



Burgen® Soy-Lin™: Development of an innovative functional staple food

K. Jorgensen, D.A.I. Suter, W.K. Thomson, F.S. Dalais, G.E. Rice and M.L. Wahlqvist

During the past ten years there has been an ever increasing body of literature demonstrating the benefits of phytoestrogens and omega 3 polyunsaturated fatty acid consumption in the diet. Evidence is mounting in the areas of:

- Relief from the symptoms of menopause (Wahlqvist & others 1990, Murkies & others 1995, Knight & Eden 1995)
 - Risk reduction in the development of hormone related cancers (breast and prostate) (Adlercreutz 1995)
 - Effects on cardiovascular disease (Anderson & others 1995)
- The potential benefits of omega 3 fatty acids include:
- Their requirement for normal brain and retinal development in babies (Makrides & others 1995)
 - Reduction in risk of primary cardiac arrest (Siscovik 1995)
 - Reduced asthma symptoms (Broughton & others 1995)
 - Reduced inflammatory and arthritis symptoms (Clifton 1997, Cleland 1997)

In October 1990 a publication in the British Medical Journal (Wahlqvist & others 1990), triggered the imagination of George Weston Foods Ltd. The study described the effect of increasing the level of phytoestrogens in the diet of 25 menopausal Western women. The results were promising. An increase in phytoestrogen, from soy and linseed intake, had a significant effect on menopause indicators.

In Asian cultures post menopausal women rarely experience the symptoms that Western women do. It is said, for example, that in the Japanese language, there is no word for the primary symptom of menopause, 'hot flushes'.

Research to date (Adlercreutz & others 1992) has indicated that one of the reasons for this lies in the difference between the typical Asian diet and the typical Western diet. One major difference is the high level of consumption of phytoestrogens, primarily from soy, in the Asian diet. Phytoestrogens are plant estrogens that are structurally similar to the female hormone estrogen. In the soy bean the primary phytoestrogens are isoflavones, and in linseed, lignans. A further benefit of an increase in consumption in soy and linseed is a consequential increase in polyunsaturated fatty acids (PUFAs) intake, primarily omega 3 fatty acids.

It is with this background that George Weston Foods contacted Professor Mark Wahlqvist at Monash University with a view to firmly establishing the link between

phytoestrogen intake and the impact on menopausal symptoms. The concept was to significantly increase the level of phytoestrogens in the typical Australian diet, without resorting to the adoption of a typical Asian diet.

In 1994 a proposal was developed for a joint study into the effects of phytoestrogens on the symptoms of menopause, to be conducted at the Monash Medical Centre and the Royal Women's Hospital, Melbourne.

Extensive product development was conducted by Weston Food Laboratories to determine the most appropriate vehicle incorporating soy and linseed to use in the study. Consideration was given to the total diet of post menopausal women, and their general concerns regarding weight gain. As a result, products developed that meant an addition to the diet, eg biscuits or American style muffins, were discarded in favour of a product that would be a substitution in the diet. The final product, bread, was formulated to supply a significant quantity of phytoestrogens in four slices to be consumed daily. The resulting bread was deemed to be highly acceptable by study participants.

The study

George Weston Foods liaised between the Monash Medical Center and the Royal Women's Hospital, and a small bakery in Melbourne was commissioned to manufacture the bread for the research. The bakery was supplied with a complete bread mix manufactured by George Weston Foods for this specific research project.

The researchers at the Monash Medical Center and the Royal Women's Hospital designed a double blind, randomised, cross over study to assess the effects of high phytoestrogen intake on menopausal symptoms. The hypothesis was that a diet high in phytoestrogens may have similar effects to estrogen in alleviating menopausal symptoms. The parameters included urinary phytoestrogens, hot flush rate and intensity (the primary symptoms of menopause), vaginal cell maturation index (an indicator of estrogenicity) and bone mineral content. The 52 subjects were randomised to diets high in soy, linseed or wheat as a means of increasing phytoestrogens intake. The results from the study were:

- A decrease in hot flush rate and intensity in the linseed and wheat groups
- An increase in vaginal cell maturation index in the soy group
- An increase in bone mineral content in the soy group

The results of the study confirm that phytoestrogens found in soy and linseed are of benefit in alleviating menopausal symptoms (Dalais & others 1998), and clearly supported other studies indicating that phytoestrogens play a role in the alleviation of menopausal symptoms.

The opportunity

George Weston Foods saw an opportunity to develop a commercial formulation of the bread, enabling consumers to obtain a significant quantity of phytoestrogens and omega 3 fatty acids in a product suited to the Australian

Kirsten Jorgensen is Manager Product Development and Dr Dai Suter is General Manager at Weston Food Laboratories, 1 Braidwood Street Enfield, NSW 2136. Bill Thomson is Principal, Thomson Woodward Partners, 99 Queens Parade, Newport Beach, NSW 2106. Dr Fabian Dalais is a Post Doctoral Fellow and Professor Mark Wahlqvist is Professor of Medicine, Department of Medicine, Monash Medical Centre, Monash University, 246 Clayton Road, Clayton, Vic 3168. Dr Greg Rice is Chief Chemist, Department of Perinatal Medicine, Perinatal Research Centre, Royal Women's Hospital, 132 Grattan Street, Carlton, Vic, 3053.

diet. The resulting bread is now commercially available and is marketed as *Burgen[®] Soy-Lin[™]* Soy and Linseed Loaf (Figure 1).

The chosen formulation involved careful consideration of the research results. The balance of soy, linseed and wheat had to be carefully calculated to optimise the phytoestrogen level (isoflavones and lignans) as well as omega 3 fatty acids.

The results of the research study and the launch of *Burgen[®] Soy-Lin[™]* were announced at the *International Congress on the Menopause* in Sydney in November 1996. The concept behind the research and the resulting commercial product captured the imagination and interest of the general public, the medical profession and the media. *Burgen[®] Soy-Lin[™]* received overwhelming acceptance in terms of organoleptic acceptability and ease of incorporation into the everyday diet.

In March 1997, Tip Top Bakeries commercially launched *Burgen[®] Soy-Lin[™]* to a huge media reception. It received nationwide coverage on television, radio and in the print media. The interest generated by the whole concept was far in excess of Tip Top Bakeries' estimates and created a huge demand for *Burgen[®] Soy-Lin[™]* by women looking for an alternative or an adjunct to their hormone replacement medication. The Tip Top Consumer Information 1800 phone line was inundated with consumers demanding to know where they could purchase *Burgen[®] Soy-Lin[™]*. Feedback came through from supermarkets where consumers were reported waiting at the loading docks for the Tip Top Bakeries delivery vans to arrive! *Burgen[®] Soy-Lin[™]* had created its own category by fulfilling a need in the community to easily incorporate a food into the diet which is high in phytoestrogens and omega 3 fatty acids without a substantial change in eating habits.

By early April 1997 *Burgen[®] Soy-Lin[™]* accounted for 5.3% volume share of the total bread market, and 23.4% of the grain (including deposited breads) bread category. This is phenomenal growth, and a 2% increase in the value of the total bread market was also recorded. (Source: Scanpath Info-Fusion week 6/4/97).

In a very short time other major bakeries recognized the benefits of adding soy and linseed to baked products. The result was a wide range of breads in the market to suit all consumer tastes, which still contribute to the consumer intake in phytoestrogens and omega 3 fatty



Figure 1. *Burgen[®] Soy-Lin[™]* Soy and Linseed Loaf.

acids. Further to this, other food categories are now also recognising the benefits of phytoestrogens and omega 3 fatty acids sourced from soy and linseed. Breakfast cereals, crispbreads and soy milks using this concept are now available in supermarkets.

According to the Bread Research Institute, bread consumption per person has remained relatively static for the past ten years, but in the last 12-18 months there does appear to have been an increase in consumption (Griffiths 1997). It is suggested that this rise is substantially due to a high level of consumption of *Burgen[®] Soy-Lin[™]* and other soy and linseed breads by post menopausal women who traditionally are low bread consumers.

The innovation of introducing significant levels of phytoestrogens and omega 3 fatty acids in a food product that is easily incorporated into the diet, has now been recognized overseas. *Burgen Soy and Linseed Loaves* have been launched in the UK and New Zealand, with interest being expressed by a number of other countries (Figure 2).

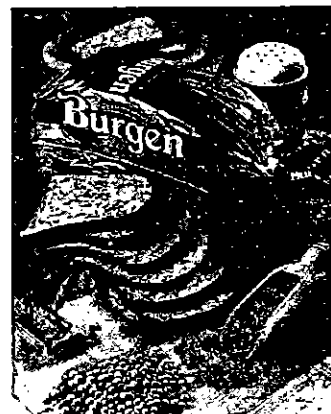


Figure 2. *Burgen Soy and Linseed Loaves* launched in the UK.

Other nutritional benefits

Burgen[®] Soy-Lin[™] could be considered to be the first most complete functional food available to the consumer, which has been developed in recent times. Four slices per day provides a significant amount of phytoestrogens (220mg), and 3.5g of alpha linolenic acid. It has now been documented that the alpha linolenic acid found in linseed can be converted by the body to the long chain fatty acids such as those found in fish (EPA or DHA) (Emkem & others 1994). It is estimated that 550mg of EPA and DHA may be obtained from 3.5g of alpha linolenic acid meeting current estimates for the recommended daily intake for EPA and DHA. Linseed has the highest level of plant sourced alpha linolenic acid and is a renewable resource. Fish stocks in today's world are becoming increasingly stressed, so *Burgen[®] Soy-Lin[™]* is an easy alternative for the consumer to eating fish as a source of essential omega 3 fatty acids (Figure 3).

Burgen[®] Soy-Lin[™] has been evaluated by the Nutrition Unit of the University of Sydney in terms of glycaemic index (Brand-Miller 1997). The glycaemic index of the *Burgen[®] Soy-Lin[™]* is 19, (white bread has glycaemic index of 70), the lowest value for any bread yet tested by the University (Figure 4). Therefore the bread may be of benefit to those consumers wishing to control blood sugar levels. The Tip Top Consumer Information phone line has received calls from diabetic consumers supporting this view.

Burgen[®] Soy-Lin[™] is also very high in fibre (10%), compared to wholemeal bread, which typically has a dietary fibre level of 6.5% (English & Lewis 1991), the benefits of which are well recognized (Egger & others 1991). The Consumer Information phone line has received numerous calls from consumers describing their improvements in regularity since consuming the bread.

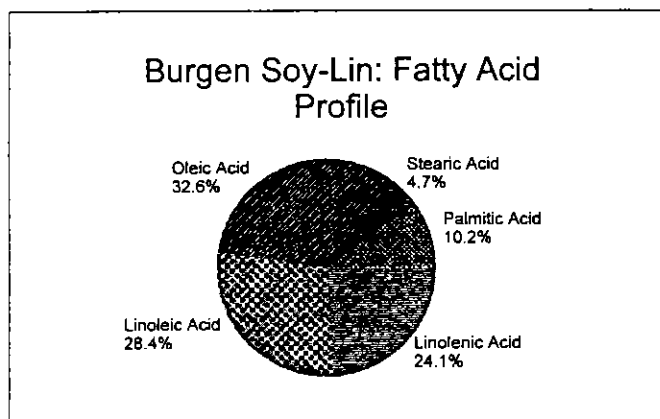


Figure 3. *Burgen*[®] *Soy-Lin*[™] fatty acid profile.

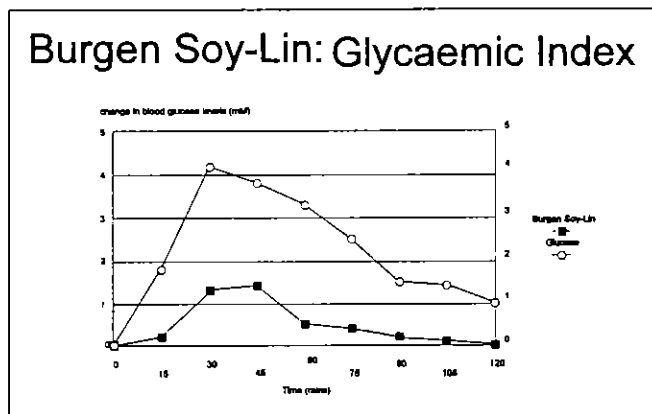


Figure 4. *Burgen*[®] *Soy-Lin*[™] : Glycaemic Index.

Burgen[®] *Soy-Lin*[™] has also been awarded the National Heart Foundation 'tick'. NHF criteria are strict in terms of fatty acid profile (polyunsaturated fat to saturated fat ratio), sodium content (less than 450mg/100g) and fibre content (greater than 5%). *Burgen*[®] *Soy-Lin*[™] contains 10% of the RDI per serve for calcium and phosphorous.

In summary, *Burgen*[®] *Soy-Lin*[™]:

- Is high in phytoestrogens (220mg of isoflavones and lignans per 4 slices)
- Is high in omega 3 fatty acids (3.5g of alpha linolenic acid)
- Has a desirable omega 6 to omega 3 fatty acid ratio (average of 1.1:1)
- Has a very low glycaemic index of 19
- Is high in fibre (10%)
- Contains 10% of the RDI for calcium
- Contains 10% of the RDI for phosphorous
- Meets NHF requirements for sodium, fat, sugar and fibre

All these factors combine to create a loaf with the potential to provide the benefits of:

- Reducing the symptoms of menopause
- Reducing the risk of hormone dependent cancers
- Assisting in the control of diabetes
- Helping maintain regularity
- May be beneficial in reducing asthma symptoms
- May be beneficial in reducing some arthritic symptoms
- Reducing the risk of arrhythmia and CHD

Conclusion

We believe that the development of *Burgen*[®] *Soy-Lin*[™] bread is a significant innovation which comprehensively recognises the special dietary needs of more than 5 million over 40 year olds in Australia.

A new staple food for the Western diet has grown out of epidemiological studies of Asian diets, sound scientific research and human feeding trials. This bread has already been successfully introduced into Australian, New Zealand and UK markets using a promotional strategy which rigorously targeted health professionals and consumers.

Burgen[®] *Soy-Lin*[™] is an example of what can be achieved when industry joins forces with the appropriate research institutions.

We would like to thank the AIFST for the honour it has bestowed on George Weston Foods Ltd by selecting

our application as the 1998 winner of the Food Industry Innovation Award.

We would like to acknowledge Professor Mark Wahlqvist and his research team for the research studies and results which contributed to the success of *Burgen*[®] *Soy-Lin*[™]. We would also like to thank Robert McNamara (Cereform) and Stuart Borthwick (Weston Food Laboratories) and all the other team members at WFL, Tip Top Bakeries and IPR Shandwick for their contribution to the success of this venture.

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