PRINCIPLES FOR CALCULATING NUTRIENT VALUES

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Steps used by the Consumer and Food Economics Institute of the U.S. Department of Agriculture in the revision of Agriculture Handbook No. 8 include nutrient data acquisition, followed by screening and evaluation of these data prior to coding, and entry into the Base I file of USDA's Nutrient Data Bank (NDB). Nutrient data are screened to insure accurate sample description for proper categorization and coding. All descriptive information about a food sample, such as physical form and portion analyzed, which might have bearing on nutrient content, must be coded. These codes become selection variables used to average data for like items and create the Base II file of the NDB. Data are also screened to insure that the analytical values were obtained by adequate laboratory procedures, such as by use of polar/nonpolar solvent mixtures as opposed to only nonpolar solvents for extraction of lipid from foods which contain appreciable amounts of phospholipids, and to insure that sampling was appropriate.

All nutrient data are put on a uniform basis, which is the 100 g food basis for proximate, mineral, and vitamin constituents, and converted to standard units for computations within the system. Nutrient data are evaluated to select data from studies on various production parameters in the published literature, which are representative of products actually on the market. Data are also evaluated to establish sources of variation in nutrient composition of foods, which must be taken into account in deriving nutrient values. The last step in the preparation of USDA's food tables is the application of weighting factors, such as production statistics, if needed, to arrive at figures which are representative of the overall market. This entails creating the Base III file of the NDB which contains the values published in Handbook No. 8

A number of factors are used in USDA's nutrient calculations. These include a set of 48 calorie conversion factors used to obtain energy values; nitrogen conversion factors for calculating protein; fatty acid conversion factors obtained by direct determination or from lipid class composition studies and used to express fatty acids as percent of total lipid; and refuse factors for calculating nutrients in the edible portion of 1 pound of food, as purchased. Amino acid data are averaged in the system on the basis of grams per 1 gram of nitrogen. Fatty acid data can be summarized on the basis of grams per 100 grams of food or as a weight percent of fatty acid methyl esters. Data on the latter basis are averaged using a normalizing program, which compensates for acids not reported in an analysis.

If no analytical data are available for a nutrient in a product, a nutrient value may be calculated from analytical and physical composition data for component tissues of some foods, such as cuts of meat. Values might also be calculated using analytical data for similar or closely related forms of a food, such as by using the content of a nutrient in the milk solids-not-fat fraction of whole milk to calculate a value for a lowfat milk of known milk solids-not-fat content. Nutrient values for cooked foods may be calculated from the analytical data for the raw food by application of yield and

retention factors. Yields of cooked meat are determined on paired samples. Retention factors for nutrients are calculated using nutrient analyses conducted on the tissues of the same paired samples in conjunction with the yields of the cooked tissues. Nutrients in mixed dish food items are frequently calculated using recipes. Retention factors are applied to data for raw ingredients. Losses of moisture on cooking and fat absorption, if present, are taken into account. For some recipes the cooked weight of raw ingredients can be determined and applied to nutrient data for the cooked ingredients.