# What nutritionists require in food composition tables

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The earliest food composition tables were those of König (1878) in Germany and of Atwater and Woods (1896) in the USA. In this century food composition tables have been developed in numerous countries; for a summary listing see Davidson *et al.* (1975). The classical UK contribution by McCance and Widdowson (first edition 1943) has been updated by Paul and Southgate (1978) and the US equivalent by Watt and Merrill (1950) by the US Department of Agriculture (1977–80). In Australia the Department of Health has the responsibility to compile food compositional data (Thomas & Corden 1977). Also of value to Australian nutritionists is the *Food composition table for use in East Asia* (FAO 1972). A general philosophy for the compilation of national food composition tables has been proposed by Southgate (1974), Watt (1962) and Watt *et al.* (1974), but there are new problems and challenges for Australian nutritionists in the 1980s which affect their food composition table requirements.

## The requirements

Nutritionists use food composition tables in at least three areas: nutritional surveillance, metabolic research, nutritional epidemiology and individual counselling. In each area there are different needs in regard to source of data, scope of nutrients covered and accuracy. For example, the food part of nutrition surveillance is normally an assessment of apparent food consumption; sources of error in such estimations are considerable due to factors other than food composition data. In some metabolic research, the impact of a major shift in food intake may be examined in which case accuracy of food compositional data are not so critical; on the other hand, metabolic balance studies usually require that the food used is analysed. For individual counselling it usually suffices to develop a concept of nutrient density in categories such as 'very high', 'high', 'moderate', 'low' and 'none'. Nutrition counselling of this kind would be facilitated if foods were similarly labelled. A Working Party of the Victorian Division of the Australian Nutrition Foundation is currently addressing this question.

Historically, food composition tables first concentrated on the energy value of foods, then on better information about protein, fat and carbohydrate, then on vitamins and minerals. More recently, there are demands for inclusion of an increasing range of trace elements, of individual fatty acids and for dietary fibre content. Other food components likely to be sought in tables in the near future would include individual carbohydrates and plant sterols; later on may see an era in which a number of physiologically active principles in food, including enzymes, enzyme inhibitors and steroids, will be defined and included in food tables. At the same time, growing interest in food toxicology will call for data about food toxicants, additives, agricultural chemicals and contaminants which it will be possible to incorporate (Tables 1 & 2). In many cases, information about toxicants in foods is already available from government analytical laboratories or the food industry and could be incorporated into a food component data bank with no additional analytical work. Consumer demands for this information will also increase.

From the nutritionist's point of view, it is not sufficient that there are legislative upper limits for a potential toxicant in a particular food, since the nutritionist has to consider the total impact of several foods with different levels of a possibly hazardous chemical. Furthermore, there is an increasing need to understand and anticipate the interactions between all the chemical components of food, added or not, and medication. An example would be the modification of drug metabolism by antioxidants in food.

Nutritional epidemiologists are increasingly interested in those food intake patterns associated with increased risk of neoplastic disease, especially gastrointestinal and gynaecological neoplasms. For this reason, those additives or toxicants which might lead to carcinogen formation, e.g. nitrites, and those which might inhibit their formation, e.g. ascorbate need to be known. An area of food analysis relevant to human nutrition which has heretofore received little or no attention by compilers of food tables is the physical chemistry of food. For example, pH has relevance for pathogenesis of dental caries. The consistency of food and its particle size probably influence the rate of glucose digestion and absorption.

## The food items

The ever-expanding range of food items in an affluent society such as Australia can be attributed principally to the activity of the food industry and to cultural pluralism. Thus, it is not unreasonable to suggest that the food industry come to share a responsibility for the development and maintenance of adequate food composition tables in this country. Ethnic minorities in Australia can also reasonably expect that, when they require nutrition counselling, this will be possible from relevant food compositional data. In any case it may well be in the interests of Australians at large that this is done. For example, foods traditionally used by Aborigines have long

**Table 1. Food compositional data important to nutritionists**

| |
|---|
| Energy value |
| Components (see Table 2) |
| Physical chemistry: pH, consistency |
| Effects of food preparation and storage |
| Interaction amongst nutrients and bioavailability |

**Table 2. Food components important to nutritionists**

| |
|---|
| Protein, fat, carbohydrates |
| Minerals and trace elements |
| Vitamins |
| Dietary fibre |
| Amino acid composition |
| Fatty acid composition |
| Cholesterol and other sterols |
| Individual carbohydrates |
| Alcohol |
| Physiologically active principles (enzymes, enzyme inhibitors, steroids) |
| Natural toxicants |
| Additives, e.g. flavourings, colourings, preservatives |
| Agricultural chemicals, e.g. pesticides, herbicides, fungicides |
| Contaminants, e.g. packaging materials, antiseptics |

**Table 3. Food composition tables in Australia: foods for inclusion**

| |
|---|
| Ethnic foods: Aboriginal; European (Greek, Italian, etc.); Middle Eastern (e.g. Lebanese); Asian (e.g. Chinese, Indian, Vietnamese) |
| Infants foods |
| Fast foods |
| Special dietary products |

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been disregarded by European settlers, certainly to their early and probably to their continuing detriment. We all know how stubborn Anglo-Saxons perished alongside surviving Aborigines! Probably the most celebrated example of this situation was the Burke and Wills expedition. In more recent times, it is not generally appreciated that some migrant groups in Australia had longer life expectancies in their homeland than did their Australian counter-parts. In the case of Greek migrants in their first years in Australia, it seems likely that their lower mortality from large bowel cancer and ischaemic heart disease has a link with their particular food intake patterns. Few Australian neighbourhoods are now without a Chinese restaurant and this kind of food must now make a significant contribution to Australian food intake patterns. Infant food manufacturers usually make comprehensive compositional data available to users, but it would be helpful if these data were collated in food composition tables. Other areas of deficiency in Australian food composition tables include fast foods and special dietary products (Table 3).

For the most part, food composition tables give one figure for a particular nutrient in a particular food, one that is meant to be a representative for food in regard to, for example, species of origin, agricultural practice, climate and season as well as storage. There is usually no range of values or estimate of error. Thus, judicious use of food composition tables requires a sense of variation, depending on the accuracy with which one requires to use the tables.

## Need for flexibility

Considering the range of components and food items ideally required in contemporary Australian food composition tables, it is obvious that a presentation other than a bound book is needed, such as a looseleaf binder. Furthermore the time has come for the development of a national computerised data bank for food composition. Each of the nutrition research groups in this country is now probably working on its own private systems because of the pressing needs for analysis of food intake data. One responsibility of the Working Party on Food Composition Data of the Nutrition Standing Committee of the National Health and Medical Research Council is to co-ordinate the limited food analytical capacity of Australian laboratories. Contributions to food compositional data banks could be made by the food industry, nutrition researchers and by government. The data bank could be accessed by these parties to their mutual benfit. Additionally, the way is then open for consumers to be provided with information that they currently seek from food labelling.

## Nutrition index of foods

In the final analysis what nutritionists require of food composition tables is the information necessary to predict the metabolic, physiological and pathophysiological responses to food. This will be possible when interactions amongst nutrients and their bio-availabilities are fully understood. At that stage, it should be possible to predict the impact of a whole meal. The advent of microprocessors in the latter part of the 20th century together with a computerised food composition data bank should ultimately allow such predictions to be made.

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