



Phytosanitary Irradiation

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Queensland
Government

Irradiation is not a new technology

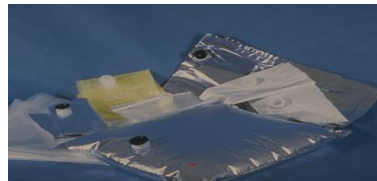
- The potential to use irradiation for sanitary and phytosanitary purposes has been known since the early 1920's.
- The first commercial facilities established for sanitary use were established in the 1950's.
 - Germany, 1957
Stuttgart
Irradiation of spices
 - USA, 1958
Ethicon, Sommerville, New Jersey
Sterilisation of catgut sutures
 - Australia, 1960
Westminster Carpet Company, Dandenong, Victoria
Irradiation of bales of goat hair suspected of containing anthrax



← Facility is still operating today

We use irradiated products everyday but most people are completely unaware

Sanitisation of
packaging items



Before filling, to prevent
contamination of contents

Mail in the US



Protection against anthrax attack (2001)

Cosmetic ingredients and items



Ensure safety with less preservatives



Rawhide dog chew



To prevent spread of
harmful microorganisms

To protect
your kids,
not your
dog



Gemstones



To give them a more
attractive color



Mummy
from
Peru



To prevent deterioration
by fungi

Enhancement of materials

- Cable and wire insulation



- Polyethylene foam

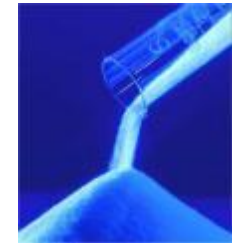
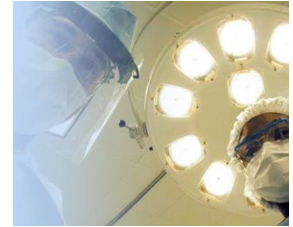


- Heat shrinkable film



Sterilisation of healthcare products

- From the 1960s re-usable healthcare instruments replaced by disposable instruments
- Estimate: 2 million m³ of single-use medical devices radiation sterilised annually worldwide
- Examples : surgical gloves, drapes, scalpels, prosthetic implants, blood dialysers, device-drug combination products, etc.



This figure was pre-covid



Irradiation of bee keeping equipment has been commercially applied in Australia since 1982 when American foulbrood was discovered

A minimum absorbed dose of 15 000 Gray is used and eliminates all disease, mould and insects

- Nosema Ceranae
- Ascosphaera Apis
- Small Hive Beetle
- American Foulbrood
- European Foulbrood
- Nosema Apis



The SI unit for absorbed dose is Gray (Gy)

1 Gray is equivalent to the absorption of 1 joule per kilogram of material
(1 Gy = 1 J/kg)

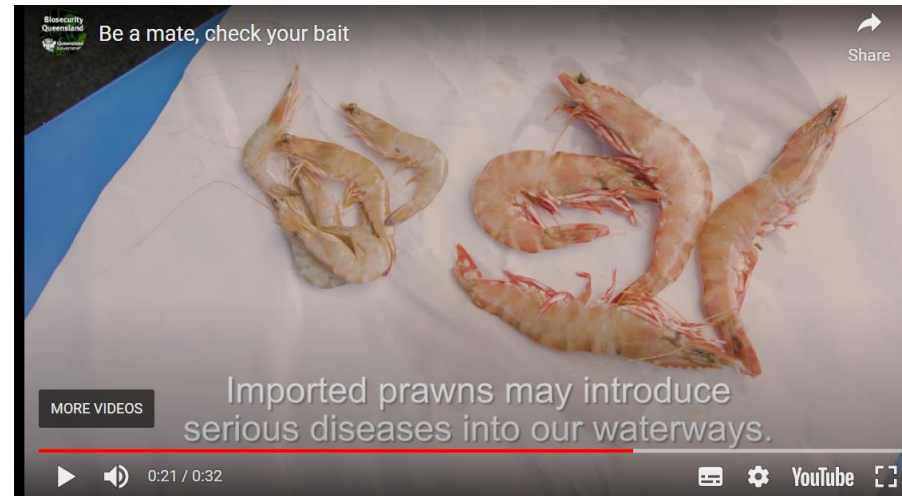


Prawns for human consumption are not irradiated

The introduction of white spot disease has had serious ramifications for the aquaculture industry in South East Qld

It also had the potential to destroy the lucrative bait industry operating out of Moreton Bay (e.g. prawns not for human consumption)

The industry is still operating today is because irradiation has been used to sterilise the product before is distributed along the east coast of Australia



Thanks Roy



There are hundreds of facilities providing sanitary irradiation worldwide

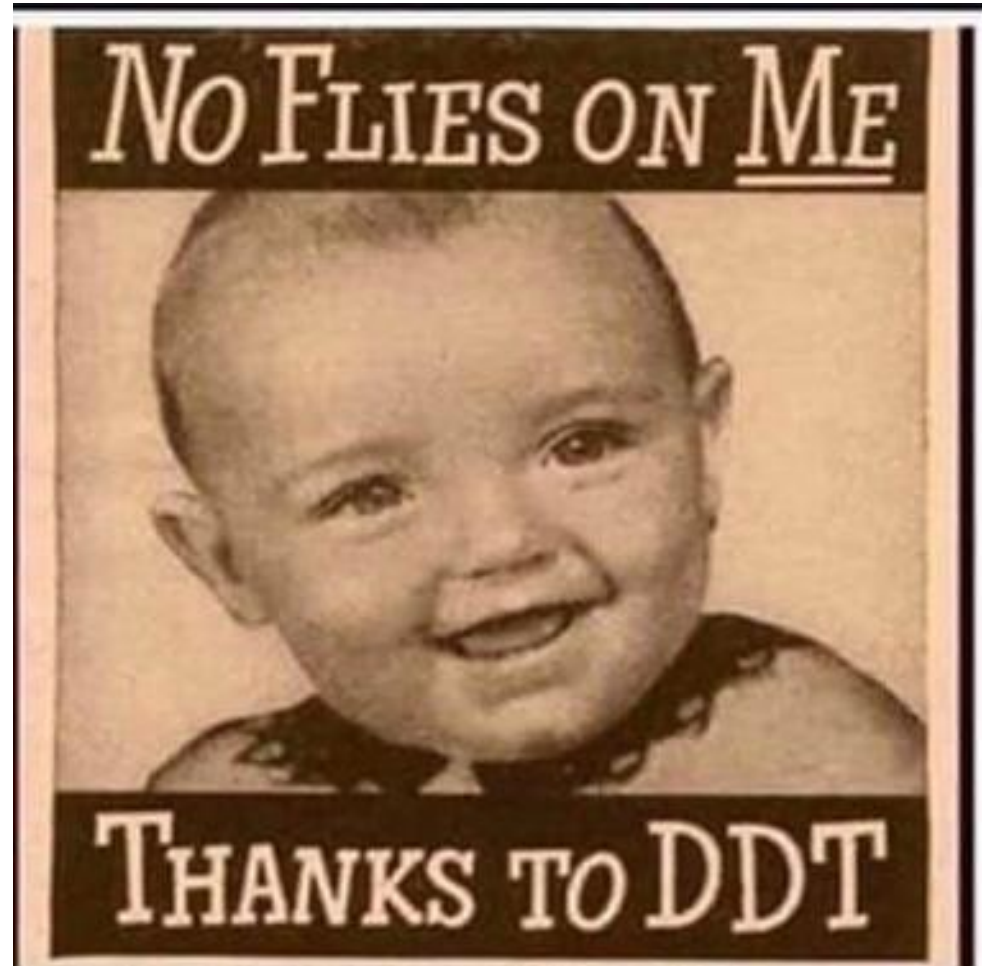
- Irradiation facilities are the most stringently regulated treatment facilities (you don't need FSANZ approval for heat or cold treatments)
- Because they operate in manufacturing and health care industries there are international standards covering virtually every aspect of facility installation, qualification, operation and reporting

Why has the phytosanitary use of irradiation been so slow?

The main reason that irradiation was not adopted sooner was that alternative treatments were cheaper and easier to apply (easier, not necessarily safer)

(EDB killed everything, that is why it was banned)

Certainly there was little consumer resistance to chemicals in the early to mid 1900's (that has changed).



But the main reason has been a lack of harmonised legislation worldwide

- Many countries approve the sanitary use of irradiation but the regulations for phytosanitary use are definitely not harmonised
- The fact that some of Australia's major trading partners such as Japan, Korea and China do not allow phytosanitary irradiation for Australian products has been a major impediment to adoption of the technology.
- It is important to note that every country has a sovereign right to determine their own regulations





Legislation on phytosanitary irradiation in the Asia Pacific Region can be classified into the following four categories:

1. Countries that do not permit the use of phytosanitary irradiation
(Australia before 2003)
2. Countries that permit at the use of phytosanitary irradiation for at least one commodity **(Australia from 2003-2021)**
3. Countries that have generic or class wise approval for groups of food
(Australia 2021)
4. Countries that use phytosanitary irradiation domestically but do not allow it for imports.



On the 22nd of July 2021, FSANZ gazetted the generic or class wise approval to irradiate all fruit and vegetables for phytosanitary purposes

- (1) Kernot, I and Chay, P. (2009) Application to amend Standard 1.5.3 Irradiation of Food of the Food Standards Code to include persimmon (*Diospyros kaki*) using irradiation as a phytosanitary measure.
- (2) Leach, P and Chay, P and Roberts, P. (2019) Application to amend Standard 1.5.3 to include irradiation as a phytosanitary measure for all fruit and vegetables.
https://www.foodstandards.gov.au/code/applications/Documents/A1193%20Application_Redacted.pdf
- (3) Leach, P and Chay, P. (2013) Application to amend Standard 1.5.3 Irradiation of Food of the Food Standards Code to include apple, apricot, cherry, honeydew melon, nectarine, peach, plum, rockmelon, strawberry, table grape and zucchini using irradiation as a Phytosanitary Measure.
<http://www.foodstandards.gov.au/code/applications/Pages/A1092-Irradiation.aspx>
- (4) Leach, P and Roberts, P. (2011) Application to amend Standard 1.5.3 Irradiation of Food of the Food Standards Code to include Tomatoes (*Lycopersicon esculentum*) and Capsicums (*Capsicum annum*) using irradiation as a Phytosanitary Measure.
<http://www.foodstandards.gov.au/code/applications/Pages/applications1069Irra511.aspx>

- The revised standard took effect immediately on the date of gazettal.
- Prior to this date Qld had led or assisted in the development of 24 of the 26 crops FSANZ had approved



The Queensland Government has been working on irradiation treatments and legislation since 1985

- Research on this technology was conducted even though there was a moratorium on the use of irradiation from 1989 to 1999.
- Qld scientists have represented Australian interests on committees such as the International Consultative Group on Food Irradiation (ICGFI) which recommended approval of irradiated foods by class (i.e. all fruit and vegetables).
- Australia also funded a review on the safety and nutritional value of irradiated food which was undertaken by the World Health Organization (WHO)

Queensland has also promoted the adoption of irradiation and harmonisation of legislation throughout Asia

We have worked and lead projects (2005- 2022) funded by the IAEA which have worked with scientists and food safety authorities in Bangladesh, China, India, Indonesia, Republic of South Korea, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam



Queensland has also promoted the adoption of irradiation and harmonisation of legislation throughout Asia

We have led projects which developed guidelines for Good Irradiation Practice which were eventually approved as regional standards for accreditation of irradiation facilities

Phytosanitary Standards

Approval of Irradiation Facilities

- Regional Standard Asia and Pacific Plant Protection Commission (APPPC)
- Submitted to IPPC
- Developed from a Regional IAEA Technical Cooperation Project



<http://www.fao.org/docrep/019/i3703e/i3707e.pdf>



Queensland has also promoted the adoption of irradiation and harmonisation of legislation throughout Asia

We have worked on the development of Generic Irradiation Doses for Quarantine Treatments (2009-2013) with scientists from Argentina, Brazil, China, India, Indonesia, South Africa, Syrian Arab Republic, Turkey, United States and Vietnam

The number of IPPC treatments is growing rapidly

Phytosanitary Standards

FAO/IAEA Coordinated Research Projects (CRPs)

- The ISPM 28 irradiation treatments – from CRP participants
- Most recent CRP D62008 Developing Generic Doses for Quarantine Treatments (2009 – 2014)
 - Institutes from 15 different countries
 - generated data on 38 different pest species.
 - Over thirty manuscripts have been prepared and submitted for publication in a special issue of Florida Entomologist.





Currently working on a new IAEA funded project on Generic Irradiation Doses

Combined with 150 Gy dose already in place for fruit flies these generic doses would address over 90% of quarantine issues for fresh fruits and vegetables worldwide.

Possible generic dose (Gy)	Pest group
150	Weevils of the family Curculionidae and possibly others
200	Leaf miners of the family Agromyzidae
250	Mealybugs of the family Pseudococcidae
250	Scale insects of the family Diaspididae
250	Eggs and larvae of the order Lepidoptera
300	All insects other than pupa and adult Lepidoptera
400	Mites of the family Tetranychidae
400	Pupae of Lepidoptera
500	Phytophagous mites in families other than Tetranychidae



What does this mean for industry?

- We do not need any more funding for nutritional assessments and submissions to FSANZ
- We do not need anymore funding for fruit fly research
- If we get an incursion of a new fruit fly species we will have treatments in place and ready to go
- Domestically in Australia we also have a 400 Gy generic treatment for all insect pests except Lepidoptera that pupate internally (broccolini, cauliflower and carrots have been treated domestically since the generic FSANZ approval)
- International protocols will still need bilateral negotiations but they are much simpler and quicker if we have internationally approved generic treatments



Generic treatments have facilitated the rapid expansion of protocols over the last decade.

Since 2002 DAWE has successfully negotiated numerous new export protocols

- Mangoes (NZ/U.S/Malaysia)
- Tomatoes (NZ)
- Capsicums (NZ)
- Lychees (NZ/US)
- Papaya (NZ)
- Zucchini (NZ)
- Cherries (Indonesia, Vietnam)
- Plums (Indonesia, Vietnam*)
- Table Grapes (NZ, Vietnam)
- Mandarins (Vietnam)
- Oranges (Vietnam)
- Persimmons (Thailand*)

*protocol is in place but no exports yet

How long does it take to get a new protocol approved?

2 Years?

5 Years?

10 Years?

20 Years?

On average it is just under ten years





Australia is now the fourth largest exporter of irradiated produce behind Mexico, Hawaii and Vietnam



Compared to cold treatments and methyl bromide, volumes are still small but they are increasing every year

Watch this space



Department of Agriculture and Fisheries

There is another session on Market Access Research on Wednesday afternoon in Meeting Room 4.

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