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Nutritional Composition of Selected Traditional Native American Foods

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ABSTRACT

Food choices have changed among Native American populations. Healthy food choices are subject to lifestyles, cooking skills, nutrition knowledge and the availability of healthy foods. There is a paucity of nutritional information on traditional and cultural Native American foods. Sixteen traditional Dakota recipes were prepared by members of the Sisseton Wahpeton Oyate, Sisseton, South Dakota. These foods were pureed, lyophilized and analyzed for moisture, ash, fat, protein, carbohydrate and individual mineral content using officially accepted methods. The following mineral elements were analyzed: calcium, copper, iron, magnesium, manganese, phosphorus, potassium, sodium and zinc. Methods of the Association of Official Analytical Chemists (AOAC) were employed in all cases. Native American traditional foods studied included: dried corn soup, fish head soup, parched corn, bean soup, hominy (Pasdaypi) soup, buffaloberry (Mastinpute) pudding, tripe soup, kabubu bread, buffalo (Tatanka) roast, chokecherry (Canpa) pudding, potato soup (Maka bdo), corn balls (Wahuwapa Wasna), pemmican, plum (Kan'ta) pudding, turtle soup and wild rice (Psi) soup. Our study determined that traditional Native American recipes tested were generally healthier in relation to selected nutrients such as fat content, total calories, and sodium content when compared to contemporary recipes that use common ingredients. These foods may provide healthy choices in the Native American diet when prepared in traditional ways.

INTRODUCTION

The purpose of this study was to conduct a nutritional and compositional analysis of infrequently consumed traditional and cultural Native American foods for which nutritional information is not currently available. The foods chosen were components of the traditional Dakota diet from the Sisseton-Wahpeton Oyate, Sisseton, South Dakota.

Samples selected for analyses were identified in consultation with members of the tribe and food preparation was carried and documented by Oyate members.

The nutritional status of Native Americans has changed over time. From the turn of the 20th century up until the 1970's, the main nutritional concern for the native population was malnutrition, usually from under-nutrition (Story et al 1998). The traditional diet was gradually replaced with a diet that was higher in fat containing less fruits and vegetables (Byers 1996). Today, traditional foods are not commonly eaten by the native population. Lytle and coworkers (2002) found that only 7 of 80 children surveyed consumed any traditional foods. Only 7 of the 1,308 foods mentioned in their surveys were traditional foods. Traditional foods are regarded as healthy, but are consumed only at festivals and other special events (deGonzague 1999, Kuhnlein 1979). In the day-to-day diet, these foods have been replaced with high fat, high calorie contemporary food products. The under-nutrition seen in the 1970's has been replaced by malnutrition with over-nutrition where vitamin and mineral intake is low, but caloric intake is sufficient to maintain obesity (Story et al 1998, Lytle et al 2002). deGonzague (1999) summarized nine dietary studies of adult Native Americans. The studies took place from 1963 to 1996 and looked at Native American populations in Arizona, North Carolina, North and South Dakota, and Oklahoma. These studies found nutrients to be lacking and between 31% - 47% of energy coming from fat. This intake is in conflict with the American Heart Association recommendation that no more than 30% of energy should come from fat. Native American foods that are prepared in traditional ways are likely to be inherently healthy in relation to key nutrients owing to the absence of excessive fat and refined sugars. As such, they have a role to play in the improvement of today's diet.

Limited information is available on the nutritional composition of such traditional Native American foods.

MATERIALS AND METHODS

Sixteen traditional food samples were prepared by members of the Sisseton Wahpeton Oyate, Sisseton, South Dakota. Food samples provided were dried corn soup, fish head soup, parched corn, bean soup, hominy soup, buffalo berry pudding, tripe soup, kabubu bread, buffalo roast, chokecherry pudding, potato soup, corn balls, pemmican, plum pudding, turtle soup and wild rice soup. These samples were pureed, lyophilized and ground to a fine powder. These treatments insured homogeneity of sampling and minimized sampling error. Samples were analyzed for moisture, ash, total fat, protein (combustion analysis), carbohydrates (by difference) and individual mineral elements (calcium, copper, iron, magnesium, manganese, phosphorus, potassium, sodium and zinc) following AOAC methods. Moisture analysis was determined using an air-oven set at 130°C for 1 hour. Total mineral content or ash content was determined by incinerating a known weight of sample in a muffle furnace at 600°C overnight. Ether-extracted fat content was determined in a Goldfish apparatus and a 4-hour refluxing time. Protein content was determined using a combustion method and a nitrogen %-to-protein %

conversion factor of 6.25. Trace element composition was determined by digesting samples in concentrated sulfuric acid followed by appropriate dilution and Atomic Absorption Spectroscopy. Carbohydrate content was determined by subtracting protein %, fat %, ash % and moisture % from 100%. As serving sizes are not standardized for these traditional Native American foods, nutrition information is reported on the basis of 100 grams weight. Energy derived from such foods were normalized to Kilocalories obtained from a serving size typically consumed (cup, slice, ounces, etc.) if such serving sizes were actually consumed. Units for protein, fat, carbohydrates and mineral elements were reported as micrograms, milligrams or grams of nutrient consumed per 100 grams eaten.

SELECTED RECIPES (INGREDIENT LIST):

Pemmican (dried buffalo, dried choke cherries)

Potato Soup (diced potatoes, celery, onions and crackling)

Dried Corn Soup (dried sweet corn, dried wild turnips, onions and buffalo meat)

Bean Soup (pinto beans, onions, potatoes, side pork)

Tripe soup (hominy, potatoes, onion, beef tripe)

Hominy soup (beef, onions, potatoes, hominy)

Corn Balls (ground parched corn, pork lard)

Parched Corn (water, salt, parched corn)

RESULTS

This study yielded nutritional and compositional data for sixteen traditional Dakota food products. Of these items, eight were soups that employed a variety of ingredients (tables 1, 2 and 3) Computerized nutrient data banks provide useful data for comparisons with analyzed values for the traditional Native American recipes (table 4, ESHA Research). The protein content of these Native American soups had a narrow range from 1.5 to 5.5 grams per 100 grams. Protein content in prepared soups may range from 1.3 grams to 14.8 grams per 100 gram (ESHA Research). Pemmican and buffalo roast showed a high protein content of 12.7g/100g and 26.9 g/100g, respectively (table 3).



Figure 1. Dried Corn Soup containing wild prairie turnip (Tipsina), onion, sweet dry corn, and buffalo meat.



Figure 2. Picture shows frozen wild plum (Kan'ta) juice being thawed and heated before addition of thickening agents.

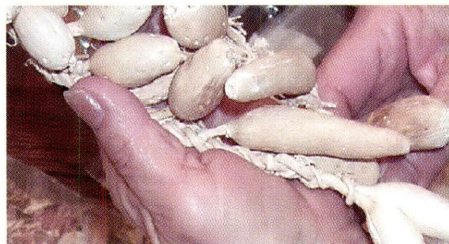


Figure 3. Prairie turnip (Tipsina) dried in a braid.



Figure 4. Tribal Elders, Dorothy Gill and Clara Eagle, two Sisseton-Wahpeton Oyate elders demonstrating how traditional foods were harvested, preserved and prepared.

Figure 5. Picture of Buffaloberry Plant. (Image copyright ©2004, PlantsDatabase.com. Used with permission.)

Table 1. Proximate composition of selected traditional Native American foods.

Native American Food	Calories	Calories	Fat	Protein	Ash	CHO	Moisture
	(KCal/conventional serving size*)						
Dried Corn Soup	131.25	52.5	0.5	4.9	0.5	7.1	87.0
Fish Head Soup	50.75	20.3	0.3	4.2	0.2	0.2	95.1
Parched Corn Soup	209.3	83.7	0.9	2.0	0.7	16.9	79.6
Bean Soup	170.0	68.0	1.2	3.9	0.7	10.4	84.3
Hominy (Pasdaypi) Soup	169.0	67.6	2.4	5.5	0.4	6.0	85.7
Buffaloberry (Mastinpute) Pudding	173.6	124.0	0.1	1.1	0.5	29.9	68.4
Tripe Soup	89.5	35.8	0.6	3.9	0.3	3.7	91.7
Kabubu Bread	88.7	316.7	3.5	9.5	2.0	61.8	23.2
Buffalo (Tatanka) Roast	119.0	141.7	2.9	26.9	1.12	2.0	67.1
Choke Cherry (Canpa) Pudding	230.0	164.3	0.3	2.0	0.6	38.4	58.8
Potato (Maka bdo) Soup	140.8	56.3	1.5	4.3	0.8	6.4	87.2
Corn Balls (Wahuwapa Wasna)	136.4	487.1	21.9	8.6	1.6	63.9	4.0
Pemmican	59.1	211.0	7.4	12.7	1.0	23.4	55.4
Plum (Kan'ta) Pudding	102.0	72.8	0.0	0.2	1.8	18.0	80.0
Turtle Soup	48.3	19.3	0.5	1.4	0.2	2.3	95.7
Wild Rice (Psi) Soup w/BB	127.0	50.8	0.8	3.0	0.7	7.9	87.7

*Serving size for soups=250g, bread=1 slice or 28g , pudding= 0.5 cups or 140g, meat= 3 ounces or 84g, Pemmican=1 ounce or 28g, corn balls =1 ounce or 28g.

Table 2. Mineral content of traditional Native American foods.

Native American Food	Calcium (mg/100g)	Cu (ug/g)	Iron (ug/g)	Mg (mg/100g)	Mn (ug/g)	Ph (mg/100g)	Sodium (mg/100g)	K (mg/100g)	Zinc (ug/g)
Dried Corn Soup	13	<1	7.7	17	1.2	54	159	13	8.9
Fish Head Soup	<10	<1	3.0	1	<1	15	26	33	1.5
Parched Corn Soup	11	<1	8.2	29	1.7	63	90	188	5.4
Bean Soup	15	1	15.9	23	1.8	59	223	42	4.3
Hominy (Pasdaypi) Soup	<10	<1	7.8	12	<1	42	135	22	10.7
Buffaloberry (Mastinpute) Pudding	24	<1	11.0	14	1.8	23	133	17	1.7
Tripe Soup	14	<1	4.9	8	<1	17	62	33	2.9
Kabubu Bread	176	2	102.0	29	8.3	169	157	365	18.5
Buffalo (Tatanka) Roast	17	2	39.0	19	<1	176	278	41	72.5
Choke Cherry (Canpa) Pudding	45	1	20.1	20	4.7	34	160	17	3.5
Potato (Maka bdo) Soup	13	<1	5.4	15	1.0	51	212	45	4.5
Corn Balls (Wahuwapa Wasna)	<10	3	23.3	104	5.4	284	336	245	20.5
Pemmican	56	4	38.6	30	5.6	134	368	25	19.0
Plum (Kan'ta) Pudding	<10	<1	5.2	5	<1	9	137	18	<0.5
Turtle Soup	2	<1	16.6	1	<1	14	027	38	2.9
Wild Rice (Psi) Soup w/BB	11	<1	6.6	18	1.7	89	216	44	5.2

Parched Corn Soup had 1tsp salt along with 1 C parched corn and 3 cups water in the entire recipe. Corn balls recipe consisted of 2 C parched corn and 6 Tablespoons of pork lard. Names within parenthesis are Dakota names for the food items.

Table 3. Comparisons between traditional Native American foods and their contemporary counterparts.

Food Product	Calories (KCal/serving)	Calories (KCal/100g)	Fat (g/100g)	Protein (g/100g)	CHO (g/100g)	Minerals (g/100g)
Traditional Native American Bean Soup	170.0	68.0	1.2	3.9	10.4	0.70
Contemporary Bean Soup	55.5	66.1	2.45	3.5	7.6	0.65
Buffalo Roast	119.0	141.7	2.9	26.9	2.0	1.12
Beef Roast	160.4	191.0	8.6	28.4	0.0	0.71

Composition for contemporary bean soup and beef roast are quoted from Food Processor For Windows Version 8, ESHA Research, Salem, OR.

Table 4. Composition of selected prepared soups.

Soup	Calories (KCal/serving)	Carbohydrate (g/100g)	Protein (g/100g)	Fat (g/100g)	Sodium (mg/100g)	Calcium (mg/100g)
Cream Salmon Soup	261.0	2.64	11.39	5.12	621.37	117.37
Sweet & Sour Soup	71.7	5.86	1.33	0.34	529.49	11.14
Hot & Sour Soup (Hot & Spicy Chinese)	162.0	2.05	6.20	3.32	414.17	12.00
Tuna w/ Rice & Mushroom Soup	352.0	13.59	8.18	5.87	374.37	39.14
Egg Drop Soup	73.0	0.45	3.08	1.57	298.60	8.60
Minestrone Soup WTW	120.0	7.73	1.68	0.67	255.31	33.59
Gumbo Soup-No Rice	178.0	4.53	6.05	3.46	248.83	31.53
Chicken & Rice Soup WTW	178.0	5.71	2.02	0.50	241.87	20.16
Crab Bisque Soup	235.8	4.65	8.23	4.72	235.69	101.93
Wonton Soup	188.5	5.93	5.84	2.92	225.26	12.89
Borscht-Beet Soup	78.5	3.37	1.37	1.64	202.25	19.16
Bouillabaise Soup/Chowder	241.0	2.11	14.80	3.94	183.12	36.43
Lobster Bisque Soup	251.8	5.11	8.17	5.29	181.55	110.87
Lobster Gumbo Soup	178.0	8.39	4.01	2.87	180.91	46.91
Shrimp Gumbo Soup	169.8	7.67	3.99	2.80	140.76	42.81
Menudo-Mexican Beef Soup	117.6	2.57	5.55	1.59	136.57	6.74
Creamy Portobello Mushroom Soup IFI	82.3	4.12	1.65	1.23	127.57	8.23
Cream of Broccoli Soup	205.8	7.03	3.68	5.15	85.96	108.07
Fisherman's Soup	193.8	4.83	9.66	2.20	73.66	60.71
Pork Rice and Vegetable Soup	126.9	3.21	5.04	1.82	22.70	6.46
Chilli	170.0	8.58	2.68	2.64	414.00	17.00
Clam Chowder	165.0	6.70	3.82	2.66	400.00	75.00
Potato Soup	175.0	4.70	0.72	0.97	410.00	8.00
Chicken Noodle Soup	126.0	8.40	3.02	0.67	248.59	20.16
Tomato Soup	162.5	8.99	2.46	2.42	300.00	64.00

*Serving size for soup is 1 cup or 250 gm. Adapted from Food Processor for Windows, ESHA Research, Salem, OR.

A narrow range in fat content (0.3g to 2.4g/100g) was noted in traditional soups in contrast to a range of 0.34g to 5.87g/100g that occurred in the soups reported in the literature (ESHA Research). A fat content of 3 grams per serving or less will permit a low-fat claim according to current labeling regulations. All soups tested in this study with the exception of Hominy Soup and Potato Soup qualified as low fat soups. A conventional serving size for soup may vary between 244 to 250 grams per serving (generally 1 cup). The highest content of fat was noted in Wahuwappa Wasna, a dessert that contained 6 tablespoons of lard in two cups of parched corn. Buffalo roast contained a significantly lower fat content (2.9g/100g) in comparison to beef roast (8.6g/100g). Sodium content in the 8 soups compared favorably (13 to 45 mg/100g) to corresponding values for soups found in the computerized data banks (22.7 to 621.4 mg/100g, table 4). Energy in traditional Native American soups derived from consuming typical serving

size ranged from 48.3KCal to 209.3 KCal. Table 4 shows a higher range (51.7 to 352 KCal) in energy in non-Native American conventionally prepared soups. Tribal elders have noted that traditional foods are prepared differently today with added sugar and fats in order to increase their palatability. This practice will undoubtedly yield less desirable nutritional outcomes with respect to calories, fat and sodium content.

SUMMARY AND CONCLUSION

A comparison of nutrient content on a serving-for-serving basis showed that traditional Native American foods analyzed in this study were generally healthier than contemporary recipes in relation to key nutrients such as fat, calories and sodium. With the exception of the corn balls, the majority of the recipes tested were low in fat and sodium.

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