STATUS REPORT ON USDA NUTRIENT DATA

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The stated mission of the Nutrient Data Research Branch is to compile and make available data on the nutrient composition of foods. This includes developing and maintaining the Nutrient Data Bank and publishing tables of food composition. Our operational objectives include making available up-to-date information on the nutrient composition of foods by publishing revised sections of Agriculture Handbook No. 8, encouraging the generation of new, reliable food composition data, and cooperating with nutrient data users and suppliers. A most important facet of cooperation is communication and we welcome the opportunity afforded by this annual meeting to exchange information and discuss the mutual problems we face in dealing with nutrient composition data.

The purpose of this presentation is to describe the progress being made on the revision of Agriculture Handbook No. 8 and the availability of provisional data and to discuss the present state of knowledge of food composition and efforts being made to fill gaps in that knowledge. I shall also discuss briefly some of the problems faced in trying to obtain reliable information on specific food components of current interest.

REVISED SECTIONS OF AH-8

As most of you know, nine sections of Agriculture Handbook No. 8 have been published to date. These are listed in Table 1. Numbers 1 through 7 are still available from our office without charge to professional workers but because of the new publication policy instituted last year, copies of all succeeding sections are available only for purchase from the Government Printing Office. These nine sections have been incorporated into the USDA Nutrient Data Base for Standard Reference, Release 3, 1983, (as described in the handout), Datasets Available in Machine Readable Form. On the computerized tape, imputed values have been supplied, where possible, to fill in the missing values in the printed sections.

Work is proceeding on all remaining sections and their present status is indicated in Table 2. Section 10, Pork Products, has been sent to the printer and should be published in a few weeks. This section incorporates data from an extensive study conducted by the Meat Science Research Laboratory and Nutrient Composition Laboratory in cooperation with industry and reflects the composition of pork as marketed today. Section 11, Vegetables and Vegetable Products, is in review. This section was greatly expanded over the 1963 edition of the handbook and will include nearly 500 items. Publication is expected this winter. Numbers have not yet been assigned to the remaining sections and the order of publication may differ from the sequence indicated in the table. We do, however, expect the first four or five of these to be completed in 1984.

In Table 2, existing data are at the Data Base II level for Legumes and Baked Products with a note indicating that additional data are expected to be received before the sections will be completed. Actually, additional data are expected for food items in each of these food groups as a result of research efforts now being conducted under contracts, grants, and cooperative agreements through our agency, by the Nutrient Composition Laboratory and by the Meat Science Research Laboratory. These efforts are directed towards filling gaps in our knowledge and are explained below in the discussion of Current State of Knowledge.

PROVISIONAL TABLES

To help meet the demand for up-to-date information, we have been releasing provisional tables of data for specific nutrients or for limited numbers of foods for which sections have not yet been revised. These data are to be considered strictly provisional and will be superseded by the information published in the completed sections. Tables available since our last meeting are shown in Table 3.

The Iron Content of Foods may be purchased from the Government Printing Office, but copies from our limited stock will be mailed to those who send written requests, as long as our supply lasts. Last year we described a unique feature of this table, which was the inclusion of confidence codes along with the data, in an attempt to describe the degree of reliability attached to the values. We shall appreciate receiving your comments and suggestions about these codes. Do you find them helpful? Can you suggest ways to make them more useful? The second two tables listed are printed on single sheets and are obtainable upon request from our office only.

In preparation, and scheduled for release by the end of this year, is a Provisional Table on the Carbohydrate Fractions of Foods. This will be a compilation of existing data on sugars, starch, and complex polysaccarides.

CURRENT STATE OF KNOWLEDGE

Table 4 depicts the current state of knowledge of the nutrient composition of foods. This information was updated in January of 1983 by the staff of the Nutrient Data Research Branch. This type of presentation has been exhibited in previous years and it was most gratifying to see the changes that could be made this year in upgrading the status of many nutrients in many food groups. An innovation in Table 4 is the inclusion of indicators to show areas where research is underway to generate needed data.

For the most part, these areas represent ongoing and planned work sponsored by the Consumer Nutrition Division in the form of contracts, grants, and cooperative agreements with land-grant universities and non-profit research organizations. They also include some of the work performed by the Nutrient Composition Laboratory and the Meat Science Research Laboratory at Beltsville.

I do not want to give the impression that all of our problems will soon be solved as a result of these activities. We know that these efforts will affect genuine progress towards filling in gaps in our knowledge of nutrient composition, but the studies are necessarily limited in scope and still will leave many boxes coded as "insufficient" information. For this reason, I shall give a brief description of some of the studies to outline their scope and limitations.

Most of our efforts are food oriented. That is, we are seeking information for particular foods on all nutrients listed in the revised sections. Our efforts are concentrated on food groups for which sections are still in preparation. Some studies, however, are nutrient oriented because of the need to develop data requiring special methodology across many types of foods. These are discussed separately.

Studies on Foods

Baked products and cereal grains: Eight variety breads, tortillas, pita bread, bagels, and three pastas, raw and cooked, are being sampled from eight cities. Two-hundred products, including breads, cakes, pastry and hot cereals, are included in a separate study.

Beverages: Beverages are being studied as components of a group of 50 miscellaneous foods.

Fish: Six raw fish and eight processed fish are under study. A separate project will determine the total lipid and cholesterol contents of 10 mollusks sampled at different times and locations over 2 seasons.

Fruits: Six fruits sampled from six cities are being analyzed.

Legumes: An extensive study on legumes is nearing completion. Eighteen legumes are being analyzed in raw and cooked forms, sampled from four growing locations, before and after 1-year's storage. Another project involves the nutrient content of unsprouted and sprouted cereal and leguminous seeds. This covers 13 legumes from four growing locations over 2 crop years and six sprouted seeds, both commercial and laboratory germinated.

Meat: Major studies on pork and on beef have been completed. An examination of ground beef is underway. Studies on lamb and veal have just been completed. These projects do not include variety meats. This is the subject of a separate project in which nutrients are being determined in five variety meats (brain, heart, liver, kidney, and tongue) from three species (beef, lamb, and veal). We also need to know the consequences of cooking meat and poultry, after removal of fat. Research will be initiated soon to determine nutrients after cooking representative cuts of beef, pork, and poultry from which fat and/or skin had been trimmed prior to cooking (four cuts, three species, and four animals of each species).

Nuts and seeds: Some work with legumes and cereals has been mentioned. Other work is included in the miscellaneous foods studies.

Vegetables: Work includes 12 items from six geographical regions, analyzed raw and some after cooking. The distribution of nutrients between the drained solids and liquid portions of 96 samples of canned fruits and vegetables is also under investigation. The effect of particle size (whether whole, sliced, chopped, etc,) and of the canning medium is also studied.

Mixed dishes: Fifty mixed dishes, analyzed raw and cooked, are being studied to measure retention of nutrients during preparation and cooking. Results will test the reliability of estimating nutrients in recipe-formulated foods from the list of ingredients.

Fast foods: All nutrients, including amino acids and fatty acids, are being determined in 42 fast foods from available restaurants in a single location. Ten types of fish foods from fast service establishments and 10 frozen convenience fish foods are under study. Fifty-one Mexican-American fast foods, obtained from four fast-food restaurants are being analyzed. A study of the nutrient composition of fast-food fried chicken is getting underway in cooperation with the Nutrient Composition Laboratory (NCL). The NCL will collect approximately 100 samples on a nationwide basis and process them for analysis.

Home-prepared and institutionally-prepared foods: Six institutional foods from each of three food service establishments and 50 miscellaneous home-prepared foods are being analyzed.

Miscellaneous foods: Three separate contracts allow for the analysis of 150 different foods as prescribed. These foods include some from the truly miscellaneous category, but extend to food items in the beverages, candies, baked products, cereals, and nuts and seeds groups to help us fill specific gaps in the data.

Studies on Nutrients

The determination of cholesterol in mollusks was mentioned in connection with fish. Other studies planned to be started this year are on amino acids, vitamin A active compounds, and carbohydrate fractions. We are seeking to determine the amino acid composition of 500 food items, utilizing samples prepared for some of the above studies. This study is aimed primarily at the mixed dish and fast food categories in order to test the reliability of calculating amino acid contents from those of the ingredients.

Because of the current interest in beta-carotene, work will be initiated to determine alpha- and beta-carotenes, cryptoxanthin, and retinol in 25 representative foods of both plant and animal origin. Samples will be collected from five locations in three seasons of the year.

Carbohydrate fractions and fiber constituents will be measured in 112 samples, selected to take into account the effects of cooking and processing.

A final project that should be of interest is a review of the Atwater system for estimating the energy content of foods. This was undertaken by the Life Sciences Research Office of the Federation of American Societies for Experimental Biology under a grant from the Consumer Nutrition Division. A comprehensive review of the literature was completed and a workshop meeting of an ad hoc expert Committee was held to discuss the appropriateness and limitations of the present system. A final report, summarizing the Committee's deliberations and recommending procedures and changes for improving the system will be submitted later this year.

PROBLEM NUTRIENTS OF SPECIAL INTEREST

Dr. Gary Beecher, Chief of the Nutrient Composition Laboratory, has provided Table 5, updating the state of development of methods for nutrients in foods. In general, the nutrients included in the revision of Agriculture Handbook No. 8 are those for which the methods are considered to be adequate or substantial in terms of that table.

Because of the intense interest in knowing about certain nutrients and energy we have extended the collection of data for Handbook 8 to include (besides energy) some nutrients for which the methods may give conflicting results. These are manganese, vitamin A activity, vitamins B12, C, and E, folacin, and pantothenic acid. In our contract work we can specify methods and request that the laboratories utilize sound principles of laboratory quality control to validate the methods as well as possible. Chief problems reported to us concern folacin, for which most laboratories find a high variability among replicate determinations and for which we continue to observe a wide variation among laboratories on similar foods. We believe that our continuing meetings with collaborators working on our contracts are helping to solve some of the problems in food analysis but final resolution of analytical problems must be achieved before we can place highest confidence in the values reported for this list of nutrients, especially folacin. At the present time, we must report the data as being best available, recognizing that they are subject to change when improved methods are established and applied to representative samples of food.

There are severe problems with selenium and beta-carotene, two nutrients being linked to the relationship between diet and cancer, and there is an urgent need to develop new data. The method for selenium is considered to be substantial and although tedious, it is believed to yield reliable results. The problem is that the distribution of selenium is known to be so variable in the food supply that meaningful, representative values cannot be estimated from existing data. Selenium is known to vary with geographical region, animal feeding practice, and food distribution patterns. A major study is required to quantitate these variables and enable the development of a rational approach to the estimation of selenium in foods.

Until now, it has been common practice to report only the total vitamin A activity of foods, and not the separate contributions of retinol and pro-vitamin A isomers. Values for beta-carotene have not been reported frequently and existing reports are often not clear as to whether a value is explicit for beta-carotene or whether it may include other isomers. Furthermore, it is not clear whether the relationship to cancer is limited to beta-carotene, to other pro-vitamin A carotenoids, or to all carotenoids regardless of vitamin A activity. In other words, we are not sure that only beta-carotene data are truly needed for investigating the relationship of diet to cancer.

We believe that a major effort should be launched to determine the contents in foods of the separate carotene isomers. Toward this end, the Nutrient Composition Laboratory is in process of developing methods. The single project we are sponsoring on 25 foods should provide helpful information on the distribution of vitamin A and related compounds in several kinds of foods and mixtures. Until such definitive information becomes available, only a crude estimate of carotene can be made by applying partition coefficients to the total vitamin A activity. We are aware that some people are constructing data bases in this fashion, using the coefficients published by the Food and Agriculture Organization of the United Nations. Evidence in our hands, however, suggests that these coefficients may be incorrect and we are concerned that their application may result in misleading information.

We are frequently asked for data on dietary fiber. This continues to be a problem because fiber is defined quantitatively by the method used to measure it and, as yet, no standard procedure has been accepted. We understand that investigations on methodology are progressing both in the United States and in collaborative studies based in England as well. Our provisional table on carbohydrate fractions will help clarify the state of knowledge of carbohydrates and fiber, but definitive information will not result until there is an agreed-on-methodological approach to this problem.

Iodine is another nutrient of continuing interest, both from the standpoint of those who are concerned about meeting the requirement and those who are concerned that some people may be consuming an excess amount. Not only is the determination clouded by the lack of methods of proven reliability, but the distribution is affected by so many facets. The iodine content of plant foods is determined by the soil content, and this varies according to geographical region, which the iodine content of animal products is dependent upon the feeding practices employed. Milk is known to have a highly variable iodine content, not only because of variability in the feed but also as a result of the variable use of iodophor containing sanitizing agents at the farm and in the dairy. Bread is another product which may or may not contain relatively high amounts of iodine. This depends upon whether or not iodate is added in its preparation, either as a dough improver or as an ingredient of the yeast food. Thus, even if reliable methods were established, it would be difficult to compile meaningful, representative iodine values for foods consumed in the United States. As with selenium, iodine is a nutrient that will require special consideration in developing data on its distribution.

The problems remaining loom large and our rate of progress in defining the nutrient composition of foods still seems painfully slow. We remind ourselves that at the present time there is a greater amount of effort being applied to the nutrient analysis of foods than ever before in history. Although the goal may still be in the future, we can see measurable progress.

TABLE 1.--PUBLISHED SECTIONS OF AGRICULTURE HANDBOOK NO. 8

Number	Food group
8-1	Dairy and egg products
8-2	Spices and herbs
8-3	Baby foods
8-4	Fats and oils
8-5	Poultry products
8-6	Soups, sauces, and gravies
8-7	Sausages and luncheon meats
8-8	Breakfast cereals
8-9	Fruits and fruit juices

TABLE 2.--STATUS OF UNPUBLISHED SECTIONS OF AGRICULTURE NO. 8

Number	Food group	Preparation stage
8-10	Pork products	In press
8-11	Vegetables	In final review
	Nuts and seeds	DB III, exc. FA in DB I; AA in entry/correction
	Fish and shellfish	DB III, exc. AA in entry/correction
	Lamb, veal, game	Data entry/correction
	Beverages	DB II
	Legumes	DB II, exc. FA and AA in DB I (additional data expected)
	Cereal grains	Data collection and entry/correction, exc. FA in DB I
	Baked products	DB II, exc. FA in DB I; AA in entry/correction (additional data expected)
	Beef	Data entry/correction, exc. AA in DB I
	Sugars and sweets	Data collection and entry/ correction
	Mixed dishes	Data collection and entry/ correction
	Fast foods	DB II (additional data expected)
	Miscellaneous	Data collection

TABLE 3.--RECENT PROVISIONAL TABLES

Iron Content of Food (HERR 45)
Table of Amino Acids in Fruits and Vegetables
Provisional Table on Percent Retention of Nutrients in Food Preparation

Table 4

STATE OF KNOWLEDGE OF NUTRIENT COMPOSITION

	CARBOHYDRATES			LIPIDS					MINERALS											
	INDIVIDUAL SUGARS	STARCH	DIETARY FIBER	TOTAL FAT	FATTY ACIDS	CHOLES-TEROL	OTHER STEROLS	TRANS-FATTY ACIDS	CAL-CIUM	IRON	PHOS-PHORUS	SODIUM	MAGNES-IUM	POTASS-IUM	ZINC	COPPER	MANGAN-ESE	CHROMIUM IODINE SULFUR SELENIUM	COBALT, FLUORINE, NICKEL, SILICON, TIN, VANADIUM
BABY FOODS	--	--	I	S	I	--	--	--	S	S	S	S	I	S	I	I	--	--	--
BAKED FOODS, BREAD	--✓	I✓	I✓	I•	I	--	--	I	S•	S•	I•	I•	I•	I•	I•	I•	--•	--	--
COOKIES, CRACKERS	--✓	I✓	I✓	I•	I	--	--	I	I•	I•	I•	I•	I•	I•	I•	I•	--•	--	--
SWEET GOODS	--✓	I✓	I✓	I•	I	--	--	I	I•	I•	I•	I•	I•	I•	I•	I•	--•	--	--
BEVERAGES	I•	NA	NA	--•	--	NA	NA	NA	I•	I•	I•	I•	I•	I•	I•	I•	--•	--	--
BREAKFAST CEREALS	S	I	S	S	I	--	--	NA	S	I	S	S	S	S	S	S	I	--	--
CANDIES	I•	--•	--•	I•	I	I	I	I	I•	I•	I•	I•	I•	I•	I•	I•	--•	--	--
CEREAL GRAINS, WHOLE	I•	I•	I•	I•	S	NA	--	NA	I•	I•	I•	I•	I•	I•	I•	I•	I•	I	I
FLOURS	I•	I•	I•	I•	S	NA	--	NA	I•	I•	I•	I•	I•	I•	I•	I•	--•	--	--
PASTA	I•	I•	I•	I•	I	NA•	--	NA	I•	I•	I•	I•	I•	I•	I•	I•	--•	--	--
DAIRY PRODUCTS	S	NA	NA	S	S	S	NA	NA	S	S	S	S	S	S	S	S	I	--	--
EGGS & EGG PRODUCTS	NA	NA	NA	S	S	S	NA	NA	S	S	S	S	I	S	S	I	I	--	--
FATS & OILS	NA	NA	NA	S	S	S	I	S	--	--	--	--	--	--	--	--	--	--	--
FISH & SHELLFISH, RAW	NA	NA	NA	S•	S•	S•	I•	--	S•	S•	S•	S•	S•	S•	S•	S	S	--	--
COOKED	NA	NA	NA	S	S	S	--	--	--	--	--	--	--	--	--	--	--	--	--
FRUITS, RAW	S✓	--✓	I•	S•	I	NA	I	NA	S•	S•	S•	S•	S•	S•	I•	I•	I•	--•	--•
COOKED, DRIED	I✓	--✓	I✓	--✓	--	NA	--	NA	--✓	--✓	--✓	--✓	--✓	--✓	--✓	--✓	--	--	--
FROZEN, CANNED	I✓	--✓	I✓	S✓	--	NA	--	NA	S✓	S✓	S✓	S✓	S✓	S✓	I✓	I✓	--✓	--	--
LEGUMES, RAW	I✓	I•	I•	S•	I	NA	I	NA	S•	S•	S•	S•	S•	S•	S•	S•	S•	--	--
COOKED	I✓	I•	I•	S•	I	NA	--	NA	S•	S•	S•	S•	S•	S•	S•	S•	S•	--	--
PROCESSED	I✓	I✓	I✓	I✓	I	NA	--	NA	I✓	I✓	I✓	I✓	I	I	--	--	--	--	--
MEAT, RAW & COOKED, BEEF	NA	NA	NA	S	S	S	NA	NA	S	S	S	S	S	S	S	S	S	--	--
LAMB	NA	NA	NA	S	S	S	NA	NA	S	S	S	S	S	S	S	S	S	--	--
PORK, FRESH & CURED	NA	NA	NA	S	S	S	NA	NA	S	S	I	S	S	S	S	S	S	--	--
VEAL	NA	NA	NA	S	S	S	NA	NA	S	S	S	S	S	S	S	S	S	--	--
SAUSAGE & LUNCH MEAT	NA	NA	NA	S	S	S	NA	NA	S	S	S	S	S	S	S	S	S	--	--
NUTS & SEEDS	I•	I•	I•	S•	S	NA	I	NA	I•	I•	I•	I•	I•	I•	I•	I•	I•	I	I
POULTRY, RAW & COOKED	NA	NA	NA	S	S✓	S	NA	NA	S✓	S✓	S✓	S✓	S✓	S✓	S✓	S✓	S✓	--✓	--✓
SNACK FOODS	--	--	--	--	I	--	--	I	--	--	--	--	--	--	--	--	--	--	--
SOUPS	--	--	--	S	I	I	I	--	S	S	S	S	S	S	S	S	S	--	--
VEGETABLES, RAW	I•	S•	I•	I•	I	NA	I	NA	I•	I•	I•	I•	I•	I•	I•	I•	--•	--•	--•
COOKED	I•	I•	I•	--•	--	NA	--	NA	--•	--•	--•	--•	--•	--•	--•	--•	--	--	--
FROZEN	I	I	I	S	--	NA	--	NA	S	S	S	S	S	S	S	S	--	--	--
CANNED	I✓	I✓	I✓	S✓	--	NA	--	NA	S✓	S✓	S✓	S✓	S✓	S✓	S✓	S✓	--✓	--	--
FAST FOODS	--•	--•	I•	S•	I•	I•	I	I	S•	S•	S•	S•	S•	S•	S•	S•	--•	--	--
FROZEN DINNERS	--	--	I	I	I	--	--	--	I	I	I	I	I	I	--	--	--	--	--
INSTITUTIONAL FOOD	I	I	I	I	I	I	--	--	--	--	--	--	--	--	--	--	--	--	--
MIXED DISHES, COMMERCIAL	--	--	--•	I•	I	I•	I	--	S•	S•	S•	S•	S•	S•	I•	I•	--•	--	--
HOME PREPARED	--	--	--•	I•	I	I•	--	--	I•	I•	I•	I•	I•	I•	--•	--•	--•	--	--
RESTAURANT FOOD	I	I	I	--•	--	--	--	--	--•	--•	--•	--•	--•	--•	--•	--•	--	--	--

-- LITTLE OR NO DATA
S SUBSTANTIAL DATA
I INADEQUATE DATA
NA NOT APPLICABLE
• USDA/CND CONTRACTS IN PROGRESS
✓ USDA/CND CONTRACTS PROPOSED FOR FISCAL 1983

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Table 4 (continued)

STATE OF KNOWLEDGE OF NUTRIENT COMPOSITION

	PROTEIN AND AMINO ACIDS						VITAMINS												
	TOTAL PROTEIN	CYSTINE METHIONINE	TRYPTOPHAN	ISOLEUCINE LEUCINE VALINE	SERINE THREONINE TYROSINE	ALANINE, ARGININE, ASPARTIC ACID, GLUTAMIC ACID, GLYCINE, HISTIDINE, LYSINE, PHENYLALANINE, PROLINE	VITAMIN A	THIAMIN	RIBOFLAVIN	VITAMIN B_6	VITAMIN B_{12}	ASCORBIC ACID	NIACIN	FOLACIN	VITAMIN D	VITAMIN E	BIOTIN	CHOLINE	PANTOTHENIC ACID
BABY FOODS	S	I	I	I	I	I	S	S	S	I	I	S	S	I	NA	I	--	--	--
BAKED FOODS, BREAD	S•	I/	I/	S/	S/	S/	NA	S•	S•	I•	NA	NA	S•	I•	NA	I	--	--	I•
COOKIES, CRACKERS	S•	I/	I/	I/	I/	I/	--	I•	I•	I•	--	NA	I•	I•	NA	I	--	--	--•
SWEET GOODS	S•	I/	I/	I/	I/	I/	--	I•	I•	I•	--	NA	I•	I•	NA	I	--	--	--•
BEVERAGES	I•	NA	NA	NA	NA	NA	I•	I•	I•	I•	NA	I•	I•	I•	NA	NA	NA	NA	I•
BREAKFAST CEREALS	S	I	I	I	I	I	I•	I•	I•	I•	I	I•	I•	I•	--	I	--	--	I•
CANDIES	I•	--	--	--	--	--	NA	I•	I•	I•	NA	I•	I•	I•	NA	--	--	--	I•
CEREAL GRAINS, WHOLE	S•	I	S	S	S	S	I	I•	I•	I•	NA	I	I•	I•	NA	I	--	S	I•
FLOURS	S•	I	S	S	S	S	--•	I•	I•	I•	NA	NA	I•	I•	NA	I	--	I	I•
PASTA	S•	I/	S/	S/	S/	S/	--•	I•	I•	I•	NA	NA	I•	I•	NA	--	--	--	--•
DAIRY PRODUCTS	S	S	S	S	S	S	S/	S	S	S	S	S	S	I	S	I	--	I	S
EGGS & EGG PRODUCTS	S	S	S	S	S	S	I/	S	S	S	S	NA	S	I	I	I	--	S	S
FATS & OILS	NA	NA	NA	NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--
FISH & SHELLFISH, RAW	S	S/	S/	S/	S/	S/	I•	I•	I•	I•	I•	NA	I•	--•	I	I	--	I	I•
COOKED	I	I	I	I	I	I	--	--	--	--	--	--	--	--	I	I	--	I	--
FRUITS, RAW	S•	I/	I/	I/	I/	I/	S•	S•	S•	S•	NA	S•	S•	I•	NA	--	--	I	I•
COOKED, DRIED	I	I	I	I	I	I	I	I	I	I	NA	I	I	I	NA	--	--	--	I
FROZEN, CANNED	S	I	I	I	I	I	S	S	S	I	NA	S	S	I	NA	--	--	--	I
LEGUMES, RAW	S•	S	S	S	S	S	--	S•	S•	I•	NA	NA	S•	I•	NA	S	--	I	I•
COOKED	S•	I/	I/	I/	I/	I/	--	S•	S•	I•	NA	NA	S•	I•	NA	I	--	--	I•
PROCESSED	S	I	I	I	I	I	I	I/	I/	--/	NA	I/	I/	--/	NA	I	--	--	--
MEAT, RAW & COOKED, BEEF	S	S	S	S	S	S	S	S	S	S	S	NA	S	S	I	I	--	I	I
LAMB	S	S	S	S	S	S	I	S	S	S	S	NA	S	S	I	I	--	--	I
PORK, FRESH & CURED	S	S	S	S	S	S	I	S	S	S	S	NA	S	I	I	I	--	I	I
VEAL	S	S	S	S	S	S	I	S	S	S	S	NA	S	I	I	I	--	--	I
SAUSAGE & LUNCH MEAT	S	S	S	S	S	S	I	S	S	S	S	S	S	I	I	--	--	--	I
NUTS & SEEDS	S•	I/	I/	I/	I/	I/	I	I•	I•	I•	NA	I	I•	I•	NA	I	I	I	I•
POULTRY, RAW & COOKED	S/	S	S	S	S	S	I/	S/	S/	I/	I/	NA	S/	I/	I	I	--	I	I/
SNACK FOODS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SOUPS	S	I	I	I	I	I	S	S	S	I	I	S	S	--	NA	--	--	--	--
VEGETABLES, RAW	S•	I	I	S	S	S	S•	S•	S•	I•	NA	S•	S•	I•	NA	I	--	I	--•
COOKED	S	I	I	I	I	I	I•	I•	I•	I•	NA	I•	I•	I•	NA	I	--	--	--•
FROZEN	S	I	I	I	I	I	S	S	S	--	NA	S	S	I	NA	--	--	--	I
CANNED	S	I	I	I	I	I	S/	S/	S/	--/	NA	S/	S/	I/	NA	--	--	--	I/
FAST FOODS	S	I•/	I•/	I•/	I•/	I•/	S•	S•	S•	I•	I•	I•	S•	--•	--	I	--	--	--
FROZEN DINNERS	I	--/	--/	--/	--/	--/	I	S	S	--	--	I	S	--	--	--	--	--	--
INSTITUTIONAL FOOD	--	--•/	--•/	--•/	--•/	--•/	--	--	--	--	--	--	--	--	--	--	--	--	--
MIXED DISHES, COMMERCIAL	S	--/	--/	--/	--/	--/	I	S	S	I	I	I	S	I	--	I	--	--	--•
HOME PREPARED	I•	--/	--/	--/	--/	--/	I•	I•	I•	--•	--•	--•	I•	--•	--	--	--	--	--•
RESTAURANT FOOD	--•	--	--	--	--	--	--•	--•	--•	--•	--	--•	--•	--•	--	--	--	--	--•

-- LITTLE OR NO DATA
S SUBSTANTIAL DATA
I INADEQUATE DATA
NA NOT APPLICABLE
• USDA/CND CONTRACTS IN PROGRESS
/ USDA/CND CONTRACTS PROPOSED FOR FISCAL 1983

NUTRIENT DATA RESEARCH BRANCH
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JANUARY 1983

Table 5

STATE OF DEVELOPMENT OF METHODS FOR NUTRIENTS IN FOODS

Nutrient Composition Laboratory
ARS, USDA
Beltsville, MD 20705
July 1983

Nutrient category	State of Methodology[a/] Adequate	Substantial	Conflicting	Lacking
Carbohydrates, fiber and sugars		Individual sugars	Fiber Starch	
Energy			Food energy	
Lipids		Cholesterol Fat (total) Fatty acids (common)	Sterols Trans-fatty acids	
Minerals/Inorganic nutrients	Calcium Copper Magnesium Phosphorus Potassium Sodium Zinc	Iron (total) Selenium	Arsenic Chromium Fluorine Iodine Manganese	Cobalt Heme-iron Molybdenum Nonheme-iron Silicon Tin Vanadium
Proteins and amino acids	Nitrogen (total)	Amino acids (most)	Amino acids (some) Protein (total)	
Vitamins		Niacin Riboflavin Thiamin Vitamin B-6	Vitamin A Carotenes Vitamin B-12 Vitamin C Vitamin D Vitamin E Folacin Pantothenic acid	Biotin Choline Vitamin K

a/ Description of methodology states

Factors	Adequate	Substantial	Conflicting	Lacking
Accuracy	Excellent	Good	Fair	Poor
Speed of analysis	Fast	Moderate	Slow	Slow
Cost per analysis	Modest (<$100)	Modest to high	High	?
Development needs	—	Method modif. Extraction proc. Applications	Method develop. modif. Extraction proc. Applications	Method develop. Extraction proc. Applications

From: Beecher, G.R. and Vanderslice, J.T. Determination of Nutrients in Foods. In: Proceedings of Symposium on Modern Methods of Food Analysis. Editors, K.K. Stewart and J.R. Whitaker. Westport: AVI, 1984 (1984).