Updates of Sodium Values for Pork Products

Williams JR.[1], Howe JC.[1] (Ret), Patterson KY.[1], Holden JM.[1], Snyder C.[2], Lofgren P.[2], Thompson L.[3]: [1]Nutrient Data Laboratory (NDL), BHNRC, ARS, USDA, Beltsville, Human Nutrition Research Center, Beltsville, MD 20705.[2] National Pork Board, Clive, IA 50325, [3]Texas Tech University, Lubbock, TX 70409.

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Abstract: Recent public health reports indicate that excessive dietary sodium intake can lead to stroke, coronary heart diseases, and renal diseases. The Institute Of Medicine has called for a reduction of dietary sodium intake in the US. Scientists at the USDA have initiated a project to monitor changes in the levels of sodium in processed foods. **Objectives:** To compare the sodium content of various pork products, including fresh pork cuts, fresh ham, cured ham products and enhanced pork products. **Materials and Methods**: Since 2003, various fresh pork products were purchased from 12 retail outlets using the multi-stage nationwide sampling plan developed for USDA's National Food and Analysis Program (Pehrsson, P. et. al, J. Food .Comp. Anal 13:379, 2000). Nutrient values, including sodium were determined for all pork products. Sodium was analyzed by the ICP multi-element method (AOAC, 984.27); analytical quality control was monitored by the use of duplicate analyses as well as by certified reference materials. Nutrient data for cured ham were statistically evaluated using SAS General Linear Model Procedure (Critical value =p< 0.05); ANOVA (Critical level = p<.05) was used to conduct comparison between the enhanced pork cuts. **Results:** Fresh pork cuts showed an overall decrease in sodium whereas fresh ham cuts showed a significant increase in sodium (p<.0001) compared to nutrient data generated before1963. Enhancement of fresh pork and cured ham products showed a significant increase in sodium concentration (p<.0001) compared to non-enhanced pork products. **Significance:** These data indicate that different processing methods for selected pork cuts can significantly affect sodium levels in that food.

Introduction

Nearly 80% of the sodium in the American food supply is contributed by processed and prepared foods. The Institute of Medicine has called for a national sodium reduction Initiative in the US. A collaborative effort is underway with scientists at USDA and other federal agencies to monitor changes in the levels of sodium in foods. As a class, pork and pork products contain varying levels of sodium for fresh, non-enhanced to enhanced or cured products. USDA has collaborated with the National Pork Board and Texas Tech University to generate nutrient composition data including sodium for fresh pork products. Enhanced products include products with added non-meat ingredients, solutions, and/ or flavorings, or "added ingredients" like salt, sugar, sodium erythrobate or sodium nitrite which are added to fresh pork products to improve flavor and texture[1]

Objectives

•To examine trends in sodium content of selected fresh pork products [i.e. tenderloin (TEN), shoulder blade (SHB), top loin (TLC) and fresh ham (whole, rump, shank,)] since 1963 (beginning with Agriculture Handbook No. 8[2] to present (2011).
• To compare the sodium profile of non-enhanced (NE) fresh pork products (TEN, SHB, TLC) compared to their enhanced (E) counterparts.
• To compare the sodium content of enhanced and non-enhanced cured ham products: ham with natural juices (HNJ), ham with water product (HWP), and ham with water added (HWA).

Methodology

• Various fresh pork products were purchased from 12 retail outlets using the multi-stage, probability-proportional-to-size (PPS) nationwide sampling plan developed for USDA's National Food and Analysis Program (Pehrsson, P. et al. 2003)[3]
• Samples of enhanced and non-enhanced fresh pork cuts (TEN, SHB, TLC; n=72), non-enhanced fresh hams (whole, rump, shank; n=36); and enhanced cured hams (HNJ, HWP, HWA; n=48) were procured, processed and frozen in the raw state for nutrient analysis.
• Sodium was analyzed by the ICP multi-element method (AOAC, 984.27),[4] analytical quality control was monitored by the use of duplicate sampling and certified reference materials.
• Nutrient data were statistically evaluated using SAS General Linear Model Procedure (Critical value =p< 0.05).[5]
• Sodium content in pork products were tracked as reported by USDA in "Composition of Foods, Agriculture Handbook No 8, 1963" to the recent USDA National Nutrient Database for Standard Reference Release 24.

Table 1. Historical Trend in Sodium Content in Pork Products

	Fresh Pork Products						
SOURCE	TEN	SHB	TLC	*WHOLE	*RUMP	*SHANK	*ARM PICNIC
	mg/100g						
Handbook No 8 (1963)	70	70	70	55	69	67	82
SR 11 (1996)	50	70	45	55	69	67	82
SR 20 (2007)	53	65	49		-	-	-
SR 24 (2011)	52	65	49	84	76	90	89

*These products are usually called ham and are from the pork leg.

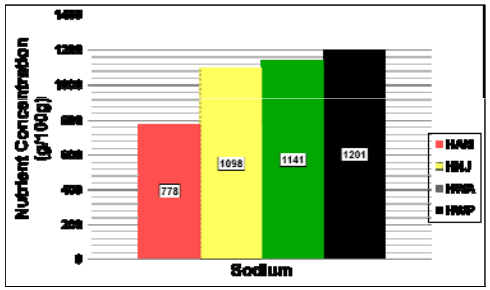

Fig 1. **Sodium content in cured ham products**. N=18 (Ham), 17 (HNJ- Ham with natural juices); 19 (Ham and water added); 12 (Ham and Water Product).

Table 2. Sodium Content for Fresh Pork Cuts: Non-enhanced (NE) and Enhanced (E)

CUTS	N	NON- ENHANCED (NE)	ENHANCED (E)
		mg/100g	mg/100g
TEN	12	66 ± 1.0	165 ± 15.0
SHB	12	47 ± 2.0	243 ± 32.0
TLC	12	49 ± 3.0	232 ± 22.0

Values represent LS means ±S. E. M. (N=12) for Non-enhanced and Enhanced pork cuts.

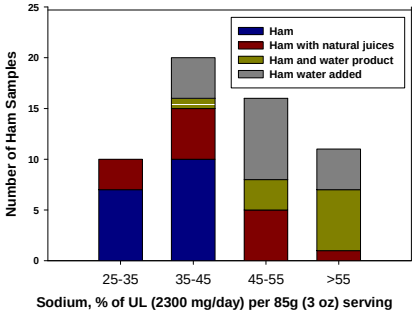

Fig 2. **Distribution of sodium content (mg/serving) by cured ham products.** The stacked columns represent the number of each ham type that falls within the range of sodium providing 25-35% UL, 35-45% UL, 45-55-% UL, >55% UL as defined in the IOM report on Dietary Reference Intakes for sodium.[6]

Results

• Historical trend of sodium from 1963 (Composition of Foods, Agriculture Handbook No 8) to present indicates a significant decrease in sodium in fresh pork cuts (TEN, SHB, TLC), while there was a significant increase in sodium in fresh hams [whole, rump half, shank half and shoulder arm picnic (p<.0001)] (Table 1).
• Levels of sodium content were significantly higher (p<.0001) in the enhanced fresh pork cuts when compared to the non-enhanced cuts (Table 2).
• In cured ham products, sodium levels were higher for all "added ingredients" ham products when compared to natural ham. Ham and water product (HWP) had the highest level of sodium concentration among the enhanced ham products (Fig. 1)
• The range of sodium concentration per serving overlapped considerably among different ham types (Fig. 2)

Conclusion

• All sodium levels in fresh, non-enhanced pork products are related to the physiological sodium levels in meat.
• Nutrient levels of sodium are significantly elevated in enhanced products.
• Sodium concentration is directly related to its presence as an "added ingredient" in pork products.
• The broad range of sodium distribution among ham types provides consumers with a variety of choices for selecting lower sodium ham products.
• The addition of these new data in USDA's National Nutrient Database for Standard Reference Release 24 will provide specific and current product information on sodium content in pork products and support sodium monitoring for the national sodium reduction initiative.

References

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