

Analytical Studies of Meat and Poultry Products

Introduction and Approach

The composition of meat and poultry products in the retail market is frequently changing due to different livestock practices, new processing methods, and varied product concepts. “Enhancement” or “marination”, for example, are methods currently used in industry whereby solutions containing water, salts, and flavorings are added to some meat and poultry items to improve taste and tenderness (1). According to industry estimates, enhancement is used for many retail meat and poultry items, including 30% of chicken and 40% of fresh pork cuts (2). Other processed meats such as ready-to-eat luncheon meats are highly consumed foods containing relatively high amounts of sodium. In fact, 44% of sodium consumed in the US came from 10 food categories including cold cuts, cured meats, and poultry (3). Due to these dynamics, NDL scientists are conducting studies in collaboration with meat scientists and industry experts. These foods are monitored through nationwide sampling and analysis by Nutrient Data Laboratory, ARS, USDA, using standardized procedures developed under the National Food and Nutrient Analysis Program (NFNAP)(4). The NFNAP employs statistically valid nationwide sampling plans, selection of brands using consumer sales data, analysis of foods using valid, approved methods by qualified laboratories, and comprehensive quality control to generate new and updated analytical data.

NDL meat study objectives include

- Evaluating nutrient content of meat and poultry products available in the retail market
- Updating nutrient profiles in the National Nutrient Database for Standard Reference (SR)
- Obtaining current sodium values for highly consumed items for NDL’s sodium monitoring project

Following are examples of recent NDL meat studies that obtained new or updated data for the sodium monitoring project:

1. Whole turkey: enhanced and non-enhanced
2. Luncheon meats and bacon
3. Rotisserie chicken
4. Chicken breast: enhanced and non-enhanced
5. Chicken dark meat (drumstick, thigh, and leg): enhanced and non-enhanced
6. Pork cuts: enhanced and non-enhanced

Selected Results

- Chicken breast study: Levels of sodium were significantly higher ($p < 0.0001$) in enhanced products ($172.6 \text{ mg}/100\text{g} \pm 12.4$) when compared to non-enhanced products ($45.6 \text{ mg}/100\text{g} \pm 2.3$).
- Chicken dark meat study: Sodium concentration in enhanced raw dark meat chicken was higher ($154.5 \text{ mg}/100\text{g} \pm 18.3$) when compared to non-enhanced raw dark meat chicken ($106.5 \text{ mg}/100\text{g} \pm 20.0$) ($p < 0.0001$).
- Whole turkey study: Analytical sodium values in enhanced whole raw turkeys were higher ($181 \text{ mg}/100\text{g} \pm 43.6$) compared to non-enhanced raw turkeys ($113 \text{ mg}/100\text{g} \pm 15.3$) ($p = 0.0252$).
- Luncheon meats study: No significant changes in analytical sodium levels were found for sliced ham, turkey, chicken, salami, or beef bologna when comparing data from 2011 to data from 2002-2007.
- Bacon study: Analytical data confirmed label values, indicating that low sodium bacon ($470 \text{ mg}/100\text{g} \pm 11.7$) contained 30% less sodium than regular bacon ($661.0 \text{ mg}/100\text{g} \pm 15.9$). Microwaving regular bacon ($1178 \text{ mg}/100\text{g} \pm 13.8$) showed a significantly higher sodium concentration than pan-frying ($1115 \text{ mg}/100\text{g} \pm 19.8$) ($p < 0.0001$).
- Pork loin study: For 3 highly consumed non-enhanced pork loin cuts, total fat values were lower in 2010 than in 1992 (2.5 to $16.3 \text{ mg}/100\text{g}$ in 2010 vs. 4.2 to $23.5 \text{ mg}/100\text{g}$ in 1992) ($p < 0.001$). Analytical sodium values for 2010 were 7-24% higher in all three cuts but still below $90 \text{ mg}/100\text{g}$.

Analytical Studies of Seafood Products

Introduction and Approach

NDL scientists conducted analytical studies on highly consumed seafood samples picked from retail locations. These foods are being monitored through nationwide sampling and analysis by Nutrient Data Laboratory, ARS, USDA, using standardized procedures developed under the National Food and Nutrient Analysis Program (NFNAP). The NFNAP employs statistically valid nationwide sampling plans, selection of brands using consumer sales data, analysis of foods using valid, approved methods by qualified laboratories, comprehensive quality control, and USDA's oversight to generate new and updated analytical data. The results for these samples were compared to those from National Fisheries Institute (NFI) untreated samples (freshly caught seafood not subjected to typical storage practices on fishing boats).

Results

The table below shows sodium values in these highly consumed seafood from the two sources: a) NFNAP retail samples and b) Data from National Fisheries Institute' untreated samples. These data were released in the USDA National Nutrient Database for Standard Reference (SR), release 25.

Table: Sodium in selected seafood (mg/100g)

Description	SR25 (retail samples)	SR25 (NFI* samples)	NFI individual values
Pacific cod	303	109	80, 72, 174
Walleye pollock	333	159	182, 146, 149
Sockeye salmon	112	71	129, 39, 44
Shrimp, mixed species	566	119	119, 115, 123

*freshly caught untreated samples

According to NFI, during commercial processing of raw fish which is eventually sold in the retail market, sodium compounds may come into contact with the fish. The seafood may be stored in refrigerated seawater on the ship after catch, and they may be treated with sodium polyphosphate or similar compounds prior to freezing, to reduce the amount of liquid (drip) that is released when the frozen fish are thawed.

1. Ergezer H, Gokce R. (2011). Comparison of marinating with two different types of marinade on some quality and sensory characteristics of turkey breast meat. *Journal of Animal and Veterinary Advances* 10(1), 60-67.
2. A snapshot of today's retail meat case. National meat case study executive summary. Accessed January 28, 2015 at <http://www.beefretail.org/CMDocs/BeefRetail/research/2010NationalMeatCaseStudy.pdf>
3. Vital Signs: Food Categories Contributing the Most to Sodium Consumption – United States, 2007-2008. Morbidity and Mortality Weekly Report (MMWR); February 7, 2012.
4. Haytowitz DB, Pehrsson PR, Holden JM. (2008). The National Food and Nutrient Analysis Program: A decade of progress. *Journal of Food Composition and Analysis* 21, S94-S102.