

COMMITTEE ON TOXICITY OF CHEMICALS IN FOOD, CONSUMER PRODUCTS AND THE ENVIRONMENT

Paper for Information:

Rebuild of the Food Standards Agency Recipes Database

Introduction

1. The Food Standards Agency (FSA) requires information on components of food dishes to ensure that foods consumed as ingredients of other foods are accounted for in dietary exposure assessments, as far as practicable and where appropriate. Until recently, the FSA had been using a Recipes Database that was initially developed over 18 years ago and more food recipes had been added on an ad-hoc basis to include foods consumed in subsequent surveys. Ingredient information had been obtained from various sources (e.g. recipe books, websites) to ensure appropriate functionality was maintained as far as possible. The FSA reviewed its Recipes Database a few years ago and concluded that the methodology and rationale for adding or editing recipes was not always clear and consistent.

2. In 2012, the FSA commissioned a project to rebuild its recipes database. The aim of this project was to produce a database, which stands up to scrutiny, and could be published; thus adding to the openness and transparency of FSA exposure assessments.

Exposure assessment

3. Exposure assessment is a vital component of risk assessment. Consumer dietary exposure assessment, in its simplest form, involves combining data on the amount of consumption of a food (usually derived from a dietary survey) with data on the level of a chemical in the food in order to estimate the amount of the chemical ingested by an individual in a population over the period of the survey. UK consumption patterns are generally derived from two surveys: (i) National Diet and Nutrition Survey (NDNS) which provides detailed, quantitative information on food consumption, nutrient intakes, nutritional status and related characteristics in the general population. The NDNS programme begun in 1992 as a series of four cross-sectional surveys each covering a different age groups: children aged 1.5 years to 4.5 years in 1992-1993; young people aged 4 to 18 years in 1997; people aged 65 years and over in 1994-1996 and adults aged 19 to 64 years in 2000-2001. Since 2008, the NDNS has been a continuous rolling program covering adults and children aged 1.5 years and over.¹ It is the only national dietary survey

¹ National Diet and Nutrition Survey (NDNS): results from Years 1 to 4 (combined) of the rolling programme for 2008 and 2009 to 2011 and 2012 -

that provides this type of data for individuals, allowing breakdown by age and sex and analysis of the distribution of intakes within the population on a per person or bodyweight basis. (ii) Diet and Nutrition Survey of Infants and Young Children (DNSIYC), 2011 which provides the only source of high quality nationally representative data on the types and quantities of foods consumed by the 4 to 18 month age group.² DNSIYC is a one-off survey (not a rolling program) commissioned to be used alongside data from the NDNS to provide a fuller picture on the diet of the nation.

4. Food ingredients (recipe) information from the Recipes Database is used to break down the consumption of foods recorded in dietary surveys into consumption of their ingredients. Total consumption of a particular ingredient can then be calculated more accurately from all sources (e.g. “total apples” would include: apples eaten as a fresh fruit, apple in a baked apple pie, as part of a fruit salad, from apple juice etc.). Depending on the purpose of the exposure assessment, the consumption data can focus on particular uses only (e.g. fresh fruit and fruit salad, which might be consumed in the home where the fruit originates from the same source).

FSA Standard Recipes Database (SRD)

5. The project to rebuild the database, carried out by Medical Research Council’s Human Nutrition Research Unit (MRC HNR), was completed in January 2015. The output of the project was a recipe dataset that included 8397 up-to-date recipes, guidance notes describing the methodology applied in the study and a project report. The protocol developed for this project included derivation of standardised recipes. The updated recipes represent the foods consumed in the UK, as reported in national nutrition surveys since 1992. Recipes have been produced using a consistent approach and a well-documented methodology to ensure transparency. The new database is referred to as the Standard Recipes Database (SRD).

Summary of methodology

6. Each food recorded in the national dietary surveys is assigned a food code and a food name (which usually includes a description of the food type and condition, e.g. raw, fresh, peeled, boiled, grilled etc.). All food codes as recorded during national nutrition surveys since 1992 were considered for inclusion in the SRD, in order to reflect the UK food consumption depicted by these surveys over a period of 20 years. Food level datasets for these surveys were retrieved from the UK data archive (<http://ukdataservice.ac.uk/>). Following this, a master food code list was compiled to represent foods consumed in all surveys, and merged with the current NDNS rolling programme year 4 nutrient databank. This final stage was important as it

² <https://www.gov.uk/government/statistics/national-diet-and-nutrition-survey-results-from-years-1-to-4-combined-of-the-rolling-programme-for-2008-and-2009-to-2011-and-2012>
Diet and nutrition survey of infants and young children (DNSIYC), 2011. Available at: <http://transparency.dh.gov.uk/2013/03/13/dnsiyc-2011/>

enabled additional food codes (n=358) to be captured which may not be represented 'as consumed' in the survey datasets but are important as components of recipes, for example, raw meat.

7. Six food types were devised to describe the differences between food codes. The European Food Safety Authority (EFSA) Technical Report on the food classification and description system FoodEx2³ provided a suitable grouping of foods which was used to inform the definition of food types in the project as follows:

Single-ingredient food codes were identified by relevant keywords in the food code description which suggested an unprocessed nature such as; raw, uncooked, and fresh. These food codes were used to determine the ingredients in multi-ingredient food codes which comprise two or more ingredients.

- **Raw commodity ingredients (RCI)** are food codes in their raw agricultural and/or unprocessed state, for example raw meat and uncooked vegetables.
- **Simple ingredient commodity (SIC)** food codes are commodity items which have undergone some processing to derive an ingredient and may originate from an RCI, such as flour and sugar.

Multi-ingredient food codes were one of three distinct categories based on their food name description and/or respective NDNS food group.

- **Recipe Homemade (RHM)** food codes relate to homemade items comprising two or more ingredients; identified by the inclusion of 'homemade' within the description, or from their categorisation into homemade food groups in the nutrient databank.
- **Recipe Purchased Composites (RPC)** are food codes relating to purchased or retail items, where the food composition data was originally compiled using more than one brand (composites). RPC codes are identified by food name description (many include the words 'retail', 'purchased'), assignment to one of the purchased food groups, and may have accompanying notes within the nutrient databank detailing food code origin.
- **Recipe Purchased Brand Specific (RPB)** relates to food codes for products which have very distinct food composition and have a brand name included within their description.
- **Miscellaneous (MISC)** relates to food codes that were used as descriptors to assist with recipes, such as 'water as a diluent'.

8. A pilot study of 40 food codes covering each type of food category demonstrated the extent of variation in food codes and the mixed approaches required to ensure ingredient lists were as realistic and accurate as possible. RHM, RPC and RPB codes were standardised according to various methods and assumptions used in standardising recipes. For example, RHM codes were investigated to determine the appropriate components and proportions to generate a standard ingredient list for the SRD. To achieve this, comparable recipes were explored and obtained from different sources, and

³ European Food Safety Authority; The food classification and description system FoodEx 2 (draft-revision 1). Supporting Publications 2011:215. [438 pp.]. Available online: www.efsa.europa.eu

used to guide decisions. The primary source of ingredient information for the SRD were the recipes published within McCance and Widdowson's Composition of Foods 6th edition (MW6)⁴ and related published supplements. As a secondary information source, the nutrient databank was used to assist with RHM food codes in two ways; firstly, to review related nutrient composition of food codes and guide proportion of specific nutrient containing ingredients, and secondly as a source of recipe information. Where comparable recipes were found in the MW6 this was the primary source of information used to create the standard ingredient lists, combined with additional recipe information which was available in the NDB. Data compilers also applied their own knowledge and experience of food consumption and current cooking methods to all the standard ingredients lists prepared for the SRD. For instance, due to the age of the recipes in the MW6 some contained lard and/or dripping, which are food ingredients used less often in current cooking practice. These were therefore substituted for more commonly consumed fats. Food intake data from the most recent NDNS was used to guide data compilers in understanding commonly consumed food ingredients. Detailed methodology and assumptions used in standardising recipes, including sources of information, is provided in guidance notes accompanying the database, prepared for users and data compilers of the SRD

Examples of how the FSA uses the SRD

9. Refining consumption estimates and resulting exposure assessments - Information on the proportion of ingredients in foods is used where the purpose for the assessment requires ingredients of certain proportions to provide refined estimates of consumption by UK consumers for exposure assessments of chemicals from foods.

10. Support food surveillance work – The SRD was used recently as follows:

- The planning of a retail survey of oat based cereal products to measure T-2 and HT-2 toxin levels. SRD was used to prioritise food groups and product types based on oat content and consumption pattern.
- A microbiological related outbreak of illness suggested a possible association with the consumption of pork products (such as sausages) in individuals over the age of 40. The SRD was used to select appropriate recipes that contained pork products and provide data on the consumption of these recipes in different age groups for focussing the investigation. Experience has shown that it is usually inevitable for some relevant foods to be missed out when foods are selected directly (manually) from the survey database without using recipe information from the SRD, as a result of uncertainty about the ingredients of some recipes.

11. Use of Marker Codes – The SRD includes information about the presence of some food additives as well as added vitamins and minerals in

⁴ McCance and Widdowson's The Composition of Foods, Sixth summary edition. Food. Standards Agency (2002). Cambridge: Royal Society of Chemistry

different foods. The researchers used marker codes to flag the presence of these constituents in different foods as follows to account for ingredients of in recipes, that are not recorded in the NDNS nutrient databank:

- Marker code for vitamins and minerals
- Marker code for flavourings
- Marker code for food additives (eg. stabilisers, thickeners, emulsifiers)
- Marker code for colourings
- Marker code for sweeteners (not sugar derivatives)
- Marker code for preservatives

This facility allows the refinement of exposure assessments involving the above mentioned classes of food chemicals by focussing on specific foods. This is an improvement on the old recipes database, where these food constituents were not explicitly flagged as being present.

Examples of how other government departments use the SRD

12. Public Health England (PHE), Nutrition Advice Team has used the information from the SRD to inform its modelling work conducted as part of the review of the *eatwell* plate⁵; example menus, meeting current Dietary Reference Values, were disaggregated into component ingredients which were then assigned to one of the current *eatwell* plate food groups. In order to disaggregate the composite foods within the menus into component ingredients it was necessary to have the corresponding recipe information. The published summary of the modelling work is available at: [eatwell modelling outcome paper](#).

13. Chemicals Regulation Directorate (CRD) of the Health & Safety Executive: Residues trials studies are conducted under controlled experimental conditions (called supervised residues trials) and these trial data have multiple purposes: they are used to propose Maximum Residue Levels (MRLs), which are legal limits for pesticide residues; and they are used to undertake risk assessments to support both the setting of the proposed MRLs and the decision making on pesticide authorisations. MRLs are set for raw traded food items and so the residue trials determine residues in the raw agricultural commodity. Therefore the consumption values used for pesticide risk assessments need to be expressed as the equivalent amounts of the raw agricultural form, while accounting for the consumption of commodities in all forms consumed: raw; home or industrially processed; or prepared with other foods. As such, food ingredient (recipe) information is needed to derive the commodity intakes in equivalent amounts of the raw form, irrespective of how food products are consumed. A 'raw' commodity intake value may include contributions for a crop item consumed in different ways (such as tomatoes eaten 'fresh'/raw, canned or from a pizza recipe, or as tomatoes in ketchup etc). Consumption data specifically for processed foods can also be of interest, especially when residue data investigating residue levels in processed foods is available, however the consumption values for the 'raw

⁵ The *eatwell* plate highlights the different types of food that make up our diet, and shows the proportions we should eat them in to have a healthy, balanced diet. It is available at: [Your guide to eatwell plate - Gov.uk](#)

form' accounting for all derivations are always needed. Using the information in this form ensures that MRL setting and the conditions of authorisations for use of pesticides on food crops takes account of UK consumer intakes of pesticide residues. The current food consumption data used by CRD are based on previous dietary surveys and an older recipes database. The new SRD will be used by the FSA together with recent data from the rolling NDNS programme and DNSIYC surveys to generate new consumption statistics for CRD.

Next Steps

14. The Agency will publish the SRD in electronic form with accompanying documents at the UK Data Service (<http://ukdataservice.ac.uk/>) in due course, subject to withholding commercially sensitive information. NDNS survey data are available from UK Data Service and the SRD would complement the use of the data for dietary risk assessment by interested parties, e.g. academia and food industry.

15. The new SRD will be updated periodically. Recipes for foods consumed in subsequent years of the NDNS, as new foods become available, will be added to the Recipes database. The SRD submitted to the FSA contains standardised recipes based on the composition of foods available at the time the project was undertaken. The diversity and formulation of food products in the UK food market changes continuously, therefore standard recipes will be reviewed periodically and updated with up-to-date food composition (e.g. lard in old recipes was replaced with more commonly consumed fats).

Secretariat
September 2015