



The New Zealand Food Composition Database: A useful tool for assessing New Zealanders' nutrient intake



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ABSTRACT

A country-specific food composition databases is useful for assessing nutrient intake reliably in national nutrition surveys, research studies and clinical practice. The New Zealand Food Composition Database (NZFCDB) programme seeks to maintain relevant and up-to-date food records that reflect the composition of foods commonly consumed in New Zealand following Food Agricultural Organisation of the United Nations/International Network of Food Data Systems (FAO/INFOODS) guidelines. Food composition data (FCD) of up to 87 core components for approximately 600 foods have been added to NZFCDB since 2010. These foods include those identified as providing key nutrients in a 2008/09 New Zealand Adult Nutrition Survey. Nutrient data obtained by analysis of composite samples or are calculated from analytical data. Currently >2500 foods in 22 food groups are freely available in various NZFCDB output products on the website: www.foodcomposition.co.nz. NZFCDB is the main source of FCD for estimating nutrient intake in New Zealand nutrition surveys.

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1. Introduction

Food composition databases (FCDBs) provide accurate data on the food composition of foods that can be used by health professionals, dietitians, government policy makers, industry, the research community, schools, universities, marketing professionals, and the general public. The country-specific food composition databases (FCDBs) are constructed with food composition data (FCD) of foods consumed by the population and is essential for estimating accurate nutritional status for a country. Food consumption pattern, types of foods consumed by the population and food production environment etc. are varied from country to country. Therefore using the food composition data from other country FCDB for estimating national nutrient intake will lead to wrong decision in terms of national nutrient related policies e.g. food and nutrient guidelines, improve diet for certain population etc.

NZFCDB is the major source of food composition data (FCD) in New Zealand (NZ) and extensively used by the Ministry of Health (MoH), a joint owner of the database with The New Zealand Institute for Plant & Food Research Limited (PFR). The partnership between PFR and MoH was initiated in mid-1980s. Since then there has been significant development. The NZFCDB-derived NZ FOOD-

files have been updated 19 times since 1989, and The Concise NZ Food Composition Tables (Concise Tables) have been updated 11 times since 1993. The last three updates (2011, 2013 and 2014) and the current version (2015) are freely available on the website www.foodcomposition.co.nz (The New Zealand Institute for Plant & Food Research Limited, 2011a). Earlier versions of these products (1989–2006) were published on CD-ROM and as printed Concise Tables.

1.1. The importance of country-specific food composition databases

The maintenance and continual updating of food composition information within a national database is an expensive process. One may ask the question why a small country should maintain a national FCDB if FCD are readily available online from other countries' databases, e.g. USA (U.S. Department of Agriculture, Agricultural Research Service, & Nutrient Data Laboratory, 2015).

There are a number of reasons for this, such as plant and animal varieties specific to NZ, e.g. NZ Greenshell™ mussels. The NZ food production environment can also mean that commonly consumed unprocessed foods can have different nutrient contents compared with those same foods produced overseas. For example, NZ soils tend to be deficient in selenium and iodine, and NZ animal husbandry practices differ from those in many other countries. In NZ most cows are fed on grass rather than on grain or mixed feeds, which affects fat-soluble components in meat and milk. Food

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exports, including meat and milk, are a key element of the NZ economy and it is valuable for overseas authorities and customers to have access to nutrient information for NZ products.

NZ has different fortification practices to other countries. As an example many countries have mandatory fortification for folic acid: USA has had mandatory fortification of all cereal/grain flours with folic acid since 1998 (Cridler, Bailey, & Berry, 2011); in Canada, white flour and pasta have been mandatorily fortified since 1998 (Public Health Agency of Canada, 2008), and Australia introduced mandatory fortification of bread-making flour in late 2009 (Food Standards Australia New Zealand, 2012b). To date, UK and NZ allow voluntary fortification of certain foods with folic acid (EFSA, 2009; Ministry of Health, 2016).

There are some food product formulations that are NZ-specific: it is not uncommon for product ranges to have different specifications for NZ compared to other markets including Australia. For example, in manufacturing Milo® in Australia, Nestlé use different recipes for the NZ and Australian markets (NZ-destined Milo has a higher proportion of cocoa than the Australian product).

National nutrition surveys inform national health policies, food and nutritional guidelines; they aid in monitoring health and nutritional status of the population. Also inform assessment of guidelines for food safety, nutrients fortification and food labelling in NZ. The combination of unique foods and unique nutrient profiles means that country-specific FCD are especially valuable in assessing nutrient intake in national nutritional surveys (Ministry of Health, 2003a; University of Otago & Ministry of Health, 2011).

Data from NZFCDB have underpinned four national nutrition surveys that have been undertaken among adult New Zealanders: the 1977 National Diet Survey (Birkbeck, 1983), the 1989 Life in New Zealand (LINZ) Survey (Russell & Wilson, 1991), the 1997 National Nutrient Survey (NNS) (Russell, Parnell, & Wilson, 1999), and the 2008/09 New Zealand Adult Nutrition Survey (NZANS) (University of Otago, 2011). NZFCDB has also been used for the 2002 National Children's Nutrition Survey (Ministry of Health, 2003b).

This paper describes the evolution of NZFCDB with up-to-date information on food composition of foods consumed by the NZ population since 2010. Also demonstrates how NZFCDB was used as a tool for estimating nutrient intake in the recent national nutrient survey (2008/09 NZANS).

2. About the NZFCDB

2.1. NZFCDB construction

The NZFCDB has three main internally-developed components: 1) The database itself – a relational database (Microsoft SQL Server) with some executable stored procedures 2) Food Information Management System (FIMS) – a Java-based Web application and the primary data entry and editing mechanism for NZFCDB. FIMS also contains the code for recipe and attribute calculations. 3) NZFCDB Auxiliary – a PHP-based web application that runs independently of FIMS for generating NZFCDB associated products (Section 3.2), and enabling bulk data entry.

NZFCDB and the software application FIMS were both developed in the early 2000s. The FCDB Auxiliary was developed around 2010. FIMS replaced an MS-DOS based Advanced Revelation 3.1 (Arev) application developed in the late 1980s.

2.1.1. Food record and descriptions

Each food record in FCDB represents a unique food or beverage and has a distinct name. Each food is also uniquely identified by an alpha-numeric FoodID: a single letter denoting the major food

groups followed by one to four digits (e.g. L1077). There are 22 food groups in NZFCDB (Table 1).

We follow the INFOODS multi-faceted naming system (Truswell et al., 1991) when constructing the names of the foods used in NZFCDB: generic name (e.g. bread, milk), kind (e.g. white, whole-meal), physical state (e.g. fluid, powdered, raw), process (e.g. boiled), parts (e.g. flesh and seed), brand or variety and fortificants (e.g. 'Spread, yeast extract, Marmite, Sanitarium, fortified vitamins B1, B2, B3, B12 & folate & Fe'). The scientific name (plant and animal origin), alternative name, descriptions of the food sampling and component source information are also documented in NZFCDB.

2.1.2. Food components

Each food component is uniquely identified by an INFOODS tag-name. Tagnames are compiled by an expert committee under the auspices of INFOODS, and allocated to unique food components (Klensin, Feskanich, Lin, Truswell, & Southgate, 1989). The INFOODS tagnames incorporate the component entity, the method of analysis where this is specific to the result (e.g. dietary fibre methodologies), and the default unit of measure. As INFOODS tagnames are not available for some of the food components recorded in NZFCDB it has adopted 'Component Identifiers' (Table 2). The 'Component Identifier' includes the available INFOODS tagname or, if there is no tagname, a label generated by following a similar convention to the INFOODS tagnames (FAO/INFOODS, 2012b; Klensin et al., 1989).

Table 1
Food groups in the New Zealand Food Composition Database.

Group	Food group	Includes information
A	Bakery products	Breads, biscuits, muffins, pizza bases and cakes
B	Beverages, alcoholic	Beers, port, sherry, spirits and wines
C	Beverages, non-alcoholic	Drink concentrates and powders, energy drinks, fruit drinks, fruit juices, smoothies, liquid breakfast, rice milks, soy milks, teas, coffees and soft drinks
D	Breakfast cereals	Extruded cereals, mixed grain cereals and mueslis
E	Cereals and pseudo-cereals	Cereal constituents, flours, noodles, pastas, rice, tempeh and tofu
F	Dairy	Butters, cheeses, ice creams, milks, protein powder, yoghurts
G	Eggs	Chicken eggs – cooked and raw
H	Fast foods	Burgers, chain store takeaways, Chinese takeaways, fries, Indian takeaways, pizzas, savoury items
J	Fats and oils	Cooking and salad oils, margarines, shortenings
K	Fin fishes	Fresh and canned fishes
L	Fruits	Fruits raw, dried, canned and stewed
M	Meats	Variety of meat cuts and types from beef, chicken, lamb, pork, venison, etc. raw and cooked
N	Meat products	Cured meats, sausages
P	Miscellaneous	Salts, stocks, yeast and yeast spreads; spices and herbs
Q	Nuts and seeds	Nuts, seeds and its products
R	Recipes	Multiple ingredients recipes, derived from recipe calculation using weight yield and nutrient retention factors
S	Sauces and condiments	Dressings, dips, tomato sauces, simmer sauces, soy sauces
T	Shellfishes	Cockles, crab, mussels, prawns, scallops, squid
U	Snack foods	Chips, muesli bars, popcorns
V	Soups	Soup dry mix and soup prepared
W	Sugars, confectionaries and sweet spreads	Chocolates, jams, lollies, Nutella, marmalade, sugars
X	Vegetables and pulses	Raw and cooked

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