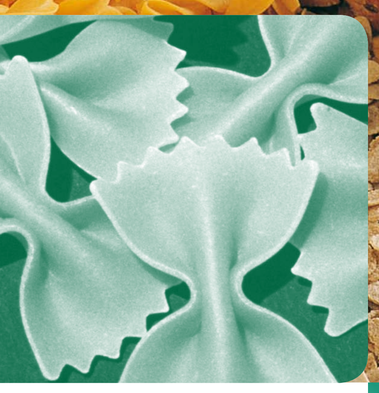

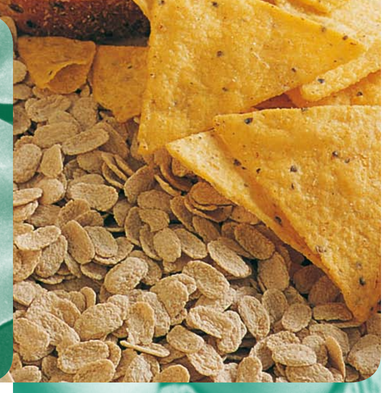

COMPARING AUSTRALIAN AND UNITED KINGDOM FOLATE VALUES

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Introduction

Food Standards Australia New Zealand (FSANZ) is currently considering fortifying the food supply with folic acid to assist in decreasing the incidence of Neural Tube Defects (NTDs). In order to assess the likely impact of fortification it is important to generate accurate and robust folate content datasets to estimate dietary intake of folate. In the past the majority of folate data used in Australian food composition tables have been borrowed, predominantly from United Kingdom (UK) tables. To generate accurate intake estimate for Australia it is important to analyse Australian foods and use the most up to date analytical methods.

Folate and its Importance

Folate is the generic term for all water soluble B-vitamin compounds that exhibit a common vitamin activity based on the structure of folic acid[1]. Naturally occurring folate is found to be high in foods such as liver, egg yolk, green leafy vegetables and legumes. The link between folate, specifically folic acid, and NTDs has been well researched across the world with many countries fortifying or considering fortification of foods to decrease the incidence of NTDs. The National Health and Medical Research Council (NHMRC)[2] recommends intakes of 400µg/day folic acid for women capable of or planning pregnancy in addition to 600µg/day of folate equivalents. However to estimate current intakes, and potential intakes if foods are fortified, it is important to know the current levels of folate in Australian foods.

Folate Analytical Methods

Methods for food folate analysis continue to be developed. Folate analysis for food composition is more challenging than most other micronutrients due to folate's sensitivity to physical environments, the various forms in which it exists, presence in lower concentrations in biological systems and complex extraction and detection techniques[3]. Due to the link between folate and NTDs, and consideration of folic acid fortification in Australia, it has become important to develop and use the best possible technique for determining reliable folate, including folic acid, values for Australian foods.

In 2004-2005 FSANZ, in conjunction with the University of New South Wales (UNSW), commissioned a study on folate levels of selected foods using the newer tri-enzyme microbiological assay methodology. Microbiological assay (traditional single enzyme method) for the determination of folates in foods generally involves 3 steps: liberation of folates from the cellular matrix; deconjugation from the polyglutamate to the monoglutamate forms; and the detection of the biological activity or chemical concentration of the monoglutamate forms[4]. The tri-enzyme method varies by treating foods high in protein with protease and foods high in starch and glycogen with α-amylase in addition to the folate conjugase[5]. Therefore for many foods, tri-enzyme analysis would be expected to yield higher folate value than single enzyme analysis.

Folic acid refers to synthetic folate which is used in food fortification and supplements. Folate refers to all forms of the vitamin, both naturally occurring, synthetic and its derivatives.

Comparing Old and New Folate Values

In the past the majority of folate data used in the Australian food composition tables AUSNUT and NUTTAB have been borrowed from the UK[5]. UK folate values are believed to have been determined by the single enzyme microbiological assay. No further information regarding the numbers of samples purchased or analysed is provided. The joint FSANZ and UNSW analysis of folate was carried out on 30 different foods including fortified foods such as breakfast cereals and juice. For each food 3-6 samples were purchased in Sydney in 2005 and composited to form a single analytical sample. Analysis was completed using the tri-enzyme microbiological assay method to determine total folates.

For specific food products some significant differences were found between the older UK data and the new FSANZ data including differences in folate values of breakfast cereals (see Figure 1) and various other selected foods (see Figure 2). These differences may be due to real differences between Australian and UK foods or due to differences in analysis technique used.

Total folate values for a number of other common foods FSANZ has recently had analysed are shown in Table 1.

Table 1. Total folates content of some popular Australian foods – 2005 and 2006, determined using the tri-enzyme method.

Food	Total Folates (ug/100g)
Chicken liver, raw	1450
Camembert cheese	90
Rye bread	72
Skim milk powder	54
Eggs, raw	47
Wholemeal bread	32
Rice noodles, prepared	9
Lamp chops, grilled	7
Milk, full fat	7
Chicken breasts, grilled	3
Soy beverage, UHT	4

Conclusions

By using the tri-enzyme analytical technique for the analysis of Australian foods, FSANZ is generating more accurate and robust datasets for folate. These data will increase the accuracy of estimated intakes of folate for the Australian population and will enable FSANZ to make more informed decisions about fortifying the food supply with folic acid. At this time it is not possible to predict whether the use of Australian data rather then UK data will substantially alter intake estimates of folate for the population although it is hoped to undertake such a comparison in the next stage of this project.

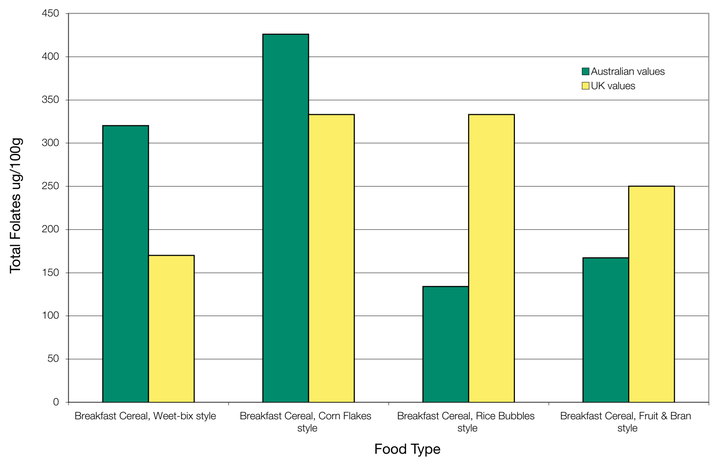

Figure 1. Comparison of Australian and UK Folate values for fortified breakfast cereals

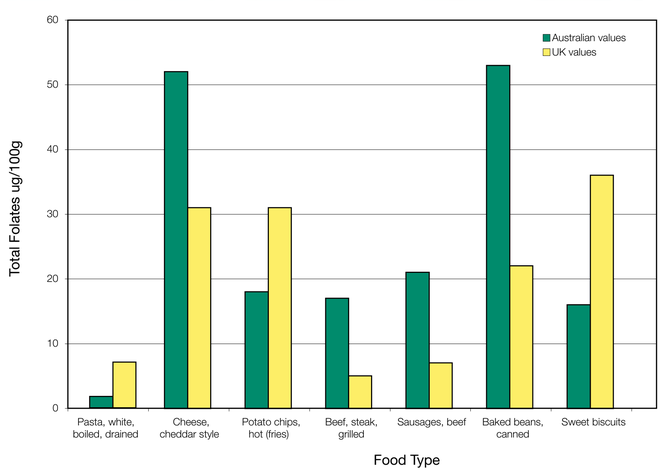

Figure 2. Comparison of Australian and UK Folate values for unfortified foods

References

1 Finglas, P. M., Wright, A. J., Wolfe, C. A., Hart, D. J., Wright, D. M., & Dainty, J. R. 2003, "Is there more to folates than neural-tube defects?", *Proc.Nutr.Soc.*, vol. 62, no. 3, pp. 591-598.

2 NHMRC 2006, *Folate Fortification: Report of the Expert Panel on Folate Fortification*, Australian Government Publishing Service.

3 Arcot, J. & Shrestha, A. 2005, "Folate: methods of analysis", *Trends in Food Science & Technology*, vol. 16, pp. 253-266.

4 Shrestha, A., Arcot, J., & Paterson, J. 2000, "Folate assay of foods by traditional and tri-enzyme treatments using cryoprotected *Lactobacillus casei*", *Food Chemistry*, vol. 71, pp. 545-552.

5 Food Standards Agency 2002, *McCance and Widdowson's The Composition of Foods*, 6 edn, The Royal Society of Chemistry, Cambridge.

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