CHAPTER 26

Iodine Fortification of Bread: Experiences from Australia and New Zealand

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CHAPTER OUTLINE

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LIST OF ABBREVIATIONS

EAR Estimated Average Requirement
MUIC Median urinary iodine concentration
UL Upper Level of Intake

INTRODUCTION

Internationally, iodine deficiency remains a leading cause of preventable mental disability (International Council for Control of Iodine Deficiency Disorders (ICCIDD)/United Nations Children's Fund (UNICEF)/World Health Organization (WHO), 2007). Unlike most nutrient deficiencies, which predominantly affect less affluent societies and individuals, iodine deficiency is found in both economically poor and affluent regions. Population iodine status is influenced by the amount of iodine in the environment, which determines the amount in locally grown foods.

WHO recommends Universal Salt Iodization (the iodization of all salt added to human and animal food) as the preferred approach to addressing iodine deficiency in human populations (ICCIDD/UNICEF/WHO, 2007). This has been effective in developing countries in which the majority of food consumed is prepared from raw ingredients in the household. However, there are substantial barriers to implementing such an approach in developed countries with complex food economies, considerable international trade, and a strong demand for consumer choice.

Foods ideally suited for fortification to address population-wide deficiencies include those widely and regularly consumed and that also support other nutritional health objectives. Bread and flours are ideal vehicles for fortification in cultures that rely on them as staples.

Mandatory fortification of bread with iodine was introduced in Australia and New Zealand in 2009. All salt used in bread making is required to be iodized at 25—65 mg/kg salt with the exception of bread represented as organic (Food Standards Australia New Zealand (FSANZ), 2008a,b). This chapter outlines the steps in the selection of bread as the food vehicle for iodine and the associated challenges.

FUNCTIONS AND REQUIREMENTS OF IODINE AND CONSEQUENCES OF DEFICIENCY

Iodine is an essential component of the thyroid hormones thyroxine and triiodothyronine, which regulate metabolism throughout life and influence fetal and childhood physical and cognitive development (ICCIDD/UNICEF/WHO, 2007). Hence, adequate iodine nutrition for pregnant women and children, especially young children, is particularly important.

Australia and New Zealand have a common set of nutrient intake recommendations for iodine (National Health and Medical Research Council/Ministry of Health, 2006), including Estimated Average Requirement (EAR; a daily nutrient level estimated to meet the requirements of half the healthy individuals in a particular life stage and gender group), Recommended Dietary Intake (the average daily dietary intake level that is sufficient to meet the nutrient requirements of nearly all (97 or 98%) healthy individuals in a particular life stage and gender group), and Upper Level of Intake (UL; the highest average daily nutrient intake level likely to pose no adverse health effects to almost all individuals in the general population) (Table 26.1).

Cretinism and large deficits in intelligence are the most serious consequences of severe iodine deficiency (ICCIDD/UNICEF/WHO, 2007). The more subtle consequences of mild and moderate iodine deficiency have been demonstrated. In children, mild deficiency can cause small cognitive deficits and impaired motor control (Santiago-Fernandez *et al.*, 2004), as well as reduced growth (Zimmerman *et al.*, 2007). Providing sufficient iodine to school-aged children can partially reverse these (Gordon *et al.*, 2009; Zimmerman *et al.*, 2007).

TABLE 26.1 Iodine Nutrient Reference Values for Australia and New Zealand by Age and Physiological State

Age (Years)	Estimated Average Requirement (μg/Day)	Recommended Dietary Intake (μg/Day)	Upper Level of Intake (μg/Day)
1–3	65	90	200
4–8	65	90	300
9–13	75	120	600
14–18	95	150	900
Adults 19+	100	150	1100
Pregnant women			
14–18	160	220	900
19–50	160	220	1100
Lactating women			
14–18	190	270	900
19–50	190	270	1100

Source: National Health and Medical Research Council/Ministry of Health (2006).

ASSESSMENT AND CATEGORIZATION OF IODINE DEFICIENCY

Population iodine status is normally determined by measuring urinary iodine concentration, which closely reflects recent iodine intake (ICCIDD/UNICEF/WHO, 2007). The median urinary iodine concentration (MUIC) of schoolchildren is often used as an indicator of overall population status, with a MUIC of 100–200 μg/l considered optimal (ICCIDD/UNICEF/WHO, 2007). As shown in Table 26.2, pregnant women have higher cutoffs due to greater iodine requirements.

THE RE-EMERGENCE OF IODINE DEFICIENCY IN AUSTRALIA AND NEW ZEALAND

Following a series of reports suggesting iodine deficiency had re-emerged in New Zealand and areas of Australia, national surveys in both countries confirmed both populations were mildly deficient (Table 26.3) (Li *et al.*, 2006; Parnell *et al.*, 2003). The Australian survey revealed that iodine deficiency was concentrated in the southeast, where the majority of the population resides (Li *et al.*, 2006).

TABLE 26.2 International Council for the Control of Iodine Deficiency Diseases Criteria for Assessing Iodine Status in Different Groups

		Iodine Status by Group		
MUIC (μg/l)	Status of Population	School-Aged Children and Adults	Children <2 Years and Lactating Women	Pregnant Women
<20	Severe deficiency	Insufficient	Insufficient	Insufficient
20–49	Moderate deficiency	Insufficient	Insufficient	Insufficient
50–99	Mild deficiency	Insufficient	Insufficient	Insufficient
100–<150	Optimal	Adequate	Adequate	Insufficient
150–199		Adequate	Adequate	Adequate
200–299	Risk of iodine-induced hyperthyroidism in susceptible groups	More than adequate	No specific classifications for these groups	Above requirements at 250 (μg/l)
>300	Risk of adverse consequences	Excessive		In excess of requirements

MUIC, median urinary iodine concentration.
Source: ICCIDD/UNICEF/WHO (2007).

TABLE 26.3 Iodine Status of Different Groups in Australia and New Zealand

State/Region	Group	Sample Size	Median Urinary Iodine Concentration (μg/l)	Iodine Status
Australia				
New South Wales	Children (8–10 years)	427	89	Mild deficiency
Victoria	Children (8–10 years)	348	74	Mild deficiency
South Australia	Children (8–10 years)	317	101	Borderline
Western Australia	Children (8–10 years)	323	143	Adequate
Queensland	Children (8–10 years)	294	137	Adequate
Tasmania	Boys (4–17 years)	126	84	Mild deficiency
Tasmania	Girls (4–17 years)	99	81	Mild deficiency
New South Wales	Pregnant women	796	85	Insufficient
Victoria	Pregnant women	752	52–61	Insufficient
New Zealand				
Nationwide	Children (7–14 years)	1793	66	Mild deficiency
Otago	Breast-fed infants	43	44	Insufficient
Otago	Formula-fed infants	51	99	Insufficient

Source: FSANZ (2008a,b).

Fortification of bread with iodine in Tasmania

The Australian island state of Tasmania was the first region to identify the re-emergence of population mild iodine deficiency in the late 1990s (Hynes *et al.*, 2004). Aware of mild iodine deficiency re-emerging in other Australian states and New Zealand, the Tasmanian government wrote to the binational food regulatory body in July 2000 requesting an investigation into possible solutions for both countries.

An expert committee advised the Tasmanian government of its concern regarding the ongoing impact of mild iodine deficiency on fetal and infant brain development. The Tasmanian government recognized that achieving a binational solution required agreement from all jurisdictions in Australia and New Zealand and would take time to achieve. Therefore, an interim program to address iodine deficiency was adopted within Tasmania.

A number of interim strategies were considered, including fortifying milk, bread, flour, cattle feed, and/or the water supply; using iodine-enriched fertilizer for food crops; restricting the sale of non-iodized salt; and, providing iodine tablets.

Voluntary replacement of regular with iodized salt in bread was selected to address iodine deficiency. Bread is a nutritious locally produced dietary staple of much of the population. Key bread industry partners were supportive, and no legislative change was required. It was anticipated that previous experience of bread fortification via iodized bread improver in the 1970s would translate into broad acceptance of fortification by consumers.

Dietary intake modeling indicated a 30–60 μg/day median increase in iodine intake, and intakes among high consumers (95th percentile for males aged 19–24 years) were well within safe ranges (Seal, 2007). Testing by a leading bakery indicated no changes to taste, texture, product quality, or any technical problems from using iodized salt in bread. A comparison of standard and iodine-fortified bread consumption in 22 volunteers found a 14 μg/slice increase in urinary iodine excretion with fortified bread; consistent with predicted increases (Seal, 2007).

In September 2001, the Tasmanian health department developed a memorandum of understanding with local bakeries in lieu of formal regulation. Signatories agreed to use salt iodized in accordance with Australian food regulations in place of regular salt in bread for the Tasmanian market and also to advise the health department if they chose to resume manufacturing bread using non-iodized salt. In return, the Tasmanian health department agreed to continue monitoring population iodine status, conduct random bread sampling to test compliance, actively promote bread as a source of iodine, liaise with local and national government, and review the program after 6 months.

Outcomes

Of the six major bakery chains in Tasmania at the time, four agreed to participate in bread fortification. Two did not agree because they were associated with national supermarket chains and baked their bread from premixes formulated interstate for stores throughout Australia. Most independent bakeries chose not to sign the memorandum of understanding, citing a lack of understanding of potential legal implications (Turnbull *et al.*, 2004). Nonetheless, a 2003 survey of independent bakeries concluded that the program had been widely adopted with minimal impact on cost or consumer satisfaction (Turnbull *et al.*, 2004). Approximately 70% of independent bakeries reported using iodized salt, none of which had reported reverting to regular salt. Among bakeries not using iodized salt, the use of salt-containing premixes or frozen dough formulated interstate was cited as the main barrier. Industry partners estimated the level of participation observed by major and independent bakeries accounted for approximately 80% of the bread available for consumption in Tasmania.

A 2004 survey of bread from the major bread manufacturers and 11 randomly selected independent bakeries reporting use of iodized salt found a median iodine concentration of 35 μg/100 g of bread, with the majority of samples falling between 20 and 70 μg/100 g (Seal, 2007). This may reflect batch-to-batch variation in salt iodine concentration and/or brand differences in salt addition to bread.

Comparisons of pre- and post-intervention surveys suggest a modest but significant increase in iodine population status consistent with predictions (Figure 26.1). The observed increase in MUIC of 30–38 μg/l in schoolchildren shifted the population into the lower end of the optimal range (Seal *et al.*, 2007). However, post-intervention surveys of pregnant women revealed that iodine status continued to be inadequate (Burgess *et al.*, 2007).

The voluntary approach to bread iodization adopted by Tasmania demonstrated that meaningful changes to population iodine status can be achieved through bakeries switching to iodized salt. However, not all bakeries adopted this approach, and the improvement in iodine status among pregnant women was not enough to achieve the desired outcome.

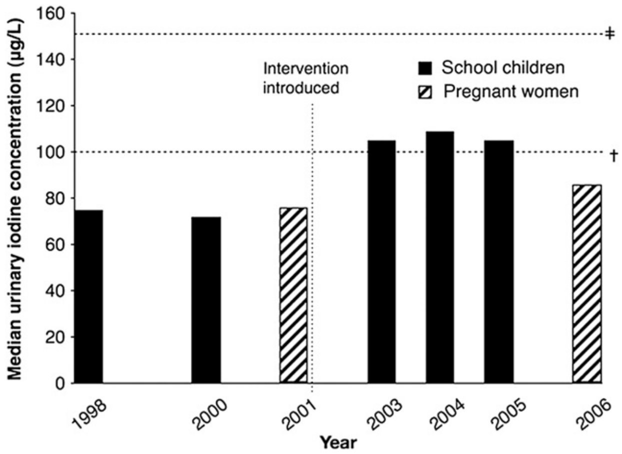

FIGURE 26.1

Median urinary iodine concentrations in children and pregnant women before and after the introduction of voluntary use of iodized salt in bread. †Median urinary iodine concentration (MUIC; 100 μg/l) cut point for adequate iodine status in the general population. ‡MUIC (150 μg/l) cut point for adequate iodine status in pregnant women. *Source: ICCIDD/UNICEF/WHO (2007).*

Development of binational mandatory fortification of bread with iodine

The binational food standards setting agency, FSANZ, was asked to explore fortification options to address iodine deficiency in both countries. The key processes employed are described here.

DIETARY INTAKE ASSESSMENT METHODS

Estimation of iodine intake in different segments of the population following fortification was essential for establishing safe and effective fortification levels and selecting appropriate food vehicles. The core objective was to optimize efficacy, by maximizing the proportion of different subpopulations with intakes above their EAR (known as the EAR cut-point method, this provides a close approximation of the proportion of a population with inadequate intakes of a nutrient provided certain criteria are met; Health Canada, 2006), and to mitigate risk by minimizing the proportion of subpopulations above their UL.

Multiple delivery vehicle combinations and iodine concentrations were modeled using the custom-made software DIAMOND (DIetAry Modelling Of Nutritional Data). This program merges regularly updated nutrient composition data with dietary intake data sets from two discrete national nutrition surveys that each collected one 24-h recall from all responders and a second recall from a subset of responders. The software uses analysis of variance to calculate the correction factors for various population subgroups to remove within-person variance and estimate a "usual" intake distribution of a nutrient for the population groups of interest.

There were challenges specific to the modeling of iodine fortification via iodized salt. The first was that food composition tables commonly just give the total sodium content of food. However, some sodium is present naturally, and not all added sodium is from sodium chloride (e.g., sodium bicarbonate for leavening and sodium cyclamate for sweetening). Failure to account for this would have overestimated the effect of fortification for some foods. Furthermore, salt reduction initiatives meant older food composition data were out-of-date. Iodine concentration data in existing databases were limited, and detailed data on iodized salt consumption were unavailable. Therefore, ingredient lists and direct analysis were used to develop new salt composition databases, analyses of the iodine content of core foods were commissioned, and sales data for iodized table/cooking salt were used to estimate intakes. Sales data probably overestimate mean intake because waste and non-food use for salt cannot be separated from consumption.

PROJECTED IMPACT OF BREAD FORTIFICATION

A range of options were modeled. Figure 26.2 shows the mean iodine intake prior to fortification in Australian children aged 2 to 3 years and Australian and New Zealand women aged 16–44 years (i.e., childbearing age). As the range of food vehicles increased from bread alone to all foods containing added salt, the concentration of iodine in salt needed to concomitantly decrease to avoid a substantial proportion of the population exceeding the UL for iodine. Specifically, the increase in mean intake using 45 mg/kg salt in bread alone was similar to the projected result if salt was iodized at 15 mg/kg in all salted foods.

Before fortification, mean iodine intake was similar across age groups (Table 26.4). Lower absolute iodine requirements in children meant that a smaller proportion of children had inadequate intakes relative to adults. Baseline iodine intakes were consistent with results from the surveys measuring urinary iodine in Australian children (see Table 26.3). Because only limited relevant dietary intake data in children were available for New Zealand, the results from the Australian data were extrapolated to New Zealand.

Bread fortification is projected to increase mean iodine intake by 54 and 84 μg/day in Australians aged 2 years or older and New Zealanders aged 15 years or older (see Table 26.4), respectively. The higher salt content of New Zealand bread at the time accounts for most of this

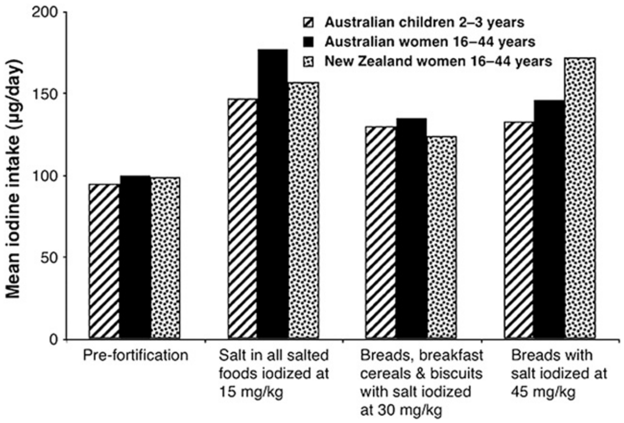

FIGURE 26.2
Estimated mean daily intake of iodine at baseline and under various fortification options. *Source: FSANZ (2008a,b).*

difference. The increase was similar across age groups in Australia—for example, 38 μg/day in 2- to 3-year-olds and 46 μg/day in women of childbearing age. The much lower UL for young children meant that the proportion of young children exceeding the UL was 6% at a fortification level, whereas 9% of women of reproductive age still had inadequate intakes.

Increasing the proportion of adults with adequate intakes by adding more iodine would further increase the proportion of young children with high intakes. Consequently, it was not feasible to meet the substantially higher iodine requirements of pregnant and lactating women, whose EAR is close to the UL for young children, without large numbers of young children exceeding their UL. Food intakes in these groups were examined in detail, but no foods suitable for fortification—and with high, widespread consumption by adult women but

TABLE 26.4 Mean Prefortification and Projected Postfortification Iodine Intakes, Percentage below Estimated Average Requirements, and Percentage above the Upper Level of Intake for Selected Groups

	Prefortification			Projected Postfortification		
Age (Years)/Group	Mean (μg)	% <EAR	% >UL	Mean (μg)	% <EAR	% >UL
Australia						
2–3	95	16	0	133	1	6
4–8	94	18	0	139	1	<1
14–18	121	35	0	179	4	0
19–29	119	41	0	177	6	0
30–49	110	47	0	166	5	0
Women 16–44	100	59	0	146	9	0
Pregnancy[a]	—	93	0	—	71	0
Lactation[a]	—	97	0	—	88	0
New Zealand						
15–18	106	27	0	193	0	0
19–29	106	49	0	190	0	0
30–49	109	46	0	195	0	0
Women 16–44	99	68	0	172	0	0
Pregnancy[a]	—	97	0	—	45	0
Lactation[a]	—	99	0	—	77	0

EAR, Estimated Average Requirement; UL, Upper Level of Intake.
Source: FSANZ (2008a,b).
[a]*The numbers of pregnant and lactating women in the nutrition surveys underpinning these predictions were too small to allow these groups to be modeled separately. Therefore, adequacy of intake in these groups was extrapolated by applying the dietary requirements for pregnant women and for lactating women to all sampled women aged 16–44 years. This may underestimate the total iodine intake because it does not allow for increased food intake during pregnancy or lactation.*

not young children—were found. A decision was made not to further increase the concentration of iodine in salt but, rather, to refer the need for an iodine supplementation initiative for pregnant and lactating women to relevant government bodies.

ADDITIONAL CONSIDERATIONS IN SELECTING BREAD AS THE DELIVERY VEHICLE FOR IODINE

As noted previously, the recommendation to use iodized salt in all foods containing added salt is problematic. As the number of foods covered by mandatory fortification increases, the costs to industry, trade barriers, the cost and complexity of enforcement, and the need to overcome technical difficulties increase while consumer choice decreases. Furthermore, government policy in both Australia and New Zealand requires that the least amount of regulation needed to achieve a purpose be adopted.

All changes to food regulations in Australia and New Zealand are subject to core objectives relating to public health and safety and the provision of adequate and non-misleading information (Australian Government, 1991). Furthermore, changes should be evidence based, and they should promote consistency between domestic and international food standards, an efficient and internationally competitive food industry, and fair trading in food. Guidelines specified that mandatory fortification should (Australian Government, 2009):

- be required only in response to demonstrated significant population health need, taking into account both the severity and the prevalence of the health problem to be addressed;
- be required only if it is assessed as the most effective public health strategy to address the health problem;
- be consistent as far as is possible with the national nutrition policies and guidelines of Australia and New Zealand;
- ensure that the added vitamins and minerals are present in the food at levels that will not result in detrimental excesses or imbalances of vitamins and minerals in the context of total intake across the general population; and
- ensure that the mandatory fortification delivers effective amounts of added vitamins and minerals with the specific effect to the target population to meet the health objective.

The selection of food vehicles for iodine fortification was therefore iterative. Fortification of all processed foods, a close approximation of Universal Salt Iodization, was considered, as was the option of fortifying bread, breakfast cereals, and biscuits (i.e., cookies and crackers). The efficacy of each option was similar (see Figure 26.2), but the burden of regulation decreased as foods were incrementally removed from the mandatory fortification model. Consultation identified a technical difficulty for one of the region's leading breakfast cereal manufacturers. Testing indicated that its salt addition method, involving a brine system, would result in highly variable and sometimes unsafe iodine concentrations in its products. Biscuits contributed least to increasing the population's iodine intake but posed the greatest impost on both import and export trade; there were also negative reactions from public health sectors to fortifying a "snack" food.

The final selection of bread as the food vehicle was consistent with the aforementioned guidelines and was supported by Tasmanian findings and extensive dietary modeling. Because bread is predominantly produced and consumed domestically, there were fewer trade issues than for other foods. Bread also contains a relatively narrow range of salt, making it easier to predict iodine intakes at the extremes of the distribution.

ECONOMIC ANALYSIS

Cost/benefit and cost-effectiveness analyses assessed the feasibility of using mandatory iodine fortification to address iodine deficiency in Australia and New Zealand (FSANZ, 2008b). Estimating the economic benefit of fortification proved difficult because the consequences of mild and moderate iodine deficiency, although clearly supported by research, were not well quantified or easily costed even when quantified. Despite these limitations, both analyses concluded that the cost of moving individuals from deficiency to adequacy was small, especially compared with the potential benefits to health and productivity. The ongoing cost of fortification was estimated to be less than four cents per capita each year based on 2007 prices.

REACTIONS TO THE PROPOSAL OF MANDATORY FORTIFICATION

Changes to food regulation in Australia and New Zealand require formal public consultation. Four rounds of public consultation and targeted consultations with relevant parties were conducted for mandatory iodine fortification.

The majority of government, health professionals, and consumer organizations supported the proposed mandatory fortification. In contrast, the majority of industry representatives opposed mandatory fortification, citing the increased regulatory burden, increased costs, reduced consumer choice, and trade impacts as reasons for their opposition. Technical issues were also raised. These are discussed later.

Among health professionals, many noted the proposed fortification would not fully meet the needs of pregnant and lactating women and viewed it as an initial step in a broader approach. Some maintained that Universal Salt Iodization would provide higher intakes in these two groups. Some challenged the decision to minimize exceedance of UL in young children and urged review of the UL. Others viewed the initiative as promoting iodized salt and expressed concern that it might conflict with health messages to reduce sodium intake and/or prompt bakers to maintain or increase the amount of salt in bread. Health professionals generally agreed that mandatory fortification would provide greater certainty, sustainability, and equity than voluntary fortification.

Some consumers, especially in New Zealand, were concerned about reduced consumer choice and thought mandatory fortification of bread would alter the perception of bread as a "wholesome health product." Given the variable prevalence of iodine deficiency across Australia, some people considered nationwide mandatory fortification to be inappropriate. Individuals with a thyroid condition or an iodine sensitivity were concerned that they would be adversely affected by increased iodine in the food supply.

All groups agreed that comprehensive monitoring of the effects of mandatory fortification was needed. The majority considered that the greater public good outweighed the small and manageable risks associated with mandatory iodine fortification.

Implementation of mandatory iodine fortification

The mandatory iodine fortification regulation specified a transition period. This allowed salt manufacturers to increase their production of iodized salt and bakers to transition to using iodized salt and to alter packaging to declare "iodized salt" in the ingredients list. The period aligned with another major initiative, the introduction of mandatory fortification of bread-making wheat flour with folic acid, to reduce a key cost to industry by allowing one set of food label changes.

An early communication strategy was developed and modified throughout the mandatory fortification project. Its purpose changed from raising awareness of the consultations conducted prior to regulation to informing the public and industry of the new fortification requirement.

Consultation continued after the regulation was gazetted to assist industry compliance with fortification requirements. A guide outlining the responsibilities of the salt and bread industries was prepared and distributed. Information material for the public and health professionals was developed and distributed via newspapers, professional groups, websites, and in response to enquiries. Relevant health bodies have prepared recommendations for iodine supplementation during pregnancy and lactation.

Monitoring of mandatory fortification

Australian and New Zealand health authorities will monitor the effects of the initiative to ensure that it is safe and effective in addressing the iodine deficiency. Monitoring will focus on:

- ensuring industry compliance with the regulation;
- assessment of the iodine content of bread and other foods;
- collection of dietary intake and urinary iodine excretion data to assess status; and
- surveillance of the effect of iodine fortification on related health parameters (e.g., rates of thyroid disease) and assessment of consumer awareness, attitudes, and behavior with respect to fortified products.

TECHNOLOGICAL ISSUES

Ongoing consultations identified at least one bread manufacturer using brine to add salt to bread. Given the technical difficulty previously identified by a brine-using breakfast cereal manufacturer, a feasibility and safety assessment was undertaken for the addition of iodized salt to bread using a brine solution (FSANZ, 2008b). The key finding was that provided the iodized salt is completely dissolved, the addition of brine to dough is unproblematic, and iodine addition can be expected to be at least as effective as dry salt addition.

Although no technological issues associated with adding iodized brine solutions to bread were identified, the potential difficulty for those bakeries that do export bread to adjust their process lines to manufacture both export products without iodine and domestic bread with iodine was noted.

DISTRIBUTION RANGE OF IODINE IN SALT

Dietary intake modeling identified a mean iodine concentration of 45 mg/kg salt for use in bread to help address the re-emergence of iodine deficiency for most of the population. This was consistent with the existing permission to iodize salt voluntarily within a range of 25—65 mg/kg salt. A narrower range was initially considered to further improve consistency of the amount of iodine delivered via fortification. However, consultations with, and analyses provided by, the salt industry indicated that the existing range could be achieved consistently, whereas a narrower range could not. The existing permission of 25—65 mg iodine/kg salt was therefore retained.

SUMMARY POINTS

- Mandatory fortification of bread with iodine, using salt iodized at a concentration of 25—65 mg iodine/kg salt, was introduced in Australia and New Zealand in 2009 in response to re-emerging iodine deficiency.
- Bread was selected as the food vehicle because it is widely consumed by the population. Also, iodine fortification of bread is effective and safe, is technologically feasible, has minimal trade impacts, and is consistent with government polices and guidelines.
- Selecting an appropriate food vehicle required a combination of dietary intake and food composition data, biochemical surveys of population nutrient status, an assessment of technological issues, and consultation with affected parties.
- In Australia and New Zealand, use of iodized salt in bread was projected to result in similar iodine intake improvements as those predicted for use of iodized salt in all salted processed foods, provided iodine concentrations were adjusted accordingly.
- Mandatory iodine fortification could not deliver sufficient amounts of iodine to fully accommodate the elevated requirements of pregnant and breast-feeding women without causing large numbers of young children to exceed their Upper Level of Intake.
- To ensure the successful implementation of mandatory iodine fortification, sufficient time was allocated to allow the salt industry and bread manufacturers to change their processes and food labels.

- A monitoring system was established to ensure the ongoing safety and effectiveness of the mandatory iodine fortification.

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