Nutrient Composition Of Selected Ethnic Foods

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This paper provides an insight into how the Nutritional Labeling Laboratory at Southern Testing organized the task of providing data a contract sponsored by the Human Nutrition Information Service (HNIS) of the USDA.

Southern Testing and Research Laboratories is an independent contract lab that has worked closely with HNIS for several years analyzing food products. This paper covers one of the current contracts dealing specifically with a variety of ethnic foods. The data is preliminary as samples are still being actively analyzed, especially fresh items where spring sampling is being done.

The first step is always to acquire the food products or ingredients for recipes to be tested. This requires making trips to places where people of the ethnic communities shop. Stores are usually in low rent areas such as the Super Duper store, a small grocery in a neighborhood largely populated with low income families in Wilson. This store has a very small selection of general grocery items at inflated prices. Much of the glass in the freezer cases is broken out and replaced with plywood. It does however have a large meat selection and provides a source of meat cuts to make stocks as well as chicken feet.

Stores are often converted from some previous use and are small and are usually not very clean. Merchandise is expensive compared to main stream groceries, is often of poor quality and is out dated. The proprietor of an Asian market in Raleigh, North Carolina, offered me frozen fish in a package dated 1988.

Stores often serve as a social gathering place and offer more than groceries. La Panadaria, a converted hardware store in Wilson caters to the large population of Hispanic migrant workers in the area. It has no shelves and merchandise is arranged in rows on the floor. Fresh baked goods are available as is clothing, decorative items and music tapes. Like many small ethnic food stores, it is a family run business. Norma, the owner is from the Hondouras. Her father makes weekly runs to Florida for fresh produce.

After the samples have been acquired, preparation is often required. This involves following instructions provided by HNIS, following package instructions, or simply trimming away inedible portions. Samples are weighed for designated serving size and refuse. Dimensions are also taken at this time. Cup measurements are made by spooning sample into measuring cups, leveling with a knife blade and weighing. Once all serving size information has been obtained, the samples are homogenized using a large commercial type food processor whenever possible. This is a very crucial part of the preparation process. A thorough homogenate is necessary to insure a representative sample and reproducibility. Blenders are sometimes required for very wet samples and hard materials such as dried shark fin or raw lentils were homogenized using a hammer mill. After grinding, the samples are split into two parts. One is packed into a polyethylene screw topped bottle, flushed with nitrogen, sealed and placed in frozen storage. The other is packed in some convenient form and held in a cooler to be used for the analysis. All analyses are performed using current AOAC procedures unless directed otherwise by HNIS. For this particular contract, alternative methods have been provided for carotenoids, total dietary fiber and total folates. As soon as possible after homogenization, samples are assayed for carotenoids, vitamin C and folates to avoid losses during storage.

The rest of this paper is concerned with some typical examples of the data we have acquired and discusses some of the conclusions that can be drawn.

In preparing to assay samples, especially for vitamins and minerals, it is often necessary to establish dilutions factors. In some cases, one can go to the literature and base dilutions on values found there. For example, banana and serrano peppers were assayed. The values found for the minerals present compare closely to those given in USDA Handbook 8 for hot chili and sweet peppers as shown in Table 1 below. Using literature values as a guide for dilution for these samples did not necessitate many repeats.

Table 1. Peppers

	Calcium (mg/100g)	Iron (mg/100g)	Phosphorus (mg/100g)	Potassium (mg/100 g)
Banana	18	0.72	37	367
Serrano	10	0.45	37	299
Hot, chili[1]	10	1.2	25	
Sweet[1]	9	0.7	22	213

[1]Values from USDA Handbook 8

Broccoli is an example of a product which proved differently. Except for potassium, the spread between mineral values was much wider for Chinese broccoli compared to the common type (Table 2). This problem was most troublesome in the analysis of samples for the microvitamins. The procedures for Vitamin B6 and B12, folates and pantothenates require a series of exacting dilutions to avoid overgrowing the organisms or insufficient growth. Lack of literature data often resulted in the necessity to do trial analyses before an acceptable dilution was found to give reproducible results.

For some samples, several brands of the same item were sampled. In some cases, the samples were found to be very similar despite differences in sources. An example of this is halavah (Table 3), a confection made from crushed sesame seeds and tahini that is popular in the Middle East. Sample 1 was cut from a block in the store and sample 2 is from individually wrapped single serving pieces. From the standpoint of proximate composition, they are nearly identical. In this case, one sample served as a dilution guide for the other.

Table 2. Cooked Broccoli

	Calcium (mg/100 g)	Iron (mg/100 g)	Phosphorus (mg/100 g)	Potassium (mg/100 g)	Sodium (mg/100 g)
Chinese	72	0.38	37	250	6.2
American[1]	88	0.8	62	267	10

[1]Values from USDA Handbook 8

Table 3. Halavah

	Moisture (g/100 g)	Nitrogen (g/100 g)	Fat (g/100 g)	Ash (g/100 g)	Carbohydrates (g/100 g)	TDF (g/100 g)
Sample #1	4.7	2.2	36	1.7	44	4
Sample #2	6.2	2.1	33	1.9	46	5

A case where this was not so true was oyster sauce, a condiment and base used in oriental cooking. These two samples proved to be very different in moisture content which affected the other proximate components as seen in Table 4. Consequently, values of the vitamins and minerals were different as well.

Table 4.	Oyster Sauce					
	Moisture (g/100 g)	Nitrogen (g/100 g)	Fat (g/100 g)	Ash (g/100 g)	Carbohydrates (g/100 g)	TDF (g/100 g)
Sample #1	86	0.27	0.32	6.9	5.1	0.2
Sample #2	75	0.16	0.17	8.1	16	0.4

Cooking also has an effect on nutrient composition as many researchers have found. This held true for items in this study as well. Table 5 shows the decrease in vitamin content for collard greens with cooking. In the case of every vitamin, significant losses were found. Length of cooking affects nutrient losses. Therefore, the individuality of cooks and taste makes the development of representative values for cooked products more difficult.

Table 5.	Collard Greens				
	Vitamin C (mg/100 g)	Thiamin (mg/100 g)	Riboflavin (mg/100 g)	Niacin (mg/100 g)	bCarotene (mg/100 g)
Raw	44	0.03	0.28	0.91	1120
Cooked	6	0.02	0.06	0.31	1000

Following recipes provided by HNIS, a variety of stocks were produced for this study. It was found that their proximate composition is fairly similar with the beef being slightly lower in fat because it was easier to skim (Table 6). The carbohydrate contribution is probably due to the tomatoes added. Vitamins were present at low levels in all three preparations as expected by the high moisture content but rather different for each meat especially in terms of niacin and riboflavin as seen in Table 7.

Table 6.	Stocks from Recipes				
	Moisture (g/100 g)	Protein (g/100 g)	Fat (g/100 g)	Ash (g/100 g)	Carbohydrates (g/100 g)
Beef	95	3.0	0.02	0.94	1.5
Chicken	93	3.5	1.4	0.96	1.0
Fish	97	2.0	1.2	0.76	0.0

Table 7.	Stocks from Recipes				
	Vitamin C (mg/100 g)	Thiamin (mg/100 g)	Riboflavin (mg/100 g)	Niacin (mg/100 g)	bCaroten e (mg/100 g)
Beef	<0.10	0.05	<0.01	0.98	<1.0
Chicken	1.2	<0.002	0.101	2.1	<1.000
Fish	0.22	0.06	0.07	0.91	<1.000

In general, as the study progressed, it was seen that each sample had to be considered individually. Some assumptions can be made regarding dilution but trial and error is usually the rule. Sampling has not been an easy task due to geographic location. Several trips to the Baltimore-Washington areas were made, as well as forays as far as Texas and California. Southern Testing is fortunate to have a diverse group of employees despite its relatively small size and they have generously provided tips on finding samples and in sample preparation.

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