



The contribution of processed pork meat products to total salt intake in the diet



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ABSTRACT

Consumption of processed meats is reported to be the second largest contributor to total dietary sodium intake. This study aims to describe the contribution of commonly consumed processed pork products to total salt intake. A large variation was found in the sodium content between similar products. Sodium content (mg/100 g) for bacon ranged from 558 to 1570, russians from 762 to 1403, viennas from 480 to 1340 and ham from 696 to 1360 respectively. When converting sodium content from 100 g to serving size, different products contributed the most sodium to the diet. A serving size of brawn (125 g uncooked) will contribute on average 983 mg sodium to total sodium intake. Pork bangers will contribute the lowest amount of sodium (~400 mg) to the diet (~4% of RDI). Reported daily intake are smaller than indicated serving sizes and the contribution of processed meat to sodium intake can be predicted to be lesser than expected.

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1. Background

It is widely accepted that reducing salt consumption will lead to lower blood pressure, which will in turn be beneficial to one's health (Webster, Dunford, Hawkes, & Neal, 2011). As well as preventing 7400 deaths due to cardiovascular diseases per year in South Africa, the prevention of non-fatal strokes will also relieve pressure on the overburdened health system. This amounts to a total annual saving of at least R300 million (40 million USD) due to the prevention of non-fatal strokes, excluding household costs, such as loss of income (Bertram, Steyn, Wentzel-Viljoen, Tollman, & Hofman, 2012).

The World Health Organisation (WHO) has been supporting the development of national salt reduction strategies since 2007, and has established networks that partner with regional organisations world-wide. Salt reduction strategies were also adopted in the revised national Food Based Dietary Guidelines, "Use salt and foods high in salt sparingly": a food-based dietary guideline for South Africa" (Wentzel-Viljoen, Steyn, Ketterer, & Charlton, 2013).

The average salt intake in South African (SA) adults, at 8.1 g/day, is almost double than the 4–6 g/day recommended by the World Health Organization (Bertram et al., 2012). This has prompted the South African Department of Health to take a legislative route

towards lowering salt content in South African foods by publishing the salt reduction regulations (R214) in March 2013. A two-phase step-change process was chosen to get consumer palates used to the taste of processed products with less salt. The first targets need to be reached by June 2016 and the second targets by June 2019. Among food products targeted for reformulation by the South African National Department of Health are bread, breakfast cereals, ready-to-eat savoury snacks and potato crisps, fat spreads and butter, processed meat and raw processed meat sausages, soup, gravy and sauce powder and stock cubes, powders, granules and jellies (Department of Health, 2013).

In a previous study, meat and meat products (such as processed meat products) is reported to be the second largest contributor to total reported dietary sodium intake (20.3–23.6%) in South Africa (Charlton et al., 2005). According to the South African National Standard (SANS 885:2011 edition 3) processed meat is defined as "meat that has undergone any action that substantially altered its original state (including, but not limited to, heating, smoking, curing, fermenting, maturing, drying marinating, extraction or extrusion or any combination of all these processes), but excludes raw processed meat" (SABS, 2011).

1.1. Salt vs sodium

Although the two terms "sodium" and "salt" are often used interchangeably, it is different substances. The vast majority of sodium in the diet is provided by sodium chloride (Wentzel-

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Viljoen et al., 2013). By weight, sodium chloride (NaCl), the chemical name for salt, is composed of 40% sodium and 60% chloride. To calculate the salt content of food (in g), the sodium value (in g) should be multiplied by 2.5. One (1) gram sodium chloride equals 17.1 mM amounts of sodium or 393.4 mg of sodium. One teaspoon of salt weighs approximately five grams and contains about 2000 mg of sodium (International Food Industry Council, 2010). Therefore, the recommended dietary guideline of 4–6 g of salt translates into 1600–2400 mg sodium per day.

1.2. The role of sodium in meat and meat products

Over the years, salt has served many diverse purposes and roles beyond its use as seasoning in foods. One of salt's most recognised uses has been in preservation and microbiological safety of meat products. As a preservative salt reduces the water activity and prevents the growth of food poisoning and spoilage organisms (International Food Industry Council, 2010). Reducing salt can also lead to a greening effect which would not be acceptable to consumers (Grant, McCurdy, & Osborne, 1988).

Salt is important to both the taste and aroma of meat products for several reasons. Firstly sodium binds to protein receptors and conveys the salty taste that consumers are familiar with. Secondly sodium enhances some of the natural flavours present in meat such as savoury and meaty notes. In terms of the flavour, it could be argued that the main challenge in reducing salt in meat products is not in fact the reduction in saltiness itself but the loss of impact on enhancing the meaty and savoury flavours in the product (Food and Drink Federation (FDF) and British Retail Consortium (BRC), 2012).

A further technical challenge is that salt also interacts with meat proteins, in particular the myofibrillar proteins which are then extracted and enabled to bind water which is retained within the meat product. Therefore reducing salt in meat products may lead to products that are different texturally as well as in terms of their flavour profile (Food and Drink Federation (FDF) and British Retail Consortium (BRC), 2012).

A reduction in salt levels therefore may lead to a reduction in shelf-life and consumer acceptability and therefore a potential increase in food waste.

Technical feasibility to reduce salt is often stated as a barrier by the industry. A survey on the current salt levels in pork products would provide insight into this issue by quantifying the variability in the salt levels of similar products produced by different companies. This study also aimed to provide information on the contribution of processed pork products to total salt intake in the diet.

2. Materials and methods

To estimate the contribution of a food group or a subclass (such as processed pork meat products) to the daily dietary sodium intake, it is necessary to firstly determine the sodium content of the food product. However, only measuring sodium content in milligrams per 100 g (mg/100 g) does not take into account either amount (daily serving size) or the likely frequency of consumption.

2.1. Food Composition data

Data analysis of the sodium content of processed pork meat products was performed using the Condensed Food Composition Tables of South Africa (Wolmarans, Danster, Dalton, Rossouw, & Schönfeldt, 2010), analysed data provided by the South African Meat Processors Association (SAMPA) and nutrition labels from processed products in selected supermarkets. Analyses were conducted on 151 processed pork meat products divided into the 9

product classes containing processed pork meat as indicated in the South African National Standard for processed meat products, SANS 885:2011 (SABS, 2011). Processed meat is defined as meat that has undergone any action that substantially altered its original state (including, but not limited to, heating, smoking, curing, fermenting, maturing, drying, marinating (surface application), extraction or extrusion or any combination of all these processes), but excludes raw processed meat. The average, minimum and maximum of the sodium content were calculated for each category.

2.2. Food intake data

The frequency of consumption of different sodium containing foods is vastly unequal, resulting in some foods with high sodium content that are infrequently consumed, being only minor contributors of sodium to the diet, and vice versa. Therefore, the total sodium load, weighted by frequency of consumption, ought to be taken into account. Electronic and manual searching of peer reviewed literature, as well as electronic data sets of unpublished studies done on the dietary intake of processed pork meat products

Table 1

Categories of processed pork products that will be affected by the salt reduction regulations (R214, published in March 2013) with target dates and maximum sodium concentration levels.

Product class	Examples per class	Target dates and maximum total sodium per 100 g foodstuff	
		30 June 2016	30 June 2019
Class 1	Gammons, pastrami, cooked silverside, roast beef (cured), country ham, edible whole muscle offal i.e. pickled tongue	#Not included under regulation R214	
Class 2	Roast pork, roast beef (uncured), carpaccio	#Not included under regulation R214	
Class 3	Uncured biltong	#Not included under regulation R214	
Class 4	Kasseler, bacon	#Not included under regulation R214	
Class 5	Cured biltong, smoked beef, koppa, pancetta	#Not included under regulation R214	
Class 6	Emulsion products (i.e. viennas, polonies, frankfurters, meat loaves, russians, cheese grillers and any combination of showpiece and meat emulsion mixtures e.g. an olive loaf)	850 mg	650 mg
Class 7	Bangers, burgers	950 mg	850 mg
Class 8	Dried wors, biltong wheels or discs	#Not included under regulation R214	
Class 9	Salami, cervelat, cabanossi, mettwurst, teewurst	#Not included under regulation R214	
Class 10	Blanched pork sausages, uncured chicken viennas, polonies, fully cooked burgers	950 mg	850 mg
Class 11	Reformed nuggets, schnitzels	950 mg	850 mg
Class 12	Reformed hams, chicken, Turkey rolls	850 mg	650 mg
Class 13	Reformed bacon, reformed kasseler chops	#Not included under regulation R214	
Class 14	Unspecified	850 mg	650 mg
Class 15	Meat portions, fingers, nuggets, strips, products including vegetables, fruit, sauce or a combination thereof	#Not included under regulation R214	

These high-sodium products, such as biltong and bacon, were excluded from the regulations, as they are not widely consumed in large amounts.

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