STUDIES ON THE COMPOSITION OF ABORIGINAL BUSHFOODS

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Summary

The first comprehensive set of tables of composition of Australian Aboriginal bushfoods is to be published at the end of 1991. In total, 1125 separate food samples, representing over 500 different bushfoods, are listed. Although there are some limitations to the data, such as carbohydrate determined by difference, the tables present good quality, accurate and original data. For many species, up to six or more samples have been analysed giving valuable information about the variation in the nutrient composition in the food. An important feature of the tables is that the majority of the data is derived from foods collected by Aboriginal people. The gradually diminishing range of indigenous Australian species and loss of Aboriginal knowledge of how they were prepared, may mean that some foods will never be analysed again.

I. INTRODUCTION

The first comprehensive set of tables of composition of Australian Aboriginal bushfoods, containing almost all the published and unpublished data in the area, is to be published at the end of 1991. In total, 1125 separate food samples, representing over 500 different bushfoods, are listed. Most of the data sets include figures for energy, water, protein, fat, carbohydrate and ash. Many also include data for dietary fibre, thiamine, riboflavin, vitamin C, sodium, potassium, magnesium, calcium, iron, zinc, copper, lead, cadmium and phosphorus.

This is a dramatic improvement on a decade ago, when data on less than 50 indigenous Australian foods had been published (Dadswell 1934, Fysh. et al., 1960, Elphinstone 1971, Peterson 1978). Three centres around Australia have contributed to this expansion of knowledge: the Human Nutrition Unit at the University of Sydney (Brand and co-workers), the Materials Research Laboratory of the Defence Science and Technology Organisation in Scottsdale, Tasmania (James and coworkers), and the School of Public Health at Curtin University of Technology (formerly WAIT) in Perth (Maggiore and coworkers).

An important feature of the tables is that the majority of the data is derived from foods collected and prepared by Aboriginal people. This means that these species are edible and safe to eat, so long as traditional methods of preparation are followed. The tables are not, however, a complete listing of the foods once available to the Aboriginal people, nor do they include all the foods still remaining. There is little information, for example, about foods indigenous to the southern parts of Australia. The gradually diminishing range of indigenous Australian species and loss of Aboriginal knowledge of how they were prepared, may mean that some foods may never be analysed again.

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This is a particularly appropriate time to collate the existing bush food data into a single publication. Sydney University's Human Nutrition Unit has discontinued their project after 10 years of funding from the Australian Institute of Aboriginal Studies and the Australian Research Council. The size of the Defence project has been reduced by half and, although Maggiore's group continues with bushfood analyses, most of their data has never been published. It may be several years before there are significant additions to the data base.

A surprising variety of professions have sought data on the composition of Australian indigenous foods. They include nutritionists and dietitians, medical practitioners and Aboriginal health workers, ethnobotantists and anthropologists, agricultural scientists, epidemiologists, toxicologists, veterinarians and conservationists, school teachers and home economists, food technologists and caterers, politicians and non-professionals such as consumers and the media. They use the data in various ways and apply the knowledge to both human and animal nutrition.

The major use of food composition tables is the calculation of nutrients from records of food intake. Until now, the major barrier to carrying out and interpreting studies of food intake in Australian Aboriginal people was the lack of food composition data, particularly in those living traditional or semi-traditional lifestyles. Food tables are also used in the formulation of food supplies that will provide specified amounts of nutrients, an application which could be critical to Australia's defence. Knowledge of the composition of foods is essential in the treatment of diseases, such as diabetes and coronary heart disease, now affecting alarming numbers of Aboriginal people. Ecological and observational studies of human nutrition also require accurate nutrient intake data. Commercial interest in bushfoods has increased and along with this a need to know their composition.

II. THE TABLES

The tables are arranged in four sections:

Table 1. Vegetables (including seeds, nuts, roots, tubers, bulbs, leaves and stalks)
Table 2. Fruits
Table 3. Animal foods
Table 4. Insects and insect products

This classification is practical rather than scientific and, unfortunately, it is not how Aboriginal people classified foods. The fruit and vegetable section together account for about 80% of the entries. Within each section, the foods are arranged in alphabetical order by scientific name. Common names are given, but it must be kept in mind that some species have multiple common names and some common names apply to more than one species. The nutrient data for each food spreads across two facing pages, the first page containing the proximates and vitamins, and the second page, the inorganic constituents. A.full index is provided so that any food can be easily located by either scientific or common name.

In general, the values in the tables apply to the raw, edible part of the food unless otherwise indicated and are expressed per 100 g edible portion. Many of the animal foods had been prepared and cooked before analysis. There is no data on what percentage of the original food was edible, primarily because the logistics of weighing food prior to and after preparation were too difficult in the field situation. In the case of many of the seeds, the whole seed, including the outer husk or casing, has been included even though Aboriginal people are known to have removed this part before consumption. Where replicate samples of a food have been analysed, an average has been calculated.

The carbohydrate figures have been calculated by difference (100 - water - protein- fat - ash -fibre if known). This method is not desirable because it incorporates cumulative errors in measurement but it was a common way of deriving carbohydrate content until recently. Carbohydrate values for James' group have been derived with the aid of the Carbon-Hydrogen-Nitrogen analyser and are inherently more accurate, but still include the fibre component. When the fibre value is not available, the carbohydrate figure represents both available and unavailable carbohydrate (dietary fibre) and the energy value will be an overestimate. The carbohydrate values should be regarded as preliminary only.

III. QUALITY OF THE DATA

The tables present good quality, accurate and original data. The foods are clearly and unambiguously named and described, and the data is expressed systematically in terms of units, factors and rounding off criteria. The source is given for each separate food listing. There are no 'borrowed' values or values obtained by imputation for a similar food. There are no values derived from recipes by calculation. Details of the analytical methods used can be determined by reference to the source. The foods were not collected and cooked to any sort of specification by non-Aboriginals as might occur for other food tables.

The quality of food composition data depends on (Southgate and Greenfield, 1988):
1. the procedure for obtaining and handling the food sample
2. the choice and execution of the analytical method
3. record keeping process

The generation of a bushfood data base requires a *very* pragmatic approach. Ideally, the values should be a true reflection of the usual composition of the food but a major problem was obtaining representative samples from different regions of a country. Wild foods are difficult to obtain at the best of times. They are usually found 'off the beaten track' and may require a great deal of physical effort to retrieve or prepare, such as the case with a yam growing 1 m underground or acacia seeds that need winnowing and grinding. An Aboriginal collector was justifiably entitled to eat a fair share of the spoils. In a country the size of Australia, with large areas uninhabited by even Aboriginal people, it is not possible to ensure that replicate samples of a foodstuff are collected and delivered to the laboratory at approximately the same time. Inadequate transport systems mean the foods may deteriorate during transport. Hence single, often small, samples were collected and analysed with the understanding that one analysis was better than nothing.

Hence, one of the most pleasing aspects of preparing these tables was the realisation that many foods had replicate analyses from different sources, and that the data were remarkably consistent. This makes the data much more reliable as an indication of the average composition. For some foods up to 6 or more samples have been analysed which gives valuable information about the variation in the nutrient composition in the food. This was a major reason behind the decision to include all the data and not just the average for that food. Calculation of the standard deviation was not considered valid on so few samples. In an arid country like Australia variation in water content is a main cause of differences in the content of other nutrients. Many fruits, for instance, dry out on the plant or ground and are eaten in various states of dessication.

The second aspect relating to the quality of the data in the tables is the choice and execution of the analytical method. Most of the data is derived using methods recommended by Southgate (1974) or official AOAC methods. As time progressed, newer more automated methods were used by some of us, particularly James and co-workers. This subject is addressed in detail in one chapter of the book.

The procedures used to assure the quality of the data included use of standard reference materials, where available, and recovery studies. Duplicate samples were an important part of the quality assurance in all three laboratories. In animal foods the sum of the proximates gave a good indication of the reliability of the data. However, in some animal foods, especially offal and insects, it is possible that some carbohydrate is present and unaccounted for. The consistency of the data from different sources also helps to verify the quality of the data.

Many problems exist with food composition data world wide (Southgate and Greenfield 1988). Data are scarce for many wild foods and many nutrients, and those available may be of uncertain quality. In some food tables, many indigenous foods have no taxonomic identification at all. These tables, therefore, are presented with full recognition of their limitations and it is critical that the user understands these limitations as well.

ACKNOWLEDGEMENTS

There are scores of people who worked towards making the data available, perhaps the most important being the Aboriginal people who still knew how and where to find the foods, and prepare them for eating. There were many researchers who accompanied Aboriginal people on the collecting expeditions, who filled out data sheets, identified the scientific name of the foods and prepared the sample for transport. In the laboratory there were the scientists and technical officers who ensured that the methods of analysis were executed correctly and kept careful records of the results. Unfortunately, the list is too long to name them individually, but it is to them that we dedicate the Tables of Composition of Australian Aboriginal Bushfoods.

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