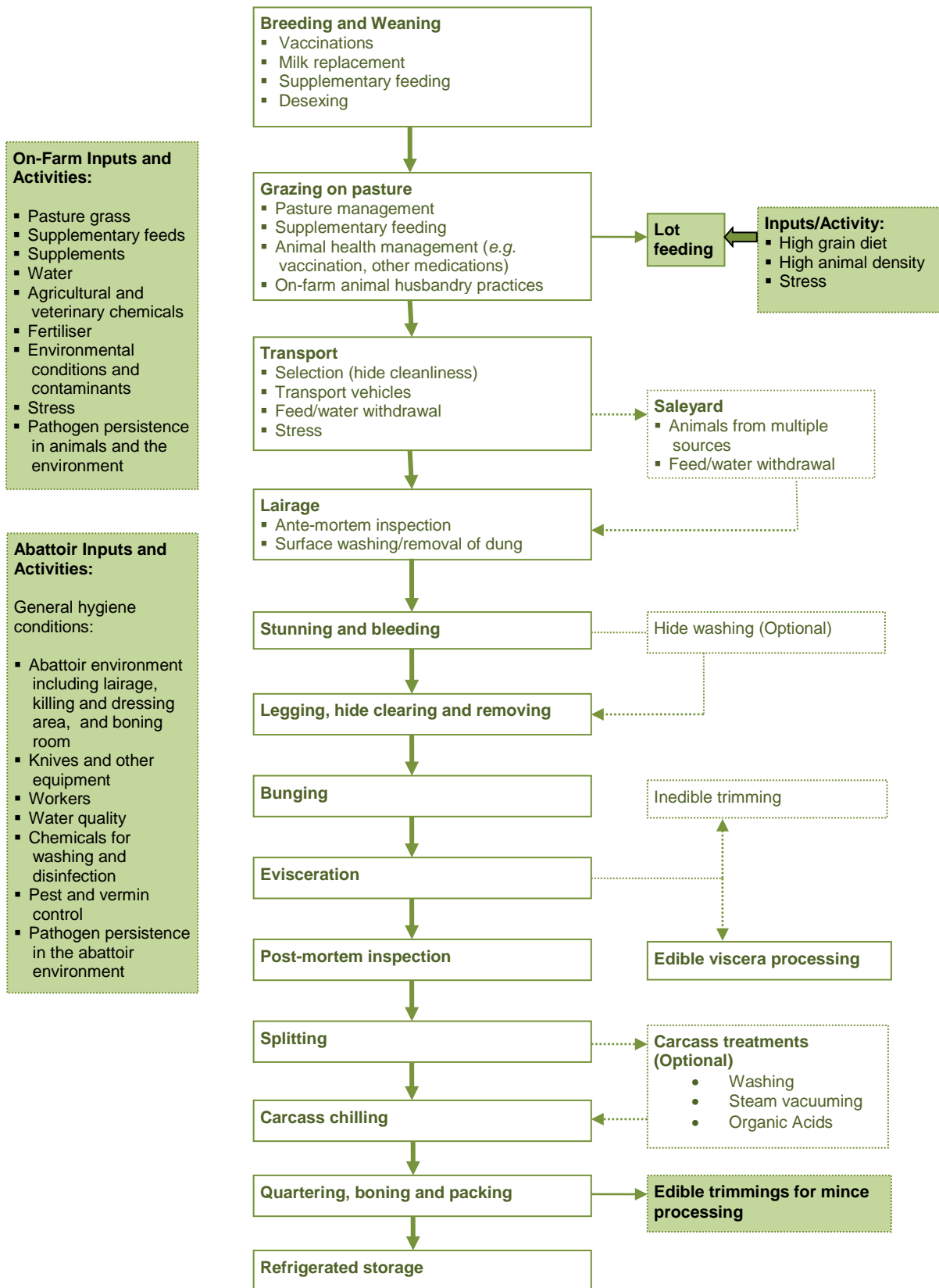
Question 1

Are there any specific state or territory industry issues that you believe we should be taking into account in doing our analysis?

The key steps in the production and processing of farm animals are summarized in Chart 1 below.

⁸ ABARES 2012

Chart 1 Production and processing of farm animals



1.3.1.1 Cattle production and processing

Cattle production in Australia is based on extensive farming systems, which range from the harsh, dry climates of the north to the cooler, wetter, green pastures of southern Australia. Significant differences exist between climatic and geographical conditions, and on the breed of animal grown and the production practices employed.

Beef production systems are evolving from extensive to semi-intensive and intensive units across Australia. Producers are switching to cow-calf operations, producing young cattle for feedlots or the live export trade, and reducing production of grass fed animals.

The major inputs during production are feed and water, with supplementary feeding at certain times of the year or during drought. There is an increasing trend towards finishing cattle on feedlots. Feedlots provide some advantages over traditional extensive cattle production, including enhanced control over quality and attributes of the carcass.

Until receipt at the feedlot yards, cattle finished on feedlots are initially subjected to the same production methods and inputs as extensively reared cattle. Once in the feedlot environment, cattle are more contained, restricted in their movements, are at higher stocking rates and exposed to greater environmental influences (i.e. environmental conditions including heat).

1.3.1.2 Sheep production and processing

The sheep industry is concentrated in New South Wales, Western Australia and Victoria with the main outputs being lamb meat and mutton. There is a large export trade, including live sheep exports to the Middle East.

Primary production of lambs and sheep are predominantly based on extensive production systems. The most efficient way to produce lambs is on quality pasture.

The major inputs during primary production are feed and water, with some supplement feeding undertaken to achieve target growth rates. Cereal grains tend to be the most cost-effective form of feed supplementation. There is also an increasing trend towards finishing lambs in feedlot environments.

The majority of sheep are processed in medium and large abattoirs, some of which slaughter up to 10,000 animals per day.

1.3.1.3 Goat production and processing

Goat meat production in Australia involves a combination of strategies: the harvesting of rangeland goats; the breeding and production from rangeland goats; and the processing of farmed goats. The majority of goat meat is derived from rangeland goat populations, and these animals provide landholders with a source of goats suitable for cross-breeding with the main meat species such as Boer goats.

The majority of goats slaughtered in Australia are derived from harvesting operations. Feral goats are present over much of Australia, with the largest numbers found in the semi-arid pastoral areas of Western Australia, western New South Wales, southern South Australia, and central and south-western Queensland.

Around 1.6 million goats are slaughtered a year in Australia. Though not a significant producer (ranking 43rd in the world for herd size), Australia is the largest exporter of goat meat. In 2011–12, 24 kilotonnes of goat meat, valued at \$114 million was exported. The USA

and Taiwan are the main importers. Live goats to the value of \$10 million were exported in the same period, mainly to Malaysia, Singapore and Brunei.⁹

1.3.1.4 Pig production and processing

Pig production occurs predominantly in the grain belts of Australia reflecting the reliance on grain as the major source of pig feed.

Pig production systems range from extensive outdoor farms to intensive farms. The vast majority of pigs are intensively reared, using all-in all-out production strategies. These all-in all-out systems generally use weekly batch farrowing methods, where sows are placed into groups to allow matings and farrowings to occur at distinct weekly intervals, making grouped movement and marketing of pigs more easily managed. Such systems make extensive use of artificial insemination.

There is increasing use of off-site grow-out facilities, rather than single site farrow-to-finish operations. This minimises the transfer of infectious diseases from breeders to market pigs and also reduces stress. Under these production arrangements, there has been greater use of lower-cost 'shelter' facilities that group-house pigs on bedding (straw or rice hulls) rather than traditional sheds.

There is some limited outdoor production practiced with sows and litters in southern Australia, with grower pigs usually brought into sheds or shelters after weaning.

Once grown to market size, pigs are taken to abattoirs for processing. Most pigs in Australia are slaughtered in dedicated pig processing facilities.

Australia slaughters about 4.7 million pigs per year. On a state basis, South Australia slaughters the greatest number of pigs (1,233,000) followed by Queensland (1,089,000), New South Wales (942,000), Victoria (924,000), Western Australia (510,000) and Tasmania (35,000). Australia produces about 356 kilotonnes carcass weight and exports about 34 kt of pig meat a year. Exports are valued at about \$100 million (Source: Australian Pig Annual 2011-12).

1.3.1.5 Minor species

The volume of meat produced from minor species is much lower than that of the major meat species. A summary of industry is provided in the following tables. These figures were sourced directly from industry participants.

Table 3 Annual Production Volumes and Indicative Value of Minor Meats

Meat Species	Total annual production (tonnes)	Export volume (tonnes)	Domestic volume (tonnes)	Retail value/Kg
Kangaroo	21,000 (for humans)	15,000	6,000	\$6
Rabbit	260	0	260	\$14.50

⁹ Meat & Livestock Australia 2013

Meat Species	Total annual production (tonnes)	Export volume (tonnes)	Domestic volume (tonnes)	Retail value/Kg
Deer	288	200	88	\$35.00 - \$65.00
Ostrich	30	29.3	0.3	\$16.50 \$30.00 (premium fillets)
Buffalo	35	8	27	\$2.70 (manufacturing carcass) \$3.60 - \$4.00 (restaurant trade carcass)
Camel	250	250		
Crocodile	100	60	40	\$10.00 - \$20.00
Emu	88.7	18.6	70.1	\$5 - \$30

Information provided to FSANZ by industry

Question 2

Are there any additional minor species statistics that you believe would be useful to this analysis?

1.3.2 Exports

Australia's meat industry is heavily dependent on exports, which account for around 65 per cent of the country's beef, 45 per cent of lamb and 80 per cent of mutton. Export markets are very sensitive to food safety issues. Between 2010–11 and 2015–16, beef production is projected to increase by around 10 per cent, sheep meat production by 12 per cent and pig meat production by 7 per cent.

Table 4 Australia's Exports in 2011–12¹⁰

Meat	Weight/numbers	Value (\$m)
Beef & veal	948 kt	4,466
Mutton	89 kt	362
Lamb	174 kt	1,061
Live animals		
Sheep	2.562 million	345
Cattle	0.579 million	412

The main destinations of Australia's beef, veal and live cattle exports in 2011/12 were¹¹:

Table 5 Beef and Live Cattle Export Destinations 2011–12

Meat Exports	Destination	Volume (kt)
	USA	205

¹⁰ ibid

¹¹ ibid

Meat Exports	Destination	Volume (kt)
	Japan	326
	Republic of Korea	123
	Total	948
Live Animals		Numbers (thousands)
	Indonesia	376
	Israel	60
	Turkey	37
	Egypt	32
	Philippines	24
	Total	578

The main destinations of Australia's of sheep and sheep meat exports in 2011–12 were¹²:

Table 6 Mutton, Lamb and Live Sheep Export Destinations 2011–12

	Destination	Volume (kt)
Mutton		
	Middle East	42.7
	Total	89.1
Lamb		
	Middle East	42.7
	USA	35.0
	China	24.6
	Total	173.8
Live Sheep		Numbers (millions)
	Middle East	2.232
	Turkey	0.293
	Total	2.562

1.4 Risk

The Australian Productivity Commission in its report on *Performance Benchmarking of Australian and New Zealand Business Regulation: Food Safety*, released on 22 December 2009, stated that the red meat industry is well regulated and intensely monitored. The Commission indicated that “red meat exporters incur greater costs and more regulatory intervention than any other businesses.”

With regard to food borne illness, sixty-six outbreaks associated with meat products in Australia were reported to OzFoodNet between January 2003 and June 2008. However these outbreaks, which were attributed to Salmonella serotypes, *Clostridium perfringens* and *Staphylococcus aureus*, resulted largely from undercooking and temperature abuse post-cooking.

¹² ibid

FSANZ has concluded that there were few unmanaged food safety risks pertaining to meat, and at First Assessment for cattle, sheep, goats and pigs, proposed maintaining the status quo, supplemented with greater self-regulation that could be cost effectively managed. Subsequent consultation with a range of stakeholders, particularly those who had a more overarching view, a long-term perspective and a more holistic approach to the meat industry, revealed a number of concerns and that cost effective steps could be taken to better manage risk. Consequently for the minor meat species and wild game, FSANZ proposed two options at 1st Call for Submissions, i.e. develop a draft national standard containing minimal primary production requirements, where relevant, for traceability, inputs and managing waste; and transfer of the processing controls in the Australian Standards into the Code or abandon the Proposal after considering submissions received from the first round of public comment.

In the early stages of this work, FSANZ acknowledged the role the Australian Standards for processing have played in ensuring the safety of meat in Australia, but considered that with the disbandment of the Meat Standards Committee in 2007, there was no longer a mechanism to update or review the current standards in the meat processing sector. This issue is being resolved and therefore the food safety elements in the Australian Standards do not need to be incorporated into the primary production and processing standard for meat and meat products in the Code. These documents, and therefore the animal welfare provisions, will be retained under state and territory legislation.

Consequently, the options for consultation now focus on whether the Code should include primary production requirements for all meat species, where applicable.

1.5 The problem

FSANZ is presently considering amending Standard 4.2.3 of the Food Standards Code to include minimal primary production requirements for traceability, inputs and management of waste for farmed animals. These changes will not alter the regulatory costs for the vast majority of farmers or substantially reduce risks as the meat industry is already managing risk well. However, they are seen as valuable as they will give food safety regulators improved capacity to regulate the industry across the entire production chain. Incidents still occur and will continue to occur in the future which will warrant follow-up actions going right back to the primary production level. It has been identified that there is a jurisdictional gap in the food regulatory coverage with respect to agencies with public health functions under States and Territory Food Acts, in taking action back to primary production level in the event of an incident. Resources would determine these situations and jurisdictions have indicated that actions would only be on a reactive basis.

Given the financial importance of the meat industry to Australia, FSANZ is conscious of the need to ensure that regulation is as well designed as possible to reduce risk where possible. Likewise, it is conscious of the significant possible financial impact of a poorly designed regulatory intervention in relation to an industry that is already heavily regulated.

Past regulatory interventions in relation to other types of food have been extremely conscious of the direct costs of food related illness. For example, it is estimated that the direct costs of Salmonella and e-Coli related illness are \$2,011 and \$213 per case respectively¹³. Potential industry-related costs of an outbreak are also magnified by the high levels of exports. Even with a minor game meat like kangaroo, when Russia, citing high

¹³ FSANZ Cost of Illness Model 2013- unpublished

levels of bacterial contamination, imposed a four year ban on imports in 2005, they halved kangaroo meat exports.

Professor James Butler from the Australian National University has prepared a research paper for FSANZ exploring the cost of major food safety incidents (Developing a RIS for Meat – Attachment 1). His paper concludes that we have considered costs too narrowly in the past and they may, in fact, be much larger than we have previously thought. The report argues that many studies of the cost of illness associated with foodborne illness have neglected two potentially important categories of cost:

- **Averting behaviour:** This refers to the behaviour of individuals who seek self-protection from the risks of foodborne disease by changing their behaviour to achieve this. An example is the rearrangement of consumption patterns to avoid exposure to foodborne diseases. While studies of this behaviour in the context of foodborne disease are lacking, studies of behaviour in response to other similar risks (such as waterborne disease) suggest averting behaviour costs can be substantial.
- **Macroeconomic effects:** When behavioural change to achieve self-protection from disease risk becomes widespread in a community, it can have measurable effects on the economic well-being of the community in terms of GDP, employment and exports. These economic impacts can give rise to economic costs that are magnitudes greater than the direct and indirect costs for those who fall ill. The report demonstrates this by reference to the SARS outbreak and to analyses of the effects of pandemic influenza. The SARS outbreak is particularly instructive as the numbers of cases and deaths were modest but led to a disproportionate economic impact. No work of this type has yet been done with respect to foodborne disease.

This wider conception of costs supports the value of seeking to achieve further, albeit smaller reductions in risk, providing the cost is likewise small.

Question 3

Do you have any evidence that supports or refutes Professor Butlers characterisation of costs (his paper is included as Attachment 1)

FSANZ needs to ensure that the cost of regulation does not exceed the benefits. Given that a high level of regulation already exists, diminishing returns are likely to exist for further regulation. For example, if jurisdictions were required to make periodic health and safety inspections of all farms, major costs would be incurred. Given that there are around 190,000 farms in Australia that produce animals for meat, about 70 per cent of them supplying red meat (see section 1.3 above), one inspection a year could be extremely expensive. Indicative costs could be as follow:

70% of 190,000 farms= 133,000 red meat farms.

Given the geographical spread of the red meat industry across some of the largest states, see Table 2 above, and given the remote location of many farms, actual costs of inspections by jurisdictions would likely be prohibitive.

Even if we use a modest average inspection cost of \$400 per farm visit, an estimate arrived at from an informal discussion with a food regulator, and assuming each farm is inspected annually; for 133,000 farms nationally, the total annual costs to government would be \$53 million per annum before industry costs are taken into account.

Therefore, any changes to the regulatory environment need to be tightly focused and mindful of the cost. However, given the size and importance of the industry and the potential cost of a food safety-related incident, opportunities to improve regulation and reduce risk even further need to be further considered in consultation with industry.

2 Objectives

In developing or varying a food standard, FSANZ is required by its legislation to meet three primary objectives which are set out in section 18 of the FSANZ Act. These are:

- the protection of public health and safety;
- the provision of adequate information relating to food to enable consumers to make informed choices; and
- the prevention of misleading or deceptive conduct.

In developing and varying standards, FSANZ must also have regard to:

- the need for standards to be based on risk analysis using the best available scientific evidence;
- the promotion of consistency between domestic and international food standards;
- the desirability of an efficient and internationally competitive food industry;
- the promotion of fair trading in food; and
- any written policy guidelines formulated by the COAG Legislative and Governance Forum on Food Regulation.

The principal objective of this proposal is to enhance the ability of food regulators at state and territory level to respond to a food safety incident in the future and thereby mitigate and contain the possible harm that may result from illness and loss of reputation. The second objective is to deter any possibility of producers failing to comply with the existing standards, by empowering jurisdictions to legally act against non-compliance by visiting farms when a problem is detected.

While the risk of an outbreak of serious illness through food contamination in Australian meat and meat products is extremely low, its impact on confidence in Australian meat exports could be catastrophic should one occur. Therefore, even small reductions in risk are likely to be worthwhile if they can be achieved cost effectively. This proposal seeks to optimise the regulatory framework by ensuring that health risks are managed at the point in the food chain where the risk is located.

3 Options

In order to decide on the most cost-effective approach to achieving these objectives, this proposal considers two options. The two options considered are the *status quo* and a regulatory option.

3.1 Option 1 – Abandon the Proposal

Under the *status quo* processors will continue to need to comply with Australian Standard pursuant to state and territory legislation. They will be responsible for accepting suitable animals from producers. The Australian Standards impose obligations relating to on-farm activities on processors but there are no corresponding obligations on producers in food safety legislation. The Food Standards Code currently does not contain requirements that

address hazards and traceability during primary production of the major and minor meat species.

3.2 Option 2 – Regulatory option

The regulatory option involves amending Standard 4.2.3 to include minimal primary production requirements for traceability, inputs and management of waste. Standard 4.2.3 would not duplicate or incorporate the Australian Standards for processing (i.e. no additional meat processing requirements would be included in Standard 4.2.3) but include an editorial note stating that processors are required to comply with specified Australian Standards under state/territory law and list the relevant standards. These primary production requirements would not apply to wild game animals.

There would be three requirements for the primary production of meat:

- a meat producer must take all reasonable measures to ensure that inputs do not adversely affect the safety or suitability of meat or meat products
- a meat producer must store, handle and dispose of waste in a manner that will not adversely affect the safety or suitability of meat or meat products
- a meat producer must have a system to identify the persons –
 - (a) from whom animals were received; and
 - (b) to whom animals were supplied.

A meat producer is defined as a business, enterprise or activity that involves the growing, supply or transportation of animals for human consumption. This definition is intended to encompass businesses, enterprises and activities involved: in the rearing of animals for human consumption; the operation of feedlots and sale yards for such animals; and the transportation of such animals to and from sale yards, between properties, or to an abattoir.

The animals covered by these requirements are listed in the table in the standard and include cattle, sheep, goats, pigs, buffalo, camels, alpacas, llamas, deer, horses, donkeys, rabbits, crocodiles, ostrich and emu. These animals were originally examined under FSANZ Proposal P1005 (cattle, sheep, goats, pigs) and P1014 (buffalo, camels, alpacas, llamas, deer, horses, donkeys, rabbits, crocodiles, ostrich and emu). These animals are the same as those covered under the existing Australian Standards.

4 Impact analysis

4.1 Affected parties

Parties that have been identified as potentially being affected by this Proposal include: industry (including those involved in production of animals, transporting animals, processing of meat and meat products and retail), consumers of meat products and government.

4.2 Option 1 – Maintain the *status quo*

The present arrangements are managing risk well. Maintenance of the status quo will obviously mean no additional costs will be incurred by industry, government or consumers.

However, given the uncertainty of the size of the costs associated with a food safety incident, further regulation may be warranted.

One of the principal limitations of current food safety regulatory arrangements in States and Territories is the inability to investigate food safety issues in the primary production sector without activating emergency powers. Currently regulatory powers in the meat sector are limited to processing environments only. There have been several incidents over the years where events have occurred in the meat supply chain that have been traced back to primary production environments. Only those incidents that have been sufficiently serious and immediate in their threat have led to the activation of emergency powers. This is a longstanding concern of meat processors and has resulted in events with potential repercussions well beyond the animal concerned. A lower threshold to investigate on-farm would provide regulators with an increased ability to appropriately manage risk. An example could be investigation of the suspected, repeated incorrect filling out of documentation provided to an abattoir despite there being no immediate or clearly established risk to human health.

4.3 Option 2 – Limited regulatory requirements

The development of food regulatory measures in the Code for the on-farm production of meat establishes through-chain oversight of the production and processing of meat for domestic consumption. Under this option, regulators can act on non-compliance by a primary producer and can continue to act on non-compliance by processors as per the current arrangements.

The following cost and benefits exist under this option:

Table 7 Costs and Benefits of Regulatory Option

Social Group	Impacts
Meat Industry	
Meat Producers	
Costs	An additional small number of producers, in response to a potential regulatory penalty, may decide to comply with current regulation and voluntary schemes. Please note that compliance with proposed requirements is already required by law and by meat processors before they can process an animal. No licensing or inspection fees are proposed as part of the implementation of the standard.
Benefits	A small reduction in the risk of a food safety incident with its associated costs to industry.
Meat Processors	
Costs	No foreseeable costs.
Benefits	A small reduction in the risk of a food safety incident with its associated costs to industry. Potentially reduced difficulty in ensuring the correct paperwork and procedures are followed by meat producers as a result of the threat of a regulatory sanction.

Social Group	Impacts
Consumers	
Cost	Potentially a very small increase in the cost of meat as a result of costs being passed down the supply chain.
Benefit	<p>A small reduction in the risk of a food related illness and its associated costs to both them and their employer.</p> <p>A small reduction in the risk of the loss associated with averting behaviour taken in response to others getting sick.</p> <p>A small reduction in risk of incurring the macro-economic costs of a major outbreak.</p>
Government	
Food Regulators	
Costs	Whilst food regulators may bear some costs undertaking a small number of inspections in response to specific issues, as experienced risk managers they will not expend resources unless they believe the benefits of the reduced risk is likely to exceed the costs.
Benefits	<p>Improved capacity to regulate the industry across the entire production chain. This will potentially reduce the risk of an incident and reduce the cost of an incident if it were to occur. Resources would determine these situations and jurisdictions have indicated that actions would only be on a reactive basis.</p> <p>A small reduction in the risk of a food related incident and its associated cost to food regulators – e.g. the cost of managing a major outbreak.</p>
General	
Costs	No foreseeable costs.
Benefits	<p>A small reduction in the cost of health care associated with food related illness not borne directly by the consumer or their employer.</p> <p>A small reduction in risk of incurring the macro-economic costs of a major outbreak.</p>

4.3.1 Costs

4.3.1.1 Industry

If producers and processors are currently complying with existing legal requirements, they will be already compliant with the proposed Standard. Meat processors should already be requiring written assurances of compliance through NVDs or other documentation. Most, if not all, producers have systems in place that allow them to provide these assurances and to comply with existing legislation covering traceability, agricultural and veterinary chemical use and animal welfare requirements. The threat of a regulatory sanction may encourage a small number of producers who are presently not complying with requirements to become compliant.

Question 4

Do you agree that this option requires no additional action by producers?

Question 5

Do you believe some industry participants may not be in compliance with existing primary production regulatory controls? If so, how many farmers would not be in compliance? What volume of meat production would this represent?

Question 6

If an industry participant is not complying with present primary production regulatory controls, how much would it cost to become compliant?

4.3.1.2 Consumers

Some of the cost of additional meat producers becoming compliant with existing requirements may be passed on to consumers. However, given the very high level of compliance with existing requirements, this additional cost is likely to be very small.**4.3.1.3**

4.3.1.3 Government

While providing jurisdictions with the authority to go on-farm in the event of an outbreak of illness, the Standard is not expected to impose additional costs on jurisdictions. Jurisdictions have indicated that they will not be undertaking on-farm audits as a matter of course. However, if there is a food safety issue, and there are compelling reasons, they will now have the ability to go back on farm to investigate. The Compliance Plan for the Primary Production and Processing Standard for Meat and Meat Products is set out at Attachment 3.

4.3.2 Benefits**4.3.2.1 Industry**

Industry will benefit from a small reduction in the risk of a food safety incident occurring.

The introduction of a through-chain standard, the enhancement of traceability and the provision for jurisdictions to go on farm may increase the level of consumer confidence in both the domestic and export markets.

The proposed regulation may also potentially reduce difficulty in ensuring the correct paperwork and procedures are followed by meat producers as a result of the threat of a regulatory sanction. This will reduce costs for meat processors.

Question 7

Do you believe that the reduction in risk as a result of the proposed regulation can be more accurately characterised and possible quantified? If so, can you please provide us with additional information or data to assist us to do so.

4.3.2.2 Consumers

Consumers will experience a small reduction in risk of becoming ill as result of eating unsafe meat.

Consumers will experience a drop in the risk of experiencing costs as a result of a reduction in averting behaviour when others become sick. Additionally, if the meat industry retains consumer and community confidence, then adverse economic impact may be quarantined.

Macroeconomic effects in cost terms could be of far greater magnitude than the direct and indirect costs of those who fall ill.

4.3.2.3 Government

Food regulators' improved capacity to regulate proactively across the entire production chain should reduce the risk of an incident and reduce the cost of a major incident if it were to occur. The capacity to regulate across the whole production chain accords with the general HACCP philosophy that it is often cheapest and most effective to attempt to manage a risk at the point in the production chain at which it is introduced. The increased scope for regulators to operate proactively across the whole food production chain will also better ensure that traceability systems are being maintained and that causation is more quickly established in non-emergency situations reducing the harm caused by food safety incidents

There will also be an expected small reduction in the health care costs associated with food related illness not borne directly by the consumer or their employer. Finally, there will be a small reduction in risk of incurring the macro-economic costs of a major outbreak (identified by Professor Butler) which government would be responsible for.

4.4 Comparison of options

The uncertainty in the level of risk reduction from extending the Code to cover on-farm activities makes benefits extremely difficult to quantify. Likewise, the reported high rates of compliance with existing regulatory controls means there will be no increase in costs for the vast majority of farmers. The location of the residual risk in the meat production process will determine the extent to which it will be reduced by an additional regulatory requirement. However, given the significant value of the industry and its sensitivity to food safety related issues, this small adjustment to the regulatory system to enable food regulators to take prompt action, when necessary, at any one or more stages of the meat supply chain, is a reasonable step and one that is likely to yield a net positive benefit to economy as a whole.

5 Consultation

The FSANZ process to date has been consultative and transparent, and has sought to engage with the industry concerned, state and territory government agencies, and consumers. To assist in developing standards, FSANZ established the Meat Standard Development Committee and the Meat Minor Species and Wild Game Working Group to provide scientific, technical, regulatory/enforcement, benefit and cost analysis and other relevant input.

FSANZ has undertaken a number of industry visits to better understand the current production and processing practices for the animals being assessed and to identify any specific issues with this Proposal particularly for the minor meat species and wild game industries.

The First Assessment Report for the major meat species was released for public comment from 23 September 2009 to 11 November 2009. Twenty-two submissions were received from:

- The Victorian Government
- The Board of Safe Food Production, Queensland
- Health Protection Directorate, Queensland Health as the lead agency for the Queensland
- Department of Health Western Australia
- New South Wales Food Authority
- Australian Quarantine and Inspection Service (AQIS)
- Department of Agriculture, Fisheries and Forestry- Food Regulation Policy Branch
- New Zealand Food Safety Authority
- AMIC - Australian Processor Council on behalf of domestic and export meat processor sectors of AMIC (Gary Burrige)
- Australian Meat Industry Council –independent and meat retailing and smallgoods manufacturing sectors of AMIC
- Food Technology Association of Australia
- Australian Pork Limited
- Australian Lot Feeders' Association
- Stock Feed Manufacturers' Council of Australia
- New South Wales Farmers' Association
- Cattle Council of Australia and Sheepmeat Council of Australia
- Professional Food and Pharmaceutical Services
- Meat and Livestock Australia
- Tasmanian Farmers & Graziers Association
- Greg Bachmann, Jemalong Pastoral Company, Queensland.
- Australian Dairy Industry Council and Dairy Australia
- SAFEMEAT

The 1st Call for Submissions report for the minor meat species and wild game was released for public consultation from 26 March 2012 to 4 June 2012. Eleven submissions were received from:

- South Australia Health
- New South Wales Farmers' Association
- Queensland Health
- NSW Food Authority
- Australian Crocodile Traders
- Tasmanian Farmers & Graziers Association

- New Zealand Ministry for Primary Industries
- Crocodile Farmers Association of Northern Territory
- Wildflower Alpacas
- Food Technology Association of Australia
- Deer Industry Association of Australia

A range of issues were raised in these submissions not all of which are relevant to this RIS. However, a number of submissions stated that the current controls along the meat supply chain are working well and questioned the cost-benefit of introducing additional regulatory measures for producers and processors. Specifically, the potential increase in regulatory burden and impact on the viability of the kangaroo meat industry was raised noting that there are existing regulatory requirements for processing. The preferred option proposes no additional regulatory requirements for processing i.e. it would retain the current Australian Standard. In regard to kangaroos, the existing Australian Standard AS 4464:2007 - Hygienic Production of Wild Game Meat for Human Consumption contains requirements for managing inputs and traceability at the primary production stage such as the sourcing of wild game animals and identification of field harvester and place of harvest. Further consultation, including through this document, will take place as part of this standard development process.

6 Conclusion

Having reviewed the two possibilities, the regulatory option is the preferred option. The regulatory option appears to be very low cost, seeking only to increase the rate of compliance with existing obligations. These changes will not alter the regulatory costs for the vast majority of farmers nor substantially reduce risks, although it could be expected that there would be a small reduction in risk that is commensurate with the small additional cost that would be imposed on those few farmers who are not currently complying with existing obligations. Moreover, the minor adjustment to the regulatory arrangements that would be delivered through this Standard would improve the capacity of food safety regulators to regulate proactively across the entire meat supply chain and maximise the opportunity to avert potential significant economic consequences for industry and the broader Australian community that may arise from food safety incidents associated with meat.

As a Consultation RIS we welcome additional comments, information and data that you believe we should take into account in developing the Decision RIS.

7 Implementation and review

If regulatory changes are made they will come into effect twelve months after the date of gazettal.

State and territory regulatory agencies and the Department of Agriculture, Fisheries and Forestry would be responsible for implementing any standard. The Meat Implementation Working Group, a national working group with membership from these agencies have developed a national compliance plan for the draft variation to Standard 4.2.3. The key principle underpinning the compliance arrangements for the Standard is that if businesses are currently complying with existing legal requirements, and continue to do so, they will comply with the future meat standard.

Attachment 1 - Developing a RIS for Meat by Professor James RG Butler
Attachment 2 – Consultation with Regulators



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Attachment 3 - Compliance Plan for the Primary Production and Processing Standard for Meat and Meat Products

Attachment 1

Developing an RIS for Meat: Extending the measurement of benefits from increased government regulations

James RG Butler

A Report prepared for Food Standards Australia New Zealand

June 2012



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Executive Summary

This report considers a problem faced by FSANZ in its development of an RIS for meat and meat products. In considering options to extend regulations governing the primary producers and processors of meat and meat products, FSANZ argues that the resulting reduction in risk, in comparison with maintaining the status quo mix of industry self-regulation and government regulation, is very small. On this basis it proposes not to consider health benefits in its assessment of the options to extend government regulations.

This situation is one involving low-probability but potentially catastrophic events. A serious outbreak of foodborne disease, if it occurs, could give rise to considerable economic costs. The avoidance of those costs would constitute a significant benefit to be considered alongside the cost of any extension of government regulations. This report argues that many studies of the cost of illness associated with foodborne illnesses have neglected two potentially important categories of cost:

- **Averting behaviour:** This refers to the behaviour of individuals who seek self-protection from the risks of foodborne disease by changing their behaviour to achieve this. An example is the rearrangement of consumption patterns to avoid exposure to foodborne diseases. While studies of this behaviour in the context of foodborne disease are lacking, studies of behaviour in response to other similar risks (such as waterborne disease) suggest averting behaviour costs can be substantial.
- **Macroeconomic effects:** When behavioural change to achieve self-protection from disease risk becomes widespread in a community, it can have measurable effects on the economic well-being of the community in terms of GDP, employment and exports. These economic impacts can give rise to economic costs that are magnitudes greater than the direct and indirect costs for those who fall ill. The report demonstrates this by reference to the SARS outbreak and to analyses of the effects of pandemic influenza. The SARS outbreak is particularly instructive as the numbers of cases and deaths was modest but led to a disproportionate economic impact. No work of this type has yet been done with respect to foodborne disease.

Consequently it is suggested that FSANZ consider undertaking further work on these two aspects of foodborne disease with a view to obtaining a more complete picture of the economic costs of foodborne disease and hence a more complete picture of the benefits of avoiding them.

Introduction

1.1 Background

Food Standards Australia New Zealand (FSANZ) has been considering the development of national food safety measures for the Australian meat industry. This is part of a broader remit to FSANZ from the Australia and New Zealand Food Regulation Ministerial Council to consider food safety throughout all parts of the food supply chain for all food industry sectors. In pursuing this remit, FSANZ has been extending the food safety provisions in the *Australia New Zealand Food Standards Code* to primary production through the development of primary production and processing (PPP) standards.

Currently, the meat industry relies heavily upon industry self-regulation in the primary production sector and government regulation for the processing sector. The Productivity Commission, in its report on business regulation and food safety, summarises the current situation with respect to meat as follows (Productivity Commission 2009, p.204):

In Australia and New Zealand, the regulation of 'meat' as a food for human consumption begins at the 'farm-gate'. While some jurisdictions (Queensland, for example) do not explicitly rule out the regulation of the farms from which animals for meat are sourced in their food safety legislation, in practice, no jurisdiction imposes any specific meat safety requirements on farms (beyond a general requirement that the product will be safe and suitable for human consumption). The exception to this is the regulation and monitoring of factors such as chemical residues and product sourcing through livestock tagging programs.

Industry self-regulation schemes for the primary production sector include the National Livestock Identification System (NLIS), the Livestock Production Assurance (LPA) program and the National Feedlot Accreditation Scheme (NFAS).

In considering possible risk management options for meat, the FSANZ document *Proposal P1005 – Primary Production and Processing Standard for Meat and Meat Products: 1st Assessment Report* provides three options:

Option 1 – Maintain the status quo: This option would not entail any changes to the *Australia New Zealand Food Standards Code* and would not introduce any other changes to existing regulations.

Option 2 – Through-chain food safety management consisting of non-regulatory and regulatory elements: The existing self-regulation programs for primary producers would be supplemented with incentive and education programs designed to encourage primary producers to adopt the various quality control measures and improve compliance with the guidelines and codes of practice. For the processing sector, existing state/territory meat safety requirements would be embodied in a national outcome-based standard incorporated into the *Australia New Zealand Food Standards Code*.

Option 3 – Through-chain food safety management consisting of regulatory elements for both primary production and processing sectors: Incorporate food regulations covering both the primary production and processing sectors into the *Australia New Zealand Food Standards Code*.

In undertaking an economic appraisal of the costs and benefits of Options 2 and 3 compared with Option 1, a problem arises in attempting to estimate any health benefits that might arise. Generally, health benefits would be assessed by estimating the reduction in risk of disease outbreaks attributable to problems in the primary production and processing sectors. The problem is that, under the current situation (Option 1), the baseline risks to public health and safety that are caused by failures to ensure the safety of meat and meat products in the primary production and processing sectors is very low. Consequently, it is argued that the reductions in such risks as a result of adopting Options 2 or 3 are not measurable and that any case for the development of a Meat and Meat Products Standard must rely on benefits other than those associated with a reduction in food safety risk.

1.2 Purpose of this report

The purpose of this report is to suggest other possible benefits that might be considered in this assessment (and other assessments of a similar nature), other than the disease reduction benefits accruing to those who would otherwise have fallen ill, in the assessment of Options (2) and (3). The report argues that, notwithstanding the low baseline health risk associated with the status quo and the small reduction in that risk that might therefore be achieved with either of these Options, such a case can be made. That case is based on the grounds that the value of the benefits from reducing the risk to public health and safety may well extend beyond those individuals who would otherwise have fallen ill. Specifically, it can be argued that the assessment should include benefits to individuals who: (a) did not fall ill under the status quo, (b) were at risk of falling ill under the status quo; and (c) changed their behaviour to reduce that risk by adopting self-protection measures. Reducing the baseline risk then enables such individuals to reduce, or even discontinue altogether, these self-protection measures.

Two lines of argument are developed. The first is a microeconomic argument based upon individual behaviour. When faced with a risk of illness, some individuals will take measures to protect themselves against that risk. This self-protection behaviour is also referred to as preventive behaviour or averting behaviour and imposes costs on individuals that would be reduced or eliminated completely if the threat that gives rise to the averting behaviour is diminished or removed altogether. The second line of argument is a macroeconomic argument based upon the cumulative effects of averting behaviour when such behaviour occurs on a large scale. Under these circumstances, the costs arising from the threat of illness escalate and may even have international economic implications.

In situations where the costs of a disease outbreak are large although the probability of the disease outbreak occurring is small, the scenario can be characterised as a low-probability catastrophic

event. These events pose challenges to individuals deciding whether or not to purchase insurance (if insurance is available), to firms supplying that insurance because of the difficulties of establishing the actuarial basis of their premiums for rare events, and to governments in designing public policies to address social issues such as the optimal provision of prevention programs and relief measures for those affected individuals and firms without insurance cover when the event occurs.

The remainder of the report is structured as follows. Section 2 provides a discussion of the expected cost of a disease outbreak with particular emphasis on low-probability catastrophic events and the conventional approach in health economics to measuring the burden of disease associated with these events. Sections 3 and 4 then deal with the potential importance of averting behaviour, and the macroeconomic consequences of disease outbreaks, respectively in assessing changes to food safety regulations. Section 5 provides concluding comments.

Expected cost of a disease outbreak

2.1 Low-probability catastrophic events

In general the expected (*EC*) cost of a disease outbreak depends upon the probability of the outbreak occurring (*p*) and the costs incurred if an outbreak occurs (*C*):

$$EC = pC \quad \dots (1)$$

For example, if the probability of the outbreak occurring in any 12-month period is 1% or 0.01 and the costs incurred if the outbreak does eventuate amount to \$100 million, then the expected cost of the outbreak is \$1 million.

Note that the *expected cost* of the outbreak is not the same as the *realised cost*. In any particular year, the outbreak will either occur or it will not. If it occurs, the costs associated with it – the realised cost – will be \$100 million. If it does not occur, the realised cost will be zero. The expected cost is the mean cost per year of the outbreak averaged over many time periods (in this example, it is the mean cost averaged over 100 years or $1/p$ time periods).

Since the expected cost depends upon both the probability of occurrence and the costs incurred if the outbreak occurs, events with a lower probability of occurrence but higher costs may have the same expected cost as higher probability events with lower costs. Consider Table 1 which shows five hypothetical disease outbreak scenarios with probabilities of occurrence ranging from 0.1 (1 chance in 10) up to 0.000001 (1 chance in 100,000). In this example, the costs associated with each scenario have been adjusted so that, as the probability of the outbreak occurring becomes smaller, the cost

associated with the outbreak increases such that the expected cost of the outbreak remains the same (\$10 million).

Table 1
Hypothetical example of five disease outbreak scenarios
with the same expected cost

Scenario	Probability of outbreak (<i>p</i>)	Cost if outbreak occurs (<i>C</i>) (\$ billion)	Expected cost (<i>EC</i>) (\$ million)
1	0.1 (1 chance in 10)	0.1	10
2	0.01 (1 chance in 100)	1	10
3	0.001 (1 chance in 1,000)	10	10
4	0.0001 (1 chance in 10,000)	100	10
5	0.00001 (1 chance in 100,000)	1,000	10

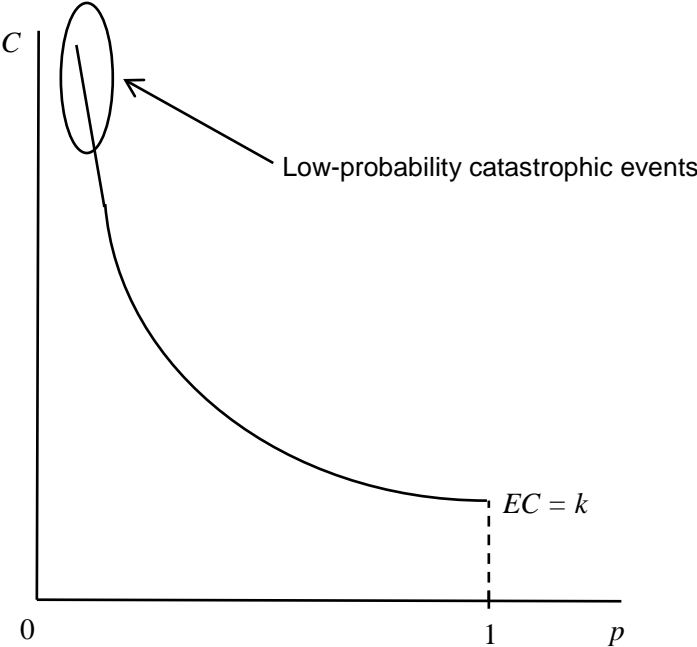
While the expected cost of each of the five scenarios in Table 1 is identical, the probabilities of occurrence, and the cost that will be incurred if the scenario eventuates, vary widely. Of particular interest in the present report are scenarios 4 and 5. While the probabilities of occurrence are relatively low, the costs that will be incurred if they eventuate are substantial. To put these numbers in the Australian context, consider that gross domestic product (GDP) in 2011 was about \$1,450 billion (Australian Bureau of Statistics 2012, Table 3). If scenario 4 eventuated, the realised cost would amount to 7% of GDP. If scenario 5 eventuated, it would amount to 69% of GDP.

Scenarios 4 and 5 are examples of low-probability catastrophic events. Figure 1 provides a simple illustration of the concept. The *x*-axis in this Figure shows the probability of an outbreak occurring while the *y*-axis shows the cost incurred if the outbreak does occur. The *EC* curve is constructed so that the expected cost of the outbreak is the same at all points on the curve (the same characteristic as shown in the hypothetical data in Table 1). The general region of low-probability catastrophic events is indicated by the ellipse in the Figure.

At the individual decision-making level, it has long been observed that individuals are less likely to purchase insurance against low-probability catastrophic events than against high-probability small loss events with the same expected cost (Kunreuther 1978). Reasons advanced for this include the propensity for individuals to ignore low probability events or to purchase insurance only when

probabilities exceed a threshold level (Slovic *et al* 1977, Kunreuther 1978).¹⁴ This behaviour poses problems for public policy when uninsured individuals who are affected by the relevant event occurring turn to government for financial assistance, an issue that has been discussed by Camerer and Kunreuther (1989). However, at the government level in the context of setting standards to reduce probabilities of loss, there is little reason to ignore low-probability events if they are potentially associated with substantial costs upon their occurrence.

Figure 1
Low-probability catastrophic events within
a class of events of given expected cost



In terms of equation (1) above for expected cost, the focus of this report is on the assessment of *costs* associated with the outbreak of foodborne diseases (*C*) rather than on the probability of occurrence (*p*). This is not because it is considered that quantifying the probability of the event occurring is a simple matter. On the contrary, quantification of probabilities for low-probability

¹⁴ Some recent evidence from experimental economics, however, suggests that the reasons for this observed behaviour lie elsewhere. Laury *et al* (2009) report that, in their experiments, subjects did indeed purchase more insurance for low-probability events than for high-probability events conditioned on a given expected loss and the same load factor.

events can be very difficult given the limited numbers of such events that have occurred and hence the limited evidence base on which to construct empirical estimates of these probabilities. Rather, the reason for concentrating on the assessment of costs is that two important dimensions of those costs have tended to be ignored in previous analyses of the costs and benefits of standard setting. These dimensions are averting behaviour costs and the costs of macroeconomic consequences, and are potentially of a considerable magnitude. Hence these costs may provide a justification for considering setting, or changing, standards even when the probability of a disease outbreak is low.

Before pursuing this line of argument further, a brief summary of the conventional basis on which the costs of an illness are commonly estimated in health economics will be provided.

2.2 Conventional approach to estimating disease costs in health economics

The common approach to estimating the cost of illness in general, and a disease outbreak in particular, health economics is to concentrate on the incidence of disease that arises because of the outbreak and the costs associated with that disease in the individuals who contract it. Three types of cost comprise a comprehensive estimate of the economic cost of illness:

- Direct costs – “The direct cost of illness represents expenditures for prevention, detection, treatment, rehabilitation, research, training, and capital investment in medical facilities” (Cooper and Rice 1976, p.22)
- Indirect costs – the costs of lost production
- Intangible costs – the cost of pain and suffering

In emphasising the cost of illness associated with the individuals who contract it, care should be taken not to confuse this notion with the incidence of those costs. The point here is that, subject to an exception discussed below, the cost of illness captures the cost arising only out of disease in the individuals who fall ill. Those costs may or may not be borne by those individuals, e.g. some portion, if not all, of the costs of medical care may be covered by health insurance.

An important exception to this is expenditures on prevention included in the definition of direct cost. Prevention programs often involve the provision of services that are either public goods in nature (e.g. media-based education programs) or provided to individuals who may not have the disease (e.g. screening tests). As will become evident in the next section of this report, prevention expenditures as usually included in cost-of-illness studies do not include the self-protection/averting behaviour costs that are the subject of interest here.

Averting behaviour costs

3.1 Definition

Averting behaviour refers to actions taken by individuals to avoid exposure to risk factors for disease. For example, an individual may purchase bottled drinking water rather than drinking reticulated water during an outbreak of water-borne disease. In the absence of the disease outbreak, the individual may prefer to drink reticulated water but switches to bottled drinking water during the outbreak to reduce the risk of contracting the disease.

Averting behaviour is synonymous with preventive behaviour and with defensive behaviour. Expenditures undertaken in connection with these behaviours are referred to as averting expenditures, preventive expenditures and defensive expenditures respectively. Consider the following definition of preventative expenditure from a dictionary of environmental economics:

Expenditures aimed at averting the damages associated with pollution and other *externalities*. Estimates of these are sometimes used as measures of the lower bound of the costs of the environmental damages. (Markandya *et al* 2003, p.153, emphasis in original).

A recently published dictionary of health economics does not include the term ‘averting behaviour’ or ‘averting expenditure’ but the definition of the term ‘prevention’ makes the connection clear:

Any procedure taken to stop a disease from either occurring (*primary prevention*) or worsening (*secondary prevention*). Some classifications also have *tertiary prevention*. (Culyer 2010, p.404, emphasis in original).

3.2 Analytical issues

Two important analytical issues are: (a) whether and to what extent the averting expenditure is incurred to mitigate disease risk as opposed to other objectives; and (b) the extent to which averting expenditures can be taken as a measure of the welfare loss to the individuals who incur them.

With respect to (a), consider as an example the case of an individual who installs smoke detectors in their home. These smoke detectors may prevent both damage to the individual’s health and damage to their property in the event of a fire. Can the averting expenditure on smoke detectors than be taken as a measure of the health benefits from reducing the risk of fire? The answer must be negative unless it is assumed that the reduction in risk of property damage is valued at zero. In cases like this where the averting expenditure jointly produces two or more outputs, it is difficult to apportion the averting expenditure between the various outputs.

With respect to (b), suppose that the joint production problem just discussed does not arise. For example, suppose that, to avoid the risk of foodborne disease from beef, an individual switches their consumption to chicken and this is the only reason for their switch in consumption. Can the averting

expenditure on chicken then be taken as a measure of the value of the health benefits from reducing exposure to the risk of foodborne disease from beef? The answer to this questions depends upon whether the consumption of chicken itself is a source of utility to the individual. In this example it is likely that this is the case, so the full value of averting expenditures on chicken will overestimate the value of the health benefits from reducing exposure to the risk of foodborne disease from beef. However, in other circumstances, the consumption of the product that is purchased to avoid disease risk may yield no utility to the individual and may even be a source of disutility. For example, suppose an outbreak of waterborne disease causes some households to boil water for drinking purposes. The process of having to boil the water then store it and cool it would be considered a nuisance for many people, and the cost imposed upon them from doing so could therefore be taken as a measure of the value of avoiding the risk of waterborne disease. Note that, in this example, the cost imposed on the household will comprise predominantly a non-monetary time cost and an unobservable disutility component.¹⁵

The potential importance of averting/preventive/defensive expenditures in the economic cost of illness has long been recognised. An interesting thought experiment which demonstrates this potential is to consider a serious disease against which all individuals at risk of exposure have incurred considerable averting expenditures that reduce this risk to zero. Suppose the extent of this preventive behaviour is such that there are no cases of the disease. Then, aside from the averting expenditures, the economic cost of the disease is zero. Now suppose that a program to eliminate the threat of the disease is being considered. This can have no effect on the actual incidence of the disease which is zero and, leaving aside the preventive expenditures, nor can it reduce the economic cost of the illness which is also zero. If the preventive expenditures are not factored into the economic cost of illness then a comparison of the cost of the program with the economic cost of illness saved will show a net loss arising from reducing the threat of disease. Yet reducing the threat of disease will also reduce the need for averting expenditures. In the words of Tolley *et al* (1994, p.315), “The benefits of reducing the threat will take the form entirely of reduction in costs of averting behavior that no longer needs to be engaged in.”¹⁶

3.3 Empirical estimates

The cost-of-illness approach to valuing food safety, whereby the benefits are estimated as the reduction in the cost of foodborne illness, is the most commonly adopted approach to the evaluation of food safety programs (Caswell 1998). While the potential importance of averting expenditures as a

¹⁵ A useful discussion of these issues has been provided by Cropper and Freeman (1991).
¹⁶ This argument has also been clearly articulated by Weisbrod (1961, p.45).

component of the cost of illness has been recognised for some time, the incorporation of such expenditures into cost-of-illness estimates is rarely undertaken.

An important reason for the exclusion of averting expenditures from cost-of-illness studies is the limited availability of data on averting expenditures. In a recent overview of human foodborne disease costs, Buzby and Roberts (2009, p.1852) state that “Analyses that estimate the costs of foodborne disease often include only the medical costs of individuals or households, costs of lost productivity, and premature death and exclude other costs (e.g. pain and suffering, institutional care) because of lack of adequate data.” This accords with the conclusion of another review of cost-of-illness studies of foodborne published a few years earlier (Golan et al 2005). Aziz and Aziz (2012) develop a theoretical model of averting behaviour for *Yersinia enterocolitica* infections but, with respect to empirical application of the model, conclude:

This paper does not apply the theoretical model above to data, primarily because no secondary data is available, and therefore we cannot comment on the value of using averting behavior versus cost of illness for *Y. enterocolitica* ... A direction for future research using the averting behavior model developed in this paper involves collecting primary data in order to test the theoretical model.

Guh *et al* (2008) undertook an empirical study in China providing a comparison of cost-of-illness and willingness-to-pay estimates to avoid shigellosis. The cost-of-illness estimates do not include any estimating of preventive expenditures. They suggest that one interpretation of the similarity of their cost-of-illness and willingness-to-pay estimates is that neither preventive expenditures nor pain and suffering are large for shigellosis so the exclusion of these costs from the cost-of-illness estimates makes little difference.

The approach, suggested by Aziz and Aziz quoted above, to furthering our knowledge of averting expenditures for foodborne disease by collecting primary data goes to the core of the problem with estimating these expenditures. This approach has been adopted in a study of the costs of a waterborne disease outbreak in the USA. Harrington *et al* (1991) undertook a comprehensive study of a giardiasis outbreak in Luzerne County, Pennsylvania, in 1983. Using survey data collected by telephone during September and October 1984, they compiled detailed information on households' and businesses' averting behaviours to avoid contaminated water. Of the household respondents, 46% either hauled water or boiled it but not both. Only 2% relied on bottled water alone. Apart from 2% who did not take any averting behaviour, the remaining households relied upon a combination of strategies (Harrington *et al* 1991, Table 6-4). Lower bound, upper bound and best estimates of the costs incurred by households because of this averting behaviour were constructed.

The estimates of losses resulting from this study are summarised in Table 2. Including both Group 1 and Group 2 losses (see Notes to Table 2), the cost of this outbreak ranged from \$23 million up to \$55 million. Of particular significance in the context of the current report is the importance of

averting behaviour costs which overall accounted for at least 60% of the total cost. Of interest also is the disaggregation of averting behaviour costs by sector (individuals, restaurants, schools/other businesses). This disaggregation is shown in Table 3. Within the category of averting behaviour costs, 78% to 90% of the costs were borne by individuals. This is indicative of the significant defensive response by households to the disease outbreak

Table 2
Estimated losses attributable to outbreak of giardiasis, Luzerne County, Pennsylvania
(millions of US dollars, 1984 prices)

Loss category	Composite scenarios ^(a)		
	A (High estimate)	B	C (Low estimate)
GROUP 1^(b)			
Losses due to illness	3.22	2.68	2.28
Losses due to averting actions	20.47	5.22	4.89
Losses to government agencies	0.23	0.23	0.23
Losses to water supply utility	1.84	1.84	1.84
Sub-total – Group 1	25.76	9.97	9.24
GROUP 2^(b)			
Losses due to illness	7.48	5.80	4.62
Losses due to averting actions	22.20	11.47	9.38
Losses to government agencies	0.03	0.03	0.03
Sub-total – Group 2	29.71	17.30	14.03
GROUP 3 (not estimated)			
Losses due to all other tangibles ^(c)	-	-	-
Losses due to intangibles ^(d)	-	-	-
TOTAL (sum of Groups 1 and 2)	55.47	27.27	23.27
Losses due to averting actions as % of total	77%	61%	61%

Notes:

(a) Scenarios A, B and C differ according to the hourly wage used to value non-work time lost by homemakers, retirees and unemployed persons.

(b) The estimates are split into Groups 1 and 2 based on the confidence in the underlying assumptions, data and methods of analysis used to estimate them. The actual losses are at least as great as the totals reported for Group 1, resulting in a relatively high degree of confidence in these estimates as a lower bound. Although the losses in Group 2 are real, there is less confidence in these estimates.

(c) All other tangibles not included in Groups 1 and 2. They include highly valued leisure activities, costs of legal fees, costs of misdiagnosis of giardiasis, losses to businesses due to reductions in productivity (in addition to those reflected by individual losses in productivity included in Group 2), net losses to individuals resulting from substituting more expensive beverages for those that require tap water, the value of time devoted to the outbreak by some government personnel (in addition to that already included in Groups 1 and 2), and the effects on businesses in the outbreak area that were not investigated (e.g. hotels, motels and meat packers).

(d) Intangibles include pain and suffering of those who were ill, anxiety of those living in the outbreak area over the possibility of contracting the disease, and the diminished intrinsic value resulting from the loss of a pure water supply for drinking, food preparation, and personal hygiene.

Source: Harrington *et al* (1991, Table 8-1).

The inclusion of averting behaviour costs in this study constituted a significant advancement in the application of cost-of-illness methods to measuring the benefits of avoiding an infectious disease

outbreak. Nevertheless, the authors suggested several areas where improvements could be made in future work (Harrington *et al* 1989, p.135):

In the household survey of averting behavior, we imposed time constraints on the interviews to avoid taxing the patience of the interviewees. As a result, the interviews may have led to an oversimplification of averting behavior. Also, we were unable to obtain data to estimate the consumption of water in the affected area by specific use prior to the outbreak. Instead, we were forced to use national per capita consumption data. Finally, we were unable to obtain much insight into the substitution of other liquids for drinking water after the public water supply was implicated.

Table 3
Estimated losses due to averting actions attributable to outbreak of giardiasis
disaggregated by sector , Luzerne County, Pennsylvania
(millions of US dollars, 1984 prices)^(a)

Loss category	Composite scenarios		
	A (High estimate)	B	C (Low estimate)
GROUP 1			
Losses due to averting actions			
Individuals (lower bound)	19.41	4.57	4.24
Restaurants and bars	1.00	0.59	0.59
Schools and other businesses	0.06	0.06	0.06
Sub-total – Group 1	20.47	5.22	4.89
GROUP 2			
Losses due to averting actions			
Individuals (best estimate minus lower bound)	19.10	8.37	7.88
Restaurants and bars	3.07	3.07	1.47
Schools and other businesses	0.03	0.03	0.03
Sub-total – Group 2	22.20	11.47	9.38
TOTAL losses due to averting actions	42.67	16.69	14.27
Losses to individuals as % of total	90%	78%	85%

Note: See notes to Table 2 for explanations of scenarios and groups.

Source: Harrington *et al* (1991, Table 8-1).

The significance of averting behaviour has also been demonstrated by Cropper (1981) with respect to willingness-to-pay for a reduction in air pollution. Cropper compares the damage function approach to estimating willingness-to-pay to avoid pollution with an alternative approach based on a Grossman-type model of health capital that incorporates a change in preventive behaviour by the individual. The damage function approach to estimating willingness-to-pay establishes a relationship between illness and exposure to pollution, and uses this to estimate the reduction in illness consequent to a reduction in pollution. A dollar value is then assigned to this reduction in illness and added to savings in medical costs to arrive at an estimate of willingness-to-pay to avoid exposure to pollution. However, this approach ignores possible savings in preventive expenditures if pollution levels fall.

Using data on men aged between 18 and 45 years obtained from the Michigan Panel Study of Income Dynamics for the interview years 1970, 1974 and 1976, combined with annual geometric mean sulphur dioxide concentrations, Cropper finds that the damage function approach yields an estimate of willingness-to-pay of \$3.60 per year for a 10% reduction in sulphur dioxide concentrations. This compares with the results of her Grossman-type model that allows for changes in preventive expenditures and results in an estimated willingness-to-pay of \$7.20 per year for this reduction in pollution – double the estimate from the damage function approach.

Returning to foodborne disease, although there are no estimates of preventive expenditures to avoid such disease, there is evidence that consumption patterns change when there is a pronounced increase in the risk of a foodborne disease. In September 2006, the US Food and Drug Administration (FDA) announced that consumers should not eat bagged spinach following epidemiological evidence that it was implicated in the transmission of the bacterium *E. coli* O157:H7. The FDA subsequently gave an “all clear” announcement about two weeks after the original announcement. Researchers at the Economic Research Service of the US Department of Agriculture subsequently analysed data on consumption of bagged spinach and other leafy greens including bulk spinach to investigate whether, and to what extent, consumers switched their consumption patterns in response to this announcement (Arnade *et al* 2009, 2010). Using weekly point-of-sale retail scanner data for a period of four years spanning the time period before and after the FDA announcement, with leafy green products aggregated into six categories, it was found that consumers switched expenditures markedly after the FDA announcement. One week after the announcement, expenditure on bulk spinach was estimated to have dropped 32% and three weeks after the announcement, expenditure on bagged spinach had dropped 63%. Expenditures on other leafy greens increased markedly but it was estimated that, 68 weeks after the initial FDA announcement, expenditure patterns had returned largely to their pre-outbreak composition. Nevertheless, at the 68-week point, “the sum of all changes in expenditures yielded a total decline in leafy greens expenditures of \$60.6 million, a decline of 1% from what expenditures would have been without a shock” (Arnade *et al* 2009, p.746).

The change in consumption patterns following the FDA announcement clearly suggests averting behaviour with consumers substituting into closely related “safe” products. As discussed in section 3.2 above, the total increase in expenditure on other leafy greens could not be taken as the cost of averting behaviour unless the other leafy greens did not yield any utility – an unlikely situation. It is the case, however, that a welfare loss has occurred because consumers are purchasing a different mix of products to that purchased before the outbreak as a direct result of that outbreak. Estimating this welfare loss would provide a measure of the cost of the averting behaviour. Although the researchers estimated own-price elasticities and cross-price elasticities for the six leafy green product groups, they did not pursue this further and use these elasticities as a basis for estimating that welfare loss.

Similar studies have been undertaken following the bovine spongiform encephalopathy (BSE)/Creutzfeldt-Jakob disease (CJD) scare in Europe in 1996. Mangen and Burrell (2001) have provided estimates of the effect of the BSE crisis on the demand for various types of meat and fish in the Netherlands over the period 1994 to 1998. They conclude:

Part of the effect of the BSE crisis was a short-run negative impact on beef demand and prepared meat, and in favour of poultry and meat products (largely pork) that disappeared after one period ... However ... our results show that the BSE scare also triggered a uni-directional shift in preferences that was mainly biased against beef, minced meat and meat products, and in favour of pork, prepared meat and fish. Over 12 per cent of this shift occurred in the same period as the BSE scare, but the shift took 21 months to complete. In order to see whether it is reversible in the longer term, this study should be repeated in 2-3 years' time. (Mangen and Burrell 2001, p.26).

As with the analysis of changes in spinach consumption by Arnade *et al* (2009, 2010), this study provides convincing evidence of averting behaviour by consumers following an infectious disease outbreak but does not develop any measures of the cost of that averting behaviour for use in evaluations of food safety programs or changes in food safety regulations.

A study of the cost of foodborne illness in Australia estimated that the annual cost amounts to \$1,249 million (2004 prices) (Abelson *et al* 2006). This study employed cost-of-illness methods to estimate productivity and lifestyle costs incurred by individuals and businesses, the costs of premature mortality, health care service costs, the cost of food safety recalls for businesses, and costs to government of surveillance/investigation and maintaining food safety systems. Averting behaviour costs were not estimated in this study.

In concluding this discussion of the costs of averting behaviour, it is instructive to consider another area where these costs are likely to be substantial, *viz.* terrorism. In addition to the direct costs of terrorist attacks, considerable resources are devoted to preventing such attacks in the future. These preventive activities include security checks, airport screening of passengers and baggage with associated queues and waiting time costs, increased “red tape” involved in international business, and screening of international mail and freight. A recent review of the costs of terrorism comments that “To achieve a significant reduction in the probability of falling prey to a terrorist attack is certainly expensive. The fraction of the economic potential that can be used for consumption today and in the future is significantly reduced. But it is impossible to attach any serious figure to these factors.” (Frey *et al* 2007, p.12). The difficulties involved in estimating averting expenditures obviously characterise other sectors of the economy in addition to the health sector.

Macroeconomic costs

4.1 The issue

The importance of macroeconomic consequences of ill-health and disease was recognised by the WHO when it established the Commission on Macroeconomics and Health in 2000. The Commission produced its report *Macroeconomics and Health: Investing in Health for Economic Development* in 2001 in which the linkages running from health to poverty reduction and to long-term economic growth were emphasised. In the wake of this report and a growing recognition of the importance of health in economic development, a number of countries developed initiatives to improve their health systems and increase investment in health. A synthesis of these initiatives has been provided in a subsequent WHO report *Tough Choices: Investing in Health for Development* published in 2006.

While the WHO Commission did much to raise the awareness of health and development at a macroeconomic level, its focus was on problems in developing countries and securing greater investments in health in those countries. It did, however, also stimulate thinking about other macroeconomic aspects of ill-health and disease. Attention to a particular aspect of this issue grew out of the recognition that the conventional approach to measuring the economic burden of disease often estimates the direct and indirect costs of illness only for those *who have* the disease. Averting behaviour, while recognised as giving rise to potentially important costs for individuals *who do not have* the disease, has not routinely been incorporated into cost-of-illness studies. If this averting behaviour occurs on a wide scale, it can have macroeconomic effects on GDP, employment and investment in a country.

While in some circumstances the conventional approach to estimating costs of illness may be appropriate, it is inappropriate for infectious diseases which are highly transmissible, whose health consequences are potentially serious and may be fatal, and for which there may be no vaccine (e.g. severe acute respiratory syndrome (SARS)) or low levels of vaccination coverage (e.g. human influenza). In addition, this conventional approach is inadequate for disease epidemics that can have devastating effects on economies through school and workplace closure, and which lead to large reductions in consumption of various goods and services such as travel and entertainment. Examples include HIV/AIDS, SARS, Bird Flu and human influenza pandemics.

4.2 Empirical estimates - SARS

Lee and McKibbin (2004) have estimated the macroeconomic effects of the SARS outbreak on a global scale. This outbreak provides a stark illustration of the argument being put in this report. The first case of SARS (first referred to as 'atypical pneumonia') was diagnosed in November 2002. From 1 November 2002 to 31 July 2003 there were 8,096 probable SARS cases worldwide with 774

deaths.¹⁷ In global terms this is a relatively small number of cases/deaths, yet the behavioural response of people in many countries was substantial. Lee and McKibbin used the G-Cubed Asia Pacific global macroeconomic model developed by McKibbin and Wilcoxin (1999) to simulate the macroeconomic effects of the SARS outbreak.¹⁸ Two scenarios were simulated, one assuming a temporary shock of 6 months duration (the actual duration of the SARS outbreak), the other assuming a persistent effect of 10 years' duration with the effect remaining constant for the first year followed by an equiproportional fade-out of the effect over the remaining nine years.

The simulations produce results for a number of macroeconomic variables of interest including gross domestic product (GDP), investment, exports and so on. The results most relevant to this report are for GDP and are reproduced here in Table 4. The countries in this Table are ranked according to the magnitude of the effect on GDP under the temporary scenario. Under the temporary scenario, GDP in Hong Kong was predicted to have fallen by 2.63%, and in China by 1.05%, in 2003 as a result of the SARS outbreak. At the other end of the spectrum, GDP in India was estimated to have fallen

Table 4
Predicted percentage change in GDP in 2003 under two alternative scenarios for the duration of the SARS outbreak

Country or region	Impact on GDP in 2003 from SARS shock (%)	
	Temporary (6 months)	Persistent (10 years)
Hong Kong	-2.63	-3.21
China	-1.05	-2.34
Taiwan	-0.49	-0.53
Singapore	-0.47	-0.51
Malaysia	-0.15	-0.17
Thailand	-0.15	-0.15
Philippines	-0.10	-0.11
South Korea	-0.10	-0.08
New Zealand	-0.08	-0.08
Indonesia	-0.08	-0.07
United States	-0.07	-0.07
Japan	-0.07	-0.06
Australia	-0.07	-0.06
OPEC	-0.07	-0.09

¹⁷ Figures taken from the World Health Organization (WHO) Global Alert and Response (GAR) data for SARS: http://www.who.int/csr/sars/country/table2004_04_21/en/index.html (accessed 21 May 2012).

¹⁸ Further details about the G-Cubed model are available at: http://www.gcubed.com/software/g_cubed.html.

Country or region	Impact on GDP in 2003 from SARS shock (%)	
	Temporary (6 months)	Persistent (10 years)
Eastern Europe and Russia	-0.06	-0.05
Rest of OECD	-0.05	-0.05
Non-oil producing developing countries	-0.05	-0.05
India	-0.04	-0.07

Source: Lee and McKibbin (2004, Table 4)

by 0.04%. If the persistent scenario had transpired (which it did not), the declines in GDP in 2003 would have been even larger in Hong Kong (3.21%) and China (2.34%) but much the same in other countries.

This study provides a useful illustration of how the macroeconomic effects of an infectious disease outbreak can be estimated. The simulation commences by imparting an exogenous shock to China and Hong Kong, the countries where the outbreak began. This shock has three components: an increase in the country risk premium of 200 basis points;¹⁹ a sector-specific demand shock being a 15% reduction in demand in the exposed industries in the retail sales sector; and an increase in costs of 5% in the exposed activities in the service sector (this could represent an increase in averting behaviour costs, for example). These shocks affect the domestic economies of Hong Kong and China but are also transmitted to other countries through trade linkages in the model.

The SARS outbreak provides a stark example of how the costs of a disease outbreak can exceed the costs of illness by an order of magnitude when macroeconomic effects assume importance. The cost of illness for an outbreak with around 8,000 cases and 800 deaths would be far less than the reductions in GDP shown in Table 4. In commenting on the macroeconomic impact of SARS, Lee and McKibbin (2004, pp.129-30) underscore this point:

This impact is not a consequence of the disease itself for the affected people but is rather the effect of the disease on the behavior of many people within these economies ... These results support the point that the true cost of disease is far greater than the cost to a health budget for treatment of patients.

In short, applying the conventional cost-of-illness approach to the SARS outbreak would yield estimates that grossly understate the economic impact of SARS on world economies. This conclusion with respect to SARS is reinforced in a paper by Smith (2006) who cites several other estimates of the

¹⁹ The country risk premium is a measure of the increase in the rate of return to investment that foreign investors in a country would need to earn to offset an increase in the risk of investing in that country. An increase in the country risk premium can be expected to dampen investment.

magnitude of the economic impact of the disease. Taken together these estimates suggest that the true economic cost of SARS was in the range US\$3-10 million per case.

With the passage of time, actual data on the macroeconomic performance of economies affected by SARS became available. Keogh-Brown and Smith (2008) revisited the issue of the economic impact of SARS following the publication of such data to investigate whether the projected macroeconomic impact was as substantial as predicted by the models. Their analysis is based on an inspection of the time series data and not on the use of a macroeconometric model. They conclude that the losses in GDP were not as substantial as predicted. However, even the losses which they estimated are greater than the cost-of-illness would yield by an order of magnitude.

4.3 Other empirical studies

A macroeconomic approach has also been taken to assessing the economic impact of pandemic influenza. McKibbin and Sidorenko (2006) again used the G-Cubed model developed by McKibbin and Wilcoxon (1999) to provide estimates of global GDP loss under four scenarios for pandemic influenza ranging from mild to “ultra”. A country-specific computable general equilibrium model has been used to assess the macroeconomic impact of pandemic influenza in the United Kingdom (UK) (Keogh-Brown *et al* 2010), more recently being used to produce sector-specific results for the finance sector (Smith *et al* 2011) and country-specific results for Belgium, France and The Netherlands as well (Keogh-Brown *et al* 2010). As with the work on SARS discussed above, these models demonstrate the importance of averting/preventive behaviour among those not necessarily infected in determining the magnitude of the economic impact. In their work on the UK, Keogh-Brown *et al* (2010) conclude that the macroeconomic impact of a mild outbreak of pandemic influenza is likely to be concentrated in the period of the attack if absenteeism is limited to the peak of the pandemic and consumption patterns of uninfected people are unaffected. However:

While the disease impacts do not present a major cause of economic concern, the real economic danger occurs when policy and behavioural change in response to the pandemic occur. When absenteeism (through school closures) increases beyond a few weeks it causes inflation to rise during the pandemic, interest rates also rise, reducing consumption and investment, and these economic effects no longer rapidly disperse once the pandemic is over ... Precautionary changes in consumption patterns also present some alarming economic prospects ... both absenteeism and precautionary consumption shocks suggest historically unprecedented economic losses. (p.1358)

To date , macroeconomic models have not been used to investigate the economic impact of foodborne disease outbreaks. Yet the possibility exists, and evidence suggests, that uninfected individuals may well change their consumption patterns in such a way as to protect themselves from infection. In so doing, they incur welfare losses themselves as a result of the outbreak and, if averting behaviour is sufficiently widespread, macroeconomic effects may well ensue.

Conclusion

This report argues that the development of an RIS for meat and meat products must confront the problem of valuing the health benefits of regulatory changes that apply to low-probability, potentially catastrophic events. These types of events have provided long-standing challenges to purchasers and suppliers of insurance and to policy-makers. The expected cost of these events is based on two key elements – the probability that the event will occur, and the economic damage that will result if the event occurs. Quantifying low probabilities, and changes in those probabilities, is difficult. By their nature, low probability events do not occur very often so insurers have limited underwriting experience and claiming history on which to base their premiums. Consumers can have cognitive difficulty in assessing small changes in probabilities and accordingly their perceptions of risk may differ from actual risk. In designing public policy, government must consider how to deal with people who are uninsured if the catastrophic event occurs.

Without attempting to downplay the difficulties of estimating the probabilities, this report has concentrated on the issues involved in the measurement of benefits. In taking avoided costs as a measure of benefit, the conventional cost-of-illness approach has generally adopted a narrow view on what constitutes the cost of an illness. This can be defended on the grounds of conservatism – if a regulatory change passes a cost-benefit test using a conservative measure of benefits then it will certainly pass that test if additional benefits are also included. And in circumstances where this is the case, there is little to be gained in extending the valuation of benefits to include previously unmeasured benefits. Difficulties arise, however, when this is not the case, i.e. when the extension of the valuation of benefits may make a difference as to whether a regulatory change will pass a cost-benefit test. Under these circumstances, failure to adopt a comprehensive measure of benefits may lead to poor investment decisions.

This report suggests there are two additional dimensions that should be considered in measuring benefits under these circumstances:

- Averting behaviour. Particularly with respect to infectious diseases, but also with respect to a number of non-communicable diseases where options exist to reduce disease risk through behaviour change, individuals who are not ill will often indulge in averting behaviour to reduce or eliminate their exposure to risk. This behaviour may well impose costs upon them, costs which could be partially or wholly avoided if the risk of disease is diminished. Regulatory changes that reduce the need for averting behaviour therefore can give rise to cost savings from reduced averting behaviour in people who are not ill or who are uninfected. These benefits have generally not been

taken into account in the evaluation of programs to reduce the risk of foodborne diseases. When data on these behaviours are not readily available from secondary sources, purpose-designed surveys can be conducted to collect relevant data.

- Macroeconomic effects. Behavioural responses in people who are not sick or who are uninfected can sometimes be so widespread that they have an impact on the GDP of one or more countries. This has been illustrated in this report with the SARS outbreak in 2002-2003. While the scale of that outbreak was modest, the fear and collapse of confidence which it engendered may cause people to indulge in averting behaviour, having a particularly marked effect on the travel and tourism industries. The result was a measureable and significant decline in the GDP of some countries with smaller declines in countries more remote from the epicentre. These effects transcend the immediate impact of the disease on the health of those infected and can give rise to major economic disruptions both domestically and internationally. Avoiding a 1% or 2% drop in GDP over a 3-month period can be a benefit that is far greater in value than the immediate savings in direct and indirect costs of those who would otherwise have fallen ill.

In its report on foodborne disease in member countries in 2003, the OECD drew attention to the “limited development of a solid conceptual framework and relative lack of information on the economic costs of foodborne disease” (OECD 2003, p.61). The OECD also drew attention to an important shortcoming of the cost-of-illness (COI) approach to measuring the costs of foodborne disease:

The major criticism of the COI approach is that it provides only a partial estimate of the economic costs. The COI approach concentrates only on the direct costs incurred by those actually suffering from the disease and ignores the benefit that every individual experiences as a result of having to devote less resources to achieving their preferred health status. (OECD 2003, p.63).

Pursuing the two additional dimensions of benefit measurement discussed in this report would go a considerable way towards meeting these criticisms.

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Attachment 2

Consultation with Government Agencies

Attachment 2

Consultation with Government Agencies²⁰

Questions	NSW	Vic	Qld	SA	DAFF
A General Questions					
1 (a) What issues if any have been raised at abattoir level regarding matters that should be addressed on farm (ie. incorrect completion on NVDs)?	<p>The following issues have been raised during abattoir audit:</p> <ul style="list-style-type: none"> • NVD's being completed incorrectly • Lost or missing ear tags on cattle • In - correct details for non-vendor bred animals <p>All abattoirs have contacts with LHPA and DPI compliance officers to investigate non-compliance with these issues.</p>	<p>Incidental amount of incorrectly completed Vendor Declarations (ovine), Misread or missing NLIS Tags (Cattle).</p>	<p>Yes – Incomplete NVD's Instances of non-compliance with NLIS Smaller plants failed to have the provisions for NLIS</p>		<p>Incorrect completion of NVDs including, traceability (use of depots), withholding periods and sourcing location to prevent residue breaches. Animal welfare issues regarding fit to load.</p>
1(b) Indicate the numbers or percentages affected?	<p>NSW Food Authority would not be able to provide exact percentage</p>	<p>Low in percentage terms, too low to approximate for ovine. For NLIS Tags on cattle compliance</p>	<p>Less than 5% noncompliance in this area</p>		<p>NVD issues have been picked up at a random audit and treated as systemic issues and address</p>

²⁰

Please note that all relevant regulators were forwarded questionnaires to complete but only five provided a response.

Questions	NSW	Vic	Qld	SA	DAFF
		is around 99% accuracy.			by both industry and DAFF. Animal welfare issues are raised directly to the appropriate state authority.
2. How and to what extent will the requirements for producers in the draft Standard make things easier for the abattoirs?	If it will allow NSWFA to take action against primary producers and/or sale yards for breaches which cause issues at abattoir, this may have most benefit to abattoirs.	No change, other than have potential to include all required information in one declaration etc.	May assist in identifying the problems about stock being farmed on contaminated areas. E.g Dee River - Coal Seam Gas etc;		Ensures that the responsibility for provision of animals meeting the requirements can be enforced by state and territory jurisdictions. DAFF require the abattoir to source appropriately to meet the requirements.
3. Can this be expressed in monetary terms?	NSW Food authority would not be able to provide this information	No	No		Unknown monetary advantage.
B Costs					
1 (a) Will the adoption of the draft Standard impose any compliance costs on Producers?	No as it formalises what producers should currently be doing to comply with Primary Industry requirements	There will be some costs to the individual producers who have not already installed appropriate on farm management practices.	No additional costs	No	Producers are not in DAFF's jurisdiction
1 (b) Will the adoption of the draft Standard impose any compliance costs on a	Processor already licensed and paying levies to industry and Government. No further costs	No. Processors already have substantial requirements in place for identifying the	Status Quo	No	DAFF does not expect any addition compliance costs

Questions	NSW	Vic	Qld	SA	DAFF
processor?		place of purchase of animals (refer to A 2 above)			
2. Will jurisdictions incur additional costs (excluding responses to food incidents)	If it is used for on-going non compliances (instead of current DPI/LHPA system), then yes. If excluding incidents, then no.	Not anticipated.	This should provide greater efficiencies "through chain"	No	DAFF does not expect any addition compliance costs
C. When compared with the status quo, how will the draft Standard make it easier/quicker/more efficient/more effective to respond on farm to a food incident?	There are currently systems in place to provide adequate response back to farm through NLIS if there is an incident occurring. System could be challenged more frequently and permit more efficient and effective response to incidents	No difference. It is rare for food incidents to be created on farm. Most issues will be animal welfare and bio-security regarding disease control/traceability. Note, given the current state of health of national herd zoonotic disease outbreaks are rare in Australia. Further MRL's do not contribute to food incidents.	As stated above	It will provide the basis for full investigation of all potential sources related to an incident under the Primary Produce (Food Safety Schemes) Act. Whereas previously this was restricted to action under the Food Act, and limited to situations where the evidence was not refutable. Producers will now be included in the meat food safety scheme.	Producers are not in DAFF's jurisdiction, standard potentially allows state and territory jurisdiction to additional provisions to manage/trace food incidents at the producer level.
D. When compared with the status quo, how will the draft Standard make it easier/quicker/more efficient/more	Only marginal gains to be had.	No difference. Identification of place of purchase/delivery is a current requirement. Further it is extremely rare for	Should provide a more rapid response through chain to go back on farm if required.	See above	Producers are not in DAFF's jurisdiction, standard potentially allows state and territory jurisdiction to additional provisions

Questions	NSW	Vic	Qld	SA	DAFF
effective to contain/manage a food incident?		on farm cause of food safety incidents (refer to C above)			to manage/trace food incidents at the producer level.
E. When compared with the status quo, how will the draft Standard make it easier/quicker/more efficient/more effective to introduce better practices industry/state-wide in the wake of a serious food incident?	If a single agency is able to regulate across producer, sale yard, processor and retailer, then consistent policies, practices and enforcement actions can aid to obtain a better compliance outcome.	Response: No difference (refer to response to C & D above)	First we need to identify them. Once identified through PICs or a register it should make it easier to disseminate information through the peak bodies eg Safe Meat.	Producers will now be included in the Meat Food Safety Scheme.	Producers are not in DAFF's jurisdiction, standard potentially allows state and territory jurisdiction to additional provisions to manage/trace food incidents at the producer level.
F. In the event of a major food safety incident, will the draft Standard adequately empower jurisdictions to respond effectively?	Powers reside under individual food acts and should be sufficient.	No difference (refer to C/D/E above).	Yes – We will be able to go back on farm	Yes	Producers are not in DAFF's jurisdiction, standard potentially allows state and territory jurisdiction to additional provisions to manage/trace food incidents at the producer level.

Attachment 3

Compliance Plan for the Primary Production and Processing Standard for Meat and Meat Products

Proposal P1014

State and Territory regulatory agencies and the Department of Agriculture, Fisheries and Forestry are responsible for implementing the standard. The Meat Implementation Working Group, a national working group with membership from these agencies have developed a national compliance plan for the draft variation to Standard 4.2.3. The key principle underpinning the compliance arrangements for the Standard is that if businesses are currently complying with existing legal requirements, and continue to do so, they will comply with the future meat standard.

Compliance plan for the Primary Production and Processing Standard for Meat and Meat Products.

The Primary Production and Processing Standard for Meat and Meat Products identifies a Meat Producer. A compliance plan for a meat producer is provided.

1. Meat Producer: means a business, enterprise or activity that involves growing, supply or transportation of animals for human consumption.
2. Animals: the following animal species are covered by this Standard: *Bovine, Caprine, Ovine, Porcine, Bubaline, Camelidae, Cervidae, Crocodylidae, Lagomorph, Ratite, Soliped.*

References to animals in this document means animals as covered by the Primary Production and Processing Standard for Meat and Meat Products, unless otherwise specified

In all instances, meat businesses are advised to contact the relevant food regulator within their jurisdiction for further advice concerning an acceptable means of compliance with the Primary Production and Processing Standard for Meat and Meat Products before adopting matters described in these Compliance Plans into their businesses.

Compliance plan for meat producer (includes growing, supply or transportation of animals for human consumption).

Inherent risk: The FSANZ risk assessment has identified no unmanaged risks in the meat supply chain.

Potential introduced risk: All animals to be slaughtered must be traceable and must not contain contaminants or residues in excess of prescribed limits.

Compliance requirement - Industry	Monitoring requirements - Government	Current Industry arrangements
<p>Meat producers are required to comply with any relevant state/territory legislation for primary production (e.g. Ag/Vet Chemicals, swill feeding).</p> <p>An individual, business, enterprise or activity authorised to undertake slaughtering of animals by the competent state/territory regulatory authority must have evidence that animals supplied and received are fit for purpose (i.e.do not adversely affect safety and suitability of meat or meat products)..</p> <p>Such evidence should have due consideration to the following issues:</p>	<p>Government will monitor compliance through evidence provided through existing industry arrangements.</p>	<p>Confirming compliance using:</p> <ul style="list-style-type: none"> - LPA program (livestock production assurance), - NVD (National Vendor Declaration), - Pigpass, - NLIS (National Livestock Identification Scheme).

Compliance requirement - Industry	Monitoring requirements - Government	Current Industry arrangements
<p><i>Inputs:</i> any feed, water, chemicals or other substances used in, or in connection with the primary production activity.</p> <p><i>Waste disposal:</i> solid and liquid waste generated during primary production such as sewage, waste water, animal carcasses and garbage.</p> <p><i>Traceability:</i> Animals are identified in accordance with State animal identification systems, and systems are in place that allow animals to be traced from the holding of origin and to the holding of consignment.</p>		

Slaughter and processing of animals²¹

State and Territory laws govern meat processors whose activities involve the slaughter and processing of animals for human consumption, including of animals in the wild and the preparation, packing, transportation, or storage of meat or meat products. These laws require persons involved in such activities to comply with specified Australian Standards.

Compliance requirement - Industry	Monitoring requirements - Government	Current Industry arrangements
<p>An individual, business, enterprise or activity undertaking slaughtering of animals must be approved by the competent state/territory regulatory authority to undertake such activity.</p> <p>All individuals, business, enterprises or activities undertaking slaughtering of all animals covered by the Primary Production and Processing Standard for Meat and Meat Products must comply with the following Australian Standards:</p> <ul style="list-style-type: none"> - AS4466:1998 Hygienic Production of Rabbit Meat for Human Consumption - AS4467:1998 Hygienic Production of Crocodile Meat for Human Consumption 	<p>Regulator to continue with current monitoring arrangements.</p> <p>e.g. may include inspection or audit, or other monitoring arrangement depending on regulator's legislation.</p> <p>The frequency of monitoring will be based on risk and performance.</p> <p>Check business's evidence to confirm that</p>	<p>Confirming compliance using:</p> <ul style="list-style-type: none"> - LPA program (livestock production assurance), - NVD (National Vendor Declaration), - Piggpass, - NORM (National organochlorine residue monitoring), - NARM (National antibacterial residue monitoring),

²¹ Animals in this context are taken to mean animals as covered by the FSANZ Primary Production and Processing Standard plus animals from the following species: *Macropod* (Kangaroo, Wallaby), *Phalangeridae* (Possum), *Puffinus tenuirostris* (muttonbird).

Compliance requirement - Industry	Monitoring requirements - Government	Current Industry arrangements
<ul style="list-style-type: none"> - AS4696: 2007 Hygienic Production and Transportation of Meat and Meat Products for Human Consumption - AS5008: 2007 Hygienic rendering of animal products - AS5010: 2001 Hygienic Production of Ratite Meat for Human Consumption - AS5011: 2011 Hygienic productions of natural casings for human consumption. - AS4464:2007 Hygienic Production of Wild Game Meat for Human Consumption. 	<p>animals received or supplied for processing are traceable, as well as meat and/or meat products produced by the business.</p>	<ul style="list-style-type: none"> - START (Sheep targeted antibacterial residue testing). - TART (targeted antibacterial residue testing). - NLIS (National Livestock Identification Scheme).