



# Organic Industries

Voice of Australia's organic industries  
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11 December 2020

Food Standards Australia New Zealand  
PO Box 5423  
KINGSTON ACT 2604

**RE: A1193 - Irradiation as a phytosanitary measure for all fresh fruit and vegetables: to extend the option of phytosanitary irradiation to all types of fresh fruits and vegetables**

As Australia's independent peak industry organisation representing the diverse members of the Australian organic industry, Organic Industries of Australia Ltd (OIA) welcomes the opportunity to comment on the proposal to expand the irradiation of Australian produce and to restate the global organic industry's historic opposition to irradiation from the perspective of nutritional costs and toxicology.

We argue that the direction of policy making in this regard should be away from, rather towards more, use of irradiation in Australian agriculture.

The future of Australian agriculture lies in clean, regenerative approaches—as used by our certified organic members.

As we have recently shown in our report on accessing premium export markets for Australian produce ([link](#)), there are many more important impediments to export income growth than permitting more use of highly questionable technologies such as Irradiation. Summaries of a few of the numerous studies showing the danger of irradiation are attached.

We thank you for the opportunity to comment on this submission, and we request that the issues we raise in the broader context of clean agriculture, nutritious food and greater market access are noted and directly addressed in your response.

The organic industry urges FSANZ to reject this proposal.

Yours faithfully,

A handwritten signature in black ink that reads "Dalene Wray". The signature is written in a cursive style with a long, sweeping underline.

Dalene Wray  
Chair, Organic Industries of Australia Ltd

## ORGANIC INDUSTRY PERSPECTIVE

The organic industry perspective on irradiation is simple: irradiation is a very effective medium for masking filthy conditions in chemical-dependent mega-farms and food processing plants.

Instead of irradiation, the solution to creating healthier, safer foods lies in cleaning up the growing conditions and processing plants, and most certainly in returning farming to a small-scale basis—not in dousing our food with varying levels of radiation.

The Australian National Standard for Organic and Biodynamic Produce, first published through industry-government cooperation in 1992, clearly prohibits irradiation for use with certified organic products, in line with global standards for organic produce.

Irradiation is defined in the National Standard for Organic and Biodynamic Produce ([Department of Agriculture](#)) as follows:

*ionising radiation (irradiation): means the use of high energy emissions capable of altering a food's molecular structure for the purpose of controlling microbial contaminants, pathogens, parasites and pests in food, preserving food or inhibiting physiological processes such as sprouting or ripening.*

Section 2.3.8 states:

*Irradiation is not permitted in the processing, storage or handling of products complying with this Standard.*

The debate over irradiation of organic produce erupted in the US in 1997, when the first draft of the National Organic Program (NOP) standards was released. To a shocked organic community, the “big three”—irradiation, genetically modified organisms (GMOs), and sewage sludge—were subtly incorporated into the standard. This issue generated the most comments the USDA had ever received; nearly 280,000 people nationwide wrote letters, emails, and faxes to contest their inclusion in the organic standards. Their actions ultimately paid off, resulting in the prohibition of the “big three” in the Final Rule of 2002.

**It is the view of OIA that, even if the submission does not require organic produce to be irradiated from a consumer health perspective, it should still be prohibited in favour of more research into the production of healthy, clean, pest-free produce using organic methods.**

## EXPORT ARGUMENTS

The Proponent bases most its argument on the need to access export markets. The reasoning for expanding the use of irradiation of all produce in order to access export markets is flawed.

*It is like saying, we will accept your pesticide residues if you accept ours.*

An opposite way of thinking is required:

*We will accept your clean, organic and nutritious produce as being clean, organic and nutritious, if you accept ours.*

This leads to the broader issue of equivalence of national organic standards which, while not directly relevant to the submission, does provide some context for our argument:

- the ability of Australian organic producers to access the premium export markets on the basis of export market acceptance of the Australian standards
- at present the equivalence status of Australia's organic industry is lower than for all of our major competitors, and is a real impediment to the growth of the export value of Australian produce
- this needs to become a policy priority at FSANZ and Federal government level

Equivalence negotiations are complicated and overlay issues such as domestic regulation of organic food. We would argue that the broad approval of irradiation of produce in any State of Australia will only further undermine Australia's challenging equivalency negotiations.

## SCIENTIFIC STUDIES

The research that shows the dangers of Irradiation of produce is almost as old as Irradiation technology itself. We suggest that the review committee does its own detailed review of the following summarised studies, and the many others that are to be found in the scientific literature.

### Reproductive Problems, Cancer in Mammals

"A careful analysis by FDA of all Army data present (including 31 loose-leaf notebooks of animal feeding test results) showed significant adverse effects produced in animals fed irradiated food... What were these adverse effects?"

- A decrease of 20.7 percent in surviving weaned rats.
- A 32.3 percent decrease in surviving progeny of dogs.

Dogs weighing 11.3 percent less than animals on the control diets... Carcinomas of the pituitary gland, a particularly disturbing finding since this is an extremely rare type of malignant tumor."

*Source: Food irradiation: An FDA report. FDA Papers, Oct. 1968.*

### Fatal Internal Bleeding in Rats (I)

"A significant number of rats consuming irradiated beef died from internal hemorrhage within 46 days, the first death of a male rat coming on the 11th day of feeding. This rat became sluggish on the 8th day of the regimen and started refusing food. He continued to be morbid during the next two days, did not eat any food, lost weight and appeared anaemic. He was found dead on the 11th day.

*Source: Vitamin K deficiency in rats induced by feeding of irradiated beef. Journal of Nutrition, 69:18-21, 1959. (Cosponsored by the Surgeon General of the US Army)*

### Fatal Internal Bleeding in Rats (II)

"Hemorrhagic death had occurred in all males fed irradiated diets by day 34... There is evidence to suggest that inefficient absorption of vitamins, i.e. vitamin K, from the intestinal tract may contribute to a deficiency state." [Note: Vitamin K plays a major role in blood clotting.]

*Source: Influence of age, sex, strain of rat and fat soluble vitamins on hemorrhagic syndromes in rats fed irradiated beef. Federation Proceedings, 19:1045-1048, 1960. (Cosponsored by the Surgeon General of the US Army)*

### Fetal Deaths in Mice

"Freshly irradiated diets produced elevated levels of early deaths in [mice fetuses] ... The increase in early deaths would suggest that the diet when irradiated has some mutagenic potential."

*Source: Irradiated laboratory animal diets: Dominant lethal studies in the mouse. Mutation Research, 80:333-345, 1981.*

### Embryo Deaths in Mice

"Feeding of mice for two months before mating with 50 percent of the standard complete diet irradiated with gamma rays provokes a significant increase of embryonal deaths, probably to be interpreted as a dominant lethal mutation associated with gross chromosomal aberrations, such as breaks repeatedly found to be induced by irradiated materials."

*Source: Pre-implantation death of mouse eggs caused by irradiated food. International Journal of Radiation Biology, 18:201-216, 1970.*

### Radioactive Organs and Excrement in Rats

“Considerable amounts of radioactivity were present in the liver, kidney, stomach, gastrointestinal tract, and blood serum of rats fed irradiated sucrose solutions. Radioactivity was present in urine and feces samples.

*Source: Biochemical effects of irradiated sucrose solutions in the rat. Radiation Research, 37:202-215, 1969.*

### A Thalidomide Warning (I)

“The thalidomide disaster might have been prevented if an easily performed investigation of possible cytotoxic effects in plant cells had been made. It must be acknowledged that any compound causing [cellular] damage must be considered a potential hazard to any living cell or cell system— including man.”

*Source: Toxic effects of irradiated foods. Nature, 211:302, 1966.*

### A Thalidomide Warning (II)

“Irradiating can bring about chemical transformations in food and food components resulting in the formation of potential mutagens, particularly hydrogen peroxide and various organic peroxides.

It is now realized, especially since the thalidomide episode, that older testing protocols do not detect the more subtle population hazards such as mutagens and teratogens. In view of the serious consequences to the human population which could arise from a high level of induced mutations, it is desirable that protocols for irradiated food should include in vivo tests on mammals for possible mutagenicity.”

*Source: Mutagenicity and cytotoxicity of irradiated foods and food components. Bulletin of the World Health Organization, 41:873-904, 1969. (Cosponsored by the US Atomic Energy Commission and Food and Drug Administration)*

### A Host of Problems

“Numerous studies have been carried out to ascertain whether cytotoxic effects occur when unirradiated biological test systems are cultured or fed with irradiated media or food. In such studies, adverse physiological growth retardation and inhibition, cytological cell division inhibition and chromosome aberrations and genetical effects have been observed in a wide range of test systems, ranging from bacteriophages to human cells... The available data suggest that a variety of free radicals may act as the toxic and mutagenic agents.”

*Source: Cytotoxic and mutagenic effects of irradiated substrates and food material. Radiation Botany, 11:253-281, 1971.*

### A Cancer Warning

“An increase in concentration of a mutagen in food by irradiation will increase the incidence of cancer. It will take four to six decades to demonstrate a statistically significant increase in cancer due to mutagens introduced into food by irradiation. When food irradiation is finally prohibited, several decades worth of people with increased cancer incidence will be in the pipeline.”

*Source: Food Irradiation. Nutrition, 16:698-701, 2000.*

### Mutations in Fruit Flies

An increase in the rate of mutation has been found in fruit flies reared on a basic medium that was irradiated with a sterilizing dose (150,000 rads) of cobalt-60 gamma rays... Visible changes were two to six times more frequent in the irradiated series than in the controls, such as half-thorax, vestigial wings and incurved wings.” [Note: Fruit flies have long been a dependable bellwether for determining the potential mutagenicity of substances.]

*Source: Mutations: Incidence in Drosophila melanogaster reared on irradiated medium. Science, 141:637-638, 1963.*

### Fatal Vitamin E Deficiency in Rats

“A considerable number of the second litter of the experimental group of rats that ate irradiated beef died. Symptoms observed were marked fluid buildup of the face, ruffled hair coat, general incoordination, spastic hopping gait, and sometimes complete loss of movement with dragging of the hind quarters.

Those pups most severely affected often became completely prostrated a short time before death. In no case were these symptoms noted in the control group. The probability is that the pups were suffering from the characteristic muscular dystrophy syndrome commonly referred to as nutritional muscular dystrophy known to result from a marginal vitamin E intake.”

*Source: Growth, reproduction, survival and histopathology of rats fed beef irradiated with electrons. Food Research, 20:193-214, 1955.*

### Chromosomal Damage to Human Cells (I)

“Irradiated sucrose solutions were extremely toxic to human white blood cells. Cell divisions were inhibited. Degenerated cell divisions were observed and the chromosomes were grossly damaged. The DNA was clumped or the chromosomes appeared shattered or pulverized. In contrast, treatment with unirradiated sucrose at the same concentration had no apparent effect on the mitotic rate and the chromosomes were not visibly damaged.”

*Source: Effects of irradiated sucrose on the chromosomes of human lymphocytes in vitro. Nature, 211:1254-1255, 1966.*

### Chromosomal Damage to Human Cells (II)

“White blood cell cultures from four different healthy human males underwent a considerable inhibition of mitosis and chromosome fragmentation.”

*Source: Cytotoxic and radiomimetic activity of irradiated culture medium on human leukocytes. Current Science, 16:403-404, 1966.*

### Toxic Chemical Formed in Food Containing Fat (I)

“When food containing fat is treated by ionizing radiation, a group of 2-alkylcyclobutanones [toxic chemicals] is formed. To date, there is no evidence that the cyclobutanones occur in unirradiated food. In vitro experiments using rat and human colon cells indicate that 2-dodecylcyclobutanone (2-DCB) ... is clearly cytotoxic and genotoxic.”

*Source: Genotoxic properties of 2-dodecylcyclobutanone, a compound formed on irradiation of food containing fat. Radiation Physics and Chemistry, 52:39-42, 1998. (Cosponsored by the International Consultative Group on Food Irradiation)*