



Salt levels in meat alternatives in Australia (2010-2019)

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Report prepared for the Vichealth Salt Partnership, by Emalie Rosewarne and Clare Farrand, World Health Organization Collaborating Centre on Population Salt Reduction, The George Institute for Global Health

Introduction

Sodium is a chemical element required by the body for many physiological functions including maintenance of blood volume and pressure. However, excess dietary sodium intake increases blood pressure and consequently increases the risk of cardiovascular diseases (CVDs).¹ Cardiovascular diseases (CVDs) are the leading cause of death worldwide, responsible for 32% of all deaths.² In Australia, about one-third of the adult population has been diagnosed with high blood pressure, a main risk factor for CVDs, and 32% of total mortality is attributable to CVDs.² ³ Salt, or sodium chloride, is the main source of dietary sodium.⁴ Correspondingly, salt reduction is an effective way to reduce non-communicable diseases such as CVDs by lowering blood pressure, as well as other complications associated with high salt intakes including chronic kidney disease, obesity, gastric cancer and liver diseases.⁵⁻⁸

In 2006, the World Health Organization (WHO) set a global target of reducing population salt intake to below 5g/day⁹ and in 2013, WHO Member States, including Australia, adopted a global target to reduce mean population salt intake by 30% by 2025.^{4,10} A recent systematic review and meta-analysis estimated that Australians are consuming on average 9.6g of salt per day, with men consuming a mean salt intake of 10.1g per day and women consuming a mean salt intake of 7.3g per day.¹¹

Salt reduction efforts in Australia began with the creation of the Food and Health Dialogue (FHD) in 2009, identifying nine priority food categories for product reformulation and setting voluntary targets to reduce sodium content in the food supply.¹² This has recently been succeeded by the Healthy Food Partnership in late 2015.¹³ Further, in 2015,

Tips for consumers

- Eat fresh foods wherever possible, and limit the amount of packaged and processed foods.
- Choose unflavoured tofu, and add your own herbs and spices
- Be aware of portion size, as portion sizes vary greatly, and you could end up eating more salt than you realise
- Try meat-free protein sources such as fresh or canned legumes, beans, chickpeas
- Try making your own meat-free alternatives, for example bean and lentil burgers and using fresh herbs and spices to flavour tofu.
- When choosing packaged foods, check the label to choose the lower sodium option.
- There is also an app to help make healthier choices. Download the FoodSwitch app, which allows you to scan the barcode of a product to reveal instant, easy to understand nutrition information about the product, and suggest healthier alternatives. FoodSwitch makes it easier than ever before to navigate supermarket shelves and improve food choices. There's even a SaltSwitch filter to focus on products lower in salt. [FoodSwitch available here.](#)

The Victorian Health Promotion Foundation (VicHealth) Salt Reduction Partnership group was established to reduce the average salt intake for Victorians by 1 gram by June 2020.¹⁴

In Australia, there has been a rise in vegetarianism¹⁵ and demand for meat alternatives.¹⁶ The Australian Health Survey 2011–2012 revealed that meat alternatives were only consumed by approximately 1% of adults and only contributed around 0.1% of sodium to the diet.¹⁷ However, a recent trend report from Roy Morgan Research illustrated a large shift towards vegetarianism in Australia, with the number of Australians consuming an all or mostly vegetarian diet, increasing from 1.7 million (9.7%) in 2012, to 2.1 million (11.2%) in 2016,¹⁵ and a further increase to 2.5 million (12.1%) of the population in 2019.¹⁸ Further, recent projections estimated that Australia would be the third-fastest growing vegan market worldwide between 2014 and

2020, and that by 2020, the packaged vegan foods industry is expected to reach \$215 million.¹⁶ Despite the rising popularity, currently there are no sodium reformulation targets for meat alternatives proposed by the Healthy Food Partnership (HFP) in Australia, and notably, the UK has three targets for meat alternatives: plain meat alternatives, meat-free bacon and other meat-free products.¹⁹

The term 'meat alternatives' encompasses a variety of meat-free food products that mimic the characteristics and appearance of meat, or are consumed as an alternate protein source. They are typically made from soy or other plant based protein-rich foods, such as legumes, and are sold in various forms, including burger patties, mincemeat, and stir fry cubes.²⁰

Therefore, this study aimed to assess the mean sodium levels in meat alternatives in 2019, to determine the changes in mean sodium levels between 2010 and 2019, and to calculate the percentage of products meeting the UK 2017 salt reduction targets.

Methods:

Data Collection

Data from 2010, 2013, 2015 and 2017 were extracted from the Australian FoodSwitch database. 2019 data was collected by gathering information from the four major supermarkets in Australia: Coles, Woolworths, IGA and Aldi from January –June 2019. Pictures were taken of the barcode, front of pack, nutrition information panel (NIP), ingredients list, health claims and manufacturer information. Data were entered into Microsoft Excel.

Data Categorisation and product exclusion

Products were categorised into two main categories: tofu and meat-free products. Meat-free products had five subcategories: falafel, meat-free sausages, meat-free burgers, meat-free bacon, and other meat-free products.

The UK 2017 salt targets had two targets for meat alternatives: Plain meat alternatives, such as tofu and meat-free mince, have a maximum target of 250mg/100g; and other meat-free products have a maximum target of 500mg/100g and an average target of 360mg/100g.

Products were excluded if there was no sodium in mg/100g value, or displayed erroneous data errors.

Data Analysis

The total number of products, products per category and per sub-category were recorded. The mean (SD) sodium content per 100g food, and range were determined for all meat alternatives, each category and subcategories. Trends in mean sodium levels between 2010, 2013, 2015, 2017 and 2019, were determined for overall and for each category and subcategory.

Statistical analyses were conducted in Stata 15. Alpha was set at a 0.05 significance level. One-way ANOVA's (post-hoc Scheffe) were performed to compare mean sodium content across the years.

Key Findings:

Summary of surveyed products

- A total of 564 meat alternative products were analysed
 - 75 products in 2010, 111 in 2013, 77 in 2015, 111 in 2017 and 190 in 2019
 - There has been a 153% increase in the number of meat alternative products from 2010 to 2019, specifically within the number of products available for falafels (+380%), meat-free burgers (+289%) and other meat-free products (187%)
- There was no change in the sodium content of meat alternatives from 2010 to 2019
 - There was no change in the sodium content of any subcategory of meat alternatives from 2010 to 2019
- The average sodium content of meat alternatives per 100g in 2019 was 379mg, and ranged from 1mg to 1260mg [average: 1g salt/100g; range: 0-3g salt]¹
- The category with the highest average sodium content per 100g was meat-free bacon (818mg sodium [2g salt]), followed by falafels (519mg sodium [1.3g salt]) and meat-free sausages (506mg [1.3g salt])
- The average sodium content per serve was 333mg [0.8g salt], 17% of an adult's maximum daily intake
- Serving size ranged from 20g to 350g
 - The average serving size was 98g overall, 117g for tofu (range 20-350g) and 93g for meat-free products (range 24 to 300g)
- The largest range in sodium content was found for falafels (124 to 1260mg/100g) followed by other meat-free products (3 to 1030mg/100g).

Sodium targets

- There are no sodium targets for meat alternatives in Australia. However, compared to current UK 2017 salt targets:
 - In 2019, 68% percent of all meat alternatives met the UK targets (250mg/100g for plain meat alternatives, 500mg/100g for other meat-free products, and 750mg/100g for meat-free bacon)
 - By category, 83% of plain meat alternatives, 65% of other meat free products and 50% of meat-free bacon, were at or below the UK salt targets.

Meat alternatives by category

Tofu

- The average sodium content of tofu was 161mg/100g overall, 404mg/100g for flavoured tofu and 35mg/100g for plain tofu
 - The average sodium content per serving was 175mg/serve for all tofu products (flavoured and plain), 442mg/serve for flavoured tofu and 37mg/serve for plain tofu
- Highest sodium content was found in B J Sliced Garlic Tofu, with 688mg/100g

¹ To convert milligrams of sodium to grams of salt, multiply sodium by 2.5, then divide by 1,000: mg sodium x 2.5 = mg salt / 1,000

- o Per serving: 688mg sodium/serve [1.7g salt], 34% maximum daily intake
- Lowest sodium content was found in TLY Lite Firm Tofu and TLY Silken Tofu, with 1mg/100g
 - o Per serving: 1mg sodium/serve [0g salt], 0% maximum daily intake
- Per serve, the highest sodium level was Bean Supreme Marinated Tofu Hoisin and Sesame, with 811mg sodium/125g serve [2g salt], 40% maximum daily intake

Meat-free products

- The average sodium content of meat-free products was 440mg/100g overall.
 - o 818mg/100g for meat-free bacon [2g salt], 519mg/100g for falafel [1.3g salt], 506mg/100g for meat-free sausages [1.3g salt], 410mg/100g meat-free burgers [1g salt] and 393mg/100g for other meat-free products [1g salt]. Other meat-free products included mince, fish free fingers, and chicken free schnitzels.

- o The average sodium content per serving was 377mg/serve overall [0.9g salt], and 473mg/serve for meat-free sausages [1.2g salt], 421mg/serve for meat-free bacon [1g salt], 377mg/serve for other meat-free products [0.9g salt], 375mg/serve meat-free burgers [0.9g salt] and 279mg/serve for falafel [0.7g salt].
- Highest sodium content was found in Monjay Mezza Traditional Falafel and Spinach Falafel, with 1260mg/100g
 - o Per serving: 315mg sodium/serve [0.8g salt], 16% maximum daily intake
- Lowest sodium content was found in Organic Village Adzuki Bean & Activated Buckwheat Tempeh, with 3mg/100g
 - o Per serving: 3mg sodium/serve [0g salt], 0% maximum daily intake
- Per serve, the highest sodium level was Bean Supreme Laksa Pie, with 990mg/220g serve [2.5g salt], 50% maximum daily intake

Table 1: Large ranges in the sodium content of meat alternative products

Category	Highest sodium content	Lowest sodium content
Falafel	1260mg/100g Monjay Mezza Traditional Falafel and Spinach Falafel	124mg/100g Naturally Falafel Original Naturally Falafel Sesame + Chilli Naturally Falafel Quinoa
Meat-free bacon	924mg/100g Vegie Delights Bacon Style Rashers	712mg/100g Quorn Bacon Style Pieces
Meat-free burgers	681.7mg/100g Fry's Family Burgers Quinoa & Brown Rice Protein	119mg/100g Unreal Co. Italian Beefy Burger with Onion
Meat-free sausages	685mg/100g Vegie Delights Classic Hot Dogs	271mg/100g Syndian Cheezy Kale & Cashew Vegan Sausages
Other meat-free products	1030mg/100g Simply Vegetarian Chickpea Sweet Potato & Quinoa Bites Meat Free	3mg/100g Organic Village Adzuki Bean & Activated Buckwheat Tempeh
Flavoured tofu	688mg/100g B J Sliced Garlic Tofu	224mg/100g Nutrisoy Tofu Spicy
Plain tofu	320mg/100g Nutrisoy Tempeh Tasty	1mg/100g TLY Lite Firm Tofu TLY Silken Tofu

Conclusion:

There has been no significant change in the average sodium content of meat alternatives between 2010 and 2019. The variability of sodium levels within categories and across different brands of products highlights the potential for reformulation by the food industry. Specifically, government established sodium targets for meat alternatives could encourage the food industry to reformulate, assisting with national salt reduction efforts.

Recommendations:

For Government

- Establish specific salt targets for all food categories including meat alternatives in Australia.
- Measure and monitor food industry compliance to reformulation activities, against established salt targets.

- Increase consumer awareness campaigns to inform about the health benefits of reducing salt intake.

For Industry

- Gradually reformulate high salt products to lowest levels of salt possible. The large ranges of salt levels identified in this report highlight that it is possible to make the same product with much less salt.
- Download the Victorian Salt Reduction Partnership's Reformulation Readiness guide to implement a best practice reduction program, [available here](#)

About the WHO Collaborating Centre on Population Salt Reduction

The WHO Collaborating Centre on Population Salt Reduction (WHO CC SALT) has a global remit with a focus

on Australia, the Western Pacific and South East Asian Regions. It is currently involved in projects in Australia, the Pacific Islands, Mongolia, Vietnam, Cambodia, Indonesia, China and India. WHO CC SALT is working with the World Health Organization to develop a range of tools and resources to support countries to develop and implement salt reduction strategies. WHO CC SALT is funded through a mixture of short and longer term contracts and research grants including National Health and Medical Research Council project and partnership grants and contract funding from the Victorian Health Foundation and the World Health Organization.

Limitations of the research:

The number of products captured by the FoodSwitch data do not necessarily represent a complete coverage of all products within Australia, but rather those captured at specific time points during surveys, and limited to a subset of food retailers. The data captured and compared is 'as given on pack'. No distinction has been made between raw and cooked nutrition information in this survey.

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Media Enquiries

Tina Wall
Senior Media Advisor
The George Institute for Global Health
P: + 61 410 411 983
E: twall@georgeinstitute.org.au

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Table 2. Sodium content of meat alternatives from 2010 to 2019

	2010			2013			2015			2017			2019		
	No of products	Mean (SD)	Range	No of Products	Mean (SD)	Range	No of Products	Mean (SD)	Range	No of Products	Mean (SD)	Range	No of Products	Mean (SD)	Range
Meat alternatives	75	366 (241)	1-1226	111	360 (241)	2-1226	77	360 (232)	2-875	111	369 (221)	1-870	190	379 (234)	1-1260
Tofu	28	153 (156)	1-480	36	144 (194)	2-665	28	163 (188)	2-649	34	181 (189)	1-649	41	161 (209)	1-688
Flavoured tofu	13	230 (147)	1-480	14	259 (196)	6-620	9	348 (132)	230-649	14	337 (164)	10-649	14	404 (157)	224-688
Plain tofu	15	87 (134)	2-385	22	71 (156)	2-665	19	75 (141)	2-481	20	72 (116)	1-320	27	35 (81)	1-320
Meat-free products	47	494 (188)	48-1226	75	464 (187)	48-1226	49	473 (173)	58-875	77	452 (179)	58-870	149	440 (204)	3-1260
Felafel	5	651 (326)	437-1226	11	537 (252)	213-1226	6	547 (150)	455-850	7	601 (176)	332-850	24	519 (264)	124-1260
Meat-free bacon	N/A	N/A	N/A	1	670 (.)	670-670	1	870 (.)	870-870	3	726 (138)	595-870	2	818 (150)	712-924
Meat-free burgers	9	359 (154)	150-613	20	372 (156)	130-814	18	392 (125)	200-593	22	398 (127)	208-682	35	410 (146)	119-682
Meat-free sausages	10	579 (98)	435-786	15	528 (122)	358-786	10	567 (103)	400-700	13	507 (108)	330-685	22	506 (136)	271-685
Other meat-free products	23	475 (159)	48-830	28	458 (189)	48-800	14	449 (207)	58-875	32	409 (196)	58-860	66	393 (203)	3-1030

Table 3. Comparison of sodium content of meat alternatives in 2019 with UK salt targets

	Target (mg sodium/100g)	Number with target	Number meeting target	% meeting target
Meat alternatives		190	130	68%
Plain meat alternatives	250	40	33	83%
Meat-free products	500	148	96	65%
Bacon	750	2	1	50%

Table 4. Serve size of meat alternatives in 2019

	Number of products	Serving size (g)		Sodium per serve (mg)	
		Mean (SD)	Range	Mean (SD)	Range
Meat alternatives	187	98 (46)	20-350	333 (217)	1-990
Tofu	41	117 (49)	20-350	175 (244)	1-811
Flavoured tofu	14	113 (73)	20-350	442 (232)	60-811
Plain tofu	27	118 (33)	100-250	37 (81)	1-320
Meat-free products	146	93 (44)	24-300	377 (188)	2-990
Falafel	21	62 (30)	25-135	279 (189)	78-671
Meat-free bacon	2	51 (11)	43-58	421 (162)	306-536
Meat-free burgers	35	96 (24)	50-130	375 (126)	155-741
Meat-free sausages	22	91 (26)	42-150	473 (203)	136-945
Other meat-free products	66	102 (56)	24-300	377 (198)	2-990

Table 5. Comparison of the mean sodium content of meat alternatives in 2019 to meat products

Category	Meat alternatives	Meat products*
Bacon	818mg/100g	1047mg/100g
Burgers	410mg/100g	523mg/100g
Sausages	506mg/100g	691mg/100g

Notes on data:

The report uses data from the FoodSwitch Monitoring Dataset. The FoodSwitch Monitoring dataset is generated from annual in-store surveys done at large grocery stores owned by Aldi, Coles, Independent Grocers of Australia (IGA) and Woolworths. FoodSwitch data collection protocol was used to collect product for 2019 from January – June 2019. Products named in this report reflect those available for sale at that time.