

Sodium proficiency testing in processed pork products

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Proficiency testing for sodium content in processed pork meat products

Industry Sector: Pork

Research Focus Area: New or adapted pig meat products on the market adhering to consumer preferences and buying patterns

Year of completion: 2017

Primary Researcher: Dr Beulah Pretorius

Secondary Researcher: Prof Hettie Schönfeldt

The Research Team

Title	Name	Surname	Highest Qualification
Ms	Daleen	Human	Matric

EXECUTIVE SUMMARY

The South African Department of Health published salt reduction regulations in 2013 to reduce the levels of sodium / salt found in processed foods. Wide variations were seen in sodium content among different brands of the same processed pork products (as indicated on the labels). This might be due to analytical variation related to method differences used by the various manufacturers and laboratories. If the methods used by these laboratories are not validated and accurate, the wrong message regarding the sodium content in processed products is portrayed by the industry to the Department of Health.

This project aimed to provide proficiency testing on processed pork meat products for laboratories to measure accuracy.

Two samples, a processed pork meat certified reference material (BB501b) and an unknown test sample (Vienna sausages) were sent to each interested laboratory for moisture, sodium and salt analyses, together with a "results reporting form" requesting information regarding methodology used. The materials distributed were as close as possible to the materials being regularly analysed, so that the results of the study represented the capability of the laboratories working under routine conditions.

Eight laboratories, including commercial laboratories, a university laboratory, the National Forensic Laboratory and the National Metrology Laboratory participated in the study. Four laboratories declared to have accreditation status according to ISO17025. Statistical analysis was done on the results received from the participating laboratories.

Proficiency testing using a certified reference material (CRM)

The reported moisture levels in the CRM for two laboratories were lower than the calculated range. Five laboratories reported moisture values within the range and one laboratory did not report any results for moisture. Five of the eight participating laboratories reported satisfactory results for sodium analyses. One laboratory did not submit results for sodium.

Proficiency testing using unknown test material (Vienna sausages)

The consensus value for the sample was calculated as the arithmetic mean from the results reported by the participating laboratories. The standard deviation was calculated from the results reported by all the participants. Data were tested for outliers using the Grubb's Test. Z-scores were used as the performance indicator. For the purpose of this study, a "satisfactory" performance is used to describe z-scores within the range ± 2 .

When evaluating the results for moisture, laboratory 3 obtained an unsatisfactory z-score. Five of the eight participating laboratories reported satisfactory z-scores. Two laboratories did not submit results for moisture. The sodium values reported by laboratory six were identified as a significant outlier ($P < 0.05$) and were not included in the calculation of the arithmetic mean, standard deviation and the z-scores for each individual laboratory. Six of the eight participating laboratories reported satisfactory z-scores. One laboratory did not submit results for sodium.

It was also noted that the sodium content stated on the product label by the manufacturer were more than 20% below the mean of the sodium value reported by the participating laboratories.

Method information used by the laboratories

Sample preparation and digestion for sodium analyses were previously reported as a concern for laboratories as a factor where analytical error can occur. From the supplementary information provided by the laboratories regarding methods used for sodium analyses, four laboratories used microwave digestion and two laboratories used dry ashing. There was no difference in accuracy of the laboratories using the different digestion methods. Laboratory six that reported unsatisfactory results did not submit method information for the analyses of moisture and sodium.

Concluding remarks

Six of the eight participating laboratories performed satisfactory in the sodium inter-laboratory study on processed pork meat and can be used by industry and government to ensure product compliance to the regulations relating to the reduction of sodium in certain foodstuffs (R.214).

Project Aims

1. To perform an inter-laboratory study between South African laboratories performing sodium analyses on processed pork meat products
2. To compile a report on methodologies used and proficiency

Popular Article

Title for Popular Article

South Africa's salt reduction strategy: Strengthening the monitoring processes and laboratory capacity

The evidence

Excess energy, saturated fat, sugar and salt from processed and fast foods are a major cause of chronic disease worldwide. Governments and the food industry are under increasing pressure to improve the quality of the food supply to better the enormous burden of disease caused by poor diets. While the food industry has achieved great success in providing a constant supply of affordable food to much of the world, improvements in nutritional composition of diets are urgently needed to reduce the very high levels of saturated fat, sugar and salt in daily food choices.

Average salt intake of South African (SA) adults, 8.1 g/day, is higher than the 4 - 6 g/day recommended by the World Health Organization. Meat and meat products (such as processed meat products) is the second largest contributor to total reported dietary sodium intake (20.3% to 23.6%) in South Africa.

Strategies

It is widely accepted that reducing salt consumption will decrease blood pressure over time, which will in turn be beneficial to one's health. Population salt reduction is a cost-effective intervention to reduce chronic disease. The prevention of non-fatal strokes and approximately 7 400 deaths due to cardiovascular disease per year in South Africa, will also relieve pressure on the overburdened health system. This amounts to a total annual saving of R713 million due to the prevention of non-fatal strokes, excluding household costs, such as loss of income. At the individual level, healthcare cost savings could prevent 2 000 households from being pushed into poverty.

As recently as 2011, there were no salt reduction strategies in Africa. In its strategic plan for non-communicable diseases (NCDs) (2013 - 2017), the South African (SA) National Department of Health (NDoH) includes the target to reduce the mean population salt intake to <5 g per day. Regulations were promulgated to reduce the levels of sodium / salt found in processed foods. According to the regulations relating to the reduction of sodium in certain foodstuffs and related matters as stipulated in the Foodstuffs, Cosmetics and Disinfectants Act gazetted in July 2012 and amended in 2016, sodium content in processed meats must be reduced to a maximum of 950mg or 850mg per 100g of foodstuff by 30 June 2016, and to 650mg or 850mg by 30 June 2019 depending on the different classes defined in SANS885 (Department of Health 2016).

Measurement and proficiency testing of sodium

A need was identified to support industry compliance with the existing legislation and increase efforts to prepare for the 2019 legislative thresholds, which would include strengthening the monitoring processes and laboratory capacity. Effective monitoring mechanisms are needed to assess the impact of the salt legislation on population-level salt intake and health-related outcomes.

However, the biggest challenges for the laboratories with regard to sodium analyses are: (1) using different matrices because not all foods are homogenous; (2) vastly differing concentrations of sodium in various foods which require different dilutions; and, (3) developing standardized, robust sample preparations in the laboratory. If the methods used by the different laboratories are not validated and accurate, the wrong message regarding the sodium content in processed products is portrayed to the Department of Health. Proficiency testing by all laboratories performing sodium analyses on processed pork meat products will provide accuracy to reported values.

A study by the University of Pretoria aimed to provide proficiency testing on processed pork meat products for laboratories to measure accuracy.

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Authors

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