LABELLING LOGIC REPORT
REVIEW RECOMMENDATION 34:

MANDATORY LABELLING OF IRRADIATED FOOD

Submission by:
The New Zealand
Fresh Produce Importers Association Inc.

Background

The New Zealand Fresh Produce Importers Association Inc. (NZ FPIA) was founded in August 2002 by the major importers of fresh produce at that time. 'Associate' and 'Ordinary' membership is open to all importers and organizations that have an interest in issues associated with imported fresh produce. The current membership accounts for approximately 98% (by volume and value) of all commercial fresh produce and fresh cut flowers currently imported into New Zealand. This includes the importation of irradiated produce.

Four key objectives have been established to underpin all Association activities:

- *Provide an independent forum for the importers of fresh produce to discuss and advance issues of mutual interest in an environment that does not compromise the commercial activities of Members; and,*

- *Improve the access for fresh produce into New Zealand by ensuring that all import requirements are consistent, technically justified, commensurate with real risks and provide the least practical restrictions to trade; and,*

- *Be actively involved with the development of biosecurity (and other regulatory driven) decisions, policies and practices to ensure that Members' interests are represented and considered; and,*

- *Co-operate and build partnership arrangements with those parties who have an interest and influence in the importation of fresh produce into New Zealand.*

The NZ FPIA supports and utilises a range of currently approved phytosanitary treatments and other phytosanitary measures to facilitate the safe trade of fresh produce into New Zealand. The use of irradiation is considered as an effective and safe option in the "toolbox" of currently available available options. Irradiated produce has been imported into New Zealand for more than a decade. The frequency, volume and range of products have been incrementally increasing over time. It is anticipated that the use of irradiation will continue to increase for products with existing approvals and as further opportunities are developed when more country/commodity approvals are implemented in the future.

Review of Mandatory Labelling for Irradiated Produce

The NZ FPIA supports the general principles associated with the current review of mandatory labelling for irradiated produce. The NZ FPIA maintains a position that the mandatory requirements for irradiated foods (viz. fresh produce) and ingredients should be removed because:

- Food irradiation (including post-harvest phytosanitary treatments for fresh produce) is no longer a new technology; and,
- Produce treated with irradiation does not compete on a level playing field with alternative post-harvest (and other) phytosanitary treatment options and/or production methods that do not require labels; and,
- Consumer-value driven issues (where there are no associated food safety issues) should not fall under a mandatory regulatory labelling regime; and,
- Labelling at the point of sale is a "blunt tool" that does not meet the intended purpose of informing consumers about the benefits of irradiation but rather adds unnecessary costs and potential confusion (e.g. acting as a "warning"); and,
- Labelling at the point of sale is costly and acts as a barrier to greater uptake of the technology at both retail and in the food service and hospitality sectors; and,
- The current mandatory labelling regime only satisfies the interests of a very small minority of consumers who wish to avoid irradiated food. Such consumers can make informed choices via other non-mandatory mechanisms; and,
- In the absence of other tools, some domestic industry players use the mandatory labelling requirements as a means to lobby Ministers, regulators and as a scare tactic to artifically protect their domestic production interests; and,
- There is now a demonstrated history (10+ years) that there is a market for irradiated fresh produce in New Zealand. As more products are incrementally approved across a number of exporting countries in the future, it is anticipated that greater opportunities will accrue over time. As a consequence, the current labelling requirements will continue to act as a barrier for full uptake of these future opportunities.

Regulatory need

The NZ FPIA supports the Food Labelling Hierarchy outlined in the Blewitt report (reproduced below). This approach should guide future regulatory decisions concerning irradiated foods and other "consumer value" issues. The NZ FPIA supports the proposed range of interventions based on this hierarchy, ranging from mandatory (i.e. where there are genuine food safety threats and/or issues) through to co-regulation and self-regulation to manage low risk and "consumer-value" issues.

The Labelling Logic report makes a number of points about the role of regulation in food safety. These include:

- food needs to be safe (p35 paragraph 2.15). The paramount role of a labelling requirement is to ensure that labelling reinforces the safety driver of regulation; and,
- if a biosecurity treatment is safe (p37 paragraph 2.20) then governments should consider citizens and industry. However, regulation should not impede efficiency and effectiveness or unduly increase compliance costs; and,

- misleading, inaccurate or confusing information can deny consumers the information they need, but can also disadvantage a company playing by the rules, tilting the playing field against it (p37 paragraph 2.21). This provides an incentive for industry as a whole to organise self-regulatory models for labelling relating to “consumer values” issues and general public health issues, both in response to consumer demands but also to constrain less ethical industry players.

Food labelling regulatory hierarchy

Risk management approach	Food Labelling Hierarchy	Dominant mode of intervention
Higher risk	**Food Safety** Direct, acute immediate threats to health	Mandatory
↕	**Preventative Health** Indirect, long term impacts on health *Individual health: Healthy eating* *Population health: Primary, Secondary prevention*	Mandatory Co-regulation
	New Technologies Technologies that require pre-approval safety assessments of foods, ingredients	Mandatory with time limits
Lower risk	**Consumer values issues** Reflecting consumer perceptions and ethical views *Treatments & production methods: e.g. irradiation, cold disinfestation & some glass house production methods (viz. climate change impacts*	Co-regulation Self-regulation

Food irradiation currently sits within the *New Technologies* section, which currently requires pre-approval on a commodity by commodty basis and also mandatory labelling. The NZ FPIA believes that irradiated fresh produce should be managed as a *Consumer Values Issue* because we are primarily dealing with perceptions and ethical views (cf. *Food Safety* or *Preventative Health* issues). Appropriate co-regulation and self-regulation mechanisms can be developed and implemented for irradiated fresh produce involving a number of participants in the supply chain.

It is noted that FSANZ has been given the specific objective of providing adequate information for consumers to make informed choices (FSANZ 2016). However, its regulatory measures must also have regard to:

- The need for standards to be based on risk analysis using the best available scientific evidence; and,
- The promotion of consistency between domestic and international food standards; and,
- The desirability of an efficient and internationally competitive food industry; and,
- The promotion of fair trading in food.

Based on the above criteria, and recognising New Zealands obligations under the WTO/SPS agreement, there is a direct conflict between the mandatory labelling requirements for irradiated products that are currently imposed by FSANZ, the desire to meet the above policy objectives and our international obligations. For example:

- "Members shall ensure that any sanitary or phytosanitary measure is applied only to the extent necessary to protect human, animal or plant life or health, is based on scientific principles and is not maintained without scientific evidence."
- The principle of non-discrimination stipulates *that "a member shall not discriminate between "like" products from different trading partners".*

The available scientific information for irradiation (cf. other other alternative processes) strongly suggests that there is no scientific justification to require a unique and mandatory requirement to label irradiated food.

Constraints in the Food Service and Hospitality Sectors

In addition to the retail sector, the discrimatory requirement for mandatory labelling of irradiated food in the food service and hospitality sectors should be removed. The requirement is almost impossible to meet, limits supply options and is difficult and costly to administer and enforce.

Enforcement

Regulatory enforcement of the mandatory labelleling provisions is largely reactive and ineffective. This reflects the very low food safety related risks, limited resources and a justifiably low low priority status. In the case of dried herbs and spices, the labelling is virtually non-existent as is the enforcement. In the case of fresh produce, the enforcement actions are largely driven by complaints from domestic industry with a vested interest in protecting their own production and supply from competition. Removal of the mandatory labelling requirements would allow for scarce resources to be more usefully employed in other areas.

Cost:Benefit Considerations

The NZ FPIA has commissioned an independent report by the New Zealand Institute of Economic Research (NZ IER) to evaluate the cost:benefit impacts assocociated with the mandatory labelling requiements for irradiated products.

The NZIER report entitled *Removing the mandatory labels with regulatory enforcement on irradiated products: Evaluation of the impact* forms part of this submission.

QUESTIONS FOR STAKEHOLDERS

All submitters

1. What information (for example, studies, data or consumer feedback) can you provide on consumer awareness, understanding and behaviour, in response to labelling about food irradiation?
   See Mango case studies (provided under separate email).

2. Do you purchase, or would you consider purchasing, irradiated food?
   Yes.

3. Does the current labelling requirement for irradiated food (see box below) provide enough information for you to make an informed choice about the food you buy?

   > **Labelling requirement**: If the food, ingredient or component of a food has been irradiated, a statement to the effect that the food, ingredient or component has been treated with ionising radiation is required.

   Yes, but the labelling is not necessary.

4. What are your views about the wording of the statement not being prescribed?

   The labelling requirement is not necessary.

5. What are your views about the voluntary use of the Radura symbol?
   Voluntary use would be acceptable as part of a wider co-regulation, communication and/or branding strategy.

6. Do you think the current labelling requirement for all foods permitted to be irradiated should be removed?
   Yes.

7. If labelling was to continue for irradiated whole foods, do you think restaurant meals containing irradiated ingredients should still be labelled?
   No.

8. If labelling was to continue for packaged foods containing irradiated ingredients, do you think the irradiated ingredients should still be labelled?

   No.

Produce growers

9. Does the mandatory labelling requirement prevent you from using irradiation as a treatment for your produce? Please provide reasons for your answer.

N/A

Food manufacturers

Section N/A

10. Do you use irradiated ingredients in your products? (For example, tomato paste, herbs & spices).
11. Does the fact that irradiated foods have to be labelled impact on your decision to use them?
12. How important is the labelling factor alongside other factors? (For example, price, availability of ingredients, quality of produce, reputation of supplier).
13. If the mandatory labelling requirement was removed for irradiated ingredients used in processed foods, would your company be more likely to use irradiated ingredients?

Food service providers

Section N/A

14. Do you use irradiated whole foods in your products? (For example, irradiated tomatoes in sandwiches).

If the mandatory labelling requirement was removed for irradiated whole foods, would you still ask suppliers to label the food?

N/A

All industry submitters

Have you conducted any consumer research or received consumer enquiries about irradiated food? If so, are you able to provide the research to FSANZ?

Yes. See mango case study reports (provided separately)

15. Do you think the current mandatory labelling requirement is an impediment to developing existing / new markets? What reasons do you have for this?

Yes. Refer to body of submission.

16. What do you perceive to be the costs associated with the mandatory labelling requirement? (For example, costs of segregating irradiated produce from non-irradiated produce, specific packaging and/or labelling costs, traceability costs).

Refer to body of submission and NZIER CBA Report (provided separately)

17. What do you perceive the costs associated with the **removal** of mandatory labelling to be? (For example, potential for loss of consumer confidence in your products, amending product segregation, handling and display processes).

Refer to body of submission and NZIER CBA Report (provided separately)

18. What are the opportunity costs for your business associated with the mandatory labelling requirement? (That is, does the requirement to label irradiated produce cause you to compromise in your business practices? For example, does the time delay involved in labelling your produce prevent you from accessing certain market opportunities?).
Refer to body of submission and NZIER CBA Report (provided separately)

19. What are the relative costs and benefits of irradiation and other treatments in terms of cost, efficacy, post-treatment product quality, convenience and timeliness?

Refer to body of submission and NZIER CBA Report (provided separately). Irradiation provides a commercially viable option in the "toolbox" of phytosanitary treatments. No single treatment is a "silver bullet" with all options having their place. Irradiation provides benefits such as timeliness (i.e. relatively fast treatment throughput), non-chemical, no residues, generic application (i.e. effective against a range of pests) and maintenance of the cool-chain. Facility location can be a draw-back (i.e. transport distances and costs) as well as negative perceptions asociated with the technology. In the phytosanitary area, the efficacy of irradiation is scientifically proven, well established and supported by numerous international standards

All submitters

22. What are your views about information on the safety and benefits of food irradiation being on food labels?
Labels are a "blunt tool" and do not adequately address the intended purpose. See body of submission.

23. What other practical approaches other than labelling can be used to communicate the safety and benefits of food irradiation? (Please describe).

See body of submission (Regulatory hierarchy).

24. Do you have any information on the effectiveness of any of these approaches? (If so, please provide).

Nothing specific. The major players in the export-import-distribution-retail supply chain have existing systems and processes that can be used to adopt a co-regulation/self-regulation approach to effectively manage consumer-value driven issues such as labelling and communication.

Removing the mandatory labels with regulatory enforcement on irradiated products

Evaluation of the impacts

NZIER report to NZ Fresh Produce Importers Association

March 2016

About NZIER

NZIER is a specialist consulting firm that uses applied economic research and analysis to provide a wide range of strategic advice to clients in the public and private sectors, throughout New Zealand and Australia, and further afield.

NZIER is also known for its long-established Quarterly Survey of Business Opinion and Quarterly Predictions.

Our aim is to be the premier centre of applied economic research in New Zealand. We pride ourselves on our reputation for independence and delivering quality analysis in the right form, and at the right time, for our clients. We ensure quality through teamwork on individual projects, critical review at internal seminars, and by peer review at various stages through a project by a senior staff member otherwise not involved in the project.

Each year NZIER devotes resources to undertake and make freely available economic research and thinking aimed at promoting a better understanding of New Zealand's important economic challenges.

NZIER was established in 1958.

Authorship

This paper was prepared [redacted]

It was quality approved [redacted]

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Key points

Objective

This report provides an analysis of the advantages and disadvantages of removing the mandatory labels with regulatory enforcement on irradiated produce.

Main findings

The removal of mandatory labels will foster increased trade and potentially has multiple benefits:

- improved regulatory consistency by treating all safe biosecurity treatments in the same manor
- small decrease in administrative costs for state and national governments
- large decreases in compliance costs for industry participants due to streamlined processes
- marked increase in the trade in produce as markets take advantage of scale and scope economies
- improved consumer choice through a wider availability of fresh produce at competitive prices
- small decreases in lobbying costs
- small increase in wider economic benefits.

The analysis takes into account that the impacts will occur over 10 years and that the benefits will not be captured immediately.

There is a negative impact on some consumers because of their opposition to irradiation and its association to atomic energy and a potential cost to parts of the New Zealand horticultural industry which will experience increased competition particularly with produce such as tomatoes.[1]

The Table below summarises the qualitative impacts of removing the mandatory labelling requirements with regulatory enforcement. The analysis considers the effect over 10 years, because benefits will take time to occur.

The qualitative approach demonstrates that it is very likely that the advantages outweigh the disadvantages. These advantages are mainly driven by the increase in trade and the subsequent benefits to consumers and industry. Other advantages include a more consistent and non-discriminatory regulatory approach and a reduction in lobbying activity.

[1] The New Zealand tomato industry has taken advantage of the mandatory labelling requirements to increase production (albeit at higher production cost in the winter months).

Advantages and disadvantages of removing mandatory labelling with regulatory enforcement from irradiated produce

Advantages (benefits)	Disadvantages (costs)
Small reduction in monitoring and regulating irradiated product trade	Consumer concern. A small proportion of consumers will feel disadvantaged with the removal of mandatory labelling
Small reduction in the costs of formulating and implementing regulation	
Reduction in paper work by the company operating the irradiation facility and those using the facility	
Decrease in lobbying	
Reduced cost of complying with regulations (streamlining production)	
Efficiency gains because of the removal of labelling distortions	
Wider economic advantages such as a more consistent regulatory approach, improved consumer choice at lower cost, WTO compliance and full development of the technology (e.g. e-beam/x-ray)	Selected industries such as New Zealand tomatoes and capsicums will have to scale back production
Broader range and availability of fresh produce at competitive prices	

Source: NZIER

Caveats

Most of the assumptions are derived from FSANZ reports and interviews with the industry. These are characterised by different outlooks on the regulatory environment and approaches.

Quantitative data is used in this report to support the qualitative points made but the data is purely illustrative and based on approximate estimates provided by industry participants.

1. Introduction

Food Standards Australia and New Zealand (FSANZ) is considering removing the mandatory labelling with regulatory enforcement requirements for irradiated products. In this paper, we develop a high level evaluation (in a cost benefit analysis format) that points to the improved efficiency and effectiveness of fresh fruit and vegetable export-import regimes where irradiated food is used as a treatment.

There are a number of reasons for the proposed labelling change. These include:

- the need for a consistent approach to regulatory management that does not discriminate against safe technology and creates a level playing field for competing treatments[2]
- that there should only be mandatory labelling of new technologies for 30 years after their introduction to the food chain. Irradiated foods have now been in the food chain for 30 years (Review of Labelling Logic, 2011)
- over 60 countries now allow the use of irradiation for food and this number is growing each year (industry interview)
- irradiation has been subject to stringent safety assessments and the science is robust and has been subject to peer review (Review of Labelling Logic, 2011)
- the costs associated with separating and identifying irradiated food from other food in the supply chain (industry interviews)
- the benefits to consumers of irradiation treatments i.e. lower prices, improved quality, and choice
- new methods of irradiating produce that:
  - remove the association of irradiation with nuclear power facilities by doing away with the need to use cobalt 60 with e-beam/x-ray treatment delivery technologies
  - increase the potential accessibility of irradiation for both Australian and New Zealand exporters and importers as new facilities are built and/or better utilised.

The purpose of this report is to provide a qualitative evaluation to examine the implications of removing the mandatory labelling requirement from irradiated fresh produce.

We have drawn on international and domestic studies in peer-reviewed journals, case studies, information from FSANZ, perceptions of stakeholders, and other sources.

The analysis is intended to give policymakers an indication of the likely qualitative costs and benefits to assist in a decision on irradiation mandatory labelling. There remain a number of important uncertainties on costs, impacts, and practical implementation issues. We also recognise that science can only give us a snapshot of current knowledge on the 'safety' of irradiation; however, this is tempered by the amount of time that irradiated food has been in the food chain albeit with a limited number of

[2] Other approved treatments do not require labels.

products. As such, the depth of the analysis reflects the initial scoping nature of the assessment.

2. The current situation

New Zealand and Australia's horticultural industries comprise fruit, wine, vegetables, nuts, flowers, turf, and nursery products. These industries operate in highly competitive domestic and international markets, are labour intensive and mostly seasonal. The horticulture industry also contributes significantly to the prosperity of people living in rural and regional New Zealand and Australia.

Both industries have good domestic and international reputations as 'producers of premium safe food'—primarily due to our high quality and process standards across all stages of the supply chain, from farm/orchard/vineyard to consumer.

In both New Zealand and Australia there is now a wide variety of imported fresh fruits and vegetables on the market. The volume, variety and source of fresh produce changes constantly depending on the season, increasing the complexity of the supply chain. The huge variety of imported fruit and vegetables suggests that the market has become highly sophisticated as suppliers closely match consumer preferences with supply.

Horticultural production comprises a mix of small-scale family farms through to large scale corporate-led operations — however, there is a growing trend towards consolidating smaller operations into medium to larger scale commercial production and supply operations. New Zealand and Australian growers continue to adjust their operations and adopt new technologies to respond to the opportunities and challenges of agricultural production, increased competition from imported fresh and processed produce, market price pressures, new pests and diseases, and challenging or adverse seasonal conditions. Below we set out the size of the production and trade. The production and exports of both countries are similar, however Australian imports are much larger because of population differences.

Table 1 Estimated horticultural production, exports and imports

June Year 2014

	Australia ($NZ)[3]	New Zealand ($NZ)
Production[1]	$6,723 million	$7,000 million[2]
Exports	$3,732 million	$3,901 million
Imports	$3,234 million	$1,000 million[2]
Notes (1) includes wine industries. (2) Estimate, Fresh Facts 2014. (3) exchange rate $A1 = $NZ 0.92.		

Source: http://www.agriculture.gov.au/ag-farm-food/hort-policy/horticulture_fact_sheet#trade-statistics, Fresh Facts 2014, Reserve Bank of New Zealand, industry interviews, and NZIER estimates

The exposure of imported fruit in each market is quite different. In Australian supermarkets, at any given time, imported fruit represents approximately 4% of total fruit on the shelves/bins. In New Zealand supermarkets, the exposure to imported produce can be as high as approximately 30% of total produce (industry interviews).

2.1. Irradiation

Food irradiation is the process of exposing foodstuffs to ionising energy (radiation). Ionising energy can be transmitted without direct contact and is capable of freeing electrons from their atomic bonds (ionisation) in the targeted food. It has now been used in Australia and New Zealand for over 30 years having health, phytosanitary, animal health, biosecurity decontamination, and food applications.

To use irradiation processes for phytosanitary purposes for fresh produce requires specific permission by Food Standards Australia and New Zealand (FSANZ). The specific standard applied is *Standard 1.5.3*, it details the permitted sources and levels of radiation and lists the foods permitted to be irradiated, and the labelling requirements.

Over the last 30 years that it has been in the food chain a small number of products have been consistently irradiated in New Zealand and Australia (although it has been applied for general use in the United States). New Zealand and Australian regulators have adopted a strategy of "wait and see" rather than be early adopters in this trade. Although irradiated products include herbs and spices, herbal teas and a range of produce have been in the Australian and New Zealand market for some time.[3] Other imported food produce in specific circumstances is also being irradiated.

Irradiation achieves the biosecurity outcome by exposing the produce and unwanted pests to radiation that damages the DNA of a pest organism, preventing its cells from replicating, sterilising or killing the pest. This treatment leaves the produce almost completely unchanged in terms of nutrition and flavour.

By killing or sterilising any living organisms it is a cost effective biosecurity tool especially at low doses required for phytosanitary disinfestation purposes. It is now used globally (including major trading partners in Asia, South America and United States) for the sterilisation of grains and fruit destined for the consumer. It poses no health risk to the consumer, and leaves no toxic residues.

Irradiation also be used as an effective risk management tool for fungi, bacteria and other pathogens.[4]

2.2. Use of irradiation in the food chain

New technologies in horticulture and agriculture have been at the forefront of producing more with less inputs since the industrial revolution. The Labelling Logic report (2011) documents progress and suggests that it has only been in the 20th century that questions have been asked about the role of technology in the food chain.

For the most part, these technologies have been accepted (e.g. fluoridation of the water supply, pasteurisation, artificial insemination etc.). Not only are these advances

[3] The list of produce approved for irradiation by Food Standards Australia and New Zealand is growing all the time.

[4] Therefore, irradiation treatment has wide application as a biosecurity and food safety treatment. It can be potentially used in the horticulture, vitculture, meat, dairy and sea food sectors as a biosecurity and/or food safety treatment.

safe they are also important for public health reasons. In the 1980s the Codex Alimentarius Commission recommended the use of labelling as a way of giving consumers choice about using a new technology.

A generation later over 60 countries allow the use of irradiation for food with varying labelling requirements. The Labelling Logic Report (2011) recommends that the requirement for mandatory irradiation labelling should be reviewed because:

- irradiation has been used in food safety strategy for over 30 years but in Australia and New Zealand it has been approved only for use on herbs and spices, herbal teas, some tropical fruits (e.g. mangoes, litchi and papaya) and more recently tomatoes, capsicums
- nearly 60 countries have a regulation approving the use of irradiation for one or more foods or food class.

Further the Labelling Logic report (2011) argues that irradiation has been subject to stringent safety assessments across multiple products and the science is robust and has been peer reviewed. This has led to the current review by FSANZ which begins from the premise that irradiation is safe and nutritionally adequate. Hence these issues are out scope of the FSANZ review.

2.3. The problem with mandatory labelling with regulatory enforcement for safe treatments

Currently, irradiation is the only safe treatment that requires labelling. This cuts across the Labelling Logic Report (2011) approach to regulatory management that is designed to protect consumers' health and safety.

Table 2 below sets out the regulatory hierarcy framework from the Labelling Logic report. It is based on the view that the greater the risk to consumer health the greater the need for regulation. We have highlighted where treatments such as irradiation should sit within that framework i.e. within the co-regulation/self-management segment of the regulatory management regime with other approved or recognised post-harvest treatments such as methyl bromide, hot air/vapour treatments, cold disinfestation.

Table 2 Food labelling regulatory hierarchy

Risk management approach	Food Labelling Hierarchy	Dominant mode of intervention
Higher risk	**Food Safety** Direct, acute immediate threats to health	Mandatory
	**Preventative Health** Indirect, long term impacts on health *Individual health: Healthy eating* *Population health: Primary, Secondary prevention*	Mandatory Co-regulation
	New Technologies Technologies that require pre-approval safety assessments of foods, ingredients	Mandatory with time limits
Lower risk	**Consumer values issues** Reflecting consumer perceptions and ethical views *Treatments: irradiation, methyl bromide, hot air/vapour, and cold disinfestation*	Co-regulation Self-regulation

Source: Labelling Logic: Review of Food Labelling Law and Policy (2011) p43

The Labelling Logic report makes a number of points about the role of regulation in food safety. These include:

- food needs to be safe (p35 paragraph 2.15). The paramount role of a labelling requirement is to ensure that labelling reinforces the safety driver of regulation
- if a biosecurity treatment is safe (p37 paragraph 2.20) then governments should consider citizens and industry. However, regulation should not impede efficiency and effectiveness or unduly increase compliance costs
- misleading, inaccurate or confusing information can deny consumers the information they need, but can also disadvantage a company playing by the rules, tilting the playing field against it (p37 paragraph 2.21). This provides an incentive for industry as a whole to organise self-regulatory models for labelling relating to consumer values issues and general public health issues, both in response to consumer demands but also to constrain less ethical industry players.

The review of mandatory labelling is therefore timely since current regulatory settings treat irradiation as an outlier – relative to other treatments – despite its advantages and safety.

2.4. Opportunities

Biosecurity activities are becoming more and more important as trade becomes more liberalised. Therefore, changes in productivity associated with biosecurity activities have major impacts. The removal of labelling requirements offers the potential to improve productivity over the whole produce sector by reducing biosecurity costs and focusing on ways to further integrate irradiation approaches into the supply/marketing chain.

How this will play out in the market is unclear but it is likely to be positive since we expect:

- technical efficiency gains (scale). The cost per consignment is likely to be cheaper than alternative methods (that is if alternative methods such as methyl bromide or phosphine gases are available and have not be phased out). Further, new technology (e.g. e-beam/x-ray) is likely to be even more cost effective and have no association with nuclear facilities
- allocative efficiency gains (matching). Irradiation techniques are well suited to meeting technical and operational biosecurity needs since they are able to kill or sterilise insects and as an effective risk management tool for plant pathogens (e.g. fungi and bacteria) across many country/product/target pest combinations
- dynamic efficiency gains (innovation). By removing the barrier of mandatory labelling, firms are not just able to take advantage of reduced administrative and compliance costs but are also able to consider the possibilities of new investments and new markets.

If the removal of mandatory labels with regulatory enforcement reduces the community-wide costs, it will improve technical efficiency. To the extent that it shifts resources from one less productive activity to a more productive activity, it also improves the allocative efficiency of resource use. If it also allows new, more efficient ways and locations for irradiation services it also improves dynamic efficiency over time.

The short term "static" opportunities may be relatively small (e.g. reduction in administrative and compliance costs) however the longer term impacts of removing the irradiation labels may be significant (e.g. a reconfigured import/export industry that takes more advantage of irradiation as a biosecurity tool).

2.5. Proposed change

The Labelling Logic (2011) report sets out a comprehensive review of food labelling law and policy. The framework developed gives clear direction in a logically consistent manner (see section 2.3). The framework illustrates why the current regulatory settings for mandatory labelling of irradiated food are an anomaly.

As part of the Labelling Logic review a large number of recommendations were made suggesting amendments to current regulatory practice. Recommendation no. 34 states:

"*That the requirement for mandatory labelling of irradiated food be reviewed*."

FSANZ has been asked to review the need for the mandatory labelling requirement for all irradiated food to continue and assess whether there is a more effective approach to communicate the safety and benefits of irradiation to consumers.

3. The evaluation

We have used a cost benefit format to examine the qualitative value of removing the mandatory labelling requirement from irradiated food.

We have used this technique to identify the economic efficiency of the proposed recommendation. Efficiency is broadly about maximising outputs obtained from available inputs.

The analysis proceeds by comparing effects and outcomes associated with the removal of the irradiation label against what would have occurred under a situation without the proposed change. This baseline can be described as a projection of the status quo into the future as supply and demand conditions change.

3.1. Baseline

A scenario is required where benefits and costs of the "without" the removal of the mandatory irradiation label (the baseline) are set out. This involves examining in detail the current status quo. It includes a commentary on:

- what exists on the ground at the moment (i.e. the existing use of irradiation and the labelling requirements)
- any non-government intervention. The non-government intervention is not relevant in this case since health and safety regulatory requirements are a government prerogative.

The baseline also includes examining the likely future policy developments. While this can be speculative, we have focused on examining recent policy changes and any industry expectations for future developments. The aim is to identify how policies are likely to change over the next 10/20 years, to establish a realistic base case.

Setting up the baseline is difficult because there is:

- limited baseline data from which to measure any change
- uncertainty about what government and businesses are likely to do if mandatory labels with regulatory enforcement are not removed
- uncertainty about the impact of initiatives in the absence of the removal of mandatory irradiation labels.

Therefore, there are potentially a number of credible baselines. The one we assume here is open to question, and should be treated as "work in progress". We treat the baseline as a tentative "peg in the ground".

We assume that mandatory labels are not removed and that alternative biosecurity measures continue to be used or that trade occurs but labelling is required.

3.2. Qualitative assessment of the recommendation

This is a qualitative rather than a quantitative cost benefit analysis in the sense that many of the effects will be too difficult to reliably quantify. For instance, the benefits of streamlining production or the dynamic efficiency opportunities that may occur once mandatory labelling is removed can be described but have a wide range of values and realisation time frames.

While we can identify these benefits, it is not feasible to value them in economic terms, given time and resources. For practical reasons the analysis has concentrated on describing and illustrating potential benefits.

Feedback from various stakeholders' points to a number of costs and benefits. Groups considered to be important include:

- **consumers**. The main benefits for consumers are improved choice, quality and lower costs. Over time, as irradiation services are reconfigured to match trade flows and offer commercially viable options for currently approved but less attractive treatment options these benefits could be considerable. It may also assist campaigns such as the 5+ a day programme by improving the quality, variety and reducing prices of fruit and vegetables
- **businesses**. The ability to reconfigure their market offering to take advantage of irradiation technology over the long term will be a major benefit to businesses involved in the produce trade. In the short to medium term it will re-ignite trade that has been closed off and reduce compliance costs e.g. tomatoes, capsicums and other fresh produce. It will also increase incentives to invest in safe treatments and the supporting infrastructure e.g. coolstores
- **government**. Administrative costs will drop marginally. Government will also reduce its policy focus on irradiation labelling and move to resources into more constructive aspects (e.g. market access). It may also support government aims to increase trade since irradiation treatments may become more prominent as other treatments are withdrawn and biosecurity regulations in importing countries tighten
- **third parties**. Technology such as irradiation is an issue for some parties because of its association with ionising radiation.[5] The introduction of new technology (e-beam/x-ray) may reduce this opposition anyway because cobalt 60 is no longer required for irradiation.

[5] Currently, the opposition remains, despite the overwhelming scientific evidence (including peer review) that point to its safety and the benefits of using irradiation techniques.

4. Advantages & disadvantages

We have focused on advantages (benefits) and disadvantages (costs) associated with removing irradiation labels. In this way, stakeholders receive a "big picture" view of the likely costs and benefits.

The costs and benefits have been provided by FSANZ publications, a variety of stakeholders, and official statistics. Every effort has been made to triangulate information that has come from unofficial sources.

We have made a number of assumptions to assist in developing advantages and disadvantages. These include:

- costs and benefits are based on historical detail
- a 10-year horizon is used, to reflect how the impacts might occur. Ten years is considered long enough because of the need to build plants and/or to better utilise existing facilities (e.g. increasing throughput for existing products, developing supply-chain solutions for new products) or develop movable facilities (technology permitting) so that it benefited a wide range of imported or export produce.

As with previous assessments, the costs and benefits are mainly qualitative since the resources and time required to quantify the problem are out of proportion to the size of the problem. Also as FSANZ (2014) p7 points out many of the identified costs and benefits cannot be assigned a dollar value.[6]

4.1. Disadvantages

There is some opposition to the removal of the irradiation label. Therefore, for some consumers the removal of labels (no matter what the overwhelming scientific evidence suggests) will be a cost. Potentially these costs will reduce as new technology (e.g. e-beam/x-ray) is introduced.

It is difficult to measure let alone value the economic welfare impact of this concern. FSANZ in the Consultation Paper (2016) has attempted to understand the level of concern. A survey commissioned by FSANZ of 2,000 Australian and New Zealand consumers indicated that 13% and 11% of Australians and New Zealanders respectively were concerned about irradiation and thought it was an issue. The survey concludes by saying that while the level of concern was high, it was only high for a small proportion of the sample.

A number of surveys and focus groups have asked consumers if they want irradiated products labelled. An overwhelming majority answer yes to this question. However, this type of questioning – highlighting specific issues that prompts consumers has been criticised by Hallman, (2013).[7] Specifically, the concern is the question asked. The difference between "What would you like to see on labels?" will get a completely different answer to "Would you like to see X on the label?".

[6] http://www.foodstandards.gov.au/code/applications/Documents/A1092%20Irradiation-CFS.pdf

[7] http://humeco.rutgers.edu/documents_pdf/news/gmlabelingperceptions.pdf

Hallman uses GMOs as an example. Many research papers highlight the fact that overwhelming numbers of consumers in the United States would like to see GMO food labelled (90%). However, if you put the question another way and ask consumers what should be on a label the number of consumers who nominate GMOs drop sharply to 7%.

The issue is that it is easy to make it look like people are concerned about something a whole lot more than they actually are. Questions that prompt consumers are often used by groups with a vested interest to support restrictions on competition. This is particularly an issue when consumers have low awareness about the technology, do not understand the processes (such as irradiation) and are not made aware of other competing alternatives that may also carry "consumer value" concerns.

Further, the level of concern about safety, however unwarranted, is one of a number of factors that regulators need to consider in their decision making. Given that irradiation is considered safe other factors such as international commitments under the WTO and business interests also enter the calculation.

A further cost may be borne by local industries. These industries have taken advantage of the barriers set up by mandatory labelling requirements. These industries, such as New Zealand tomatoes have grown to take advantage of the "windfall" gain generated by the sudden banning of Australian tomato imports (see Appendix A). The removal of the mandatory labelling requirement will increase competition in the New Zealand market and reduce returns to the New Zealand growers – although production during the winter months when costs are highest is likely to cease.[8]

Table 3 Costs of removing the mandatory labelling

Cost	Qualitative estimate	Comment
Consumer concern	Relatively small	A small number of consumers are opposed to irradiation. This is expected to diminish over time. However, given the proven safety of irradiation treatments this is only one factor that regulators need to take account of e.g. WTO commitments, business development, and regulatory fairness
New Zealand domestic industry	Difficult to tell since a reduction in production may allow for resources to be used elsewhere	New Zealand growers will reduce production but will also stop or reduce production in the winter months when production costs are at their highest, crop yields are at their lowest and the return on investment is at its lowest

Source: NZIER

[8] Further competition will lead to a competitive response which benefits consumers e.g. in terms of reduced price and availability.

4.2. Benefits

The short term benefits revolve around the reduction in administrative and compliance costs. However, the main benefits are potentially the longer term (5 to 10 year) dynamic benefits as industry stakeholders take full advantage of new opportunities in the market. This will become more apparent as more country and commodity pathways are approved through both the FSANZ approval process and changes to biosecurity import regulations across a number of countries. For example, under the timeline being considered, irradiation as a market access development tool for New Zealand produce is a realistic proposition.

4.2.1. Reduction in administrative oversight

Administrative costs include the reduction in monitoring and enforcement costs. These are more associated with Australian government costs since Australia has irradiation plants and New Zealand does not.

These costs are likely to be small to the point that they might not impact on budgets. That is, agencies will focus their resource on another food issue rather than irradiation.

Another administrative cost is the cost of formulating and implementing regulation. These include the periodic reports which consider irradiation issues (such as Labelling Logic, 2011 and the Calls for Submissions for various applications)[9], applications to change the interpretation of the rule that guides irradiation use, and the transaction costs of consulting stakeholders in the course of putting these documents together.

Table 4 Reduction in administrative costs

Cost reduction	Qualitative estimate	Comment
Cost of maintaining and monitoring	Relatively small	Agencies likely to spend resources on other priorities
Cost of formulating and implementing regulation	Relatively small	While the documents produced are sizeable and consume substantial resources it is hard to see agencies not spending this type of money on other priorities

Source: NZIER

[9] See for example Calls for Submissions – Application A1092. http://www.foodstandards.gov.au/code/applications/Documents/A1092%20Irradiation-CFS.pdf

4.2.2. Reduction in compliance costs

A number of government and industry related compliance costs will be reduced with the removal of the need to label.

Reduction in paper work

Demonstrating the need to comply with regulatory compliance. This is the paperwork that is required to show compliance.[10] The reduction in paper work will be relatively small since direct regulatory oversight is light and reactive rather than proactive. For irradiation labelling activities, it comprises of annual half day audits of irradiation plants by state governments in Australia (industry interviews). As more and more products are approved with irradiation as an agreed treatment option, the logistical complexities associated with labelling compliance (and therefore costs) will increase over time.

Reduction in costs associated with labelling practices

Removing mandatory irradiation labels will streamline practices associated with irradiated produce. This includes software used to track irradiated produce and other equipment and warehousing arrangements dedicated to separating irradiated from non-irradiated produce.

Savings are difficult to quantify because of the packaging requirements, time in market, price points, gauging throughput, and product characteristics. Examples of the costs include the following:

- Australian growers also have to set up independent packing lines for mangos going to New Zealand. While the costs are difficult to judge it does have an impact on a packhouse bottom line.
- the costs of checking the label as they arrive at the irradiation facility. One person spends a small amount of their time checking that each consignment has the correct label. If consignments are not labelled, then extra labour has to be bought in to do the labelling at $35 per hour. Of the 450 consignments in one Australian irradiation facility between 20 and 30 consignments per annum require labels. Costs for each consignment vary because of the differing size of the consignment but labelling can take anywhere between 3 and 6 hours to complete for up to 3 people (industry interview).
- importers and retailers also face costs. These participants in the value chain have to ensure that they have systems in place to cope with distinct food lines.
- for a large number of supermarkets and food service outlets the problems and complexities of labelling mean that they do not stock irradiated food because it is almost impossible to separate and identify irradiated and non-irradiated produce on a day to day basis. The problem is particularly acute for food service outlets because the product is mixed with other produce and sold in sandwiches etc. so labelling is not possible.

[10] Irradiated produce freight movements will still require a "certificate of irradiation" for irradiation facility to port, port-to-port and port to retail transport. It is also necessary for a phytosanitary treatment certificate for phytosanitary use.

- as more irradiated products are approved and introduced into the retail supply chain, the scale and costs of the labelling problems becomes even more of an issue.

In all cases the withdrawal of mandatory labelling would streamline operations and introduce a degree of flexibility hither to not possible.

Regulatory fairness

A further factor that needs to be considered is regulatory fairness. The framework developed by the Labelling Logic report (2011) points towards the use of a co-regulatory or self-management model for irradiation treatments. This suggests that either all approved/recognised treatments are labelled or none are labelled e.g. methyl bromide, hot air/vapour, cold disinfestation treatments. Also, other consumer-value driven issues such as certain production processes (e.g. coal fired glasshouses and links to climate change) may also require labels

Reduction in lobbying activity

The removal of mandatory labelling with regulatory enforcement will encourage industries to scale back their lobbying activities. In the current regulatory environment firms/industries are trying to protect the status quo by commissioning reports, lobbying ministers and attempting to influence public opinion through media campaigns.

How much effort is being put into this is unknown, however from a national perspective this unproductive effort is better spent on other activities that improve the efficiency of the domestic producer e.g. through improving skills, better understanding markets, and other industry good activities.

Compliance cost that distort economic behaviour

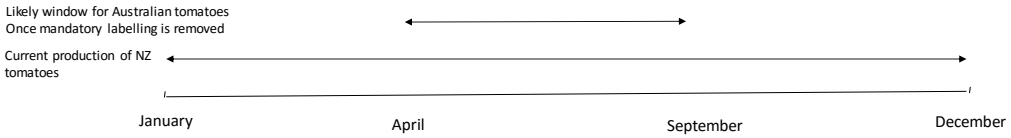
The removal of the labelling requirement is likely to reduce costs for entities doing business. Entities will no longer have to comply with regulations that impact on the viability of the irradiation operation and effectively curtail or significantly reduce trade.

These result in economic distortions. This includes:

- scale and scope impacts. With the mandatory labelling requirements removed the amount of product irradiated is likely to grow substantial (e.g. see appendix A for tomatoes case study). The increased scale and scope associated with the trade will lower costs and some of these costs will be passed on to the consumer in both Australia and New Zealand
- better matching of produce to plant utilisation. It is likely to stimulate further investment in irradiation technology and facilities which could also drive further efficiencies e.g. where irradiation plants are located and the use of new technology may better match supply chain logistics with demand (an allocative efficiency gain)
- a more competitive trade will mean that the New Zealand producers are likely to stop producing in the winter months (with the added advantage of burning less fossil fuel such as coal and gas). Australian production will expand to meet the need of New Zealand consumers (see Figure below) by

using irradiation treatments to expand trade. This is a further allocative efficiency gain where the comparative advantage of Australian producers matches the need of New Zealand consumers. Other crops such as capsicums and stone fruit may also offer consumers a wider choice at lower prices

Figure 1 Illustrative example of likely increase in the tomato trade with the removal of mandatory labelling



Source: NZIER

- dynamic efficiency gains as business take advantage of new opportunities. As volumes increase and the supply chain becomes more streamlined the opportunities for further use of irradiation (outside produce) will also increase e.g. in Australia bee keepers use irradiation treatment to disinfest hives at the end of the season. This improves the productivity of hives by removing pests and diseases. A plant located in New Zealand could encourage similar business. No estimates of dynamic innovation losses under the mandatory labelling regime are available but over ten years these losses are expected to be relatively high.

Table 5 Compliance costs

Cost reduction	Current cost	Assessment
Reduction in paper work by the company operating the irradiation facility and those using the facility	Half day audits by Australian state governments	Likely to be small but could increase overtime as more products are approved
Reduced cost of practice changes to comply with regulations	Ensuring that labels are in place, separate packing lines by growers, and ensuring irradiated produce is not mixed with other produce	Staff costs and separating irradiated produce in the supply chain. Likely to be relatively small but could increase overtime as more products are approved
Efficiency losses because of the labelling distortions	Technical (scale), allocative (matching), and dynamic efficiency (innovation) losses	Costs removed that distort resource use arising from the labelling requirement e.g. by removing mandatory labelling trade is likely to increase dramatically as more outlets (supermarkets and food service outlets) stock irradiated produce and the range of products increase over time

Source: NZIER

4.2.3. Wider economic benefits

Wider economic benefits may also occur as firms re-position themselves to take advantage of the labelling change. While possibly the biggest source of benefit they are also the most difficult to quantify.

These could include:

- a more consistent regulatory regime providing a level playing field for those processes that meet effective biosecurity delivery outcomes and safe health standard requirements
- improved choice for consumers and more competitive market for produce, particularly in areas such as tomatoes, capsicums, mangoes, grapes and stone fruit (improved quality, wider availability and lower prices). This could also assist programmes such as 5+ a day by providing cheaper produce and more variety safely
- the full development of a technology (i.e. the introduction of e-beam/x-ray with no association with nuclear power plants) that can replace older or other technologies lacking irradiation's advantages to industry and consumer
- the possible construction of a new irradiation facility in Victoria, New South Wales or New Zealand and its consequences (for New Zealand this gives exporters a potential avenue to meet import requirements in 3rd countries and/or to develop new market access opportunities
- full compliance with international trade obligations by endorsing safe and effective biosecurity and food safety related treatments.

The benefits could include increase exports, higher employment through the marketing chain, and further additional contributions to GDP.

Table 6 Wider economic costs reductions

Cost reduction	Current cost	Assessment
More consistent regulatory approach	Unknown	Signalling impact
Increase in trade	Small but could grow over time	As labelling distortions are removed trade opportunities are likely to grow in both the domestic market and for exports
Improved consumer choice, quality and price	Unknown but significant for consumers	Removal of irradiation labelling
WTO compliant	Unknown	Small countries have a vested interest in following international rules since the depend upon them
Full development of the technology	Unknown	Difficult to value

Source: NZIER

4.2.4. Other benefits

The withdrawal of the label may have other benefits. For example, where consignments require emergency treatments on arrival, irradiation treatment is internationally recognised as an effective phytosanitary treatment and can also be considered as a "generic" treatment for many internationally important pests.

A further benefit is the rapid treatment time relative to other treatments (relative to methyl bromide, hot air/vapour treatments, cold disinfestation), possibly offset by transport to the treatment facility under some circumstances.

Longer term, the use of irradiation could have a major impact on not only horticulture but floriculture, meat, seafood and dairy exports. Since irradiation is an effective risk mitigating tool for bacterial diseases it will have a positive impact on health costs for food borne bacterial diseases.

5. Results

The section above has indicated the basis on which the analysis has been developed. The results are summarised below. On the basis of the qualitative information the advantages are likely to outweigh the disadvantages of removing the mandatory labelling requirements.

However, the robustness and representativeness of the analysis is influenced by:

- any bias and errors in information provided by experts[11]
- the potential magnitude of unquantified benefits, such as the wider economic benefits from increased trade and the improved price, quality and choice for consumers.

We also assume that the analysis is undertaken over a number of years since some of the benefits will take time to materialise, whereas the disadvantages occur as soon as that mandatory labelling is removed.

Table 7 Advantages and disadvantages of removing mandatory labelling with regulatory enforcement from irradiated produce

Advantages (benefits)	Disadvantages (costs)
Small reduction in monitoring and regulating irradiated product	Consumer concern. A small proportion of consumers will feel disadvantage with the removal of mandatory labelling
Small reduction in the costs of formulating and implementing regulation	
Reduction in paper work by the company operating the irradiation facility and those using the facility	
Decrease in lobbying	
Reduced cost of complying with regulations (streamlining production)	
Significant reduction in efficiency losses because of the labelling distortions	
Wider economic advantages such as a more consistent regulatory approach, improved consumer choice at lower cost, WTO compliant and full development of the technology	Selected industries such as tomatoes and capsicums will have to scale back production
Broader range and availability of fresh produce at competitive prices	

Source: NZIER

5.1. Sensitivity analysis

The lack of quantitative data means that we have not been able to set out a sensitivity analysis.

[11] To try and avoid bias and errors we asked a standard set of questions of each interviewee and where possible cross-checked answers with different sources.

6. Conclusions

In this qualitative assessment the results suggest that the benefits are likely to outweigh the costs.

The principal parts of the qualitative analysis resulting from the removal of the mandatory labelling requirement with regulatory enforcement are:

Improving regulatory consistency by treating all approved/recognised biosecurity treatments in the same manor:

- the small decrease in administrative costs
- the likely large increase in compliance costs as the trade in irradiated produce increases markedly
- a small decrease in lobbying costs
- the small increase in wider economic benefits
- the small loss of economic welfare for those consumers who object to irradiated product. This is likely to dissipate over time particularly with the introduction of e-beam/x-ray technology that does away with need to use cobalt 60
- the undetermined cost to New Zealand producers who will have to reduce production particularly in the winter months.

We must stress that there are limitations in the qualitative analysis due to the information available on different aspects. The robustness of the analysis is influenced by the potential bias in the information provided and uncertainty of how much trade will take place once the mandatory labelling on irradiated products is removed.

Appendix A Case studies

A.1 Tomatoes

Australian tomatoes have been imported into New Zealand for some time. A biosecurity treatment called dimethoate was used in the form of a dip or flood spray to deal with pests such as fruit fly. After a lengthy food safety driven investigation, dimethoate was deemed to be a potential carcinogenic and banned from use as a biosecurity treatment under some circumstances (e.g. for products with an edible peel).

With no other treatment available for Australian growers the volume of tomatoes exported to New Zealand dropped from approximately 400,000 carton equivalents to zero in 2012. It has since recovered slightly to approximately 40,000 – 60,000 carton equivalents.

As a result, the New Zealand industry geared up to produce all year round including in the winter months. The cost of glasshouse production in the winter months is relatively high because it requires increased use of fossil fuels such as coal and gas.

The removal of the mandatory labelling requirement for irradiated produce will mean that the imports from Australia can compete on a level playing field and meet the needs of the market. The cost to the consumer for Australian irradiated tomatoes in the winter months is likely to be around $4.99/5.99 per kg whereas New Zealand tomatoes can retail at $12.99+ per kg.

The buy New Zealand policy of New Zealand supermarkets and efficiency of New Zealand producers will mean that the expansion of the Australian trade is most likely to be in the winter months (see Figure 1).

A.2 Mangoes

The New Zealand market for Australian irradiated mangoes dates back many years, however, the removal of the only fumigation treatment option for fruit flies (viz. ethylene dibromide) in the early 1990's effectively curtailed that trade. Apart from those suppliers who are directly competing with Australian mangos (e.g. importers of South American mangos) the irradiation issue appears to be secondary to discussions of future market development.[12]

New Zealand does not have a mango growing industry, therefore there is little opposition to the imported product. Australian mangoes are of superior quality in terms of taste, texture and size and therefore meet a market niche at the higher value end of the market. The South American sourced mangoes are of different characteristics in terms of taste, texture and size and fulfil a need at the lower price end of the market. Accordingly, the mango consumers in New Zealand have adapted accordingly with both products fulfilling certain consumer choices and niches and both provide alternatives to other fruit.

[12] Australian mangos compete with South American mangos in the New Zealand market place – there is no domestic production of mangoes in New Zealand, therefore, industry lobbying is virtually non-existent. The Australian mangoes are irradiated and labelled.

Initially, importers were cautious about irradiated mangoes. However, a window of opportunity turned quickly into a season of opportunity. Calculations based on import statistics show the 'season' of opportunity now extends for about 15 – 19 weeks (October to February/March).

Once Australian mangoes became established in the market, mainstream supermarkets began to offer mangoes for sale. A key advantage is the quality and flavour of the mangoes.

Today Australian irradiated mango exports are increasing. In the 2014/15 year. Of the 8.5 million trays produced 12% are exported. Exports are growing and the five-year strategic plan targets export growth as a major goal. By 2020 the exports of irradiated mangoes are expected to increase to 20% of the total crop. Exports have mainly been to New Zealand, Asia and the Middle East with mangoes being exported to the United States for the first time in the last year.

Appendix B Sources of regulatory costs

Costs of regulation come in many forms:

- Administrative costs for those implementing a regulation:
  - Costs of formulating and implementing the regulation
  - Costs of maintaining and enforcing the regulation (inspections etc.)
- Compliance costs for those subject to regulation (industry and individuals):
  - Costs of demonstrating compliance to regulators (administrative costs)
  - Costs of equipment purchase, practice changes to comply with regulations
  - Costs of delay in gaining approvals or permits to continue business as usual or adjust to changes in the regulations
- Deadweight (allocative) costs resulting from distortions in resource use arising from the influence of other costs (e.g. abandoning some activities where costs of compliance or delay is sufficient to affect the viability of the activity).

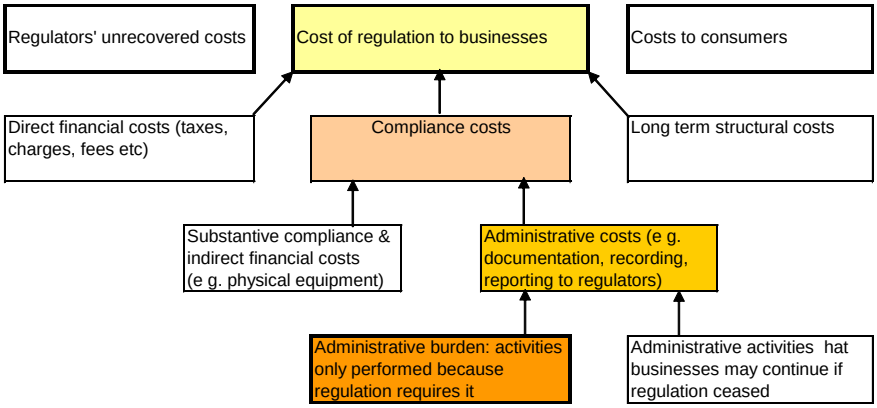
These costs may shift between affected parties without affecting the outcome of a cost benefit analysis that takes a state-wide welfare perspective. For instance, even if the regulating body fully recovers the costs of maintaining and enforcing the regulation from those being regulated, this simply transfers those costs from the regulator to the regulated and they continue to contribute to the total cost to be compared against the benefits received.

Some things that are commonly regarded as regulatory impositions are not included in economic analysis of regulations. Taxes and charges paid to government are a cost to business, but generally are not costs of implementing the regulation. While charges recovering costs of inspections, or fines for non-compliance, can be regarded as part of regulatory implementation costs.

The full costs of regulation are illustrated in the Figure below. Regulation can entail implementation costs for regulators, which if not recovered from other parties will fall on taxpayers, and also costs for ultimate consumers of the products subject to regulation, in addition to costs of regulation to businesses. The costs to businesses include compliance cost, which includes substantive costs on equipment to comply with environmental or health and safety requirements (such as emissions filters or fire extinguishers), and administrative costs on records and documentation to demonstrate compliance. In addition to compliance costs, there may also be direct financial costs (taxes, public agency fees) and long term structural costs caused by changes in behaviour in response to the regulation (the allocative distortions referred to above). Administrative burden is only that part of administrative cost that businesses would cease if the regulation were removed. Businesses may be able to recover some regulatory costs by passing them onto consumers in prices, but they are less able to do this where markets are competitive and consumers are price sensitive.

From a national or state-wide perspective, a regulatory cost does not cease to be a cost just because it is transferred from businesses to consumers.

Figure 2 Full components of regulatory costs



Source: NZIER; adapted from SCM Network (2006)

Terminology in the literature varies from that listed above. For instance, industries often regard administrative costs as solely their own costs, rather than those incurred by the body administering the regulation (as above). They also often distinguish compliance costs of equipment purchase and practice changes from the broader costs they incur in complying with all aspects of a regulation. The term "policy costs" is also sometimes used to encompass industry costs such as delay costs and deadweight costs of distortions.

Nevertheless, it is clear that the focus on administrative burden implicit in red tape reduction targets in Victoria and other countries applies to only a small portion of the total costs imposed by regulation. The OECD (2006) defined administrative burden as "regulatory costs in the form of asking for permits, filling out forms and reporting and notification requirements for government".

This focus on a narrow portion of total regulatory costs has profound implications for the search for regulatory cost savings, as there is a risk of focusing on small changes that are difficult to make while overlooking larger and easier to make savings elsewhere. For instance, in applications for permits there may be far larger economic gains to be made in speeding up approval times than in changing the forms and information required to support the application.