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NEW ZEALAND TOTAL DIET SURVEY
(Prepared by New Zealand)

Introduction

New Zealand conducts a comprehensive Total Diet Survey (TDS) once every 5-6 years. It is a major undertaking both in terms of resource commitment, planning and execution but the New Zealand Food Safety Authority (NZFSA) considers the benefits are significant. The NZTDS is seen as an essential vehicle for gaining exposure data for risk assessment and for building consumer confidence in the food supply.

The primary focus of the NZTDS is to assess exposure to chemical residues, contaminant elements and selected nutrients, from approximately 120 representative foods, across the average diet of different age-sex groups within the New Zealand population.

A distinguishing characteristic of TDSs, including the NZTDS, is that foods are analyzed on an 'as consumed' basis (i.e. banana, peeled; meat, cooked). Thus providing an assessment of any potential risk to the consumer at the point of consumption of the food. As such, the NZTDS contrasts with commodity based surveillance or monitoring programmes, which analyze foods as they are available for sale or 'as produced' i.e. bananas, whole with skin; meat, raw.

The NZTDS contributes not only to New Zealand risk assessment activities but also to international commitments and obligations, such as the World Health Organization Global Environmental Monitoring Systems Food programme (WHO GEMS/Food), Codex Alimentarius and the WHO/FAO Joint Expert Committee on Food Additives (JECFA), and WHO/FAO Joint Meeting on Pesticide Residues (JMPR).

The survey is conducted in accordance with the recommendations of the FAO/WHO Joint Expert Committee on Pesticide Residues and in agreement with the objectives of the Joint FAO/WHO Global Environmental Monitoring Systems (GEMS; FAO/UNEP/WHO, 1985). The NZTDS is recommended by WHO as a template for developing countries initiating their first TDSs.

History of Total Diet Surveys in New Zealand

The 2003/04 NZTDS is the sixth such study of its kind in New Zealand. The previous five surveys have been carried out jointly by the Ministry of Health (formerly the Department of Health) and ESR (formerly DSIR Chemistry Division).

The first NZTDS was carried out in 1974 (Dick et al, 1978a, b) and involved analysis of a relatively small number of food group composites. These were based on the diet of an adolescent male, the age/sex group which consumes the largest quantity of food on a daily basis. The 1982 survey was similar, but the energy content of the diet was recalculated to give intake estimates for other age/sex groups (Pickston et al, 1985). The 1987/88 survey saw a change in survey design to an analysis of a large number of individual foods. This increased the flexibility of the survey and allowed calculation of estimated dietary intakes for a wider range of age/sex groups (ESR/MoH, 1994). The 1990/91 and 1997/98 surveys adopted a similar approach for food selection (Vannoort et al, 1995a,b; Hannah et al, 1995; Pickston and Vannoort, 1995; Cressey et al, 2000; Vannoort et al, 2000), and this is to be used as the basis for the 2003/04 survey.

The 1987/88 and 1990/91 NZTDSs considered a wide range of nutrient elements (13 nutrient elements and eleven nutrient elements plus one vitamin respectively) in addition to agricultural compounds and contaminant elements. The 1997/98 and 2003/04 NZTDSs refocused mainly onto contaminants in food, with only two nutrient elements of special interest (selenium and iodine) being considered in both, and iron and sodium being additionally assessed in the 2003/04 NZTDS. The range of agricultural compounds screened for has increased consistently with each NZTDS, to over 200 in the current survey.

Objectives

The objectives of the 2003/04 NZTDS are:

- agree in consultation with stakeholders the design and content of the 2003/04 NZTDS;
- estimate dietary exposure for selected chemical residues, contaminants and nutrient elements in the New Zealand food supply and identify trends in New Zealand over time;
- compare dietary exposure estimates with those in other countries where comparable data is available;
- ensure that the outcomes of the NZTDS complement data on chemical residues, contaminants and nutrient elements generated from other sources in New Zealand;
- where appropriate, provide data on selected chemical residues, contaminants and nutrient elements for incorporation into other databases including the World Health Organization (WHO) Global Environmental Monitoring System (GEMS) and the New Zealand Food Composition Database; and
- communicate findings in a timely and transparent manner.

Features

The NZTDS has been designed to have two components, a core and add-ons. This is intended to give a structure that provides for:

- continuity with what has occurred in past surveys and can be expected to continue into future surveys and
- components that would be included in the NZTDS on a less regular basis, e.g. once every second or third survey.

Similarly there is the potential for smaller projects or focused mini-surveys to be undertaken between each NZTDS. Such focused work could be drawn from the data gathered in a specific NZTDS to rework the data for a specific age, sex or cultural group, or could involve a wider sampling of a particular type of food(s) to look at a particular chemical or element that may have been identified as of concern.

The individual representative foods approach used in the NZTDS (rather than a food groups approach) also provides much greater flexibility with regard to assessing the dietary exposures of different age-sex groups within the population and tracing back issues to key foods.

The NZFSA undertook extensive consultation with stakeholder groups and interested parties (including public health, academia and research institutes, industry sector groups, and consumer groups) on the design and content of the 2003/04 NZTDS. With limited resources, NZFSA needs to consider carefully the areas that must be looked at and those areas or issues that it would be desirable to look at or that interest groups want considered or investigated. A consultation process helps ensure that design and content decisions are transparent.

The NZTDS is different from the National Nutrition Surveys (NNS). In the NZTDS simulated diets, using the foods in the food list, are developed to represent an average New Zealand dietary pattern. By comparison, the NNS surveys individual actual food intakes and calculates nutrient intake from food composition data. Food contributions to the nutrient intake data within the NNS are in the thousands rather than the approximately 120 representative foods used in the TDS.

TDSs should be undertaken on an on-going and regular basis. This enables monitoring of trends of exposures and levels of contaminants (and selected nutrients) in the food supply, some of which can vary significantly over time. By monitoring trends, appropriate management strategies can be implemented and their effectiveness assessed. The NZTDS represents a powerful tool for the NZFSA's risk management activities related to the safety of the New Zealand food supply and is an integral part of the NZFSA science strategy.

Timetable for the 03-04 NZTDS

Food samples were collected on four occasions during the 2003/04 financial year. Chemical analyses will be carried out during the 2003/04 year and the early part of the 2004/05 year. Data analysis, exposure estimates, writing of full interpretative reports will take place in the latter part of 2004/05 and be completed early in 2005/06 year.

Foods included in the NZTDS

The NZFSA commissioned a separate report on a recommended food list. The report revised the previous food list from the 1997/98 TDS and using the latest food intake date available - this included nationally representative data for adults 15 years plus from the 1997 National Nutrition Survey and information from the food list for the Children's National Nutrition Survey – 5 to 15 yrs that was being conducted at that time.

The foods selected are intended to represent the average and typical intakes of New Zealanders - while recognizing at we need to be able to develop simulated diets for the populations groups that are being considered. For example flavoured milk is included because it is consumed by children and young males. Infant formula and weaning foods included. In the interests of continuity, all foods from the previous survey were considered for inclusion and were changed only when there was a better representative or the food was no longer identified as popular or was not relevant to the population groups being considered.

Foods to be analyzed have been divided into two categories (national and regional foods). Food samples are collected on four occasions over a 12 month period.

National Foods (63) - are not expected to exhibit any regional variability and include processed foods such as biscuits, breakfast cereals and beverages, which are uniformly available New Zealand wide. National Foods are sampled in a single location on two occasions. Up to four brands, selected on the basis of market share, are collected on each sampling occasion. Foods will almost all be prepared and analyzed on the basis of individual brands/seasons to give a total of four analyses for each food for each season, although occasionally seasonal composites of the four brands to give one analysis for each food.

Regional Foods (58) - may be expected to demonstrate variation in agricultural compound, contaminant and nutrient level depending on the location in which the food was produced. Regional foods include meat, fruit and vegetables. Regional foods are sampled in each of four locations on two occasions. Foods will almost all be prepared and analyzed on the basis of individual regions/seasons to give a total of four analyses for each food for each season, although occasionally seasonal composites of the four regions to give one analysis for each food each season.

Population Groups

The 2003/04 NZTDS will develop simulated diets for the following population groups:

• Infant 6-12 months • Young Child - 1 - 3 yrs • Child - 5 - 6 yrs • Female adolescent - 11 - 14 yrs	• Male adolescent - 11 - 14 yrs • Young male - 19 - 24 yrs • Adult male - 25+ yrs • Adult female - 25+ yrs

Analyses

Testing of foods in the 2003/04 NZTDS is undertaken for pesticides, dithiocarbamate and acid herbicide compounds by way of three separate screens. The multi-residue pesticide screen includes organochlorine pesticides, organophosphorus pesticides, pyrethroids, fungicides, and a number of other pesticides not included in these groups. All foods included in the survey are analyzed by the multi-residue pesticide method. Analysis for dithiocarbamate fungicides is carried out on fruit and vegetable products only. Selected foods are analyzed for acid herbicides.

All foods are tested for the cadmium, iodine, iron, lead and sodium. The majority of foods are also analyzed for arsenic, mercury and selenium.

Foods were also analyzed for moisture so that the information could be utilized by the New Zealand food composition database.

The following criteria were used to decide if a food was analyzed in the 2003/04 NZTDS for certain analytes, and whether these were analyzed as an individual regional / brand composite per season; or as a seasonal composite:

- high contributor to exposure ex WHO GEMS
- high contributor to exposure ex 97/98 NZTDS;
- high concentration in 97/98 NZTDS;
- limit of detection (LOD) in respective matrices
- key food(s) /food groups covered for new analytes (i.e. AH)
- available budget, recognizing differential costs for agricultural compounds, elements and moisture
- increase individual analyses from 97/8 NZTDS to 2003/04;

Reporting

Following each quarter, a report containing the analytical data is released. These reports detail the concentrations of agricultural compounds, contaminants and nutrients found in foods sampled during that quarter. The NZFSA undertook to do this because of length of time the whole process can take – 4 years from initial planning to release of final report. It also allows those with an interest in the results of the NZTDS to access to data in a timely fashion.

Two internally and externally peer-reviewed interpretative reports will be produced at the conclusion of the project (target date October 2005), commenting on concentration data and estimated dietary intakes, and making comparisons to internationally accepted health standards and comparable overseas studies.