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Original Research Article

Compilation of an Australian database of manufactured and packaged food products containing wholegrain ingredients

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ABSTRACT

Comprehensive food databases are critical components of translational nutrition research. The food industry maintains proprietary data on the wholegrain content of manufactured food products which are available for collation. The aim of this study was to systematically collate wholegrain composition data on Australian manufactured and packaged food products. Wholegrain content data (g) per 100 g of product were retrieved from the Australian food industry via the representative body the Grains & Legumes Nutrition Council™, direct data transfer from food manufacturers and product packaging. Products were coded according to the food grouping hierarchy applied in the AUSNUT (Australian food and nutrient) 2007 database. The mean, median, standard deviation and range of wholegrain (g) per 100 g and serving of product were calculated for each food group. The mean and range in wholegrain content (g/100 g) of major food groups were: flours/cereal-grains (uncooked) (100.0; –); regular breads/rolls (37.6; 5.1–70.0); muffins/flat/sweet breads (40.5; 6.0–64.0); pasta (86.0; 51.0–100.0); breakfast cereal, ready-to-eat (59.9; 6.0–100.0); breakfast cereal, porridge-type (74.5; 60.0–96.0); sweet biscuits (30.5; 9.0–44.0); savoury biscuits (69.1; 26.0–100.0); batter-based products (43.0; –); dairy substitutes (11.3; 10.0–15.0); soup (10.0; 7.0–11.0); corn snacks (48.8; 30.0–100.0); other snacks (58.1; 53.0–66.0); cereal bars (32.1; 2.0–56.0). This research establishes data for assessing the wholegrain content of Australian manufactured and packaged food products, for application in nutrition research and practice.

1. Introduction

The consumption of wholegrains is associated with reduced risk of cardiovascular disease (CVD), type 2 diabetes mellitus (T2DM) and cancers of the digestive system (de Munter et al., 2007; Fung et al., 2002; Haas et al., 2009; Jacobs et al., 1998; Kasum et al., 2001; Liu et al., 1999, 2000, 2003). A recent meta-analysis of 45 prospective cohort studies and 21 randomised controlled trials found that participants consuming 48–80 g wholegrains per day had a 26% lower risk of T2DM and 21% lower risk of CVD compared to those who rarely consumed wholegrains, suggesting a significant benefit from consumption (Ye et al., 2012). In Australia, the prevalence chronic disease is increasing and statistics suggest that the number of people living with diabetes may double within 20 years, necessitating the rapid implementation of evidence-based preventative strategies to address the growing health concerns (AIHW, 2012; Magliano et al., 2009). However, while wholegrains offer putative protection against the development of chronic disease, little research has investigated the role of wholegrain consumption in the context of the Australian diet.

To facilitate this agenda, certain elements of research infrastructure must be implemented. The development of a wholegrain database, focusing on the content of manufactured and packaged food products is a useful starting point, as wholegrain composition data are required to fulfil a number of research tasks including quantification of wholegrain intakes in dietary studies and nutritional monitoring of the growing market of wholegrain products (Cleveland et al., 2000; Franz and Sampson, 2006; Hodgkins et al., 2010; Louie et al., 2012; Maras et al., 2009). In Australia the primary national nutrient databases available to support nutrition research and practice are the Australian Food, (Supplement) and Nutrient Database (AUSNUT) (FSANZ, 1999, 2008a) and Nutrient Tables (NUTTAB) (FSANZ, 2010). However,

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while these databases are well established for the purpose of providing nutrient estimates of common Australian foods, they do not contain wholegrain content data, exposing a gap in the resource base for research.

As grains are typically consumed in the form of processed foods, characterisation of the wholegrain content of food products is an important aspect of developing a wholegrain database (Kyro et al., 2011; McLennan and Podger, 1999; Schakel, 2001; Slavin et al., 2001). "Wholegrain" is defined by Food Standards Australia New Zealand (FSANZ) as the "... the intact grain or the dehulled, ground, milled, cracked or flaked grain where the constituents—endosperm, germ and bran—are present in such proportions that represent the typical ratio of those fractions occurring in the whole cereal, and includes wholemeal" (FSANZ, 2005, 2009). This definition refers to grains from the Poaceae (Gramineae) grass family of plants, including wheat, barley, bulgur, corn, oats, rye, rice, millet, triticale, teff and sorghum (Kellogg, 2001; McKeown et al., 2013; McKevith, 2004). However, accurately determining the proportion of wholegrain ingredients in a food product presents a specific challenge for researchers, as the wholegrain content of food products may vary considerably, product formulations may contain proprietary information and the wholegrain ingredient content of products may not be labelled on the product packaging (Jonnalagadda et al., 2011; Maras et al., 2009; Slavin et al., 2013). Furthermore, manufacturing processes such as baking and extrusion may influence the composition of foods, adding complexity to the task of characterising the wholegrain content of food products for research purposes (Slavin et al., 2001).

Food manufacturers are required to provide information about the nutritional content of foods on product labels, according to the specifications of the Australia New Zealand Food Standards Code (FSC) (FSANZ, 2013a). Standard 1.2.10 of the FSC stipulates the requirements for calculating and declaring the proportion of characterising ingredients in foods, with provisions made to account for weight and moisture changes that occur during processing (FSANZ, 2011). The term 'characterising ingredients' is defined in the FSC as ingredients associated with the name of a product, mentioned in the name of the food or emphasised on the food label, such as wholegrains in a product labelled as a "wholegrain food" (FSANZ, 2011). While the methods for calculating the percentage of characterising ingredients vary according to the compositional changes that occur during processing, standard 1.2.10 provides a framework for consistency in how the wholegrain content of products is calculated by manufacturers and a useful methodological framework for the development of a wholegrain database.

Previous studies report sourcing compositional data from the food industry to aid in the development of wholegrain databases, suggesting that the food industry is an important source of compositional data that may be drawn upon for research purposes (Franz and Sampson, 2006; Fung et al., 2002; Hodgkins et al., 2010; Jacobs et al., 1998; Jonnalagadda et al., 2011; Koh-Banerjee et al., 2004; Kyrø et al., 2011; Liu et al., 2000; Maras et al., 2009; McKeown et al., 2002). Kyrø et al. (2011) report deriving wholegrain estimates based on data displayed on food product labels and by obtaining data shared from food manufacturers. Similarly, Jacobs et al. (1998) estimated the wholegrain content of breakfast cereals consumed by a cohort of over 41,000 women, through analyses of product labels and by obtaining wholegrain data shared from a major food manufacturer. In contrast other studies report utilising a recipe approach to derive wholegrain content estimates based on the analyses of food label data (Franz and Sampson, 2006; Kyrø et al., 2011). Collaboration with stakeholders in the food industry thus represents a potential avenue to obtain wholegrain content data pertaining to food products in the Australian market (Hodgkins et al., 2010).

In response to the research gap in Australia and the primary need for wholegrain composition data, the aim of this study was to develop a wholegrain database which delineates the wholegrain content of Australian manufactured and packaged food products, utilising data systematically obtained from the Australian food industry.

2. Materials and methods

2.1. Identification of products containing wholegrain ingredients and development of a framework for data collection

For the purpose of this study, the term "wholegrain" was defined in accordance with that outlined by Food Standards Australia and New Zealand (FSANZ), as presented in the introduction of this manuscript (FSANZ, 2005, 2009). There was no lower limit on the amount of wholegrain a product should contain to be included in the database and in accordance with the above definition, bran, germ, nuts, seeds, legumes and pearled barley were excluded from the definition.

To obtain a broad coverage of foods and gain a representative sample of food products on the Australian market, a framework was developed to guide the selection of food product data; this approach was adopted in previous research (Grimes et al., 2008; Webster et al., 2010). Firstly, all grain-containing foods listed in the most recent editions of the primary Australian food composition databases, AUSNUT 2007 and NUTTAB 2010, were used to create a list of target foods and food groups (FSANZ, 1999, 2008a, 2010). The *Retail World's Australasian Grocery Guide* (Retail World) (Retail World, 2010) was then used to identify the top selling brands and food products across relevant categories, to ensure that products with the greatest market share were included in the database. With these data, a list of foods and food groups was built to target foods for inclusion in the database.

2.2. Data extraction and management

Data were obtained from the food industry between June and November in 2011 from three sources:

1. As a first point of contact, the nutrition research and communication organisation Grains & Legumes Nutrition Council™ (GLNC) was approached to seek assistance with contacting and requesting wholegrain data from the food companies and manufacturers listed as members of their organisation. Assistance from the GLNC was sought because they function as an intermediary for research and science communication in Australia and have a membership consisting of several major food companies which distribute grain-based food products in Australia. Companies that provided data through the GLNC included Campbell Arnott's, Cereal Partners Worldwide, Nestle, Kellogg's, Bakers Delight, Sanitarium, George Weston Foods, Goodman Fielder and SunRice®.
2. Food companies and manufacturers were contacted via phone or through websites to request data, which was provided in the form of verbal feedback or as spreadsheets. Data were also transcribed directly from company websites if verbal feedback from the manufacturer confirmed that the website data were up-to-date and reflective of products available on the Australian market at the time of data collection.
3. Product data were obtained directly from the product packaging of food labels to identify products in the list and to cross-check data obtained using the previous collection methods. This process involved surveying the four primary local supermarkets (Woolworths, Coles, Franklins and Bi-Lo), located in the Illawarra region of New South Wales, Australia. The primary