Nutrient content and variability in newly obtained salmon data for USDA Nutrient Database for Standard Reference

Jacob Exler, Pamela R. Pehrsson
Nutrient Data Laboratory, Beltsville Human Nutrition Research Center, ARS/USDA, 1030 Baltimore Ave, Beltsville, MD 20705

Introduction
Among seafood species consumed in the United States, salmon is an important contributor of many nutrients. The Food and Drug Administration (FDA) publishes six species of salmon in two separate categories in the top two most frequently consumed fish in the United States for voluntary nutrition labeling. Salmon is also a highly consumed, nutrient dense food in the diet of Alaskan Natives. The objective of this work was to generate nutrient data for various forms, sources, and species of salmon, to be used in the Nutrient Data Laboratory (NDL) Nutrient Data Base System (NDBS), compiled, and released into the USDA Nutrient Database for Standard Reference (NDB) to provide current and accurate data for those foods.

Materials and Methods
Retail samples of salmon were obtained from a nationally representative sampling plan as part of the National Nutrient and Nutrition Analysis Program (NNAP)1. Results

Sample size (number of composites analyzed) varies for the fish items and nutrients because some of the foods were sampled using different protocols. Also, in a few cases the values were calculated. In Tables 3-6, values with sample size = 1 represent multiple for Standard Reference (SR) to provide current and accurate data for these foods.

Table 3: Data on the moisture, protein, and total lipid content of seven forms of salmon. The moisture level in the AN red, smoked sample (CE) is significantly higher than that in the AN and R raw samples (CE, 19.8 – 21.3 g/100g). Protein is also correspondingly higher in the AN red smoked sample (CE, 15.3 g/100g) than in the other AN and R samples (15.0 – 15.3 g/100g). Total lipid is the most variable proximate among the processed forms shown, ranging from 3.45 to 11.7 g/100g, regardless of the form of salmon. In general, nutrient content increased as moisture content decreased.

Discussion
Among seafood species consumed in the United States, salmon is an important contributor of many nutrients. As shown in Table 3, the level of protein in raw salmon species is relatively consistent at about 20 g/100g. This corresponded to 20 g/100g for 6/8 of the Daily Value (DV) for protein for adults. The much higher level of protein in the AN smoked red salmon (AN23, 25 g/100g) is due to the changes in the protein that are made during smoking process and as a result of the much lower moisture content. Using 8 g grams per 100 grams of fish as a cut-off between low and high fat fish, most of the species can be considered high fat fish. There is a relatively narrow range of values for the grams of moisture and fat between 75 and 80 g/100g. Fish, not shown in about 1.2 g/100g for most of the samples.
Based on the data for calcium given in Table 4, canned salmon with bones provided between 17 and 22% of the DV for the calcium. The intermediate values for the other processed forms of salmon are about five times higher than values for raw salmon. This might be explained by some of the calcium being leached from the bones into the fish during the processing practices or by the presence of some small pieces of bone in the edible portion.

Table 4: Calcium values for nine forms of salmon. Raw salmon tissue contained between 6 and 13 mg/100g. Retail canned salmon with bones had 28–49 mg/100g. Canned salmon samples provided about 41–59% of the DV for calcium. The intermediate values for the other processed forms of salmon are about five times higher than values for raw salmon. This might be explained by some of the calcium being leached from the bones into the fish during the processing practices or by the presence of some small pieces of bone in the edible portion.

Table 5: Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), two omega-3 fatty acids typically found in fish, and cholesterol in 10 forms of salmon. Moisture and total lipid contents are given for each of the forms. The EPA content ranged between a low of 0.035 g/100g in AN raw chum and 5.71 g/100g in AN raw, canned, solids w/bone Atlantic salmon. The DHA content ranged between 0.02 g/100g in AN raw chum and 141 g/100g in AN raw, canned, solids w/bone Atlantic salmon. The highest level of cholesterol (141 mg/100g) was in the lower-moisture AN smoked red salmon. Raw salmon had cholesterol values ranging between 55 and 65 mg/100g. Cholesterol in the retail canned red salmon was 44 mg/100g and the retail canned pink was 82 mg/100g.

Table 6: Moisture, niacin, and vitamin B12 in 10 forms of salmon. The highest levels of niacin occurred in the two smoked red salmon (21.1 and 22.1 mg/100g). The raw and canned red salmon had niacin values ranging between 5.86 and 6.96 mg/100g. Vitamin B12 in the higher in the AN raw salmon (7.4 and 8.55 mg/100g) than in the R raw salmon samples (2.5 – 3.5 mg/100g). The AN smoked red salmon had the highest value (9.24 mg/100g). The in raw salmon values for vitamin B12, 5.0 and 5.55 mg/100g, were closer in line with the high end of the range for raw R salmon.

References

Acknowledgment
This work was supported by USDS, ARS and NIH Agreement No. 19-C-N-1000. Special thanks go to Bethany Showell for her assistance in preparation of this postscript.


The data presented here clearly support that decision.

A variety of species and forms of salmon are available in the American diet and are important to the diet of Alaskan Natives. Besides the availability of different species and wild and farmed sources for some, there are also the inherent differences in smoking, canning, and freezing processes (some with bone and some without) forms. This varies allows the consumer a wide range of choices that can cover reasonable and significant levels of all nutrient intake variations. The recently published report from the Institute of Medicine of the National Academies on balancing the benefits and risks in choosing seafood tested salmon high as a good choice.1 The data presented here clearly support that decision.

The National Academies of Science on balancing the benefits and risks in choosing seafood tested salmon high as a good choice.1 The data presented here clearly support that decision.

The National Academies of Science on balancing the benefits and risks in choosing seafood tested salmon high as a good choice.1 The data presented here clearly support that decision.

The National Academies of Science on balancing the benefits and risks in choosing seafood tested salmon high as a good choice.1 The data presented here clearly support that decision.

The National Academies of Science on balancing the benefits and risks in choosing seafood tested salmon high as a good choice.1 The data presented here clearly support that decision.