

Short Communication

Changes in the sodium content of Australian ready meals between 2008 and 2011

Anthea Kay Christoforou MPH¹, Elizabeth Kalpiaka Dunford MPH^{1,2},
Bruce Charles Neal PhD¹

¹The George Institute for Global Health, Sydney, NSW, Australia

²The University of Sydney, NSW, Australia

Australians consume substantially more sodium than recommended. Three quarters of dietary sodium derives from processed food and the growing ready meal category is a significant contributor. This study examined changes in sodium levels of Australian ready meal products between 2008 and 2011. Sodium data were systematically collected from all product labels in the same 5 stores each year. Mean sodium levels were calculated overall and compared between ready meal types, and by major brands. The levels of sodium in new, discontinued and established products were also compared. There were 107 ready meal products in 2008, 313 in 2009, 219 in 2010 and 265 in 2011. Overall mean sodium content was unchanged between 2008 and 2011 (279 vs 277 mg/100g). There were clear differences between sodium levels of different brands (222 vs 310 mg/100g in McCain Healthy Choice and McCain products respectively) and marked variation in similar products (240 mg/100g in one brand of frozen cottage pie product vs 425mg/100g in another). The mean sodium content of recently introduced products was lower than discontinued products (289 vs 309 mg/100g), with the sodium level of established products remaining stable. The absence of any overall reduction in sodium levels of Australian ready meal products is discouraging. The failure of voluntary industry efforts to reduce the saltiness of these foods suggests a regulated approach will be required to drive product reformulation.

Key Words: sodium, ready-to-eat meals, food reformulation, public health nutrition, cardiovascular disease

INTRODUCTION

A substantial body of evidence exists to suggest that excess dietary sodium is an important causal factor for high blood pressure, which increases the risk of cardiovascular disease (CVD).¹⁻³ CVD accounts for 34%⁴ of all deaths and 18%⁵ of the overall burden of disease in Australia. Currently Australians are consuming between 7 and 12 g of salt per day, far greater than the 4 g recommended for optimal health.⁶

Reducing population salt intake has become a global priority and the WHO advocates that all countries adopt salt reduction interventions.⁷ The UK and Finland have successfully implemented salt reduction programmes with demonstrated declines in population salt intake.⁸ In Australia, the Australian Division of World Action on Salt and Health (AWASH) was launched in 2007 with the aim of reducing average population salt intake by 25%.⁹ The Australian Federal Government's Food and Health Dialogue (FHD), commenced in 2009, has also made salt reduction a priority.¹⁰ As a considerable proportion of dietary salt is non-discretionary, key to this goal is engaging the food industry to reduce the average sodium content of their products.⁹

Of the seventy-five percent of dietary sodium that derives from processed foods,¹¹ the ready meal category is a growing contributor.¹²⁻¹⁴ Retail volume and value growth rates for this sector increased at a compound annual rate of more than 7% between 2004 and 2009.¹⁴ This devel-

opment is largely in response to changes in consumer trends and lifestyles which favour quick and easy meals.¹⁵

The present study represents the first comprehensive survey of the sodium content in ready meal products available for purchase within Australia and defines the changes in sodium levels within the ready meal market between 2008 and 2011.

METHODS

A systematic survey of the sodium content of Australian ready meal products was undertaken each year between 2008 and 2011.

Products included

Ready meals were defined as pre-prepared, complete meals that required no extra ingredients and minimal preparation, other than heating. Each ready meal product was further subcategorized as "ambient", "chilled" or "frozen". The definition of the ready meal category and

Corresponding Author: Anthea Christoforou, The George Institute for Global Health, PO Box M201 Missenden Rd, Sydney, NSW 2050, Australia.

Tel: +61 2 8507 2506; Fax: +61 2 9993 4502

Email: achristoforou@georgeinstitute.org.au;

achr1478@uni.sydney.edu.au

Manuscript received 4 July 2012. Initial review completed 24 August 2012. Revision accepted 24 September 2012.

doi: 10.6133/apjcn.2013.22.1.10

subcategories was based on an examination of applicable literature and is consistent with the classification system used in the development of category specific sodium reduction targets.¹⁶⁻¹⁸

Data collection process

Data were collected from the flagship stores of two major supermarket chains (Coles and Woolworths) and three smaller, independent retailers (IGA, Franklins and ALDI) between July and September of each year. Together these companies control over 96% of the Australian grocery market.¹⁹ Data were recorded either by manual transcription into a record book or by photograph of the item in store followed by entry into a bespoke food composition database. A random selection of 5% of records was verified against the original data source, the nutrition information panel (NIP), for each year.

Product information collected

For each ready meal product, the brand name, product name, manufacturer and sodium content per 100 g were recorded from the product's mandatory NIP.²⁰ Identical products present in both 2010 and 2011 were matched and defined as carried over, unmatched products present only in 2010 were classified as discontinued and those present only in 2011 were considered newly introduced into the market.

Data analysis

The number of products, median, mean, SD and range of sodium content were calculated overall, by year, by ready meal type and by brand. The proportions of products meeting an interim sodium reduction target of 280 mg/100g defined by AWASH in 2011 were also calculated for the four-year study period. Changes in mean sodium content over the 4 year study period were calculated by subtracting the mean levels in 2011 from those in 2008. To further explore the dynamics of sodium levels in ready meals, analyses were conducted to determine the mean sodium levels of products that had been newly introduced to the market in 2011, products that were carried over from the previous year, and products that were marketed in 2010 but discontinued in 2011.

RESULTS

Sodium data were available for 107 ready meal products in 2008, 313 in 2009, 219 in 2010 and 265 in 2011. The rise in ready meal products across the 4 year period was present in all subcategories, with chilled ready meals displaying the greatest growth with a 103% increase. The decline in product numbers from 2009 to 2010 reflects the discontinuation of two large brands (Leggo's and You'll Love Coles) during that period (Table 1).

Sodium content of ready meals in 2011

Table 1. Mean sodium content of Australian ready meals and proportion meeting targets during 2008-2011

	Year			
	2008	2009	2010	2011
Frozen ready meals				
No. of products	88	188	138	172
Sodium content, mg/100g				
Mean (SD)	264 (77)	304 (122)	273 (71)	264 (85)
Median	260	278	270	260
Range	120-590	125-863	50-576	120-777
Proportion \leq 280 mg/100g*	68%	79%	58%	67%
Chilled ready meals†				
No. of products	-	46	32	65
Sodium content, mg/100g				
Mean (SD)	-	266 (121)	230 (93)	286 (98)
Median	-	235	229	307
Range	-	90-584	42-592	42-535
Proportion \leq 280 mg/100g*	-	63%	72%	43%
Ambient ready meals				
No. of products	19	79	49	28
Sodium content, mg/100g				
Mean (SD)	340 (93)	350 (91)	345 (103)	350 (85)
Median	341	316	355	316
Range	121-527	206-470	140-562	206-470
Proportion \leq 280 mg/100g*	21%	32%	29%	20%
All ready meals				
No. of products	107	313	219	265
Sodium content, mg/100g				
Mean (SD)	279 (85)	303 (118)	283 (90)	277 (85)
Median	270	280	275	270
Range	120-590	90-863	42-576	42-777
Proportion \leq 280 mg/100g*	59%	51%	53%	57%

*AWASH interim sodium reduction target. † Data collected from 2009 to 2011

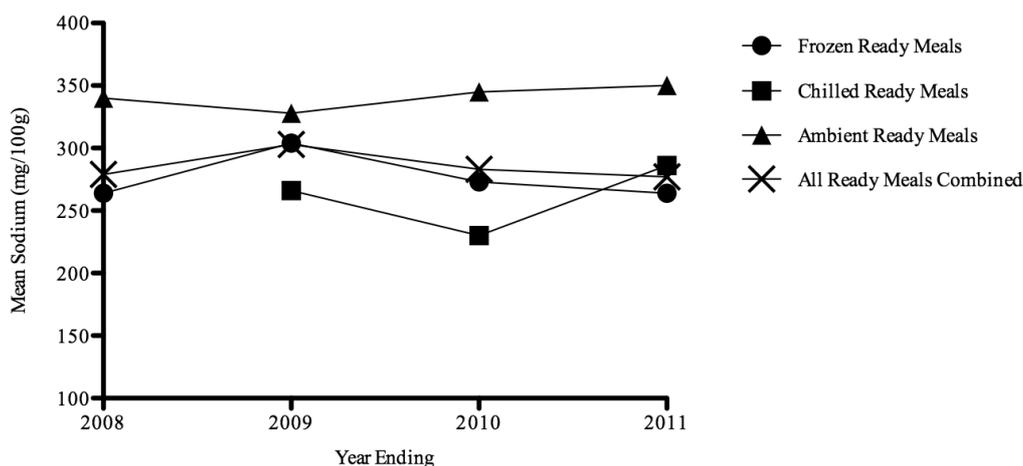


Figure 1. Mean sodium content (mg/100g) by ready meal subcategory from 2008 to 2011

In 2011, the overall average level of sodium in Australian ready meal products was 277 mg/100g. There was marked variation in sodium content within and between ready meal subcategories (Table 1). Substantial variation was also observed between apparently similar ready meals produced by different brands. Two frozen Cottage Pie products by Weight Watchers and McCain Healthy Choice for instance, had sodium contents of 425 mg/100g and 240 mg/100g respectively. This was mirrored in the chilled category where a beef lasagne by Emily's Kitchen had nearly double the amount of sodium in a similar Coles product (340 mg/100g vs 190 mg/100g).

There were also systematic differences between the mean sodium levels of different brands of ready meals. For example, the mean sodium content of McCain ready meals (310 mg/100g) was substantially higher than that of the company's sister brand, McCain Healthy Choice (222 mg/100g).

Changes in mean sodium content between 2008 and 2011

The overall mean sodium content of ready meal products was largely unchanged from 2008 to 2011 (279 mg/100g vs 277 mg/100g). Analysis by subcategory showed a similar pattern for frozen and ambient ready meals while the mean sodium content of chilled ready meals rose by 20 mg/100g (Figure 1).

At the brand level considerable variation was seen in changes to mean sodium content. Mean sodium levels fell over the study period for Weight Watchers (18%) and McCain (11%), while Lean Cuisine and Emily's Kitchen slightly increased (by 2% and 3% respectively) (Figure 2).

Changes in the proportion of ready meals meeting interim sodium reduction targets between 2008 and 2011

The overall proportion of Australian ready meal products meeting the 280 mg/100g interim sodium reduction target recommended by AWASH remained constant over the study period (59% vs 57%). There were some changes observed in ready meals subcategories, with chilled ready meals exhibiting a substantial decrease in the proportion of products meeting sodium targets (Table 1).

Analysis by major ready meal brand yielded similarly variable results with Coles increasing the proportion of its

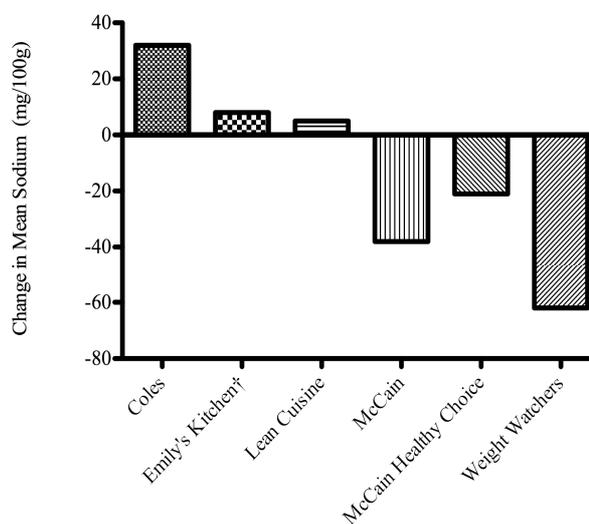


Figure 2. Change in mean sodium content from 2008 to 2011 by major ready meal brand. †Represents change from 2009 to 2011.

ready meals meeting the sodium target to 64% from 27%, while Emily's Kitchen saw a reduction from 75% to 55%. Other brands had minimal net change over the study period, and McCain Healthy Choice remained the best performer with 91% of meals meeting target. The McCain brand, while achieving important reductions in mean sodium levels between 2008 and 2011 (Figure 2), still had only 34% of products meeting target.

Sodium levels in new, discontinued and persisting ready meal products

In 2011, 147 new ready meal products were introduced into the Australian market with a mean sodium level of 289 mg/100g. The majority (63%) of these products were produced by new brands, many of which could be categorized as 'boutique manufacturers'. The remaining ready meal products (n=118) which carried through from the previous year, had an overall mean sodium level of 264 mg/100g. Mean sodium in these same products in 2010 was 266 mg/100g. There were 101 products present in 2010 but discontinued in 2011 with a mean sodium level of 309 mg/100g. Of these discontinued products, 75% were the result of the entire brand being withdrawn from the market. Of those products that met the interim sodium

reduction target in 2011, the majority were introduced that year and only 6% (9/151 products) met sodium targets in 2011 as a result of product reformulation since 2010.

DISCUSSION

Increasing consumer demand, significant average salt levels and widespread availability make ready meal products an important target for Australian salt reduction efforts. It is therefore disappointing to see that the voluntary efforts of industry to reduce the salt levels of these foods over 4 years have yielded a reduction in the overall mean sodium content of the product category of less than 1%. Particularly concerning is the observation that salt levels in frozen ready meals remain unchanged over this period, because in 2010 these constituted some 64% of the market and more than \$201 million in sales.¹⁴ Given this high demand, reductions in the frozen subcategory are likely to have made the greatest impact in ameliorating the increasing contribution of these meals to the average population salt intake. The increasing levels of sodium in the chilled meals category is also a problem because growth in this sector is attributed primarily to the perceived higher nutrient quality of these products compared to their frozen counterparts.²¹

The failure to make headway with reducing the mean salt levels of ready meals in Australia is in stark contrast to recently released data from the UK, where a 45% decrease in the average sodium levels of ready meal products has been reported over the four years prior to 2007.²² Both the achievements of the UK, and the wide range of salt levels we identified in quite similar ready meal products on the market in Australia, highlight the technical feasibility of reducing salt levels in this category. Furthermore, recent sensory trials that progressively lowered the levels of sodium in frozen ready meals concluded that incremental reductions of up to 40% could be achieved with no effect on sensory properties or product acceptability.¹²

Given that it is clearly possible to manufacture and market ready meals with much lower sodium content, without compromising the quality and safety of the product, the question arises as to why this has not been achieved in Australia. Almost certainly the absence of any coordinated industry response is fundamental to the problem. The excellent progress made by Weight Watchers in delivering a 19% reduction in average salt levels is offset by brands such as Coles, which over the same time period has increased mean salt levels of its ready meals by 13%. And while the McCain brand, a clear category leader with 25% of the market,¹⁴ has achieved significant overall reductions, it had one of the highest average levels of sodium amongst major brands each year.

The lack of coordination across industry is importantly dependent upon the failure of the Australian government to take a significant leadership role in improving the quality of the food supply. The FHD is progressing very slowly¹⁰ and has still not set targets for ready meals, despite the high penetration of these products within the market and concerns expressed by health agencies about their often high levels of sodium.^{13,14} The voluntary nature of the program led by the FHD and the absence of systemat-

ic and objective monitoring are also significant weaknesses that need rectifying.²³ A recent survey of Australian bread products, the first category targeted by the program, showed negligible impact to date, with several important manufacturers entirely disengaged from the process.²³ In the ready meal sector where there is an increasing market contribution from 'boutique brands', the effectiveness of a voluntary strategy that focuses on just the major players in food manufacturing is also uncertain.

Our findings on the sodium composition of new, discontinued, and persisting ready meal products between 2010 and 2011 provide further insight into the actions being undertaken by industry. While it was encouraging to see lower mean sodium levels in new products compared to discontinued products, the absence of reformulation of established ready meals on the market in both years is problematic. Almost certainly established products include those with greatest market share and if salt is not removed from these, it is much less likely that the contribution of ready meals to the daily salt intake of the average Australian will fall.

A key strength of these analyses is the completeness of the dataset and the standardised sampling method applied across each year. With data collected from all ready meals for sale in five leading Australian supermarkets it is likely that the majority of ready meal products purchased in Australia over this four year period were covered by the dataset. Almost all sodium values were collected directly from the product's NIPs which appear to provide unbiased estimates of true sodium content.²⁰ While some market share data were available for brands in this category,¹⁰ more complete information on the sales volume of individual products would have enabled the calculation of weighted mean sodium values and thus provided a better indication of the contribution the category makes to dietary sodium exposure. Reassuringly, data from a UK survey showed only a 2.5% difference in the weighted and unweighted mean sodium levels for ready meals.¹⁷

Limited progress in reducing sodium levels in Australian ready meals, in conjunction with increasing consumer demand for these products, highlights the importance of this category as a target for salt reduction efforts. Current progress with food reformulation in Australia is too slow and piecemeal. Given the striking commonalities between the foods sold in Australia and countries such as the UK, the FHD should draw much more readily upon work done overseas, rather than reinventing the wheel for each Australian food category. If this were done Australian consumers could already be enjoying the benefits of salt reduction available to their UK counterparts.

AUTHOR DISCLOSURES

Anthea Christoforou is a Research Assistant, Elizabeth Dunford is the Research Officer and Bruce Neal is the chair of the Australian Division of World Action on Salt and Health (AWASH). Elizabeth Dunford is supported by a Sydney Medical School Foundation Scholarship. Bruce Neal is supported by an Australian Research Council Future Fellowship.

REFERENCES

1. INTERSALT Cooperative Research Group. INTERSALT: an international study of electrolyte excretion and blood

- pressure. Results for 24 hour urinary sodium and potassium excretion. *BMJ*. 1988;297:319-28.
2. Dyer AR, Elliott P. The INTERSALT study: relations of body mass index to blood pressure. *J Human Hypertens*. 1989;3:299-308.
 3. Cook NR, Cutler JA, Obarzanek E, Buring JE, Rexrode KM, Kumanyika SK, Appel LJ, Whelton PK. Long term effects of dietary sodium reduction on cardiovascular disease outcomes: observational follow-up of the trials of hypertension prevention (TOHP). *BMJ*. 2007;334:885-92.
 4. Australian Bureau of Statistics (ABS). Causes of Death, Australia 2007. [cited 2011/12/2]; Available from: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3303.0.2007?OpenDocument>
 5. Australian Institute of Health and Welfare. Australia's Health 2008. [cited 2011/12/12]; Available from: <http://www.aihw.gov.au/publications/index.cfm/title/10585>
 6. Keogh JB, Clifton PM. Salt intake and health in the Australian population. *Med J Aust*. 2008;189:526.
 7. Marrero NM, He FJ, MacGregor GA. Current Experience and Future Perspectives for Worldwide Reduction of Dietary Salt Intake. In: Mancini M, Ordovas JM, Riccardi G, Strazzullo P, editors. *Nutritional and Metabolic Bases of Cardiovascular Disease*. Malden, MA, USA: Blackwell Publishing Ltd; 2011. pp 353-364.
 8. Webster JL, Dunford EK, Hawkes C, Neal BC. Salt reduction initiatives around the world. *J Hypertens*. 2011;29:1043-50.
 9. Webster J, Dunford E, Huxley R, Li N, Nowson CA, Neal B. The development of a national salt reduction strategy for Australia. *Asia Pac J Clin Nutr*. 2011;18:303-9.
 10. Australian Government Department of Health and Aging. Food and Health Dialogue: About us. 2011. [cited 2012/11/2]; Available from: <http://www.foodhealthdialogue.gov.au/internet/foodandhealth/publishing.nsf/Content/about-us>
 11. Webster JL, Dunford EK, Neal BC. A systematic survey of the sodium contents of processed foods. *Am J Clin Nutr*. 2010;91:413-20.
 12. Mitchell M, Brunton NP, Wilkinson MG. Studies on the acceptability, sensory properties & consumer perception of reformulated reduced sodium ready-meals. *J Foodservice*. 2011;20:298-308.
 13. Mitchell M, Brunton NP, Wilkinson MG. Current salt reduction strategies and their effect on sensory acceptability: a study with reduced salt ready-meals. *Eur Food Res Technol*. 2011;232:529-39.
 14. Datamonitor. Ready meals market in Australia to 2014. Datmonitor research report. 2011. [cited 2012/2/3]; Available from: http://www.datamonitor.com/store/Product/ready_meals_market_in_australia_to_2014?productid=DBC8759
 15. Van Der Horst K, Brunner TA, Siegrist M. Ready-meal consumption: associations with weight status and cooking skills. *Public Health Nutr*. 2011;14:239-45.
 16. Grimes CA, Nowson CA, Lawrence M. An evaluation of the reported sodium content of Australian food products. *Int J Food Sci Technol*. 2008;43:2219-29.
 17. Mhurchu CN, Capelin C, Dunford EK, Webster JL, Neal BC, Jebb SA. Sodium content of processed foods in the United Kingdom: analysis of 44,000 foods purchased by 21,000 households. *Am J Clin Nutr*. 2011;93:594-600.
 18. Webster JL. Interim Australian targets for sodium levels in 85 food categories. 2011. [cited 2012/1/21]; Available from: http://www.awash.org.au/documents/Interim_Salt_Targets_for_Australia.pdf
 19. Ethical Consumer Guide. Supermarkets in Australia. 2010. [cited 2012/2/3]; Available from: <http://www.ethical.org.au/issues/?issue=16>
 20. Food Standards Australia New Zealand. Standard 1.2.8 Nutrition information requirements. [cited 2011/2/22]; Available at: http://www.foodstandards.gov.au/_srcfiles/Standard_1_2_8_Nutrition_Info_v115.pdf
 21. Reed Z, McIlveen-Farley H, Strugnell C. Factors affecting consumer acceptance of chilled ready meals on the island of Ireland. *Int J Consum Stud*. 2003;27:2-10.
 22. Consensus Action on Salt and Health. Salt in UK ready meals 45% lower than four years ago. 2007. [cited 2012/1/31]; Available from: <http://www.actiononsalt.org.uk/news/surveys/2007/ready/index.html>
 23. Dunford E, Eyles H, Ni MC, Webster J, Neal B. Changes in the sodium content of bread in Australia and New Zealand between 2007 and 2010: implications for policy. *Med J Aust*. 2011;195:346-9.

APPENDIX

Supplemental Table 1. Mean sodium content by ready meal brand and subcategory by year

	Mean sodium content (mg/100g)			
	2008	2009	2010	2011
Ambient				
Coles	-	-	225	-
Heinz	319	352	363	-
Hormel	-	405	433	365
SunRice	-	360	490	297
Chilled				
Coles	-	344	232	310
Emily's Kitchen	-	232	227	240
Woolworths	-	200	234	220
Frozen				
Coles	248	360	255	260
Lean Cuisine	235	238	246	240
McCain	348	295	307	310
McCain Healthy Choice	243	241	237	222
Weight Watchers	336	356	285	274

Short Communication

Changes in the sodium content of Australian ready meals between 2008 and 2011

Anthea Kay Christoforou MIPH¹, Elizabeth Kalpiaka Dunford MPH^{1,2},
Bruce Charles Neal PhD¹

¹The George Institute for Global Health, Sydney, NSW, Australia

²The University of Sydney, NSW, Australia

2008 年至 2011 年澳洲即食餐品鈉含量的改變趨勢

澳洲人口之鈉攝取遠超過建議攝取量。其中有四分之三的膳食鈉攝取，來自於加工食品，其中不斷增加的即食餐品，為主要的貢獻者。本研究檢視 2008 年至 2011 年澳洲即食餐品的鈉改變量。鈉含量資料，是藉由每年系統性地蒐集，相同的 5 間商店所有即食餐品的標示而得。除了計算整體的平均鈉含量外，尚比較不同型態及不同品牌產品的鈉含量。同時也比較新的、停產的與現有的即食餐品之鈉含量差異。2008 年、2009 年、2010 年及 2011 年，分別收集到 107、313、219、265 項即食餐品。整體的平均鈉含量在 2008 年至 2011 年間並未改變(279 比上 277 mg/100 g)。不同品牌產品的鈉含量具有明顯的差異，且同類食品的標示含量也大不同。近期的新產品，平均鈉含量低於已停產的產品，但與現有的產品鈉含量相似。令人失望的，澳洲即食餐品的鈉含量整體並未減低。食品業界顯然缺乏自發性減低食品鹹味的努力，有必要制定規格，以導引新的食品配方。

關鍵字：鈉、即食餐品、食品新配方、公衛營養、心血管疾病