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ACCESS ECONOMICS

Fortification of bread with folic acid

Report by Access Economics Pty Limited for

Food Standards Australia New Zealand

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EXECUTIVE SUMMARY

Food Standards Australia New Zealand (FSANZ) commissioned Access Economics in Winter 2006 to investigate the costs of a proposal to require bakers to fortify bread with folic acid. Monitoring costs were to be included. This follows a similar commission by FSANZ of Access Economics in March 2006 to undertaken a cost benefit analysis of a proposal to fortify bread making flour with folic acid. The FSANZ brief in March excluded monitoring costs.

It should be noted that some of the costs for fortification of flour have been updated since the analysis was prepared in May in light of new data that became available from new respondents who were unable to contribute last time, or because of revisions and further discussion with respondents to the previous analysis.

KEY FINDINGS

Cost is only one factor in the decision to mandate fortification of the food supply. The decision also needs to take into account the uncertainty associated with each option in achieving the desired outcome.

Estimates of the costs of the two options for fortification — addition of folic acid to bread or addition of folic acid to bread making flour — suggest that using flour as the food vehicle is the cheaper option in both Australia and New Zealand (see summary of results under 'bottom line' below). By way of comparison, the **net present value of the costs to industry over 15 years**:

- for Australian industry, are $18.9 million for fortifying flour, whereas for fortifying bread are $292.5 million.
- for New Zealand industry, are $29.2 million for fortifying flour whereas for fortifying bread are $47.7 million.

However, the costs of fortification of flour may need to be further investigated, as subsequent to the preparation of the initial cost estimates for fortification of flour, industry has suggested that the current thiamine feeder systems will need to be replaced by more accurate dosage equipment to ensure the concentration of folic acid falls within the required range. It is worth noting that:

- The difficulty in ensuring accuracy of concentration is illustrated by the experience of a bakery which already adds folic acid to bread making flour. Analytical testing of fortified bread has indicated that 40% of samples had a concentration of folic acid in the range 70ug to 280ug per 100g bread. The cause has not been determined but could reflect variability at the mill, differing quantities of flour used in different varieties of bread or recipe variability at the bakery level.
- One milling company checking flour samples fortnightly for 14 months found the thiamine concentration to be significantly higher than the target required (6.4mg thiamine per kg flour). The probable cause for this was not discussed with the company and needs to be investigated.

That said, there is likely to be greater uncertainty in achieving outcomes (in terms of intake of folic acid) associated with requiring fortification of bread by bakers compared with fortification of flour. This reflects:

- the need to inform and monitor a vastly larger number of firms;
- the difficulties faced by smaller bakers in measuring and controlling precisely the concentration of folic acid given the very small amounts involved. Depending on the process of fortification, this might include 5% to 40% of the industry; and
- that individual retail bakers often produce a number of different varieties of bread, with a range of different recipes. For example, some varieties might include improvers and some might not. Hence, it is likely that the process by which fortification would occur in the one bakery would differ depending on the variety of bread — adding to the possibility of error.

If Ministers decide to introduce mandatory fortification, regulation needs to be formulated in a way that allows industry participants in both Australia and New Zealand to fortify their products to achieve the desired outcome in most effective and efficient way possible. This may differ across firms. Some industry participants might add folic acid at the mill, and others to improver or premix.

The bottom line — consumers

As far as fortification of bread involves higher costs to industry, and these are passed onto consumers, consumers will face higher prices for bread than they would under the alternative proposal involving fortification of flour.

The bottom line — industry

In Australia, both upfront and ongoing costs appear substantially higher if bread is the regulated fortification vehicle as opposed to flour (Figure 1-1).

- **Upfront costs** are higher because some bakers specified that additional equipment would be required, including pallet racks for storage, an analytical testing machine (specified by one large baker) and additional equipment for automated ingredients lines (at one large baker). However, as noted above, the upfront cost estimates for fortification of flour were prepared prior to the suggestion/recognition by industry that more precise 'dosage equipment' (or feeders) would be required. This needs to be further investigated.
  - It should be noted that the packaging write-off reflects responses from two large companies (perhaps 50-60% of the industry in Australia):
    - A large plant baker (who was not able to respond to the analysis of fortification of flour) indicated that — no matter what the transition period for complying with the regulation — it would need to write-off old packaging because it would implement fortification processes all at once business-wide to ensure complete compliance (thus gaining efficiencies in auditing of the implementation process).
    - Another firm provided an estimate of the value of the preprinted packaging it would need to write-off assuming a transition period of 12 months.
    - Another large wholesale baker indicated no write-off of preprinted packages would be necessary if the transition period was 12 months as it would be able to use up preprinted labels within 3 months.
- The higher **ongoing costs** reflect
  - the substantial labour and material costs involved in preparing premixes for fortifying bread not already fortified; and

- the substantial analytical testing costs associated with bakers testing their bread.

FIGURE 1-1 SUMMARY OF COST COMPARISON, AUSTRALIA

			Fortifying flour	Fortifying bread
			Total cost	Total cost
Upfront	labelling	*unpackaged*	436,800	
		prepackaged	2,049,600	
		Total	2,486,400	2,486,400
	Packaging write off		4,000,000	2,050,000
	Equipment		0	1,202,000
Upfront total			**□,48□,400**	**5,738,400**
Ongoing	Folic acid		112,000	inc in premix
	Premix		51,893	13,773,500
	Analytical testing		673,077	10,036,567
	Administration		186,883	84,500
	Maintenance		0	591,500
	Clean out mill		34,739	0
Ongoing per year			**1,058,593**	**24,48□,0□7**

In New Zealand, upfront costs of fortifying bread are around half those estimated previously for fortifying flour, but the ongoing costs per year are around double (Figure 1-2). It should be noted that the cost estimates from the previous analysis of fortification of flour have been updated given new information — but that the difference is minor.

- **The upfront costs** of fortifying bread are less than those of fortifying flour because New Zealand millers indicated that to fortify flour, they would need to purchase micro-feeders and extra silos. If more precise feeders are required (as noted above), these costs may need to be revisited. The cost of redesigning labels is also higher reflecting revised estimates from respondents and additional data from new respondents.
  - It should be noted that one respondent indicated the need to write off preprinted packaging (and this estimated was doubled by Access Economics to account for industry share). Last time, no respondents indicated the need to write off packaging.
- The higher ongoing costs reflect the substantial labour and material costs involved in preparing premixes for fortifying bread not already fortified and the substantial analytical testing costs associated with bakers testing their bread. These additional costs of fortifying bread outweighed the reduction in costs because flour millers no longer need to clean out their mills to remove traces of folic acid.

The following were excluded from the cost calculations:

- Potential trade related costs were not calculated in detail (outside the brief from FSANZ), although are discussed in the body of the report.

- The FSANZ health benefit-risk assessment suggests there is no adverse health effects at the intakes specified in the FSANZ proposal, so insurance premium rises were costed at zero.[1]

FIGURE 1-2 SUMMARY OF COST COMPARISON, NEW ZEALAND

			Fortifying flour	Fortifying bread
			Total cost	Total cost
Upfront	Labelling	*unpackaged*	101,160	43,063
		prepackaged	174,460	393,000
		Total	275,620	436,063
	Packaging write off		640,000	500,000
	Equipment		1,470,000	0
Upfront total			**2,385,□20**	**93□,0□3**
Ongoing	Folic acid		23,496	in premix
	Premix		343,200	1,786,818
	Analytical testing		141,202	2,253,497
	Administration		11,200	109,278
	Maintenance		117,600	0
	Mill clean and storage		1,741,040	0
Ongoing per year			**2,377,738**	**4,149,593**

The bottom line — government

Three Australian state and territory governments provided cost estimates that varied widely and so the @RISK program was used to provide a central estimate. The costs are substantially higher for fortification of bread than for fortification of flour. Australian government costs for administering and enforcing the proposal have a net present value of around $27 million over 15 years.

The New Zealand Food Safety Authority estimated costs for monitoring and enforcing the proposal to require bakers to fortify bread that were similar to those of a proposal requiring miller to fortify flour. The New Zealand government costs for administering and enforcing the proposal were similar for fortification of bread and flour.

The costs to governments of monitoring the proposed fortification policy — while outside the brief from FSANZ for the last analysis — have this time been included. The net present value of the draft monitoring program is around $4.5 million over 15 years in both countries.

Economy-wide savings from simultaneous introduction of folic acid and iodine

As noted in the previous reports on the proposal to require flour mills to add folic acid to bread making flour and the proposal to fortify salt used in bread making with iodine, the

[1] It is worth noting that the FSANZ health benefit-risk assessment found there was scientific uncertainty about the impact of unmetabolised circulating folic acid and a predicted possible small increase in twinning (of less than 5 per cent) (see the draft assessment report by FSANZ, P295).

introduction of the two fortification requirements (folic acid and iodine) together is likely to lead to economy wide savings including:

- Reduced upfront implementation costs for industry; and
- Economies of scale for governments, for example, in training and awareness raising amongst industry and consumers, and in auditing of firms in the baking industry.

GLOSSARY AND ACRONYMS

CBA	Cost benefit analysis
Folate and folic acid	Folate is a vitamin that naturally occurs in various foods such as fresh, raw or lightly cooked vegetables, raw fruit, breads, cereals, dried beans and peas. Folic acid is the synthetic form of folate. The bioavailability of folic acid in food is greater than that of natural folate. Folate has some protective effect against NTDs but less than that of folic acid.
FSANZ	Food Standards Australia New Zealand
NPV	Net present value
NTD	Neural tube defect
Overage	amounts of folic acid added in excess of the required dose to ensure compliance with the content requirements
μg	Microgram (one-millionth of a gram)

1. BACKGROUND

Food Standards Australia New Zealand (FSANZ) commissioned Access Economics in Winter 2006 to investigate the costs of a proposal to require bakers to fortify bread with folic acid. This follows a cost benefit analysis (CBA) by Access Economics, commissioned by FSANZ, of the proposal by FSANZ to fortify bread making flour with folic acid.

Folic acid is the synthetic form of folate, a vitamin that naturally occurs in various foods such as fresh, raw or lightly cooked vegetables, raw fruit, breads, cereals, dried beans and peas. The bioavailability of folic acid in food is greater than that of natural folate. Folate has some protective effect against NTDs but less than that of folic acid.

The genesis of the fortification proposal lies in the link between folate deficiency among women of child bearing age and the potential for neural tube defects (NTDs) in infants, including spina bifida, anencephaly and encephalocele. This is detailed in the previous Access Economics CBA. Currently in Australia there are around 338 incident cases of NTDs a year and around 72 a year in New Zealand.

FSANZ modified its proposal from a requirement upon millers to add folic acid, to a requirement upon bakers to add folic acid because of the potential costs of fortification to millers in NZ. While Australian millers had processes for adding vitamins such as folic acid already in place (as they are required to fortify bread making flour with thiamine), NZ millers do not. NZ millers also raised concerns about the difficulties of segregating fortified and unfortified flour, and the potential for contamination of export flour with folic acid.

The modified FSANZ proposal

Mandatory fortification by bakers of bread with folic acid within a range between 100 – 170ug folic acid per 100grams bread..

Bread is defined in the Australia New Zealand Food Standards Code, Standard 2.1.1 as " the product made by baking a yeast-leavened dough prepared from one or more cereal flours or meals and water". For the purposes of guidance, this is assumed to include: bread and bread rolls, sweet buns, fruit bread, English muffins (plain and with fruit), bagels, breadcrumbs. This may also include some flat breads.

POINTS TO NOTE

The brief does not include consideration of alternative food vehicles for fortification.

- Complementary or alternative interventions such as public health education programs and encouraging those in the target group to take supplements are not in the purview of the FSANZ and are therefore outside the scope of this brief.
- The health risk-benefit assessment commissioned by FSANZ concluded that folic acid intakes of less than 1.0 mg per day present no risk to health. Any potential for adverse

effects associated with folic acid fortification have therefore been costed at zero.[2] It is worth noting, however, that there was scientific uncertainty about the impact of unmetabolised circulating folic acid and a predicted possible small increase in twinning (of less than 5 per cent) (see the draft assessment report by FSANZ, P295).

[2] The assessment covered toxicity (including interactions with zinc), masking of vitamin B12 deficiency, interactions between folate and other drugs (including anti-epileptic drugs, anti-folate drugs and anti-inflammatory drugs), and associations between folate and an increased risk of cancer.

2. METHOD

The costs of mandatory fortification quantified here include the costs to government of administering and enforcing the modified fortification proposal, the costs to bakers of fortification and the costs of monitoring the impact of the policy on population health. Other potential costs not estimated here include restriction of consumer choice, potential adverse health effects from excess folic acid intake (health risk-benefit assessment suggested at the concentration proposed, there would be no adverse risks to health), and the introduction of policies complementary to fortification but which are outside the purview of FSANZ (for example, public health advice for pregnant women on the need to supplement their folic acid intake).

Cost estimates were obtained from a sample of bakers in Australia and New Zealand. The sample included large plant bakeries and franchise bakeries in both countries, a wholesale baker in Australia, and an ingredients manufacturer in New Zealand. While a bakery association in New Zealand was contacted for data, it was unable to respond in the time available, although contributed via phone discussion, highlighting the difficulties for smaller bakers of controlling the accuracy of the folic acid dose. It would be useful given additional time to investigate the proposal further with individual bakeries or hot bread shops.

In most cases, except upfront labelling costs and equipment costs, the costs of fortification were calculated by dividing total cost estimates of fortification from each company by the amount of **unfortified** bread produced each year to obtain a unit cost per kilogram of bread. These unit costs were then multiplied by the total production of bread in each country to obtain total industry costs.

A baker in Australia with a significant portion of the market already fortifies all of its bread using fortified flour. The Australian cost estimates prepared here incorporate the costs to this firm of fortification to account for the possibility that it would accrue costs if required to switch from fortifying flour to fortifying bread.

Australian jurisdictional government costs were based on indicative estimates from three jurisdictions and New Zealand government cost estimates were provided by the New Zealand Food Safety Authority.

The costs of monitoring were based on estimates provided by FSANZ.

3. THE COSTS

This section describes the incremental costs associated with mandatory fortification by bakers of bread over and above voluntary fortification already occurring, including:

- Costs to consumers;
- Costs to industry; and
- Costs to government.

It has been assumed that the costs of consumer choice discussed in the previous analysis will be similar whether the food vehicle of flour or bread — although it is possible that with fortification of bread the costs to consumer choice will be slightly lower.

3.1 CONSUMERS

Mandatory fortification aims to address the potential for under-consumption of folate by women of childbearing age. In a world of perfect information and foresight, where women of child-bearing age knew of the potential social (and personal) costs of under-consumption of folate in terms of an increased risk of NTDs, they would alter their dietary habits. Public health information campaigns aside (not in scope here), regulation in the form of mandatory fortification could improve consumption outcomes by increasing folate intake in this target group, since information is imperfect and does not always result in a behavioural response, and pregnancies are not always planned.

However, proposing a staple food consumed by the population as a whole (such as bread) as the food vehicle for mandatory fortification results in a reduction in consumer choice for those outside the target group (ie. children, men and older women). A willingness-to-pay vehicle could be used to estimate this cost, but was not undertaken for this project.

While costs will initially fall on industry, in a competitive industry such as bread making, these costs will be largely (if not entirely) passed on to consumers. That is, while the legal incidence of fortification falls on industry, the economic incidence will be on the purchasers of bread. A CBA is necessarily a partial analysis of the first round impacts of a policy change – it is beyond the scope of this analysis to estimate the second round effects as industry and consumers adjust to the increased costs of bread production. That said, we note that an across-the-board increase in the cost structure for an industry tends to be rapidly passed on to consumers. A possible exception to this is production being exported, where the scope to pass on cost increases may be less.

As far as fortification of bread involves higher costs to industry, consumers will face higher prices for bread than they would with fortification of flour.

3.2 INDUSTRY

Costs to industry are calculated by estimating the value of resources allocated to activities that would only be undertaken in the event that mandatory fortification is introduced.

3.2.1 PRODUCERS OF FOLIC ACID

For the food industry, folic acid is imported into Australia and New Zealand. It costs between $115 (AUD) per kilo for European folic acid (pers. com. DSM 11 April) and around $30-$50 (AUD) per kilo from China (pers. com. BASF 21 March 2006 and DSM 11 April).

Producers of folic acid advised that the introduction of mandatory fortification would not result in the achievement of economies of scale not otherwise realised without mandatory fortification. While prices may fall in future as two major manufacturers are building factories in China, this cannot be attributed to mandatory fortification in Australia and New Zealand, given their relatively small shares of the world economy.

Folic acid is sold in spray dried powder form and needs no special storage arrangements other than a cool dry place (refrigeration is not necessary). Unopened, it has a two year shelf life. After opening, the shelf life is around six months.

3.2.2 BAKERS AND INGREDIENTS MANUFACTURERS

Wholesale and plant bakeries produce bread for wholesale distribution and exporting, and account for the majority of bread production. Plant bakeries in Australia and New Zealand include:

- Goodman Fielder (whose brands in Australia include Helga's, Molenberg, Buttercup and Wonderwhite and whose brands in New Zealand include Quality Bakers, Ernest Adams, Molenberg and Vogel's [under licence]); and
- George Weston Foods (whose brands include Tip Top, Golden, Noble Rise, Top Taste and Burgen).

Traditional hot bread shops, supermarket in-store bakeries and franchise outlets have on-site manufacturing and retailing. In Australia, Coles and Woolworths dominate the supermarket in-store bakeries and Bakers Delight, Banjos (in Tasmania) and Brumby's dominate the franchise bakeries. Bakers Delight and Brumbys are also represented in New Zealand. Manufacturers of ingredients include Goodman Fielder (Serrol) George Weston Foods (Cereform), Bakels, Allied Mills, and others.

In Australia in 2000-01, there were around 7,000 establishments involved in baking bread and bread products (BRI 2003). In New Zealand, based on estimates by baking industry representatives:

- there are around 8 major bakeries (including sites owned by George Weston, Goodman Fielder, and others) and three ingredients (improver) suppliers (pers. comm., New Zealand Association of Bakers, August 2006); and
- around 2000 to 3000 small bakeries (pers. comm., Baking Industry Association New Zealand, 14 August 2006).

TABLE 3:1 BAKERY INDUSTRY, AUSTRALIA, 2000-01

	Proportion of bread production by volume	Number of establishments
Wholesale bakeries	na	211
Plant bakery	61%	52
Franchise bakery	14%	886
Retail bakery	5%	4681
Supermarket bakery	20%	1163
Total bakeries	**100%**	**993**

Source: BRI 2003, tables 2.3 and 2.4.

The plant, franchise and supermarket bakeries produce the majority of bread in both Australia and New Zealand (over 90%). Table 3:1 shows the proportion of bread produced by each sector of the baking industry in Australia in 2000-01 based on the BRI (2003). According to the New Zealand Association of Bakers, the proportions are relatively similar in New Zealand (pers. comm., New Zealand Association of Bakers, August 2006) and for the purposes of the analysis here are assumed to be same in both countries.

The volume of bread produced

There is a paucity of information available on production of bread or bread making flour. Estimates of bread making flour were calculated in the previous Access Economics report on fortification of the food supply with folic acid using ABS data and advice from the Bread Research Institute (BRI). (The approach is detailed/reiterated here in the footnotes to this section). A literature review and further advice from the BRI suggests that no robust estimates of bread production are available for Australia or New Zealand. An estimated range for bread production has been developed based on the following:

1 In 2000, the volume of bread produced in Australia was approximately 777 kilo tonnes (777,000 tonnes) (BRI 2003, p.12). The BRI subsequently advised that this estimate might represent a lower bound (pers. comm. Via email, BRI, 17 August). Data on bread production from Australian bakers provided for this analysis support the BRI's advice.

2 Based on production of bread making flour and estimates of the amount of flour used in bread, alternative estimates of bread production are contained in Table 3:2.

- In Australia, the amount of bread making flour produced in 2004-05 was in the range 1053,000 tonnes to 1,120,000 tonnes[3]. The higher bound was inflated to

[3] In Australia, according to the ABS (2006), in 2003-04, around 994,000 tonnes of flour was used in bread making (or around 51 per cent of total flour production). This is similar to a BRI (2003) estimate for 2002 that around 45 per cent of all flour produced was used by bread bakers. The BRI (2003) estimate included bread loaves, English muffins, rolls and buns, specialty bread, flat bread, buttered bread, crumpets and breadcrumbs. The amount of flour used in bread increased by 6 per cent per year (on average) between 1999-2000 and 2003-04 (ABS 2006), implying that total production of flour for bread was around 1,053,000 tonnes in 2004-05. It is not clear from the data sources whether this estimate includes all products in the FSANZ definition of products made with bread making flour.

In order to ensure that all products made with bread making flour are incorporated into estimates of costs (and on the basis that in a cost benefit analysis it is better to err on the side of overestimating rather than underestimating compliance costs), Access economics has used a range for estimating the amount of bread making flour produced. At the higher end of the range, it is possible that an additional 12 per cent of flour might be affected by fortification with folic acid — which encompasses flour used for pastry (which includes donuts and muffins for example), packet flour and mixes, and flour used for frozen dough (which might include pizza bases). Access

ensure all of the products selected by FSANZ for fortification, including breadcrumbs, were incorporated into the costs. This range probably represents an upper bound. A more recent estimate of flour volume for Australian bread production for 2005 is 956,000 tonnes — provided to Access Economics by the BRI (from the Flour Millers Council) (pers, comm. via email, BRI, 17 August 2006). This last estimate is also included in Table 3:2. The estimate used for preparation of this analysis is **1,□90,000 kg of bread** (highlighted in the table).

- Information for New Zealand is less robust than that for Australia as there are no systemic national data on production of bread making flour. In part this reflects that NZ flour millers do not separate bread making flour from other types of flour. The amount of bread making flour produced in 2004-05 was estimated by Access Economics based on feedback from New Zealand flour mills at between 150,000 tonnes and 220,000 tonnes[4]. The first figure is used in this analysis (equivalent to **2□5,000,000 kg of bread** — highlighted in the table)

Economics has weighted the bread making flour estimate by 1.12 to ensure that all products included in the FSANZ definition are accounted for in estimating total costs. On this basis, total production of bread making flour in Australia in 2004-5 could have been around 1,120,000 tonnes.

[4] According to the New Zealand Flour Millers Association (NZFMA), around 270,000 tonnes of flour was produced for all purposes in 2004-05. NZFMA estimates of the amount of flour used in bread were in the range 150,000 to 220,000 tonnes. Drawing on similar proportions in the New Zealand market compared with the Australian market, between 45 per cent4 to 51 per cent of flour is used in bread. Using these proportion leads to a view that the lowest NZFMA estimate of 150,000 tonnes is the most reliable. The higher estimate from the NZFMA (220,000 tonnes) is used as the upper limit of the range of bread making flour produced.

TABLE 3:2 ESTIMATES OF BREAD PRODUCED FOR 2005

		White	Wholemeal	Other	Total bread
Bread type as a proportion of total bread sales		60%	15%	25%	100%
Amount (on average) of flour used to produce bread of each type		60%	55%	50%	
Tonnes bread produced from flour tonnage of 956,000	Australia	956,000	260,727	478,000	**1,□94,727 t**
Tonnes bread produced from flour tonnage of 1.053 million		1,053,000	287,182	526,500	1,866,682 t
Tonnes bread produced from flour tonnage of 1.12 million		1,120,000	305,455	560,000	1,985,455 t
Tonnes bread produced from flour tonnage of 150,000	New Zealand	150,000	40,909	75,000	**2□5,909 t**
Tonnes bread produced from flour tonnage of 220,000		220,000	60,000	110,000	390,000 t

Source: Distribution of bread types by sales for 2001 from BRI (2003 p.12). Averages for proportion flour in bread from pers. comm., New Zealand Association of Bakers, August 2006, Bakers Delight (Australia) 15 August 2006, and recipes from New Zealand ingredients manufacturer, August 2006).

Some of the bread produced currently is already fortified with folic acid. The costs are based on fortifying bread not currently fortified. Access Economics sought data from industry on the following cost centres: labelling and packaging, capital equipment, folic acid, premix, compliance testing, administration, and transport and storage.

3.2.2.1 CAPITAL EQUIPMENT

Plant bakers specified that they would require additional capital equipment. The equipment and the method for incorporating the associated costs are discussed in the following dot points.

- One Australian plant baker specified that additional pallet racking would be required at each site for raw materials storage. These costs have been pro-rated up on a per-site basis to all plant establishments (see Table 3:1).
- Another Australian plant baker indicated that it would require additional storage bins for its automatic ingredients system. Others indicated that they would undertake these processes manually, so their additional costs are reflected as part of the labour costs required to add folic acid (or premix).
- One Australian plant baker specified that it would require an analytical testing machine.

- No New Zealand respondents indicated the need for equipment.

3.2.2.2 FOLIC ACID

Folic acid could be added to bread in a number of ways.

- Add folic acid to bread making flour (considered as an option by FSANZ in a previous proposal for folic acid fortification). This method is currently used already by some bakeries who voluntarily fortify their bread.
- Add folic acid to bread via bread premix. There are various different types of bread premixes, but all basically include a blend of active ingredients and some or all of the flour. Some flour and water are then added to the premix at the bakery. According to an ingredients manufacturer in New Zealand, premixes generally constitute 30% to 100% of the weight of flour in the final recipe.
- Add folic acid via an improver. There are various different types of improvers which are a blend of active ingredients and/or emulsifiers. These are used alone or in conjunction with other improvers and are added to flour and water at the bakery. According to an ingredients manufacturer in New Zealand, improvers generally constitute between 0.25% to 15% of the weight of the flour in the final recipe.
- Add folic acid via a vitamin premix. Some plant bakeries indicated that they purchase a vitamin premix from a pharmaceutical company such as Roche or BASF. These incorporate vitamins and minerals.
- Some bakeries might purchase a prepared frozen dough which already contains folic acid.
- Add folic acid along with a flour carrier at the bakery directly into the dough.

Important issues to note

- A number of bakers indicated that there would be an overage of 30% to account for vitamin losses during baking. Thus to obtain an average of 135ug folic acid per 100g bread, an average of 175.5ug folic acid would need to be added to every 100g bread.
- Smaller individual bakers and franchise bakeries indicated that while they might use a premix or an improver for some varieties of bread, these are not used for all types of bread. As consequence, it is possible that a number of bakeries (particularly franchise and smaller individual bakeries) there would be different processes for adding folic acid depending on the variety of bread.
- Controlling the accuracy of the dose of folic acid will be difficult, particularly for smaller bakeries, including franchises and individual hot bread shops or artisan style bakeries. According to the Baking Industry Association of New Zealand, while many bakers have digital weighing equipment, these generally only allow for intervals of two grams or five grams. While the volumes of dough that bakers work with each day vary across bakeries depending on the size of the bakery, the variety of bread and baker preference, dough sizes might range from 10kg to 80kg. 83kg of dough would require about 0.123 grams of folic acid and 20kg dough would required even less — 0.0297 grams (calculations presented in Table 3:3). Individual bakers would have considerable difficulty adding this amount of folic acid and it is likely that there would be considerable variation in the concentration in the final bread.

  The difficulty in ensuring accuracy of concentration is illustrated by the experience of a bakery which already adds folic acid to bread making flour. Analytical testing of fortified bread has indicated that 40% of samples had concentration of folic acid in the range 70ug to 280ug per 100g bread. The cause has not been determined but could reflect

variability at the mill, differing quantities of flour used in different varieties of bread or recipe variability at the bakery level.

While additional machinery might be available to overcome this problem, it was not able to be investigated in the time available. It would, however, add to the total costs to industry of fortification of bread.

TABLE 3:3 AMOUNT OF FOLIC ACID REQUIRED TO BE ADDED TO DOUGH AT AN INDIVIDUAL BAKERY

Kilograms of dough	Kilograms of bread produced	Grams of bread	Micrograms folic acid per 100g bread with 30% overage	Total folic acid required in dough	Grams of folic acid required in dough
Kg	Kg	Grams	Micrograms (ug)	Micrograms(ug)	grams
83	70	70,000	175.5	122,850	0.1229
20	16.9	16,900	175.5	29,660	0.0297

Discussion of processes for adding folic acid

1 Fortification of improver or premix by the ingredients company

An ingredients manufacturer in New Zealand advised that it would add folic acid manually to 1000kg batches of improver. Improver is already mixed vigorously so it would be unlikely that additional processes or machinery would be required to ensure a uniform distribution of folic acid throughout the improver.

The amount of folic acid required in a 1000kg batch depends on the contribution of the premix or improver to the final bread. Examples of the calculations determining how much folic acid would need to be added to improver or premix and the resulting total cost of folic acid per 1000kg batch of improver or premix are included in Table 3:4. **The table shows that even for a 1000kg batch of premix constituting 100% of the weight of flour in the final bread, the volume of folic acid required is very small (2.93g). The cost of the folic acid per kilogram of bread (based on a price for folic acid of NZ$42.72 per kg) is also very small (NZ$0.0000750 per kg of bread).** In all, the ingredients manufacturer suggested it would keep around $300 worth of folic acid in stock at any one time.

As well as the cost of folic acid, the ingredients manufacturer indicated it would incur costs associated with labelling, recipe and formulation changes, analytical testing, and trade related costs. These are discussed elsewhere in this report and have been included under their respective headings.

TABLE 3:4 EXAMPLES OF CALCULATIONS OF AMOUNT OF FOLIC ACID REQUIRED IN IMPROVER OR PREMIX

	Usage rate by weight flour	% flour in bread	Usage rate in bread	Volume bread from 1000kg batch of improver or premix	Amount ug folic acid per 100g bread 30% overage	Volume bread	Micrograms folic acid required	Grams folic acid required	Price folic acid per kg	Total cost folic acid for 1000kg batch improver or premix	Cost folic acid per kilo bread
	%	%	%	kg bread	ug folic acid	grams bread	ug folic acid	g folic acid	$/kg	$	$/kg
Improver	0.25	60.0	0.15	666,667	175.5	666,666,667	1,170,000,000	1,170.00	42.72	49.98	0.000075
Premix	100.00	60.0	60.00	1,667	175.5	1,666,667	2,925,000	2.93	42.72	0.12	0.000075

2 Fortification via vitamin premix

Some large bakers already add a vitamin premix to a proportion of their bread.

- The premix is obtained from a pharmaceutical company and contains folic acid as well as other vitamins.
- In addition, the company would incur labour costs associated with adding premix to all of its bread. Manual sieving, weighing, addition of premix and then record-keeping would probably take around one minute per batch and there are close to 1.6 million batches per year.
- The company suggested that while it may be possible to use machines to add the premix, it was not able to investigate this option in the time available, so the costs of manual addition are included here.

3 Fortification via a folic acid premix

A large plant bakery indicated that it would add folic acid via a premix comprising a blend of folic acid and a wheat flour carrier. The premix would be weighed and added to each recipe batch and then added to the mixer for each dough mix. The process would involve adding folic acid to the list of ingredients added during the weigh-up procedure. At some sites, the weigh-up is done manually and at others it is done using an automated weigh up system.

3.2.2.3 COMPLIANCE TESTING

Compliance testing refers to the need to analyse the content of bread produced to determine whether the concentration of folic acid complies with the proposed regulation. The total costs of analytical testing depend on the quality assurance approach adopted by each company.

- One option would be to transport samples to a testing laboratory certified by the National Association of Testing Authorities. A NATA certified laboratory in Victoria advised that it charges nearly A$200 (NZ$214) per test to analyse the folic acid content of bread. The frequency of testing and number of samples tested varied across firms. For example:
  - One manufacturer indicated that it would test around 30 products at random every second month.
  - Another foreshadowed that 100 dough groups would be tested once each per quarter.
- Another option is to purchase laboratory equipment to undertake the testing at the firm. One plant baker indicated this would be its preferred option and that the cost of the equipment would be $250,000. While in the first year, the equipment would be dedicated to folic acid testing, over time, other compounds would be tested using this equipment. However, in the interests of erring on the side of generosity in estimating costs, the whole of the cost of this equipment has been allocated to folic acid fortification.

3.2.2.4 LABELLING AND PACKAGING COSTS

If mandatory fortification were introduced, bakers producing **prepackaged** bread, would incur upfront costs associated with adjustment of label templates to ensure compliance with labelling standards. The redesign is likely to be relatively minor, involving inclusion of folic acid in the ingredients list, and possibly the nutritional panel. That said, the costs depend on the colours and plates involved for each stock keeping unit.

Foods containing breadcrumbs may be affected because labelling standards require that the compound ingredients[5] of a compound (such as breadcrumbs) be declared if the amount of the compound ingredient in the final food is 5 per cent or more by weight. In other words, if mandatory fortification is introduced, labels on products with 5 per cent or more of a compound ingredient containing fortified breadcrumbs will need to be altered to reflect the inclusion of folic acid (pers. comm. FSANZ, 5 May 2006). **However, this is not clear given that further heating of bread in the process of manufacturing breadcrumbs may further deplete the folic acid content. This requires further investigation.**

In-store supermarket bakeries, franchise bakeries, and individual bakers would incur some labelling costs, but to a lesser extent than manufacturers of pre-prepackaged products. According to the labelling standards, food sold **unpackaged**, or made on the premises from which it is sold, or packed in the presence of the purchaser, does not require a label. Enterprises producing unpackaged products generally provide information about ingredients via information manuals available for public perusal, label stickers, or cardboard inserts listing ingredients.

Companies manufacturing ingredients for wholesale would also need to change their labels, but at a lower unit cost as the labels are less complex than for the retail market (pers. comm. NZ bakery ingredients company, 15 August 2006).

Estimates provided to Access Economics of the costs of label redesign were in the range:

- for retail products in Australia — A$550, A$1000 and A$2000 per stock keeping unit;
- for retail products in New Zealand — NZ$500 per SKU; and
- for ingredients sold wholesale in New Zealand — NZ$100 per label.

As noted in the previous report on folic acid fortification, the retail label cost estimates are consistent with cost estimates for label changes in KPMG 2000 (cited in NZIER 2005).

3.2.2.5 TRADE RELATED COSTS

Research is needed to confirm the impact of folic acid fortification on trade. According to Australian figures from 2001-02, sales from exports of bread products account for less than one per cent of turnover in bread manufacturing (BRI 2003). However, the BRI (2003) noted that frozen doughs and par-baked products are emerging as export opportunities particularly to Asian markets.

- A plant bakery in Australia indicated that it does not export bread.
- On the other hand, an ingredients manufacturer in New Zealand noted that it directly exports products to countries such as Japan as well as supplying ingredients to New Zealand companies for inclusion in their exported products. Export destinations mentioned by this manufacturer included Japan, Malaysia, Singapore and the Pacific Islands.

If products for export needed to be manufactured separately, manufacturers will accrue costs associated with cleaning machinery to remove traces of folic acid as well as costs associated with separate storage.

The same NZ ingredients manufacturer indicated that machines would be cleaned manually and then scoured with sugar. While the costs would depend on the number of products and

[5] Compound ingredient means an ingredient of a food which is itself made from two or more ingredients.

countries affected, a worst case scenario for this manufacturer would involve additional cleaning costs of $60,000 per annum. There would also be additional analytical testing costs to check each new batch for export. These costs have not been included in this analysis.

3.2.2. OTHER COSTS

- Administration costs have been included in the analysis and estimates varied greatly across firms, although in all cases, the costs were not substantial.
- Public liability insurance premiums paid by industry. It has been assumed that these will remain unchanged as a result of folic acid fortification because the health risk-benefit assessment commissioned by FSANZ concluded that folic acid intakes of less than 1.0mg per day present no risk to health. In the event that health risks were identified, insurance premiums could rise.
- Potential loss of sales. One large plant bakery represented in both Australia and New Zealand suggested that it would lose around 1% of sales as a result of fortification (costing A$2,960,000 and $NZ537,200 respectively). While this represents a loss to this company, consumers who switch away from bread will increase consumption of a substitute product, which does not represent a loss to the economy as a whole.

3.2.3 TRANSITION COSTS AND LENGTH OF TRANSITION PERIOD

If mandatory fortification is introduced at a time when labels are redesigned in the normal course of business, then the incremental costs of complying with mandatory fortification with folic acid would be minimal. Some firms requested a transition period of two to four years to ameliorate labelling costs. Further, simultaneous implementation of a number of regulatory changes would also reduce the associated cost of labelling changes to industry (for example, combining the implementation of proposals to fortify products with iodine and folic acid).

The optimal transition time is difficult to gauge and differs across firms. NZIER suggested that, in order to gain economies of scale in purchase, manufacturers may purchase labels for up to two years in advance, but usually for shorter periods (NZIER 2005).

- A new respondent contributing to this analysis indicated that it would need to write off $1,050,000 in pre-printed labels **no matter what the transition period**. This is because fortification would be implemented on one day at all of its bakeries. This represents the most reliable transition approach and capture efficiencies in auditing.
- Another plant bakery represented in Australia and New Zealand indicated packaging write offs of A$1,000,000 and NZ$250,000 respectively if given a 12 month transition period.
- Other wholesale bakeries indicated that they would be able to use up their stocks of pre-printed labels in three months and so would not need to write off label stocks.
- Enterprises producing unpackaged bread (such as franchises, supermarket instore bakeries and small individual bakers) would most likely be able to use up their stocks of information cards and labels in a transition period of 12 months and would not need to write off label stocks.

The need to dispose of preprinted packaging is not consistent with government policies aimed at reducing waste, for example, the National Packaging Covenant.

3.2.4 THE IMPACT ON THE PRICE OF BREAD.

Bread markets are highly competitive. It is likely that over time bread prices would rise slightly — some bakers contributing to this study indicated price rises of up to two per cent. A change in the price of bread as a consequence of fortification could impact on the benefits associated with fortification by changing bread consumption patterns. However, demand for bread is relatively inelastic and the price change is likely to be small, so the change in consumption of bread (if any) would probably be small.

3.2.5 JOINT IMPLEMENTATION OF FSANZ PROPOSALS.

A number of industry representatives noted that joint implementation of two of the FSANZ proposals currently being considered — the proposal to require mandatory fortification with folic acid and the proposal relating to fortification with iodine (FSANZ proposal P230 in the event that flour is the food vehicle) — would minimise costs to industry.

3.3 GOVERNMENT

The costs to society of regulation include the costs of resources used in monitoring and administering the regulations by governments. These costs are estimated in this section.

The bakery industry is made up of a large number of firms, many of which are small businesses. Depending on the monitoring approach adopted, governments potentially need to monitor a large number of firms — around 7,000 in 2000-01 Australia wide (BRI 2003) (Table 3:1). Of these, around 4,700 were small retail bakeries with less than 20 employees (Table 3:1). Industry estimates for New Zealand suggest there are around 2000 to 3000 small bakeries. Given the higher rate of instability amongst small businesses, monitoring compliance with fortification regulations over time is likely to be difficult.

- Small businesses with less than 20 employees have a higher exit rate than larger businesses. The PC (2000) defined an exit as a change in ownership or cessation of operations (due to failure, retirement of owner or decision by owner to change lifestyle for example). Small businesses are more likely than other businesses to cease operations (p. 19 PC 2000). In 1994-5 and 1995-6 (the most recent ABS data available on business exits), close to 8 per cent of small businesses (less than 20 employees) exited, compared with around 5 per cent for medium to large businesses, but small businesses ceased operations at more than twice the rate of all other businesses during those two years. This represents an average across the two years and across industries. More research is required to determine whether bakery turnover is higher or lower than this average and whether exit rates for small businesses have changed in the last decade.

3.3.1 COSTS OF ADMINISTERING AND ENFORCING REGULATION

The cost estimates in this section reflect only the value of resources allocated to activities that would not otherwise be undertaken if mandatory fortification was not introduced, ignoring costs already sunk in developing the proposal thus far.

Cost centres for governments include awareness raising and training, auditing (surveillance), administration and enforcement.

It needs to be noted that monitoring costs have been included in this analysis (Section 3.3.3) based on a draft program for monitoring developed by FSANZ. The allocation of costs for this

program between state and territory governments and the Australian Government has not yet been determined. It is possible that some of the costs identified by Australian state and territory governments or the NZFSA may overlap those included in the monitoring cost estimates.

3.3.1.1 AUSTRALIA

Administration and enforcement of mandatory fortification would be undertaken by the relevant section of the health or human services department in each State and Territory, often in concert with local government.

For example, in Victoria there is a legal requirement for local councils to test a certain number of food samples per population each year (pers. comm., Victorian Health Department, 14 August 2006 — see detail below under the heading 'auditing'). In NSW, local councils currently check retail food premises while the NSW State Government checks high risk premises (for example, oysters and meats like salami) (pers. comm., NSW Health Department, 14 August 2006).

FSANZ would be involved in preparation of manuals but has indicated that these costs in the case of folic acid would be negligible.

Access Economics obtained full cost estimates from three jurisdictions (two small and one large), and part cost estimates from one jurisdiction (large).

> Method
>
> The total costs of administration and enforcement by all State and Territory governments Australia-wide were estimated by calculating the jurisdictional cost per head for those jurisdictions that provided cost estimates to Access Economics, and then applying these per capita costs to the entire Australian population (around 20.5 million people in 2005).

Upfront set up costs

These costs included setting up systems for administering the regulation (files, manuals etc), along with training government staff (for example via workshop) and some collaboration with other jurisdictions. Estimates differed across jurisdictions — with some at $0.0003 per head ($6,000 Australia-wide) and others at $0.03 per head ($570,000 Australia-wide).

Training industry and raising awareness

Proposed approaches to raising awareness amongst industry participants and providing training differed across jurisdictional governments. Costs are also likely to differ across jurisdictions because of differences in distances and population dispersion.

- One state indicated that it would distribute a letter to firms affected by fortification. In addition, during general survey and monitoring work, discussions would be held with enterprise owners, but this does not constitute an additional cost attributable to folic acid alone, so has not been included in the costs of fortification.
- One state suggested that this would be a significant ongoing cost because of business turnover. Costs were based on face-to-face contact with bakers and so incorporated travel. At around 9 cents per head, this estimate amounts to $1.9 million Australia-wide.

- Another jurisdiction foreshadowed a range of awareness-raising activities including information provision on its website, in media releases, on baking industry websites and in trade magazines, in concert with distribution of fact sheets (including in foreign languages). At $0.002, this would cost $40,000 Australia-wide.

Auditing

Auditing includes auditing food content for risk to health and compliance with compositional requirements (including appraising food content against statements on food labels). Estimates of auditing costs depend on the approach adopted (for example, sample structure and size). Costs are also likely to differ across jurisdictions because of differences in distances and population dispersion.

A laboratory in Victoria indicated that it would charge nearly $200 to test a sample of bread for concentration of folic acid at concentrations of micrograms folic acid per 100grams bread (pers. comm. 10 August 2006).

In some cases, governments had difficulty in estimating the extra costs associated with a folic acid fortification requirement. For example, the Victorian Government was not able to estimate the proportion of the sampling already undertaken by local councils that would be allocated to folic acid content of bread (if any). In Victoria, enforcement of food standards is usually undertaken by local councils, which are required under *The Food Act 1984 (Vic)* to test not less than three samples of food for each thousand persons in the municipal district (section 32, subsection(1)). As an illustration, the City of Stonnington in Melbourne has a population of 87,400 and so would need to undertake around 260 tests per year. It is likely that priority would be given to foods that presented a significant danger to health such as seafood.

Cost estimates differ according the auditing model that would be implemented. Cost estimates for this component were provided by four states — two large and two small.

- Cost estimates for testing bread samples provided by one jurisdiction incorporated testing at $200 per sample, the costs of transporting samples to the laboratory, and the costs of a government Professional Officer's time to administer the testing. In addition, checking labels at bakeries would cost the equivalent of about 10% of one Professional Officer's salary per year. Australia-wide, this is equivalent to around $1.2 million.
- Another jurisdiction indicated that it's usual approach is to undertake surveys at irregular intervals to test foods from a sample of businesses. Around 3 samples might be purchased from each of around 100 businesses, and analysed for content. If this approach was repeated every 5 years, the cost per year would be one cent per head. Australia-wide, this amounts to $200,000 per year.
- Another jurisdiction indicated it would either institute testing of a representative sample of bakers across the state (possibly around 2000 to 3000 outlets), or else focus on the larger firms. In either case, composite samples would be required whereby 5 to 10 loaves from the same batch from one manufacturer would be tested in order to obtain a estimate of the variation across loaves of folic acid content. The overall cost would depend on the sample size. 10% of bakeries would be tested. In addition, to implement and administer the testing, around 6 months of a Professional Officer's time would be necessary. At a cost per head of $0.016, Australia-wide, the cost would be $320,000.
- The last state government foreshadowed that — every three years — it would take samples from 15% of outlets, including four bread categories (white, wholemeal, grain and other), 5 batches, 5 samples per batch and 4 bakery categories (plant,

supermarket, franchise and local retail). Checking labels and analysing data for these samples would cost around $0.01 per head or $205,000 Australia-wide.

Administration

Administration costs for governments include the costs of briefing Ministers and the Executive, filing and answering questions.

- One jurisdiction estimated the costs of administration would account for around 10% of a Professional Officer's salary per year, or close to 2 cents per capita. Australia-wide this is around $360,000.
- Other estimates of administration costs were substantially lower ($500 per year in one state).

Enforcement

Enforcement costs include the costs of 'encouraging' compliance and the costs of responding to complaints. The costs of prosecutions have not been included in the analysis. FSANZ advised that prosecutions are rarely mounted on food standards compliance issues (pers. comm., FSANZ, 4 May 2006), with 'encouragement' being the preferred approach.

- One jurisdiction estimated that the costs of writing to and negotiating with firms to encourage compliance would be equivalent to around 10% of a Professional Officer's annual salary, and likewise, the costs of dealing with complaints would cost around 10% of a Professional Officer's salary. This amounts to around 3.5 cents per head, which Australia-wide is $722,000.
- Another jurisdiction indicated that it might need to follow up 20% of bakeries at a cost of $0.002 per head, or around $40,000 Australia-wide.
- Another suggested there might be around 30 complaints to respond to, and also estimated that enforcement costs might include be based on an assumption of a 25% failure rate of the premises surveyed, with a warning letter sent out, followed for some by a penalty infringement notice. The cost of this would be around $0.003 per head, or Australia-wide, $65,400.

Overall, for the three states that provided a full set of data, the cost estimates are outlined in Table 3:5. **The ongoing costs (per annum) are all higher than those indicated for monitoring FSANZ proposed regulation requiring fortification of bread making flour.**

The @RISK program was used to establish a cost range based on these three estimates. The central estimate from the @RISK results was adopted for modelling (see Figure 3-1**).**

TABLE 3:5 ESTIMATES OF THE COSTS OF GOVERNMENT ADMINISTRATION OF REGULATION, AUSTRALIA (A$)

	Lower estimate	Middle estimate	Upper estimate
Upfront	9,788	52,506	209,896
Ongoing per year	245,750	270,320	4,533,761

Source: based on estimates from a sample of three Australian state governments — one large and two small.

3.3.2 NEW ZEALAND

Administration and enforcement of mandatory fortification in New Zealand would be undertaken by the New Zealand Food Safety Authority (NZFSA). The NZFSA estimates of the associated costs are outlined in Table 3:6. The estimates are similar to those for fortification of flour.

TABLE 3: COSTS OF GOVERNMENT ADMINISTRATION OF REGULATION, NEW ZEALAND (NZ$)

	Upfront	Ongoing cost per year
Set up costs	$2,520	
Training and Awareness raising (industry)	$4,800	$2,400
Administration		$1,320
Auditing	$600	$80,000
Enforcement		$4,780
Total	**$7,920**	**$88,500**

Source: NZFSA

3.3.3 MONITORING

Monitoring and policy evaluation represent best practice policy making, and in any case, COAG Guidelines for Standard Setting Bodies specify that regulations should be reviewed at intervals of less than 10 years (COAG June 2004). Accordingly, FSANZ has developed a draft monitoring model for Australia and New Zealand which so far applies over a five year period. **For the purposes of modelling here, the costs have been continued over a 15 year period.**

FSANZ commissioned an assessment of the scientific evidence on the potential health effects of folic acid fortification which concluded that, at the folic acid intakes associated with the fortification program proposed by FSANZ, there is unlikely to be any harm. However, there was scientific uncertainty about the impact of unmetabolised circulating folic acid and a predicted possible small increase in twinning (of less than 5 per cent) (see the draft assessment report by FSANZ, P295).

- The Food Unit in the Victorian Government Department of Health suggested that a 5 year monitoring program may not be long enough to determine health outcomes given there is some uncertainty around some of the impacts of fortification on health over the long term.

The Australian costs estimates for the draft program are provided in Table 3:7. The New Zealand costs are the same (adjusted for exchange rates) but are not presented here.

- It is possible that not all of the costs would be attributable to folic acid alone, however it is not possible to determine the proportion attributable to folic acid at this point in time — except for the costing of the National Nutrition Survey, which applies to folic acid alone.
- The distribution of costs between the Australian Government and State/Territory governments has not been discussed. It is possible that jurisdictional governments might have included some of the proposed monitoring activities in their estimates of costs for administering the proposed regulation (thus duplicating cost estimates). However, it is not possible to determine this for this report.

Nevertheless, the draft program provides the best guide to the potential costs of monitoring the fortification proposal. The draft model includes the following components:

- Administration and oversight of the program
- Surveys of FSANZ stakeholders to evaluate whether food industry participants are aware of the new standards and interpret them correctly.
- Auditing to check whether foods are fortified as required and labelled correctly. This would be undertaken by collecting data from manufacturers, checking labels against food content, and updating national food composition databases.
- Surveys of consumers to investigate whether they are aware of mandatory fortification requirements.
- A national nutritional survey (undertaken once in the 5 year period) to examine folic acid intakes[6].
- Monitoring of the prevalence of neural tube defects (NTDs), twin birth rates, and other disease rates (see the health benefit-risk assessment by FSANZ). This component of the monitoring program would use existing data collections where possible. However, the accuracy of this cost depends on the characteristics of existing data sources and whether they will be able to reveal information about the health impacts of increases in folic acid intake.

TABLE 3:7 ESTIMATES OF MONITORING COST EACH YEAR (AUSTRALIAN COSTS ONLY) (A$)

Year	0	1	2	3	4	5
Administration	50,000	50,000	50,000	50,000	50,000	50,000
Survey manufacturers for awareness of standards		36,000	36,000	36,000	36,000	36,000
Content and label audit		73,000	73,000	73,000	73,000	73,000
Consumer awareness		118,000	118,000	118,000	118,000	118,000
Folic acid intake		100,000	0	0	0	0
Protection of public health and safety (NTD rates etc)		78,000	78,000	78,000	78,000	78,000
Total	**$50,000**	**$455,000**	**$355,000**	**$355,000**	**$355,000**	**$355,000**

Source: FSANZ (draft cost estimates based on the draft monitoring program for folic acid). New Zealand costs would be similar — simply adjusted for the exchange rate.

[6] The cost of nutritional surveys would not be attributable in full to folic acid fortification as costs would be spread across all policy issues that would benefit from such survey information (for example, folic acid fortification, or other health policy issues such as obesity). FSANZ estimates (based on a nutritional survey that reported intakes of 36 nutrients and costing A$3.6 million for the whole survey including the development of a food composition survey database) suggest that the cost attributable to monitoring iodine intake would be approximately A$100,000 (and the same cost in New Zealand — about NZ$107,000) (pers. comm. FSANZ, 6 July 2006). An Australian children's nutrition survey and a New Zealand adult nutrition survey are both due in 2007.

3.4 SUMMARY OF COSTS

FIGURE 3-1 COSTS OF FORTIFICATION OF BREAD WITH FOLIC ACID OVER 15 YEARS, AUSTRALIA

(Only 4 years shown in the diagram.)

Kg bread production		1,690,000,000					
			$/kg bread		$/kg bread		
Ongoing			Minimum		Maximum		Mean
	premix		0.0067	to	0.0096		0.00815
	maintenance		0.0002	to	0.0005		0.00035
	administration		0.0000	to	0.0001		0.00005
	analytical testing		0.0003	to	0.0168		0.00594
	Year		0	1	2	3	4
	Discount rate	3.30%					
	Discount index		100.00%	96.81%	93.71%	90.72%	87.82%
S/T governments			1,223,000	2,210,000	2,210,000	2,210,000	2,210,000
	NPV (15 years)	*27,042,349*	1,223,000	2,139,400	2,071,055	2,004,894	1,940,846
Monitoring			50,000	455,000	355,000	355,000	355,000
	NPV (15 years)	*4,446,525*	50,000	440,465	332,681	322,053	311,765
Industry	*Upfront*						
	labelling		2,486,400	0	0	0	0
	package write off		2,050,000	0	0	0	0
	Equipment		250,000	0	0	0	0
			900,000	0	0	0	0
			52,000	0	0	0	0
	Ongoing						
	maintenance			591,500	591,500	591,500	591,500
	Premix			13,773,500	13,773,500	13,773,500	13,773,500
	Analytical testing			10,037,000	10,037,000	10,037,000	10,037,000
	Administration			84,500	84,500	84,500	84,500
	Total industry		5,738,400	24,486,500	24,486,500	24,486,500	24,486,500
	NPV (15 years)	*292,567,322*	5,738,400	23,704,259	22,947,008	22,213,948	21,504,306
Total costs			7,011,400	27,151,500	27,051,500	27,051,500	27,051,500
discounted total costs			7,011,400	26,284,124	25,350,744	24,540,894	23,756,916
NPV costs (15 years)		**324,05□,195**					

FIGURE 3-2 COSTS OF FORTIFICATION OF BREAD WITH FOLIC ACID OVER 15 YEARS, NEW ZEALAND

(Only 7 years shown in the diagram.)

kg bread production			265,000,000							
			$/kg bread		$/kg bread					
			Minimum		Maximum		Mean		% of market	
Unit ongoing costs										
	premix	plant	0.0102	to			0.0102		61%	
		retail	0.0014				0.0014		39%	
	administration		0.0004	to			0.0004			
	analytical testing		0.0002	to	0.0004		0.0003			
	Year		0	1	2	3	4	5	6	7
	Discount rate	3.80%								
	Discount index		100.00%	96.34%	92.81%	89.41%	86.14%	82.99%	79.95%	77.02%
NZFSA			7,920	88,500	88,500	88,500	88,500	88,500	88,500	88,500
	NPV (15 years)	1,005,802	7,920	85,260	82,139	79,132	76,235	73,444	70,755	68,165
Monitoring			53,000	485,000	378,000	378,000	378,000	378,000	485,000	378,000
	NPV (15 years)	4,574,762	53,000	467,245	350,830	337,987	325,613	313,693	387,755	291,146
Industry	*Upfront*									
	labelling		436,063	0	0	0	0	0	0	0
	package write off		500,000	0	0	0	0	0	0	0
	Equipment		0	0	0	0	0	0	0	0
	Ongoing									
	maintenance			0	0	0	0	0	0	0
	Premix			1,786,818	1,786,818	1,786,818	1,786,818	1,786,818	1,786,818	1,786,818
	Analytical testing			2,253,497	2,253,497	2,253,497	2,253,497	2,253,497	2,253,497	2,253,497
	Administration			109,278	109,278	109,278	109,278	109,278	109,278	109,278
	Total industry		936,063	4,149,593	4,149,593	4,149,593	4,149,593	4,149,593	4,149,593	4,149,593
	NPV (15 years)	47,724,811	936,063	3,997,681	3,851,330	3,710,338	3,574,506	3,443,648	3,317,580	3,196,127
Total costs			996,983	4,723,093	4,616,093	4,616,093	4,616,093	4,616,093	4,723,093	4,616,093
discounted total costs			996,983	4,550,186	4,284,300	4,127,456	3,976,355	3,830,785	3,776,090	3,555,438
NPV costs (15 years)		**53,305,375**								

4. REFERENCES

Bickerdyke, I., Lattimore R. and Madge, A. 2000, *Business Failure and Change: An Australian Perspective*, Productivity Commission Staff Research Paper, Canberra.