Ministry for Primary Industries
Manatū Ahu Matua

2016 New Zealand Total Diet Study

Consultation paper

MPI Discussion Paper No: 2015/35

ISBN No: 978-1-77665-035-4 (online)
ISSN No: 2253-3907 (online)

September 2015

New Zealand Government

Growing and Protecting New Zealand

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Abbreviations

ADI	Acceptable Daily Intake
AI	Adequate Intake
ALARA	As low as reasonably achievable
ANS	Adult's National Nutrition Survey
bw	Body weight
CNS	Children's Nutrition Survey
DTC	Dithiocarbamate
EAR	Estimated Average Requirement
GEMS	Global Environmental Monitoring System
kg	Kilogram
mg	Milligrams
MoH	New Zealand Ministry of Health
MPI	Ministry for Primary Industries
NZFSA	New Zealand Food Safety Authority
NZTDS	New Zealand Total Diet Study
WHO	World Health Organization
UL	Upper Level of Intake
µg	Microgram

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1 Purpose of the consultation paper

This consultation paper presents a draft plan for the 2016 New Zealand Total Diet Study (NZTDS). MPI is seeking specific comments on paper, as per the questions outlined throughout the paper. In particular, MPI is interested in seeking feedback as to whether there are any issues regarding the analytes, changes to the revised key foods list, and the simulated diet approach proposed. In terms of the broad approach, MPI has retained many key features of the 2009 NZTDS, primarily to ensure that dietary exposure trends can be monitored overtime.

2 Consultation process and timeline

Table 1 outlines MPI's plans around consultation, planning, implementing and reporting the results of 2016 NZTDS.

Table 1: 2016 NZTDS timeline

Dates	Activity
2015	
September - October	Draft proposal stakeholder consultation
October	Summarise submissions and finalise proposal
November	Pilot study implemented
December	Finalise 2016 NZTDS plans based on pilot study evaluation
2016	
January - March	1st quarter collection and analysis of food samples*
April - June	2nd quarter collection and analysis of food samples*
July - September	3rd quarter collection and analysis of food samples*
October - December	4th quarter collection and analysis of food samples*
2017	
January - July	Complete data analysis and conduct dietary exposure estimates
July - November	Finalisation of report
December	Publication of full report online

* Quarterly results reported and published online once analysis completed.

Submission form

The consultation submission form can be found in Appendix One. Submissions are due by 5pm, Monday 12 October 2015, and can be emailed sent directly to: tds.2016@mpi.govt.nz

Or posted to:
2016 New Zealand Total Diet Study Consultation
Ministry for Primary Industries
PO Box 2526
Wellington 6140

Please note that late submissions will not be considered, unless prior approval has been sought.

3 Background

3.1 HISTORY OF NEW ZEALAND TOTAL DIET STUDIES

The primary focus of the 2016 NZTDS is to assess exposure to agricultural compounds, contaminant elements and selected nutrients from select representative foods across the average diet of different age-sex groups within the New Zealand population. By its very nature, the NZTDS is relatively large and complex, and is thus carried out only on a periodic basis.

Globally, a Total Diet Study (TDS) is considered a critical tool to enable the identification of food safety risks that might exist due to chemical hazards in the food supply. Detailed scientific analysis and reporting contributes to continued consumer confidence in New Zealand's food supply, both domestically and globally. TDSs are promoted by the World Health Organization (WHO) as the most cost effective means of assessing dietary risks.

A distinguishing characteristic of TDSs, including the NZTDS, is that foods are prepared 'as consumed' (i.e. banana, peeled; meat, cooked) and analysed for a range of chemicals including agricultural compounds, contaminants and nutrients. These data are combined with food consumption information in the form of simulated diets to generate dietary exposure estimates. The level of exposure to these chemicals is compared with national/international health-based guidance values such as the Acceptable Daily Intake (ADI). This information is used to identify the potential for adverse health effects associated with certain foods in the diet across different population groups.

The NZTDS is different to commodity-based surveillance or monitoring programmes which analyse certain chemicals in a particular food and compliance is checked with established standards or legal limits. These monitoring programmes aim to identify risks associated with the particular food, whereas the NZTDS assesses risks from food within the context of the total diet. In assessing the total diet, the NZTDS uses simulated diets to represent an average New Zealand dietary pattern using a number of commonly consumed foods. The NZTDS also differs to National Nutrition Surveys where individual actual food intakes are recorded and the nutrient intake is calculated using food composition data. All are important tools for monitoring the safety of the New Zealand food supply.

TDSs are most effective when undertaken on an on-going and regular basis. This enables the monitoring of trends in concentrations of certain chemicals as well as dietary exposure to these chemicals in the food supply; some of which can vary significantly over time. By monitoring trends, appropriate management strategies can be implemented if there is a potential risk to human health and their effectiveness assessed.

3.2 SUMMARY OF THE 2009 NEW ZEALAND TOTAL DIET STUDY

There have been seven NZTDSs completed to-date, the first in 1974/75. The first five were undertaken by the New Zealand Ministry of Health (MoH). The responsibility for the NZTDS transferred to the New Zealand Food Safety Authority (NZFSA) with its establishment in 2002. The 2003/04 NZTDS and most recent 2009 NZTDS were undertaken by NZFSA.

The 2009 NZTDS, involved analysing multiple samples of 123 different foods to determine the concentrations of 241 agricultural compounds, five selected contaminants (arsenic,

cadmium, lead, mercury and methylmercury) and three selected nutrient elements (iodine, selenium and sodium).

The 123 foods were sampled from January through to December 2009 in four regions of New Zealand (Auckland, Napier, Christchurch and Dunedin). Overall, 4330 food items were purchased and combined into 982 samples for analysis. Simulated diets for the following age and gender groups were constructed based on the 1997/98 National Adults Nutrition Survey (ANS) (University of Otago and Ministry of Health, 2011) data and the 2002 National Children's Nutrition Survey (CNS) (Ministry of Health, 2003):

- 25+ year males
- 25+ year females
- 19-24 year young males
- 11-14 year boys
- 11-14 year girls
- 5-6 year children
- 1-3 year toddlers
- 6-12 month infants

Dietary exposure to the range of chemicals was calculated for each of these age-gender groups and reported in the 2009 NZTDS report (Ministry of Agriculture and Forestry, 2011) located on the MPI Food Safety website: http://www.foodsafety.govt.nz/elibrary/industry/total-diet-study.pdf.

3.2.1 Key findings of the 2009 NZTDS

Agricultural compounds

For the agricultural compounds, dietary exposures were all below the relevant ADI, and therefore unlikely to represent a risk to public health. Ninety-three percent of these were less than 0.1 percent of the ADI. Of all samples analysed, 45 percent were found to contain detectable residues; this is lower than that found in 2003/04 (50 percent) and in 1997/98 (59 percent).

The highest dietary exposure was found for dithiocarbamate (DTC) fungicide, due to residues on a range of fruits and vegetables; namely apples, potatoes and brassicas. At the time, the methodology was unable to differentiate between DTCs and natural compounds found in some vegetables.

Contaminants

The estimated dietary exposures for mercury, methyl mercury and cadmium were below the health standards set by the WHO.

For arsenic, most foods had mean concentrations less than 0.01mg/kg. Fish products contributed 92 percent and 82 percent of the weekly total arsenic exposure for 19-24 year old males and 6-12 month old infants respectively. For 25+ year old males, exposures were similar to that in the United Kingdom (UK), but higher than Australia and the United States of America (USA).

For cadmium, the key dietary sources are oysters, potatoes and breads. Dietary exposure to cadmium was similar to 2003/04, when oysters were excluded. For 25+ year old males, exposures were similar to Australia, the USA and the UK when oysters were excluded.

For lead, levels remained similar to 2003/04, however with a further reduction for infants from 2.9 micrograms (µg) /kg bw/week to 2.1µg/kg bw/week. The higher level in 2003/04 was due to one of the eight samples found to be contaminated. In general, the levels of lead in our diet have now stabilised and are now as low as reasonably achievable (ALARA).

Methyl mercury is predominantly found in fish and shellfish whereas inorganic mercury is found in other foods. Fish and shellfish provided up to 73 percent of the total mercury exposure for young males; and fish provided 55 percent of total mercury exposure for infants (as shellfish was excluded). A lower mean mercury concentration was found in 2009 and 2003/04 compared to 1997/98, despite a 40 percent increase in fish and shellfish consumption in 2009 and 2003/04.

Nutrients

For iodine, 50 percent of each of the age-gender groups had inadequate intakes (or less than the Estimated Average Requirement (EAR)). Key sources were dairy foods, eggs, mussels, fresh fish and oysters. It is important to note that the introduction of mandatory fortification of bread with iodine occurred in September 2009; during the fourth quarter of the 2009 NZTDS sampling. Therefore the iodine intake results do not adequately reflect post fortification levels of bread with iodine. Since discretionary iodised salt use, such as additions at the table and in cooking, was not included in the dietary exposure estimates, it is likely that iodine intakes are underestimated.

The estimated exposure to selenium for all age-gender cohorts exceeded the EAR and the AI for an infant. Furthermore, no age-gender group exceeded the Upper Level of Intake (UL). Differences between the North and South Islands were noted for bread, reflecting that North Island-produced breads are likely to be made of imported wheat containing higher levels of selenium, compared to South Island-produced breads that are made with domestically grown wheat.

For sodium, intakes were much higher than the AI for all age-gender cohorts. Bread was the greatest contributor (14-27 percent total sodium intakes), followed by processed meats (10-15 percent total sodium intakes). Sodium intake has however decreased by 14-28 percent since the 1987/88 NZTDS, but only by five to eight percent since the 2003/04 NZTDS. As noted for iodine, discretionary salt use was not included in the dietary exposure estimates; potentially under estimating overall sodium intakes.

4 Proposed study

4.1 GOALS AND OBJECTIVES

4.1.1 Goal

Overall, MPI aims to implement a best practice New Zealand TDS, which is consistent with previous NZ TDSs and supports domestic and global confidence in the safety of the New Zealand food supply and its monitoring systems.

4.1.2 Objectives

1. Determine the estimated dietary exposure for selected agricultural compounds, contaminants and nutrient elements in the New Zealand food supply through collecting and analysing foods that represent the diet of New Zealanders

2. Compare dietary exposure estimated with internationally recognised acceptable exposures or recommended levels; identify dietary exposure trends in New Zealand overtime; compare these estimates with those in other countries, where comparable data is available; and implement appropriate strategies where a potential risk to human health has been identified

3. Ensure the outcomes of the 2016 NZTDS are complementary with data on agricultural compounds, contaminants and nutrient elements generated from other sources in New Zealand

4. Where appropriate, provide data on selected agricultural compounds, contaminants and nutrient elements for incorporation into other databases including the WHO Global Environmental Monitoring System (GEMS)

5. Engage with key interested stakeholders in the development of methodology, and communicate findings to interested parties in a timely and transparent manner

4.2 ANALYTES

4.2.1 Overview

A well-designed TDS that follows best practice should focus on analysing a specific range of priority contaminant, nutrient and agricultural compound analytes that will reflect what is consumed through the diet. Analytes of interest are fundamentally those that through deficiency or excess from the diet can have adverse health outcomes to the New Zealand population. Prioritising these analytes can be based on the need to determine trends in exposure or intake of these chemicals over time from previous studies and the need to have realistic New Zealand dietary exposure estimates. Priority may also be established based on emerging issues overseas that present strong regulatory interest. The determination of dietary exposures in the TDS allows for assessment of the need to implement any risk management or risk communication activities.

Chemical analysis makes up a large component of the NZTDS expense, and as such it is important that resources are allocated in order to obtain as much data as possible on the highest priority analytes.

A review of the chemical analytes (the analyte review) to be included in the 2016 NZTDS was undertaken by MPI earlier this year. The purpose of the analyte review was to refine the wide list of agricultural compounds, contaminants and nutrients that could potentially be determined, down to a priority list. The analyte review encompassed an analysis of trends from previous TDS reports, a summary of findings from overseas TDS monitoring programmes and analysis of emerging and high priority chemical issues overseas.

The outcome of the analyte review is for a number of core analytical screens to be included in the 2016 NZTDS from which the prioritised analytes (agricultural compounds, contaminants and nutrients) will be measured.

4.2.2 Summary of the recommended analytes

The analyte review has identified priority analytes for each of the three categories in the NZTDS: agricultural compounds, contaminants and nutrients.

Agricultural compounds

For the agricultural compounds the two multi-screen methods based on gas chromatography liquid chromatography can provide analytical results for a large number of individual analytes. The analyte review supported the use of these two methods with a focus placed on interpreting results for the important chemical groupings of carbamates, neonicotinoids, organochlorines, organophosphates and triazoles. This focus would include, where appropriate, a cumulative assessment of the exposure from these groups in the diet.

Additionally, retention of the DTC assay was seen as a priority due to the higher exposure to this chemical grouping than other agricultural compounds, as shown in previous TDS reports.

Contaminants

Consideration of the contaminant analytes has identified that retention of arsenic, cadmium, lead, methyl mercury and inorganic mercury is strongly warranted. This is on the basis that potential adverse health impacts from excess exposure to these environmental contaminants can be significant and they are identified as priority contaminants internationally. Assessment of trends for these contaminants from previous TDS reports indicates that exposure levels are steady or declining, however continuing to monitor for any changing trends is important to identify if exposures begin to increase.

It is also proposed to selectively analyse for the inorganic form of arsenic. The form of arsenic present in the diet can have a large impact on its toxicity, with inorganic arsenic forms being of greater concern than organic forms. Identifying the proportion of arsenic present in the more toxic form allows the exposure assessment to be of greater accuracy as to dietary burden to arsenic.

Finally, results of overseas TDSs have indicated a growing concern about aluminium concentrations in the diet both from environmental contamination and the use of aluminium salts in food additives. The level of aluminium exposure through the New Zealand diet is not currently known as aluminium concentrations have not been previously quantified. It is therefore recommended that aluminium is included in the 2016 NZTDS.

Nutrients

Iodine, selenium and sodium are recommended to be retained in the 2016 NZTDS. Iodine is an essential trace element, it is used in thyroid hormone for normal growth and metabolism. Over the past two decades, studies have reported a prevalence of mild iodine deficiency amongst the New Zealand population (MoH, 2003; Rose, 2009; Thomson, 1996; Thomson, 1997; Thomson, 2001; Thomson, 2009). The low iodine concentrations of New Zealand soil (therefore in crops and meat) and the reduction in the use of iodophors (sanitising and cleaning agents used by the dairy industry) have been contributing factors.

As per the 2009 NZTDS report, dairy products were the primary contributor of iodine in the diet, with seafood, seaweed, and cereal grains contributing to a lesser extent. Since fortification of bread with iodine, MPI has since conducted two surveys to estimate the iodine intakes of New Zealand children 5-14 years of age (Edmonds, 2012; MPI, 2014). Although iodine intakes appear to have improved, continued monitoring of the iodine content of bread, and iodine intakes, is critical to ensure New Zealanders are achieving adequate iodine intakes.

Selenium is an essential trace element in the diet. Selenium is incorporated into several enzymes in the body including having an important role in the thyroid. Selenium is of concern to the New Zealand population due to the potential for inadequate intakes, as a result of low soil concentrations. This is most pronounced in the South Island of New Zealand.

Sodium is an essential nutrient, however sodium levels in the diet through the intake of salt (sodium chloride) and other sodium additives are believed to be in excess of those required by the body. Excess sodium is associated with hypertension, which is a risk factor in chronic conditions such as renal and cardiovascular disease.

Sodium levels in the 2009 NZTDS were above the established UL for all age/gender cohorts and three to four times the intake deemed adequate. Sodium is primarily present in processed products, such as breads, processed meats and cheese, with discretionary use (not measured by the NZTDS) also adding to our intake. Sodium levels in manufactured foods over the course of four NZTDS reports since 1987/88 have shown a general trend of decrease, and New Zealander's intakes of sodium are also lower than those in other developed nations.

Monitoring sodium intakes is important for determining whether dietary excess continues to decline and if sodium levels in foods are decreasing. Furthermore, sodium reduction policies, which many food manufacturers now employ, may result in a reduction in the use of iodised salt in manufactured products and could have an impact on the dietary iodine intakes of New Zealanders. This highlights the need for regular ongoing monitoring of the sodium and iodine content of the food supply.

A full list of the core analytes for the 2016 NZTDS is presented in Table 2. As the costing of the analytical component is finalised there may be an opportunity to include analysis and interpretation of results for a small number of non-core analytes. These could include screens for further agricultural compounds, such as quaternary ammonium compounds, environmental contaminants, such as polybrominated diphenyl ethers, or further nutrient elements such as fluorine or zinc.

Table 2: Core chemical analytes for the 2016 New Zealand Total Diet Study

Agricultural compounds	Contaminants	Nutrients
Carbamates	Aluminium	Iodine
Dithiocarbamates	Arsenic (i)	Selenium
Neonicitinoids	Arsenic (total)	Sodium
Organochlorines	Cadmium	
Organophosphates	Lead	
Triazoles	Mercury (i)	
	Methyl Mercury	

4.2.3 MPI's food surveillance and monitoring programmes

A wide range of chemical analytes could be proposed for the 2016 NZTDS screen. To ensure a focused TDS that delivers to the objectives and operates within a set budget, it is not feasible to include all of the analytes that could potentially be tested.

MPI runs a number of frequent monitoring programmes that target specific residues or contaminants. These include the National Chemical Residue Programme which monitors the chemical residue and contaminant status of animal products and the Food Residue Surveillance Programme which targets compliance of food crops with Maximum Residue Limits (MRLs). The focused nature of these programmes makes them more appropriate tools for addressing specific chemical concerns in individual or small numbers of crops, or where compliance with MRLs is the primary consideration rather than overall dietary exposure levels.

Q1. Do you consider that the current list of priority analytes are sufficient? If not, please indicate which analytes should be substituted and provide relevant data and/ or justification to support these recommended changes.

4.3 KEY FOODS

4.3.1 Overview

One of the key activities in designing the 2016 NZTDS is the development of a food list. The 2016 NZTDS food list should represent approximately 90 percent of a population' food intake (Moy and Vannoort, 2013). In the 2009 NZTDS, 123 foods were identified for sampling and grouped in to the following 14 categories: additional meat and shellfish; alcohol; beverages; chicken, eggs, fish and meat; children's foods; dairy; fruits; grains; infant foods; nuts; oils; spreads and sweets; takeaways; and vegetables. Appendix Two lists the 123 key foods included in the 2009 NZTDS.

Data from the 1997/98 ANS and 2002 CNS were used to inform the development of the 2003/04 TDS key foods list. The 2008/09 ANS data were not available in time to review the 2009 TDS food list, however two changes were still made. These were to include an Indian takeaway dish and to separate water into bottled and tap water.

Since the 2009 NZTDS, the 2008/09 ANS has been completed and is available to inform the food list for the 2016 NZTDS. The 2002 CNS is still the most recent national food

consumption data for children 5-14 years of age, and there is no national data available for children under five years.

4.3.2 Summary of methodology for reviewing the key foods list

The 2008/09 ANS data is currently accessible through the FSANZ dietary modelling tool HARVEST. This tool has been used to review the 2009 NZTDS food list and make recommendations for change. The basic method used was to review each of the 2009 key foods in HARVEST and compare the ratio of consumers to the total number of respondents of a food (e.g. apple, orange etc) within a food category (e.g. fruit) in the survey. In some instances, consumption of this food within a recipe (such as apple in an apple pie) has not been taken in to account). In using this method, foods most commonly consumed and those which could be included in the 2016 NZTDS were identified. Although recommendations have primarily been based on 2008/09 ANS data for adults over 15 years of age, consideration has been given to children's consumption patterns where a change to a key food or new key food is recommended.

4.3.3 Recommended changes to the 2009 key foods list

Food Groups

In reviewing the food list, the categorisation of foods was also revised. A number of changes to the 14 food groups are recommended for the 2016 NZTDS, including the addition of three new categories. In total there are 17 food groups and 130 key foods identified for inclusion in the 2016 NZTDS. Table 3 provides a summary of the 2009 NZTDS food groups, and the proposed food groups for the 2016 NZTDS.

Table 3: Summary of the 2009 food groups and proposed 2016 food groups

Food Group			
2009		2016	
1	additional meat and shellfish	1	additional meat and shellfish
2	alcohol	2	alcohol
3	beverages, non-alcoholic	3	beverages, non-alcoholic
4	chicken, eggs, fish and meat	4	butter and table spreads*
5	children's foods	5	chicken, eggs, fish and meat
6	dairy products	6	composite foods*
7	fruits	7	dairy products
8	grains	8	dairy substitutes*
9	infant foods	9	fruits
10	nuts	10	grains
11	oils	11	infant foods
12	spreads and sweets	12	nuts
13	takeaways	13	oils
14	vegetables	14	savoury sauces and condiments*
		15	snack foods*
		16	sweets and sweet spreads*
		17	vegetables

* New or amended food group

Changes to the key foods list

A summary of the recommended changes to the 2009 food list is provided below. In total 130 foods are recommended for inclusion in the 2016 NZTDS; seven more foods than that included in 2009. Appendix Two provides a list of the key foods to include in the 2016 NZTDS.

Within the 'additional meat and shellfish' category, prawns and shrimps are recommended to be included. Of all shellfish, prawns and shrimps were consumed by 44 percent of people.

Chicken soup is recommended to be removed from the food list, with vegetable soup added. This is on the basis that vegetable soups were consumed by more people (56 percent) compared to chicken soup (16 percent). Any potential contaminants from canning that previous applied to chicken soup will also apply to a vegetable soup.

Pork roast will replace pork chop on the basis that 32 percent consumed pork roast compared to 16 percent for pork chop.

Of all fish products (fish cakes, fingers, nuggets and croquettes), fish fingers are consumed by 29 percent and fish cakes by 69 percent. Fish cakes are recommended to be added, however included under 'Composite foods', as fish cakes are likely to contain a range of ingredients in addition to fish, such as potato.

Of all rice and noodle based stir-fries, fried rice dishes, vegetable dishes and sushi, Indian takeaway, although included in the 2009 NZTDS, was not identified as a popular dish. In addition, there was a paucity of data on consumption of a Chinese specific dish. Both specific foods are recommended to be excluded, and replaced with a 'rice dish' and 'noodle dish' which represents 41 percent of the total category. Sushi is recommended for inclusion, as the next most popular takeaway (24 percent), and that it accounted for 14 percent of overall rice consumption.

It is recommended that cream is removed as there are already a wide range of dairy products included, and was one of the least popular choices (6 percent) after cheese (46 percent), milk (*3.25 percent fat*) (45 percent), yoghurt (26 percent), milk (*0.5 percent fat*) (19 percent), icecream (7 percent). Furthermore, cream is likely to be consumed in much lesser quantities than is milk, yoghurt and icecream.

It is recommended that apricots canned are removed as this is likely to be similar to peaches canned, which were consumed by 3 percent. A review of the agricultural compounds for peaches and apricots canned for 2009, also indicated no difference.

Oranges were consumed by 6 percent, and although not a key food, mandarins were also consumed by 6 percent. It is recommended to include mandarins, in addition to oranges, as these are likely to be consumed by children over oranges; in terms of being easy to peel and slip into lunch boxes.

Mixed berries frozen is recommended to be added to the key foods list, based on increased availability and potential consumption by young adults in particular.

Extruded cereal products (referred to as other cereal products) such as rice puffs and cocoa puffs are recommended for inclusion. Although they made up 4 percent of the overall breakfast cereal category, they are highly likely to be consumed by children.

It is recommended that 'cakes' is changed to 'cakes and slices' and 'muffin' changed to 'muffin and scones'. Of all cakes, muffins, slices and scones, the most popular in descending order is cakes (41 percent), slices (23 percent) muffins (20 percent) and scones (16 percent).

It is recommended that almonds (27 percent) are included as these were consumed in a similar quantity to peanuts (24 percent).

Of all mature legumes and pulses, hummus was consumed by 23 percent of people. Due to its popularity, is recommended that this be included.

Of all potatoes, kumara and taro, taro was consumed by <1 percent. Based on a very low level of consumption and that levels of agricultural compounds in taro were very low in the 2009 TDS, it is recommended that taro is removed from the food list.

Vegetables that were consumed by 1 percent each were beans (frozen), beetroot canned, cabbage, celery, corn canned, courgette, silverbeet and tomatoes canned in juice. For corn, a greater proportion consumed frozen corn, with fresh corn second and canned corn third. On this basis, it is recommended that canned corn is changed to frozen corn. Due to low consumption, it is recommended that beans (frozen) are removed, and mixed vegetables (frozen) included, which are likely to include not only beans, but a range of other vegetables.

Tofu was identified within the 'meat substitute' category as being the most popular (53 percent). It is recommended that this is included, not only based on consumption, but evidence suggesting a high level of a number of nutrients and contaminants in tofu (Noel et al, 2012).

Q2. Do you consider there are any foods that should be included or excluded based on dietary consumption patterns? If so, please provide data to identify and justify any recommended changes.

4.4 SIMULATED DIETS

4.4.1 Overview

In order to estimate dietary exposure to the various analytes, 14-day simulated diets are developed to estimate the mean weight of each food consumed for specific population groups. Analytical data are then multiplied by the daily weight for each food consumed over two weeks, then averaged to a daily exposure estimate.

For agricultural compounds, the estimated mean exposure is then divided by body weight (bw) to yield dietary exposures on a µg (of the compound) per kg bw per day basis. For contaminant elements, dietary exposures are expressed on a µg per kg bw per week or month. For nutrient elements, daily intake is not divided by bw and are simply expressed as mean daily intake in µg or milligrams (mg) per person per day.

In order to ensure dietary exposure estimates are as accurate as possible, the simulated diets used in the 2009 NZTDS will be reviewed for their currency for use in the 2016 NZTDS. The simulated diets used in the 2003/04 and 2009 NZTDS were based on the 1997/98 ANS and the 2002 CNS. Since then, the most recent 2008/09 ANS data has become available, so it will be used to review the simulated diets for the 2016 NZTDS.

4.4.2 Population groups

Historically, the population groups chosen to be represented in the NZTDSs have been justified on the basis of groups most likely to represent a range of dietary exposures, including those with the highest intake of foods (young males aged 19-24 years), vulnerable population groups (6-12 month old infants, 1-3 year old toddlers and 5-6 year old children and 11-14 year old children) and the average adult population (males and females aged 25 years and older) (Brinsdon S, 2004). It is also important to retain some consistency with previous NZTDSs in order to track trends in exposure.

It is therefore proposed that for the 2016 NZTDS, the population age and gender cohorts will remain as follows:

- 25+ year males
- 25+ year females
- 19-24 year young males
- 11-14 year boys
- 11-14 year girls
- 5-6 year children
- 1-3 year toddlers
- 6-12 month infants

Q3. Do you consider there are any population groups that should be included in the 2016 NZTDS based on significant differences in intake patterns and likely increased exposures to "higher risk" foods? If so, please provide data to identify and justify any recommended changes.

4.4.3 Construction of the simulated diets

Adult simulated diets used in the 2009 NZTDS will be updated to include the 2016 NZTDS key foods list together with 2008/09 ANS data.

The simulated diets for infants, children and adolescents used in the 2009 NZTDS will be updated to include the 2016 NZTDS key foods list and any recent New Zealand research which may inform the currency of the diets.

Where recent, nationally representative food consumption data are not available, a review of recent New Zealand studies on food consumption in the relevant age groups (i.e. under 14 years of age) will be undertaken to ascertain whether the existing simulated diets reasonably reflect current dietary intakes.

Q4. Are there any recent studies on dietary intakes in New Zealand infants, children and adolescents that should be reviewed to inform updates of the simulated diets used in these age groups? If so, please provide details of this research.

4.5 SAMPLE SIZE, COLLECTION AND PREPARATION

The NZTDS aims to estimate New Zealander's dietary exposure to certain chemicals through the foods they eat. Foods are analysed on an 'as consumed' basis. This means that foods such as meat will be cooked and bananas peeled etc., as part of the sample analysis preparation, prior to being sent for laboratory analysis. It is important to note that other MPI monitoring and surveillance programmes analyse foods at the point of import or immediately after harvest or processing.

4.5.1 Regions for sample collection

Foods sampled for the NZTDS are made up of regional foods (collected in four locations around New Zealand) and national foods (for which four brands available nationwide are collected from one location). The regional locations for the last four NZTDSs were:

- Auckland – largest population in North Island
- Napier – regional agricultural and horticultural growing area
- Christchurch – largest population in South Island
- Dunedin – Otago is known to have low natural iodine

Foods identified as 'regional foods' are more likely to be fruits, vegetables, meat etc., that may vary in terms of the agricultural compounds, contaminants and nutrients. 'National foods' are likely to be branded, processed and packaged foods that are less likely to be influenced by regional variation.

It is proposed that the regional locations remain the same for the 2016 NZTDS to ensure consistency in trend analysis. Christchurch was identified as the national region in the 2009 NZTDS. This is likely to remain the same for the 2016 NZTDS.

4.5.2 Proposed sampling plan

For the key foods which are branded, the sampling plan will include approximately four top sellers. This will ensure that the branded foods collected represent a typical diet of an average New Zealander. As per the 2009 NZTDS, the selection of branded and non-branded foods will not be based on whether they are imported or locally-produced foods. Information such as place of purchase, date of purchase, brand, use by or best before date, country of origin, batch/ lot number and the barcode will be recorded as part of the sampling process.

As per the 2009 NZTDS, it is proposed that samples will be collected on two occasions over a 12-month period. To manage the amount of food to be collected and prepared for analysis, as well as to take into account seasonal variation, sampling will be undertaken over four quarters of the year. This includes two sampling rounds for regional foods (January and July) and two for national foods (April and November), with eight samples purchased for each food. In the 2009 NZTDS, samples from each of the four regions and the four national brands were individually analysed, and it is proposed that this continue.

4.5.3 Sample preparation methodology

Sample preparation methods will be revised using 2008/09 ANS data. This national food consumption data provides useful information on how foods were consumed at the time of data collection. For example, whether chicken was grilled, baked or fried. Preparation methods will be revised once the key foods list is finalised.

4.6 REPORTING

4.6.1 Reporting of results

As soon as results become available from each sampling round, these will be compiled into a report and published quarterly on the MPI website.

A final comprehensive report including dietary exposure estimates for all specific population groups will be prepared once all data has been consolidated. This is proposed to published in December 2017 (one year following final sampling).

4.6.2 Unexpected results

MPI will review any analytical results that are unusual or unexpected to ascertain whether immediate follow up action is required.

5 Appendices

Appendix One. 2016 NZ Total Diet Study submission form

Name…….

Organisation……

Email address……

Address……

…….

…….

Phone number…….

Consultation questions

Q1. Do you consider that the current list of priority analytes are sufficient? If not, please indicate which analytes should be substituted and provide relevant data and/ or justification to support these recommended changes.

Q2. Do you consider there are any foods that should be included or excluded based on dietary consumption patterns? If so, please provide data to identify and justify any recommended changes.

Q3. Do you consider there are any population groups that should be included in the 2016 NZTDS based on significant differences in intake patterns and likely increased exposures to "higher risk" foods? If so, please provide data to identify and justify any recommended changes.

Q4. Are there any recent studies on dietary intakes in New Zealand infants, children and adolescents that should be reviewed to inform updates of the simulated diets used in these age groups? If so, please provide details of this research.

Q5. Do you have any comments regarding any other aspect of the consultation paper?

Submissions are due by 5pm, Monday 12 October 2015, and can be emailed sent directly to: tds.2016@mpi.govt.nz, or posted to:

2016 New Zealand Total Diet Study Consultation
Ministry for Primary Industries
PO Box 2526
Wellington 6140

Please note that late submissions will not be considered, unless prior approval has been sought.

Appendix Two. 2009 and 2016 NZTDS Key food list

2009 Key foods	2016 Key foods*
	Almonds, whole
Apple	Apple
Apple-based juice	Apple-based juice
Apricot, canned	~~Apricot, canned~~
Avocado	Avocado
Bacon	Bacon
Banana	Banana
Beans	Beans
Beans, baked, canned	Beans, baked, canned
Beef, corned	Beef, corned
Beef, mince	Beef, mince
Beef, rump	Beef, rump
Beer	Beer
Beetroot, canned	Beetroot, canned
Biscuit, chocolate	Biscuit, chocolate
Biscuit, cracker	Biscuit, cracker
Biscuit, plain sweet	Biscuit, plain sweet
Bran flake cereal, mixed	Bran flake cereal, mixed
Bread, mixed grain	Bread, mixed grain
Bread, wheatmeal	Bread, wheatmeal
Bread, white	Bread, white
Broccoli/Cauliflower	Broccoli/Cauliflower
Butter	Butter
Cabbage	Cabbage
Caffeinated beverage	Caffeinated beverage
Cake	Cakes and slices
Capsicum	Capsicum
Carbonated drink	Carbonated drink
Carrot	Carrot
Celery	Celery
Cheese	Cheese
Chicken	Chicken
Chicken takeaway	Chicken takeaway
Chinese dish	~~Chinese dish~~
Chocolate beverage	Chocolate beverage
Chocolate, plain milk	Chocolate, plain milk
Coffee, beans, ground	Coffee, beans, ground
Coffee instant	Coffee instant
Confectionery	Confectionery
Corn, canned	Corn, frozen
Cornflakes	Cornflakes
Courgette	Courgette
Cream	~~Cream~~
Cucumber	Cucumber
Dairy dessert	Dairy dessert
Egg	Egg
Fish fingers	Fish fingers
Fish, battered	Fish, battered
Fish, canned	Fish, canned
Fish, fresh	Fish, fresh

2009 Key foods	2016 Key foods*
-	Fish, cakes
Fruit drink	Fruit drink
Grapes	Grapes
Ham	Ham
Hamburger, plain	Hamburger, plain
Honey	Honey
-	Hummus
Ice cream	Ice cream
Indian takeaway	~~Indian takeaway~~
Infant and Follow-on formula	Infant and Follow-on formula
Infant weaning food, cereal based	Infant weaning food, cereal based
Infant weaning food, custard/fruit dish	Infant weaning food, custard/fruit dish
Infant weaning food, savoury	Infant weaning food, savoury
Jam	Jam
Kiwifruit	Kiwifruit
Kumara	Kumara
Lamb/mutton	Lamb/mutton
Lambs liver	Lambs liver
Lettuce	Lettuce
-	Mandarins
Margarine	~~Margarine~~
Meat pie	Meat pie
Melon	Melon
Milk, 0.5 percent fat (Trim)	Milk, 0.5 percent fat (Trim)
Milk, 3.25 percent fat	Milk, 3.25 percent fat
Milk, flavoured	Milk, flavoured
-	Mixed berries, frozen
-	Mixed vegetables, frozen
Muesli	Muesli
Muffin	Muffins and scones
Mushrooms	Mushrooms
Mussels	Mussels
Nectarine	Nectarine
-	Noodle dish
Noodles, instant	Noodles, instant
Oats, rolled	Oats, rolled
Oil	Oil
Onion	Onion
Orange	Orange
Orange juice	Orange juice
-	Other cereal products
Oysters	Oysters
Pasta, dried	Pasta, dried
Peaches, canned	Peaches, canned
Peanut butter	Peanut butter
Peanuts, whole	Peanuts, whole
Pear	Pear
Peas	Peas
Pineapple, canned	Pineapple, canned
Pizza	Pizza
Pork chop	Pork roast
Potato crisps	Potato crisps
Potato, hot chips	Potato, hot chips

2009 Key foods	2016 Key foods*
Potatoes, peeled	Potatoes, peeled
Potatoes with skin	Potatoes with skin
-	**Prawns and shrimps**
Prunes	Prunes
Pumpkin	Pumpkin
Raisins/sultanas	Raisins/sultanas
-	**Rice dish**
Rice, white	Rice, white
Salad dressing	Salad dressing
Sausages	Sausages
Silverbeet	Silverbeet
Snack bars	Snack bars
Snacks, flavoured	Snacks, flavoured
Soup, chicken	~~Soup, chicken~~
-	**Soup, vegetable**
Soya milk	Soya milk
Spaghetti in sauce, canned	Spaghetti in sauce, canned
Strawberries	Strawberries
Sugar	Sugar
-	**Sushi**
-	**Table spreads**
Taro	~~Taro~~
Tea	Tea
-	**Tofu**
Tomato	Tomato
Tomato sauce	Tomato sauce
Tomatoes in juice	Tomatoes in juice
Water, bottled	Water, bottled
Water, tap	Water, tap
Wheatbiscuit cereals	Wheatbiscuit cereals
Wine, still red	Wine, still red
Wine, still white	Wine, still white
Yeast extract	Yeast extract
Yoghurt	Yoghurt
Total number of foods = 123	*Total number of foods = 130*

*New foods or changes to current foods are identified in bold

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