

Impact case study (REF3b)

Institution: Cardiff Metropolitan University
Unit of Assessment: A3 Allied Health Professions, Dentistry, Nursing and Pharmacy
Title of case study: The impact of food safety research on knowledge exchange, food safety practice and economic prosperity in the Welsh food industry
1. Summary of the impact (indicative maximum 100 words)

This case study is concerned with the impact of our research on small and medium sized enterprises (SMEs) in the food industry in Wales. Specifically, the preliminary impact is about the development of a Knowledge, Innovation and Technology Exchange (KITE) programme. Set up in 2008, it was based on £3.9 million initial investment from the Welsh Government and the European Agricultural Fund for Rural Development. Through sustained knowledge exchange via the KITE programme with 31 food manufacturing businesses in Wales there have been two main types of direct impact with benefits to end-users. First, there have been improvements to food production and food safety management systems in many of those businesses. Second, there has been increased economic prosperity, by March 2013 resulting in £27 million of increased sales, £540k of waste reduction within processing, and the creation and safeguarding of 1,072 jobs.

[Throughout this Impact Case Study, references to the underpinning research are numbered 1 to 6; sources to corroborate the impact are numbered 7 to 16.]

2. Underpinning research (indicative maximum 500 words)
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The programme of research that underpins this Impact Case Study has a 20 year history at Cardiff Metropolitan University, most recently delivered by the Food Industry Centre at the Cardiff School of Health Sciences. Led initially by **Griffith** (a Professor who retired in 2009), the other senior food scientists during the period of the research were **Fielding** (appointed in 1993 as a Lecturer) and **Peters** (appointed in 1995 as a Senior Lecturer) – both are now Professors. The multi-disciplinary team of researchers has also included **Clayton**, a psychologist (appointed in 2004 as a Research Fellow – now a Senior Lecturer). Research Assistants, **Ellis** (2002) and **Mortlock** (1997-2002) also made key contributions. The Director of the Food Industry Centre is **Lloyd** (appointed in 1997).

The development of the research undertaken is set in context through a chronological narrative. The empirical studies draw mainly on questionnaire surveys (1, 2, 5, 6) as well as a quasi-experimental design to show the effects of an intervention using a sector specific information resource (3). Based on a decade's research (and more), the other output (4) is a 'position statement' that emphasises the importance of food safety management systems linked inextricably to organisational food safety culture – particularly attitudinal constructs associated with practitioner behaviour.

Data for the earliest substantive piece of research that underpins this case study were gathered in 1997 (5). From the survey responses of 254 food businesses across manufacturing, retail and catering, it was shown that systems such as the 'hazard analysis critical control point' were being used by significantly more manufacturers than by retailers and caterers. Perceptions of the level of risk to food safety were more even, but only half of the sector as a whole thought their business presented a low risk. These findings had implications for the development of industry-wide food hygiene practices.

In a linked study using the same data base (6) four different grades of food handlers were compared. It was shown that there were significant differences in the methods of training delivery and qualifications held across all four grades in the same three sectors of the food industry. Importantly, whilst many managers were positive about training for their employees, in follow-up interviews they noted concerns about cost, time and relevance of the training their staff received. Conclusions highlighted the need to develop training that resulted in behaviour change in workplace settings and consolidated food hygiene as a fundamental part of food safety control.

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The multi-disciplinarity of the underpinning research was established in 2002 when insights from cognitive psychology shed light on the beliefs and practices of food handlers (1). The views of 137 food industry practitioners from 52 SMEs in Wales were collated, interpreted and analysed. The results showed that although food handlers were aware of food safety actions required by the industry, they identified barriers to their implementation – specifically, lack of time, lack of staff and lack of resources. As a result almost two thirds of those who had received food hygiene training admitted not carrying out food safety behaviours; and although all food handlers perceived their business to be relatively low risk, they all prepared high risk foods.

The most recent questionnaire survey (2) had two main functions – to audit hazard-based quality management, and to analyse comparatively the differences between SMEs and the subset of microbusinesses (fewer than 10 employees). The findings revealed that although hazard-based quality management was practised widely, the ability to define a hazard or identify types of hazard was poor – especially amongst microbusinesses.

Together, this body of empirical research provided the platform for an understanding of the food safety practices of the industry and the importance of implementing ‘risk-based’ training. It also consolidated the importance of actual behaviour change in the sector as well as appropriate resourcing for this work. The most recent study (3) adopted a quasi-experimental intervention design in an attempt to improve compliance with food safety hazard analysis critical control point legislation. Using a user-friendly (non-technical) information resource, 123 SME food businesses participated, and although the resource was well received, there were no significant differences in knowledge, behaviour or attitude as a result of its use. The null finding is crucial because it demonstrates that mere provision of an information resource is insufficient to bring about positive change. It is only through pro-active engagement with SMEs in the sector that actual benefits can be achieved.

3. References to the research (indicative maximum of six references)

The underpinning research for this Impact Case Study has been published in international peer-reviewed journals. Five of the referenced outputs have been funded by external grants: Ministry of Agriculture, Fisheries and Food, 1997-2000, £121k (5 and 6); Ministry of Agriculture, Fisheries and Food, 1999-2001, £120k (1); Food Standards Agency, 2002-2003, £42,034 (2); and Food Standards Agency, 2004, £56,079 (3). For specific journals, the impact factor (IF) on 31st October 2013 is indicated, and, where known, the number of citations by the same date is also included.

1. Clayton, D., Griffith, C.J., Price, P. and Peters, A.C. (2002). Food handlers' beliefs and self-reported practices. *International Journal of Environmental Health*, 12, 25-39.
DOI: 10.1080/09603120120110031 [IF: 1.203; Taylor and Francis citations: 79]
2. Fielding, L.M., Ellis, L., Beveridge, C. and Peters, A.C. (2005). An evaluation of HACCP implementation in UK Small and Medium Enterprises in food manufacturing. *International Journal of Environmental Health Research*, 15 (2), 117-126.
DOI: 10.1080/09603120500061583 [2012 IF: 1.203; Taylor and Francis citations: 12]
3. Fielding, L.M., Ellis, L., Clayton, D. and Peters, A.C. (2011). An evaluation of process specific information resources, aimed at hazard analysis, in Small and Medium Enterprises in food manufacturing. *Food Control*, 22 (8), 1171-1177.
DOI: 10.1016/j.foodcont.2011.01.011 [IF: 2.738 - 5 year IF: 3.006; citations: 3]
4. Griffith, C.J., Livesey, K.M. and Clayton, D. (2010). The assessment of food safety culture. *British Food Journal*, 112 (4), 439-456.
DOI: 10.1108/00070701011034448. [2013 Impact Factor: 0.614; citations: 1]
5. Mortlock, M.P., Peters, A.C. and Griffith, C.J. (1999). Food hygiene and Hazard Analysis Critical Control Point in the United Kingdom food industry: Practices, perceptions and attitudes. *Journal of Food Protection*, 62 (7), 786-792.
URL: <http://www.ingentaconnect.com/content/iafp/jfp/1999/00000062/00000007/art00014>
[2013 Impact Factor: 1.94; citations: 51]

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6. Mortlock, M.P., Peters, A.C. and Griffith, C.J. (2000). A national survey of food hygiene training and qualification levels in the UK food industry. *International Journal of Environmental Health Research*, 10 (2), 111-123.
DOI: 10.1080/09603120050021119 [2012 IF: 1.203; Taylor and Francis citations: 27]

4. Details of the impact (indicative maximum 750 words)

Recognition of our research on food safety led to preliminary impact resulting in the development of a KITE programme (13). Delivered through the Food Industry Centre at Cardiff Metropolitan University, it was set up as a feasibility study to run between 2008 and 2015, with additional investment added in 2012 (12). Its aims included addressing the critical need for food sector SMEs to meet technical demands required for business sustainability by implementation of effective delivery mechanisms to facilitate the transfer and embedding of food science / technology knowledge and expertise.

Recognised in the *Food Strategy for Wales* (11) as a provider of innovation and for instilling best practice, and in the report of the European Agricultural Fund for Rural Development, *Making Wales a Better Place 2007-2013* (8), the Welsh Government also made explicit the impact of our work. Under the banner headline 'KITE project gives lift to Welsh food industry', it commented on "A ground breaking programme financed by £3.9 million", and explained that the intention was "to get more Welsh food on the shelves of large retail stores across the world, which in turn will allow SMEs to grow, providing local jobs for local people including young food science graduates who would have traditionally had to move to England to further their careers."

Having established the KITE programme, the impact of our research for end-users (i.e., the food industry in Wales) have been concerned with: (i) impacts on commerce – sales of new products, business performance measures, employment figures, and commercial adoption of new technology, process and knowledge; (ii) impacts on production – new products and reduced wastage; and (iii) impacts on practitioners and services – adoption of best practice.

The KITE programme has undergone a rigorous second party evaluation that has been submitted to the Welsh Government. The Evaluation Report for 2008-2011 (10) made clear that there were also secondary outcomes linked to investment, sustainability, nutrition and health, supply chain efficiency, food culture, regeneration, market development, tourism, reduction of environmental impact, business remodelling, focus on Welsh Government convergence areas, workforce development, increased exports, links with Welsh Government food and other policies, and food 'hubs'. The Report indicated progress on each of these spheres of influence and projected more in the future.

Through the KITE programme a food science graduate is placed in a food industry business with the aim of making improvements against four main key performance indicators (KPIs),– technical management, new product development, production management systems and waste control. Food safety culture change philosophy and practices are fundamental to delivering these KPIs. The clearest evidence of the impact on the food industry in Wales is from the Quarterly Claim Report (9) which is verified by Welsh Government (14). The most recent of these (to March 2013) shows that against every measurable criterion, the actual performance has matched, and often exceeded significantly the contractual target for the programme:

- Participation in the scheme: target 31 companies, actual performance 31
- Dissemination of outputs: target 86 companies, actual performance 86
- Increased sales of Welsh produce: target £16.3 million, actual performance £27.2 million
- Creation of quality assurance roles: target 38, actual performance 38.8
- Creation of manufacturing roles: target 219, actual performance 270
- Waste reduction at source within processing: target £223k, actual performance £540k
- Jobs safeguarded: target 620, actual performance 764
- Technical transfer conference to share good practice: target 1, actual performance 1.

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Particular examples illustrate the ways in which the KITE project has impacted on SMEs in the food industry in Wales (15), and the role of Cardiff Met has featured in a Welsh Government news bulletin on nutrition for national sports teams (15).

As a result of this work, Food Industry Centre researchers have been invited to become involved in other activities. Fielding acted as a consultant to the Food and Agriculture Organisation of the United Nations, on a European Union funded programme about curriculum design for sanitary inspectors in Bangladesh (7) as well as contributing to the Centre for Medical Education and the Institute of Public Health, advising on risk based food safety management, and updating the curriculum (implemented in July 2012). Lloyd contributed to public engagement through broadcast and electronic media (16).

5. Sources to corroborate the impact (indicative maximum of 10 references)

7. Chief Technical Officer (2013) Personal testimony. Food Safety in Bangladesh project.
8. European Agricultural Fund for Rural Development: Europe Investing in Rural Areas (2013) *Making Wales a Better Place 2007-2013*. Cardiff: Welsh Government.
9. KITE Processing and Marketing Grant Scheme – Claim for Payment (1st January 2013 - 31st March 2013).
10. KITE Evaluation Report 2008-2011 endorsed by the Welsh Government and the European Agricultural Fund for Rural Development
11. Welsh Assembly Government (2010) *Food for Wales, Food from Wales 2010/2020 – Food Strategy for Wales*. WAG 10-10583. Cardiff: Welsh Assembly Government.
12. Welsh Government (2011) *Funding for the three Food Centres in Wales*. Cardiff: Welsh Government.
<http://cymru.gov.uk/about/cabinet/decisions/dr2012/janmar/business/5741041/?lang=en>
13. Director of the Welsh Government's Food and Market Development Directorate (2013) Personal testimony. KITE programme award.
14. Welsh Government (2013) Verification confirmation for Quarterly Claim for Payment (1st January 2013 - 31st March 2013).
15. *Illustrative examples of impact*
WalesOnline (2011) Treforest family-owned pastry company The Welsh Pantry announces expansion plans. <http://www.walesonline.co.uk/business/business-news/treforest-family-owned-pastry-company-welsh-1810478>
WalesOnline (2011) Asda baby food coup for Welsh company
<http://www.walesonline.co.uk/business/business-news/asda-baby-food-coup-welsh-1843764>
WalesOnline (2011) Fruitapeel in line for £12m turnover in first year
<http://www.walesonline.co.uk/business/business-news/fruitapeel-line-12m-turnover-first-1903950>
National Centre for Universities and Business (no date) Cardiff Metropolitan University's Food Industry Centre collaboration with Just Love Food Company
<http://www.ncub.co.uk/case-studies/success-stories.html>
Welsh Government (2013) Welsh soup powering rugby and football teams.
<http://new.wales.gov.uk/newsroom/businessandconomy/2013/7383085/?lang=en>
16. *Media engagement*
WalesOnline (2011) Wales' food and drink sector struggles to fill vacancies
<http://www.walesonline.co.uk/news/local-news/wales-food-drink-sector-struggles-1795310>
BBC News Wales (2013) Horsemeat: Councils in Wales check school and hospital food
<http://www.bbc.co.uk/news/uk-wales-21480481>
BBC News Wales (2013) Horsemeat: Cardiff food expert David Lloyd on controls
<http://www.bbc.co.uk/news/uk-wales-21469858>