FOOD ANALYSIS AND THE DEVELOPMENT OF THE NEW ZEALAND FOOD COMPOSITION DATABASES

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Summary

This paper addresses the activities in two areas of research and science-service in the Department of Scientific and Industrial Research's (DSIR) food and nutrition program: the composition of foods and nutritional information systems. Major developments in the composition of foods area include the continuation of the analyses of major categories of foods, the continual reassessment of methods (carotenoids), and the attention to food constituents previously neglected (eg, soluble and insoluble non-starch polysaccharides). Activities in the area of nutritional information systems include the completion of the "interim database", the second editions major database products, and the third edition of the Therapeutic Database of Brand-name Foods; the continual refinements to numeric data, food descriptors, and source documentation; and alteration of the database structure for ease of both internal use and future interchanges with other countries.

I. INTRODUCTION

New Zealand began developing its food composition and nutritional information systems projects in the early 1980s. However, for many years before, identical work in the area of animal nutrition and feed database development had been undertaken.

The early philosophy was to collect all the data scattered throughout the country in laboratory books, internal reports, the domestic scientific literature, as well as the data being generated specifically for this purpose in our own analytical laboratories. These data were processed using established criteria and over 74,000 mean values were incorporated in the first edition of the New Zealand Food Composition Database and its associated products (printed food tables, FOODfiles and FOODsearch). During the data evaluation process, many values were rejected because of obsolete methodology, incomplete description of the food, and other problems. The resultant database contained analytical data of the highest possible quality, and everyone involved in the production of this database trusted the validity of each value. Many users, however, were unable to use a database with gaps in the mean value field.

II. PROGRESS

(a) Creation of New Zealand's Food Composition INTERIM Database

Users of New Zealand's food composition database required complete data sets in order to evaluate dietary surveys, patient diet histories and other food intake studies. DSIR had produced a database of food composition containing the highest quality analytical data, supplemented with British data by agreement with HMSO. There were many gaps in the database where nutrients had not been analysed and DSIR continued to analyse foods to fill in

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these gaps. This is a very slow process and users could not wait until the year 2000 for a reasonably complete set of analytical data on the composition of foods.

This led to the recommendation of developing a "Best Bet" dataset, now known as the NZ Food Composition Interim Database. Every mean value field for 40 nutrients contains a number, essential for users requiring completeness. And each mean is associated with a "source code" which identifies our confidence in the value, satisfying us as producers.

The major phase of the Interim Database was completed in June 1991. As the work progresses, most of the interim values will be replaced with high quality analytical values.

(b) Methods Development

Methods development work is taking place continually, with greatest attention being paid to the analyses of what we generally refer to as dietary fibre and its constituents, and the carotenoids. The most current information will be presented at the conference.

(c) Inter-regional and International Interchange

Electronic interchange of food composition data is a topic being addressed by several countries and international organisations. Some tricky problems have been identified and are being worked through.

Naming of foods has long been acknowledged as a source of difficulty in development and use of extra-national food composition tables. Language is a problem, but even in the English language there are many differences between British English, Australian English, New Zealand English and American English. We all have unique descriptors for foods, and which can be confounding for other users. The problem of naming or describing foods is being addressed by international bodies, most notably the FDA with their Langual project (Center for Food Safety and Applied Nutrition of the U.S. Food and Drug Administration. Langual, An automated method for describing, capturing and retrieving data about food, as presented at the 12th International CODATA Conference, July 1991).

Naming of nutrients is potentially a more serious problem. A simple comparison between the USDA, the Australian and the New Zealand tables shows some confusing anomalies. For example New Zealand lists a food component as "Available carbohydrate" and Australia and USDA list a component as "Carbohydrate, total". Although described differently, the Australian and the New Zealand (both of which exclude dietary fibre) are more similar than the identically-described Australian and USDA (which is calculated by difference and includes dietary fibre). This issue has been addressed by INFOODS in the book Identification of Food Components for INFOODS Data Interchange (Klensin et al. 1989). In a datafile, each of these components would receive a different identifier: USDA's would be <CHOCDF>, which is "carbohydrate, total; calculated by difference"; Australia's would be <CHOAVL>, which is "carbohydrate, available"; and New Zealand's would be <CHOAVLM>, which is "carbohydrate, available; expressed in monosaccharide equivalents". The values all represent different things, and without the use of specific identifiers, international interchange will lead to dramatic misinterpretation of data by users in different countries.

Method of analysis is another problem area, which is partially addressed in the naming of nutrients. The most discussed component for which different methods yield very different values is dietary fibre. The above-mentioned INFOODS book also addresses this by listing eight different tagnames for fibre based on method, including method "unknown". This is essential for interchange, but also useful within a country where data presented as dietary fibre have been determined by more than one method.

Units used can also present a problem. When users are familiar with their own country's units for nutrients it is easy to miss a difference when using data from other countries. For example, manganese is expressed in milligrams by Australia and in micrograms

by New Zealand. The Germans express the same nutrient (eg, sodium) in both grams and milligrams, depending on the amount present. It is a simple matter to catch differences in printed food tables, but tedious to try and determine differences in datafiles. Again, this problem area is addressed in at least two INFOODS' books published by United Nations University (Klensin et al. 1989; Klensin in press), and all INFOODS-recommended tagnames for food components are unit-specific.

Most of the world's food composition databases and printed food tables are copyrighted. New Zealand reproduces some of the British and Australian data with permission from the copyright holders. Royalty payments and exchanges are involved. Software developers and book publishers using the New Zealand source data enter into arrangements with the Department of Scientific and Industrial Research for reproduction of these data.

Many foods are unique to a country or at least to the food database of a country with no equivalent counterpart (eg, New Zealand lists two varieties of feijoa, a popular fruit). Additionally, conditions affecting nutrient composition can also be unique. New Zealand, for example, is known to have unusual geochemistry, affecting the elemental concentration of foods. New Zealand also has unique food legislation which affects composition by regulating extraction rate for refined grains, the prohibiting nutrient fortification and enrichment of most foods including milk and refined grain products, and setting a minimum fat content for milk products. This poses no problem when viewing or comparing compositional data from different countries, but it would pose problems if data were to be adopted for use in another country's national database. CER (Closer Economic Relations) and food legislation harmonisation between New Zealand and Australia will address some of the issues related to unnecessary uniqueness.

An international interchange experiment is now being planned which will include trialing the nutrient tagnames system and standardized data format structure.

The successful trialing of the system (perhaps including the food descriptor system, LANGUAL) will lead to general adoption and dramatic easing of the problems now facing those who wish to participate in international interchange of food composition data.

III. DATABASE PRODUCTS

Products currently available in New Zealand include the Food Composition Database as compressed datafiles on disk (FOODfiles; Datafiles of the New Zealand Food Composition Database, Version 2.0 (1991). FOODDATA, Department of Scientific and Industrial Research, Palmerston North), datafiles with simple application software (FOODsearch; Applications software plus datafiles of the New Zealand Food Composition Database, Version 2.0 (1991). FOODDATA, Department of Scientific and Industrial Research, Palmerston North) and more advanced software (NZ Diet/1; Applications software plus datafiles of the New Zealand Food Composition Database, Version 2.0 (1991). FOODDATA, Department of Scientific and Industrial Research, Palmerston North), printed unabridged New Zealand Food Composition Tables (Milligan et al. 1988), and users' guides for all products. There are three volumes in the Composition of New Zealand Foods series of books completed (Visser & Burrows 1983; Visser et al. 1990, 1991), with another several pending. Additionally, there is a consumer-style book with data on seven nutrients (The New Zealand Food Facts (1990). DSIR and Department of Health (Mills Publishing, Wellington)), and a book on the proximate composition of nearly 100 NZ fish species (Vlieg 1988).

The Therapeutic Database of Brand-name Foods is only available in electronic form, and its use is restricted to that of New Zealand registered dietitians.

IV. CONCLUSION

Over the course of the last decade much progress has been made and New Zealand has two well-established food composition databases: the New Zealand Food Composition Database, which continues to be stocked with high quality analytical data, and a continually up-dated database of brand-name foods, containing industry-supplied data.

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