UNPACK
THE SALT

REFORMULATION READINESS

A best practice guide to salt reduction for Australian food manufacturers

Victorian Salt Reduction Partnership

VicHealth | Heart Foundation

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01 INTRODUCTION

Each day Australians consume around 9.6 grams (g) of salt in their diets; this is close to double the World Health Organization's (WHO) recommended maximum daily intake of 5g.[1,2] Consuming excess salt at or above this level is a major cause of heart health issues. High levels of salt in people's diets increases their risk of developing high blood pressure, a leading cause of heart disease and death.

In Victoria, almost one in 20 deaths can be attributed to high salt intake; this is six times higher than the annual road toll.[3]

If Victorians reduced their salt intake to 5g per day, in line with WHO recommendations, this could save around 800 lives and $50 million in healthcare costs each year.[4]

This reduction is in line with Australia's commitment to the WHO global targets to prevent and control non-communicable diseases. The WHO has set a target for a 30% reduction in population salt intake by 2025.

In 2015, the Victorian Salt Reduction Partnership (VSRP) was established to develop a salt reduction action plan for the state.

This document, "Reformulation Readiness: A Best Practice Guide to Salt Reduction for Australian Food Manufacturers", is part of a range of resources developed by the VSRP to support all food manufacturers, particularly small and medium-sized businesses, to develop and implement programs to reduce salt in their products. While this guide will be useful to manufacturers large and small, Australia wide and even globally, there is a specific focus on supporting Victorian based food manufacturers, given the project is focussed on the Victorian population.

The reformulation of packaged food products is necessary to reduce the high salt intake in Victorian diets.

Reducing the salt content in food products is achievable and support is available.

In this guide you will find information on:

- *Salt and its role in food from a sensory and technical perspective*
- *Reducing the salt content of foods*
- *Agreeing on reformulation targets and timeframes*

  and

- *Developing and implementing a reformulation program, including assessing the nutrient composition of foods, benchmarking and sensory testing.*

Food manufacturers can find additional information and resources for salt reduction by visiting unpackthesalt.com.au

02 RATIONALE FOR SALT REFORMULATION

a) Australians consume around twice the recommended amount of salt each day. For individuals, this leads to increased blood pressure and higher risk of developing cardiovascular disease, stroke and kidney disease

Many Australians are eating unhealthy diets:

- *Less than 1 in 10 eat five serves of vegetables each day, as recommended in the Australian Dietary Guidelines*[5]
- *On average, over a third (35%) of energy consumed daily comes from energy dense, nutrient poor foods and drinks*[6]
- *Environments conducive to poor lifestyles including unhealthy diets, physical inactivity, smoking and high alcohol use, contribute to ill-health, reducing both the quality and length of life.*

The Australian Institute of Health and Welfare estimates nearly a third (31%) of the burden of disease in Australia is preventable, being attributable to modifiable or lifestyle factors and 10% of the 31% relates to diets alone.[7] This affects the quality of life of individuals and also impacts the wider community, leading to a total cost burden of $8.6 billion.[8]

The reformulation of packaged food products to lower salt content is achievable and will make a significant contribution to reducing consumption of large amounts of salt.

Modelling studies in Australia suggest that reformulation of foods to reduce salt is one of the most cost-effective interventions for the primary prevention of cardiovascular disease.[9]

The majority of salt consumed by Australians comes from processed foods. High salt intakes have been shown to raise blood pressure, which in turn increases the risk of cardiovascular disease, the leading cause of death in Australia. There is also emerging evidence suggesting that excessive salt intake may be associated with stomach cancer, decreased bone mineral density and obesity.[10,11]

The average amount of salt consumed in Australia is 9.6g a day (men average 10.1g and women average 7.3g).[12] This is almost double the recommended maximum amount of salt according to the WHO and the National Heart Foundation of Australia who both recommend a salt intake of no more than 5g for adults per day (2000mg of sodium).[13,14]

The National Health and Medical Research Council recently updated the sodium Nutrient Reference Value (NRV) for adults, and now recommend a Suggested Dietary Target of 2000mg of sodium which is equivalent to 5g salt (note that the suggested dietary target is defined as the daily average intake that may help in the prevention of chronic disease).[15]

It is recommended that children need even less sodium than adults, and the NRV for those under 19 is currently under review. For further information on NRV's go to: nrv.gov.au

Salt is made up of two components: sodium (40%) and chloride (60%). Within salt, the sodium is responsible for negative health effects, when it is consumed in excess. Sodium in our diet is mostly consumed as salt, however it is contained in other food additives, such as sodium phosphate, sodium bicarbonate and sodium benzoate.[16]

CONVERTING SODIUM TO SALT AND SALT TO SODIUM

SODIUM = SALT ÷ 2.5

SALT = SODIUM x 2.5

The Heart Foundation also has a salt/sodium converter, go to: heartfoundation.org.au

Sodium is essential for life; the chemical element plays a vital role in achieving fluid balance, normal cell function and nervous system function. As the human body can't produce sodium, it must be obtained through our diet, however, the amount the body needs is very small (460-920mg/day for adults) compared to the amount that is generally consumed.[17,18]

Many foods in their natural state contain small amounts of sodium. However, the biggest contributors to dietary salt intakes are processed foods, especially grain-based products such as bread, processed meats, soups and sauces (see Figure 1).[19] Although these are the leading contributors, they are not necessarily the foods that are highest in salt on a weight-by-weight basis (see Table 4 High Salt/Sodium Ingredients). These foods are consumed frequently and/or in large amounts, and therefore their overall contribution to salt intakes is high.

b) Consumers understand that too much salt is bad for their health but struggle to reduce their intake without food manufacturers acting through reformulation

A recent study of consumer attitudes found that almost half of Victorians surveyed (47%) are particularly concerned about the amount of salt in food. The result is unsurprising, given that most people (90%) understand that too much salt is bad for their health.[22]

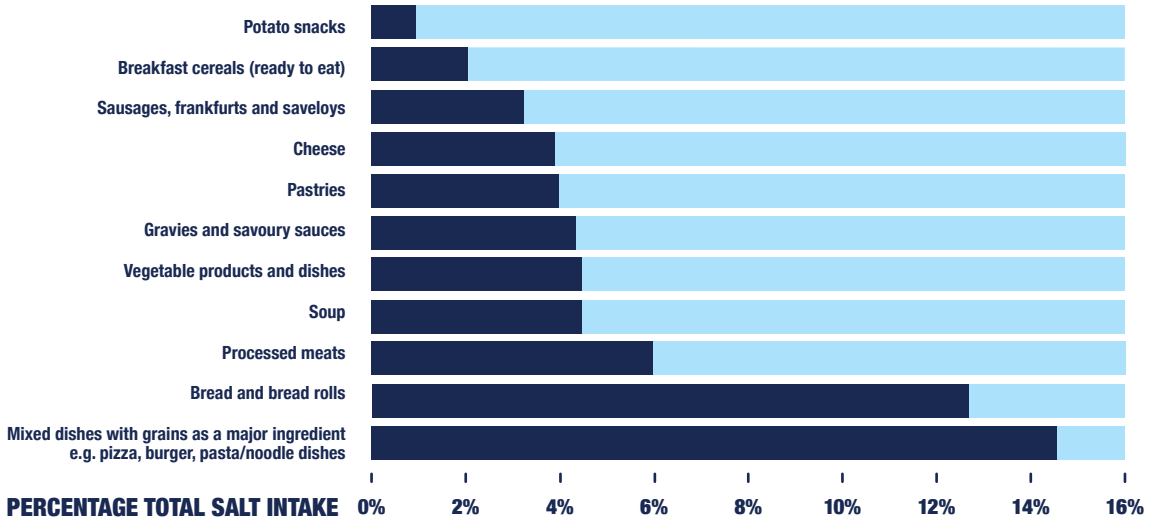
The saltiness of the wider environment and food supply has a large influence on people's preference for salty foods. However, in the absence of any changes to the food supply, most people struggle to reduce their salt intakes to fall in line with dietary recommendations, even when they are given intensive guidance and support.[23,24] All of this suggests that there is a clear opportunity for food manufacturers to meet the growing consumer demand in Australia, and globally, for healthier and less salty foods. Reformulation is an important way to meet this demand and is a crucial part of a range of policy measures needed to improve the dietary intakes of Australians.[25] (See Section 12 Wider Policy Environment).

c) Reformulation programs have been successful in reducing population salt intakes

Many other countries around the world have already adopted salt reformulation programs with great success. The United Kingdom (UK) is seen as one of the leading examples for salt reformulation. In 2006, the UK introduced targets as central to one of the most robust and successful salt reduction programs. The targets covered 85 food categories that contributed the most salt to people's diets and aimed for a gradual reduction in salt at a rate of 10-20% at one-two yearly intervals.[26] The program led to a 15% reduction in the average salt intake of the population; a drop from 9.5g a day in 2001 to 8.1g a day in 2011. There was a corresponding reduction in blood pressure in the adult population of 3.0/1.4mmHg over the same period.[27] The program is estimated to have prevented more than 9,000 premature deaths a year and saved £1.5 billion annually in healthcare costs.[28] The UK now have one of the lowest salt intakes of any

AROUND 75% OF SALT IN THE AUSTRALIAN DIET COMES FROM PROCESSED FOODS SUCH AS PIZZA, PROCESSED MEATS, AND READY MADE MEALS.[20]

Figure 1 Leading contributors to salt intake in the Australian diet for the total population (children and adults)[21]



developed country, achieved through the setting of progressive, time-bound salt targets to be achieved by the food industry. Key characteristics of the UK approach include strong leadership from the UK Government through the Food Standards Agency and the Department of Health, strong engagement and transparent monitoring of the food industry towards achieving the targets.[29]

Given the burden of disease across society due to high salt consumption, and the fact that processed food accounts for the bulk of salt consumed in Australia, food manufacturers have a clear responsibility to reformulate their products to reduce salt. Reformulating food means that healthier options are more readily available to consumers. A clear, demonstrable commitment to health may offer a competitive advantage for some products at the shelf edge (for example by displaying a higher Health Star Rating). This commitment could also avoid negative publicity for food manufacturers, which can hamper consumer trust.

Evidence suggests that, over time, it's possible to reduce the salt content of processed foods without affecting consumer taste acceptance. The amount of salt that can be removed / reduced depends on the product category; a recent review found that salt can be reduced in bread and selected processed meats by up to 37% and 67% respectively.[30] While there are measures other than consumer acceptability to consider, such as the impact on product shelf life, numerous reports of reformulation programs internationally have demonstrated significant success in reducing salt content by an average of 25% (range 5-81%).[31]

d) Summary - the benefits of reformulation for food manufacturers

The pursuit of health and wellness is driving widespread innovation across the food manufacturing industry. While it is positive that Australian food manufacturers are making some progress, more needs to be done to reduce salt intakes. These are just some of the benefits that reformulation will bring to food manufacturers:

- *Improved dietary intakes and better health outcomes for Australians*
- *Meet consumer demand for healthier products and improved nutritional content*
- *Build consumer trust, enhance company reputation and improve brand positioning*
- *Demonstrate leadership, commitment and responsibility for health and well-being agenda*
- *Develop business opportunities to win new contracts, such as private label or food services*
- *Potentially achieve cost savings if reformulation involves reducing ingredients, driving an improved bottom line and profits*
- *Benchmarking will deliver product insights, leading to more innovation in the future.*

THE WORLD HEALTH ORGANIZATION (WHO) RECOGNISES THE VITAL ROLE OF THE FOOD INDUSTRY IN REFORMULATING FOOD TO CONTAIN LESS SALT. THE WHO VIEWS THIS ROLE AS A "BEST BUY" IN PREVENTING NONCOMMUNICABLE DISEASE AND REDUCING HEALTHCARE COSTS.[32]

03 FUNCTIONS OF SALT IN FOOD

a) Taste and flavour

A survey of food manufacturers suggested that salt is mainly added to food to improve taste and flavour.[33] The sense of a salty taste when food is eaten is one of the five basic perceptions, along with sweet, sour, bitter and umami (savoury).

Taste is a component of flavour; a term used to capture the complexity of the total sensation experienced when food is consumed. Other terms that apply to sensations experienced when food is eaten include smell, chemesthesis (irritation) and texture.[34] As flavour perception plays an overall role in food acceptance, it is important to consider the totality of flavour, rather than simply the saltiness of food when undertaking reformulation. In addition, salt can mask other flavours and sometimes by reducing salt in foods you can reveal and enhance other flavours.

The fact that the same person might be fully satisfied with two snacks of widely varying sodium levels - a fresh apple and a handful of salted pretzels – shows how dependent the [salt] taste issue is on wider flavour contexts.[35]

Several factors influence the salty taste perception, including the nature of the food matrix (where perceived saltiness will be greater in a liquid than a solid at the same salt concentration) and interactions with other taste compounds where, for example salt masks bitterness.[36]

For many foods, adding salt increases liking of them up to a threshold, at which stage, any further increase in saltiness reduces the foods' palatability. Although this is commonly referred to as the "bliss point", rather than being a precise concentration, it is generally a range – explaining why it is often possible to reduce the salt content of foods without impacting on their acceptance.[37]

The "bliss range" can vary significantly from person to person and can shift downwards (or upwards) over time, according to the overall exposure that a person has to salt in their diet.

The length of time it takes to become accustomed to a lower salt intake has been reported to be somewhere in the range of one to three months.[38,39] This supports the idea that gradual, stepwise reductions in salt across the entire food supply can be successful in shifting acceptance towards lower salt products.

b) Preservation and food safety

Salt plays a role in food preservation; it does this by inhibiting the multiplication of pathogenic or spoilage microorganisms by reducing the availability of water (often referred to as water activity a_w). Reducing the water activity impacts on the survival or growth of spoilage microorganisms. Water activity is expressed on a scale of 0 (anhydrous substance) to 1 (pure water). Several moulds develop when a_w values exceed 0.70 and certain pathogenic bacteria appear at 0.83.[40]

Other barriers that prevent the development of microorganisms include changing the pH (for example by adding organic acids such as acetic, citric or lactic acid), adding antimicrobial agents (such as lactates, sorbates/sorbic acid, benzoates, propionates, nitrates/nitrites, phosphates), excluding oxygen, heating, reducing temperature (freezing/refrigerating), drying, fermenting and using high pressure.[41]

Reducing salt in a product may lower or remove a hurdle allowing for the growth of microorganisms. It is essential that food manufacturers carefully and holistically assess the product, processing and packaging system for the availability and efficacy of other microbial barriers.[42] It's also important to consider that lowering salt can shorten a product's shelf life and therefore lead to a potential increase in food waste (See Section 11 Shelf Life Testing).

c) Processability

In some foods, the role of salt extends beyond flavour enhancement and food preservation. In these foods, salt performs several functions central to product quality or processing. For instance, in bread, salt helps to reinforce the structure of gluten-containing doughs, slows down the fermentation rate of yeast and reduces the stickiness of dough, making it easier to process. In bread, the use of salt also affects the colour of the crust. In cheese, salt interacts with the casein protein matrix to affect texture and controls the activity of the starter culture and ripening enzymes. In meat, salt helps with water retention and improves hydration; it forms complexes with protein to bind the meat and improve texture. In meat, salt is also used to maintain colour. These factors need to be taken into account when considering reducing salt in these products.

04 DEVELOPING A REFORMULATION PROGRAM

The stages involved in developing a reformulation program will vary from:

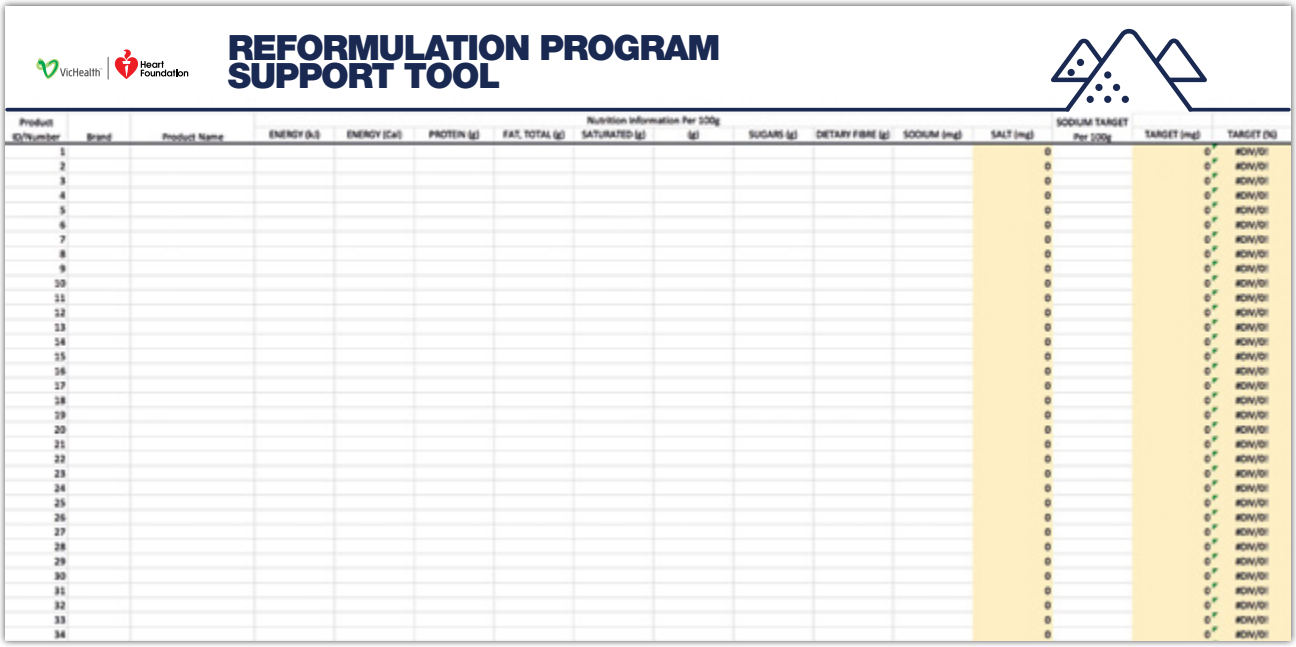
- *business to business*
- *the types of food products manufactured*
- *the role/s of salt within them, and*
- *whether externally agreed reformulation targets are available.*

Figure 2 Reformulation Program Support Tool aids food manufacturing businesses in collecting the necessary information for a reformulation program. In addition, Figure 3 Reformulation Program Decision Flow outlines a general flow for a nine-step process in decision making for the development of a reformulation program.

The aim of the Reformulation Program Support Tool, Reformulation Program Decision Flow, and subsequent explanatory sections is to serve as a guide to the different elements that food manufacturers may need to consider, and the stages they need to undergo, to successfully launch reformulated food products.

DOWNLOAD THESE TOOLS
unpackthesalt.com.au

Figure 2 Reformulation program support tool


REFORMULATION PROGRAM SUPPORT TOOL

Product ID/Number	Brand	Product Name	Nutrition Information Per 100g: ENERGY (kJ)	ENERGY (Cal)	PROTEIN (g)	FAT, TOTAL (g)	SATURATED (g)	(g)	SUGARS (g)	DIETARY FIBRE (g)	SODIUM (mg)	SALT (mg)	SODIUM TARGET Per 100g	TARGET (mg)	TARGET (%)
1												0		0	#DIV/0!
2												0		0	#DIV/0!
3												0		0	#DIV/0!
4												0		0	#DIV/0!
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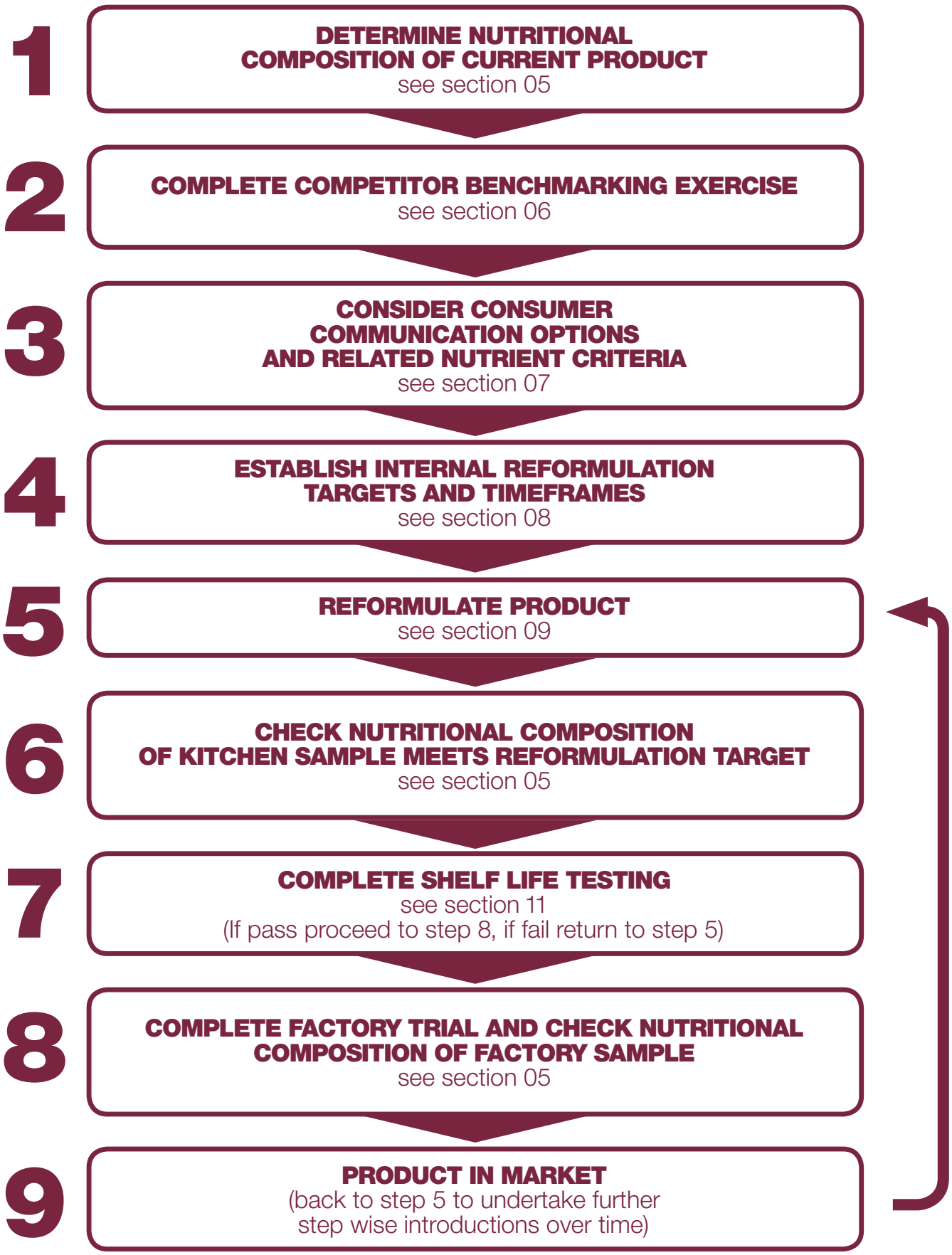
Figure 3 Reformulation program decision flow



05 DETERMINING NUTRITIONAL COMPOSITION

Knowing the current nutritional composition of products is an essential first step in undertaking reformulation. There are two main methods for assessment: laboratory analysis or calculating from known ingredient data. Both methods have their pros and cons, which are outlined below.

Food manufacturers may choose to use a combination of these methods to support their reformulation program. For example, when assessing the nutritional composition of new product samples, calculation may be preferred over laboratory analysis to reduce cost and the time to access results. However, in establishing nutritional composition for declaring on the product label, laboratory analysis may be preferred for accuracy.

Laboratory Analysis

Laboratory analysis is the most accurate method of determining the nutritional make up of food. However, this is also the most expensive method and it can take longer to receive results. Analysing samples from multiple batches and from various stages of a product's shelf life can help to produce reliable results that are more representative of the product's make up.

Laboratories can offer guidance for food manufacturers on a suitable testing protocol. Ideally, food laboratories should be accredited by either the National Association of Testing Authorities (NATA) or International Accreditation New Zealand (IANZ). See Table 1 for some food laboratories in Melbourne, Australia that can assist.

Calculating from Reference Data

It is possible to calculate the nutritional composition of a product using the published nutrition data for ingredients. Several food composition datasets are available online, both in Australia, for instance the AUSNUT 2011-13 database, and internationally, for instance the USDA Food Composition Database.[43,44] There are also paper-based published datasets, for example The Composition of Foods based on the UK food supply.[45]

Using datasets in their 'raw' form to calculate nutritional composition can be time-consuming, particularly if a product has many ingredients. A number of software companies, such as Foodworks, have developed packages that provide a more user-friendly way to access these datasets.[46]

Food Standards Australia New Zealand (FSANZ) also has a free online tool which calculates the average nutrient content of products and prepares a nutrient information panel.[47]

To obtain additional support for nutritional composition calculations, it is advisable to work with a nutritionist with experience in recipe analysis.

The following networks could also assist you with nutritional composition and other technical issues:

Food Innovation Network:

The Food Innovation Network (FIN) connects businesses in the food value chain with industry expertise to solve innovation-related business problems and create opportunities for food businesses in Victoria. The FIN works with businesses developing product formulations and new networks for product sourcing and product development.

For more information, visit foodinnovation.vic.gov.au

Building Healthier Foods Portal:

The Building Healthier Foods Portal is a new platform that connects food manufacturers with experts who can assist in developing healthier products. Food manufacturers can access experts or consultants that can help businesses to make better decisions, solve technical challenges, develop healthier foods and implement reformulation programs. For more information, visit Building Healthier Foods at fialdev.net

Table 1 Food laboratories in Melbourne, Australia

NAME	LOCATION	WEBSITE
Monash Food Incubator	Clayton	foodinnovationcentre.com.au
RMIT Food Research & Innovation Centre	Bundoora	rmit.edu.au
CSIRO's Food Innovation Centre For Industry	Werribee	csiro.au

06 COMPETITOR BENCHMARKING

Benchmarking is a way of comparing a current or proposed product to existing products available on the market. Using benchmarking as part of a reformulation program is a helpful way to assess how a product measures up across one or more characteristics. Benchmarking can also highlight food manufacturing risks and opportunities.

For example, benchmarking may highlight that a product has a higher salt level than a competitor. This finding may potentially put the brand at risk of negative publicity and drive consumers to choose a lower salt option that is already available.

To inform reformulation programs, benchmarking may consider several characteristics related to nutritional composition, such as the nutrition information panel (providing information per 100g and per serving size), portion/serving size, the Health Star Rating, ingredients and on-pack nutrient content and health claims. Benchmarking may also include sensory testing (see Section 10 Sensory Testing).

The number of products selected for comparison can vary and this will depend on the time and resources available to complete the exercise, the product mix available to the consumer and the level of insight needed to inform decision making. To aid the benchmarking process, it is helpful to agree at the outset whether products are intended to be equal to or better than the particular characteristic/s being assessed.

Depending on the number of products needed for an assessment, benchmarking can be costly and time-consuming. However, there are a range of resources available to support food manufacturers with their benchmarking activities, including:

- *Supermarket and competitor websites* - these often share information on several key product attributes, including ingredients and nutrition information. Bear in mind that this information is not comprehensive and is not always up-to-date.
- *FoodSwitch website and app (available from foodswitch.com.au)* - delivered by The George Institute for Global Health, this website and app is a comprehensive food composition database in Australia. The resource offers full market coverage of all food categories and nutrition attributes. The tool enables the quick search and comparison of the Health Star Rating of around 90% of packaged food products available in most Australian supermarkets.
- *Unpack the Salt Food Category Reports* - The George Institute for Global Health, VicHealth and the National Heart Foundation have released reports that contain an analysis of salt levels in ready-made meals, pasta sauces, dips and crackers, processed meats (sausages) and Asian style sauces. These reports cover all products found in Australia's major supermarkets (Woolworths, Coles, IGA and Aldi) from 2010 to 2018 and highlight the top five saltiest and lowest salt products. A summary of the food category reports with examples of low salt foods currently available in Australia can be found at unpackthesalt.com.au. Also, the full reports can be accessed here: unpackthesalt.com.au
- *Manufacturing Analysis Service* - FoodSwitch at the George Institute for Global Health in partnership with the VSRP provides a service for food manufacturers which analyses the sodium profile of Australian manufacturers' products across three product categories. The Manufacturing Analysis Service reports compare these products with those produced by competitors and against Healthy Food Partnership Reformulation Program targets. This service uses FoodSwitch data to assist food manufacturers to reformulate their products in line with sodium targets. For more information, contact unpackthesalt@heartfoundation.org.au

07 CONSUMER COMMUNICATION OPTIONS

Reviewing consumer communication options for products proposed for reformulation is important early in the product development cycle. This process can help to guide decision-making, not just regarding labelling and claims made as part of the marketing process of the product, but also relating to nutritional composition and meeting reformulation targets.

For instance, if a company wants to make a 'no added salt' claim on the product, it is essential that there is no added salt in the recipe, and that no ingredients that contain added salt are used (see Table 2). Food manufacturers can find they have wasted time and resources if the conditions of making claims have not been considered early on in the product development cycle.

In addition, if a company strives to achieve a specific Health Star Rating, for example, one that is half a star higher than is typical for a product category or compared to a key competitor, then understanding the nutrient scoring criteria for the Health Star Rating System is essential in formulating a product to meet raised targets and expectations.

Before launching a reformulated product, food manufacturers may research their target consumers to understand whether claims related to salt reduction have a motivating impact on purchase. While consumer insight businesses report that salt is within the top 10 ingredients that Australians are actively avoiding, food manufacturers often prefer to adopt a 'health by stealth' approach.[48] This means that reformulation is carried out 'silently' in light of concerns that, when consumers are made aware that salt reduction has taken place, they may assume a product doesn't taste as good (even if that is not found to be the case through blind sensory testing, see Section 10).[49]

Health Star Rating

The Health Star Rating is a voluntary front-of-pack nutrition labelling system that rates the overall nutritional profile of a packaged food product and assigns it a rating from ½ a star to 5 stars. According to this labelling system a product with more stars is a healthier choice, compared to similar products.

The level of sodium in a food is one of seven components used in the Health Star Rating calculation (the others being energy, saturated fat, sugars, protein, fibre and the fruit, vegetable, nut and legume content). Reductions in sodium content may increase the Health Star Rating of a packaged food product, depending on the balance of other nutrients/ingredients and the overall Health Star Rating score. For more information, go to healthstarrating.gov.au to see the Guide for Industry to the Health Star Rating Calculator for details on the sodium content and corresponding baseline point scores.[50]

Nutrient Content and Health Claims

Nutrient content and health claims are voluntary statements about packaged food products and feature on the packaging or in other communication materials such as TV or press advertising. These statements enable food manufacturers to share information about the nutrient content and health benefits of their products with consumers.

Nutrient content and health claims are governed by Food Standards Australia New Zealand (FSANZ) Standard 1.2.7. Schedule 4 of that document contains a full list of permitted claims.[51] When communicating messages about salt or sodium content in foods, there are three permitted nutrient content claims and one high level health claim (see Tables 2 and 3).

Table 2 Nutrient Content Claims for Salt or Sodium[52]

CLAIM	CONDITIONS OF USE
Low salt or sodium	The food contains no more sodium than: a) 120mg/100mL for liquids b) 120mg/100g for solids
Reduced salt or sodium (or Light/Lite)	The food contains at least 25% less sodium than the same amount of reference food*
No added salt or sodium or unsalted	a) The food contains no added sodium, including no added salt; and b) The ingredients of the food contain no added sodium, including no added salt

*According to subclause 16 on comparative claims, when making this type of statement, the following information must also be provided:
a) the identity of the reference food; and
b) the difference between the amount of salt or sodium in the food making the claim and the reference food

Table 3 High Level Health Claim for Salt or Sodium[53]

PROPERTY OF FOOD	SPECIFIC HEALTH EFFECT	CONTEXT CLAIM STATEMENTS	CONDITIONS
Salt or sodium	Reduces blood pressure	Diet low in salt or sodium	The food must meet the conditions for making a nutrient content claim about low sodium or salt

08 ESTABLISHING REFORMULATION TARGETS AND TIMEFRAMES

The final consideration in establishing internal reformulation targets is to review externally established reformulation targets. This takes place after obtaining information about a product's nutritional composition, competitor benchmarking and consumer communication opportunities. The Healthy Food Partnership is developing reformulation targets, including for sodium. In July 2018, draft targets were released for consultation with stakeholders and the food manufacturing industry. These targets are still being finalised. The voluntary draft targets provide valuable guidance which the food manufacturing industry can use to take a proactive approach, ahead of their introduction.

For the latest information on progress with voluntary targets contact the HFP Secretariat on HealthyFoodPartnership@health.gov.au, or go to goo.gl/DQBmR8

Also see Section 12 on the Wider Policy Environment for further information on the Healthy Food Partnership.

The Healthy Food Partnership reformulation targets replace the existing Food and Health Dialogue, the previous sodium reduction targets for bread, breakfast cereals, simmer sauces, processed meat, soups, savoury pies, potato/corn/extruded snacks, savoury crackers and cheese.[54] Between 2009 – 2015, the Dialogue made some progress in reducing sodium content in the Australian food supply. The Dialogue achieved sodium reductions in a group of targeted food products including breads, breakfast cereals, pasta sauces, processed meats, soups, savoury pies and pastries, savoury crackers and potato, corn and extruded snacks.[55]

As of 2015, 75 countries have implemented salt reduction programs, including the United Kingdom and New Zealand.[56] These may be referred to for examples of what may be technically achievable for certain product categories. However, it is important to consider manufacturing capabilities and issues around transport logistics and shelf-life that may present unique challenges for Australian food manufacturers.

Evidence suggests that the slow and stepwise reduction of salt can go unnoticed by consumers and, when gradually continued over time, it is possible to achieve significant reductions in salt content.[57]

The wide ranges in sodium content that have been revealed in the VSRP food category reports provide further evidence that it is possible to make processed and packaged food products that are low in salt. A summary of the food category reports with examples of low salt foods currently available in Australia can be found at unpackthesalt.com.au. Also, the full reports can be accessed here: unpackthesalt.com.au.

When setting reformulation timeframes, food manufacturers will need to take account of the extent of salt reduction needed (noting that larger reductions may require longer timeframes to overcome technical challenges, in addition to supporting gradual consumer taste adaptation), normal timelines for product development and the volumes of on hand stock or packaging that may need to sell-through or be disposed of.

09 APPROACHES TO SALT REDUCTION

When reformulating to reduce salt content, product developers need to consider the overall nutritional profile of a food. For instance, adding in extra sugars or saturated fats to compensate for a change in flavour due to salt reduction does not improve the overall nutritional composition. Therefore, a reformulation program that targets salt also presents an opportunity to holistically assess the nutritional composition of processed food products and to identify ways these can be made more nutritious for consumers.

When considering options to reduce salt, the first step is to review all ingredients; this will help to identify where the salt is coming from and to consider whether reducing, removing or replacing those higher salt ingredients with lower salt alternatives could be an option (see Table 4).

Check with ingredient suppliers to see if there are lower salt options available. For example, some bakeries in the UK have been able to reduce salt in products by using reduced sodium baking powders.

Once you have assessed the ingredients for salt, there are three main ways that you can reduce the amount of salt in your product: reduce, replace or remove. Each of these options offers different levels of reductions and can be considered alone or in combination. Food manufacturers should consider the pros and cons before deciding which path to take. See Table 5 for a summary of the pros and cons of the three different approaches:

a) Reduce the amount of salt added to the product recipe or through the production process – highly recommended and most widely used approach in Australia and internationally

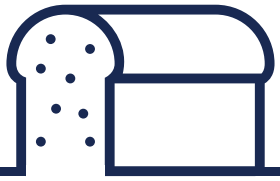
Remove salt gradually without any direct substitution of any other ingredient (e.g. potassium chloride). Do this gradually and over time and reduce the salt as much as possible. You might have to look at rebalancing the other ingredients in the recipe. This is also the cheapest option for food manufacturers as there is no cost in additional ingredients and meets the increasing demand for “clean” label ingredients.

b) Replace with salt enhancers – herbs and spices are the best option for a flavour boost and ensuring a clean label

When looking to reduce salt in foods by replacing it (as opposed to just removing it), there are two main alternatives available to food technologists – salt enhancers or salt replacers. Salt enhancers are ingredients or substances that do not have a salty taste themselves, but can enhance a salty taste when used in combination with salt.[59] In the first instance, utilising herbs and spices to boost flavour would be an obvious route to try for some products.

Table 4 High Salt/Sodium Ingredients[58]

INGREDIENT	SALT CONTENT G/100G
Fish sauce	20.6
Preserved lemon	19.0
Soy sauce	16.4
Gravy powder	15.0
Anchovies	13.7
Yeast extract	12.1
Curry paste	Varies
Miso (soybean paste)	9.5
Oyster sauce	9.5
Cheese	Varies
Stock cubes/seasoning mixes	Varies
Processed meats	Varies
Olives	Varies



There are also a range of other ingredients that can perform this function and they typically work best in savoury applications.[60] Also, when using alternatives, food manufacturers may need to be aware of the lack of acceptance of some of these additives, due to food allergies and intolerances and the growing consumer desire for 'clean labels' (i.e. greater transparency, shorter list of ingredients, naturalness and origins of ingredients). Consumer testing is advisable before taking these steps.

c) Replace with other salts – recommended only when salt has been removed as much as possible in the first instance

Other salts can be added to replace sodium chloride in some food products. Potassium chloride (508) is generally the most widely-used salt substitute.[61] Other examples include calcium chloride (509), magnesium chloride (511) or magnesium sulphate (518). Alternatively, salts with different crystal structures can be used in lesser amounts to achieve the same level of taste in certain applications.[62] Check the food regulations for salts that may be added (check Food Standards Australia's food additives list at foodstandards.gov.au)

Being white, crystalline and odourless potassium chloride is virtually indistinguishable from sodium chloride from a visual standpoint. It also is similarly salty, but at higher levels can be unpleasant with a bitter, acrid and metallic aftertaste.[63] Substitution of 25-30% is generally recommended and it can therefore be of help in making significant reductions in salt content.[64]

Before using a potassium chloride salt replacer, two key points are worth noting.

The first is that one of the goals of salt reduction is to gradually shift the population's palate for salt downwards, so that collectively a lower level of salt in the diet is achieved and preferred.

Aiming to reduce the salt content of a product through reformulation but aspiring to mimic (as closely as possible) the previous taste is unlikely to support this objective.

The second point is that a number of key population groups, primarily those with kidney disease, diabetes, hypoaldosteronism and older adults (60 years+) may be sensitive to high potassium intakes.[65] However, many public health agencies including the UK Department of Health and the Food Standards Agency (Ireland), which have been concerned about the risk of increased potassium in the diet have now reviewed their position and conclude that the benefits outweigh the risk at the population level.[66,67] Both of these agencies now support the use of salt substitutes when further reducing sodium impacts foods safety, but not to maintain salty taste.

d) Remove addition of salt completely - recommended when salt has been added purely for taste

Table 5 Pros vs Cons: Reformulation Approaches - adapted from Leatherhead Food Research (2012) Evaluation of Technical Approaches to Salt Reduction[68]

APPROACH	TECHNOLOGY	EXPLANATION	PROS	CONS	RECOMMENDATION
Reduce	Small step reduction	Evidence suggests that a gradual reduction in products can go unnoticed as consumer palates adjust. When small reductions are made over time, large reductions can be achieved. Many food companies have already adopted this strategy.	- Simple to do - Takes consumers on a journey so their palates adjust, and so they do not stop buying the product and switch to a saltier alternative	- Takes time and investment - Palates will only adapt if all food becomes less salty - therefore all food companies need to participate	**Highly Recommended**
Replace	Replace with herbs and spices	By careful reformulation of savoury products, natural herbs and spices can be used to deliver an acceptable flavour with less salt. This also avoids using mineral salts.	- Can be easy to do - Allows a "clean label" /natural declaration which consumers are increasingly demanding	- Only suitable for savoury products that lend themselves to addition of spices. Therefore, may be less appropriate for bread and cheese	**Highly Recommended**
	Replace with flavour enhancers	Flavour enhancers allow the use of less salt by enhancing the salty taste when used in combination with salt.	- Already being successfully used in products	- Limited consumer acceptability due to negative perceptions - Salt still needs to be used - Change in flavour profile may be noticed and lead to product rejection	**Weigh up pros & cons**
	Replace with mineral salts	Some mineral salts replicate both the antimicrobial, functionality and taste of salt. They can be used in direct replacement for sodium chloride, e.g. potassium chloride (508). Amount that can be substituted may vary by category. Magnesium sulphate (518) is becoming more widely used.	- 508 can be effective in bread product category - Low levels of 518 = salty taste without bitterness - Positive evidence suggests 518 has broad range of applicability (ie preservation and functionality)	- High levels of 508 = bitter taste - Mimicking salt defeats purpose and won't shift population palate for salt - Potential health implications - people with kidney disease, diabetes and over 60 may be sensitive to high 508 levels	**Weigh up pros & cons**
Remove	Remove addition of salt completely	If the only source of salt is coming from added salt and it has been added purely for taste - then potentially it can be removed.	- Simple to do - Will not require much investment	- Could affect sensory properties too much and deter consumers	**Recommended**

10 SENSORY TESTING

Sensory testing involves the careful analysis and measurement of product attributes, such as taste, texture, consistency, appearance and smell, and their relationship to perceptions of quality. For reformulation programs, sensory testing, whether carried out in-house or outsourced, is essential in determining whether changes in product composition to accommodate salt reduction have the potential to impact upon perceptions of product quality. When performed well, sensory testing can provide valuable insights to support more informed and effective business decisions.

To determine the most appropriate sensory testing format, it is essential to understand the objective of the assessment. For instance, what is the test intended to measure – is the expectation that one product is similar, different, preferred or at parity to another product? Clarity from the outset will enable selection of the best sensory test to provide the insights needed. There are two main types of sensory tests:

- *Discrimination* – assessors objectively measure and compare two or more products on a characteristic, such as saltiness, and determine whether a difference exists. Examples include a triangle test where assessors are asked to spot the odd one out of three products (two of which are the same), or a ranking test where assessors are asked to rank several products for a stipulated attribute, for example from the least salty to the most salty.
- *Preference* – assessors subjectively report whether they like one product over another. Examples include a paired comparison test where assessors are asked which product they prefer out of a choice of two, or a hedonic test where products are ranked on a scale of liking (like extremely (9), like very much (8), like moderately (7), like slightly (6), neither like nor dislike (5), dislike slightly (4), dislike moderately (3), dislike very much (2) and dislike extremely (1)).

When undertaking sensory testing in-house, it's important that the testing environment is controlled in a way that minimises distractions that may affect judgement or introduce bias. For example, noise levels should be minimised, intrusive odours avoided, the room temperature should be comfortable (not too hot or cold), and the presentation of samples should be consistent, blind (without packaging or other identifying features) and randomised. To support this and prevent distractions, assessors should ideally be isolated in testing booths.

11 SHELF LIFE TESTING

The shelf life of a processed food product is defined as the time period during which food will:

1. **Remain safe;**
2. **Be certain to retain its desired sensory, chemical, physical, microbiological, and functional characteristics; and**
3. **Where appropriate, comply with any label declaration of nutrient data, when stored under the recommended conditions.**[69]

Food manufacturers should determine the impact of salt reduction on the shelf life and microbiological stability of a food through properly conducted storage trials. In principle, storage trials should employ conditions that mimic those the food is expected to encounter during storage, distribution, retail display and consumer use. However, these conditions can be complex and expensive to reproduce.[70] Accelerated testing and computer modelling may be a more time-effective and cost-effective option for smaller businesses. However, care should be taken in the interpretation of the results and a suitably experienced food microbiologist should be engaged to do this work.

12 WIDER POLICY ENVIRONMENT

Reformulation needs to be part of a comprehensive approach to reducing the burden of diet-related diseases. There are other policies and programs aimed at improving dietary intakes, which are set out below in further detail. All food manufacturers should be aware of these other activities and should be mindful of how these activities relate to their reformulation programs and products.

National:

Australian Dietary Guidelines

eatforhealth.gov.au

The Australian Dietary Guidelines provide evidence-based advice on the amounts and kinds of foods to eat for achieving good health. Most policies and programs outlined below use the Australian Dietary Guidelines as their foundation.

Healthy Food Partnership

health.gov.au

The Healthy Food Partnership is a collaboration between government, the public health sector and the food industry to tackle obesity, encourage healthy eating and empower food businesses to make positive changes. Reformulation is a key focus area, along with improving consumer education and awareness.

The Reformulation Working Group published draft reformulation targets for risk-associated nutrients, including sodium, in July 2018. health.gov.au

For the latest information on the work of the Healthy Food Partnership and the Reformulation Working Group, including progress on when the voluntary targets will be implemented, contact the secretariat on healthyfoodpartnership@health.gov.au

Health Star Rating

healthstarrating.gov.au

The Health Star Rating (HSR) is a voluntary front-of-pack nutrition labelling system that rates the overall nutritional profile of a processed food product and provides the food with a rating of ½ a star to 5 stars; more stars indicate healthier choices. This rating provides a quick, easy, standard way to compare similar packaged foods. Improvements in the nutritional profile of products through reformulation programs may be reflected by higher HSRs (see Section 07 Consumer Communication Options).

Food manufacturers should also note that an important change to the form of the food ("as prepared") rules of the HSR system was announced on 29 June 2018. That is, the HSR should be calculated and displayed on the basis of the product as it appears on the shelf, ie "as sold", rather than "as prepared". Specific exemptions will apply for products which must be rehydrated with water, diluted with water, drained of water or drained of brine. This decision will be implemented alongside the recommendations of the five-year review of the HSR system, which is currently underway. For further details contact the review secretariat on frontofpack@health.gov.au

Nutrient Content and Health Claims Regulation

foodstandards.gov.au

Standard 1.2.7 regulates the nutrient content and health claims made on food labels and other commercial communications. All food manufacturing businesses must comply with this standard when making a voluntary statement about the nutrient content or health effects of consuming a processed food product (see Section 07 Consumer Communication Options).

Victoria:

Healthy Choices Framework

healthychoices.vic.gov.au

The Victorian Government's Healthy Choices Framework aims to improve the availability and promotion of healthy food and drinks in settings such as hospitals, health services, sport and recreation centres, workplace catering and parks. The Framework includes the Healthy Choices food and drink classification guide which classifies foods and drinks as GREEN (best choices), AMBER (choose carefully) or RED (limit), based on their nutritional value. For some food categories, sodium limits are included to help determine the appropriate colour rating and the suitability of offering a food in a specific setting.

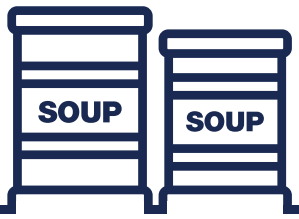
Victorian School Canteens and Other School Food Services Policy

The Department of Education's School Canteens and Other School Food Services Policy ensures school food services provide foods and drinks which contribute to a supportive, healthy school environment.

The Healthy Canteen Kit includes several resources to assist schools in implementing this policy. Included in this kit is the Food Planner, which groups foods and drinks into the following categories: GREEN (every day), AMBER (select carefully) or RED (occasionally). Sodium criteria are included for some food categories to determine their classification. The sodium criteria align with the Healthy Choices guidelines for other settings (above).

The Healthy Eating Advisory Services

Offers a free online 'FoodChecker' tool that food businesses can use to assess food and drink classifications under both the *Healthy Choices Guidelines* and the *School Canteens and Other School Food Services Policy*.[71]



13 CONTINUOUS IMPROVEMENT & ONGOING MONITORING

Food manufacturers need to work in stages to progressively reduce the amount of salt in their products. Continual monitoring and evaluation is an important component of any reformulation program. Food manufacturers should keep abreast of changes and developments in the external environment (see Section 12 Wider Policy Environment) that may affect internal targets and timeframes. These can include the release of updated government reformulation targets, as well as periodically completing benchmarking exercises (see Section 6 Competitor Benchmarking) to understand how the nutritional profile of the wider market has shifted over time.

14 SUMMARY & CONCLUSION

Food manufacturers have an increasingly important role to play, as part of a shared responsibility together with government and public health bodies, to reduce the amount of salt in the diet (ie 75%) that comes from processed and packaged foods. Reformulation of processed foods to contain less salt provides an important opportunity to improve the health of a population, by improving the nutritional quality of processed food and reducing dietary salt intake.

As public health awareness increases, consumers will continue to demand greater corporate social responsibility and access to healthier foods.

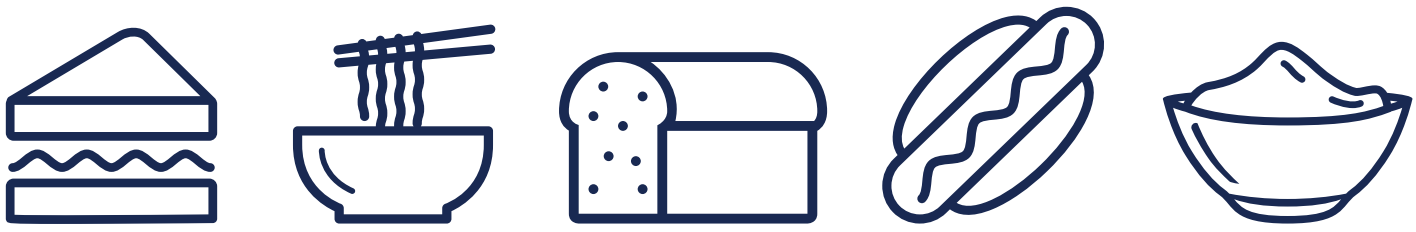
Manufacturers have the opportunity to respond to consumer demand and many Australian food manufacturers are already doing just this by reformulating their foods to contain less salt. The approach that's being employed by these companies is predominantly one of stealth: ie implementing salt reduction incrementally over time to give consumers the chance to adapt to the changes over time.

However, there is much more progress that needs to be made in Australia - we need to ensure all food manufacturers reformulate as this will create a level playing field and collectively contribute to reducing consumer preference for salty foods.

With the introduction of voluntary targets by the Healthy Food Partnership imminent, it's important that food manufacturers prioritise and start planning now to look at how they will implement programs to meet these targets.

The VSRP has developed this document, "Reformulation Readiness: A Best Practice Guide to Salt Reduction for Australian Food Manufacturers", to encourage and assist food manufacturers to go further in their sodium reformulation efforts, so Australia can catch up to, and even lead the way globally in unpacking the salt from our diets.

The VSRP is committed to continuing to engage with food manufacturers to develop innovative solutions and foster positive changes in our food supply, to deliver healthier outcomes for Victorians and all Australians. For more information contact unpackthesalt@heartfoundation.org.au



References

1. Land, M-L, Neal BC, Johnson, C, Nowson, CA, Margerison, C & Peterson, KS 2018, 'Salt consumption by Australia adults: a systematic review and meta-analysis', *Medical Journal of Australia,* vol.208, no.2, pp.75-81.
2. World Health Organization (WHO) 2012, 'Sodium intake for adults and children: guideline', WHO, Geneva.
3. VicHealth 2015, 'The state of salt: a case for salt reduction in Victoria 2015', viewed March 2019, https://www.vichealth.vic.gov.au/media-and-resources/publications/state-of-salt
4. VicHealth 2015, 'The state of salt: a case for salt reduction in Victoria 2015', viewed March 2019, https://www.vichealth.vic.gov.au/media-and-resources/publications/state-of-salt
5. ABS (Australian Bureau of Statistics) 2014, 'Australian Health Survey: Nutrition First Results – Foods and Nutrients, 2011-12', ABS, Canberra.
6. ABS (Australian Bureau of Statistics) 2014, 'Australian Health Survey: Nutrition First Results – Foods and Nutrients, 2011-12', ABS, Canberra.
7. Australian Institute of Health and Welfare (AIHW) 2011, 'Impact and causes of illness and death in Australia for chronic conditions: Australian Burden of Disease Study 2011', AIHW, Canberra, pp.57
8. PricewaterhouseCoopers (PWC) 2014, 'Weighing the cost of obesity: a case for action', viewed March 2019, http://www.pwc.com.au/pdf/weighing-the-cost-of-obesity-final.pdf
9. Cobiac LJ, Magnus A, Lim S, Barendregt JJ, Carter R, et al. 2012, 'Which Interventions Offer Best Value for Money in Primary Prevention of Cardiovascular Disease?' *PLoS ONE* 7(7): e41842. doi:10.1371/journal.pone.0041842
10. Liem, D-G, Miremadi, F & Keast, RSJ 2011, 'Reducing sodium in foods: the effect on flavour', *Nutrients*, 3, pp.694-711.
11. Ma Y, He FJ, MacGregor GA 2015, 'High Salt Intake: Independent Risk Factor for Obesity', *Hypertension* 2015 Oct;66(4):843-9 https://www.ncbi.nlm.nih.gov/pubmed/26238447
12. Land, M-L, Neal BC, Johnson, C, Nowson, CA, Margerison, C & Peterson, KS 2018, 'Salt consumption by Australia adults: a systematic review and meta-analysis', *Medical Journal of Australia,* vol.208, no.2, pp.75-81.
13. World Health Organization (WHO) 2012, 'Sodium intake for adults and children: guideline', WHO, Geneva.
14. Heart Foundation 2017, 'Position Statement: Salt & Heart Healthy Eating', viewed March 2019, https://www.heartfoundation.org.au/images/uploads/main/Position_Statement_SaltHealthyEating.pdf
15. National Health and Medical Research Council and New Zealand Ministry of Health 2006, 'Nutrient reference values for Australia and New Zealand', viewed March 2019, https://www.nrv.gov.au/nutrients/sodium
16. National Health and Medical Research Council and New Zealand Ministry of Health 2006, 'Nutrient reference values for Australia and New Zealand', viewed March 2019, https://www.nrv.gov.au/nutrients/sodium
17. Food and Nutrition Board: Institute of Medicine 2005, 'Dietary reference intakes for water, potassium, sodium, chloride and sulfate 2005', The National Academies Press: Washington, DC, pp.269.
18. National Health and Medical Research Council and New Zealand Ministry of Health 2006, 'Nutrient reference values for Australia and New Zealand', viewed March 2019, https://www.nrv.gov.au/nutrients/sodium
19. ABS (Australian Bureau of Statistics) 2014, 'Australian Health Survey: Nutrition First Results – Foods and Nutrients, 2011-12', ABS, Canberra.
20. Salt, Better Health Channel, 2018 https://www.betterhealth.vic.gov.au/health/healthyliving/salt
21. Australian Bureau of Statistics 2014 Australian Health Survey: Nutrition First Results – Foods and Nutrients, 2011-12', ABS, Canberra.
22. Grimes G & Nowson C 2016, 'Victorian consumer survey of knowledge, attitudes and behaviours related to salt intake', viewed March 2019, https://www.vichealth.vic.gov.au/-/media/ResourceCentre/PublicationsandResources/healthy-eating/VicHealth_Salt_KAB_Survey_FinalReport.pdf?la=en&hash=2EDA7AA9837DC8EE994E2D4275AF5B15ACB8E2F6
23. Webster, J Li, N, Dunford, EK, Nowson, CA & Neal, BC 2010, 'Consumer awareness and self-reported behaviours related to salt consumption in Australia', *Asia Pacific Journal of Clinical Nutrition,* vol. 19, no.4, pp.550-554
24. Jaenke, R, Barzi, F, McMahon, E, Webster, J & Brimblecombe, J 2017 'Consumer acceptance of reformulated food products: a systematic review and meta-analysis of salt-reduced foods', *Critical Reviews in Food Science and Nutrition,* vol.57, no.16, pp.3357-3372.
25. Jaenke, R, Barzi, F, McMahon, E, Webster, J & Brimblecombe, J 2017 'Consumer acceptance of reformulated food products: a systematic review and meta-analysis of salt-reduced foods', *Critical Reviews in Food Science and Nutrition,* vol.57, no.16, pp.3357-3372.
26. He, FJ, Brinsden, HC & MacGregor, GA 2014, 'Salt reduction in the United Kingdom: a successful experiment in public health', *Journal of Human Hypertension,* vol.28, pp.345-352.
27. He, FJ, Brinsden, HC & MacGregor, GA 2014, 'Salt reduction in the United Kingdom: a successful experiment in public health', *Journal of Human Hypertension,* vol.28, pp.345-352.
28. World Health Organization (WHO) 2016 'Shake the salt habit: the SHAKE technical package for salt reduction', WHO, Geneva.
29. He FJ, Pombo-Rodrigues S, MacGregor GA, 2014, 'Salt reduction in England from 2003 to 2011: its relationship to blood pressure, stroke and ischaemic heart disease mortality', doi 10.1136/bmjopen-2013-004549
30. Jaenke, R, Barzi, F, McMahon, E, Webster, J & Brimblecombe, J 2017 'Consumer acceptance of reformulated food products: a systematic review and meta-analysis of salt-reduced foods', *Critical Reviews in Food Science and Nutrition,* vol.57, no.16, pp.3357-3372.
31. Jaenke, R, Barzi, F, McMahon, E, Webster, J & Brimblecombe, J 2017 'Consumer acceptance of reformulated food products: a systematic review and meta-analysis of salt-reduced foods', *Critical Reviews in Food Science and Nutrition,* vol.57, no.16, pp.3357-3372.
32. World Health Organisation 2017, 'Best Buys" and other recommended interventions for the prevention and control of noncommunicable diseases: Tackling NCD's,' Geneva
33. Jaenke, R, Barzi, F, McMahon, E, Webster, J & Brimblecombe, J 2017 'Consumer acceptance of reformulated food products: a systematic review and meta-analysis of salt-reduced foods', *Critical Reviews in Food Science and Nutrition,* vol.57, no.16, pp.3357-3372.
34. Committee on Strategies to Reduce Sodium Intake, Food and Nutrition Board: Institute of Medicine 2010, 'Strategies to reduce sodium intake in the United States', viewed March 2019, http://nap.edu/12818, pp.69.
35. Committee on Strategies to Reduce Sodium Intake, Food and Nutrition Board: Institute of Medicine 2010, 'Strategies to reduce sodium intake in the United States', viewed March 2019, http://nap.edu/12818, pp.70.
36. Jaenke, R, Barzi, F, McMahon, E, Webster, J & Brimblecombe, J 2017 'Consumer acceptance of reformulated food products: a systematic review and meta-analysis of salt-reduced foods', *Critical Reviews in Food Science and Nutrition,* vol.57, no.16, pp.3357-3372.
37. Committee on Strategies to Reduce Sodium Intake, Food and Nutrition Board: Institute of Medicine 2010, 'Strategies to reduce sodium intake in the United States', viewed March 2019, http://nap.edu/12818, pp.71.
38. Committee on Strategies to Reduce Sodium Intake, Food and Nutrition Board: Institute of Medicine 2010, 'Strategies to reduce sodium intake in the United States', viewed March 2019, http://nap.edu/12818, pp.80.
39. He, FJ, Brinsden, HC & MacGregor, GA 2014, 'Salt reduction in the United Kingdom: a successful experiment in public health', *Journal of Human Hypertension,* vol.28, pp.345-352.
40. Conseil de la transformation agroalimentaire et des produits de consummation (CTAC) 2009 'Reformulation of products to reduce sodium: salt reduction guide for the food industry' viewed March 2019, http://dg.cnsoc.org/upload/affix/20140818104749473.pdf pp.34.
41. Conseil de la transformation agroalimentaire et des produits de consummation (CTAC) 2009 'Reformulation of products to reduce sodium: salt reduction guide for the food industry' viewed March 2019, http://dg.cnsoc.org/upload/affix/20140818104749473.pdf pp.34.
42. Christopher, D & Wallace, CA 2014, 'The food safety impact of salt and sodium reduction initiatives', *Perspectives in Public Health,* vol.134, no.4, pp.216-224.
43. Food Standards Australia New Zealand 2011-13, 'AUSNUT food nutrient database', viewed March 2019, http://www.foodstandards.gov.au/science/monitoringnutrients/ausnut/foodnutrient/Pages/default.aspx
44. United States Department of Agriculture 2016, 'USDA food composition database', viewed March 2019, https://ndb.nal.usda.gov/ndb/
45. Finglas, PM, Row, MA, Pinchen, HM, Berry R, Church SM, Dodhia, SK, Farron-Wilson, M & Swan G 2015, 'McCance and Widdowson's the composition of foods, seventh summary edition', Cambridge: Royal Society of Chemistry.
46. FoodWorks: https://xyris.com.au/
47. Food Standards Australia New Zealand 2011, 'Nutrition panel calculator', viewed March 2019, http://www.foodstandards.gov.au/industry/npc/Pages/Nutrition-Panel-Calculator-introduction.aspx/
48. Paul, J 2017, 'If you're healthy shout about it', viewed March 2019, http://www.nielsen.com/au/en/insights/news/2017/if-you-are-healthy-shout-about-it.html
49. Regan, A, Kent, MP, Raats, MM, McCannon, A, Wall, P & Dubois, L 2017, 'Applying a consumer behaviour lens to salt reduction initiatives', *Nutrients*, vol.9, no.8, pp.901.
50. Commonwealth of Australia 2016, 'Guide for industry to the Health Star Rating Calculator version 5', viewed March 2019, http://healthstarrating.gov.au/internet/healthstarrating/publishing.nsf/Content/guide-for-industry-document
51. Food Standards Australia New Zealand, 'Food Standards Code', viewed March 2019, www.foodstandards.gov.au/code.
52. Food Standards Australia New Zealand, 'Food Standards Code', viewed March 2019, www.foodstandards.gov.au/code.
53. Food Standards Australia New Zealand, 'Food Standards Code', viewed March 2019, www.foodstandards.gov.au/code.
54. Department of Health, 'Food and Health Dialogues', viewed March 2019, http://www.health.gov.au/internet/main/publishing.nsf/Content/fhd
55. National Heart Foundation of Australia, 2016, 'Report on the Evaluation of the nine Food Categories for which reformulation targets were set under the Food and Health Dialogue,' https://www.health.gov.au/internet/main/publishing.nsf/Content/7BD47FA4705160A6CA25800C008088B9/$File/Healthy%20Food%20Partnership%20Evaluation%20Report_Heart%20Foundation.pdf
56. Trieu K, Neal B, Hawkes C, Dunford E, Campbell N, Rodriguez-Fernandez R, et al. 2015, 'Salt Reduction Initiatives around the World – A Systematic Review of Progress towards the Global Target', *PLoS ONE* 10(7): e0130247. https://doi.org/10.1371/journal.pone.0130247
57. Leatherhead Food Research 2012, 'Evaluation of technological approaches to salt reduction', viewed March 2019, https://www.fdf.org.uk/resources/salt_reduction_2012.pdf, pp. 13.
58. Food Standards Australia New Zealand 2011-13, 'AUSNUT food nutrient database', viewed March 2019, http://www.foodstandards.gov.au/science/monitoringnutrients/ausnut/foodnutrient/Pages/default.aspx
59. Leatherhead Food Research 2012, 'Evaluation of technological approaches to salt reduction', viewed March 2019, https://www.fdf.org.uk/resources/salt_reduction_2012.pdf, pp. 17
60. Committee on Strategies to Reduce Sodium Intake, Food and Nutrition Board: Institute of Medicine 2010, 'Strategies to reduce sodium intake in the United States', viewed March 2019, http://nap.edu/12818, pp.406.
61. Durack, E, Alonson-Gomez, M & Wilkinson, MG 2008, 'Salt: a review of its role in food science and public health', *Current Nutrition & Food Science,* vol.4, pp.290-297.
62. Committee on Strategies to Reduce Sodium Intake, Food and Nutrition Board: Institute of Medicine 2010, 'Strategies to reduce sodium intake in the United States', viewed March 2019, http://nap.edu/12818, pp. 405.
63. Cepanec, K, Vugrinec, S, Cvetkovic, T & Ranilovic, J 2017, 'Potassium chloride-based salt substitutes: a critical review with a focus on the patient literature', *Comprehensive Reviews in Food Science and Food Safety,* vol.16, pp. 881-894.
64. Durack, E, Alonson-Gomez, M & Wilkinson, MG 2008, 'Salt: a review of its role in food science and public health', Current Nutrition & Food Science, vol.4, pp.290-297.
65. Cepanec, K, Vugrinec, S, Cvetkovic, T & Ranilovic, J 2017, 'Potassium chloride-based salt substitutes: a critical review with a focus on the patient literature', *Comprehensive Reviews in Food Science and Food Safety,* vol.16, pp. 881-894.
66. Food Safety Authority of Ireland 2016, 'Report of the Scientific Committee of the Food Safety Authority of Ireland, Salt and Health: Review of the Scientific Evidence & Recommendations for Public Policy in Ireland, viewed March 2019.
67. Scientific Advisory Committee on Nutrition (SACN) and the Committee on Toxicity (COT) 2017, 'Statements on the health benefits and risks of using potassium-based sodium replacers in the UK', viewed March 2019, https://www.gov.uk/government/publications/sacn-cot-statements-on-potassium-based-sodium-replacers
68. Institute of Grocery Distribution 2013, 'Reformulation: A Best Practice Guide', pp.15-19.
69. Subramaniam, P and Wareing P 2016, The Stability and Shelf life of Food: 2nd Edition', Cambridge: Woodhead Publishing
70. Subramaniam, P and Wareing P 2016, The Stability and Shelf life of Food: 2nd Edition', Cambridge: Woodhead Publishing
71. http://foodchecker.heas.health.vic.gov.au/

About the Victorian Salt Reduction Partnership

The Victorian Salt Reduction Partnership was established in 2015 to reduce salt intake in Victoria and Australia by building consensus around, and commitment to, salt reduction from government, the public and the food manufacturing industry. The Partnership was established by the Victorian Health Promotion Foundation (VicHealth) and brings together:

- **National Heart Foundation of Australia**
- **The George Institute for Global Health**
- **Deakin University's Institute for Physical Activity and Nutrition (IPAN)**
- **The Victorian Department of Health and Human Services (DHHS)**
- **National Stroke Foundation**
- **Kidney Health Australia**
- **Baker Heart and Diabetes Institute**
- **High Blood Pressure Research Council**
- **CSIRO**
- **FIAL**

We are:

- **Raising awareness that 75% of the salt in our diets comes from processed/ packaged foods;**
- **Providing consumer education and tips on how to reduce salt intake;**
- **Seeking engagement and action from government; and**
- **Encouraging, engaging and working with the food manufacturing industry to produce healthier foods and influence the adoption of practices to reduce sodium in processed foods.**

About Vanessa Clarkson

This guide has been written by Vanessa Clarkson with input from the VSRP. Vanessa Clarkson is a Registered Nutritionist with over 15 years' experience with food and nutrition policy and has worked across sectors to improve the food supply both in Australia and overseas. Vanessa is a leading expert in reformulation in Australia and chairs the Healthy Food Partnership's Reformulation Program. She is also a member of the Health Star Rating Advisory Committee.

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