Institution: University of Aberdeen

Unit of Assessment: 1- Clinical Medicine

Title of case study: Fuller Longer™: University of Aberdeen Rowett Institute of Nutrition and Health helps to develop a new health food range for Marks and Spencer

1. Summary of the impact

The Fuller Longer™ (FL) food range was developed by Marks & Spencer (M&S) with expertise from the University of Aberdeen Rowett Institute of Nutrition and Health. Product development was based on Rowett research into the efficacy of high protein and mixed carbohydrate diets for sustained appetite control and weight loss. Obesity is a major public health challenge; therefore it is not surprising that FL has become an established brand for M&S's 20 million customers. This industry-academia partnership to develop a food range based on scientific input, was a first for M&S, and has led to one of the UK's most popular retail healthy-eating food ranges.

Therefore the claimed impact here includes benefits to health and welfare, on commerce, business performance and the economy.

2. Underpinning research

The research findings underpinning the development of FL emerged from human intervention studies conducted from 2008 onwards and led by Dr Alexandra Johnstone, Senior Research Fellow at the University of Aberdeen Rowett Institute of Nutrition and Health. These demonstrated the use of high protein diets in volunteer appetite control and weight loss. The Aberdeen team conducted numerous studies in obese human volunteers to examine the mechanistic basis of protein-induced satiety in long-term dietary studies. This included psychological and physiological monitoring in free-living and laboratory controlled nutritional studies.

The team identified that high-protein, moderate carbohydrate (HPMC) diets are as effective at achieving appetite control as less balanced high-protein, low carbohydrate (HPLC) diets [1]. This indicated that the novel HPMC dietary composition could in fact maintain intake of fruit, vegetables and fibre - the absence of which is a frequent criticism of other high-protein diets [2,3]. The research identified protein as the key macronutrient in modulating hunger [1].

The researchers received external funding from the Scottish Chief Scientist Office to use Positron Emission Tomography (PET) to understand how HPMC weight loss diets mediated changes in the brain. This work indicated uptake of glucose by the brain remained similar, despite differential nutrient supply. The initial HPMC diet studies used meat protein sources, but the team were successful in obtaining further external funding (a competitive grant award from the Alpro Foundation) to also examine the role of vegetable protein sources in appetite control. This indicated that vegetarian sources of protein have comparably positive effects on satiety. More invasive methods using tracer kinetics were also applied to assess how protein turnover and amino acid flux, are related to gut hormone profile.

In order to identify the mechanisms behind protein-induced satiety, and the relationship between protein and carbohydrate dietary components, animal (rodent) studies were conducted with the Rowett Gut Health group [4]. Using tightly controlled dietary studies, and the collection and analysis of faecal samples, the optimal macronutrient content could be identified. This research revealed the importance of maintaining carbohydrate with protein for optimal gut health [5]. These different research strands were then integrated, leading to the development of a number of weight-reducing diets based on high protein intakes. These novel diets promoted satiety, at caloric intakes below normal daily energy expenditure requirements, leading to weight loss. The safety and efficacy of these diets has recently been confirmed [6].

This research has been published in peer-reviewed publications (e.g. [1,3,4,6]) and presented at international research symposia. The subsequent interaction with M&S took the research findings

of protein-induced satiety from the laboratory through to the marketplace. The product range has represented a huge commercial success for the industry partner. Further work is underway to assess the efficacy of the specific M&S FL food range in longer-term studies to support a health food claim portfolio of research.

3. References to the research

Peer reviewed publications:

[1] Johnstone AM, Horgan, GW, Murison SD, Bremner DM, Lobley GE. (2008). Hunger and appetite response to a high-protein ketogenic diet in obese men feeding ad libitum. *Am J Clin Nutr,* 87: 44-55.

(This cornerstone study identified that high protein component of the diet, rather than a low-carbohydrate component is important in controlling appetite. This discovery ran counter to the then dieting 'trends' such as the Atkins diet, and led directly to the contract work with M&S).

[2] Johnstone AM. High protein diets for appetite control and weight loss – the 'holy grail' of dieting? (2009). *Br J Nutrition,* 101: 1729-1730.

(An invited commentary of peer publications).

[3] Johnstone AM, Lobley GE, Horgan GW, Bremner DM, Fyfe CL, Morrice PC, Duthie GG. (2011). Effects of a high-protein, low-carbohydrate weight loss diet on antioxidant status, endothelial function and plasma indices of cardio-metabolic profile. *Br J Nutrition*, 106: 282-291.

(This study examined the safety and efficacy of the diet).

[4] Russell WR, Gratz SW, Duncan SH, Holtrop G, Ince J, Scobbie L, Duncan G, Johnstone AM, Lobley GE, Wallace RJ, Duthie GG, Flint HJ. (2011). High-protein, reduced-carbohydrate weight-loss diets promote metabolite profiles likely to be detrimental to colonic health. *Am J Clin Nutr* 93:1062-72.

(One of several publications with the Gut Health group identifying the role of type and amount of carbohydrate required during dieting).

[5] Johnstone AM. (2012). Safety and efficacy of high-protein diets for weight loss. *Proceedings of the Nutrition Society*, 71: 339–349.

(This paper discusses and documents current opinion on high protein weight loss diets and attempts to dispel common myths surrounding different high protein diets).

[6] Duncan SH, Lobley GE, Holtrop G, Ince J, Johnstone AM, Louis P, Flint HJ. (2008) Human colonic microbiota associated with diet, obesity and weight loss. *Int J Obes (Lond),* 32:1720-4.

(This paper discusses current thoughts on role of gut microbiota in weight control, relevant for the safety and efficacy of the dietary approach).

Grant awards which have supported this work:

- 2013 Marks and Spencer – LEAD PI - Weight loss trial, £200k
- 2010 Marks and Spencer – LEAD PI - Weight loss trial, £150k
- 2009 Marks and Spencer - Consultancy agreement, £15k.
- 2009 Alpro Foundation £66k – LEAD PI – Effect of soya protein on appetite and gut health.
- 2007 World Cancer Research Fund - £150k - collaborative grant with Gut Health at the Rowett -effect of starch and fibre on metabolic health and weight loss diets.
- 2007 Chief Scientist Office - £15k - collaborative grant with clinical colleagues and University of Aberdeen PET scan department, to assess brain metabolism on weight loss diets.

4. Details of the impact

Obesity and its associated co-morbidities are a major public health burden. The development of a commercially available, specifically designed food range gives consumers another option to make sensible meal choices to control their weight.

The Rowett research was the subject of a series of high impact publications and presentations at major conferences. M&S was contacted as part of an ongoing programme at the Rowett aimed at promoting knowledge transfer to the food industry. Following a presentation of this research at a meeting with M&S senior executives, prospects for its commercial application as part of complete meal solutions was explored in 2008. The potential for the development of a new range of calorie controlled food products, underpinned by Dr Johnstone's research into high protein diets, was quickly identified as a key strength for the development of a unique and new commercial food range.

M&S retained Dr Johnstone and her team, for a year in 2009, to provide scientific support and guide them in creating and developing their new product concept. The Rowett team also worked face-to-face with the M&S senior management team and their supply chain partners to reinforce their understanding of the scientific basis for the new food products.

The Aberdeen researchers provided further scientific support during the development of marketing and media materials [a,b]. They were also involved at the formal event in London in January 2010 when the range was launched in M&S stores across the UK, with an estimated weekly customer base of 20 million people. Figures for one week's sales in January 2012 indicate it is the No1 food diet brand in M&S in healthy meals (including FL and Count on Us™ ranges) with 1.5m meals sold in a week (M&S statistics, personal communication from Head Office). The FL range has exceeded sales expectations and was quoted in the 2011/2012 M&S annual reports. Just a year after launch (2011) of this new product range, the Fuller Longer range became the UK's second favourite health food brand. This range was beaten into second place only by Marks and Spencer's own hugely successful Count on Us™ range, which had a clear advantage of being in its eleventh year of production. The FL range continues to grow with addition of new products following consumer demand for more variety. In July 2012, M&S reported that the company held the highest share of the market for healthy eating through the quarter with its FL range as the market leader [c,d].

The Fuller Longer™ (FL) range encourages people to manage their weight sensibly with a menu plan, which features a carefully calculated balance of proteins and carbohydrates for calorie-counted meals and snacks to achieve sustained weight loss. Recently, the FL range has been extended further to give those following the programme more choice and a greater range of flavours. There is currently an M&S-produced advert which explains the expanding range of meals available. Importantly, details of this range of foods have been featured by a wide and diverse range of media targeting a range of ages and socio-economic groups (e.g. YouTube, *Daily Star*, *Daily Record, The Daily Telegraph, The Independent, Cosmopolitan,* LiveStrong, Reuters, BBC). Given the obesity challenge facing the world, this type of coverage is vital to provide information to the large numbers of people trying to achieve a healthy weight [e,f,g,h,i].

The relationship between M&S and Dr Johnstone's group has developed further through collaborative research into science-led design of dietary components. The company has now identified new areas of potential interaction, including the assessment of other M&S food ranges and the provision of in-house training for staff. The collaboration with industry has led to Dr Johnston's team organising a key satellite symposium, 'Industry and academic partnerships for developing health-improving products', at the Nutrition Society Summer meeting 2011, with M&S, where the data on weight loss and improvement in health indices were presented to peer groups. This successful and important collaboration with industry has been further highlighted by the Scottish Government supported website, Knowledge Scotland [j].

Overall, this research has had clear and demonstrable impacts on commerce through the development and sales of new products, with resultant enhanced business performance and competitiveness. Furthermore, with increasing concern over levels of obesity in the UK, there is an additional impact of this research on health and welfare in terms of public behaviour as evidenced

by the increasing sales of this product. Marks and Spencer are putting together the required data for a portfolio for a health claim with the European Food Standards Agency (EFSA).

Therefore the claimed impact as defined by REF is that: the research has demonstrable impacts on commerce through the development and sales of new products, with resultant enhanced business performance and competitiveness. Furthermore, with increasing concern over levels of obesity in the UK, there is an additional impact of this research on health and welfare in terms of public behaviour as evidence by the increasing sales of this product.

5. Sources to corroborate the impact

Marks and Spencer Health and Nutrition Website

[a] http://health.marksandspencer.com/our-health-ranges/fuller-longer

April 2013 – M&S company home page web link to FL range information; mentions the role of the University: 'It was developed with expert advice from scientists at the Rowett Institute of Nutrition and Health at the University of Aberdeen, renowned for its ground-breaking research on effective weight-loss.'

[b] http://health.marksandspencer.com/uploads/pdfs/FLDietPlan.pdf

April 2013 – M&S company home page web link to FL menu plan

Financial impact and trading figures

[c] http://annualreport.marksandspencer.com/financial-review/food.aspx

2012 – M&S annual report with FL mention on page 23

[d] http://www.thisismoney.co.uk/money/markets/article-2014220/Marks--Spencer-posts-forecast-beating-sales-boost.html July 2011 – *M&S sales figures releases via press article*

Press and Media coverage

[e] http://www.fdin.org.uk/2011/04/marks-spencer-food-sales-on-the-rise-despite-challenging-trading-environment

April 2011 – M&S trading figures

[f] http://www.youtube.com/watch?v=UXoCEqQlkkY

Jan 2011 - M&S advertisement – FL diet

[g] http://www.dailymail.co.uk/femail/article-2209739/So-lose-stone-month-eating-M-S-Fuller-Longer-ready-meals-Amanda-Cable-nearly-did--wants-packaged-food-again.html

Sept 2012 - A journalist tests the FL meals for a month and loses a stone in weight.

[h] http://www.dailyrecord.co.uk/life/men/health-and-fitness/2012/01/30/nutritionist-juliette-kellow-reveals-the-low-calorie-ready-meals-for-those-with-no-time-to-cook-86908-23727260/

Jan 2012 – Newspaper coverage on FL food range

[i] http://www.cosmopolitan.co.uk/lifestyle/diet-fitness/diets/diet_helps_Lose-inches-the-low-carb-way *Dec 2011 – Cosmopolitan magazine article*

The Knowledge Scotland Website

[j] http://www.knowledgescotland.org/success-stories.php?id=241

July 2011 – Science engagement website for Government Policy colleagues