United States General Accounting Office

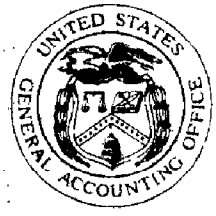
GAO

Report to the Chairman, Committee on Science, Space, and Technology, House of Representatives

October 1993

FOOD NUTRITION

Better Guidance Needed to Improve Reliability of USDA's Food Composition Data



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GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-254330

October 25, 1993

The Honorable George E. Brown, Jr.
Chairman, Committee on Science,
Space, and Technology
House of Representatives

Dear Mr. Chairman:

As the U.S. population's interest in the relationship between nutrition and health increases, federal agencies and others are seeking more and more information on the composition of foods. They need to know not only the vitamin and mineral content of foods but also such information as caloric, fat, cholesterol, and carbohydrate values. From the federal government's perspective, food composition information is essential to 22 federal agencies in making public policy decisions relating to their programs, such as the U.S. Department of Health and Human Services in its efforts to improve Americans' health through improved nutrition, the U.S. Department of Agriculture (USDA) in its projects to learn more about the nutritional content of school meals, and the U.S. Department of Defense in its surveys to evaluate the nutritional adequacy of military personnel's diets. Additional users include (1) persons and institutions conducting medical research; (2) dietitians responsible for meal planning in hospitals, nursing homes, and schools; and (3) commercial enterprises that market food composition data bases and weight-reduction programs.

USDA's Human Nutrition Information Service (HNIS) maintains the primary repository of food composition data in the United States. The data are available to the general public by computer from HNIS' National Nutrient Data Bank Electronic Bulletin Board and are also published in USDA's Agriculture Handbook No. 8—referred to as Handbook 8. The data bank and handbook are designed to accommodate about 70 items of composition data for each of about 5,300 food items. (See app. I for examples of Handbook 8 food data.) HNIS obtains some food composition data through its own contracts with universities and food testing laboratories; however, about 85 percent of the information is obtained from either the food industry or scientific literature. No entity is required to provide data to HNIS. Private industry provides the data voluntarily.

You asked us to (1) review the criteria and procedures that USDA uses to ensure the reliability of food composition data before they are included in Handbook 8 and (2) assess the extent to which USDA coordinates and

exchanges food composition data with other countries and international groups that maintain similar data bases.

Results in Brief

Because HNIS' criteria and procedures for evaluating food composition data lack specificity, HNIS staff have considerable latitude in determining the amount and type of scientific information needed to qualify data for entry into the Handbook 8 data base. In some cases, data have been accepted into the data base with little or no supporting information on the testing and quality assurance procedures used to develop the data. For example, data on bacon-cheeseburgers included in Handbook 8 came primarily from brochures provided by fast-food chains; the brochures generally did not explain how the nutrient values were determined. Consequently, HNIS cannot be assured that all the data in Handbook 8—used in so many nutritional decisions—are reliable.

HNIS cooperates and exchanges food composition data with foreign countries and international groups. Many foreign countries depend—some quite heavily—on HNIS' data as a source for their own data bases. On the other hand, HNIS seldom uses foreign food composition data. According to HNIS officials, they seldom use foreign data because, among other things, (1) U.S.-produced data are generally available and (2) the nutrient content of foreign-grown foods differs from that of the same foods grown in the United States because of differences in climate, processing techniques, handling, and storage. HNIS also has participated in international efforts aimed at producing or improving food composition data for various parts of the world.

Background

HNIS is a small agency within USDA that is responsible for conducting applied research in three areas: (1) food consumption—what Americans buy and eat; (2) food composition—the nutrient content of foods; and (3) nutrition education—helping Americans make informed food choices. As of June 1993, the agency had the equivalent of 105 permanent, full-time employees; its budget for fiscal year 1993 was $8.5 million. In 1993, HNIS' Nutrient Data Research Branch, which is responsible for compiling and disseminating food composition data, had about 17 employees and a budget of $990,000, including $200,000 to contract for food composition analyses.

The Nutrient Data Research Branch has 13 principal investigators, who are responsible for gathering data on nutrients for specific food groups. These

principal investigators identify and collect nutrient data from analyses conducted by industry, government, and universities and through HNIS contracts. The investigators evaluate the data and enter accepted data into HNIS' computerized nutrient data base. Because data on a specific nutrient in a food item are often obtained from several sources, the principal investigators must combine the data for the nutrient into a single value for Handbook 8 purposes.

Some Handbook 8 Data May Not Be Reliable

HNIS does not provide its principal investigators with specific criteria for evaluating food composition data obtained from industry and scientific literature. As a result, principal investigators rely primarily on their professional judgment, and most investigators have entered data into Handbook 8 without having adequate information on how the data were developed. In addition, HNIS staff have not appropriately directed the food composition analyses done by laboratories under HNIS' contracts. Without adequate criteria for reviewing data and better control over contracted analyses, HNIS cannot be assured that Handbook 8 data are reliable. Another group—the Food Composition Data Working Group of the Interagency Committee on Nutrition Monitoring—has also questioned the reliability of HNIS' data, that is, the (1) accuracy of the data, (2) adequacy of analytical methods used to produce the data, (3) sufficiency of documentation related to the data, and (4) adequacy of documentation on the criteria for acceptance of data.

HNIS Does Not Provide Specific Criteria for Evaluating Nutritional Information

Because HNIS' two documents that serve as guidance for evaluating data are so general, they cannot ensure that investigators will apply the same standards in reviewing data for inclusion into Handbook 8. For example, HNIS' Outline for Validation and Documentation of Analytical Data, a three-page document, provides this instruction for the number of samples used in developing data: "The larger the number of samples, the better the mean value represents the true mean." However, the outline does not specify the minimum number of samples needed before the data will be accepted for Handbook 8. Unless a sufficient number of samples of a food item are available, the nutrient values for that food in Handbook 8 may not be reliable. For example, officials of the American Association for Laboratory Accreditation said that at least six samples of a food item should be tested when nutrient values are being developed.

The other document used as guidance—Guidelines for Revising Agriculture Handbook 8—also lacks specific standards for evaluating food

composition data. For example, in advising investigators on determining whether the data are current enough, the guidelines state,

> Select data analyzed 1960 or later. . . . This date was set arbitrarily and should be revised as circumstances warrant. The date should be later where agricultural or manufacturing practices have changed or where analytical methods were improved since 1960.

HNIS Staff Accept Poorly Documented Information

Most of HNIS' principal investigators have accepted some data that did not have sufficient supporting information on the testing and quality assurance procedures used to develop the data.

According to officials of several federal agencies and private laboratory associations we contacted, determining the scientific validity of food composition data requires a review of the quality assurance measures used to produce the data. The officials considered that, generally, information on the following five quality assurance measures are needed to adequately evaluate the quality of food composition data: (1) the number of samples analyzed in developing the data, (2) the method of sample selection, (3) the protection and treatment of the sample prior to analysis (for example, refrigeration), (4) the method of analysis, and (5) the laboratory procedures used to ensure accurate analytical results.

In updating 12 food items for the 1991 Supplement to Handbook 8, HNIS' principal investigators often used supporting documentation that lacked information on the five quality assurance measures. The investigators collected data from 48 different sources for these 12 food items. Table 1 shows how many of the five quality assurance measures were contained in the 48 data sources. For example, 10 data sources contained information on all five quality assurance measures; 8 sources had information on only one measure; and 7 sources had no information on any of the measures.

Table 1: Quality Assurance Measures Contained in Source Documentation Collected by Principal Investigators

Number of quality assurance measures in documentation	Number of data sources with documentation
5	10
4	14
3	6
2	3
1	8
0	7
Total	**48**

Source: GAO's analysis of HNIS' data.

The quality assurance measure most often missing from the source documentation was a description of the laboratory procedures used to ensure accurate analytical results. This information was missing from 37 (or 77 percent) of the 48 data sources. Each of the remaining four quality assurance measures was missing from about one-third of the data sources.

Data sources for three food items illustrate the differences in the documentation reviewed by the principal investigators. When we reviewed the laboratory studies on fish, we found that they included information on all five quality assurance measures. In contrast, the nutrient data on honey-roasted almonds were supported only by documentation on the number of samples analyzed. Nevertheless, these data on honey-roasted almonds were incorporated into Handbook 8. Similarly, the documentation used to support the nutrient values for bacon-cheeseburgers consisted of food nutrition brochures or pamphlets prepared by several fast-food chains. These brochures and pamphlets generally did not explain how the nutrient values were determined.

HNIS Does Not Appropriately Direct Contracted Studies

HNIS requires the laboratories it contracts with for food nutrient data to have quality assurance procedures, and HNIS specifies the analytical methods to be used. However, HNIS officials told us that they do not regularly visit the laboratories to ensure that the required procedures and methods are being used.

Furthermore, to assess the accuracy of its contract laboratories' analytical work, HNIS requires the laboratories to periodically analyze control samples of food items whose nutrient values are known. Under HNIS' contracts, laboratories usually purchase the food items to be analyzed for

Handbook 8 from local grocery stores—the samples are not provided by HNIS or its quality control contractor. Control samples, however, are shipped directly from HNIS or its quality control contractor to the contract laboratories. Because the laboratories know that these are control samples, they may give special attention to the analyses of the samples, thereby reducing the usefulness of this quality control effort.

Finally, HNIS' contracts for food composition data generally require that only two samples be analyzed. According to Food and Drug Administration and Food Safety and Inspection Service officials, as well as representatives of laboratory associations, data produced from analyzing only two samples are not sufficient for inclusion in Handbook 8. As pointed out earlier in this report, laboratory experts told us that at least six samples should be analyzed before data are accepted. More samples result in additional data points, giving greater confidence that test results are accurate.

HNIS officials recognize that more visits to laboratories, more analytical samples of each food item, and better disguising of control samples would be preferable. However, according to the officials, these measures would result in fewer foods being analyzed, because of limited funds. Consequently, a trade-off is made between the reliability of data and the quantity of foods analyzed.

Others Have Also Raised Concerns About Handbook 8 Data

Another review of data entered into the Handbook 8 data base has also questioned the reliability of the food composition data. In 1989, a federal interagency working group expressed concern about the (1) accuracy of the data, (2) adequacy of analytical methods used to produce the data, (3) sufficiency of documentation related to the data, and (4) adequacy of documentation on the criteria for acceptance of data. The working group identified several projects to address their concerns, such as establishing criteria for evaluating the quality of a data base. These projects have since been incorporated into the 10-year plan for the National Nutrition Monitoring and Related Research Program, a comprehensive effort spanning the nutrition-monitoring activities of 22 federal agencies. (See app. II.)

According to an HNIS member of the working group, none of the projects had been completed as of June 1993—about 4 years after the concerns were identified. Two primary reasons for not completing the projects were

limited staff resources and the long-term nature of the projects. (See app. III.)

HNIS Cooperates and Exchanges Food Composition Data With Other Countries

Over the years, HNIS has cooperated and exchanged food composition data with representatives of international groups and foreign countries. HNIS has a policy of sharing its food composition data with any person or group requesting the data, and all of its published data are available to anyone who wants to use the information.

HNIS officials informed us that the agency's food composition data are used extensively by other countries. A total of 56 individuals from 28 foreign countries are on a mailing list to receive periodic revisions and supplements to Handbook 8. These individuals represent a variety of foreign organizations, such as hospitals, universities, and government offices. The officials explained that other countries often use HNIS' data because the countries (1) lack the scientific resources and funding to produce analytical nutrient values and (2) accept HNIS' data as being adequate for their purposes.

HNIS officials also informed us that their use of foreign food composition data is minimal, principally because they believe analytical data produced in the United States are generally available for the key foods in the American food supply. According to the officials, other reasons for not using foreign data include (1) differences in the nutrients contained in food produced in the United States and the same food produced elsewhere because of differences in climate, processing techniques, formulas, handling, and storage in other parts of the world; (2) for meat products, differences in feeding regimens for the animals and the amount of fat in the product sold to consumers; and (3) differences in the terminology (names) for foods in different countries.

HNIS has also participated in a number of international efforts aimed at producing or improving food composition data for various parts of the world. These efforts include participating in international organization activities, participating in international collaborative research studies relating to nutrients in foods, and hosting visiting foreign scientists who come to HNIS for assistance in developing their own data bases. For example, HNIS staff have served on or participated in international food composition committees or activities such as the following:

- International Network of Food Data Systems, whose goal is to network data bases between countries worldwide.
- Committee on Data for Science and Technology, whose goal is to improve the quality, reliability, processing, management, and accessibility of data important to the scientific community.
- International Union of Food Science and Technology, whose purpose is to share food science technology.
- National Nutrient Data Bank Conference, which encourages international attendees and papers relating to food composition data.

Conclusions

HNIS' Agriculture Handbook No. 8 is the world's principal source of nutrient information, and its data are essential to a wide spectrum of users, including researchers, federal agencies, and international organizations. Because of the widespread use and importance of HNIS' food composition data, it is critical that Handbook 8 be as accurate as possible. However, its accuracy may be in question because (1) some Handbook 8 data have so little documentation on how the data were produced that it is possible some nutrient values are not reliable and (2) HNIS does not appropriately direct the generation of food composition data under its contracted laboratory studies. If some Handbook 8 data are unreliable, there could be implications for users, such as the federal agencies that use the data for food consumption studies.

Recommendations to the Secretary of Agriculture

We recommend that the Secretary of Agriculture direct the HNIS Administrator to develop (1) specific quality assurance criteria for HNIS staff to use in evaluating food composition data obtained from others before the data are included in Handbook 8 and (2) procedures to better direct the generation of food composition data under HNIS' contracts.

Agency Comments and Our Evaluation

HNIS provided written comments on a draft of this report. HNIS generally agreed with the report's findings, conclusions, and recommendations. HNIS concurred with our two recommendations to improve the reliability of its food composition data and will implement them as quickly as possible within current fiscal and budgeting constraints. HNIS also provided some additional information on the rationale for its existing procedures. We made appropriate changes to the report to incorporate these comments. HNIS' comments and our evaluation of them are presented in appendix IV.

Scope and Methodology

We identified the guidance and procedures that HNIS uses to ensure the reliability of its food composition data through discussions with HNIS officials and reviews of various documents. Because the HNIS guidance and procedures provided to us were vague and inexplicit, we contacted officials of other entities to determine what they believed to be components of an acceptable quality assurance system for compiling food composition data. Specifically, we contacted officials of (1) federal agencies—the Food and Drug Administration's food labeling office, USDA's Food Safety and Inspection Service's food labeling office, and USDA's Agricultural Research Service's Nutrient Composition Laboratory; (2) private associations—the American Association for Laboratory Accreditation, the American Council of Independent Laboratories, and the Association of Official Analytical Chemists, International; (3) several private firms that maintained food composition data bases; and (4) the University of Maryland, which has an HNIS contract laboratory.

Using the criteria developed from these sources, we reviewed the amount and types of information used by each of the eight HNIS principal investigators who were responsible for evaluating data for specific food groups for the 1991 Supplement to Handbook 8. The 1991 Supplement, published in May 1992, was the most recently published supplement at the time of our review.

We focused on determining whether there was evidence that HNIS staff had information on the five quality assurance measures cited in this report when they evaluated food composition data for inclusion in Handbook 8. As agreed with your office, we did not review the accuracy of the information provided, nor did we independently analyze the foods to corroborate the food composition data provided.

To address the extent to which USDA coordinates and exchanges food composition data with international organizations that maintain similar data bases, we met with HNIS officials to discuss and obtain documentation on (1) the number of foreign countries on HNIS' mailing list to receive periodic updates to Handbook 8 data; (2) the extent to which HNIS used other countries' data; and (3) the extent to which HNIS staff participated in international food composition activities.

We performed our review work from September 1992 through August 1993 in accordance with generally accepted government auditing standards.

We are sending copies of this report to the Secretary of Agriculture; the Secretary of Health and Human Services; the Director, Office of Management and Budget; and other interested parties. We will also make copies available to others upon request.

This work was performed under the direction of John W. Harman, Director of Food and Agriculture Issues, who can be reached on (202) 512-5139, if you or your staff have any questions. Major contributors to this report are listed in appendix V.

Sincerely yours,

J. Dexter Peach
Assistant Comptroller General

Contents

Abbreviations

GAO	General Accounting Office
HNIS	Human Nutrition Information Service
USDA	U.S. Department of Agriculture

Examples of Handbook 8 Pages

SWEETS
Desserts, puddings, lemon, ready-to-eat

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Nutrients and units		Amount in 100 grams, edible portion			Amount in edible portion of common measure of food		Amount in edible portion of 1 pound of food as purchased
		Mean	Standard error	Number of samples	Approximate measure and weight: 1 oz = 28.35 g	1 can (5 oz) = 142 g	Refuse: 0
(A)		(B)	(C)	(D)	(E)	(F)	(G)
Proximate:							
Water	g	71.6	0.099	30	20.3	101.6	324.7
Food energy	kcal	125			35	177	565
	kJ	522			148	741	2,366
Protein (N x 6.25)	g	0.1	0.008	11	0.0	0.1	0.3
Total lipid (fat)	g	3.0	0.068	30	0.9	4.3	13.7
Carbohydrate, total	g	25.0			7.1	35.5	113.6
Crude fiber	g	0.0	0.000	6	0.0	0.0	0.0
Ash	g	0.3	0.022	29	0.1	0.4	1.2
Minerals:							
Calcium[1]	mg	2		1	1	3	9
Iron	mg						
Magnesium	mg	1		1	0	2	5
Phosphorus	mg	5		1	1	7	23
Potassium[1]	mg	1		1	0	1	4
Sodium[1]	mg	140		1	40	199	635
Zinc	mg						
Copper	mg						
Manganese	mg						
Vitamins:							
Ascorbic acid	mg						
Thiamin	mg						
Riboflavin	mg						
Niacin	mg						
Pantothenic acid	mg						
Vitamin B-6	mg						
Folate	mcg						
Vitamin B-12	mcg	0			0	0	0
Vitamin A	RE						
	IU						
Lipids:							
Fatty acids:[2]							
Saturated, total	g	0.45			0.13	0.64	2.06
4:0	g						
6:0	g						
8:0	g						
10:0	g						
12:0	g						
14:0	g	0.00			0.00	0.00	0.01
16:0	g	0.30			0.08	0.42	1.36
18:0	g	0.15			0.04	0.21	0.69
Monounsaturated, total	g	1.30			0.37	1.84	5.86
16:1	g	0.01			0.00	0.02	0.05
18:1	g	1.29			0.36	1.82	5.83
20:1	g						
22:1	g						
Polyunsaturated, total	g	1.14			0.32	1.61	5.15
18:2	g	1.06			0.30	1.50	4.80
18:3	g	0.08			0.02	0.11	0.36
18:4	g						
20:4	g						
20:5	g						
22:5	g						
22:6	g						
Cholesterol	mg	0			0	0	0
Phytosterols	mg						
Amino acids:							
Tryptophan	g	0.000			0.000	0.001	0.002
Threonine	g	0.002			0.001	0.003	0.011
Isoleucine	g	0.003			0.001	0.004	0.012
Leucine	g	0.009			0.003	0.013	0.042
Lysine	g	0.002			0.000	0.002	0.007
Methionine	g	0.001			0.000	0.002	0.007
Cystine	g	0.002			0.000	0.002	0.007
Phenylalanine	g	0.004			0.001	0.005	0.016
Tyrosine	g	0.003			0.001	0.004	0.011
Valine	g	0.004			0.001	0.005	0.016
Arginine	g	0.004			0.001	0.005	0.016
Histidine	g	0.002			0.001	0.003	0.009
Alanine	g	0.005			0.001	0.007	0.022
Aspartic acid	g	0.005			0.001	0.007	0.024
Glutamic acid	g	0.014			0.004	0.018	0.062
Glycine	g	0.002			0.001	0.003	0.011
Proline	g	0.007			0.002	0.009	0.030
Serine	g	0.003			0.001	0.004	0.014

[1] Source added.
[2] Values for product with partially hydrogenated soybean oil.

AH-8-19 (1991)
NDB No. 19380

FINFISH

Catfish, Channel, wild, raw

Ictalurus punctatus (Rafinesque)

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Nutrients and units		Amount in 100 grams, edible portion			Amount in edible portion of common measures of food		Amount in edible portion of 1 pound of food as purchased
		Mean	Standard error	Number of samples	Approximate measure and weight: 3 oz = 85 g	1 fillet = 169 g[1]	Refuse: 0
(A)		(B)	(C)	(D)	(E)	(F)	(G)
Proximate:							
Water	g	80.36	0.301	5	68.31	127.77	364.51
Food energy	kcal	96			81	152	439
	kJ	399			339	636	1,811
Protein (N x 6.25)	g	16.38	0.226	5	13.92	26.04	74.30
Total lipid (fat)	g	2.82	0.504	5	2.40	4.49	12.79
Carbohydrate, total	g	0.00			0.00	0.00	0.00
Crude fiber	g	0.00			0.00	0.00	0.00
Ash	g	0.99	0.024	5	0.82	1.53	4.36
Minerals:							
Calcium	mg	14	7.641	5	12	23	65
Iron	mg	0.30	0.024	4	0.25	0.47	1.36
Magnesium	mg	23	0.000	4	20	37	105
Phosphorus	mg	209	18.568	4	178	332	947
Potassium	mg	368	19.999	4	304	569	1,624
Sodium	mg	43	3.871	4	37	68	195
Zinc	mg	0.51	0.032	4	0.43	0.81	2.30
Copper	mg	0.054	0.008	4	0.038	0.054	0.153
Manganese	mg	0.025	0.005	4	0.021	0.040	0.113
Vitamins:							
Ascorbic acid	mg	0.7	0.225	4	0.6	1.2	3.3
Thiamin	mg	0.210	0.030	4	0.178	0.334	0.953
Riboflavin	mg	0.072	0.008	5	0.061	0.114	0.327
Niacin	mg	1.907	0.167	4	1.621	3.033	8.662
Pantothenic acid	mg	0.768	0.120	4	0.650	1.216	3.470
Vitamin B-6	mg	0.116	0.012	4	0.099	0.184	0.528
Folate	mcg	10	0.011	2	8	15	45
Vitamin B-12	mcg	2.23	0.185	4	1.90	3.56	10.12
Vitamin A	RE	15			13	24	68
	IU	80	0.000	4	42	79	227
Lipids:							
Fatty acids:							
Saturated, total	g	0.722			0.613	1.147	3.273
4:0	g						
6:0	g						
8:0	g						
10:0	g						
12:0	g						
14:0	g	0.084		10	0.056	0.102	0.292
16:0	g	0.442		10	0.376	0.702	2.004
18:0	g	0.180		10	0.139	0.239	0.681
Monounsaturated, total	g	0.844			0.717	1.342	3.828
16:1	g	0.178		10	0.150	0.280	0.798
18:1	g	0.664		10	0.566	0.945	2.696
20:1	g	0.021		10	0.018	0.034	0.097
22:1	g	0.009		10	0.007	0.013	0.037
Polyunsaturated, total	g	0.868			0.736	1.376	3.921
18:2	g	0.101		10	0.086	0.160	0.456
18:3	g	0.071		10	0.060	0.112	0.320
18:4	g	0.013		10	0.011	0.020	0.057
20:4	g	0.148		10	0.127	0.237	0.677
20:5	g	0.130		10	0.111	0.207	0.592
22:5	g	0.100		10	0.085	0.160	0.455
22:6	g	0.294		10	0.199	0.373	1.063
Cholesterol	mg	66	3.930	4	48	92	262
Phytosterols	mg						
Amino acids:							
Tryptophan	g	0.163			0.156	0.292	0.832
Threonine	g	0.718			0.610	1.142	3.257
Isoleucine	g	0.756			0.642	1.200	3.424
Leucine	g	1.331			1.132	2.117	6.039
Lysine	g	1.504			1.278	2.392	6.824
Methionine	g	0.485			0.412	0.771	2.199
Cystine	g	0.176			0.149	0.279	0.796
Phenylalanine	g	0.939			0.544	1.017	2.901
Tyrosine	g	0.553			0.470	0.879	2.508
Valine	g	0.844			0.717	1.342	3.828
Arginine	g	0.980			0.833	1.558	4.446
Histidine	g	0.482			0.410	0.767	2.187
Alanine	g	0.991			0.842	1.575	4.494
Aspartic acid	g	1.677			1.426	2.667	7.606
Glutamic acid	g	2.445			2.078	3.888	11.091
Glycine	g	0.786			0.668	1.250	3.566
Proline	g	0.579			0.492	0.921	2.627
Serine	g	0.668			0.568	1.063	3.031

[1] Yield from 2 lb whole fish.

AH-8-15 (1991)
NDB No. 15010

The National Nutrition Monitoring and Related Research Program

The National Nutrition Monitoring and Related Research Program is a comprehensive effort spanning all of the nutrition-monitoring activities of 22 federal agencies. The National Nutrition Monitoring and Related Research Act of 1990, enacted on October 22, 1990, mandated the program. One of the purposes of the act was to improve the quality of data on the status of national nutrition and health and related data bases.

The Operational Plan for the National Nutrition Monitoring System lays out three goals: (1) greater coordination among components of the National Nutrition Monitoring System; (2) improved information dissemination and exchange; and (3) an improved research base for nutrition monitoring. The Food Composition Data Working Group of the Interagency Committee on Nutrition Monitoring contributes to the third goal. The working group is responsible for considering the information needed to evaluate current food composition data and the analytic methodology and quality control related to producing the data.

The 22 federal agencies involved with the National Nutrition Monitoring and Related Research Program spend hundreds of millions of dollars each year to carry out food nutrition-related activities, such as nutrition monitoring, labeling, and related research. The U.S. Department of Agriculture (USDA) alone is expected to spend over $300 million during fiscal year 1993 in support of nutrition research, education, and monitoring.

The following illustrate the wide range of nutrition-monitoring activities listed in the Ten-Year Comprehensive Plan for the National Nutrition Monitoring and Related Research Program:

- Third National Health and Nutrition Examination Survey. This is the third in a series of surveys conducted by the National Center for Health Statistics. The survey monitors the overall nutritional status of the American people. It includes a physical examination, biochemical analyses of blood and urine, x-rays, and interviews on dietary intake.
- Nationwide Food Consumption Survey. This survey, conducted periodically by the Human Nutrition Information Service (HNIS), also monitors the overall dietary status of Americans. It describes food consumption behavior and assesses the nutritional content of diets. The survey is used for policies relating to food production and marketing, food safety, food assistance, and nutrition education.
- Navajo Health and Nutrition Survey. This survey was planned by the Indian Health Service to establish data on nutrition-related chronic

diseases and to generate a valid description of the nutritional status and dietary behaviors of the Navajo people. The survey includes collecting information on dietary intake, blood pressure, and full blood chemistry.

- Nutritional Evaluation of Military Feeding Systems and Military Populations. The Department of Defense conducts periodic surveys and assessments to monitor the nutritional adequacy of the diet consumed by military personnel in peacetime and during combat operations. The data are used to monitor and evaluate the effectiveness of nutritional initiatives for military feeding systems and health promotion programs.
- School Food Authority Menu Modification Demonstration Projects. These projects will enable USDA's Food and Nutrition Service to learn more about the processes and effects of reducing the fat and sodium content of foods served by five school food authorities. The projects will provide information about the nutritional content of the menus offered by the school food authorities.

Concerns Raised About Handbook 8 Data by Interagency Food Composition Data Working Group

During its first meeting in August 1989, members of the Food Composition Data Working Group of the Interagency Committee on Nutrition Monitoring expressed several concerns about the quality of the food composition data in HNIS' Nutrient Data Base. These concerns included the

- accuracy of the data;
- adequacy of analytical methods and quality control procedures used to produce the data;
- sufficiency of documentation related to the data, including dates of analyses, analytical methods, and references for methods used; and
- adequacy of documentation on criteria for acceptance of new or revised data into the data base.

During the meeting, the working group discussed five projects that needed to be done to address their concerns. One of these focused on establishing criteria for evaluating the quality of the data base for priority nutrients and evaluating the data base using the criteria. A second project was to identify needed improvements in nutrient measurement systems, that is, analytical methods, quality control procedures, standard reference materials, etc.

An HNIS official, a member of the working group, informed us that some work has been done on the five projects, but none had been completed as of June 1993—about 4 years after the concerns were identified. The official said that after the National Nutrition Monitoring and Related Research Act of 1990 was enacted in October 1990, the working group decided to give priority to preparing the Ten-Year Comprehensive Plan for the National Nutrition Monitoring and Related Research Program. All five projects have been incorporated into the plan. The March 1992 plan, which covers the years from 1992 through 2002, does not state specifically when each of the projects will be completed. The official also said that (1) limited staff is available to work on the projects, and the staff still have to do their regular job-related work and (2) the projects are long-term, not short-term, projects.

Comments From the Human Nutrition Information Service

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

United States Department of Agriculture

Human Nutrition Information Service

Beltsville Research Center
Beltsville, Maryland
20705

SEP 16 1993

Mr. John W. Harman, Director
Food and Agriculture Issues
General Accounting Office
Washington, D.C. 20548

Dear Mr. Harman:

Thank you for giving me the opportunity to comment on your recent draft report entitled "Better Guidance Needed to Improve Reliability of USDA's Food Composition Data." We appreciate the opportunity to have the General Accounting Office evaluate our procedures, because, as your report notes, "Agriculture Handbook 8 is the world's principal source of nutrient information and its data are essential to a wide spectrum of users, including researchers, federal agencies, and international organizations." We concur in principle with your two recommendations to improve the reliability of our food composition data, and we will move forward as quickly as possible to implement them within current fiscal and budgeting constraints.

Food Composition is one of three major HNIS functions (food composition, food consumption, and nutrition education) that must compete for resources. In this regard, I would like to note the following:

- In 10 of the last 12 fiscal years, Congress has provided HNIS with a lower level of resources than had been requested by the President. For the fiscal year beginning October 1, 1993, the agency's request was reduced by almost $2 million from $13.0 million to $11.1 million. The reductions in FY 1994 will force a substantial downsizing of the agency's staff and may delay once again implementation of plans to redesign and modernize the Nutrient Data Bank.

- The budget you referenced of $400,000 for the Nutrient Data Research Branch was their original research budget for FY 1993. Of this amount, $200,000 was earmarked for the Nutrient Data Bank redesign. These funds were redirected, because the redesign was postponed to allow additional planning. The actual discretionary budget for the branch was closer to $200,000 and it was used to support laboratory analysis of specific food items.

A number of competing factors complicate the development of food composition tables. They are (a) the need to ensure the best possible values; (b) the need to publish complete nutrient profiles for each food to prevent researchers from having to estimate missing values, (c) the expense of obtaining analytical

Mr. John W. Harman 2

data, and (d) the fact that the contribution of data to the Nutrient Data Bank by the food industry is strictly voluntary.

Specifically, we would like to call your attention to the following issues:

See comment 1.

- Your report states that staff accept poorly documented information. In most cases, the data generated by HNIS contracts are the only data for which there are complete documentation, that is, documentation that includes all of the GAO recommended quality assurance measures.

- Our major source of data is the food industry. We regret that you omitted the statement included in your draft summary that explained "Nobody is required to provide food composition data to HNIS," since submission of data from industry is strictly voluntary and we seldom receive complete documentation regardless of the number of times we request it. We sometimes use data without adequate documentation until it can be replaced with more reliable information. Even with little documentation, we believe it is better to include those data that have been developed by industry as the basis for calculating nutrient labels than to include no data, at all, for an item.

See comment 2.

- Your report is critical of the fact that sometimes we use fewer than six samples to derive Handbook 8 values. Data users have been emphatic about the need for HNIS to provide complete nutrient profiles of foods, even if those values are based on limited data. We know from past experience that if values are not available from Handbook 8, different researchers derive different estimated values for their own purposes. This lessens the comparability of their respective research and, thus, its usefulness to the scientific community.

- Publication of the mean values with standard errors and sample sizes for each nutrient gives data users a means by which to assess the certainty of the values.

- Few studies alone provide the six samples of a food that your report recommends. We increase the number of samples, when possible, by combining data from several studies. Reasonableness of data is checked through comparisons with existing data for the same or similar food, and multi-ingredient foods are compared to nutrient profiles that have been calculated based on proportions of the individual ingredients. Also, draft pages of all new and updated food items are sent to outside reviewers before publication.

- I would note that the average sample, analyzed to HNIS's standards, costs $2,000. To analyze 6 samples would cost $12,000 per food item. Currently, there are 5,300 foods in Handbook 8. Multiple samples of each food, while highly

desirable, would mean a substantial increase in costs.

See comment 3.

- To generate the amount of completely documented data that GAO suggests is necessary is well beyond the HNIS budget. We routinely identify frequently consumed foods and major food contributors of nutrients and target those foods for analysis to ensure that they have a strong analytical base. Honey-roasted almonds, your example of a food for which documentation is limited, does not meet the requirements as a high priority item for analytical work.

See comment 4.

Regarding your comments about the Food Composition Data Working Group, this is an interagency group consisting of representatives from HNIS, the Agricultural Research Service's Nutrient Composition Laboratory, the Food Safety and Inspection Service, the Economic Research Service, the Food and Drug Administration, the National Center for Health Statistics, and the National Institutes of Health. Members of this group have been very helpful in lending their perspectives regarding food composition issues. However, they did not review the data and then question the accuracy as your report implies. They identified accuracy of data, adequacy of analytical methods and so forth, as concerns that must be continually addressed.

In closing, your study was especially timely for two reasons. First, we are implementing the Ten-Year Plan for Nutrition Monitoring and Related Research, which includes several activities to improve our food composition data base. Your recommendation to develop specific quality assurance criteria for evaluating data reinforces the need for Activity V-A-4.4 "to evaluate the effectiveness of criteria used for verifying and updating food composition values over time and revise, formalize, and document, as appropriate..." I have instructed staff that this activity be broadened to cover specifically your recommendations and that HNIS develop its criteria within one year. Two of the Federal agencies you contacted for recommendations about an acceptable quality assurance system, the Food and Drug Administration and the Agricultural Research Service's Nutrient Composition Laboratory, are also directly involved in this activity.

Second, as we mentioned above we are currently planning a revision to our Nutrient Data Bank system, which is used to store the food composition values as they are collected and to generate the summary values published in Handbook 8. We will review these plans to see if modifications are necessary based on your recommendations.

Sincerely,

Janice G. Lilja

JANICE G. LILJA
Acting Administrator

The following are GAO's comments on the Acting Administrator's letter dated September 16, 1993.

GAO's Comments

1. These comments substantiate our finding that documentation on how the data from other sources were produced—that is, information relating to the five quality assurance measures—are often missing for data incorporated into Handbook 8. HNIS agrees that, in most cases, the only data for which there is complete documentation are the data generated by HNIS contracts and that it seldom receives complete documentation from others, regardless of the number of times it requests the documentation. We believe that HNIS cannot be assured that such data with little documentation are reliable. We have also added statements in the report to note that no one is required to provide food composition data to HNIS and that private industry provides the data voluntarily.

2. These comments relate primarily to our finding that analyzing two samples of food under HNIS contracts may not produce reliable data for Handbook 8, but they also address data HNIS receives from other sources. HNIS does not dispute the fact that only two samples may not produce reliable data. Rather, it states that it would be costly to analyze six samples of each of the 5,300 food items in Handbook 8. We are not advocating that HNIS have each Handbook 8 food item analyzed. Our position is that, for the few food items analyzed under HNIS contracts, analyzing two samples is not sufficient.

3. These comments state that HNIS does not have the resources to gather the documentation we say is necessary to evaluate the quality of food composition data from others. HNIS agreed with our recommendation to develop specific quality assurance criteria for evaluating data obtained from others. After developing the criteria, HNIS should inform the food industry of the types of documentation it needs and obtain, to the maximum extent possible, industry's cooperation to provide the necessary documentation. If HNIS then believes it lacks the resources to gather the needed documentation, we believe that HNIS should convincingly demonstrate, during the budgetary process, the importance of Handbook 8 and the need for additional resources to obtain adequately documented data.

In connection with the comment that honey-roasted almonds are not a high-priority food item, we did not select this food because it was consumed in large amounts. We selected it because our review

methodology called for us to select two food items for each of the principal investigators who were responsible for providing data for the 1991 Handbook 8 Supplement. The principal investigator who handled honey-roasted almonds handled only two food items for the 1991 supplement; thus, we had to select honey-roasted almonds. Irrespective of why we selected honey-roasted almonds, we found that other foods we reviewed also had limited documentation. For example, 15 of the 48 data sources for the foods we reviewed contained information on none or only one of the five quality assurance measures. Some foods that fit into this category are highly consumed, such as bacon-cheeseburgers.

4. These comments state that the interagency working group did not review Handbook 8 data, and subsequently question the data's accuracy. We did not mean to imply that the interagency working group did a review or an analysis of Handbook 8 data and then concluded that some data may be inaccurate. Nonetheless, working group members discussed their major food composition data issues during an August 1989 meeting, and some members cited the reliability or accuracy of data as a major issue. In response to these concerns, the working group proposed projects to (1) establish criteria for evaluating the quality of the data base for priority nutrients and evaluate the data base using the criteria and (2) identify needed improvements in nutrient measurement systems, such as analytical methods, quality control procedures, and standard reference materials. However, after about 4 years, the working group still has not completed the projects. Because the working group proposed these two projects, we continue to believe our report is accurate in stating that working group members were concerned with the accuracy of the data and adequacy of analytical methods.

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