COSTS, BENEFITS AND BARRIERS TO THE APPLICATION OF HYGIENE MANAGEMENT SYSTEMS IN THE UNITED KINGDOM FOOD INDUSTRY.

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2002
DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

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Summary.

Hazard Analysis Critical Control Point (HACCP) is the system of choice for the Food Standards Agency in attempting to improve risk management within the UK food industry. Informing the debate surrounding the potential barriers to HACCP implementation, this research aimed to identify the factors influencing the uptake of such systems and profile the potential costs and benefits of their implementation either individually or as part of industry wide initiatives.

Results from a 1997 postal survey showed that 69% of UK food manufacturers reported having implemented HACCP, compared to only 15% of caterers and 13% of retailers. Business size, status, managerial risk perceptions and training levels were associated with use of HACCP within individual industry sectors.

The experience of eight case studies suggested that HACCP systems had been able to be implemented within the reasonable financial means of businesses both large and small. Although tangible financial benefits as a result of HACCP were experienced by only one case study, the less tangible benefits of improved food safety control through HACCP were recognised.

Evaluation of a sector wide HACCP initiative for English retail butchers identified average implementation costs of £859. Although significant improvements in HACCP related knowledge and ability were delivered by the training provided, many managers believed that they would require further support to help maintain their system. Results from a Vickrey auction suggested that a substantial proportion of consumers would be willing to pay more for HACCP, although once mandatory, the system attracts lower premiums.

Recommendations made for further action in promoting the wider use of HACCP include the need for monitoring of HACCP implementation rates, the provision of further evidence on the likely costs and benefits of HACCP and the need to ensure a sound basis for HACCP by improving general levels of hygiene practice and hygiene training.
To my wife,

*Katie*
ACKNOWLEDGEMENTS.

The completion of this thesis and the study preceding it would not have been possible without the help of many people, nor without the financial support for the project which formed the basis of my research from the then Ministry of Agriculture, Fisheries and Food (MAFF).

Dr. Adrian Peters and Dr. Chris Griffith, my supervisors, have provided ongoing support and encouragement over the last few years. The opportunities provided by this research provided an invaluable starting point to my career which would not have been possible without their initial employment of me as a research assistant. Thanks are also due to my colleagues during my time at UWIC for their support and ongoing friendship and to Mike and Shaun at MD Associates for their support in helping develop the costing database.

The co-operation of many businesses and individuals working within the food industry was pivotal to the success of this research. Whether through responding to surveys or taking the time to commit to face to face interviews and case studies, their willingness to be involved was vital. Thanks are also expressed to the environmental health departments around the UK whose assistance was required in delivering the initial survey of the food industry and to the Meat and Livestock Commission for their role in facilitating the survey of butchers involved in the accelerated HACCP initiative in England.

Finally, thanks to my wife Katie for her support through what have been a busy few years of marriage for us, combining full time work with the completion of our PhD theses.
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CHAPTER ONE: INTRODUCTION

"It is paradoxical that when science and technology have eliminated some major infectious diseases, gastrointestinal infections constitute a growing problem worldwide." (Griffith, 2000)

Provisional data suggests that there were 85,581 notified cases of food poisoning across England and Wales in 2001. Food poisoning, as referred to throughout this thesis and as defined by the United Kingdom (UK) Advisory Committee on the Microbiological Safety of Food in 1992, being any disease of an infectious or toxic nature caused by, or thought to be caused by, the consumption of food or water. Whilst this level represents a decline from a peak of almost 94,000 cases in 1998, the number of cases has more than doubled since 1988, with a six-fold increase since 1982 (Public Health Laboratory Service, 2002). Of additional concern has been the emergence of new, or previously unrecognised pathogens and vehicles for their transmission (Wolf and Lechowich, 1989; Collins, 1997; Majkowski, 1997; Morris and Potter, 1997; Tauxe, 1997).

Such trends reflect those in other developed countries (Maurice, 1994) and along with highly publicised food scares over the same period, have raised the public and political profile of food safety to previously unprecedented levels, both in the UK and internationally. Modifications to the definition of food poisoning may be partly responsible for the increase in notified cases, in particular those attributable to Campylobacter infection (World Health Organisation, 2000). Other possible factors include general improvements in the reporting and recording of food poisoning, modern food production methods and globalisation of food trade, general consumer handling practices and demographic or lifestyle changes. These, and the wider economic burden of food poisoning on this scale, are discussed in Chapter 2.1-2.2. Whatever the explanation, the increased incidence of food poisoning over the past two decades has drawn attention to the failure of traditional food safety control strategies to stem this tide, particularly given the significant under-estimation within recorded statistics of the real extent of the food poisoning problem. The critiques of these strategies, focusing upon end product testing, inspection of food premises and the provision of food hygiene training, are discussed in Chapter 2.3.

In attempting to address the increased incidence of food poisoning, the UK Food Standards Agency (FSA) has committed itself to delivering improvements in these traditional approaches to food safety control. Alongside these improvements, the FSA has, in keeping
with the prevailing trend worldwide, drawn attention to the Hazard Analysis Critical Control Point (HACCP) system, as its preferred means of achieving day to day risk management across the food industry. In a recent policy paper, the FSA set a specific target of 30% HACCP implementation in UK food businesses by April 2004 (Food Standards Agency, 2001a).

Chapter 2.4 discusses the developments that have seen HACCP evolve as very much the system of choice worldwide, at least for policy-makers if not the entire food industry. In promoting a risk-based, systematic and prevention based approach to food safety control, HACCP is believed to be more effective than traditional control strategies. However, the discussion recognises the view that seeing HACCP as the panacea of all food poisoning problems risks overlooking the importance of effective implementation and management of the system, and the need for it to build on rather than replace general good hygiene practice within a business.

Chapter 2.5 begins by drawing attention to one of the key strengths of the HACCP system, namely its applicability, in theory at least, to all sectors of the food industry. However, there is also a general recognition that manufacturing businesses have been the most proactive in adopting HACCP. This may be explained not only by the historical origins of the system within this sector of the industry, but also by apparent advantages in adopting the more process-based approach required by the system. The potential barriers to development of HACCP within small or less developed businesses, in particular the retail and catering sectors, are also discussed in Chapter 2.5 which analyses the role of regulation and generic models in encouraging HACCP use, and current evidence on the likely costs and benefits of HACCP implementation.

Despite the increasing profile of HACCP in both UK and worldwide food safety management strategies, there remained, until the late 1990’s at least, a lack of primary data against which to assess the actual impact of the system on the UK food industry and the factors that may influence its implementation. Consequently, Chapter Three presents results from a large-scale 1997 survey of the UK food industry designed to address such issues and expanded upon through a series of face to face interviews with a diverse range of food industry managers. The results presented draw attention to the relative lack of HACCP implementation in the retail and catering sectors, as well as among smaller scale manufacturing businesses. Issues such as levels of training and access to knowledge, risk perceptions, business size and general managerial attitudes are highlighted as key factors in
both the current and future uptake of the system. The chapter concludes that whilst many of these barriers are not insurmountable, overcoming them is bound to have a financial impact, with relatively little primary evidence available to inform managers of the likely burden, or benefits, that may arise from HACCP implementation.

This sets the scene for Chapter Four, which presents data on the practical experience of eight businesses that claimed to have implemented HACCP. Estimates of the cost implications and direct financial benefits of HACCP are presented alongside more general description of the context and culture into which HACCP. The chapter also describes the development of the costing model and unique database used to generate, collate and analyse this data. The results presented suggest that the financial burden of HACCP implementation need not be as great as is perhaps feared by business managers. However, Chapter Four also draws attention to, with one exception, the lack of tangible financial benefits from HACCP implementation and recognises that the examples presented were not necessarily a full and fair reflection of the likely barriers to be overcome by food businesses in general. Given that the systems introduced were not formally audited, it is also possible that the voluntarily implemented HACCP systems within at least some of the businesses were guided, designed and limited more by the financial and human resource constraints present than the necessary requirements of food safety control.

Chapter Four concludes that direct government intervention, through the development of generic models, training materials or HACCP specific regulation, was almost inevitable in order to deliver HACCP at a pace and consistency likely to deliver a tangible short term improvement in food safety control. One example of such intervention, the accelerated HACCP initiatives designed to speed up implementation in preparation for the HACCP based licensing of butchers shops (Department of Health, 2000), forms the basis of the research presented in Chapter Five. Results from a survey of English butchers involved in such an initiative are presented. These focus upon the managers' attitudes towards the system and the initiative in general, the impact in terms of general hygienic practice, the implementation of HACCP principles, perceived knowledge and ability relating to HACCP and the economic impact of its implementation. To try and identify whether HACCP implementation and management costs may be able to be recouped through the till, evidence from an experimental auction of consumer willingness to pay (WTP) for HACCP in butchers shops is also presented.
Chapter Six draws together wider conclusions from the research presented and makes recommendations for future research or interventions likely to be required in order to help encourage the future adoption of HACCP. Among the issues raised are the need for up to date systems to capture ongoing information on HACCP implementation levels, greater development and dissemination of primary evidence on the various costs and benefits of HACCP and the possible development of food safety certification schemes using HACCP implementation as a key criteria. The thesis concludes by highlighting the value of the research presented in contributing to the debate surrounding the current and future application of HACCP across the food industry, a debate that has often been based on only limited primary evidence.
CHAPTER TWO: THE INCREASED INCIDENCE OF FOOD POISONING AND IMPLICATIONS FOR FOOD SAFETY CONTROL STRATEGIES

2.1. THE INCREASED INCIDENCE OF FOOD POISONING.

Improvements in diagnosis, testing of food products and reporting systems as well as changing definitions of food poisoning may have artificially inflated food poisoning statistics in recent times (Maurice, 1994; Kaferstein et al. 1997). For example, scientific advances such as electron microscopy have made it easier for laboratories to identify foodborne pathogens (Australia New Zealand Food Authority, 1999). Nevertheless, Lacey (1993) pointed out that the UK experience through the 1980’s and early 1990’s had been one of almost year on year increases in food poisoning incidence, with no obvious link to specific technological advances or changes in surveillance procedures (Lacey, 1993).

Increasing consumer food safety awareness may also have resulted in greater reporting of food poisoning (Frewer et al. 1995). The largest year on year increases in food poisoning cases occurred during the 1989 UK scare over Salmonella enteritidis in eggs. However, Lacey (1993) points out that similar annual increases have been experienced both before and since that time. Furthermore, whilst the past six years have seen widespread publicity as a result of Escherichia coli outbreaks, Bovine Spongiform Encephalopathy (BSE), Genetically Modified (GM) foods and the introduction of the FSA (Ministry of Agriculture Fisheries and Food, 1998), the annual increases in recorded food poisoning have slowed down and indeed reversed. It could be argued that for every food poisoning case reported as a result of increased consumer awareness, another is prevented by improved awareness and implementation of good hygiene practices in the home.

More convincing are the arguments that modern food production methods, globalisation, demographic changes and contemporary consumer lifestyles have each helped support a ‘real’ increase in food poisoning incidence (Collins, 1997). The intensive rearing and automated slaughter of animals to provide affordable food for a growing population has helped create reservoirs of bacteria within certain animal groups (Meldrum, 1994; Lacey, 1993; Kaferstein et al. 1997). These bacteria may in turn be transferred to any of the wide variety of foodstuffs produced from these animals (Baird-Parker, 1990a; Tauxe, 1997). The presence of such bacteria could also result in faecal contamination during the
slaughtering process (Ahl and Buntain, 1997; Vanderlinde et al., 1998). Alternatively, if this faecal waste is not treated and disposed of properly, bacteria could re-enter the food chain via horticultural products (Australia New Zealand Food Authority, 1999).

Rapid expansion and globalisation in food trade over the past thirty years has compounded these potential problems (Tauxe and Hughes, 1996; Canet, 1993; Fidler, 1996). Modern food products often comprise ingredients from a range of countries, with the greater number of distribution and processing stages involved increasing the potential risks of contamination. As production and distribution chains have lengthened, the characteristics of food poisoning outbreaks have also evolved. Where outbreaks used to affect relatively small populations, normally as a result of locally produced food distributed within a limited area, they may now occur on a wider scale in terms of both the numbers affected and their geographical spread (Hennessey et al., 1996; Mahon et al., 1996). As well as complicating the process of control and corrective action, larger scale outbreaks may actually go unnoticed but for a fortunate concentration of cases in any one location (Hall, 1997; Cartwright and Chahed, 1997).

Changes in human demography, consumer lifestyles and consumer demands may also have increased the risks of food poisoning. Between 1971-1997, the percentage of the UK population aged 65+ increased from 13% to 16%, equivalent to 9,268,000 people (Office for National Statistics, 1999). The elderly are one of a number of groups, including pregnant women, the very young and the immuno-suppressed, who are at an increased risk of food poisoning because of the lower infective dose required (Australia New Zealand Food Authority, 1999). Furthermore, the consequences of illness within these groups are likely to be more severe, with an increased risk of fatality (Gerba et al. 1996; Smith, 1998). The 1996 outbreak of Escherichia coli O157 in Scotland illustrates this trend, with all of the fatalities from the outbreak aged 65 or above (Pennington Group, 1997).

Since the early 1980's there has also been a shift towards healthy eating, symbolised by a declining consumption of salts and sugars, rising consumption of fresh fruit and vegetables and a general desire for the taste and texture qualities of fresh foods (Wolf, 1989). Consequently, many processing and distribution systems have moved away from practices such as salting, acidifying and canning. Similarly, consumer concerns about artificial additives or preservatives have forced manufacturers to remove them from many of their products (Wheelock, 1988). Zink (1997) notes that these developments are likely to have delivered positive health benefits, yet processes such as canning and the use of some
preservatives have traditionally helped provide unfavourable conditions for the growth of pathogenic bacteria in foods (Wheelock, 1988; Desmarchelier, 1996).

Another development has been the increasing variety of options available to the consumer for, as Dade (1988) observed, consumers are no longer happy with just one type of sausage on the shelf. The market opportunities presented have sparked a rapid increase in the number of UK food related businesses, especially within catering, increasing the potential sources of contamination. In 1999 there were 612,203 food-related establishments in the UK of which approximately 62% were categorised as restaurants or catering businesses (Food Standards Agency, 2000a). Over the two years 1997 and 1998, typical UK household expenditure on meals or take away food bought away from the home was £16 per week, or 29% of the average weekly food bill. This represented a significant increase from the 20% of the weekly food bill spent on such meals in the period 1987/1988 (Office for National Statistics, 1998a). With evidence suggesting that the catering sector makes the most significant contribution to general outbreaks of food poisoning in the UK (Cowden et al., 1995; Djuretic et al., 1996; Food Standards Agency, 2001b), any increase in the consumption of meals bought away from the home could be expected to produce a proportional increase in food poisoning incidence.

Despite these trends, Van Schothorst (1991) points out that every sector of the food chain, including the consumer and government, has to accept their share of responsibility for food safety. Griffith (2000) describes a model of shared responsibility for food safety with government responsibility focusing on regulation and enforcement, advice to industry, consumer education, information gathering (basic research and epidemiology) and health service provision. Core industry responsibility was identified as implementation of good practices at all stages of production, distribution and final preparation, quality assurance, appropriate technology, equipment and facilities, training and consumer education and labelling. The consumers' role was described as encompassing their expectations and demands, the acquisition of appropriate knowledge and attitudes, use of recognised good practices, acceptance of responsibility and direct action of consumer groups.

Certainly, there is a range of research to demonstrate that Ackerley (1994) and Knabel (1995) are right to note the effect of consumer knowledge and practices upon the incidence of food poisoning. This includes examples from the UK (Worsfold and Griffith, 1997; Food Standards Agency, 2002a), the United States (Altekruse et al., 1995; Klontz et al., 1995; Williamson et al., 1992; Woodburn and Raab, 1997; Zhang et al., 1999), Canada
(Albrecht, 1995) and Australia (Jay et al., 1999). Djuretic et al. (1996) identified that of 1280 general outbreaks between January 1992 and December 1994 in the UK, 9% were associated with private dwellings. American data presented by Lin et al. (1997) suggested that the food industry had achieved success in reducing the number of food poisoning outbreaks associated with it, in contrast to increasing numbers of domestic outbreaks.

It is unlikely that the increased incidence of food poisoning can be attributed to any one factor in isolation. However, whilst the recorded levels of food poisoning may themselves be deemed unacceptable, the percentage of actual cases reflected in official figures may range from 10% (Norris, 1989; Lacey, 1993; Maurice, 1994), to fewer than 1% (Hope, 1999; Crerar et al., 1996; Kaferstein et al., 1997). A recent large scale study of infectious intestinal disease in England, although extending in scope beyond that acquired from food, found evidence to suggest that for every 1000 cases in the community only 160 were presented to a General Practitioner, only 45 had a stool sample routinely sent for microbiological examination, only 10 had a positive result and only 7 were reported to the Public Health Laboratory Service (Food Standards Agency, 2000b). An even more recent survey of UK consumers’ attitudes to food standards found that 12%, equivalent to around 5.5 million people, reported food poisoning symptoms attributed to food eaten in the UK during the previous year (Food Standards Agency, 2002a). Almost three quarters of those reporting such symptoms attributed them to food prepared away from the home.

2.2. THE ECONOMIC IMPACT OF FOOD POISONING.

The economic impact of food poisoning on this scale is considerable. Taylor (1992) presented data suggesting that food poisoning cost the UK a total of eight million working days, equivalent to £35 million. Sockett and Roberts (1991) identified the potential costs of food poisoning using data collected from those individuals and public health authorities affected or involved in 1482 recorded cases of Salmonellosis (Table 2.1). These results suggested that a single case of Salmonellosis would have cost a total of £789 at 1988 prices, taking no account of costings of the general discomfort of the illness or lives lost in the longer term, nor for industry costs from any legal action that was involved. Sockett (1993) used the same baseline data and other estimates of the recorded and unrecorded incidence of Salmonellosis to suggest that the overall annual cost incurred from such infections was between £231-331 million. Although costs vary depending upon the nature of individual food-borne infections, it was estimated that if the cost per case from all other
food poisoning related illness was only 10% that of *Salmonella*, the annual national cost of food poisoning would be between £500 million and £1 billion at 1988 prices.

Table 2.1. Costs of Salmonellosis Food Poisoning in England and Wales - 1988/89.

<table>
<thead>
<tr>
<th>Cost (£'s)</th>
<th>Cost Per Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Health Costs (of which...)</td>
<td></td>
</tr>
<tr>
<td>Local authority investigations</td>
<td>85632.69</td>
</tr>
<tr>
<td>Laboratory testing</td>
<td>71529.40</td>
</tr>
<tr>
<td>Medical / NHS Costs (of which...)</td>
<td>235659.61</td>
</tr>
<tr>
<td>General practitioners (GPs)</td>
<td>31367.35</td>
</tr>
<tr>
<td>Hospital services</td>
<td>193642.25</td>
</tr>
<tr>
<td>Ambulance service</td>
<td>2959.50</td>
</tr>
<tr>
<td>Prescriptions (cost to NHS)</td>
<td>7690.51</td>
</tr>
<tr>
<td>Family Costs (of which...)</td>
<td>4666.58</td>
</tr>
<tr>
<td>GP visits travel for cases</td>
<td>1892.90</td>
</tr>
<tr>
<td>GP visits travel for others</td>
<td>38.48</td>
</tr>
<tr>
<td>Prescriptions (cost to patients)</td>
<td>2735.20</td>
</tr>
<tr>
<td>Hospitalisation (of which...)</td>
<td>9023.97</td>
</tr>
<tr>
<td>Travel for cases</td>
<td>2029.04</td>
</tr>
<tr>
<td>Travel for visitors</td>
<td>4285.89</td>
</tr>
<tr>
<td>Trousseau</td>
<td>2630.75</td>
</tr>
<tr>
<td>Out patients department expenditure</td>
<td>78.29</td>
</tr>
<tr>
<td>Other Family Costs (of which...)</td>
<td>82271.48</td>
</tr>
<tr>
<td>Additional expenditure</td>
<td>18020.65</td>
</tr>
<tr>
<td>Unexpected loss due to illness</td>
<td>9204.05</td>
</tr>
<tr>
<td>Expenditure loss from illness acquired abroad</td>
<td>55046.78</td>
</tr>
<tr>
<td>Lost Production (of which...)</td>
<td>507554.98</td>
</tr>
<tr>
<td>The ill (9337 days)</td>
<td>370935.08</td>
</tr>
<tr>
<td>Carers (1493 days)</td>
<td>58963.89</td>
</tr>
<tr>
<td>Labour costs</td>
<td>77565.01</td>
</tr>
<tr>
<td>TOTAL</td>
<td>996338.71</td>
</tr>
</tbody>
</table>

Data adapted from Sockett and Roberts (1991). Public health costs based on 1482 cases, all other costs based on 1229 cases.

More recent estimates have quoted a substantially lower average cost per case of infectious intestinal disease of £79 at 1993-95 prices although these figures were based on cases arising from all sources and only took account of the direct costs to businesses, the people concerned and the NHS (Food Standards Agency, 2000b). The costs identified did however vary considerably dependent on the organism concerned with *Salmonella*, a
predominantly foodborne organism, costing an average £606 per case. The general cost of cases presented to General Practitioners, at £250, was also higher than the overall average.

Internationally, Todd (1989) estimated that there were 12.6 million food poisoning cases in the United States costing a total of $8.4 billion in 1985. Although the mean cost per case was $670, botulism was estimated to cost $322,200 per case, largely due to the increased likelihood of death and estimates of the economic value of life. More recently, the United States has focused its attention on the cost of meat and poultry related food poisoning as part of the introduction of new legislation for this sector of the US manufacturing industry. Estimates have varied from a 1995 estimate of between $4.5 billion and $7.5 billion (Post 1995) to more conservative estimates of between $1.1 billion and $4.1 billion (Roberts et al., 1996). Buzby and Crutchfield (1997) estimated the costs attributable to meat and poultry related infection to be between $0.99 billion and $3.69 billion although this was based only on cases arising from the seven most common microbial pathogens.

The increased incidence of food poisoning in countries such as the UK and awareness of its economic impact has generated a recognition among policymakers and food industries alike that traditional approaches to food safety control have failed to provide the necessary assurances of food safety in the modern world (EHiri and Morris, 1994; Council for Agricultural Sciences and Technology).

2.3. A CRITIQUE OF TRADITIONAL FOOD SAFETY CONTROL STRATEGIES.

2.3.1. End Product (Microbiological) Testing.

Huss (1992) suggested that even the most thorough program of end product testing can not lead to the proper management of risks. The destructive nature of the approach imposes cost limitations upon the extent of testing possible, either in terms of the number of samples taken or the number of potential hazards able to be tested for (Mitchell, 1992; Buchanan and Deroever, 1993; Harrigan, 1998). The sampling approach also assumes contaminants are evenly distributed throughout a product batch, when in reality this is rarely the case (Van Scothorst and Jongeneel, 1994). End product testing can not prevent a problem from occurring, can not identify where or why a problem occurred (Van Scothorst and Jongeneel, 1994), and assumes that because a product was of satisfactory microbiological quality on one day then it will be the next (Buchanan and Deroever, 1993).
These problems are compounded by the slow turnaround of results from testing, which would in most cases have to be conducted outside of a business. Modern methods have helped reduce the time taken and enable more in house testing (Smith, 1996). However, the need for product turnover still limits their usefulness, particularly in catering settings where even a one hour delay would be unacceptable in most instances (Sheppard et al., 1990). The application of these techniques is also limited by the ability of staff to understand the results and take appropriate action where required (Mitchell, 1992).

2.3.2. Inspection of Food Premises.

Inspection of food premises by Environmental Health Officers (EHOs) also tends to be reactive and offers only a snapshot picture on a relatively infrequent basis. Ehiri and Morris (1994) point out that because standards are satisfactory on one occasion does not imply they will remain so and businesses may make a special effort before reverting to ‘normal’ practices once the inspectors leave.

The revised Code of Practice No.9 of the UK Food Safety Act provides guidance on the frequency and nature of inspections to be carried out by local food authorities, based upon evaluation of the potential risks (Food Standards Agency, 2000c). The guidance includes a scoring system, accounting for the type of foods and methods of handling (5-40 points), the method of processing (0 or 20), the numbers of consumers at risk (0-15) and whether in the case of catering operations these are serving vulnerable groups (0 or 20). Also rated is the general level of compliance with food hygiene requirements (0-25), structural conditions (0-25), the confidence of EHOs in their control systems (0-30) and the presence of a significant risk posed by specific pathogens (0 or 20). Based on their total score, businesses are assigned ratings from A to F, with category A businesses (scoring above 91) being inspected at least twice in a calendar year whilst category F businesses (scoring below 21) only need to be inspected every five years.

One of a number of potential anomalies within Code of Practice Number 9 concerns the consumers at risk scores. Twenty points are added to the rating of establishments such as hospitals, nursing homes or nurseries where high-risk foods such as cooked meats are served to twenty or more people per day from a vulnerable group such as the elderly, the very young or the immuno-compromised. Yet the guidance does not appear to allow an extra risk score for a manufacturer or retailer who might be making or selling a product, particularly popular among these vulnerable groups or indeed any retail and catering
business whose local clientele might be heavily dominated by either young families or the elderly. Gillespie et al. (2000) provide further evidence to question the validity of consumers at risk scores. In a study of the microbiological quality of ready to eat cooked meat products from UK catering premises, they found 28% of microbiological samples from businesses with consumer at risk scores of five to be of unsatisfactory or unacceptable quality. This compared to only 2% of samples from businesses with higher consumer at risk scores, suggesting that whilst certain businesses may be likely to put more people at risk if things go wrong, others are more likely to put people at risk in general.

One limitation in applying risk based inspection approaches is that surveillance data on food poisoning incidence is still largely limited to the issue of how often food poisoning occurs as opposed to the underlying factors involved (Ehiri and Morris, 1994; North, 1994) and yet it is such data that can most effectively aid the targeting of limited inspection resources at high risk areas. Furthermore, North (1994) and Pritchard and Walker (1998) each question the extent to which there is any connection between increased inspection frequency and improved food safety control, with inspections still tending to rely upon the subjective EHO interpretation, the consistency and reliability of which have been questioned in the past (Tebbutt, 1986; 1991). Even if proven effective, the contribution of inspections to overall food safety control is limited by the manpower required (Wheelock, 1989). North (1994) put the number of EHOs in the UK at 6000, but noted that only 14-20% of their time was dedicated to food control, of which only half again was spent actually inspecting premises.

These pressures would appear to be reflected in the 17% reduction in the level of food standards inspections by local authorities between 1997 and 1999, a 0.7% decrease in food hygiene inspections and a 22% fall in food sampling. This is all despite the number of registered food premises increasing by 10% over the same period (Food Standards Agency, 2000d). New UK wide standards for food safety enforcement have been introduced, involving greater reporting of enforcement practices, an annual audit programme of local authorities and annual reporting on performance to the consumer (Food Standards Agency, 2000d). Preliminary results have found that of 228 local authorities, 40 lacked the adequate IT systems to track and manage their enforcement activity effectively. Meanwhile some 18 authorities had unacceptably low levels of activity in key areas, including rates of below 50% for the inspection of high risk premises or a complete lack of any food sampling activity (Food Standards Agency, 2000e).
2.3.3. Food Hygiene Training.

With most outbreaks resulting from faulty handling practices, Ehiri and Morris (1996) suggest that the role of training in preventing food poisoning is straightforward in theory. However, improper training could present a greater risk to food safety than no training at all (Ackerley, 1989) and severe food poisoning outbreaks can still occur even where comprehensive training programmes have been implemented (Luby et al., 1993). Nevertheless, all UK food businesses are required to provide food hygiene training for all staff, commensurate with their work activities (Department of Health, 1995). West (1992) suggested that all food handlers should at least hold an accredited basic food hygiene qualification, whilst Taylor (1992) recommended advanced training as a requirement for managers. However, surveys have consistently cast doubts upon the extent to which these proposed levels of training, or the knowledge they would promote, are fully reflected across the UK food industry (Tebbutt, 1992; Ehiri et al., 1997a; Little and de Louvois, 1998; Coleman et al., 2000; Gillespie et al., 2000; Clayton et al., 2002).

There has also been an increasing debate as to whether traditional food hygiene training methods can deliver the sort of long term and transferable benefits to food safety control alluded to by Smith (1994). Key to this debate is the extent to which such training actually impacts upon food handling practices. Food hygiene training has traditionally followed the Knowledge, Attitudes, Practices (KAP) model, assuming that the provision of education and knowledge will stimulate changes in working practices (Rennie, 1995). Studies have highlighted associations between the presence of formal hygiene training or levels of knowledge within a business and the degree of risk to food safety assessed against various inspection standards (Audit Commission, 1990; Tebbutt, 1991; Kitchner, 1994; West and Hancock, 1994). Gillespie et al. (2000) identified a similar association between managerial training qualifications and the microbiological quality of meat samples in catering premises. However, these findings do not imply direct causal relationship between training and hygienic standards. Meanwhile, other studies have cast doubt on the extent to which food hygiene training improves food safety knowledge (Ehiri et al., 1997b), or impacts on food handler behaviour and business hygiene standards in general (Oteri and Ekanem, 1989; Mathias et al., 1994; Riben et al., 1994; Howes et al., 1996; Powell et al., 1997).

Nevertheless, Ehiri et al. (1997b) note that poor handling practices do not necessarily result from ignorance, with the prevailing circumstances within any individual business
also an important factor. Behavioural change relies to a large extent upon the provision of the technical, social and environmental support for training messages (Bryan, 1991; Rennie, 1995). Worsfold (2001) surveyed 91 butchers shops selling raw and cooked meat products, only 46% of whom had a hand-wash basin in the service area despite 98% using the same staff for handling raw and cooked products. More space, better design of space, better location of sinks and more storage were mentioned by a significant percentage of the food handling staff surveyed by Clayton et al. (2002) as factors that would encourage or make it easier to carry out desirable food safety actions.

General business management literature has paid considerable attention to the issue of staff training, particularly within smaller businesses. Although retail turnover is concentrated within the larger retailers and manufacturers (Hewitt-Dundas and Roper, 1999), in terms of their overall numbers, small businesses are less the exception and more the rule within the UK food industry (Audit Commission, 1990). The relative lack of size of most food businesses has implications for food hygiene training given that human resource development is not traditionally regarded as a core element of small business strategy (Ross, 1993), often merely a one off activity spurred by short term problems (Hendry et al., 1992; Kitching and Blackburn, 1999). In the event of new work practices, technologies, systems, hazards or legislation, previous training may prove insufficient to provide either the necessary food safety assurances or legal compliance. West (1992) suggested that this had been a particular problem for the catering industry where training had failed to keep pace with technological advances.

One of the key issues involved with training provision is the potential cost (Tebbutt, 1992), particularly relative to the perceived benefits (Matlay, 1997). This is a particular issue for the food industry given the lack of clear evidence linking training and improvements in food hygiene behaviour. Additional problems include the labour intensive nature of the food industry, particularly the catering sector, resulting in a simple lack of time for training among both employers and employees alike (West, 1992; Marshall et al., 1995). The catering sector is also characterised by a high staff turnover (Taylor, 1992), with training presenting the risk of merely making employees more attractive to other employers (Stanworth et al., 1992). In house training can help offset the problems of time and cost and is often seen as the most appropriate and preferred approach for small businesses (Hendry et al., 1992; Curran et al., 1997; Ehiri et al., 1997b). However, in house training relies upon the quality of managerial training to prevent bad practices from simply being passed on to staff (Ackerley, 1989). As already stated, the extent to which food industry
managers have sufficient training to deliver adequate in house hygiene training is doubtful.

2.3.4. Addressing the Problem of Food Poisoning.

The FSA has set itself the target of a 20% reduction in the incidence of food poisoning arising from the five most common food poisoning organisms (Salmonella, Campylobacter, Listeria monocytogenes, Escherichia coli O157 and Clostridium perfringens) by the year 2006 (Food Standards Agency, 2001b). The baseline taken was the collated laboratory reports for these organisms in 2000. To help achieve this the Agency pledged itself to improving the effectiveness of these traditional control methods, for example, in making sure that food handlers received proper training and that this training results in safer practices. It also expressed a desire to see greater standards of hygiene in the home and improved surveillance and enforcement by local authorities. Given the criticisms already levelled at these methods of control, the extent to which they alone can deliver the desired reduction in food poisoning is debatable. However, if addressed as part of a joined up strategy, the impact of each of these measures is likely to be more significant.

One further key element of the Agency’s strategy is the wider implementation of the HACCP system (Food Standards Agency, 2001a; 2001b), of particular relevance to its’ desire to improve risk control across the food industry, especially within small businesses. Industry managers and legislators worldwide are increasingly turning to HACCP to provide their primary means of food safety control with the Agency itself having recognised the international acceptance of the system as the most effective approach to food safety management in food businesses (Food Standards Agency, 2000b). A specific strategy aimed at widening the implementation of HACCP has recently set a target for 30% of all food businesses to have implemented documented HACCP systems by 2004, based on a 2001 benchmark level of 20% (Food Standards Agency, 2001a).

2.4. HACCP: The Future of Food Safety Control?

2.4.1. The Increasing Impact of HACCP

HACCP as known today consists of hazard analysis, identification of critical control points (CCPs) using a decision tree approach, establishment of critical limits for CCPs, monitoring at CCPs, corrective action, documentation or record keeping and verification.
These seven principles are set out in the HACCP guidelines adopted by the Codex Alimentarius Commission of the Food and Agriculture Organisation (FAO) and World Health Organisation (WHO), (Codex Alimentarius Commission, 1997). The role of these guidelines in facilitating the worldwide development of HACCP has been considerable and is discussed in more depth by Garrett et al. (1998). In addition to the seven core principles, any textbook application of the system would involve considerable preparations prior to embarking upon the first principle of hazard analysis (World Health Organisation, 1997).

The origins of HACCP are well documented, as is the evolution of the system from the original three principles of hazard analysis and risk assessment, determination of CCPs and monitoring of CCPs. Included among a plethora of articles are those of Baird-Parker (1990b), Bauman (1990), Buchanan (1990), Sperber (1991) Mitchell (1992), Bryan (1992), Bryan et al. (1993), Bauman (1994), Cronk (1994), Bernard (1998) and Khandke and Mayes (1998). Some of these are among the larger number reviewed by Savage (1995). Meanwhile Bryan (1991), himself a prolific source of research into HACCP, listed almost one hundred references on HACCP and related subjects, including many of his own.

In 1990, a UK report recommended that all food premises should base their food safety control upon the principles of HACCP (Advisory Committee on the Microbiological Safety of Foods, 1990). This recommendation effectively became a reality in September 1995 when the Food Safety (General Food Hygiene) Regulations, in response to the European Union’s horizontal directive on the hygiene of foodstuffs (European Commission, 1993), required all UK food businesses to carry out a hazard analysis of their food processes, identify critical control points (CCPs) in their process and set out target levels, critical limits, control and monitoring mechanisms and corrective action procedures at these CCPs (Department of Health, 1995). This legislation stopped short of requiring all of the seven principles of HACCP, although the missing principles of documentation and verification are arguably inevitable in order to effectively implement the first five principles. Documentation in particular could contribute to a due diligence defence under the 1990 Food Safety Act (Ministry of Agriculture, Fisheries and Food, 1990).

As of May 1st 2000, licensing regulations have required many English butchers shops and retail food outlets to demonstrate the implementation of a fully documented and effective HACCP system (Department of Health, 2000). Businesses were given until November 1st 2000 to obtain a licence by complying with this requirement as well as with existing food
hygiene legislation, enhanced staff training requirements and the payment of a £100 fee to their local authority. Similar regulations have been proposed for other parts of the UK although these are yet to have been fully implemented. The regulations apply to businesses handling and selling a combination of unwrapped raw meat products and ready to eat foods, having been introduced in response to the report into the 1996 outbreak of *Escherichia coli* O157 from a butchers shop in Scotland (Pennington Group, 1997).

Food poisoning outbreaks have had a similar impact upon the development of HACCP elsewhere, notably in the United States (Motarjemi and Kaferstein, 1999; Post, 1995) and Australia (Peters, 1999). In the United States, the late 1990s saw the staggered introduction of the Final Rule requiring the use of HACCP by meat and poultry plants (United States Department of Agriculture, 1996). Larger firms (500+ employees) were required to comply by January 1998, small firms (10-499 employees) by January 1999 and all other plants by January 2000. Measures have also been developed to encourage HACCP implementation in the US seafood industry (United States Food and Drug Administration, 1995).

HACCP is the cornerstone of the voluntary Food Safety Enhancement Programme (FSEP), for the production of agri-food products and shell eggs in Canada. Also in Canada, the Department of Fisheries and the Oceans introduced the Quality Management Programme (QMP) to fish inspection, incorporating several of the principles of HACCP (Majewski, 1997). The Australia and New Zealand Food Authority (1999) put HACCP at the heart of its proposals for a new Food Standards Code for all food businesses, following a commitment from the Australian Meat Industry Council to introduce HACCP based systems by the end of 1999. Further discussion of the role of HACCP within the Australian and New Zealand food industries can be found in Lee (2000) and Souness (2000). The examples of the USA, Canada, Australia and New Zealand are arguably those, along with EC countries, to have made the most progress with mandatory or voluntary HACCP implementation, the approaches to which are compared by Ropkins and Beck (2000). However, the reality is that the impact of HACCP is increasing worldwide.

2.4.2. *An Improved Approach to Food Safety Control?*

Given the attention paid to its development, it is unsurprising that varying theories have been put forward as to how HACCP could or should be used. However, Elliott (1996) suggests that diversity of opinion has allowed the system to evolve, whilst Panisello and
Quantick (1998) stress that the underlying philosophy has remained unchanged. This philosophy is based upon HACCP representing a systematic approach to identifying and assessing hazards and risks within a food operation and setting out the means by which these are to be controlled. By controlling food hazards at every critical points, HACCP delivers a greater assurance that food being produced and sold is fit for consumption (Dillon and Griffith, 1996). The World Health Organisation (1997) description added the words scientific and rational on the basis that the system should be guided by scientific evidence of the risks to human health, whilst the FSA has used terms such as structured and methodical when describing HACCP (Food Standards Agency, 2000b).

The promotion of a risk based approach to food safety management is the defining characteristic of HACCP, with Hathaway (1995) describing risk analysis, generally understood as incorporating risk assessment, management and communication (Mayes, 1998), as a key discipline if HACCP systems are to achieve the goal of improving food safety. However, there is no real agreement as to how to define or measure risk with Soby et al., (1994) observing its many dimensions, including probability of bad health effects, psychological concerns, social influences, political economic and ethical factors. Oleckno (1995) also highlights the common discrepancy between expert and lay perceptions of risk.

Of the three elements of risk analysis, it is risk assessment that has been most widely discussed in relation to HACCP development, as alluded in the description of hazard analysis as not only requiring identification of hazards but also an assessment of the likelihood of them occurring and consequences should they do so. Despite this close association, Jouve (1998) is keen to stress that risk assessment and HACCP should nevertheless be viewed as separate. Dillon and Griffith (2001) warn of possible confusion given the range of ways in which terms such as risk and risk assessment are used.

Risk assessment can be either a quantitative or qualitative process (Hathaway, 1995; Coleman and Griffith, 1998), although as Mayes (1998) and Sperber (2001) observe, the traditional approach to hazard analysis using the decision tree approach is a largely qualitative process. Despite this, quantitative risk assessment has been the focus of increasing debate with respect to HACCP development. Notermans et al. (1995a) proposed a shift in focus from qualitative to quantitative HACCP and risk assessment, incorporating unacceptable levels of microbiological contamination. It is their belief that with knowledge of microbial behaviour growing it becomes increasingly possible to quantitatively assess the impact of specific control measures. This is in keeping with the
approach of predictive modelling to help guide how numbers of micro-organisms are affected by parameters such as pH, temperature and packaging (Mayes, 1998). The role of quantitative risk assessment within HACCP and food safety control in general is further discussed in other articles co-written by Notermans (Notermans et al., 1994; Notermans et al., 1995b; Notermans and Mead, 1996; Notermans and Teunis, 1996; Notermans et al., 1998; Hoomstra et al. 2001).

Yet, whether qualitative or quantitative, Coleman and Griffith (1998) point out that the need for data or evidence on which to base risk assessment remains the same. Despite the increasing understanding of microbial behaviour described by Notermans et al. (1995a), there remains a relative lack of primary data organised in such a way as to facilitate quantitative risk assessment across the food industry (Harrigan, 1998; Jouve, 1998). Even where data exists, Jaykus (1996) suggests that food safety and public health professionals have been, or would be, reluctant to apply a quantitative risk assessment approach because of a lack of adequate training. Powell and Atwell (1998) called for the development of a national epidemiological database ranking the risks associated with foodborne disease in the UK. Such a database would, in their view contribute greatly to a better understanding of risk in a food industry context and would inevitably aid the development of any HACCP system. Similar calls have been made by Moy et al. (1994), Romero (1999) and Jouve (1994), with the general consensus that governments should take the lead in this activity.

Models have been designed to assist businesses in carrying out their own assessments of risk using multi-issue scoring systems. Coleman and Griffith (1998) presented what they described as a 30 minute model for the catering sector based upon assessment of the food products being handled, the frequency of their use and the practices involved. The model was designed in the knowledge that the predominantly small businesses within the sector would have less time and experience to commit to risk assessment. Weingold et al. (1994) proposed a two dimensional model for quantitative risk assessment based on the methods of preparation and significant ingredients used, which it is suggested would complement any HACCP system.

The inherent shift in focus of HACCP towards risk based process control and preventive action (Easter et al., 1994; Moy et al., 1994; Silliker, 1995), is to some degree a contradiction of traditional economic analysis which regards performance standards as a more efficient means of regulation than process standards (Macdonald and Crutchfield, 1996). However, given the problems, costs and uncertainty over microbial testing and the
fact that contamination can occur at any point in the food chain, Unnevehr and Jensen (1996) suggest that HACCP offers a potentially more efficient approach. In summing up the strengths of HACCP over traditional control measures, particularly end product testing, Mitchell (1992) pointed to the fact that HACCP enabled food safety to be controlled by things that are easy to monitor, such as time and temperature. Further advantages rest with the system being controlled or owned by a business itself with all staff able to be actively involved in the process of food safety control.

As well as these comparative advantages, HACCP delivers potential benefits of its own. The system can be used to identify and control not only biological, but also physical and chemical hazards (Moy et al., 1994), offering potential efficiency savings for businesses. By identifying the points of critical control, businesses should be able to focus resources upon these areas, whilst by maintaining closer control over product safety throughout a process, time and money can be saved through a reduction in the amounts of lost product (Bauman, 1994). Furthermore, by identifying all reasonably expected hazards the system can be applied even where these hazards have not been directly experienced, such as by new businesses during their initial development (World Health Organisation, 1997), even potentially facilitating the design and construction of new facilities (Moy et al., 1994).

Despite these apparent advantages, there are those who have warned against the system being seen as the panacea of all process safety issues (Easter et al., 1994; Elliott, 1996), not least because of the human element and potential human failings inherent within any HACCP system. Whilst recognising the international acceptance of the systems merits, Jouve (1998) pointed to a relative lack of data to quantify how well HACCP works in practice and Mead (1997) noted that only time would tell whether the wider application of HACCP would help reduce the incidence of food poisoning. Research has demonstrated improvements in the microbiological quality of food in a range of contexts as a result of HACCP implementation. These have included in-flight catering (Lambiri et al., 1995), the slaughter and dressing of sheep carcasses (Biss and Hathaway, 1998), meat processing (Aramouni et al., 1996), tomato packing (Rushing et al., 1996) and hospital cook-chill catering systems (Shanaghy et al., 1993). However, improved microbiological quality does not necessarily imply improved food safety control if catastrophic failure is the problem.

Motarjemi and Kaferstein (1999) point out that despite the undoubted spread of HACCP through the 1990’s in particular, food poisoning statistics have continued to increase, albeit
that the UK has witnessed a recent downturn in recorded food poisoning. They note that examples of food poisoning outbreaks have occurred even where businesses have been strongly committed to HACCP. This reflects the need expressed by Easter et al. (1994), for HACCP to be fully and effectively implemented and maintained, rather than being a mere paper exercise. Motarjemi and Kaferstein go on to suggest that, in the short term at least, the greatest potential for HACCP lies in preventing large scale food poisoning outbreaks. However, the extent to which doing so would impact on the overall incidence of food poisoning from all causes is likely to be relatively limited.

Smith (1996) used a car analogy to warn against complacency in HACCP, suggesting that just as drivers may now feel better protected and thus take less care, the same could be true of food businesses using HACCP. Similarly, Peri (1993) suggested that there was almost no food safety risk as great as a partial hazard analysis which could lead to the ineffective use of resources or potential neglect of high risk areas. In summing up the common mistakes when implementing HACCP, Panisello and Quantick (1998) and Panisello et al. (1999) described a series of ‘misses’ that businesses make. These were the ‘missed hazard principle’, whereby hazards are not recognised, the ‘missed risk principle’ where hazards are recognised but their risks are not considered, and the ‘missed prevention principle’ where hazards and risks are recognised, but means of control are not implemented. These generally occur as a result of either a lack of understanding or a lack of available resources.

It is important to recognise that implementation of an effective HACCP system would be extremely difficult were businesses not already adhering to general good hygiene practices. Such practices, including training and sanitation programmes, issues relating to ventilation, lighting, facilities, waste disposal and health and safety, underpin or are pre-requisite to HACCP (Easter et al. 1994; Elliott, 1996; NACMCF, 1998; Sperber et al., 1998). Despite the arguments against its use as the primary basis of food safety control, microbiological testing can also make an important contribution to HACCP, particularly in helping to validate that elements of a HACCP plan are effective prior to their implementation and to generally verify that the system is being complied with once implemented (Jouve, 1994; Silliker, 1995; Kohn et al., 1997). Even in its simplest form, microbiological testing can be used to help demonstrate to staff the potential consequences of mishandling products and help to motivate them to place greater emphasis upon hygienic procedures (Beckers, 1988; Sheppard et al., 1990). Wallace and Williams (2001) question whether these pre-requisites are a help or a hindrance in the light of concerns that too great a focus on them could dilute the effectiveness of HACCP itself. However, they and others including
Setiabuhdi et al. (1997) and McSwane and Linton (2000), conclude that food safety is best addressed through a combination of HACCP and pre-requisite good hygiene practice.

Given the assertion of Motarjemi and Kaferstein (1999) that the success of HACCP relies upon a thorough understanding and effective implementation, specific training in HACCP (Mayes, 1994; Engel, 1998), either as part of advanced hygiene training or independently, is clearly essential. Concerns about the appropriateness of traditional hygiene training in changing food handler behaviour are arguably less relevant in terms of spreading knowledge about HACCP and making managers confident and able to implement the system. Barrett et al. (1998) analysed the impact of a HACCP training course upon food service operators and found that even a six hour course resulted in significant improvements in knowledge and perceived ability, even if not sufficient to enable full HACCP implementation. By focusing attention on areas of critical control and introducing the concept of risk, Bryan (1991) suggests that HACCP training could deliver the changes in behaviour that traditional approaches have long failed to achieve (Bryan, 1991).

Ultimately, the long term potential of HACCP rests with the fact that the system’s core principles can in theory be applied to any food business, regardless of the products handled or processes in place (Jouve 1994). In addition to more general HACCP literature, there is an increasingly wide range of material focusing upon the practical application of HACCP with regard to specific products, risks or food industry settings. These have included alcoholic beverage production (Senkel et al., 1999; Efstratiadis and Arvanitoyannis, 2000; Kourtis and Arvanitoyannis, 2001), retail and restaurant situations (Bryan, 1990; Reimers, 1994), dairy production (Arvanitoyannis and Mavropoulos, 2000; Ronan, 1998), hospital catering and neo-natal units (Hunter, 1991; Richards et al., 1993), meat or processing and production (Huss, 1992; Kukay et al., 1996; Chung, 1999; Sandrou and Arvanitoyannis 1999; Bolton et al., 2001), sous-vide products (Adams, 1991), refrigerated foods (Daniels, 1991; Microbiology and Food Safety Committee of the National Food Processors Association, 1993), street foods (Bryan, 1995), smallgoods (Kennedy, 1998), product distribution (Kalish, 1991) and Salmonellosis control in general (Simonsen et al., 1987).

However, Ehiri and Morris (1995) discuss the argument that HACCP is best suited to food manufacturing environments where products tend to follow well defined, uniformed patterns, simplifying the systematic identification of hazards, critical control points and control measures. By contrast, retail and catering businesses tend to have to adapt flexibly to different working patterns or often unexpected variations in potential demand and
workloads. These problems are often exacerbated by the greater variety of products or range of processes involved (Bryan 1990; Leitenberger and Rochen, 1998). A general comparison of the characteristics of manufacturing and catering businesses that impinge on their relative ability to manage food safety control is provided by Griffith (2000).

The manufacturing sector also has in its favour an existing tradition and experience of quality management systems such as the ISO 9000 series. As the debate surrounding HACCP has developed, the use of the system within the manufacturing sector has increasingly been discussed alongside that of such quality assurance systems (Adams, 1994a; Mayes, 1993; Bryan et al. 1993; Lambiri et al., 1995; Peters, 1997; Bennett and Steed, 1999; Bryan, 1999; Wood et al. 1998; Yacout et al. 1998). Newslow (1997) notes that both HACCP and ISO are fundamentally based on the prevention rather than identification of problems. This said the two systems should not be confused and HACCP is not a quality assurance system but exists as a food safety management tool.

2.5. IMPLEMENTATION OF HACCP ACROSS THE FOOD INDUSTRY.

2.5.1. The Food Manufacturing Sector

Certainly there is a general consensus that HACCP has been widely adopted by the food manufacturers, both in the UK and worldwide (Sperber, 1991; Adams, 1994b; Ehiri et al., 1995; Meredith and Perkins, 1995). Caswell and Hooker (1996) and Kirby (1994) suggest that for many large food companies, particularly those trading internationally, HACCP is no longer a system of choice but rather a market requirement. In the UK, the adoption of HACCP by larger manufacturers and grocery retailers may have also been stimulated by the Food Safety Act 1990 and the requirement to demonstrate due diligence in the event of an offence against food safety (Ministry of Agriculture Fisheries and Food, 1990). Cronk (1994) noted that many manufacturers and large retailers have equated due diligence with the use of HACCP and have consequently required HACCP within their supply chains.

The limited evidence available appears to support the belief that, by the late 1990’s at least, HACCP was having an increasing impact within UK food manufacturing. Panisello et al. (1999) presented results from a survey of 1000 mainly manufacturing and processing businesses in Yorkshire and Humberside, with 73% reporting having implemented HACCP and a further 15% being in the process of doing so. HACCP implementation was
associated with business size, customer requirements (those supplying major national chain supermarkets being more likely to have HACCP), product type and main processing operation. In a separate survey of UK dairy processors (Henson et al. 1999), 74% reported having a fully operational HACCP system with a further 19% being in the process of doing so. Of those to have implemented HACCP, 97% claimed to have fully documented procedures and 93% claimed to have had their systems independently audited by a third party. Despite these developments, Stevenson (1990) and Jouve (1994) are among those to note the need for HACCP implementation across all food industry sectors and in businesses of all sizes for the system to deliver any significant improvement in food safety control and ultimately impact upon the food poisoning incidence.

2.5.2. Small and/or Less Developed Businesses (SLDBs).

In the debate surrounding the use of HACCP, the distinction continues to be drawn between manufacturing businesses and others, particularly those in the retail and catering sectors. Whilst the potential advantages for HACCP within manufacturing environments have already been summarised, many of the potential barriers to HACCP are connected, at least indirectly, with business size as much as with industry sector. This is demonstrated within the findings of Panisello et al. (1999) and Henson et al. (1999). Nevertheless, the relatively small size of the majority of UK retail and catering businesses (Audit Commission, 1990), would serve to explain the sectoral distinction that is often drawn.

There has been relatively little empirical assessment of the level of HACCP implementation or understanding in non-manufacturing sectors of the UK food industry. However, the research that has been carried out suggests that improvements have occurred in the late 1990s. Meredith and Perkins (1995) identified that only 7% of public houses had even heard of HACCP, Ehiri et al. (1997a) found that 59% of food operators (many of them from catering sector) had not heard of HACCP whilst Gillespie et al. (2000) reported that 42% of catering premises surveyed had documented hazard analysis systems. In the retail sector, Little and de Louvois (1998) found that 17% of butchers surveyed had documented HACCP based systems with a further 31% having undocumented systems. However, local authority estimates recently used by the FSA to set its targets for future HACCP implementation put the level of documented HACCP use at only 19% of businesses in the catering sector and 16% in the retail sector compared to 59% for manufacturers. Furthermore, 30% of caterers and 42% of retailers were thought to have no hazard analysis system in place, whether documented or undocumented.
The potential barriers to HACCP, for smaller businesses in particular, are well documented, although primary evidence of the extent of their impact is limited. The available literature has commonly referred to the problems for small and medium sized enterprises (SMEs). However, in June 1999, the World Health Organisation (WHO) convened a consultation in The Hague to discuss the barriers to HACCP implementation. With the input of experts from Europe and beyond, the report produced as a result of the consultation moved away from the traditional focus upon SMEs to a less rigid emphasis on small and/or less developed businesses (SLDBs). Key barriers to HACCP for SLDBs suggested in the report were financial constraints, human resource constraints, lack of expertise and/or technical support, inadequate infrastructure and facilities, inadequate communication, lack of customer or business demand, lack of government commitment and the absence of legal requirements (World Health Organisation, 1999). These barriers are neither mutually exclusive nor exhaustive, but reflect the themes commonly discussed within the literature. McSwane and Linton (2000) describe similar barriers in relation to retail food establishments, also including language or cultural variations and high employee turnover. Taylor (2001) also lists similar barriers for small companies, focusing particularly on the burden of documentation, validation and verification of HACCP.

Ultimately, many of these issues condense to the question of the time and monetary resources available to support HACCP implementation (Stevenson, 1990). This is reflected in the attention afforded to financial constraints in most lists of the barriers to HACCP (Jouve, 1994; Kirby, 1994; Jansen, 1999; McEachern, 1999; Romero, 1999). Included among the direct costs of HACCP may be equipment, physical changes to the business environment, staff training, external consultancy and materials. McEachern (1999) and Martin and Anderson (2000) each note that the costs incurred are likely to vary on what existed pre-HACCP, suggesting that small businesses would most likely be starting from a lower level in terms of their control systems, training and documentation. Commenting on small bakeries, Leitenberger and Rochen (1998) highlight the lack of prior adherence to the general good hygienic practice as a key barrier to HACCP implementation.

Although financial issues are likely to be a pressure across the whole food industry, McEachern (1999) points out that larger businesses also have the margins to be able to afford to allocate the necessary resources to HACCP. Smaller businesses are likely to have less available resources relative to their overall turnover (Jouve, 1994) and are also less
likely to be able to wield pressure on suppliers to introduce HACCP (Kirby, 1994). In theory at least, the value for a retail, catering, or indeed any business in implementing HACCP is diminished if their supply chains are not doing likewise.

De Sitter and Van de Haar (1998: 133) state that, "most businesses lack the capacity and knowledge to perform their own HACCP study". Certainly the evidence would suggest that managers in many UK food businesses are unlikely to have anything more than basic food hygiene training (Ehiri et al., 1997a; Little and De Louvois, 1998; Gillespie et al., 2000). Ehiri et al. (1997a) found that 44% of businesses surveyed felt inadequately staffed to implement and manage HACCP whilst 67% felt that they would require help to identify hazards within their operation. Any lack of knowledge and technical expertise is likely to lead to a situation where HACCP is implemented either inefficiently or ineffectively by managers or that businesses have to relay on external support, often in the form of private consultants. Meredith and Perkins (1995) and Kirby (1994) suggest that the wording and terminology associated with HACCP is itself enough to put small business managers off HACCP and to lead them to feel that the system is either beyond, or at least irrelevant, to them. Begum and Mathieson (2000) highlighted the further problem of communicating and raising awareness of HACCP in businesses with non English speaking owners.

Even where smaller businesses possess some technical expertise, the labour intensive nature of the industry, in particular the catering sector (West, 1992), means that businesses may lack the capacity to commit sufficient time to HACCP implementation whilst maintaining day to day functions. Compounding this is the 'concentration of functions' (Jouve, 1994; Kirby, 1994; Jansen, 1999), whereby the technical expertise that exists is likely to be restricted to a single individual, resulting in greater time pressures and also implying that the system developed would have to be self-verified (McEachern, 1999).

Although significant, the barriers discussed are not necessarily insurmountable. Baird Parker (1990b) and Ehiri et al. (1995) each suggest that negative reactions, or a lack of willingness to adopt HACCP, arises largely from a lack of understanding. Guzewich (1986) showed that businesses are likely to view the system more favourably if they have through direct experience. At the very least, there is an argument in favour of a more flexible approach to HACCP within smaller businesses, whilst not compromising on the basic philosophy of the system (Ehiri and Morris, 1995). Meredith and Perkins (1995) have suggested that for many small businesses, HACCP should not need to consist of much more than a simple checklist based approach. Kirby (1994) suggested that small
caterers, for whom the range of products produced could present problems in developing a HACCP plan, should focus instead on stages in their process generic across products.

In its guidance on HACCP implementation for SLDBs, the World Health Organisation (1999) provided an overview of the issues to be considered in the development of industry wide strategies to encourage use of the system. Recommendations put forward included measures specific to individual businesses, although the general emphasis was upon measures to be taken at a wider level by governments or industry wide associations. As well as the possibility of direct HACCP regulations, the WHO document discusses the development of effective HACCP training materials suited to the needs of SLDBs, generic HACCP models and industry guides, the development and communication of information on products, hazards and risks, the provision of low cost access to support services or technical expertise and the production of objective evidence on the likely costs and benefits associated with HACCP. These reflect the needs expressed by Roberts and Smallwood (1991) and are further discussed in the remaining sections of this chapter.

2.5.3. Regulatory Intervention and the Use of Generic Models.

As already noted, HACCP is increasingly forming the basis of worldwide food safety legislation. However, there remains a lack of consensus as to whether regulation is the most appropriate means of either encouraging and introducing HACCP in a manner that will have a long term and positive impact upon food safety with Kirby (1994), arguing that that reason not force should be used to encourage HACCP implementation.

In keeping with his view that different approaches to HACCP have enabled the system to evolve over time, Elliott (1996) expressed concern that more mandatory, standardised interpretations of HACCP would hinder future evolution of the system. In recognising that regulatory HACCP can help improve food safety, Motarjemi and Kaferstein (1999) questioned whether regulation helped satisfy the requirement that the implementation of HACCP is best based upon a business recognising the need for the system, taking ownership of it and understanding its core principles. McEachern (1999) added to this debate by doubting whether generic plans would mature alongside a business and the extent to which managers would believe that HACCP would, like a well placed investment, benefit them if it was not plant and product specific. Antle (1996) suggested that there were clear differences in business efficiency between voluntary HACCP tailored to specific business needs and more generic regulatory HACCP, enforced by inspectors.
Despite these concerns, there is also a relatively widespread acceptance that although not ideal, generic models and the intervention of government in providing training materials and advice are vital in delivering HACCP, in small businesses, particularly at a speed required by any mandatory requirements (Jouve, 1994; Jouve, 1998; Pritchard and Walker, 1998; Griffith et al., 1999; Romero, 1999). De Sitter and Van de Haar (1998) suggest that without legal compulsion, many businesses will be reluctant to start on what they describe as the difficult process of HACCP and developments have largely overtaken the debate in any case. Nevertheless, Buchanan (1990) pointed out that it would be naïve of regulatory bodies to simply mandate a HACCP system and expect it to be effective, with DeWaal (1997) suggesting that many questions remain as to how regulatory HACCP should best be applied. Examples of such questions may include the extent of EHO competency in HACCP (Pennington Group, 1997); methods for the enforcement, auditing and verification of HACCP by regulatory bodies (Buchanan, 1990; Mayes, 1994; Jouve, 1998; Sperber, 1998; McEachern, 1999; Motarjemi and Kaferstein, 1999); the extent to which certain industry sectors are ready for HACCP or should focus first upon improving general hygiene practices (Motarjemi and Kaferstein, 1999; Sandrou and Arvanitoyannis, 1999); and the extent to which generic HACCP models can deliver the required food safety guarantees (McEachern, 1999; Motarjemi and Kaferstein, 1999).

One feature of the debate surrounding the use of more generic HACCP models is the extent to which they are a means to an end or an end in themselves. Jouve (1998) called for governments and industry to mobilise themselves and the relevant expertise to produce generic models to aid the use of HACCP, but saw such models as just that, an aid rather than a solution. To try and limit the risk of duplication between businesses, Hathaway (1995) suggested that models should limit themselves to broad descriptions of HACCP with an emphasis on the need for adaptation to individual circumstances. Similarly, Jansen (1999) suggested that generic models should be little more than template approaches designed to guide businesses through the development of their own individual system.

In the UK, generic advice to businesses has already been produced in the form of sectoral guides to good hygiene practice (Department of Health, 1997; 1998a; 1998b). These at least provide information and guidelines to act as a foundation for the development of HACCP. Other UK attempts to allow the core principles of HACCP to be adopted, even
by small-scale catering operations, have included the Assured Safe Catering (Department of Health 1993) and Systematic Assessment of Food Environment approaches (British Hospitality Association, 1995). Meanwhile, focusing initially upon catering practices within public houses, Meredith and Perkins (1995) put forward their 'Small But Safe' approach, an informal checklist based approach to HACCP designed to help small businesses comply with the 1995 Food Safety (General Food Hygiene) Regulations, whilst minimising the input required from external sources. As might be expected, independent authors have also produced manuals designed to guide small businesses through the HACCP process (Macdonald and Engel, 1996).

If there is one area where more generic approaches to HACCP have won the widest favour, it is in the delivery of training and the development of a common baseline understanding of the system (Buchanan, 1990; Bryan et al. 1993; Jouve, 1994; Hathaway, 1995; Romero, 1999). Mortimore and Smith (1998) suggest that not only should generic HACCP training be developed but that the delivery of this training to business managers and their workforces should be supported financially by governments. In their view, standardised and centrally verified HACCP training is an important element of any strategy to promote the use of HACCP, with business managers needing to have faith in the training on offer.

The need for a common understanding of HACCP arguably extends beyond the food industry to food authorities (Mayes, 1994; Moy et al., 1994; Engel, 1998). Motarjemi and Kaferstein (1999) stress that the strength of HACCP is in its maintenance and regulatory authorities need a clear understanding of how to enforce it. Moy et al. (1994) pointed out that any enforcement based on the verification of HACCP would require a significant shift by enforcement officers, away from their traditional focus on the floors, walls and ceiling approach. Bryan et al. (1993) and Peters (1999) are among those to have proposed that standardised audit mechanisms for HACCP should also be developed to enable consistency of verification and enforcement. However, there is again the contradictory view that in enforcing any mandatory HACCP, regulatory officials need to adapt their approaches to individual circumstances rather than being too heavily restricted to a generic audit model.

Spencer (1992), Mayes (1994), Newslow (1997), McEachern (1999) and Moy et al. (1994) each suggest that the role of regulators should be to simply confirm whether businesses are using HACCP to appropriately manage food safety. However, this inevitably requires training in HACCP sufficient to allow appreciation of the 'degrees' of HACCP appropriate for different types of operation. Notably, in October 2000, Code of Practice No. 19 of the
1990 Food Safety Act was revised to include required standards of competence for local authority officers in relation to HACCP based management control systems (Table 2.2).

**Table 2.2. Required Standards of HACCP Competence for Local Authority Officers.**

<table>
<thead>
<tr>
<th>Core Objectives</th>
<th>Standards of Competence (To Be Able To…)</th>
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| Identify through audit, the need for improved food safety control in food premises | - assess the quality of food safety hazard identification in a food business.  
- assess the quality of CCP identification in a food business.  
- assess the suitability of controls in place and their monitoring at CCPs.  
- assess the verification and review by business proprietors of HACCP based management control systems. |
| Promote and support the implementation of HACCP based management control systems in food businesses. | - explain principles of hazard analysis to business proprietors / managers.  
- specify targets for improved control of food safety hazards.  
- provide advice on carrying out hazard analysis and implementing controls.  
- explain the relationship between HACCP systems (based on Codex) and other food safety management systems. |
| Secure compliance with hazard analysis / HACCP based control system requirements in legislation. | - explain legal requirements in relation to HACCP based control systems.  
- secure compliance by discussion and persuasion.  
- secure compliance by the issue of notices.  
- secure compliance through the courts (and gather and preserve evidence in a form usable in court). |

*Adapted from Food Standards Agency (2000f)*

### 2.5.4. Evaluating the Costs and Benefits of Improved Food Safety Control

Commenting on the catering sector, Skroder (1988) drew attention to the need for the industry and its staff to be encouraged to see hygiene as a positive means of reducing waste and increasing productivity, suggesting that it was easier to enthuse business owners about profits than microbiology. Similarly, Caswell and Mojduszka (1996) suggest that food producers will supply food quality and safety, even beyond a level legally required, if it is profitable for them to do so. They suggest that this contribution to profitability may stem from outcomes such as increased product differentiation, sales and possibly prices or alternatively from the avoidance of costly events such as food poisoning outbreaks. However, attempts to fully balance the costs and benefits of food safety, whether in a single business or across a whole industry sector must also recognise the wider benefits.
across society (Zeckhauser, 1985). In the case of HACCP, Cato (1998) points out that as well as being a recognised hygiene management tool, the system can deliver economic benefit not only to firms, but also to society and governments. Economic evaluation techniques such as cost benefit analysis (CBA) offer a potential means of quantifying the wider costs and benefits of a project or projects in monetary terms (Robinson, 1993).

This is not the place for a rigorous discussion of CBA or economic evaluation in general. Nevertheless, certain issues are pertinent to the application of such techniques to food safety. One such issue is the monetary value of goods that do not have a natural market value, such as safety or the value of life (Ford et al. 1995), referred to by Brent (1996) as the measurement of intangibles or unquantifiables. An overview of this problem is provided by Jones-Lee (1994) who summarises the values produced from a range of research, aggregated to 1987 prices. Estimates of the value of a statistical life ranged from £50,000 based on Acton (1973) to over £5 million (Smith, 1973; Olson, 1981; Jones-Lee, 1976). In a more recent study, Viscusi (1993) put the value of saving one life at $5 million.

Another consideration is that whilst CBA might conclude that the benefits outweigh the costs of a project, these may not be evenly distributed. In the language of welfare economics, a project would deliver what is referred to as a Pareto improvement in welfare if it made one member of a community better off and none worse off after all costs and benefits were balanced (Sugden and Williams, 1978). However, Perkins (1994a) notes that if projects could only be implemented if they were expected to deliver a Pareto improvement, then very few would ever get off the ground. Consequently, CBA is founded on the Hicks Kaldor compensation criterion, whereby a project will deliver a potential Pareto improvement in welfare if those who gain could compensate those who lose and still remain better off themselves, even if this compensation does not actually take place.

Because the Hicks Kaldor compensation criterion takes no account of the relative utility of a level of benefit to different groups, economists often distinguish social CBA from traditional CBA. Social CBA is based on the assumption that the decision maker is not only concerned with the level of costs and benefits but with the way these are distributed among different individuals or groups (Perkins, 1994a). For example, the utility of an increase in weekly income of £20 would be greater to someone on an income of £100 per week than to another receiving £500 per week. The issues of distribution and
compensation have potential implications for any evaluation of the costs and benefits of food safety and HACCP, particularly regulatory initiatives. Antle (1996) noted that the start up costs of compliance with HACCP regulations is often independent of business size, therefore threatening the survival of smaller firms more than larger firms.

2.5.5. The Costs and Benefits of HACCP

There is a suggestion that the relative costs and benefits of HACCP are of secondary importance. Caswell and Hooker (1996) point out that the primary motivation for the adoption of HACCP should be the moral desire to improve food safety beyond any cost-benefit or market tests. Similarly, Roberts et al. (1996) assert the view that HACCP is about setting standards rather than business marginalism, the most significant issue being the shifting of responsibility for food safety back to the business. However, regardless of the priority given to such issues, the reality as previously noted by Henson and Traill (1993) and Antle (1996), is that there has still been relatively little attention paid to the explicit assessment of these issues. This is despite the theoretical debate that has ensued and the widespread recognition of the potential benefits of HACCP, examples of which are listed in Table 2.3.

Table 2.3. Potential Benefits of HACCP Implementation.

| To Consumers | • reduced risk of foodborne disease; |
|             | • increased awareness of basic hygiene; |
|             | • increased confidence in the food supply; |
|             | • improved quality of life (health and socio-economic). |
| To Industry | • improved product consistency; |
|             | • improved staff-management commitment to food safety; |
|             | • decreased business risk; |
|             | • increased consumer and/or government confidence; |
|             | • reduced legal and insurance costs; |
|             | • increased market access; |
|             | • reduction in production costs (reduced recall / wastage). |
| To Government | • trade facilitation; |
|             | • increased confidence of the community in the food supply; |
|             | • improved public health; |
|             | • more efficient and targeted food safety control; |
|             | • Reduced public health costs. |

Economic assessment of these perceived benefits of HACCP is complicated by the fact that they tend to be of the intangible nature described by Brent (1996). Caswell (1998) notes that a crucial element in any evaluation of the benefits and costs of HACCP is likely to be the achieved reduction in pathogen levels in food and the subsequent reduction in food poisoning incidence. Evidence, such as that presented by Lambiri et al. (1995), has proven that HACCP can achieve such reductions in pathogen levels in individual situations. However, even if such results enabled a calculation of risk reduction as a result of HACCP implementation, this would be difficult to value in economic terms (Zeckhauser, 1985; Weddig, 1994). Where benefits assessments have been made, these tend to have been based on assumed rather than actual reductions in illness resulting from HACCP implementation across whole industries rather than on a case by case basis.

In 1998, a conference was held in the United States, bringing together academics and policy-makers to discuss and present findings from studies on HACCP costs and benefits (Unnevehr ed. 2000). However, many of the papers presented at this conference continued to address the issue from either a theoretical perspective or using macro-economic estimates for HACCP implementation across whole industry sectors. Such approaches are likely to be of relatively little relevance in encouraging individual businesses within the food industry of the likely costs and benefits of HACCP to their individual situation.

Among the studies presented was UK research by Henson et al. (1999) assessing the ranked costs and benefits of HACCP implementation among dairy or ice-cream processors. The most significant cost, both in terms of the extent to which it was faced and the level of the cost, was staff time in documenting the system, which in 55% of cases exceeded prior expectations. Another common cost was staff training, incurred by 91% of businesses although ranked as the most important cost by only 14% of businesses. Where used, the costs of external consultants also assumed a relatively large degree of importance. Ongoing HACCP operating costs of record keeping, product testing, staff training and managerial/supervisory time were each incurred by at least 75% of businesses, the most significant being record keeping. Only a small minority of businesses indicated a reduction in their overall costs of production, whilst 45% of firms (including 54% of those with less than 50 employees), noted an increase in production costs since implementing HACCP. The most widely felt benefit was an increased ability to retain existing customers (76%) or attract new customers (63%). These were also the benefits likely to be cited as the most important along with a reduction in product microbial counts, identified as a benefit by 68% of businesses.
The research by Henson et al. (1999) provided the first real UK assessment of the costs and benefits associated with HACCP. However, their findings provided no assessment of the actual sum of these ranked costs, nor any attempt to quantify the financial value of the benefits and balance the two. It is also not possible to say whether or not, in ranking the relative importance of different issues, respondents interpreted particular time commitments in terms of their economic cost when comparing their relative importance to more obvious direct costs, such as new equipment or consultancy fees.

In the course of introducing HACCP based licensing for butchers shops in England, the Department of Health published an assessment of the likely compliance costs to businesses (Department of Health, 1998c). This assessment provided for a relatively large variation in implementation costs dependent on the scale and previous activities of businesses, in particular their cooked meat handling practices, ranging from below £500 to up to £5000. This assessment used an estimated turnover of £1000 per week per full time member of staff to suggest that the non-recurring costs of implementation would be between only 0.5% and 1.5% of annual business turnover. It was also assumed that additional ongoing costs would be minimal as many of the activities involved should already have been routine. In addition to these implementation costs, the costs of training to meet the requirements of the proposed licensing regulations and the cost of paying for a licence itself were estimated at £6.5m and £1.3m respectively. Added to the costs of implementation, the total economic impact of licensing was put at a maximum of £38.5m.

Despite this attempt to quantify the economic impact of HACCP based regulation in the UK, assessment of the likely benefits in either economic of non-economic terms was not included. By contrast, the United States Department of Agriculture is obliged not only to estimate the costs of any significant rules or regulations imposed but also to estimate the likely benefits (Macdonald and Crutchfield, 1996). One of the regulations to have received the most attention from the perspective of HACCP implementation has been the HACCP ‘final rule’ for meat and poultry processors. The economic impact assessment accompanying this regulation estimated a total industry cost of between $76-89m equivalent to an increase in production costs of one tenth of a cent per pound of meat (Cross, 1996; United States Department of Agriculture, 1996). As with the Department of Health cost assessment for licensing of English butchers, the assessment of the HACCP final rule for US meat and poultry expected plants with existing and effective processing to face relatively low HACCP implementation costs.
The United States Department of Agriculture’s Economic Research Service produced a final estimate of the benefit of HACCP in the meat and poultry industry based on a reduction in the cost of illness of between £7.13-$26.59 billion over twenty years. This estimate was based on an assumed and optimistic 90% reduction in illness and death as a result of meat and poultry related infection with the four main pathogens (Roberts et al., 1996). Whilst the 90% reduction might be optimistic, for anything above a 10% reduction in illness and death, the benefits outweighed the costs of HACCP over twenty years, estimated at between $1.0-$1.2 billion.

Buzby and Crutchfield (1997) estimated that HACCP would only have to reduce meat and poultry related illness from the seven major microbial pathogens by between 15-17% for the benefits to outweigh the costs. This was based on a low estimate of the costs of food poisoning when if higher estimates were used, only a 4-5% reduction would be required. Given that these estimates take no account of the value of any other benefits beyond a reduction in the cost of illness, they would seem to offer a strong incentive for HACCP implementation. Yet as already discussed, those reaping the benefits of the reduced cost of illness, namely the government and wider society and industry in general are unlikely to be the firms who have faced the costs of implementation (Golan et al., 2000). On a similar theme, Unnevehr and Jensen (1996) suggest that there is little market incentive for firms in meat and poultry processing to adopt HACCP and consequently any regulatory HACCP would impose costs that would impact most significantly on smaller firms. They point out that the benefits lie in the resulting reduction in illness yet the costs would be with the firms to set up and maintain the system.

Similar benefit-cost estimates of HACCP based regulation have been carried out across other industry sectors in the United States, notably seafood, a summary of which is provided by Cato (1998). For example, the Food and Drug Administration (FDA) estimated the benefits arising from the HACCP programme for US seafood processors at between $1.435 to $2.561 billion beyond the fourth year after implementation. Included among the benefits valued in this analysis were the reduced cost of illness, reduced enforcement costs and increased consumer confidence. By contrast, implementation costs were estimated at between $677 million and $1.488 billion. The average cost per plant was put at $23,000 in the first year and $13,000 in subsequent years.
Although not specifically related to HACCP implementation, Robbins and McSwane (1994) measured the benefits of an improved sanitation programme in the meat department of a retail food store. They identified a measurable reduction in bacterial counts on equipment and utensils as well as in raw ground beef samples following the introduction of the improved sanitation system and improved training. Reprocessing losses from waste were cut by over 30%, delivering an average daily saving of $14.41 per day, although this cost saving was not presented in relation to the overall turnover of the department or the cost of implementing the new system. In another study, Kalish (1991) reported that the application of HACCP to the distribution of refrigerated juices had helped one US company reduce the level of customer complaints by over 40% in two years. Again however, the economic value of this benefit was not estimated, nor was it presented in relation to any assessment of the costs of HACCP implementation.

2.5.6. Consumer Willingness to Pay (WTP) for Improved Food Safety.

In commenting on the possible benefits of higher food safety standards, Leach (1995) noted that business owners and managers needed convincing that higher standards would help secure more customers. Henson and Traill (1993) suggest that in a perfect market, similar products posing different risks would be offered to the consumer at a variety of prices. Choice would be a trade off of factors including price, convenience and attitude to risk (Crutchfield and Cooper, 1997). Whilst Henson et al. (1999) showed that 63% of dairy processors highlighted some ability to attract new customers as a result of HACCP implementation, such businesses would be trading in industrial markets where, as Caswell and Hooker (1996) note, HACCP has increasingly become a trading standard. For retail and catering businesses dealing direct with the general public, it is less clear whether there either is, or could be, sufficient market demand for food safety as described by Caswell and Mojduszka (1996) to either increase turnover by attracting more customers or to at least offset the costs of HACCP through price rises, tolerated by the informed consumer.

Consumer WTP for various food safety or quality attributes has received increasing attention, in conjunction with apparent increases in the general levels of consumer concern about food safety (Frewer et al., 1995; Holm and Kildevang, 1996). Kinsey (1993) noted the increasing trend towards niche markets for ‘safer’ foods such as Salmonella free chickens or uncontaminated raw oysters and concluded that, in higher income countries, consumers will increasingly demand and seek out higher quality and safer foods in the market where the information is available to allow them to do so. With particular
reference of the use of pesticides and additives, Jussaume and Judson (1992) drew attention to the increasing concern about food safety across the industrialised world. Jolly et al. (1989) reported that 80% of US consumers put food safety as a very important concern in food purchasing decisions whilst Bruhn et al. (1992a) found that 40% of US consumers actively avoided some produce items due to safety concerns. Concern over microbiological safety would appear to have increased given that Bruhn et al. (1992b) reported that only 13% of US consumers reported concerns over spoilage whilst Bruhn (1997) cited US research which found that 49% volunteered concerns about microbiological food safety.

In the UK, although the FSA published evidence to suggest that overall concern over food safety issues declined in 2001, this was attributed at least in part to the timing of its survey around the events of September 11th after which global fears appeared to overtake, at least temporarily, concerns over issues such as food safety (Food Standards Agency, 2002a). Nevertheless, 22% of consumers reported that they were very concerned about food safety issues with a further 49% being quite concerned. Food poisoning was the issue most commonly cited as a source of concern in relation to the food supply, by 59% of consumers. Just over half of the 3,120 consumers surveyed expressed some concerns about hygiene from at least one type of catering outlet, most notably mobile food outlets, takeaways and fast food outlets. The most common concern appeared to be the cleanliness of the premises in general, the staff, or the kitchen. Of those expressing concern, 43% claimed that they changed their eating habits in 2001 in response to their concerns. In the retail sector, 43% of consumers expressed concern about food hygiene from market stalls selling meat and 17% expressed concern about local butchers, although these levels were lower than those seen in 2000.

Applications of WTP methodologies to food safety or quality issues, common within environmental valuation (Seip and Strand, 1992; Hanemann, 1994), are still relatively rare and those that exist tend to have focused upon American consumers. Examples of the studies carried out to date are summarised in Table 2.4 although none are related specifically to the WTP for HACCP in particular. Survey based approaches to WTP estimation are generally defined as contingent valuation (CV), the origins of which are discussed by Portney (1994). Three main approaches are adopted by CV surveys, compared by Cameron and James (1987) and Jordan and Elnagheeb (1994). The 'open-ended' approach asks participants to state the maximum amount that they would be willing to pay for a given product. 'Sequential bidding' presents participants with a pre-
determined amount and asks whether they would be willing to pay that amount. Subject to a positive response the amount presented would increase until a negative response was received. Finally, the 'dichotomous choice' or 'referendum' approach would use an open ended pilot study to select a random value between two intervals. Participants would then simply be asked to indicate their willingness or otherwise to pay this single stated sum.

The main alternatives to survey based WTP estimation are experimental auctions using real goods, real money, repeated participation and information on market prices to create what is in theory a more realistic scenario (Shogren et al., 1994). A range of auction approaches exist, a general review of the theory and behaviour of which is provided by Cox et al. (1982). However, it is the ‘Vickrey second price auction’ that has received the most attention (Vickrey, 1962). The basic approach of a Vickrey auction would be for all participants to be provided with a good which has certain characteristics, as well as a financial endowment. They would then be presented with the same good but with different characteristics and invited to bid to exchange their endowment for the alternative good. The bidding process would be continued over several rounds after each of which bidders would be made aware of the second highest bid, or market price and the identity of the highest bidder. At the end of the experiment, one bidding round would be selected at random with the highest bidder in that round having to pay the second highest price in that round to exchange their good for that which they were bidding for.
Table 2.4. Summary of Research on Consumers’ Willingness to Pay for Food Safety or Quality.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Summary of Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crutchfield and Cooper (1997)</td>
<td>A CV survey valuing reduction of nitrate levels in drinking water via a special filter. Average WTP of $52.89 per month for a filter that reduced nitrates to the maximum level recommended by the US Environmental Protection Agency.</td>
</tr>
<tr>
<td>Donaldson et al. (1996)</td>
<td>Survey of 500 Scottish consumers to assess WTP to avoid poultry-borne illness through treatment with a hypothetical device or irradiation. Of those who would buy irradiated poultry meat, mean WTP for the benefits of irradiation was an average of 10.8% of weekly poultry expenditure. Those who would not buy irradiated meat would pay an average 3.6% premium on their weekly poultry expenditure to avoid irradiated poultry.</td>
</tr>
<tr>
<td>Wessells and Anderson (1995)</td>
<td>CV survey of WTP for various seafood safety assurances including inspection procedures, information provision such as catch date and storage temperature or alternatives such as a money back guarantee of top quality. The most widely preferred choice was catch date information, generating a mean WTP per pound of $0.47 on top of a normal selling price of $4.50 per pound.</td>
</tr>
<tr>
<td>Buhr et al. (1993)</td>
<td>A split valuation auction to estimate the WTP of a sample of US students with regard to leaner pork produced with the help of genetically engineered growth enhancers. The split valuation involved estimation of both the positive attribute (leaness) and the negative attribute (use of growth enhancers). Results highlighted a higher value placed on the positive attribute than the negative attribute. By introducing new information at the experiments’ midpoint, the study highlighted the impact of information on WTP.</td>
</tr>
<tr>
<td>Buzby et al. (1995)</td>
<td>Used contingent valuation to find that on average, US consumers displayed an additional WTP of between $0.19 and $0.69 for grapefruit which displayed a reduced risk from pesticide residues. This premium was based on a market price of $0.50 for the product.</td>
</tr>
<tr>
<td>Elmagheeb et al. (1992)</td>
<td>Contingent valuation survey of US consumers WTP for leaner pork produced with the use of the pST growth hormone. Over 50% of those who consumed pork were willing to pay some premium for the pST product. Including zero bids, the mean WTP was a premium of $0.25 per kg. The study identified lower WTP among older consumers and higher income respondents, trends attributed to more limited red meat consumption of older consumers and different consumption habits / food safety concerns among higher income groups.</td>
</tr>
<tr>
<td>Malone (1990)</td>
<td>Assessed consumer willingness to purchase and/or pay more for irradiated fresh food products, from a survey of 800 US households. Of those willing to purchase irradiated food, 69% of households were willing to pay for a 50% reduction in foodborne disease risk from fresh beef and 77% for a similar risk reduction in fresh chicken. Some 54% of households would pay more for a doubling in shelf life of strawberries.</td>
</tr>
<tr>
<td>Mullen and Wohlgenant (1991)</td>
<td>WTP of a sample of 821 US consumers for changes in the leanness and portion size of lamb loin chops. The results of this survey based approach suggested that consumers would be prepared to buy loin chops with more fat cover but at a discounted price yet are generally unwilling to offer a premium for chops with larger areas of red meat.</td>
</tr>
</tbody>
</table>
Table 2.4. continued

<table>
<thead>
<tr>
<th>Study</th>
<th>Auction Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fox et al. (1995)</td>
<td>Vickrey</td>
<td>Auction assessing WTP of 114 US students to exchange a pork loin sandwich with leaner meat produced with the aid of the hormone porcine somatotropin (pST) for a sandwich made with untreated meat and vice versa. Over 20 bidding rounds, 57% of subjects would not bid to change their leaner pork for typical pork whilst 27% would not bid to change their typical pork for leaner pork. Introducing additional safety information after bidding round 10 increased the bids to exchange for the leaner pork and decreased the bids to exchange for the typical pork.</td>
</tr>
<tr>
<td>Roosen et al. (1998)</td>
<td>Vickrey</td>
<td>Auction measuring WTP for the elimination of a single insecticide or a whole group of insecticides in apple production. A sample of 54 participants were willing to pay an average $0.22 premium in the first round of bidding for a 2.5 lb bag of apples with no cosmetic damage, produced without the single pesticide in question. However, this included zero premium bids from 48% of participants. Results suggested strong WTP for the removal of pesticides, but less so if this had a negative impact on the cosmetic quality of the product.</td>
</tr>
<tr>
<td>Misra et al. (1991)</td>
<td>Measured</td>
<td>WTP for pesticide free fresh produce using a survey of 580 US households. Some 46% of respondents expressed some additional WTP for tested and certified pesticide free produce. Of those willing to pay more, the majority would only pay a premium of up to 5% of market value. WTP was positively influenced by respondents own concerns about the health effects of pesticide residues on fresh produce, attitudes towards testing and certification, age and income.</td>
</tr>
<tr>
<td>Shin et al. (1992)</td>
<td>Vickrey</td>
<td>Auction among a sample of college students to assess WTP to eliminate the risk of <em>Salmonella</em> or <em>Trichinella spiralis</em> from typical food products. The first 10 of the 20 bidding rounds were based on students naïve risk perceptions, after which additional information was presented on the actual chance of contracting the two illnesses from one-off consumption of the food product and the likely consequences of falling ill. The average WTP for the naïve bidding rounds 7-10 was $0.44 for the <em>Salmonella</em> experiment and $0.69 for <em>Trichinella spiralis</em>. The mean bids across rounds 17-20 were $0.55 for <em>Salmonella</em> and $0.81 for <em>Trichinella spiralis</em>. This represented an increase in mean bids between the two sets of rounds of 24% for <em>Salmonella</em> and 16% for <em>Trichinella spiralis</em>.</td>
</tr>
<tr>
<td>Henson (1996)</td>
<td>Contingent</td>
<td>Valuation survey of 1250 UK households to assess WTP for reductions in various food poisoning risks. Respondents were offered two brands of egg or chicken, differing in their risk of causing food poisoning. The market price of the products with the higher food poisoning risk was provided and respondents were asked whether they would be willing to buy the brand with the lower food poisoning risk and the premium that they would be pay to consume this product over a whole year, taking into account their own consumption patterns and the market price of the higher risk product. Contrary to the hypothesis in place prior to the survey, WTP was negatively related to personal experience of food poisoning. Possible explanations for this trend were consumers distorted views of food poisoning, whereby because they had it in the past they are less likely to have it in the future. Alternatively, it was suggested that respondents who had suffered only mild food poisoning might give less weight to the risk of contracting moderate, severe or fatal symptoms.</td>
</tr>
</tbody>
</table>
2.6. AIMS AND OBJECTIVES OF THE RESEARCH

As stated, HACCP is now firmly established as the system of choice for food safety control, both in the UK and worldwide. However, this increased prominence has been accompanied by a similar level of, largely theoretical debate, surrounding the potential barriers to HACCP, particularly within small or less developed businesses. Consequently, the primary research to be presented in Chapters Three to Six of this thesis was intended to contribute to the primary evidence in support of this debate, in particular by aiming to:

1. Identify the factors influencing the application of systems such as HACCP in the UK food industry and the likely barriers to their future development.

2. Profile the costs and time commitments required to implement and maintain HACCP.

3. Evaluate the impact of accelerated HACCP implementation initiatives for the UK butchery sector in terms of costs, practices, attitudes, knowledge and ability.

4. Assess the potential marketability of HACCP to the end consumer and their willingness to pay extra for additional food safety.

In seeking to achieve these aims, a number of objectives were met, these being to:

1. Design and implement a multi-sector survey of food hygiene systems, practices, training, attitudes and risk perceptions within a random sample of UK food businesses.

2. Consult directly with business managers from across the industry on the perceived barriers to the implementation of food hygiene management systems.

3. Identify and profile the implementation of HACCP based systems and their costs and benefits in a series of case studies from across the UK food industry.

4. Develop a costing model and database capable of storing and analysing data on the direct costs and benefits of HACCP and hygiene management in general.

5. Design and conduct a survey of businesses involved in the accelerated HACCP Initiative for English retail butchers, focusing on previous systems / practices, attitudes, financial impact and managerial knowledge and ability.

6. Design and implement a study of consumer willingness to pay for HACCP.
CHAPTER THREE: FOOD HYGIENE MANAGEMENT, TRAINING AND MANAGERIAL ATTITUDES IN THE UNITED KINGDOM FOOD INDUSTRY.

3.1. INTRODUCTION.

Among the issues discussed in Chapter Two were the increased incidence of recorded food poisoning in the UK, increasing doubts as to the effectiveness and indeed level of use of traditional food safety control methods and the emergence of HACCP as a key theme in future food safety control strategies both in the UK and worldwide. Despite these developments and the incorporation of HACCP principles into recent food safety legislation (Department of Health, 1995; 2000), there had been relatively little multi-sector research carried out to assess either the uptake of HACCP, or the factors such as general hygiene management practices and attitudes likely to influence its future implementation.

Sperber (1991) suggested that HACCP had been widely accepted by food manufacturing companies worldwide, whilst Caswell and Hooker (1996) noted that at an international level, HACCP had grown in status as both a voluntary and mandatory trading standard across national boundaries. However, these authors were writing from an American manufacturing perspective. Even assuming similar trends in the UK food industry, smaller domestic manufacturers would have been unlikely to face the same market pressures to adopt HACCP. Furthermore, with the ongoing debate surrounding the potential application of HACCP by small or less developed food businesses (World Health Organisation, 1999) particularly retailers and caterers, it was important to be able to assess the current position of HACCP across the industry and the factors affecting its application.

This chapter reports results from a national postal survey and follow up face to face interviews with food industry managers. The survey was unique in addressing the issue of HACCP implementation across a range of industry sectors, as well as evaluating general levels of food hygiene training, practices and the attitudes of managers. The initial survey was carried out between July and August 1997 with the interviews taking place between November 1997 and July 1998. The survey took place almost two years after the introduction of the 1995 Food Safety Regulations, although the industry had been given a years grace in which to adapt to the new requirements (Department of Health, 1995).
The survey aimed to identify the extent of self reported food hygiene and HACCP related practices across the three largest sectors of the UK food industry, these being retail, catering and manufacturing. The survey also assessed the types of training and qualifications present among industry staff to provide an impression of the training strategies being adopted by food businesses, within the requirement to offer food hygiene training commensurate with the work activities of their staff (Department of Health, 1995). By measuring a range of other business characteristics, the survey results identify the factors that may influence the use of HACCP, hygiene practices and training, focusing in particular on business sector, size, status and managerial risk perceptions. With managers or owner managers recognised as playing a key role in the strategies of small businesses in particular (Tebbutt, 1992), their attitudes towards HACCP, food hygiene and training issues are assessed via both the initial survey and follow up interviews.

3.2. METHODOLOGY.

3.2.1. Questionnaire Design and Piloting.

Among the issues examined by the survey questionnaire (see Appendix One) were baseline business characteristics (questions 1-3, 14-17, 22-23, 26-27), the food hygiene systems and practices in place (questions 6-11), food hygiene training levels (questions 18-21) and managerial risk perceptions (questions 4-5). Likert scales (Schuman and Presser, 1981; Oppenheim, 1992; de Vaus, 1996), were used to determine attitudes towards issues such as the role of food hygiene management, HACCP and training (question 25). The multi-sector focus of the survey required that the content and wording of questions was as inclusive as possible. This therefore prohibited a more in depth investigation of attitudes and practices relating specifically to HACCP because it was believed that many respondents would not have had sufficient knowledge or experience with which to comment. Any perceived irrelevance could have had a potentially negative effect on response rates and the likelihood of encountering non-response bias.

The questionnaire could not directly address adherence to existing food hygiene legislation or attitudes towards the enforcement activities of local environmental health departments. Any impression that the survey was somehow measuring legal compliance would have had a likely negative impact upon response rates while local authority environmental health
departments, key to the development of the survey sample, would have been less willing to co-operate with research that assessed their own activities. Nevertheless, the survey did address compliance with the hazard analysis based legal requirements by including these alongside the more general good hygiene practices listed in question nine. The follow-up interviews were able to probe managerial attitudes towards enforcement in greater depth.

The final questionnaire was the result of a considerable period of design, re-design and piloting. Moser and Kalton (1971) listed nine positive contributions that piloting can make. Particularly pertinent to this research were the ability to predict the main study response rate, to assess the adequacy of the questionnaire design, the variability of the sample being addressed, the efficiency of the instructions provided and the range of response categories offered by certain questions. A pilot questionnaire was sent to a stratified quota sample of forty food manufacturing, eighty retail and eighty catering businesses in South Wales (Hakim, 1987; Henry, 1990), mostly selected from the public register of food premises for Merthyr Tydfil county council. Other local Yellow Pages directories had to be used to supplement the numbers of food manufacturers available.

Pilot respondents were asked additional questions to identify issues to be addressed in the final questionnaire design. For example, 23% of pilot respondents felt the questionnaire was too long, whilst 7% felt that some question instructions were not clear. The average time taken to complete the pilot questionnaire was fourteen minutes. Consequently, efforts were made to shorten and simplify the final questionnaire by changing the question layout and reducing the number of response categories available for certain questions. Separating the covering letter from the questionnaire, the two had been combined for the pilot, also created the illusion of a shorter questionnaire. Prior to distribution, the final questionnaire and covering letter were validated by the survey control unit at the Ministry of Agriculture, Fisheries and Food and approved by the then Secretary of State for the department.

3.2.2. Sample Size and Selection Method.

A low response rate was anticipated because of the sensitive nature of food hygiene management issues, the use of the postal survey method and the lack of focus upon any one industry sector. Such issues are among those commonly cited as having a negative effect on survey responses (Fox et al., 1988; James and Bolstein, 1990; Bourque & Fielder, 1995). The pilot study response rate of 19% resulted in an increase in the main study
sample size from 1000 to 1650 businesses (350 manufacturers, 650 retailers and 650 caterers). The difference in strata sizes was partly due to the pilot study response rate having varied between 27.5% for manufacturers, 17.5% for retailers and 16.5% for caterers. The different strata sizes therefore ensured sufficient numbers of returns from each industry sector to allow reliable statistical analysis of the results, assuming that the main study would deliver a similar pattern of response to the pilot. The larger strata sizes for retailers and caterers also recognised the sheer size and diversity of these sectors, together comprising over 90% of all individual UK food premises (Food Standards Agency, 2000a).

A random stratified multistage cluster sampling procedure (Moser and Kalton, 1971) was determined to be the most appropriate and cost effective method with which to deliver a representative, nationally dispersed sample of the 1650 businesses required for the main study. By providing some degree of geographical clustering, this approach was also expected to reduce the costs and time required to carry out the face to face interviews. The public registers of food premises held by local authority environmental health departments were identified as the most reliable source available from which to draw the survey sample. Most food related businesses are required to be registered with their local authority (Department of Health, 1991), with those exempt from such requirements generally not falling into the manufacturing, retail and catering sectors that were the focus of the survey.

Registers were requested from a simple random sample of eighty UK councils. Although free to view in person, many environmental health departments charge commercial fees for copies of food premises registers. The sponsorship of the project by MAFF was therefore used to encourage these to be released at little or no cost. Lists were received from forty councils, guaranteeing sufficient geographical spread to recognise the diversity of the councils across the UK. These forty included metropolitan, unitary and local district councils. Where lists could not be obtained this was due to either prohibitively large costs, council policy that they did not provide copies to external sources, concerns about data protection or difficulties in providing the lists within the required time-scale.

The forty registers yielded 787 manufacturing, 14,681 retail and 26,470 catering businesses. The final sample was selected using sampling fractions and random starting points for each sector, guaranteeing that each of the three sample strata would include businesses from across all forty councils. The number of businesses from each council was
proportional to the total numbers of businesses located within them. The complexity of the sample design prohibited estimation of the sampling error involved in these procedures, both because of the number of steps involved and the unavailability of other information against which to estimate this error (Moser and Kalton, 1971). Nevertheless with every stage of the sampling procedure adhering to the random approach it is believed that the final sample was a fair representation of the industry as a whole.

3.2.3. Survey Administration.
Survey packages, including a copy of the questionnaire, a covering letter and a pre-paid return envelope were sent out simultaneously to the entire 1650 business sample. In an effort to maximise response rates, the entire sample was sent a duplicate copy of the questionnaire with a reminder letter two weeks after the initial mailing, although pre-paid return envelopes were not included on this occasion because of cost constraints. Businesses that had not yet responded were sent another brief reminder slip after a further two weeks.

3.2.4. Statistical Analysis.
Questionnaire responses were coded and entered into the SPSS software package (Kinnear and Gray, 1997; SPSS Inc., 1998). The presence and nature of any significant differences in responses between groups within the data were assessed using a range of statistical tests. Chi-square ($\chi^2$) tests were most widely used due to the nominal or categorised nature of much of the data collected, with the figures adjusted for Yates’ continuity correction if a 2 x 2 chi square table was used with only one degree of freedom. Non-parametric tests such as Spearman’s rho, Mann Whitney U tests and Kruskal Wallis H tests were used when analysing interval data that was not normally distributed. Several statistically significant associations (95% confidence level, $P < 0.05$) are highlighted within the tables presented in the results section. However, many are mentioned within the main body of the text and are provided with reference numbers. A breakdown of the statistical values and significance levels corresponding to each reference number is included in Table 3.21.

3.2.5. Response Rates.
The final survey response rate was 16.6% or 15.3% when adjusted for spoiled responses, businesses that had ceased trading or those that simply stated that they did not have the time to take part. At the likely time of receipt of the first reminder notice the valid response rate was 6.7% and had risen to 13.6% by the second reminder notice after four
weeks. Non-response bias was monitored through a telephone follow-up of ten per cent of non-respondents. No significant differences were identified between non-respondents and respondents on variables of business size, status or the use of HACCP within each of the three industry sectors. The final response rate was lower than for the pilot, despite the improvements made to the research design, probably reflecting the greater familiarity that the South Wales businesses used in the pilot would have had with the University of Wales Institute, Cardiff (UWIC). However, the pattern of response broadly reflected the pilot (manufacturers 21.4%, retailers 13.5% and caterers 14%) and justified the disproportionate sample distribution across the three sectors. Comparable response rates have since been cited by other UK food industry surveys (Henson et al., 1999; Panisello et al., 1999).

3.2.6. Face to Face Interviews.

Pilot and main study respondents were invited to take part in face to face interviews to discuss hygiene management, HACCP and other general issues in more depth. Twenty interviews were conducted with respondents from the main survey with two interviewees recruited from the pilot. A further two formal interviews were conducted with businesses recruited to the case study stage of the research presented in Chapter Four. With the interviews dependent upon the voluntary involvement of business managers, the views expressed were not necessarily representative of the industry as a whole. Nevertheless, it was desirable that the interviews represented as wide a range of perspectives as possible, the extent of which can be seen in the profile of the businesses involved (Table 3.1).

The interviews followed a broadly qualitative, unstructured format (Oppenheim, 1992), recognising that in different settings there would be different priorities and issues of relevance to the interviewee. Survey responses were sometimes used to prompt discussion although the interviews followed no other set format, with the pattern of the discussion largely determined by the priorities of the interviewee, in keeping with the qualitative approach and protecting against interviewer bias (Dexter, 1970: Bryman, 1989). Where interviewees had not been involved in the main survey, the interviews followed a brief aide-memoire developed from the main themes discussed in previous interviews although priority was again given to the concerns and priorities of those being interviewed.

Interviews were tape-recorded and lasted up to an hour, depending upon the willingness of the interviewee to talk openly and the amount of time available. In some of the smaller retail and catering businesses involved, interviews had to be carried out while interviewees
were working behind the shop counter or in the kitchens. Full transcripts were edited under broad subject groupings common to the interviews and of particular relevance to this research. These groupings were the actual or potential use of formal hygiene management systems, staffing and food hygiene training issues, reasons for increasing levels of food poisoning, customer or consumer issues and regulation / enforcement by EHOs.

Table 3.1. Profile of Businesses Participating in Face to Face Interviews.

<table>
<thead>
<tr>
<th>Nature of business</th>
<th>Ownership</th>
<th>Food hygiene systems</th>
<th>Food handlers*</th>
<th>Interviewee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td>Multinational</td>
<td>Documented HACCP</td>
<td>450</td>
<td>Technical manager</td>
</tr>
<tr>
<td>Brewery</td>
<td>Multinational</td>
<td>Documented HACCP</td>
<td>55</td>
<td>Quality manager</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Multinational</td>
<td>Documented HACCP</td>
<td>31</td>
<td>Technical manager</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Independent</td>
<td>Documented HACCP</td>
<td>16</td>
<td>Technical manager</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Independent</td>
<td>Documented HACCP</td>
<td>13</td>
<td>Technical manager</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Independent</td>
<td>Documented HACCP</td>
<td>6</td>
<td>Owner manager</td>
</tr>
<tr>
<td>Supermarket</td>
<td>National Chain</td>
<td>Documented HACCP</td>
<td>18</td>
<td>Store manager</td>
</tr>
<tr>
<td>Mini-supermarket</td>
<td>Franchised</td>
<td>Documented hygiene system</td>
<td>8</td>
<td>Owner manager</td>
</tr>
<tr>
<td>Delicatessen</td>
<td>Independent</td>
<td>No documented systems</td>
<td>8</td>
<td>Owner manager</td>
</tr>
<tr>
<td>General stores</td>
<td>Independent</td>
<td>Documented hygiene system</td>
<td>6</td>
<td>Owner manager</td>
</tr>
<tr>
<td>Butcher</td>
<td>Independent</td>
<td>Documented hygiene system</td>
<td>6</td>
<td>Owner manager</td>
</tr>
<tr>
<td>Butcher</td>
<td>Local chain</td>
<td>Documented HACCP</td>
<td>6</td>
<td>Owner manager</td>
</tr>
<tr>
<td>General stores</td>
<td>Independent</td>
<td>No documented systems</td>
<td>4</td>
<td>Owner manager</td>
</tr>
<tr>
<td>Butcher</td>
<td>Independent</td>
<td>No documented systems</td>
<td>4</td>
<td>Owner manager</td>
</tr>
<tr>
<td>Butcher</td>
<td>Independent</td>
<td>No documented systems</td>
<td>2</td>
<td>Owner manager</td>
</tr>
<tr>
<td>Retailer (healthfood)</td>
<td>Independent</td>
<td>No documented systems</td>
<td>2</td>
<td>Owner manager</td>
</tr>
<tr>
<td>Retailer / distributor</td>
<td>Independent</td>
<td>No documented systems</td>
<td>1</td>
<td>Owner manager</td>
</tr>
<tr>
<td>Café</td>
<td>Independent</td>
<td>No documented systems</td>
<td>41</td>
<td>Head chef</td>
</tr>
<tr>
<td>Concert / conference venue caterer</td>
<td>National chain</td>
<td>Documented HACCP</td>
<td>23</td>
<td>Head chef</td>
</tr>
<tr>
<td>Hotel</td>
<td>Independent</td>
<td>Documented HACCP</td>
<td>10</td>
<td>Head chef</td>
</tr>
<tr>
<td>Residential home</td>
<td>Independent</td>
<td>Documented HACCP</td>
<td>5</td>
<td>Head chef</td>
</tr>
<tr>
<td>Café / restaurant</td>
<td>Independent</td>
<td>Documented HACCP</td>
<td>5</td>
<td>Owner manager</td>
</tr>
<tr>
<td>Caterer</td>
<td>Independent</td>
<td>Documented hygiene system</td>
<td>4</td>
<td>Owner manager</td>
</tr>
<tr>
<td>Indian restaurant</td>
<td>Independent</td>
<td>No documented systems</td>
<td>4</td>
<td>Owner manager</td>
</tr>
</tbody>
</table>

* Food handlers were defined as those handling or preparing unwrapped or packaged food, drink or ice (Department of Health, 1995)

Most of these 41 food handlers were volunteers, not paid staff.
3.3. **Survey Data and Interview Findings.**

3.3.1. **Baseline Business Characteristics.**

Table 3.2 considers business size, with respondents having been asked how many food handling staff they employed. Although using food handler numbers as a measure of business size was relevant given the survey’s focus upon food hygiene management issues, these figures take no account of other employees staff, such as clerical staff.

<table>
<thead>
<tr>
<th></th>
<th>Manufacturing (n=75)</th>
<th>Retail (n=88)</th>
<th>Catering (n=91)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>94</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>SE Mean</td>
<td>22.1</td>
<td>2.5</td>
<td>9.0</td>
</tr>
<tr>
<td>Range</td>
<td>1199</td>
<td>150</td>
<td>749</td>
</tr>
<tr>
<td>Skewness</td>
<td>3.8</td>
<td>4.8</td>
<td>7.5</td>
</tr>
<tr>
<td>Quartiles:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25%</td>
<td>6</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>50%</td>
<td>23</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>75%</td>
<td>100</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 3.2. Analysis of Business Size Based on Food Handler Numbers.

*Figures in italics for caterers have been adjusted after the removal of two large outliers.*

Manufacturers clearly employ significantly greater numbers of food handlers on average\(^1\), whilst the retail and catering sectors were broadly similar in their size distribution, when two large contract-catering companies were discounted. The range of responses received and the skewness of the data from all three sectors make consideration of the quartile ranges as important as the mean figures. These show that at least three quarters of caterers employ seven or fewer food handlers, whilst the same proportion of retailers employ eight or less. Meanwhile, at least half of all retailers and caterers employ fewer than four food handlers. Despite an average employment of 94 food handlers, half of all manufacturing businesses employ 23 or fewer food handling staff with a quarter employing six or less.

Table 3.3 presents a percentage breakdown of business size based on both food handler and total staff numbers, demonstrating that the frequency distributions of businesses by overall staff numbers and food handler numbers are broadly similar. Although slight disparities may have existed in the precise numbers employed within each size band, this was not able...
to be confirmed due to the fact that food handler numbers were collected as numerical (interval) data whilst total staff numbers were collected within categorised size bands.

Table 3.3. Percentage Breakdown of Business Size Based on Total Staff and Food Handler Numbers.

<table>
<thead>
<tr>
<th></th>
<th>Manufacturing (n = 75)</th>
<th>Retail (n = 88)</th>
<th>Catering (n = 91)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Food Handlers</td>
<td>Total Food Handlers</td>
<td>Total Food Handlers</td>
</tr>
<tr>
<td>1-4 staff</td>
<td>16% 19%</td>
<td>63% 65%</td>
<td>47% 59%</td>
</tr>
<tr>
<td>5-14 staff</td>
<td>19% 22%</td>
<td>21% 21%</td>
<td>34% 29%</td>
</tr>
<tr>
<td>15-29 staff</td>
<td>18% 16%</td>
<td>8% 6%</td>
<td>8% 6%</td>
</tr>
<tr>
<td>30-49 staff</td>
<td>4% 7%</td>
<td>5% 4%</td>
<td>6% 1%</td>
</tr>
<tr>
<td>50+ staff</td>
<td>43% 37%</td>
<td>4% 4%</td>
<td>6% 5%</td>
</tr>
</tbody>
</table>

Clearly, the majority of businesses employed relatively few staff, although as two of the managers interviewed stressed, a lack of staff is not necessarily a negative issue:

"I think it's easier for a small company to keep tabs on people. I hate to think what it would be like if I'd got 150 people working in a factory" (Independent manufacturer, 13FHs).

"It's much more easy to supervise when you've only got two or three people involved and the people that are involved are all people that have an interest in the business...a small company is easier to manage." (Independent caterer, 4FHs)

Respondents were also asked how many of their food handlers were part time staff and whether they employed food handlers on a temporary basis (Table 3.4). The figures combine to show that the manufacturing sector is significantly less reliant upon part-time food handlers, comprising an average of 25% of all food handlers compared to almost 50% in the retail and catering. Some 40% of manufacturers employed no part-time food handlers although over half did employ temporary staff, whilst almost one in five retailers and caterers only employed part-time food handlers. Where businesses employed a greater number of part time food handlers these also comprised a greater proportion of the total food handling staff. The strongest such relationship was identified within manufacturing although similar trends were identified in retail and catering. Manufacturers employing greater numbers of food handlers were also more likely to employ temporary food handlers. Although similar trends were identified in the other two industry sectors, these relationships did not prove statistically significant.
Table 3.4. Trends in the Employment of Part-time and Temporary Food Handlers.

<table>
<thead>
<tr>
<th></th>
<th>Manufacturing (n = 75)</th>
<th>Retail (n = 88)</th>
<th>Catering (n = 91)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employ no part time food handlers.</td>
<td>40%</td>
<td>29%</td>
<td>22%</td>
</tr>
<tr>
<td>Employ only part time food handlers.</td>
<td>4%</td>
<td>17%</td>
<td>18%</td>
</tr>
<tr>
<td>Mean proportion of food handlers who were part time staff.</td>
<td>25%</td>
<td>44%</td>
<td>48%</td>
</tr>
<tr>
<td>Employ temporary food handlers.</td>
<td>51%</td>
<td>16%</td>
<td>34%</td>
</tr>
</tbody>
</table>

* Significant difference, manufacturing vs non-manufacturing. \(U_{75-72, 75-173} = 4211, P < 0.001\).  
  
* Significant variation in sector responses \(X^2_{df=2} = 22.2, P < 0.001\).

The interviews highlighted contrasting opinions as to the relative merits of employing different types of staff with one manufacturing manager commending his temporary staff whilst another was reluctant to use them. Meanwhile, another manager suggested that part time workers were often more productive than full time staff:

"In many ways we’ve found them (temporary staff) to be the best staff that we have because they’re older people, about 40/50 years of age, generally women who are looking for something to do." (Independent food manufacturer, 16FHs)

"The cheaper you try and get the temporary workers for, the less of an education they’ve had...they are basically a waste of time for us... I’ve found that you spend that much of the time worrying about what they could be doing." (Independent food manufacturer, 13FHs)

"You get far more out of your part timers than you do out of your full timers. Because they come into work fresh, it’s a change... they’re coming out and they want to get their teeth into it." (Independent general stores, 6FHs)

Business status is the final baseline characteristic to be considered, with the results showing that the majority (72% manufacturers, 84% retailers, 78% caterers) were single, independent businesses. The remainder fell in to five other categories, of which 21% of manufacturers and 7% of retailers were part of national or multinational chains, 8% of retailers operated under a franchised name and 11% of caterers were under local authority control, namely school or hospital kitchens. Business size and status were positively associated in the manufacturing, retail and catering sectors alike.

3.3.2. Food Hygiene Management Systems.

Respondents were asked to identify the systems used to manage food hygiene and which of a range of other good hygiene practices they were carrying out, including practices relating
to each of the seven principles of HACCP. Table 3.5 shows the clear difference in the use of HACCP across the three industry sectors, although an additional 12% of caterers were using Assured Safe Catering.

### Table 3.5. Trends in the Application of the Principles of HACCP and Full HACCP Systems.

<table>
<thead>
<tr>
<th></th>
<th>Manufacturing (n = 75)</th>
<th>Retail (n = 88)</th>
<th>Catering (n = 91)</th>
<th>Significant difference in sector responses?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full HACCP system</td>
<td>69%</td>
<td>13%</td>
<td>15%</td>
<td>$\chi^2_{df=2} = 77, P &lt; 0.001$</td>
</tr>
<tr>
<td>Hazard analysis</td>
<td>80%</td>
<td>24%</td>
<td>37%</td>
<td>$\chi^2_{df=2} = 57, P &lt; 0.001$</td>
</tr>
<tr>
<td>Identification of CCPs</td>
<td>88%</td>
<td>28%</td>
<td>43%</td>
<td>$\chi^2_{df=2} = 64, P &lt; 0.001$</td>
</tr>
<tr>
<td>Target values and critical limits</td>
<td>64%</td>
<td>20%</td>
<td>30%</td>
<td>$\chi^2_{df=2} = 37, P &lt; 0.001$</td>
</tr>
<tr>
<td>Control and monitoring</td>
<td>61%</td>
<td>16%</td>
<td>31%</td>
<td>$\chi^2_{df=2} = 39, P &lt; 0.001$</td>
</tr>
<tr>
<td>Corrective action.</td>
<td>71%</td>
<td>45%</td>
<td>58%</td>
<td>$\chi^2_{df=2} = 11, P &lt; 0.005$</td>
</tr>
<tr>
<td>Documentation</td>
<td>95%</td>
<td>48%</td>
<td>63%</td>
<td>$\chi^2_{df=2} = 41, P &lt; 0.001$</td>
</tr>
<tr>
<td>Verification</td>
<td>83%</td>
<td>43%</td>
<td>65%</td>
<td>$\chi^2_{df=2} = 29, P &lt; 0.001$</td>
</tr>
</tbody>
</table>

* A further 12% of caterers indicated that they were using Assured Safe Catering

Significant differences were also identified in the application of each individual HACCP principle, with manufacturers again more likely to have carried them out although a substantial proportion of retail and catering businesses identified corrective action, documentation and verification activities, despite the low levels of HACCP use in these sectors. Nevertheless, comments made by two of those interviewed suggested a lack of basic knowledge and understanding of hazard analysis procedures:

"I've heard of hazard analysis but I have to say I don't think I could explain it properly to you." (Independent general stores, 4FHs)

"I think there was a leaflet about hazard analysis from the environmental health. I know they sent me a huge envelope full of things but half of it wasn’t really relevant to us." (Independent Indian restaurant, 4FHs)

If the level of HACCP use across all three sectors is interpreted as those businesses which stated they were using HACCP and identified that they carried out all seven HACCP principles, then only 43% of manufacturers, 3% of retailers and 10% of caterers could be said to have full HACCP systems. Among manufacturers who claimed to be using HACCP, businesses with fewer food handlers were likely to have significantly fewer of the
seven HACCP principles in place. Manufacturers that claimed to have all seven HACCP principles in place employed greater numbers of food handlers than those that did not. Only 47% of manufacturers, compared to 9% of retailers and 15% of caterers identified that they were carrying out each of the five HACCP based legal requirements.

Comparison of reported HACCP use with the numbers of food handlers employed identified a statistically significant association among manufacturers in particular, although similar trends were seen among retailers and caterers. In each case, businesses operating HACCP were likely to employ greater numbers of food handlers. No statistically significant differences were identified between independent or non-independent retailers in terms of their use of HACCP although there were differences in the use of HACCP by different types of retail business. For instance, 23% of butchers and 33% of bakers stated that they were using HACCP compared to only 5% of all other retail businesses. Independent manufacturers were significantly less likely than other manufacturers to be using HACCP with a similar trend identified among caterers. The trends in HACCP use across the three sectors and by size of business were often reflected in the balance of the comments made by those interviewed (Table 3.6).

Those interviewed that were not using HACCP commonly explained that they thought such systems were generally inappropriate for them, being the domain of ‘big business’ and too burdensome for them to carry out. Particular issues highlighted were concerns about costs, time and available expertise. By contrast, several of those who were using HACCP were keen to suggest that HACCP could and should be applied regardless of sector or size. However, two interviewees representing larger organisations that were part of multinational chains did not believe that HACCP would be easily applied in smaller retail or catering establishments, suggesting that the current controls were surely sufficient or the use of guidelines rather than full systems.
Table 3.6. Managerial Opinions Towards the Applicability of HACCP to Theirs and Other Businesses.

HACCP Not Suited to Smaller Retailers and Caterers

“They are for the big companies... there’s enough paperwork as it is without increasing it... (HACCP) would just make things more complicated.” (Independent Indian restaurant, 4FHs)

“When you’re within a large organisation and you’re responsible for more than one premises and you don’t know what is going on all the time then you have to put these systems in.” (Independent general stores, 4FHs)

“If we did it (hygiene management) the same as the big companies we’d need an actual person just for that job.” (Independent café, 41FHs)

“Unless somebody said to me well if you don’t do it we’ll have to close you down then no I wouldn’t do it... if you’re running a great big kitchen it’s more critical that you’re doing something like that.” (Independent café / restaurant, 5FHs)

“The type of products we are handling, they don’t really warrant any investment in, if you like, fine tuning that particular side of it (i.e. HACCP).” (Independent retailer / distributor, 1FH)

“They (formal hygiene systems) will make it even more difficult for the small man to survive... I know that an awful lot of butchers that are one man businesses.” (Independent butcher, 6FHs)

“If people who are producing HACCP and who are enforcing them particularly don’t recognise that the practical implementation of them is difficult for a guy in a shop, it costs them time, it costs money and that he can’t employ other people, then nobody will pay any attention to it.” (Independent butcher, 6FHs)

“If we were expected to say comply with HACCP then we would be forced to close down because we simply haven’t got the turnover to afford it... we can’t employ a flow system because the unit just isn’t geared up for it... if you have a single type of product then HACCP is pretty easy because you can verify things as you go... but it is very difficult to apply unless you can afford to have lots of people who just do that one thing.” (Independent caterer, 4FHs)

“We’re too small to have any kind of real system, everybody in this shop does everything... I don’t object to hazard analysis because it’s what most people do anyway but you’re talking about courses and you’re talking about putting into action kind of systems that are going to take you longer to carry out than it does to run the shop.” (Independent delicatessen, 8FHs)

“You don’t need to do a HACCP audit on a little shop... surely a set of some guidelines would be better.” (Multinational brewery, 55FHs)

“Don’t you feel that the EHO’s anyway are currently enforcing the controls that a HACCP plan would list... so what extra would a written plan offer... I don’t think that that level of operator (small retail/catering) is ready for HACCP... can I see it taking place in a Chinese takeaway... only if it became legislation, only if they had no choice.” (Multinational food manufacturer, 31FHs)

All Businesses Should / Could Use HACCP

“If you’re self disciplined it (HACCP) is not a problem... I think anybody who runs food ought to do it” (Independent food manufacturer, 6FHs)

“You can apply it (HACCP) to all systems, the ground rules seem pretty good to myself... it should be simpler as well (for small companies) because usually the smaller you are the less variety of products you’ve got.” (Independent food manufacturer, 13FHs)

“It’s quite easy to look at something and say whether it’s a critical control point or not... if people are saying it is too difficult then I think it’s an excuse... I can’t see how it (HACCP) is a problem... yes it’s a bit of a pain setting it all up but once it’s set up it runs smoothly.” (Independent residential home, 5FHs)
Table 3.7 describes the range of use of various good hygiene practices which, as noted by two of the managers interviewed, are likely to form the basis of any HACCP system:

“You should have them (good hygiene practices) in without HACCP.” (Independent manufacturer, 13FHs)

“This (HACCP) is all very well but it's only the final end point of a much more thorough and integrated process of hygiene... HACCP's not a substitute for the application of principles of hygiene.... it's better to have good hygiene practices in place before starting the HACCP process.” (Multinational brewery, 55FHs)

<table>
<thead>
<tr>
<th>Table 3.7. Trends in the Application of General Good Hygiene Practices.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Cleaning schedules</td>
</tr>
<tr>
<td>Stock rotation</td>
</tr>
<tr>
<td>Temperature monitoring of foods</td>
</tr>
<tr>
<td>Microbiological testing</td>
</tr>
<tr>
<td>Inspection of foods on delivery</td>
</tr>
<tr>
<td>Monitoring staff for illness / infection</td>
</tr>
</tbody>
</table>

* NS = not statistically significant.

Cleaning schedules, stock rotation and temperature monitoring were reported by the majority of businesses. Only 6% of retail and 2% of catering businesses, compared to 71% of manufacturers were carrying out microbiological testing, with several interviewees seemingly happy to comment upon their own lack of microbiological awareness.

“To be honest that there are more and more bacteria coming out of the woodwork these days and a lot of us haven't heard of them.” (Independent general stores, 4FHs)

“It (microbiology) is alien to me.” (Independent Indian restaurant, 4FHs)

“The science of things is all very well but I'm not here needing to know the science of it... at the end of the day my responsibility lies in selling stuff that is of good quality and within the date” (Independent general stores, 4FHs)

Within the manufacturing sector, businesses carrying out microbiological testing were likely to employ significantly greater numbers of food handlers 16 whilst significant differences between sectors were also identified between the practice of inspecting...
foodstuffs on delivery and monitoring staff for illness or infection. Despite the figures presented, comments made by several of those interviewed suggested that being implemented ‘on paper’ was not a guarantee that this was the case in practice:

"The biggest issue is people, the systems themselves are OK as long as they’re being operated to properly." (Multinational food manufacturer, 450FHs)

“We have written cleaning procedures, the problem is they’re not followed properly, this is a problem where we don’t have proper supervisors as such on the floor... our staff are very good at cleaning when they do it, the problem is they don’t, they can be haphazard at times.” (Independent food manufacturer, 16FHs)

“If your cleaning staff have favourite areas which they always do, they look wonderful because they’re easily cleaned but the bits you’re supposed to get left for a long time.” (Multinational food manufacturer, 31FHs)

“They (EHOs) have left pamphlets, particularly about recording temperatures of fridges on a daily basis but there’s been no pressure to keep up with them and I must confess we haven’t done.” (Independent butcher, 6FHs)

### 3.3.3. Sources of Advice on Food Hygiene Management.

Table 3.8 demonstrates that EHOs are by far the most common source of advice on food hygiene management. However, trade associations also play a role for many manufacturers and retailers in particular. Manufacturers were the most likely to have had advice from in house experts and external consultants. Further analysis demonstrated the positive relationship between business size and the likelihood that such advice had been received. Only 34% of manufacturers, 23% of retailers and 24% of caterers indicated that they would appreciate more advice on food hygiene management from any of these groups.

<table>
<thead>
<tr>
<th>Source of Advice</th>
<th>Manufacturing (n = 75)</th>
<th>Retail (n = 88)</th>
<th>Catering (n = 91)</th>
<th>Significant difference in sector responses?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Health Officers (EHOs)</td>
<td>77%</td>
<td>83%</td>
<td>88%</td>
<td>NS*</td>
</tr>
<tr>
<td>Local Authorities Coordinating Body on Trading Standards (LACOTS)</td>
<td>16%</td>
<td>17%</td>
<td>18%</td>
<td>NS</td>
</tr>
<tr>
<td>Trade Associations</td>
<td>45%</td>
<td>40%</td>
<td>18%</td>
<td>( \chi^2_{df=2} = 17, P &lt; 0.001 )</td>
</tr>
<tr>
<td>External consultants / in-house experts</td>
<td>34%</td>
<td>2%</td>
<td>4%</td>
<td>( \chi^2_{df=2} = 45, P &lt; 0.001 )</td>
</tr>
</tbody>
</table>

*NS = not statistically significant.
The interview data provided further evidence to explain the lower use of either consultants or in house expertise by retail, catering and smaller manufacturing businesses, due in the main to cost considerations:

"They (large companies) have probably got a sort of safety and health officer within the company, someone whose job is to do that... we couldn't afford to do anything like that." (Independent Indian restaurant, 4FHs)

"It's very easy for large companies which have got margins on their products to get consultancy... but generally most consultancy is far too expensive... companies like us cannot afford that, especially when we were starting up." (Independent food manufacturer, 16FHs)

"We've done all ours in house and if we've had any questions we've gone to the EHO. It would be nice to think that everyone could do that... the big companies would probably employ people to do it (HACCP) because they could afford it but I don't know about the smaller companies." (Independent food manufacturer, 13FHs)

With Environmental Health Officers (EHOs) identified as the main source of advice, the interviews with business managers were able to further investigate these relationships as well as general perceptions towards industry regulation and enforcement. The majority of managers showed a keen interest to discuss these issues and the views expressed contrasted between those who pointed to their own healthy relationships with EHOs, and those critical of what they perceived as their lack of practical experience and their tendency to go to the farthest degree in every respect. Even among those whose own relationship with local EHOs was good, there was general recognition of the need for and benefits of having EHOs who are able to recognise the practicalities of specific situations.

However, several of those interviewed felt that their businesses were somehow being dealt with unfairly or at least more stringently than other businesses, both locally within the UK and in comparison to counterparts across Europe (Table 3.9). Managers of larger scale businesses who commented on this issue tended to believe that smaller businesses should perhaps be vetted more closely although the managers of the smaller businesses interviewed also felt that there were others getting away with things that they were being forced to address. Adding to these views were a number of managers who rather than focusing upon inequalities of enforcement between businesses, believed that there should be a general tightening up of enforcement across the board, recommending wider licensing for all food businesses.
Table 3.9. Managerial Opinions Towards the Equality of Enforcement Across the Food Industry.

“They (EHOs) are gunning for the big guys when it comes to complaints and prosecutions when perhaps they should be spending more time on educating and improving the smaller areas.” (Multinational manufacturer, 450FHs)

“I think that bigger companies do get a raw deal in that it is better for environmental health to go after a big company because it will make sort of good headlines in the paper. There’s certain areas of the food business where you know contraventions are happening every day but on the day environmental health go in everything’s fine... it’s that end of the market, it’s the takeaways, it’s the sandwich shops... they don’t get the pressure from environmental health that we do.” (Independent hotel, 10FHs)

“When you go out and see some of the dives that are around .... you wonder to yourself, do they ever get an inspection.... it’s got to be the same across the board.” (Event function caterer, 23FHs)

“There are people slipping through the net and yet it’s the people who abide by the rules and regulations who get the regular visits.” (Independent general stores, 6FHs)

“At a practical level, I don’t think there’s a great policing of food safety... whatever legislation you have in the world there are some catering operations where it’s really not effectively reaching the people” (Independent retailer, 1FH)

“I think our authorities are very strict here, with the people they feel they can be strict with, and the people that perhaps bother them get away with it.” (Independent delicatessen, 8FHs)

“I think we’re the only EU country that actually applies them to the letter because you go over to France, they’re not applying the regulations.” (Independent Indian restaurant, 4FHs)

“I get really cross about the way they can sell things in France at the markets... since we’ve been in the EEC we seem to get lumbered with all these regulations which are not carried out by every country.” (Independent delicatessen, 8FHs)

3.3.4. Risk to Food Safety.

Respondents were asked what risk to food safety, low, medium or high, they thought their business represented (Table 3.10). Most businesses in each sector identified themselves as low risk whilst only 19% of caterers identified themselves as high risk. Accurate interpretation of the risk perception data should take account of the handling practices of the businesses involved, with at least some of those interviewed positively recognising the higher risks involved in their own handling practices:

“We sell a lot of high risk products which we sell chilled, so you’ve got to be extremely careful with your dates and your rotation and with your temperatures in your cabinets” (Independent general stores, 6FHs)

“We’re a high risk status because we’re selling cooked, fresh food.” (Independent general stores, 6FHs)

“We’re dealing with raw food and cooked foods so obviously you’ve got to be careful to keep them separate and that’s really why I would call it high risk” (Independent café, 5FHs)
Table 3.10. Managerial Perceptions of the Risk to Food Safety Presented by Their Business.

<table>
<thead>
<tr>
<th>Risk level</th>
<th>Manufacturing (n = 75)</th>
<th>Retail (n = 88)</th>
<th>Catering (n = 91)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>21%</td>
<td>13%</td>
<td>19%</td>
</tr>
<tr>
<td>Medium</td>
<td>26%</td>
<td>24%</td>
<td>25%</td>
</tr>
<tr>
<td>Low</td>
<td>53%</td>
<td>59%</td>
<td>48%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>-</td>
<td>5%</td>
<td>8%</td>
</tr>
</tbody>
</table>

* No statistically significant differences in sector responses.

b Don’t know responses were treated as missing cases for the purposes of statistical analysis.

Overall, 84% of catering businesses handled both raw and cooked meat or fish products, presenting the risk of cross contamination, compared to 47% of retailers and only 28% of manufacturers. Businesses handling this combination of products were generally more likely to identify themselves as high or medium risk, although when considered in isolation there was no significant difference within the catering sector. Businesses using HACCP were also more likely to identify themselves as high risk. Providing further data to complement managers risk perceptions, respondents were asked at what frequency they were inspected by EHOs (Table 3.11). Approximately two thirds of all businesses in each sector were inspected at least once a year whilst only a small proportion had not yet been inspected. Businesses inspected more regularly (i.e. at least once a year) were significantly more likely to be considered medium and high risk by their managers. No statistically significant associations were identified between the frequency of inspection and the handling of raw and cooked meat products, use of HACCP or size of business.

Table 3.11. Frequency of Local Authority Food Hygiene Inspections

<table>
<thead>
<tr>
<th>Time Periods</th>
<th>Manufacturers (n = 75)</th>
<th>Retailers (n = 88)</th>
<th>Caterers (n = 91)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-6 mths</td>
<td>41%</td>
<td>34%</td>
<td>35%</td>
</tr>
<tr>
<td>7-12 mths</td>
<td>32%</td>
<td>31%</td>
<td>32%</td>
</tr>
<tr>
<td>13 mths - 2 yrs</td>
<td>16%</td>
<td>26%</td>
<td>25%</td>
</tr>
<tr>
<td>Over 2 yrs</td>
<td>9%</td>
<td>7%</td>
<td>3%</td>
</tr>
<tr>
<td>Not yet inspected</td>
<td>1%</td>
<td>2%</td>
<td>4%</td>
</tr>
</tbody>
</table>

* No statistically significant differences in sector responses.

Perceived responsibility for food safety was also assessed as a factor associated with these managerial risk perceptions. Only 29% of retailers and 35% of caterers compared to 67% of manufacturers believed their sector had the greatest responsibility for food safety.
However associations between these views and managerial risk perceptions did not prove statistically significant in any industry sector. The comments in Table 3.12 expand on the issue of responsibility with managers keen to express opinions on who or what was most to blame for the food poisoning problem.

**Table 3.12. Managerial Opinions on the Relative Responsibility for Food Safety.**

'Look at the people in the war, look how they lived, what they ate, what did they catch?' (Independent butcher, 2FHs)

"At the end of the day if you look at how many meals are produced in the country every year and how many cases of food poisoning do crop up, it's not a lot, it's fairly minor." (Independent hotel, 10FHs)

'I think we are overly hygienic, I was always brought up on the theory that a bit of dirt never hurt anybody.' (Independent delicatessen, 4FHs)

"It (food hygiene) is self-defeating because the more we purify food, the more susceptible we are to viruses or any sort of food problem." (Independent caterer, 4FHs)

"We (butchers) are experienced, we've been doing the job for many years, we know about cross contamination, but I mean why should the general housewife" (Independent butcher, 4FHs)

"I think the public has to blame themselves a lot... you can control the production, you control the distribution, you can control the shops where it's being sold, after that you have lost control." (Independent food manufacturer, 6FHs)

"I would bet any money you like that 90 per cent of cases of food poisoning occur in their own home" (Franchised general stores, 8FHs)

"It's more likely that it (food poisoning) would originate in the home, some peoples standards are deplorable." (Independent café, 5FHs)

"People have this misunderstanding that they should be able to expect perfect food with no possible risk yet at the same time people are saying that they don't want genetic modification of foods or they don't want irradiation." (Independent food manufacturer, 16FHs)

"There's a lack of skill and knowledge about meat products from a whole range of people who are involved in using that product" (Independent butcher, 6FHs)

"I would say that the percentage of abuses that occur in the kitchen is far greater than either occur in the farm, in the factory or in the shop... you can't control the lethal end which is the person eating it." (Multinational food manufacturer, 31FHs)

Several managers pointed to changes in the immunity of the general population, whilst a range of remarks placed much of the blame with consumers, perceived as being unaware of food safety risks and safe food handling practices. Mention was also made of the fact that consumer pressure had limited the development of technologies such as irradiation or genetic modification. This apparent shifting of responsibility for food safety was in some cases allied to a view that a lack of previous problems with food poisoning problems meant that they were operating effectively.
Table 4.13 describes the sources which informed respondents' food safety risk perceptions. EHOs were the most commonly cited by each of the three sectors, although retailers and caterers were significantly more likely to cited this source. Industry codes of practice and trade associations were highlighted by over one third of businesses whilst around a quarter of retailers and caterers suggested that the media had helped inform their risk perception.

Table 3.13. Sources that Informed Managerial Risk Perceptions.

<table>
<thead>
<tr>
<th></th>
<th>Manufacturing (n = 75)</th>
<th>Retail (n = 88)</th>
<th>Catering (n = 91)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The media</td>
<td>14%</td>
<td>26%</td>
<td>24%</td>
</tr>
<tr>
<td>EHOs</td>
<td>59%</td>
<td>74%</td>
<td>85%</td>
</tr>
<tr>
<td>Industry codes</td>
<td>45%</td>
<td>33%</td>
<td>41%</td>
</tr>
<tr>
<td>Trade associations</td>
<td>32%</td>
<td>33%</td>
<td>21%</td>
</tr>
</tbody>
</table>

* Significant difference in sector responses ($\chi^2_{df=2} = 13.3, P = 0.001$)

3.3.5. Managerial Attitudes Towards HACCP and General Food Safety Issues.

Attitude scaling was used to determine attitudes towards HACCP systems and other food hygiene related issues (Table 3.14).

Table 3.14. Managerial Attitudes Towards HACCP and other General Food Hygiene Management Issues (n = 254)

<table>
<thead>
<tr>
<th>Attitude statements</th>
<th>Agree</th>
<th>Neither agree / disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal hygiene systems, e.g. HACCP, are difficult to apply in a business of your size.</td>
<td>42%</td>
<td>27%</td>
<td>32%</td>
</tr>
<tr>
<td>Formal hygiene systems, e.g. HACCP, are difficult to apply in your sector of the industry.</td>
<td>28%</td>
<td>35%</td>
<td>37%</td>
</tr>
<tr>
<td>It is easy to get information on systems like HACCP.</td>
<td>45%</td>
<td>34%</td>
<td>21%</td>
</tr>
<tr>
<td>The management of food hygiene is expensive to implement.</td>
<td>32%</td>
<td>29%</td>
<td>39%</td>
</tr>
<tr>
<td>Management of food hygiene increases long-term business costs.</td>
<td>39%</td>
<td>26%</td>
<td>35%</td>
</tr>
<tr>
<td>Customers are willing to pay more for safer food products.</td>
<td>39%</td>
<td>31%</td>
<td>30%</td>
</tr>
<tr>
<td>Expert advice on food hygiene is too expensive.</td>
<td>31%</td>
<td>34%</td>
<td>36%</td>
</tr>
</tbody>
</table>

* Respondents were initially invited to respond on a 5 point scale from strongly agree to strongly disagree.

b Statistically significant difference in responses between industry sectors.
Significant differences in sector responses were identified for several of the statements. Retailers were less likely than non-retailers to disagree that systems such as HACCP were difficult to apply to businesses of their size \(^{23}\) or their industry sector \(^{24}\). Manufacturers were more likely than non-manufacturers to agree that it was easy to get information on HACCP \(^{25}\). Within the retail sector, businesses using HACCP were more likely to agree with the ease of accessing HACCP information \(^{26}\). Caterers using HACCP were less likely to agree that such systems were difficult to apply to businesses of their size \(^{27}\) or sector \(^{28}\) with similar trends seen across the manufacturing sector \(^{29},^{30}\). Manufacturers were also significantly more likely to agree that it was easy to get information on HACCP \(^{31}\). Across the whole sample there was a strong positive correlation between agreement that systems such as HACCP were difficult to apply to businesses of both their size and sector \(^{32}\).

Caterers agreeing that HACCP was difficult to apply in businesses of their size were likely to employ fewer numbers of food handlers \(^{33}\) with the same true of manufacturers although this relationship was not quite statistically significant. Caterers \(^{34}\) and retailers \(^{35}\) agreeing that formal hygiene systems were difficult to apply to their sector employed fewer food handlers. Further analysis of the final four statements listed showed that caterers were more likely to have disagreed that the management of food hygiene was expensive \(^{36}\). Across the whole sample, businesses using HACCP were less likely to agree that expert food hygiene advice was too expensive \(^{37}\). However, no statistically significant relationships were identified between business size and attitudes towards the expense of food hygiene management, external expertise or customers willingness to pay for safer food products.

Although the survey paid only cursory consideration of attitudes towards consumers willingness to pay for food safety, this was a recurring theme from the majority of the interviews. The views of those interviewed were generally of the opinion that even if consumers are influenced by food safety concerns, these normally came second to price, convenience or other considerations (Table 3.15).
Table 3.15. Managerial Opinions Towards Customers’ Willingness to Pay for Food Safety.

“Consumers were worried about BSE when it was 2 quid a pound but when it was 50 pence a pound they weren’t so worried.” (Local chain butcher, 6FHs)

“The customer is only interested in two things, one is reliability and the other is cost. They don’t expect to have to pay you extra for it (safety).” (Independent caterer, 4FHs)

“There’s certainly a large core that care now about food quality who are well educated and switched on to the risks of food... but I think there aren’t many people prepared to pay the premium that’s involved.” (Multinational food manufacturer, 3FHs)

“I don’t think they look at things that go on behind the scenes at all, they’re more concerned with how much is it and what are they getting.... people just expect that you’re doing the things that you need to be doing to put food in front of them safely.” (Independent café / restaurant, 5FHs)

“The majority of the customers I would say are very price conscious.” (Independent general stores, 6FHs)

“People are aware of places that are dirty, untidy, unclean and always flogging stuff that’s short dated.... but people around here are prepared to buy those sorts of things” (Independent general stores, 4FHs)

“People do like to go in nice shops, but they will not pay more” (Independent butcher, 4FHs)

“They don’t care what happens at the back door as long as they get is tasty and they’re paying the right sort of money for it.” (Independent hotel, 10FHs)

“Personally I don’t think that people consider the safety aspect, they go because they like a place.... they like the food, it’s convenient.” (Independent Indian restaurant, 4FHs)

3.3.6. Food Hygiene Training Delivery.

Table 3.16 shows the trends in food hygiene training delivery, with respondents asked to identify the food hygiene training provided for any staff at each grade. In 70% of cases at least some full-time food handlers had attended a formal course, compared to only 46% and 26% of businesses in the case of part time and temporary staff respectively. Full-time food handlers received on-the-job training in 59% of businesses, compared to 78% and 79% for part-time and temporary food handlers. Temporary food handlers were most likely to have received induction training and whilst managers in most businesses had been on food hygiene courses, less than a third had received any specific HACCP training.

Manufacturers were significantly more likely than non-manufacturing business to give induction training to full time 38, part time 39 and temporary food handlers 40, as well as business managers 41. Similar trends were found as regards on the job training 42, refresher training 43 and HACCP training for business managers 44 as well as HACCP training for full time food handlers 45. These final two statistics reflect the wider use of HACCP by manufacturers, although only 21% of all businesses using HACCP appeared to have trained any full time food handlers in the system and only 60% had managers with any specific

63
HACCP training. Where managers had received HACCP training then 75% of businesses were carrying out all seven of the principles of HACCP, compared to only 42% of businesses where managers had not received any HACCP training 46.

Table 3.16. Trends in Food Hygiene Training Provision for Different Staff (n = 254).

<table>
<thead>
<tr>
<th>Type of training</th>
<th>Full Time FHs</th>
<th>Part Time FHs</th>
<th>Temporary FHs</th>
<th>Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not trained</td>
<td>7%</td>
<td>5%</td>
<td>9%</td>
<td>4%</td>
</tr>
<tr>
<td>Induction training</td>
<td>33%*</td>
<td>34%*</td>
<td>50%*</td>
<td>32%*</td>
</tr>
<tr>
<td>On the job training</td>
<td>59%</td>
<td>78%</td>
<td>79%</td>
<td>52%*</td>
</tr>
<tr>
<td>Food hygiene course</td>
<td>70%*</td>
<td>46%*</td>
<td>26%</td>
<td>81%</td>
</tr>
<tr>
<td>Refresher training</td>
<td>19%*</td>
<td>14%*</td>
<td>5%</td>
<td>29%*</td>
</tr>
<tr>
<td>HACCP training</td>
<td>8%*</td>
<td>4%</td>
<td>0%</td>
<td>31%*</td>
</tr>
</tbody>
</table>

*Figures represent businesses where any of that grade have received such training.
*Statistically significant difference in responses between industry sectors as derived by a chi square test.

Full 47 and part time food handlers 48 in retail businesses were less likely to have been on food hygiene courses and were also less likely to have received refresher training 49, 50. If retail managers believed that their business presented a low risk to food safety then full-time food handlers 51 and managers 52 were less likely to have been on a formal course. A similar trend was identified for part timers in the catering sector 53, whilst manufacturers perceived to be high risk were most likely to give induction training to temporary staff 54.

Business status was identified as a significant factor in the delivery of induction training to full-time 55, part-time 56 and temporary food handlers 57 within manufacturing businesses. Within catering, significant differences were identified in refresher training for full-time food handlers 58, as well as food hygiene courses 59 and refresher training 60 for part-time food handlers. Among retail businesses, significant differences existed as regards induction training 61 and food hygiene courses 62 for full-time food handlers. In each of these cases, staff from independent businesses were less likely to receive each type of training. Meanwhile, full time food handlers from larger retail 63 and manufacturing 64 businesses were more likely to have been on food hygiene courses. A similar pattern was identified amongst managers from retail 65 and manufacturing businesses 66. Where part time food handlers within the catering sector made up a greater proportion of the total food handling staff, these staff were more likely to have been on a food hygiene course 67. The
interviews with business managers highlighted cost and time considerations as a significant influence upon training strategies, especially the provision of formal courses away from the business, requiring cover to be provided at an additional cost beyond that of the training itself. The provision of such training for temporary staff was particularly highlighted as not cost effective.

### 3.3.7. Food Hygiene Qualification Levels.

Table 3.17 follows on from Table 3.16, to show the levels of food hygiene qualification. Within each sector, managers were the most highly qualified staff, with 28% of manufacturers and 31% of catering businesses employing managers with advanced qualifications. However, no managers were qualified in 35% of retail businesses. A chi square test confirmed the significant difference in qualification levels between retail and non-retail businesses. Similar proportions of full time food handlers as managers were qualified in each of the industry sectors albeit not to as high levels. Catering businesses employed the highest qualified full time food handlers, holding intermediate or advanced qualifications in 39% of businesses. The differences in these qualification levels across all three industry sector were again statistically significant.

<table>
<thead>
<tr>
<th>Qualification</th>
<th>None Qualified</th>
<th>Basic</th>
<th>Intermediate</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full Time Food Handlers</strong>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturers</td>
<td>7%</td>
<td>80%</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>Retailers</td>
<td>44%</td>
<td>51%</td>
<td>5%</td>
<td>-</td>
</tr>
<tr>
<td>Caterers</td>
<td>20%</td>
<td>41%</td>
<td>29%</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Part Time Food Handlers</strong>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturers</td>
<td>22%</td>
<td>76%</td>
<td>2%</td>
<td>-</td>
</tr>
<tr>
<td>Retailers</td>
<td>60%</td>
<td>35%</td>
<td>5%</td>
<td>-</td>
</tr>
<tr>
<td>Caterers</td>
<td>34%</td>
<td>47%</td>
<td>12%</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Temporary Food Handlers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturers</td>
<td>62%</td>
<td>38%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Retailers</td>
<td>70%</td>
<td>30%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Caterers</td>
<td>52%</td>
<td>37%</td>
<td>11%</td>
<td>-</td>
</tr>
<tr>
<td><strong>Managers</strong>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturers</td>
<td>11%</td>
<td>42%</td>
<td>19%</td>
<td>28%</td>
</tr>
<tr>
<td>Retailers</td>
<td>35%</td>
<td>45%</td>
<td>13%</td>
<td>7%</td>
</tr>
<tr>
<td>Caterers</td>
<td>19%</td>
<td>31%</td>
<td>20%</td>
<td>31%</td>
</tr>
</tbody>
</table>

* Figures represent the highest qualification level held per business.
* Statistically significant difference between industry sector responses.
Moving from full time to part time food handlers, the proportions of businesses where staff were qualified clearly falls. Only 40% of retailers employed any qualified part time food handlers whilst the general difference in qualification levels between sectors was statistically significant. Although part time food handlers in manufacturing businesses were most likely to be qualified, those in catering businesses were more likely to hold intermediate or advanced qualifications. Across the whole sample, as the perceived risk to food safety changed from low to high, full time food handlers and managers were more likely to hold food hygiene qualifications. Where businesses were using HACCP, managers were more likely to hold food hygiene qualifications and be qualified to a higher level.

Although basic food hygiene qualifications are the most commonly held, the comments made by those interviewed suggest that even though managers may have provided this training for their staff or taken it up themselves, in many cases they may have been dissatisfied with what this consisted of and the value for money that it represented (Table 3.18). However, a number of managers also emphasised the positive contribution that they felt this training made, both to behaviour and general staff morale.

Table 3.18. Managerial Opinions Towards the Value of Basic Food Hygiene Training.

"We'd been doing it for donkeys years and it basically is common sense... although we all thought it was a waste of time going to these hygiene courses, we still had to do it because we had to have the certificate.” (Independent café / restaurant, 5FHs)

"It (basic hygiene training) was unbelievable really... a lot of it is common sense...... it’s what I would call normal cleanliness and common sense.” (Independent general stores, 6FHs)

"I think that a ordinary middle class intelligible person would pass the basic one ...... they might not know much about salmonella and things like that but they would have enough of the basic hygiene instilled in them” (Franchised general stores, 8FHs)

"I didn’t think it contributed anything at all, I’d have had to have been an imbecile not to pass it, it was common sense again, I honestly can say I don’t think I learnt anything.” (Independent delicatessen, 8FHs)

"I think with all this stuff like training, they’ll be more aware of what’s actually going on and they’ll think twice before doing some of the things they have been doing in the past.” (Independent café, 41FHs)

"The chance to do something different and actually get a formal qualification... they were quite interested in it, I was myself as well, it’s nice to get something down on paper and get a certificate for it... it just shows that they’re good at what they do.” (Independent food manufacturer, 13FHs)

"I believe that staff appreciate being trained and when they take the training on board they seem to really take it seriously.” (National chain supermarket, 18FHs)

"They (staff) see it (training) as an investment in them in some ways and because it shows that we’ve taken an interest in them to do this they do take a more avid interest and they incorporate it into their work.” (Independent food manufacturer, 16FHs)
Overall, 62% of businesses had used in house staff to deliver food hygiene training, 30% had used EHOs, 25% had used local colleges and 11% had used other sources such as consultants. Whilst the use of these sources showed no significant variation by industry sector, further analysis revealed relationships between business size and training sources within each sector. Retailers using other sources such as consultants were likely to employ greater numbers of food handlers \(^{75}\). Manufacturers using in house staff to deliver training were also likely to employ greater numbers of food handlers \(^{76}\), as were businesses in the catering sector \(^{77}\). Across the whole sample, businesses using in house staff to deliver training were more likely to provide induction training \(^{78}\), on the job training \(^{79}\) and refresher training \(^{80}\) for full time food handlers. Meanwhile, businesses where full time food handlers had been on a food hygiene course were more likely to have used EHOs \(^{81}\), and local colleges \(^{82}\). Where businesses had used local colleges to deliver training, full time food handlers were more likely to hold food hygiene qualifications \(^{83}\).

Several of the managers interviewed expressed their preference for in house training as a means of reducing training costs and ensuring greater relevance to the workplace. However, managers also recognised that small businesses in particular may find it difficult to deliver training in this manner (Table 3.19).

**Table 3.19. Managerial Opinions Towards the Value of On-the-job or In-house Training.**

- "I felt that all my staff would probably have to have a basic food hygiene certificate and I thought well if I got the advanced one I could teach them.... if it’s on the job training then you train the new member in whatever is necessary to train them.... if you send them somewhere else it means that your new member of staff is of little use until they’ve been through the course." (Franchised general stores, 8FHs)

- "We do an induction straightaway as soon as we employ someone... we use our own in house trainers ..... it isn’t terribly expensive as far as he store is concerned” (National chain supermarket, 18FHs)

- "We normally have sufficient numbers to actually run training in house... It’s not just the kitchen staff, it’s the duty managers, it’s senior people in the restaurant, the night porters... their job might not be a food handler but they might be involved in food handling at some point.” (Independent hotel, 10FHs)

- "If you’re a large company you can afford to get people trained up really well and have shift managers etc., a small company can’t really do it because you’d have too many managers and not enough workers” (Independent food manufacturer, 13FHs)

- "It leads to a greater understanding and a greater linkage between management and staff" (Independent food manufacturer, 16FHs)

- "It’s cheaper, to me it is just the best way of doing it... I don’t think there’s a substitute for knowing the processes, the little foibles of your production line... we can afford to have our own on site trainers, the expertise is there... you can imagine for a smaller place they don’t have that luxury.” (Multinational food manufacturer, 450FHs)
3.3.9. Managerial Attitudes Towards Food Hygiene Training.

General attitudes towards food hygiene training were measured, with positive attitudes being expressed by most respondents (Table 3.20). Nevertheless, 21% and 26% did not express their disagreement as to whether training was worthwhile for part time and temporary staff with retailers least likely and manufacturers most likely to agree with the statement about part time staff. Similarly, 34% of respondents did not agree that food hygiene training enhances job satisfaction. If part time food handlers had been on a food hygiene course, respondents were more likely to have disagreed that food hygiene training was not worthwhile for these staff. No statistically significant differences were identified between responses from businesses of different sizes within the three sectors, nor between businesses with different numbers or proportions of part time staff or temporary staff.

Table 3.20. General Managerial Attitudes Towards Food Hygiene Training (n = 254).

<table>
<thead>
<tr>
<th>Attitude statements</th>
<th>Agree</th>
<th>Neither agree / disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food hygiene training is essential for all food handlers.</td>
<td>90%</td>
<td>8%</td>
<td>2%</td>
</tr>
<tr>
<td>Food hygiene training is not worthwhile for part time staff.</td>
<td>6%</td>
<td>15%</td>
<td>79%</td>
</tr>
<tr>
<td>Food hygiene training is not worthwhile for temporary staff.</td>
<td>9%</td>
<td>17%</td>
<td>75%</td>
</tr>
<tr>
<td>Food hygiene training enhances job satisfaction.</td>
<td>66%</td>
<td>26%</td>
<td>7%</td>
</tr>
<tr>
<td>Hands on training is the best way to acquire basic skills.</td>
<td>79%</td>
<td>15%</td>
<td>7%</td>
</tr>
</tbody>
</table>

* A 5 point Likert scale from strongly agree to strongly disagree was originally used.

b Statistically significant difference in responses from the three industry sectors studied.
<table>
<thead>
<tr>
<th></th>
<th>( \chi^2_{df=2} = 58, P &lt; 0.001 )</th>
<th>30. ( \chi^2_{df=2} = 10, P &lt; 0.01 )</th>
<th>59. ( \chi^2_{df=1} = 8.5, P &lt; 0.005 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>( \rho = +0.86, n = 72, P &lt; 0.001 )</td>
<td>31. ( \chi^2_{df=2} = 13, P = 0.001 )</td>
<td>60. ( \chi^2_{df=1} = 16, P &lt; 0.001 )</td>
</tr>
<tr>
<td>3.</td>
<td>( \rho = +0.76, n = 82, P &lt; 0.001 )</td>
<td>32. ( \rho = +0.7, n = 238, P &lt; 0.001 )</td>
<td>61. ( \chi^2_{df=1} = 4, P &lt; 0.05 )</td>
</tr>
<tr>
<td>4.</td>
<td>( \rho = +0.74, n = 91, P &lt; 0.001 )</td>
<td>33. ( \chi^2_{df=2} = 11, P = 0.005 )</td>
<td>62. ( \chi^2_{df=1} = 6, P &lt; 0.05 )</td>
</tr>
<tr>
<td>5.</td>
<td>( U_{N=38, Na=36} = 466, P &lt; 0.05 )</td>
<td>34. ( \chi^2_{df=2} = 8, P = 0.05 )</td>
<td>63. ( U_{N=Na=32} = 289, P &lt; 0.005 )</td>
</tr>
<tr>
<td>6.</td>
<td>( U_{N=53, Na=21} = 114, P &lt; 0.001 )</td>
<td>35. ( \chi^2_{df=2} = 11, P &lt; 0.005 )</td>
<td>64. ( U_{N=69, Na=12} = 152, P &lt; 0.005 )</td>
</tr>
<tr>
<td>7.</td>
<td>( U_{N=70, Na=13} = 257, P &lt; 0.05 )</td>
<td>36. ( \chi^2_{df=2} = 16, P &lt; 0.005 )</td>
<td>65. ( U_{N=28, Na=13} = 69, P = 0.001 )</td>
</tr>
<tr>
<td>8.</td>
<td>( U_{N=61, Na=20} = 354, P = 0.001 )</td>
<td>37. ( \chi^2_{df=2} = 7, P &lt; 0.05 )</td>
<td>66. ( U_{N=55, Na=8} = 122, P &lt; 0.05 )</td>
</tr>
<tr>
<td>9.</td>
<td>( \rho = +0.38, n = 52, P &lt; 0.01 )</td>
<td>38. ( \chi^2_{df=1} = 23, P &lt; 0.001 )</td>
<td>67. ( U_{N=Na=55} = 443, P &lt; 0.05 )</td>
</tr>
<tr>
<td>10.</td>
<td>( U_{N=32, Na=20} = 181.5, P &lt; 0.01 )</td>
<td>39. ( \chi^2_{df=1} = 14, P &lt; 0.001 )</td>
<td>68. ( \chi^2_{df=1} = 14, P &lt; 0.005 )</td>
</tr>
<tr>
<td>11.</td>
<td>( U_{N=52, Na=22} = 279.5, P = 0.001 )</td>
<td>40. ( \chi^2_{df=1} = 12, P &lt; 0.001 )</td>
<td>69. ( \chi^2_{df=4} = 54, P &lt; 0.001 )</td>
</tr>
<tr>
<td>12.</td>
<td>( U_{N=11, Na=72} = 222, P &lt; 0.05 )</td>
<td>41. ( \chi^2_{df=1} = 18, P &lt; 0.001 )</td>
<td>70. ( \chi^2_{df=4} = 29, P &lt; 0.001 )</td>
</tr>
<tr>
<td>13.</td>
<td>( U_{N=14, Na=77} = 347, P &lt; 0.05 )</td>
<td>42. ( \chi^2_{df=1} = 6, P &lt; 0.05 )</td>
<td>71. ( \chi^2_{df=2} = 14, P = 0.001 )</td>
</tr>
<tr>
<td>14.</td>
<td>( \chi^2_{df=1} = 8, P = 0.006 )</td>
<td>43. ( \chi^2_{df=1} = 8, P &lt; 0.005 )</td>
<td>72. ( \chi^2_{df=2} = 8, P &lt; 0.05 )</td>
</tr>
<tr>
<td>15.</td>
<td>( \chi^2_{df=1} = 20, P &lt; 0.001 )</td>
<td>44. ( \chi^2_{df=1} = 24, P &lt; 0.001 )</td>
<td>73. ( \chi^2_{df=4} = 6, P &lt; 0.05 )</td>
</tr>
<tr>
<td>16.</td>
<td>( U_{N=53, Na=21} = 306, P &lt; 0.005 )</td>
<td>45. ( \chi^2_{df=1} = 9, P &lt; 0.005 )</td>
<td>74. ( \chi^2_{df=3} = 12, P &lt; 0.01 )</td>
</tr>
<tr>
<td>17.</td>
<td>( U_{N=25, Na=49} = 326, P = 0.001 )</td>
<td>46. ( \chi^2_{df=1} = 5, P &lt; 0.05 )</td>
<td>75. ( U_{N=75, Na=42} = 82, P &lt; 0.05 )</td>
</tr>
<tr>
<td>18.</td>
<td>( \chi^2_{df=2} = 53, P &lt; 0.001 )</td>
<td>47. ( \chi^2_{df=1} = 16, P &lt; 0.001 )</td>
<td>76. ( U_{N=51, Na=23} = 365, P &lt; 0.01 )</td>
</tr>
<tr>
<td>19.</td>
<td>( \chi^2_{df=3} = 31, P &lt; 0.001 )</td>
<td>48. ( \chi^2_{df=1} = 10, P = 0.001 )</td>
<td>77. ( U_{N=51, Na=40} = 700, P &lt; 0.05 )</td>
</tr>
<tr>
<td>20.</td>
<td>( \chi^2_{df=2} = 11, P &lt; 0.005 )</td>
<td>49. ( \chi^2_{df=1} = 5, P &lt; 0.05 )</td>
<td>78. ( \chi^2_{df=1} = 6, P &lt; 0.01 )</td>
</tr>
<tr>
<td>21.</td>
<td>( \chi^2_{df=2} = 26, P &lt; 0.001 )</td>
<td>50. ( \chi^2_{df=2} = 6, P &lt; 0.05 )</td>
<td>79. ( \chi^2_{df=1} = 21, P &lt; 0.001 )</td>
</tr>
<tr>
<td>22.</td>
<td>( \chi^2_{df=2} = 12, P &lt; 0.005 )</td>
<td>51. ( \chi^2_{df=2} = 9, P &lt; 0.05 )</td>
<td>80. ( \chi^2_{df=1} = 5, P &lt; 0.05 )</td>
</tr>
<tr>
<td>23.</td>
<td>( \chi^2_{df=2} = 19, P &lt; 0.001 )</td>
<td>52. ( \chi^2_{df=2} = 11, P &lt; 0.005 )</td>
<td>81. ( \chi^2_{df=1} = 9, P &lt; 0.005 )</td>
</tr>
<tr>
<td>24.</td>
<td>( \chi^2_{df=1} = 21, P &lt; 0.001 )</td>
<td>53. ( \chi^2_{df=2} = 9, P &lt; 0.05 )</td>
<td>82. ( \chi^2_{df=1} = 15, P &lt; 0.001 )</td>
</tr>
<tr>
<td>25.</td>
<td>( \chi^2_{df=2} = 13, P &lt; 0.005 )</td>
<td>54. ( \chi^2_{df=2} = 6, P &lt; 0.05 )</td>
<td>83. ( \chi^2_{df=1} = 12, P = 0.001 )</td>
</tr>
<tr>
<td>26.</td>
<td>( \chi^2_{df=2} = 10, P &lt; 0.01 )</td>
<td>55. ( \chi^2_{df=1} = 10, P = 0.001 )</td>
<td>84. ( \chi^2_{df=4} = 12, P &lt; 0.05 )</td>
</tr>
<tr>
<td>27.</td>
<td>( \chi^2_{df=2} = 8, P &lt; 0.05 )</td>
<td>56. ( \chi^2_{df=1} = 5, P &lt; 0.05 )</td>
<td>85. ( \chi^2_{df=2} = 16, P &lt; 0.001 )</td>
</tr>
<tr>
<td>28.</td>
<td>( \chi^2_{df=2} = 10, P &lt; 0.01 )</td>
<td>57. ( \chi^2_{df=1} = 4, P &lt; 0.05 )</td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>( \chi^2_{df=2} = 6, P &lt; 0.05 )</td>
<td>58. ( \chi^2_{df=1} = 7, P &lt; 0.01 )</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.21. Values for the Statistically Significant Relationships Quoted in Chapter 3.3.
3.4. DISCUSSION.

3.4.1. Use of HACCP and General Hygiene Management.

The survey and interview findings presented in this chapter suggest that, despite forming the basis of current food safety legislation, HACCP is yet to be accepted across the whole of the UK food industry. Nevertheless, with 69% of manufacturers claiming to be using HACCP, the results confirm the perceived spread of HACCP across this sector (Ehiri et al. 1995; Meredith and Perkins, 1995), especially by larger businesses in local, national or multinational chains. Consequently, a substantial proportion of food products are being handled under HACCP conditions, albeit at only one point of a supply chain in which food products are handled as many as thirty-three times before reaching the consumer (Kantor et al., 1997). The figure of 69% of manufacturers who claimed to have full HACCP systems is broadly in line with the findings of Panisello et al. (1999) and Henson et al. (1999).

Interestingly, the trends identified within the manufacturing sector, both by this research and also by that of Panisello et al. (1999) and Henson et al. (1999) suggest wider levels of HACCP implementation than the more recent estimate of 59% implementation provided by the FSA (Food Standards Agency, 2001a). However, the extent to which self reporting of HACCP was backed up by the apparent implementation of all seven of the principles of HACCP suggested a more conservative figure of 43% implementation among manufacturers, which would suggest progress since the survey results were gathered.

By contrast, retail and catering businesses did not appear to have widely adopted HACCP, with less than one in six businesses claiming to be using the system and even fewer appearing to have implemented all seven HACCP principles. A further 12% of caterers claimed to be using Assured Safe Catering (Department of Health, 1993), although whether this is a particularly positive statistic is debatable given the considerable efforts taken to promote the system to caterers at the time and this approach now appears to have been overtaken by other developments. Nevertheless, the results do suggest improvements in the three years prior to the survey given that Perkins (1994b) found that only 7% of public houses had even heard of HACCP whilst none had any knowledge of Assured Safe Catering. This improvement would appear to have since continued with Gillespie et al. (2000) finding that 42% of catering premises had documented hazard analysis systems.
although this figure is significantly higher than the 19% of caterers estimated by local authorities to have documented HACCP in place (Food Standards Agency, 2001a).

The results from the retail sector, and butchers shops in particular are similar to those quoted by Little and de Louvois (1998) who found that 17% of butchers surveyed had fully documented HACCP systems. Despite the barriers to HACCP introduction in small bakeries described by Leitenberger and Rochen (1998), this segment of the retail sector appeared most likely to have implemented HACCP, although those using HACCP tended to be part of nationally recognised chains.

Although manufacturers are often deemed better placed to implement HACCP because of their single product, systematic processing lines (Ehiri and Morris, 1995), the survey results found no evidence to suggest that within the manufacturing sector itself, businesses using HACCP were likely to be handling fewer numbers of food products. Rather, business size and status appeared to be the key determinants of HACCP, reflecting the trends identified by Panisello et al. (1999) and Henson et al. (1999) who measured business size in terms of the total numbers of staff employed rather than food handling staff. Despite this slight difference in measurement, the results presented in this chapter demonstrated that in the smallest businesses, the majority of employees, including owner managers, were classed as food handling staff.

The small size of the majority of the food businesses surveyed reflects general industry trends (Selden, 1999). However, despite the lack of a single definition against which to determine relative business size, those recently amended by the DTI (Department of Trade and Industry, 2000) would still not appear to be entirely applicable to the food industry as measured in this study. Given the restrictions of business size upon the amount of technical expertise, financial resources or time available to support HACCP (Kirby, 1994; Jouve, 1994; Stevenson, 1990), it is clear that the retail and catering businesses are immediately disadvantaged, with over three quarters employing fewer than eight food handlers. This lack of size is exacerbated by the proportion of part time and temporary staff employed. The average 48% breakdown of part time food handlers among caterers is comparable with the 50% figure identified by West (1992).

Regardless of these definitions, the attitudes measured in the survey certainly suggest that managers of smaller businesses were more likely to feel that HACCP would be difficult to
apply. These attitudes were supported by those interviewed, although in both the interviews and the survey, managers from businesses that had implemented HACCP were less inclined to regard it as a difficult process. This may be a reflection of the size and status bias of those companies that had implemented HACCP. However, it would also support the suggestions that individuals become more positive about HACCP through experience (Guzewich, 1986) and that negative attitudes commonly reflect a lack of understanding of the HACCP concept (Ehiri et al., 1995). One of the managers interviewed went so far as to suggest that because of their lack of size, small businesses would find it easier to implement and manage formal systems such as HACCP. However, there was also a clear belief among other managers that due to their small size, formalised systems were simply not a necessary requirement for them.

The survey results showed that retailers, caterers and smaller manufacturers were unlikely to having gained advice from external consultants, with those interviewed highlighting costs as the key barrier. Nevertheless, the use of external support by manufacturers using HACCP appeared to have an impact on the likelihood that they had all seven principles in place. Without having adopted an audit based approach, there is no way of telling whether these systems had been properly developed or were being effectively managed. However, the survey trends do suggest that without being able to access specialist expertise, implemented HACCP systems may be incomplete and as a result ineffective.

With cost constraints prohibiting small businesses from employing specialist technical expertise, the role of environmental health officers (EHOs) in providing information and guidance assumes particular importance. However, the low uptake of HACCP by retailers and caterers suggests that EHOs have been either unsuccessful in passing on information about HACCP, or at least have failed to encourage use of the system. With less than half of manufacturers, less than one in six caterers and one in ten retailers appearing to have carried out the hazard analysis based legal requirements (Department of Health, 1995), serious doubts are raised about the way in which these regulations have thus far been communicated and enforced. Such doubts reflect the concerns expressed by among others, Ehiri et al. (1997a), Little and de Louvois (1998) and Begum and Mathieson (2000).

Notably, the majority of those surveyed indicated no desire for more information or advice on food hygiene management from external sources, implying that even if provided with information on HACCP, business managers may be unlikely to act upon it. The interview
findings suggested that this ambivalence may stem from antagonism to what are perceived as the never ending demands of EHOs and food hygiene regulations generally, possibly reflecting the fact that 30% of the caterers surveyed by Coleman et al. (2000) felt that the amount of food safety legislation had become excessive. Interviewees also seemed to have relatively little confidence in the advice or instruction they had received from EHOs. These general attitudes would appear to reflect the isolationist tendencies of small business managers in general (Bryson and Daniels, 1998) and their tendency to be unconvinced of the value of external advice and information (Kitching and Blackburn, 1998; Lybaert, 1998; Leonidou and Adams-Florou, 1999).

Managers also expressed a relatively common concern about the consistency of enforcement between UK businesses, and across the European Union states that are governed by the same baseline legislation. It is important to be aware of the barriers that such attitudes can place in the way of encouraging both an awareness of the need for a change in approach towards HACCP and a positive commitment to such change. This is particularly true where these comments were being made by the owner-managers of smaller businesses who are key to the decision making process (Matlay, 1997; Lybaert, 1998; Fuellhart, 1999). However, only 16% of the caterers surveyed by Coleman et al. (2000) expressed similar concerns, whilst several of the interviewees were keen to see more stringent enforcement across the board, even if this impacted upon their own business. Whether the comments made about EHOs and regulation in general were fully representative of the whole industry is debatable, as is whether they are founded on a full understanding of the issues. Nevertheless they appear to be justified by the empirical evidence available with Tebbutt (1991) finding evidence to suggest variations in EHO interpretation of inspection standards against preset guidelines.

Despite the overall levels of HACCP use, the majority of businesses were carrying out hygienic practices such as stock rotation, cleaning schedules and temperature monitoring that are an important prerequisite to the implementation of HACCP (NACMCF, 1998, Sperber et al., 1998). However, over half of retailers and almost a third of caterers did not inspect their foodstuffs on delivery or monitor their staff for illness and infection. Again, without auditing individual food premises, it is impossible to tell whether the hygienic practices reported are either consistently carried out or have a positive impact upon food hygiene. Indeed, several of those interviewed openly admitted that it was not easy to guarantee that those practices laid down were being carried out effectively.
Microbiological testing was almost non-existent within most retail, catering and smaller manufacturing businesses. The potential contribution of microbiological testing to HACCP was discussed in Chapter Two, be it in terms of verification (Jouve, 1994; Silliker, 1995; Kohn et al., 1997; Harrigan, 1998) or in helping demonstrate the impact of poor hygienic practice (Beckers, 1988; Sheppard et al., 1990). The key issue with respect to microbiological testing is not the necessarily the testing itself but the fact that the lack of it may be a reflection of a more general lack of awareness and understanding of microbiological issues. The remarks made by interviewees suggested that this may be a valid argument, such as the Indian restaurant owner who stated that, “it (microbiology) is alien to me”. A general understanding of microbiological issues would greatly assist an individual’s ability to carry out a well reasoned hazard analysis and to be able to properly assess the risks associated with their operation. The survey results and comments of some of those interviewed would suggest that many managers remain largely unaware of, or unconcerned about the inherent risks and potential consequences of their practices.

3.4.2. Risks to Food Safety.

Based on the scoring system used within Code of Practice Number 9 of the Food Safety Act 1990 (Food Standards Agency, 2000c), the results presented in this chapter would suggest that the food manufacturing sector contained the greatest proportion of relatively high risk businesses. Some 73% of manufacturers indicated that they were being inspected at least once a year implying that they are category A or B risk businesses. This compared with 65% of retailers and 67% of caterers, appearing to contradict the view that the catering sector presents the greatest risk to food safety based upon food poisoning trends (Mead, 1987; Wheelock, 1988; Phillips et al., 1994; Cowden et al., 1995; Crerar et al., 1996; Palmer et al., 1996; Djuretic et al., 1996; Coleman and Griffith, 1998).

It is important to recognise that the responses provided were likely to represent estimated time periods of inspection, with possible confusion between the frequency of food hygiene inspections and other food standards inspections or general visits by EHOs. The likelihood of such misinterpretation is supported by the fact that Gillespie et al. (2000) found that only 48% of caterers surveyed had inspection ratings of A or B, requiring at least one inspection per calendar year compared to the 67% suggested by the results presented in this chapter. It is also possible that this difference indicates that authorities are taking a more
proactive stance to inspections than is ultimately required by Code of Practice No. 9, which merely outlines the minimum requirement for each inspection category. However, the apparently higher frequencies of inspections for manufacturers may also reflect the anomalies in the Code of Practice No. 9 approach, in particular the consumers at risk scores, as discussed in Chapter 2.3.2.

It is equally important to consider the risk to food safety that managers themselves believe that their business represents. With the majority of respondents across all three sectors believing that their business represented a low risk to food safety, these results would not appear to tally with the prevailing scientific judgement, particularly among caterers where 48% thought their business represented a low risk whilst only 19% believed it was high risk. Similarly, if the frequencies of inspection cited by respondents are a true reflection of their inspection ratings then the risk perceptions of survey respondents across all three industry sectors would again appear inaccurate. Even the 48% of caterers surveyed by Gillespie et al. (2000) which had inspection ratings in categories A and B is well above the 19% in this study who felt that they were high risk. Meanwhile, if categories A to C are interpreted as high or medium risk then the results of Gillespie et al. (2000) would suggest that 92% of caterers were in these categories, compared to the 44% of caterers in this study who described their business as high or medium risk.

This apparent disparity between the perceptions of business managers and the inspection ratings determined by EHOs supports concerns about the effectiveness of risk communication across the industry (Fischhoff and Downs, 1997). This is particularly pertinent given that EHOs were themselves cited as the most common source that informed the risk perceptions provided. Indeed 2% of retailers and 4% of caterers had apparently never even been inspected, despite the fact that Code of Practice Number 9 advocates inspections within twenty-eight days of a business setting up. Whilst it is possible that the registers used to draw the sample for the main survey included some businesses that had only recently opened, the time lag between receiving these registers and the survey being carried out would have left scope for this twenty-eight day period to have passed by.

It is also likely that managers risk perceptions are affected by their psychology with theories suggesting that in assessing the likelihood of negative events, most people will ultimately underestimate their personal probability in terms of two factors, unrealistic optimism and the illusion of control (McKenna, 1993; Slovic, 1987). These psychological
theories, reflected in the views of some of the managers interviewed, may explain why the majority of managers across each industry sector believed that their business represented a low risk to food safety. For example the view that because a business had never had a problem meant they must be doing something right is representative of the illusion of control. Likewise, the view that in comparison to the number of meals served, food poisoning incidence is relatively rare, represents a degree of optimistic bias.

Nevertheless, the findings presented do suggest that a proportion of managers not only recognise the food safety risk that their business represents but have taken action to minimise these risks. This was reflected by the fact that businesses regarding themselves as high risk were more likely to be handling a combination of raw and cooked meats, more likely to have implemented HACCP and more likely to be inspected at regular intervals. The results also suggested that perceived responsibility may influence risk perceptions. Less than 35% of retail and catering businesses believed that they took the greatest responsibility for food safety, although those taking responsibility were no more or less likely to define themselves as high risk. The interviews appeared to confirm that many managers do not perceive food safety or food poisoning as a particularly industry related problem, preferring instead to blame the consumer, or factors outside their control such as a lower immunity within the population.

One further issue highlighted by the interview findings was possible industry antagonism towards consumers who appear to demand risk free food and yet who have been unwilling to embrace new technologies such as irradiation and genetic modification, or are unwilling to pay the premiums that might be involved. However, with most food poisoning cases easily prevented if the basic good hygiene practice is adhered to (Pritchard and Walker, 1998), the food industry has little excuse for the role it plays in food poisoning incidence. To blame consumer aversion to some modern technologies for food safety problems would seem to overlook the individual responsibility and control that can be exerted over food safety at each stage of the food chain.

3.4.3. Food Hygiene Training.

The data collected on food hygiene training and qualifications could not assess whether these were universal to all staff at a particular grade. Furthermore, qualifications may have been gained by staff in previous jobs, therefore not necessarily being representative of
businesses own training strategies. The categories of training described were also not necessarily independent of each other. Despite these issues, it is still believed that the results present a balanced insight into training strategies across the industry.

The fact that all UK food businesses must now provide food hygiene training commensurate with the work activities of their staff (Department of Health, 1995) suggests that the levels of training within the industry may have improved since Tebbutt (1992) found that in only 22% of businesses surveyed had the all or the majority of food handling staff passed a basic food hygiene course. This improvement would appear to be borne out by the findings presented in this chapter given that in fewer than 10% of businesses had no staff at either grade received any hygiene training, whilst at least some full time food handlers had been on food hygiene courses in 70% of the businesses surveyed. Meanwhile, 90% of respondents agreed that food hygiene training was essential for all food handlers.

However, the importance attributed to training by small businesses is not always reflected in the actual provision of training (CBI, 1989; Stanworth et al., 1992). Although relatively few of the businesses surveyed did not follow up their positive attitudes with actual training delivery, the variations in the nature of this training cast doubt upon the strength of this commitment. There are still businesses in which no food hygiene training of any type seems to be taking place. Meanwhile, the relatively low proportion of businesses to have provided induction training to their full and part time food handlers, suggests that many workers carry out their jobs for at least a limited period without appropriate training. It is in cases such as these that the potential risks to food safety may be greatest.

Hendry et al. (1992) highlighted the importance to small businesses of being able to combine on-the-job training with off-site education. The results presented here suggest that in most businesses full-time food handlers and managers have been provided with food hygiene courses as well as also receiving on-the-job training. By contrast, part-time and temporary food handlers would appear to be more reliant on induction training and on-the-job training. Whilst less than 10% of those surveyed agreed that food hygiene training was not worthwhile for part time or temporary staff, it is clear that the level at which this training is carried out is dependent upon the status of individual staff.

The trends in provision of food hygiene courses are generally reflected in the use of external sources of training and the qualification levels held by different grades of staff.
Just as part time food handlers were less likely than full timers, and temporary staff less likely than part timers to have been on food hygiene courses, so they are also less likely to have food hygiene qualifications or to have as high a level of qualification. As with the provision of food hygiene courses, it was the retail sector that appeared to have the lowest qualified staff. However, whilst the catering sector performed worse than manufacturing in terms of the employment of food handlers or managers with any qualifications, those that were qualified were more likely to hold intermediate or advanced, level qualifications. This may reflect the employment of trained chefs within the catering industry who are not necessarily managers and yet are likely to have had formal hygiene training.

The 31% of catering businesses with managers who had obtained advanced level qualifications was well above the figures quoted by Gillespie et al. (2000) who found that of catering managers with food hygiene training, only 4% had attended an advanced course. These two figures are not wholly comparable due to the former having been based on any managers within a single business rather than all managers. Furthermore, Gillespie et al. (2000) gathered data during visits to businesses suggesting that there may have been less ambiguity about the definitions of advanced level training. Nevertheless, this disparity would suggest that the figures for the catering sector are likely to over estimate the real level of managerial training across the sector.

Despite these internal variations, it is clear that a large proportion of food handling staff, especially those in the retail and catering sectors more heavily dominated by part time staff, do not hold any formal hygiene qualifications. The most likely explanation for these trends would appear to be the costs involved with food hygiene courses (Tebbutt, 1992). Indeed, the anecdotal evidence from managers highlighted their concern about training costs, particularly for part-time and temporary staff for whom the costs may be the same as for full time staff yet the long term benefits may not be perceived to be as great.

Training costs are likely to be of particular concern to small businesses with lower turnovers. In both the retail and manufacturing sectors, businesses that had provided food hygiene courses for full time food handlers and managers were likely to employ a greater number of food handlers although this trends did not hold as true for the catering sector. However, business status did appear to influence training among caterers with those of non-independent status, notably schools and hospitals, more likely to be providing various
types of training to full and part time food handlers. This reflects the findings of previous UK and US research (Audit Commission, 1990; Manning, 1994).

Given the costs and time involved in off site training courses, those responsible for making training decisions may be unconvinced as to the tangible benefits delivered by investing in formal hygiene training. In the majority of businesses with under ten employees, these decision makers are the owner managers (Matlay, 1997). Responses to this issue from the interviews suggest that many managers remained unconvinced of the actual contribution that this had made to changing work practices or improving knowledge. Where benefits were identified, these were more to do with the impact on morale of being seen to make an investment in their staff, rather than any particular impact on food safety.

Despite the potential barriers to off-site training, it should not be assumed that any reliance on in house, on the job training is an implicitly bad thing (Hendry et al., 1992; Curran et al., 1997). Most managers agreed that hands on training was the best way to acquire basic skills, backed up by the widespread use of on-the-job food hygiene training for part-time and temporary staff in particular. This finding reflects the 63% of operators surveyed by Ehiri et al. (1997b) who preferred to develop skills through participation rather than via traditional ‘chalk and talk’ teaching methods. Similarly the comments made by some of those interviewed further supported the wider benefits of in house, job related training.

However, in house training relies upon the quality of managerial training in order to prevent bad practices from merely being passed down within the business from management to staff (Ackerley, 1989). If managers were qualified to advanced levels they could deliver house training to help their staff obtain basic level qualifications. Yet, the results of this survey, in keeping with the trends identified by Little and de Louvois (1998) and Gillespie et al. (2000), suggest that advanced level training is not widespread enough at present to allow most businesses to rely on in house training from managers. This is especially true in the retail sector, where over one in three managers had no food hygiene qualifications whilst of those that did, the majority were only qualified to basic levels.

Coleman and Griffith (1998) suggested that advanced training would also better equip business managers with the ability to carry out their own risk assessments and an awareness of the characteristics of high-risk foods and practices. Certainly the significant relationships identified between higher level qualifications and managers’ risk perceptions
support this notion. However, it is possible that managers’ risk awareness stimulated their desire for higher level qualifications rather than vice versa. It is unfortunate that risk awareness and training represent something of a vicious circle, whereby without adequate training, people may not fully understand the concept of risk and yet without this understanding of risk they may be ambivalent towards the need to train in the first place.

The inter-relationship between training and risk awareness also incorporates knowledge and development of HACCP. Barrett et al. (1998) stress that advanced level training would generally be of benefit to HACCP implementation. This is possibly demonstrated within the survey results by virtue of the fact that on a sectoral basis, managers in businesses reporting their use of HACCP were generally qualified to higher levels. However, the results presented also highlight the fact that many businesses had apparently implemented HACCP without the help of either advanced level or specific HACCP training, in turn influencing the likelihood that they had a full seven principled system in place. Furthermore, the low levels of HACCP training given to staff other than managers suggest that even where HACCP is being implemented, the system is regarded as the domain of management rather than involving all of the staff within the business.

The particular types of training provided or qualifications held by employees and managers within the food industry may, to some extent, be less important than the philosophy that guides this training. With relatively few businesses across each sector delivering any refresher training to staff at all levels, the suggestion is that many of those working in the industry have not had any recent training. The general lack of refresher training would appear to support the view that human resource development has never been a central element of small business strategy (Ross, 1993). Given the lack of refresher training, particularly for business managers, it is perhaps not surprising that the industry is still lacking in knowledge and awareness of HACCP. This might in turn help explain why so many of the businesses surveyed did not appear to have complied with recent food safety legislation, supporting the earlier proposition that the HACCP message has not yet been effectively delivered to many food businesses.

3.5. Conclusions.

Although further research has been published since collection of the results described in this chapter, the results presented form a benchmark against which to assess future progress
both in HACCP implementation, hygienic practices, risk perceptions and training levels across the bulk of the UK food industry.

However, given the view that HACCP will only ever be as good as the weakest link in the food chain (Van Schothorst, 1991; Easter et al., 1994), there is certainly considerable scope for improvement. There clearly remain considerable barriers to the future implementation of HACCP by the UK retail and catering sectors, not to mention smaller scale manufacturers. Key among these barriers would appear to be business size, managerial risk perceptions, training levels and appreciation or evidence of the benefits of hygiene training, general attitudes towards HACCP and to some extent the existing implementation of general good hygiene practice that will inevitably form the foundation of any HACCP system. Communication with the industry is also clearly an issue with the survey findings suggesting a relative failure in communication of the HACCP philosophy inherent in the 1995 Food Safety Regulations (Department of Health, 1995).

Whilst these barriers are not necessarily insurmountable, overcoming them is likely to impact on business costs either directly or indirectly through the commitment of staff time. Consequently, any management commitment to either HACCP implementation or improved hygiene systems and training in general is likely to result from personal appraisal of the relative costs and benefits to be gained from such action. The results presented in this chapter suggest that many business managers, particularly those of smaller businesses with less financial resources, remain unconvinced of the ability of their business to meet the costs of such action or to derive any financial benefit from doing so. It is in attempting to provide evidence on these issues from examples of businesses that have completed a process of HACCP implementation, that the following chapter is based.
CHAPTER FOUR: COSTS, BENEFITS AND MOTIVATIONS FOR IMPLEMENTING HACCP IN EIGHT CASE STUDY BUSINESSES.

4.1. INTRODUCTION.

As well as highlighting the need for better levels of food hygiene training and an improved understanding of risk based concepts, the previous chapter concluded that if more UK food businesses are to be encouraged to adopt HACCP then they, as well as those responsible for developing and implementing food safety policy, need to be aware of the likely burden of HACCP implementation as well as the potential benefits. A range of studies have attempted to estimate some of the potential costs and benefits of compliance with new HACCP based food safety standards or regulations across different industries around the world (Meat Research Corporation, 1996; United States Department of Agriculture, 1996; Cato, 1998; Department of Health, 1998c; Australia New Zealand Food Authority, 1999; Heyhoe and Associates Pty Ltd., 1999).

The costs and benefits of a sector wide HACCP implementation will be discussed in Chapter Five. Worthwhile as these industry wide, ‘macro’ costings are, they are only estimates and do not present primary evidence at the ‘micro’ level, from individual businesses that have implemented HACCP. Furthermore, these estimates tend to pay little attention to the wider cultural issues or benefits that may result from HACCP implementation.

This chapter presents findings from eight case study businesses who claimed to have implemented HACCP. The aim of the case studies was to provide some baseline costing data which could be used in the future to inform wider cost benefit analyses of HACCP implementation in the UK food industry. Data collection therefore focused on the direct and tangible costs and time put into HACCP implementation as well as providing a baseline assessment of the short-term impact of HACCP upon ongoing business management costs. A wider analysis of the costs and benefits for each business was not practical due to time, cost and access limitations.

The case study results are discussed in relation to several of the commonly cited barriers to HACCP implementation including cost and time constraints and access to technical
expertise. The background to HACCP implementation within each business is described and where appropriate direct quotes from discussions with those managers responsible for HACCP implementation are included. Before presenting the results from the eight case studies, the chapter describes the process adopted to collect the costing data from each business, including the design and testing involved in the development of a unique database enabling collation and analysis of this costing data.

4.2. METHODOLOGY.

4.2.1. Selection of the Case Study Businesses.

Participants in the survey presented in Chapter Three were asked to volunteer as a case study. However, only four of the eighteen businesses that volunteered appeared from their survey response to have a full HACCP system (all seven principles), a key criterion for selection. All survey respondents that appeared to meet this requirement were contacted again by post and invited to take part as a case study, yielding an additional five possible case studies and making a total of nine. Five of these nine businesses were then ruled out due to their failure to meet two further criteria, namely that the completion of HACCP implementation had occurred within the previous year and that the people best placed to provide the information required were still with the business. Consequently, from the initial postal survey, only four case studies were identified, each being a food manufacturer thus preventing comparison between industry sectors. In order to represent the retail and catering sectors within this stage of the research, four more businesses that had recently implemented HACCP systems were recruited through local contacts within South Wales.

4.2.2. Data Collection.

Case study participants were visited to formally discuss the processes involved in HACCP implementation within their business. This helped inform the design of the tool used to gather the costing data and provided qualitative data about the background to HACCP implementation. In some cases these conversations were tape recorded although this was not always possible either because of reluctance on the part of business managers or the fact that the noisy ‘on the job’ working environment in which these discussions took place.

At this preliminary meeting, managers were shown a costing form, similar in design to the one that they would have to complete. An explanation was provided and after the meeting
a costing form was designed for each case study, taking into account some of the unique elements involved in HACCP implementation highlighted within each business. The unique design of each costing form, an example of which can be found in Appendix Two ensured that they were as relevant as possible to the individual business experience. Forms were divided into three sections to examine non-recurring implementation costs, general running costs and the additional running costs incurred since implementing HACCP. Each section contained a list of cost centres with managers asked to express the time and monetary input into each. Also collected was some generic baseline information concerning the systems in place prior to HACCP and their attitudes towards HACCP. This provided scope for comparison between these issues and the costing data.

Costing forms were sent out to the business by post for completion. Three weeks later, managers were contacted in order to discuss any problems they may have had with the form. Upon confirmation that the forms had been completed, a follow-up appointment was made with the business in order to discuss their results. This follow up was vital in ensuring that the results provided were as reliable as possible and that those costs highlighted were valid to the specific process of HACCP implementation. The discussion was able to identify any outstanding cost issues not covered by the costing form and also helped protect against the risk of double accounting. For example, a cost may have been included twice under separate activity headings or the time spent on any activity may also have been given a capital cost of its own as well as a time value, potentially distorting the results. Without fully examining the accounts of the individual businesses then the precise accuracy of any direct costs incurred was not able to be confirmed. Similarly, with case study participants largely estimating from memory the time commitments involved in the HACCP process, it is important to recognise that the figures provided were not independently validated and can be best treated as estimates. However, the three stage process of the initial visit, costing form and follow up visit were believed to represent the best available means of ensuring reliability and validity.

4.2.3. Database Design for Analysis of Costing Data.

To facilitate the storage and analysis of the costing data collected from the case studies, a unique Microsoft Access Database was designed, tested and developed between March 1998 and June 1999. Software programming support was provided by MD Associates Ltd. from Grimsby, an independent training and consultancy company offering specific expertise in HACCP and database development for hygiene management costing issues.
However, all aspects of the actual design of the database, the functions required from it and the reporting procedures were all developed and determined solely by the author.

The database was designed in such a way as to store all of the costing data which was gathered from the case studies. Baseline demographic details of each business can be entered into the database along with the activity costing and time data collected. In keeping with the unique design of each costing questionnaire, the database offered the flexibility to include different activity costs within any individual business entry.

**Figure 4.1.** Costing Database, Main Menu.

The database comprises four main sections as displayed on the Main Menu (Figure 4.1). Entering the Set Up Menu displays two choices ‘Global Data’ and ‘Question Groupings’. Under ‘Global Data’, figures are added for use within the production of reports, these define the number of hours worked per week that you wish both a full time and part time member of staff to represent. A generic cost of time per hour figure enables final reports to calculate the total value of time spent on HACCP related activities by each business. To have included different time costs for the different staff involved in specific activities would have unreasonably added to the costs of the database construction as well as complicating the data collection process.

Under Question Groups (Figure 4.2), generic cost groupings are entered for each of the questionnaire sections. These groups can be added to as required although the three section headings are fixed.

**Figure 4.2.** Costing Database, Question Groups.
Figure 4.3. Costing Database, Question Editor.

By selecting the Questionnaire Demographics option on the Main Menu, primary data can be entered for each business under Questionnaire Details (Figure 4.4). Background data on each business is required including location, status, numbers of full and part time food handlers and other staff, turnover, industry sector, the numbers of prerequisite practices being carried out from the list of eight included in the costing questionnaire and finally the numbers of HACCP principles in place prior to formal implementation.

Figure 4.4. Costing Database, Questionnaire Details.
By selecting ‘Add/Edit Question Set’ on the Questionnaire Details screen, specific lists of cost centres can be developed or selected for each business entry providing the flexibility to tailor each entry to the specific experience of individual businesses or groups of businesses. If desired, all cost centres originally entered in the question editor can be included for each business entry, however, as the list of cost centres develops this can result in a lengthy list for each entry.

**Figure 4.5.** Costing Database, Pre-Set List of Questions

Alternatively specific cost centres can be selected for each section and group as demonstrated under the Pre-Set List of Questions (Figure 4.5). One further option is to develop templates of cost centres that can be easily applied to any business entry. This is particularly appropriate when dealing with costing data from larger scale surveys where all respondents have originally responded to the same list of cost centres. Having selected the cost centres, the time and cost expended on each of these can be entered onto the Questionnaire Details screen, with the option of defining whether these costs are at daily, weekly, monthly or yearly rates, although this does not apply to the non-recurring costs in the planning and implementation section.

**Figure 4.6.** Costing Database, Reports Menu.

A range of reports can be produced using the Reports Menu (Figure 4.6). All questions included in the question editor can be listed and printed by section and group. Alternatively a list of business entries can be produced by date using the List Questionnaires Between Dates option.
The summary of survey data report produces a descriptive summary using frequencies and arithmetic means of the baseline business characteristics entered into the database for each business, for example status, business type, location, turnover, prerequisite practices and control principles. The database also uses the data supplied in the Set Up menu under global data to estimate the mean numbers of man-hours worked by food handlers and other staff per week. For the survey data report you are required to select criteria against which to filter certain businesses into or out of the analysis (Figure 4.7). The criteria selection allows you to produce reports for selected groups of business within the database. The screen displayed represents that shown if the criteria have been reset using the box in the bottom right corner. In this case the report would include all the businesses within the database.

The final six reports are the cost, time and cost/time reports for the survey count and the cost, time and cost/time reports. Again, upon selecting these reports you will have to select criteria. The difference between the survey and non-null count reports is that the survey count presents figures for all the businesses selected whereas the non-null counts only present mean figures for businesses that have actually faced any such costs.

Figure 4.7. Costing Database, Report Criteria Selection.

The cost reports are limited to direct capital costs (£s) and the time reports to the time spent on given activities (hours). Regardless of the period over which the money or time
was spent, the reports automatically convert these figures to weekly rates for all businesses. The cost and time reports use the multiplier values originally provided in the Set Up menu under Global Data to convert the time spent into a cost value and hence work out overall total costs. In each report, the figures are presented for individual activities, for groups of activities or indeed for whole sections. For each cost centre, mean figures, minimums, maximums, the range and the standard deviation figures are presented.

The report menu also provides the facility to download the costing data to Microsoft Excel for each of the businesses in the database. This will export the ID code and the grouped costs, time or cost and time to enable a more complex statistical analysis if required.

The final version of the database was the result of some forty three amendments made over the period of its development, with costing data from one pilot case study being originally used to verify the feasibility of the program. As data was gathered from more case studies, further refinements to the database were made to enable the full flexibility required.

4.3. RESULTS.

4.3.1. The Backdrop to HACCP Implementation.

Table 4.1 describes the baseline characteristics of the case study businesses, demonstrating their variety in terms of business practices, ownership, staff and turnover. Business A produces a wide range of frozen food products (including meat products), supplying major chain supermarkets in the UK and abroad. Beyond ensuring legal compliance, the main motivation for HACCP implementation within business A was pressure from above within the company hierarchy and simple market forces caused by the demand for such systems from the company’s major customers and the fact that their leading market competitors were using HACCP.

Despite being under a similar pattern of ownership, business B is a much smaller operation, working primarily with dry cereals and seeds which are made into a pre-mix that is sold on to bakeries to be added in order to make bread, in particular granary style bread. As a result the main hazards faced within that particular part of the operation are physical contaminants such as glass, stone, metal or plastics. By contrast microbiological hazards are largely insignificant. The attention of the technical manager was drawn to HACCP by
individuals higher up the company chain although he admitted that at that time they were just paying it, "lip service", and didn't really know what it was. The need for HACCP came about as a result of continuing problems with the companies that the business supplied. As the supplier of the largest component of the bread being produced, they were always first in line to deal with any contaminant problems in the finished product:

"We ended up trying to field every other suppliers contaminant problems... and that's why HACCP became a tool we were aware of."

Indeed, the technical manager also recognised that now, it would be almost impossible to get any orders without having a HACCP system in place.

"They (the big five supermarkets) are looking to only work with people who will work with them within HACCP and within ISO 9002...... there is nowhere else to sell your food any more so you have to meet their requirements."

<table>
<thead>
<tr>
<th>Industry Sector</th>
<th>Full Time (FT) &amp; Part Time (PT) Food Handlers</th>
<th>Status</th>
<th>Weekly Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Manufacturer</td>
<td>250 FT 0 PT</td>
<td>Multinational parent company</td>
<td>£870,000</td>
</tr>
<tr>
<td>B Manufacturer</td>
<td>31 FT 0 PT</td>
<td>Multinational parent company</td>
<td>£153,800</td>
</tr>
<tr>
<td>C Manufacturer</td>
<td>5 FT 1 PT</td>
<td>Independent</td>
<td>£10,577</td>
</tr>
<tr>
<td>D Manufacturer</td>
<td>3 FT 0 PT</td>
<td>Independent</td>
<td>£4,800</td>
</tr>
<tr>
<td>E Retail</td>
<td>12 FT 19 PT</td>
<td>Food section in national department store</td>
<td>£26,500</td>
</tr>
<tr>
<td>F Retail</td>
<td>2 FT 8 PT</td>
<td>Independent baker</td>
<td>£3300</td>
</tr>
<tr>
<td>G Catering</td>
<td>1 FT 4 PT</td>
<td>Independent nursing home kitchens</td>
<td>Unavailable</td>
</tr>
<tr>
<td>H Catering</td>
<td>3 FT 20 PT</td>
<td>Event catering in large arena complex</td>
<td>£20,800</td>
</tr>
</tbody>
</table>

* Turnover represents the income generated from the sale of goods / services.

* Case study E acted as a pilot for the case study methodology, the approach was deemed to be satisfactory and reliable and so the results are presented for comparison.

Business C was an even smaller, independent business producing continental style meat products, mainly sausages, for the speciality end of the market. The main driving force behind HACCP was the owner-manager who described himself as, "a great believer in keeping up to date with the latest things", although he admitted that HACCP was also a response to pressure from existing customers and a desire to expand and supply larger scale catering companies:
"We’ve got one customer who we got virtually because we had a system in operation, for between 40 and 50 thousand sausages a week.... if we hadn’t got it (HACCP) we wouldn’t get the orders."

The final manufacturing case study, business D, was a three-man operation producing a single product, ice-cream. HACCP was implemented within three to four months of the business start-up, largely upon the suggestion of local EHOs. The owner-manager described HACCP as having been relatively easy to apply because of the fact they were dealing with, “one type of product in a very small space with very few processing stages”. However, he also recognised that if, as was his intention, the business expanded production into a greater variety of product lines, this would present new challenges for HACCP. In particular he felt that he might have to employ someone with sole responsibility for HACCP and was concerned as to whether this would prove financially viable.

The two retail businesses, E and F, contrasted greatly, one being a relatively large food section of a department store handling a wide variety of food products including ice-creams, dry goods, dairy goods and both raw and cooked meat products and the other being a small independent bakers’ shop, also providing a limited catering service. Case study E had implemented HACCP in response to the suggestion of environmental health officers and an increased awareness of the potential risks involved in their business practice. Business F had implemented HACCP mainly to ensure compliance with the hazard analysis based legal requirements being enforced by the local authority.

In business G, the first of the two catering businesses, HACCP was implemented by the nursing home chef very much as a result of his own initiative and enthusiasm. Having returned to catering he was keen to keep up to date with modern trends and regulations.

"I’d been out of catering for five or six years so I’d missed all the new regulations, so whilst I looked at things I didn’t record temperatures of things like that, or I hadn’t been....... if I stagnate I get bored, I need to be doing something all the time so this (HACCP) is ideal because it’s ongoing and it keeps my mind active”.

A particularly important influence upon HACCP implementation was the awareness of the chef towards the need to take all possible precautions when catering for the elderly:

"I’ve always been very aware in the kitchen anyway, I’ve had food poisoning myself, but obviously with the elderly.... they’re weak when they come here and the slightest little thing could knock them out completely."
Finally, in business (H), HACCP was prompted mainly in order to keep up to date with legislation and meet the requirements of environmental health officers as opposed to any particular customer pressure, concern about the food safety control measures that were previously in place or influence from higher up the company chain. The system was implemented jointly by the catering manager and head chef who confessed that:

"Basically the only reason we did it was because it was a legal requirement, otherwise we wouldn’t have bothered."

Table 4.2 shows the sources of HACCP information or advice that were used by each of the case studies. Case study A was able to implement HACCP largely in house with the help of guidance from specific HACCP literature. This process was aided by the presence of a three-tier management structure of senior managers, shift managers and production line leaders, all of whom were involved in the development of the HACCP plan. One new permanent member of staff with specific HACCP expertise was also employed.

Case study B implemented their HACCP plan with the help of a private consultant and an off-site training course. The business was also able to draw upon the expertise of a range of in house staff including engineers and team leaders. However, the manager responsible for HACCP implementation was keen to stress the fact that even though they had employed an external consultant, they still had a hands on role in the HACCP plan development. Indeed he felt that this was pivotal to the ultimate effectiveness of the system.

"Unless you spend time with the consultant they can’t put it (HACCP) into place..... bringing in the consultant is only of any value if the person working with him or the team have enough experience to convey to him what should be appearing and then it needs to be checked afterwards"

Table 4.2. Sources of Information and Advice Used to Help Implement HACCP.

<table>
<thead>
<tr>
<th>Private trainers / consultants</th>
<th>EHO's</th>
<th>Trade Associations</th>
<th>Trade Publications</th>
<th>HACCP textbooks</th>
<th>In house staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>B</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
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<td>x</td>
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<td>x</td>
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<td>x</td>
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<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Business C also relied heavily on a private consultant to develop their HACCP plan in conjunction with the owner-manager, whilst business D drew on the advice of EHOs and their trade association. EHOs were also an important source of advice for E-G, reflecting the role that they played in each case in providing the spur for HACCP. None of the retail or catering businesses used external consultants. The chef in business G did attend a private training course to enhance his own knowledge of HACCP, although he stressed the difficulty that he'd had in finding such help:

"The hardest part that I found was getting a course to go on, it's just not that easy in Swansea to actually find something."

HACCP literature was also used by F-H, with a government produced guide to good hygiene practice being of particular use to business F. The manager of business F was also fortunate to be able to draw on the knowledge of her husband who had experience of HACCP from his work in a larger scale food manufacturer. Similarly, business E was able to use one of their part time sales assistants who was a Food Technology student and had obtained knowledge of HACCP from her course.

Table 4.3 shows that prior to HACCP, business A already had a wide range of hygiene practices in place as well as having implemented some of the principles of HACCP within its existing business practice. The only principle of HACCP not previously incorporated was any systematic verification of the hygiene control measures that they had in place.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Temperature monitoring</td>
<td>✓</td>
<td>NA*</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Formal hygiene training</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Inspection of deliveries from suppliers</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Hazard analysis</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Identified CCPs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>Specified target levels and critical limits</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Monitoring at CCPs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Corrective action</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>Documentation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Verification</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

*Not Applicable, only handling dry goods requiring no heat treatment or special control over storage temperatures.
Businesses B and C were already carrying out all of the good hygiene practices listed and business C adhered to each of the first five principles of HACCP although had no documentation or verification procedures in place. In contrast, business B had not previously carried out a systematic hazard analysis, had no set corrective action procedures in place and carried out no formal verification of their control systems. Most notable in business D was the lack of any formal hygiene training prior to HACCP and the fact that a hazard analysis had not been carried out, nor were food hygiene controls documented.

Of the two retailers, business E had more hygiene practices in place prior to HACCP, compared to business F where only pest control and temperature monitoring were previously carried out. As regards the principles of HACCP, business E had identified its CCPs and set out target levels and monitoring requirements as well as having documentation, whilst business F had not previously carried out any of the principles of HACCP. With the exception of microbiological testing, both caterers (G and H) had all of the hygienic practices in place as well as having covered hazard analysis and the identification of critical control points as well as having some documentation of these processes.

4.3.2. Costs of Implementing and Maintaining HACCP.

Tables 4.4 to 4.6 highlight the reported non recurring (one-off) capital costs and time associated with HACCP implementation in each of the case studies. Only three of the eight business faced any direct training costs as a result of implementing HACCP. For business B, the cost of £500 represented the cost of a two day training course with a nationally recognised HACCP training centre for the technical manager of the business. Similarly, although at much lower cost, the training costs of business G were largely taken up by the HACCP based training received by the chef of the nursing home, although £20 of the total also went on producing training materials for the other kitchen staff, as did all the training costs of business H. Only two businesses, E and H, faced any direct costs which they attributed to the planning stage of their HACCP system representing costs involved in producing materials for use within the business.

Businesses A-G all had to meet equipment related costs, and in the case of businesses B-G these costs formed the largest part of their overall capital expenditure. These costs mainly related to the purchase of additional equipment or the refurbishment of existing equipment,
for example, business C spent over £2000 implementing new time/temperature monitoring equipment for use in its factory. The two exceptions to this trend were businesses D and E who spent £140 and £1100 respectively making actual physical changes to the layout of their production/retail environments or their storage facilities.

Table 4.4. Non-Recurring Capital Costs of HACCP Implementation (£s).

<table>
<thead>
<tr>
<th></th>
<th>Training</th>
<th>Planning</th>
<th>Equipment</th>
<th>Consultancy</th>
<th>Wages/turnover</th>
<th>Audits</th>
<th>Miscellaneous</th>
<th>Total costs</th>
<th>Total as % of weekly turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>94,530</td>
<td></td>
<td>2350</td>
<td></td>
<td>94,880</td>
<td></td>
<td></td>
<td></td>
<td>11%</td>
</tr>
<tr>
<td>B</td>
<td>500</td>
<td></td>
<td>3300</td>
<td>1000</td>
<td>500</td>
<td>185</td>
<td></td>
<td>5093</td>
<td>3%</td>
</tr>
<tr>
<td>C</td>
<td>2400</td>
<td></td>
<td>220</td>
<td>50</td>
<td>5</td>
<td>6500</td>
<td></td>
<td></td>
<td>62%</td>
</tr>
<tr>
<td>D</td>
<td>220</td>
<td></td>
<td>220</td>
<td>50</td>
<td>5</td>
<td>355</td>
<td></td>
<td></td>
<td>7%</td>
</tr>
<tr>
<td>E</td>
<td>200</td>
<td>1270</td>
<td>3300</td>
<td>600</td>
<td>0</td>
<td>2420</td>
<td></td>
<td></td>
<td>9%</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>145</td>
<td>35</td>
<td>50</td>
<td>20</td>
<td>145</td>
<td></td>
<td></td>
<td>4%</td>
</tr>
<tr>
<td>G</td>
<td>85</td>
<td>100</td>
<td>50</td>
<td>20</td>
<td>171</td>
<td></td>
<td></td>
<td></td>
<td>&lt;1%</td>
</tr>
<tr>
<td>H</td>
<td>21</td>
<td>140</td>
<td>100</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Where additional costs relating to increased wages or lost turnover were mentioned, these largely represented overtime costs for time spent on staff training outside normal working hours or the additional wages paid to provide extra cover for staff whilst on training sessions within working hours. However, for business A which faced by far the largest costs in this category, the implementation of a comprehensive program of training for all its 250 food handlers actually meant a temporary downturn in production output equivalent to £90,000 of lost turnover. This cost could potentially have been listed under training therefore. Businesses B and C faced the largest consultancy costs, due entirely to the capital cost of employing independent consultants to help design and implement HACCP. Other costs worthy of mention are the auditing costs in businesses C and E and the miscellaneous costs of £2000 in business A, made up of general consumables. These consumables could not be specifically identified as relating to any one of the other cost groups although it was appreciated that a substantial part of this cost was the production of training materials for the total staff.

The wide variation in total direct costs is clear to see and is to some extent expected as a result of the different size of the eight operations and their different status prior to HACCP implementation. In order to provide comparison these costs are also presented as a percentage of weekly turnover. Turnover data was not available for business G, however, for six of the remaining businesses, direct capital implementation costs comprised under
12% of one week’s turnover falling to less than 1% in business H. Nevertheless these costs represented a far more substantial 62% of weekly turnover in business C.

In each case study, the main time inputs for HACCP implementation were on planning and training (Table 4.5). Training time was particularly high in business A, reflecting the comprehensive program of training delivered to all its food handlers, similarly for what was a very large scale operation, planning time for HACCP was also very high at 340 hours. Despite having employed external consultants, businesses B and C each still spent considerable time internally on their HACCP implementation. This commitment is important in ensuring that consultants are working from a valid information base and also provides a sense of ownership in the system, a point emphasised previously in this chapter.

The equipment related time in businesses D and E reflects the physical changes made in these businesses. Supplier auditing was a particular feature of the time spent by businesses C and E, the importance of which was emphasised by the manager of business C.

"They (suppliers) have got to work to the HACCP system as well.... it’s not good if I work to a HACCP system and one of my suppliers doesn’t."

<table>
<thead>
<tr>
<th></th>
<th>Training</th>
<th>Planning</th>
<th>Equipment</th>
<th>Consultancy</th>
<th>Wages / turnover</th>
<th>Audits</th>
<th>Miscellaneous</th>
<th>Total time</th>
<th>Total as % of food handlers weekly man hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1120</td>
<td>340</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>1462</td>
<td>16%</td>
</tr>
<tr>
<td>B</td>
<td>32</td>
<td>55</td>
<td>-</td>
<td>32</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>119</td>
<td>10%</td>
</tr>
<tr>
<td>C</td>
<td>15</td>
<td>110</td>
<td>2</td>
<td>-</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>167</td>
<td>82%</td>
</tr>
<tr>
<td>D</td>
<td>5</td>
<td>16</td>
<td>11</td>
<td>12</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>47</td>
<td>42%</td>
</tr>
<tr>
<td>E</td>
<td>10</td>
<td>45</td>
<td>98</td>
<td>5</td>
<td>60</td>
<td>-</td>
<td>-</td>
<td>218</td>
<td>27%</td>
</tr>
<tr>
<td>F</td>
<td>26</td>
<td>20</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>53</td>
<td>24%</td>
</tr>
<tr>
<td>G</td>
<td>45</td>
<td>16</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>64</td>
<td>57%</td>
</tr>
<tr>
<td>H</td>
<td>23</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.5</td>
<td>49.5</td>
<td>10%</td>
</tr>
</tbody>
</table>

*a assumes an average working week of 37 hours for full time and 18.5 hours for part time food handlers.*

As with the direct costs in relation to turnover, the time spent was converted into a figure representing the proportion that this time took from the food handler man-hours in the average working week. The highest percentage figure was again identified for business C at 82% of a working week. It should be stressed that these are merely notional figures as they are based only on the time worked by food handling staff and by applying generic
figures to represent the working week overlook the likely differences in hours worked not only between businesses but between staff within the same business.

Table 4.6 converts the time spent on HACCP implementation to a cost figure are based on the hourly rate of the person responsible for the majority of the HACCP implementation. Whilst they may not fully represent the real monetary value of the time spent this approach provides a useful reference point for comparison between businesses. Where the overtime payments included in the costs listed in Table 4.3.4 were for staff training whose time was also included under training in Table 4.3.5 then these payments were deducted from the final calculation to minimise the risk of double accounting.

The result is a total value ranging from £516 for business F to £116,310 for business A, or the equivalent of 3% of weekly turnover for business H to 76% of weekly turnover in business C. Whilst translating time into a cost value in this way is a valid approach, the fact that this time is by no means accounted for by additional wage payments, and only in the case of business A resulted in a loss of any turnover, suggests that the majority of time required to implement HACCP can be found within the normal working week. This was emphasised by the manager of business B who stated that there were, "no real costs in terms of time..... it just meant shuffling other functions, we didn’t sort of come here on Sunday morning and get paid double time to catch up, we didn’t need to". Alternatively for the smaller businesses, e.g. C, D, F and G, this time may have been found from the spare time of those responsible for HACCP development, which in businesses C, D and F were the owner-managers who obviously had a vested interest in making this commitment.

Table 4.6. Total Value of Time and Money Spent on HACCP Implementation.

<table>
<thead>
<tr>
<th>Business</th>
<th>Capital costs (£'s)</th>
<th>Time (hours)</th>
<th>Hourly time value per business (£'s)*</th>
<th>Time cost represented in capital costs by overtime expenditure (£'s).</th>
<th>Total cost + Time value (£'s)b</th>
<th>Total value as % of weekly turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>98,880</td>
<td>1462</td>
<td>15</td>
<td>4500</td>
<td>116,310</td>
<td>13%</td>
</tr>
<tr>
<td>B</td>
<td>5093</td>
<td>119</td>
<td>13</td>
<td>108</td>
<td>6532</td>
<td>4%</td>
</tr>
<tr>
<td>C</td>
<td>6500</td>
<td>167</td>
<td>12</td>
<td>500</td>
<td>8004</td>
<td>76%</td>
</tr>
<tr>
<td>D</td>
<td>355</td>
<td>47</td>
<td>9</td>
<td>60</td>
<td>718</td>
<td>15%</td>
</tr>
<tr>
<td>E</td>
<td>2420</td>
<td>218</td>
<td>10</td>
<td>50</td>
<td>4550</td>
<td>17%</td>
</tr>
<tr>
<td>F</td>
<td>145</td>
<td>53</td>
<td>7</td>
<td>-</td>
<td>516</td>
<td>16%</td>
</tr>
<tr>
<td>G</td>
<td>205</td>
<td>63.5</td>
<td>9</td>
<td>-</td>
<td>777</td>
<td>-</td>
</tr>
<tr>
<td>H</td>
<td>171</td>
<td>49.5</td>
<td>11</td>
<td>-</td>
<td>716</td>
<td>3%</td>
</tr>
</tbody>
</table>

* based on the approximate hourly wage of those staff responsible for HACCP implementation.

b calculated using the formula: Capital costs – overtime expenditure + (Time x hourly time value).
Table 4.7 highlights the ongoing weekly costs associated with hygiene / HACCP management. Cleaning was the main direct cost for businesses A, C, F, G and H, with the high cleaning costs of business A reflecting the value of their outside cleaning contract.

### Table 4.7. Ongoing Weekly Costs Relating to HACCP and Related Hygiene Management (£s).

<table>
<thead>
<tr>
<th></th>
<th>Cleaning</th>
<th>Monitoring / recording</th>
<th>Documentation</th>
<th>Corrective action</th>
<th>Updating / verification of HACCP</th>
<th>Miscellaneous</th>
<th>Total costs</th>
<th>Total as % of weekly turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>14,270</td>
<td>-</td>
<td>-</td>
<td>730</td>
<td>-</td>
<td>-</td>
<td>15,500</td>
<td>2%</td>
</tr>
<tr>
<td>B</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>1078</td>
<td>-</td>
<td>2</td>
<td>1,089</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>C</td>
<td>20</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>32</td>
<td>&lt;0.5%</td>
</tr>
<tr>
<td>D</td>
<td>20</td>
<td>30</td>
<td>-</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>90</td>
<td>2%</td>
</tr>
<tr>
<td>E</td>
<td>30</td>
<td>190</td>
<td>-</td>
<td>450</td>
<td>-</td>
<td>55</td>
<td>725</td>
<td>3%</td>
</tr>
<tr>
<td>F</td>
<td>112</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>142</td>
<td>4%</td>
</tr>
<tr>
<td>G</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>-</td>
</tr>
<tr>
<td>H</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>&lt;0.5%</td>
</tr>
</tbody>
</table>

Monitoring and documentation placed considerable direct costs onto businesses A and E in particular, mostly arising from microbiological testing. Businesses A and B also lost considerable amounts of money from the loss of products as a result of corrective action although the impact of this product loss in relation to turnover was greatest in business E. Total running costs ranged from only £15 to £15,500, but never represented more than 5% of weekly turnover. There may be other costs that could be attributed to hygiene management, for example utility costs for refrigeration. However, these could not have been identified without further investigations at a level that would have been impractical.

The weekly time spent cleaning was largely similar across all eight businesses with no obvious link to business size (Table 4.8). The relative lack of time spent cleaning by business B reflects its use of dry products of low microbiological risk, the main clean taking place during a shut down day each month. The complete lack of time entered under cleaning for business A reflects the fact that this was carried out by an external contractor whose time was included in the cost of the contract as included in Table 4.7.

The time spent on monitoring and documentation did shows signs of being related to business size whilst the 123 hours spent by business A on miscellaneous activities represents ongoing processes of staff training and assessment. Despite this such seemingly large time commitments, in proportion to the man hours available each week, business A
spent the least time on its HACCP / hygiene management, especially in comparison to the smaller manufacturers, C and D. By contrast business G spent the largest proportion of its time on hygiene management at around 29%.

<table>
<thead>
<tr>
<th>Cleaning</th>
<th>Monitoring / recording</th>
<th>Documentation</th>
<th>Corrective action</th>
<th>Updating / verification of HACCP</th>
<th>Miscellaneous</th>
<th>Total time</th>
<th>Total as % of food handlers weekly man hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>-</td>
<td>84</td>
<td>288</td>
<td>64</td>
<td>185</td>
<td>123</td>
<td>744</td>
</tr>
<tr>
<td>B</td>
<td>33</td>
<td>77</td>
<td>.25</td>
<td>4</td>
<td>1.4</td>
<td>1.5</td>
<td>117</td>
</tr>
<tr>
<td>C</td>
<td>40</td>
<td>8</td>
<td>2</td>
<td>-</td>
<td>0.2</td>
<td>2</td>
<td>52</td>
</tr>
<tr>
<td>D</td>
<td>15</td>
<td>9</td>
<td>1</td>
<td>-</td>
<td>0.5</td>
<td>0.5</td>
<td>26</td>
</tr>
<tr>
<td>E</td>
<td>39</td>
<td>74</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>136</td>
</tr>
<tr>
<td>F</td>
<td>20</td>
<td>4</td>
<td>2</td>
<td>0.5</td>
<td>1</td>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>G</td>
<td>20</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>0.2</td>
<td>7</td>
<td>32</td>
</tr>
<tr>
<td>H</td>
<td>24</td>
<td>24</td>
<td>0.5</td>
<td>0.5</td>
<td>-</td>
<td>1.5</td>
<td>51</td>
</tr>
</tbody>
</table>

When weekly direct costs and time costs were combined to produce an overall cost (Table 4.9), the total figures, ranging from £305 to £26654 per week, bore direct comparison to the size of the different businesses both within and to some extent between industry sectors. However, when expressed as a proportion of weekly turnover, these costs are a generally larger burden upon the smaller businesses.

<table>
<thead>
<tr>
<th>Capital costs (£'s)</th>
<th>Time (hours)</th>
<th>Hourly time value per business (£'s)</th>
<th>Total cost + Time value (£'s)*</th>
<th>Total value as % of weekly turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>15,500</td>
<td>744</td>
<td>15</td>
<td>26660</td>
</tr>
<tr>
<td>B</td>
<td>1089</td>
<td>117</td>
<td>13</td>
<td>2610</td>
</tr>
<tr>
<td>C</td>
<td>32</td>
<td>52</td>
<td>12</td>
<td>656</td>
</tr>
<tr>
<td>D</td>
<td>90</td>
<td>26</td>
<td>9</td>
<td>324</td>
</tr>
<tr>
<td>E</td>
<td>725</td>
<td>136</td>
<td>10</td>
<td>2085</td>
</tr>
<tr>
<td>F</td>
<td>142</td>
<td>28</td>
<td>7</td>
<td>338</td>
</tr>
<tr>
<td>G</td>
<td>15</td>
<td>32</td>
<td>9</td>
<td>303</td>
</tr>
<tr>
<td>H</td>
<td>20</td>
<td>51</td>
<td>11</td>
<td>581</td>
</tr>
</tbody>
</table>

* calculated using the formula: Capital costs + (Time x hourly time value)

The largest increase in ongoing weekly costs (Table 4.10) was faced by business A, largely due to a substantial increase in its microbiological testing (listed under control / monitoring) and the additional wage costs attributed to the additional member of staff
taken on with the responsibility for managing the HACCP system. This increase represented 0.1% of weekly turnover. In businesses B and E, the majority of additional weekly costs came from the extra value of products lost / removed as a result of a failure in control measures. It is anticipated however that these costs would settle down over time as corrective actions were introduced. Despite representing a cost to the business, there is a wider industry / societal benefit to the customer / consumer by preventing these goods from reaching the market. Similarly to some extent there is a non-tangible benefit to business B in being able to better maintain its reputation in the marketplace by not sending out these sub-standard goods in the first place.

The additional weekly costs in businesses D, F, G and H are low by comparison, indeed G and H faced no additional direct costs, which in the case of H in particular reflects the wide range of prerequisite practices and HACCP principles that were in place prior to formal HACCP implementation. Nevertheless it is worth noting that the extra £25 being spent by business D represents a more significant proportion of weekly turnover than in the larger manufacturing businesses A and B. Business C is the exception to the rule with small increases in any additional costs being more than offset by a substantial increase in weekly turnover to the value of £3000 per week having won a large contract purely as a result of having HACCP in place. This extra production output was achieved without any increase in weekly wage bills. It is worth noting that it was business C that faced the largest implementation costs proportional to its turnover and yet this increased income means that this initial investment will have been rapidly returned.

Table 4.10. Increase in Weekly Running Costs as a Direct Result of HACCP (£s).

<table>
<thead>
<tr>
<th>Business</th>
<th>Cleaning</th>
<th>Monitoring / Recording</th>
<th>Documentation</th>
<th>Corrective Action</th>
<th>Updating / Verification of HACCP</th>
<th>Wages / Turnover</th>
<th>Miscellaneous</th>
<th>Total change in weekly costs</th>
<th>Total change as a % of weekly turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>+30</td>
<td>+500</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+300</td>
<td>+0</td>
<td>+830</td>
<td>&lt;0.5%</td>
</tr>
<tr>
<td>B</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+231</td>
<td>+0</td>
<td>+0</td>
<td>+2</td>
<td>+233</td>
<td>&lt;0.5%</td>
</tr>
<tr>
<td>C</td>
<td>+8</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+2</td>
<td>-3000*</td>
<td>+0</td>
<td>-2,990</td>
<td>28%</td>
</tr>
<tr>
<td>D</td>
<td>+5</td>
<td>+10</td>
<td>+0</td>
<td>+10</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+25</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>E</td>
<td>+5</td>
<td>+100</td>
<td>+0</td>
<td>+400</td>
<td>+0</td>
<td>+100</td>
<td>+0</td>
<td>+605</td>
<td>2%</td>
</tr>
<tr>
<td>F</td>
<td>+52</td>
<td>+0</td>
<td>+0</td>
<td>-50</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+2</td>
<td>&lt;0.5%</td>
</tr>
<tr>
<td>G</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>0%</td>
</tr>
<tr>
<td>H</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>0%</td>
</tr>
</tbody>
</table>

* represents increased weekly turnover of £3000, presented as a minus figure to offset other increased running costs.
Changes in weekly time spent on hygiene / HACCP related activities are spread across a range of groupings (Table 4.11). Cleaning, whilst not unique to HACCP, was clearly highlighted by several of the businesses as an area for improvement in the course of their HACCP plan development. Prominent are the increases of 10 weekly staff hours spent cleaning in businesses C and E, particularly significant given the total weekly staff hours worked in these businesses. Changes in monitoring and documentation activities are to some extent proportional to business size. The most significant single increase in time was faced by business A in its ongoing updating and verification of HACCP although the overall time increase faced by business A was similar to that of the other businesses in terms of the proportion of staff hours available. The smallest increase in weekly time was faced by business H, again reflecting the prerequisite practices and HACCP principles already in place prior to formal HACCP implementation.

Table 4.11. Increase in Weekly Hygiene Management Time as a Direct Result of HACCP (hours).

<table>
<thead>
<tr>
<th></th>
<th>Cleaning</th>
<th>Monitoring/Recording</th>
<th>Documentation</th>
<th>Corrective Action</th>
<th>Updating/verification of HACCP</th>
<th>Wages/Turnover</th>
<th>Miscellaneous</th>
<th>Total change in weekly time</th>
<th>Total % of food handlers weekly man hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>+0</td>
<td>+30</td>
<td>+20</td>
<td>+0</td>
<td>+139</td>
<td>+0</td>
<td>+5</td>
<td>+194</td>
<td>2%</td>
</tr>
<tr>
<td>B</td>
<td>+0</td>
<td>+26</td>
<td>+0</td>
<td>+0.5</td>
<td>+0</td>
<td>+0</td>
<td>+1.5</td>
<td>+28</td>
<td>2%</td>
</tr>
<tr>
<td>C</td>
<td>+10</td>
<td>-0.5</td>
<td>+2</td>
<td>+0</td>
<td>+0.2</td>
<td>+0</td>
<td>+2</td>
<td>+14</td>
<td>7%</td>
</tr>
<tr>
<td>D</td>
<td>+3</td>
<td>+2.5</td>
<td>+1</td>
<td>+0</td>
<td>+0.5</td>
<td>+0</td>
<td>+0</td>
<td>+7</td>
<td>6%</td>
</tr>
<tr>
<td>E</td>
<td>+10</td>
<td>+21</td>
<td>+3</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+5</td>
<td>+39</td>
<td>5%</td>
</tr>
<tr>
<td>F</td>
<td>+1</td>
<td>+2</td>
<td>+2</td>
<td>+0</td>
<td>+0.5</td>
<td>+0</td>
<td>+0</td>
<td>+6</td>
<td>3%</td>
</tr>
<tr>
<td>G</td>
<td>+0</td>
<td>+2.5</td>
<td>+1</td>
<td>+0</td>
<td>+0.2</td>
<td>+0</td>
<td>+5</td>
<td>+9</td>
<td>8%</td>
</tr>
<tr>
<td>H</td>
<td>+2</td>
<td>+0</td>
<td>+1</td>
<td>+0</td>
<td>+0</td>
<td>+0</td>
<td>+3</td>
<td>&lt;1%</td>
<td></td>
</tr>
</tbody>
</table>

The additional weekly time and costs are again combined to make one monetary value (Table 4.12). It is notable that with the exception of business E, where running HACCP had resulted in increased weekly costs, it was the time component of these costs that was of greatest value. Nevertheless in only two businesses had wage bills increased since HACCP implementation, suggesting that in practical terms whilst businesses may be busier as a result of HACCP they are not necessarily as worse off as these figures suggest. As already noted, the major exception from the eight case studies is business C, the only business to see a positive return on its initial investment in HACCP.
Table 4.12. Total Value of the Increased Weekly Hygiene Management Costs and Time as a result of HACCP.

<table>
<thead>
<tr>
<th>A</th>
<th>+830</th>
<th>+194</th>
<th>15</th>
<th>300</th>
<th>+3440</th>
<th>&lt;1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>+233</td>
<td>+28</td>
<td>13</td>
<td>-</td>
<td>+597</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>C</td>
<td>-2990</td>
<td>+14</td>
<td>12</td>
<td>-</td>
<td>-2561</td>
<td>27%</td>
</tr>
<tr>
<td>D</td>
<td>+25</td>
<td>+7</td>
<td>9</td>
<td>-</td>
<td>+88</td>
<td>2%</td>
</tr>
<tr>
<td>E</td>
<td>+605</td>
<td>+39</td>
<td>10</td>
<td>100</td>
<td>+895</td>
<td>4%</td>
</tr>
<tr>
<td>F</td>
<td>+2</td>
<td>+6</td>
<td>7</td>
<td>-</td>
<td>+44</td>
<td>1%</td>
</tr>
<tr>
<td>G</td>
<td>+0</td>
<td>+9</td>
<td>9</td>
<td>-</td>
<td>+81</td>
<td>-</td>
</tr>
<tr>
<td>H</td>
<td>+0</td>
<td>+3</td>
<td>11</td>
<td>-</td>
<td>+33</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

*a* based on the approximate hourly wage of those staff responsible for HACCP implementation.

*b* calculated using the formula: Capital costs – overtime expenditure + (Time x hourly time value).

4.3.3. General Management Attitudes Towards HACCP.

The attitudes expressed by the case study managers suggest the presence of a number of intangible benefits from HACCP, despite the fact that only business C previously indicated any overall cost savings or increase in turnover (Table 4.13). With the exception of business H, all believed that HACCP would increase staff hygiene awareness, with all but business E and H also agreeing that the system would ease customers food safety concerns.

Table 4.13. Attitudes Towards the Relative Costs and Benefits of HACCP Implementation

<table>
<thead>
<tr>
<th>(✓ = agree, x = disagree, ? = neither agree / disagree)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>HACCP will increase staff awareness of food hygiene issues.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>HACCP will ease customers concerns about food safety.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>HACCP will enable the business to win more customers.</td>
<td>?</td>
<td>x</td>
<td>✓</td>
<td>?</td>
<td>x</td>
<td>?</td>
<td>✓</td>
<td>?</td>
</tr>
<tr>
<td>Food hygiene is under greater control since implementing HACCP.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>HACCP reduces the risk of the business causing a food poisoning outbreak in the future.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>The benefits of implementing HACCP outweigh the costs.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>HACCP is a cheap system to implement.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>?</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Introducing HACCP has been a waste of time and money.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>The cost of implementing and running HACCP threatens the financial viability of the business.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>
However, only businesses C and G believed that HACCP would help them win more customers which in the case of business C directly reflected the increased turnover since implementation. In business G, the residential home, this belief was not able to be tested due to the lack of data available on the turnover of the business. However, the chef believed that local authorities and private clients considered food safety as an important issue when selecting accommodation for the elderly.

"From the owners perspective, I've been able to say to them well look at the advantage, if we get food poisoning then that's it, you're not going to get new residents coming in here... if social services have x numbers of people that they've got to put in somewhere, they're not going to put them in somewhere where the reputation is bad." (Case study G)

Greater control of food hygiene and a reduced risk of causing a food poisoning outbreak were cited by six of the businesses, the exceptions being businesses E and H. In the case of business E, this may represent a misunderstanding on the part of the food hall manager given that the business was losing an additional £400 per week after implementing HACCP because of products rejected due to the failure to implement corrective actions. The fact that these unsatisfactory products were being identified suggests improved control over food hygiene and consequently a reduced risk to the consumer.

Despite the costs of HACCP, businesses A-D, G and H agreed that HACCP had been cheap to implement whilst only businesses E and H disagreed that the benefits of HACCP outweighed the costs. None of the businesses felt that introducing HACCP had been a waste of time or money. In the case of business E, it is important to recognise the specific pressures placed upon the food hall manager by higher up within the department store. The manager expressed concern that any additional costs from HACCP may make the food hall a less profitable alternative to using the floor space to sell other goods. This was reflected in his belief that the costs of HACCP threatened the financial viability of the business.
4.4. **DISCUSSION.**

4.4.1. **The Direct Costs of HACCP Implementation.**

Although a lack of financial resources is one of the most commonly cited barriers to HACCP development, the experience of the eight case studies suggests that the system can be implemented within the reasonable financial means of businesses, both large and small. The main implementation costs identified and measured in each case study reflect the main headings used by Heyhoe and Associates Pty Ltd. (1999) namely initial systems set up / training and capital investment in building upgrade or equipment.

With the exception of businesses A and H, the largest direct capital costs were equipment related, including structural changes to the work environment. By contrast, Henson *et al.* (1999) found that only 14% of dairy processors surveyed cited equipment related costs or structural changes as the most significant they had faced when implementing HACCP. However, their survey presented these as separate cost centres in contrast to the case studies where the costs were combined as one category. The outstanding costs experienced by business A in staff training, both in terms of the training itself and downturn in production as a result, reflects the view of McEachern (1999) that large firms are likely to face disproportionate costs from being more likely to implement formalised training for all staff as a result of HACCP implementation. However, with by far the largest turnover of the eight, business A appeared well placed to absorb these costs and minimise the burden.

As McEachern (1999) notes, the direct costs of HACCP implementation may have been biased by a general upgrading of facilities, beyond a level ultimately required by HACCP itself. It is difficult to discern where the costs strictly required by HACCP end, although one example would seem to be business C that had implemented a computerised system of temperature monitoring which could arguably have been carried out manually. This said, the computerised system could prove more systematic and reliable and therefore provide greater food safety guarantees which, after all, is the intention of HACCP.

With the exception of business E whose status within the department store was under scrutiny, none of the case study participants felt that the costs of HACCP threatened their financial viability. This reflects the relatively low costs incurred in relation to weekly turnover. Of course it is unlikely that businesses would have voluntarily implemented HACCP had these costs threatened viability, unless to not have done so would have posed
an even greater threat to the future of the business. However, businesses may have only committed the resources that they felt able to afford, as opposed to those necessary to ensure the implementation of a fully effective system. If true, this could lead to the risks that may result from an incomplete or ineffective HACCP system (Easter et al., 1994; Smith, 1996; Adams, 1998; Panisello et al. 1999).

Assessment of the HACCP systems themselves was never a primary aim of the case study investigations, although each business provided the opportunity to briefly review their HACCP documentation. This documentation appeared comprehensive enough to assume that their systems, on paper at least, had identified the hazards and critical control points in their processes and had implemented monitoring, recording and corrective action procedures. However, without having been able to assess in more detail how these systems were working 'on the shop floor' it is impossible to guarantee whether the systems were making a real contribution to food safety. This was a particular concern in business F whose documentation was more limited and whose capital implementation costs were low given that the business was the least developed prior to HACCP implementation. By contrast, although capital implementation costs were also low in business H, the practices already in place were largely able to be incorporated into the new system.

That business A was able to implement a large scale HACCP plan drawing purely upon internal expertise is testament to the advantageous position of large firms in terms of the level of technical expertise available (Jouve, 1994; Kirby, 1994; Jansen, 1999). Only businesses B and C had employed external consultants, although they each recognised that these consultants were only as good as the information they were provided with. Businesses D-H had all drawn on the advice of EHOs alongside the use of trade associations or HACCP related literature. When compared to the smaller manufacturers, retailers and caterers surveyed in the previous chapter, businesses D-H arguably represent the exception rather than the norm and were able to reduce the potential costs or difficulties of HACCP implementation thanks to their individual circumstances. For example, those responsible for HACCP implementation in businesses G and H each had Advanced Food Hygiene qualifications, business E employed a part time sales assistant studying for a degree in Food Technology and the owner of business F had a husband with experience of HACCP from a food manufacturing environment.
4.4.2. *Time and the Concentration of Functions.*

The significance of the time commitment required by HACCP was highlighted by each case study to some degree. The main focus was upon the time spent either receiving training, training employees or generally planning and developing the system. The largest single amount of time spent on any activity was in business A, where a total of 1120 staff hours were spent providing a HACCP training program for all food handling employees. Nevertheless, such was the size of business A that this still represented a relatively marginal proportion of the total hours worked by food handling staff each week.

In keeping with other studies on the costs of HACCP implementation, hourly time was converted to a time cost to estimate the overall economic burden of HACCP implementation. However, in most cases this time commitment was met without any undue expenditure on either overtime provision or lost turnover, with the main exception of business A. The main barrier to overcome, particularly for smaller businesses, is therefore likely to be the fact that any time commitment is exacerbated by the concentration of functions and responsibility for HACCP plan development upon the shoulders of business managers (Kirby 1994; Jansen, 1999; McEachern, 1999). It is thought unlikely that the enthusiasm shown by the managers involved in these case studies could be relied upon to be present across the industry as a whole.

4.4.3. *The Impact of HACCP upon Operating Costs.*

Despite the costs and time associated with the day to day management of HACCP, and hygiene in general, a significant proportion of this was clearly committed even prior to HACCP implementation. Therefore, of greatest relevance is the specific impact of HACCP upon these operating costs. The common view is that businesses will be able, over time, to recoup some of the implementation costs of HACCP by achieving direct business benefits such as reduced product wastage, increased product shelf life and hence a reduction in production costs (see for example, Sperber, 1991; Ehiri and Morris, 1995; World Health Organisation, 1999; Henson *et al.*, 1999; Martin and Anderson, 2000; Jensen and Unnevehr, 2000).

However, only business A reported any reduction in costs as a result in improvements in product loss or spoilage, whilst businesses B, D and E had experienced an increase in production costs due to product loss. This increase was most significant in business E where increased monitoring carried out had led to more unsatisfactory products being
identified and highlighted failures in control measures. Nevertheless although this represents a direct cost to the business, by preventing this product reaching the consumer then the food safety risks are reduced and the business and the consumer receives an intangible benefit as a result. Although businesses C, G and H reported no such costs from product loss either before or after HACCP it is unlikely that such costs do not exist, rather as Henson et al. (1999) observe, businesses do not tend to formally monitor the costs of quality assurance and thus remain unaware of the impact, be it increased or reduced costs.

Other increased weekly costs were incurred as a result of the enhanced monitoring and documentation requirements of HACCP, reflected in other international HACCP costing studies in the US seafood industry (Colatore and Caswell, 2000) and the Brazilian foodservice sector (Buchweitz and Salay, 2000). However, the overall increase in direct capital costs amounted to a maximum 2% of weekly turnover in the case of business E which was largely due to the increased product losses, anticipated to settle down as greater control was exerted through the HACCP system. In all other cases, overall capital running costs were up by less than 0.5% per week and in the case of business C the balance of any increased costs was far outweighed by the increased turnover accrued.

As with HACCP implementation, the additional ongoing time commitment required as a result of HACCP, notably on cleaning, monitoring and documentation, appeared to be as just as significant a factor. Only business C reported any time savings, amounting to half an hour per week on monitoring as a result of their new computerised temperature monitoring system. In relation to the weekly hours available from food handlers, this increased time commitment was more significant than the equivalent increase in direct costs representing up to 8% of the food handler hours available per week in business G. However, these additional time demands again appeared to be absorbed without subsequent increases in wage bills. The exceptions were businesses A and E although the extent of their wage bill increases did not fully make up for the increased time being spent.

4.4.4. Marketing HACCP to Increase Trade.

One of the clear differences between the eight case studies was the primary factor that motivated HACCP implementation. Change within any industry is often motivated by customer demands and in the two larger manufacturers studied (Businesses A and B), market forces were the driving force behind the change to HACCP. Meanwhile in business C, HACCP implementation was driven by a single account. For many
manufacturing businesses the economic incentives for HACCP have increased as domestic
and international markets have fostered the development of HACCP as a significant
trading standard (Caswell and Hooker, 1996; Roberts et al., 1996) and for many companies
the adoption of HACCP is as much about survival as it is about actually increasing trade.

Neither businesses A or B reported any increase in turnover as a direct consequence of
HACCP. This was reflected in the fact that the managers in these businesses were
ambivalent about whether HACCP would help to win customers but agreed that the system
would at least ease the food safety concerns of current customers. Notably, 77% of the
dairy processors surveyed by Henson et al. (1999) reported an increased ability to retain
existing customers as a result of HACCP implementation. Business C provided some
possible stimulus for other small food manufacturers, having increased weekly turnover by
some £3000 since implementing HACCP. This was as a direct result of being able to
prove that HACCP procedures were in place and thus enter new markets and compete to
some extent with their larger competitors. This is also likely to explain why the
implementation costs of business C were considerably higher in relation to weekly
turnover than any of the other seven businesses, with the manager having been willing to
make a greater investment in the development of HACCP, confident in securing new
contracts as a result.

However, the benefits of increased turnover were not felt by any of the retail and catering
businesses, nor was there any obvious sense in which contracts or customers had been
retained as a result of HACCP. This was not unexpected given that none of the businesses
used hygiene as a marketing tool, with the possible exception of business G where a
positive reputation as regards hygiene in general was seen as important in attracting
residents to the home. The relative lack of market forces in driving HACCP is reflected by
the fact that it was EHOs who to a greater or lesser extent had recommended the adoption
of HACCP procedures, the main influence therefore being the enforcement and food safety
perspective rather than customer pressure.

Small retail and catering businesses in particular will largely deal direct with customers
from a limited catchment area. Leach (1996) suggests that in theory, this level of direct
customer contact means that there is scope for food safety to be marketed more positively,
whilst recognising, along with Beaumont (1991), that the extent to which this would prove
cost effective and yield tangible results is doubtful. These issues are discussed in more
depth in Chapter Five.
4.4.5. Non-Tangible Benefits of HACCP Implementation.

With the exception of business C, despite the apparent lack of direct and tangible economic benefits arising from HACCP implementation, a number of intangible benefits were suggested. For example, almost all of the business managers felt that HACCP would increase food hygiene awareness among their staff, that it had brought food hygiene under even greater control and that the risk of a food poisoning outbreak stemming from the business had been reduced. Although the nature of this research prevented any microbiological analysis of product safety before or after HACCP, other studies carried out in a range of environments have consistently highlighted improvements in this respect (Aramouni et al., 1996; Biss and Hathaway, 1998; Lambiri et al., 1995; Rushing et al., 1996; Shanaghy et al., 1993).

The contribution of HACCP to improved food safety is difficult to quantify in economic terms, particularly at the ‘micro’ level. To do so would require comprehensive identification and valuation of the risk reduction in terms of the likely consequences of any food poisoning outbreak both for the business involved and for the population or society in general. However, the general response of the case study managers implied that despite the lack of direct economic benefits, they were able to appreciate the value of HACCP in terms of these non-tangible benefits. None felt that HACCP had been a waste of time and money and almost all agreed that the benefits of having implemented HACCP outweighed the costs.

4.5. Conclusions.

The results presented in this chapter make a positive contribution to the existing literature by comparing the experience of eight UK businesses that have implemented HACCP systems and the micro-economic impact of these systems. The findings suggest that the implementation of HACCP based systems can be achieved within the resources available of small retail and catering businesses. Non-recurring start up costs can be kept below 10% of weekly turnover although the time commitment required may place a significant burden upon managers of smaller businesses. Although the relative running costs of the system comprise a substantial part of weekly turnover, many of the costs described were not unique to HACCP, representing some of the general management costs involved with
running a food business with or without HACCP, albeit that HACCP may impact on the level of these costs.

What the case studies have failed to prove, despite identifying a number of intangible benefits as a result of HACCP implementation, is that businesses will experience tangible short term financial benefits. The one exception to this was business C which managed to significantly increase its turnover as a result of having a HACCP system and will easily have recouped the initial outlay costs involved as a result. Nevertheless, in the retail and catering sectors, such market incentives do not currently exist for most businesses and the traditionally short term perspective of such businesses is likely to continue to act as a barrier to investment in HACCP.

The isolated examples provided in this chapter, whilst valid in their own right, can not be used to make wholesale conclusions of the likely impact and issues involved in wider HACCP implementation across the industry. The examples selected, especially those from the retail and catering sectors, are likely to represent the exception rather than the norm as regards the challenges and burdens likely to be faced in order to implement HACCP. As already discussed in the previous chapter, there remains a general lack of understanding among food business managers of either the nature or purpose of the HACCP approach (Ehiri and Morris 1995). Furthermore, not every small retailer will be fortunate enough to employ a member of staff studying for a qualification in Food Studies, although the extent to which this qualified them to be involved in HACCP implementation is open to debate.

Caswell and Hooker (1996) suggested that the adoption of the HACCP is driven first and foremost by the desire to improve food safety in a manner that goes beyond simple cost-benefit tests. This would appear to be especially true given the lack of tangible economic benefits identified for most of the businesses described in this chapter. With ongoing difficulties in quantifying the intangible benefits of HACCP implementation, it is likely that purely voluntary and independent implementation of HACCP is unlikely to occur at a particularly rapid pace. As discussed in Chapter Two, possible responses to increasing the pace of HACCP implementation across the industry as a whole therefore tend to focus either on direct government intervention through regulation, generic HACCP implementation models or initiatives, or a combination of the two. The following chapter discusses these issues in the light of the introduction of HACCP based licensing for the UK butchery sector. Results from a survey of butchers involved in an initiative to accelerate
the introduction of HACCP are presented, alongside findings from a study of consumers’ willingness to pay for HACCP systems within this sector of the UK food industry.
CHAPTER FIVE: ACCELERATED HACCP IMPLEMENTATION FOR RETAIL BUTCHERS: COSTS, BENEFITS, ATTITUDES AND CONSUMER WILLINGNESS TO PAY.

5.1. INTRODUCTION.

As discussed in Chapter Two, there is still some debate as to whether mandatory HACCP or the use of generic models of implementation are the most appropriate means of introducing effective and sustainable HACCP systems across the food industry. However, it was also noted that events had largely overtaken this debate. Preparations for the introduction of the new licensing regulations for English butchers shops (Department of Health, 2000) saw businesses encouraged to take part in an accelerated HACCP initiative organised by the Meat and Livestock Commission (MLC) and funded by the UK Department of Health. The initiative provided businesses with free training in HACCP for one member of staff as well as the additional support of a food safety consultant subcontracted by the MLC to assist with the design and implementation of a HACCP system. A similar initiative was delivered in Wales through instruction and materials provided via local authority environmental health departments. Results collected from the Food Standards Agency (FSA) suggested that 86% of English businesses needing a licence were expected to have had one by December 2001 (Food Standards Agency, 2001c).

Despite these developments, no systematic evaluation of the impact of either the English or Welsh initiatives had been planned. Consequently, the MLC were approached with the proposal to carry out a survey of butchers involved in the accelerated HACCP initiative in England. Prior to this, a similar survey had been proposed to, and approved by, the Wales Food Safety Technical Panel consisting of local authority representatives and staff from the then Welsh Office. This chapter reports results from the English survey which, using two separate questionnaire instruments, aimed to gather basic background data on the butchery industry and its practices prior to the HACCP initiative, and to estimate the costs to businesses of their involvement in the initiative and the implementation of HACCP. Previous estimates had put the non-recurring costs of HACCP implementation within the licensing regulations at between £0-5000 per business (Department of Health, 1998c).
The survey also sought to identify the attitudes and beliefs of business managers towards HACCP itself, the factors that may have motivated them to take part in the initiative and the impact of the training provided upon managerial knowledge and ability relating to HACCP and food safety in general. Due to the time-scales involved in developing and administering the research it was not possible to carry out a direct before and after comparison of these issues, something which would undoubtedly have proved of even greater value. Nevertheless, respondents were asked to retrospectively identify their business practices, and the levels of knowledge and ability they held prior to the initiative.

One of the themes discussed in the previous chapters has been the fact that whilst businesses may experience a range of benefits from HACCP implementation, these benefits are largely intangible and difficult to quantify or value in economic terms. This is particularly true for retail and catering businesses where a lack of market demand for, and consumer awareness of HACCP, is likely to prohibit them from positively marketing food safety to cover the extra costs of HACCP identified, either by increasing prices or by attracting more customers. Consequently, as a follow up to the survey of butchers involved in the accelerated HACCP initiative, this chapter also presents findings from a pilot experimental auction, designed to identify whether consumers may be willing to pay more for products sold from butchers operating HACCP.

5.2. **Butchers’ Survey Methodology.**

5.2.1. **Questionnaire Design.**

The two questionnaires used for the English butchers survey (Appendix Three) were developed from a single questionnaire distributed to the 730 Welsh butchers involved in their equivalent of the accelerated HACCP initiative. The Welsh study, which acted as a pilot for the English survey, attained a response rate of 18.5%. Although this was marginally higher than that for the survey described in Chapter Three, the response was disappointing given the direct relevance of the survey content to the businesses involved. It was for this reason that two separate questionnaires were developed for the English study.

Both questionnaires started by collecting some background data about the business, its food hygiene practices and systems prior to HACCP implementation and the extent to which they handled or manufactured cooked meat products. One questionnaire continued
by considering managerial attitudes towards the HACCP initiative and the impact of the training and advice they received upon their perceived knowledge and ability relating to both HACCP and food hygiene control in general. Attitude measurement was again carried out using the Likert scale approach, whilst improvements in knowledge and ability were measured using a format developed directly from the pre and post test method used by Barrett et al. (1998). This involved a retrospective assessment of managers' knowledge and ability prior to their involvement in the HACCP initiative, as well as an assessment of their current level of knowledge and ability since completing their HACCP implementation.

The second questionnaire focused instead upon the costs and time spent implementing HACCP through the initiative, the ongoing management costs that they faced and the impact that HACCP had itself had upon these running costs. The approach used to gather the costing of HACCP was developed from the costing forms used to elicit data from the case studies described in the previous chapter. Although the self completion survey approach did not offer the opportunity to validate and discuss individual findings as was possible with the case studies, having already been used relatively successfully in the study of Welsh butchers, the results were considered to be both valid and reliable.

5.2.2. Administration of the Survey.

Questionnaires were sent out at the beginning of September 1999, to the first 1000 businesses identified by the MLC to have completed their HACCP implementation. Half of the businesses received the questionnaire focusing upon managerial attitudes and the impact of the training provided, with the other half receiving the costing questionnaire. Completed questionnaires were returned using pre-paid envelopes. Three weeks after the initial mailshot, all businesses received a reminder letter, and whilst response rates had already been good up to this point, these had a further positive impact on the response.

A representative random sample of all businesses taking part in the initiative was not possible. This would have meant waiting until all businesses had completed the initiative which was not practical within the timescale available for the work. It is therefore important to recognise that the sample used was not necessarily representative of the 7000+ businesses that passed through the initiative. It is entirely possible that those enrolling on the initiative and finishing their HACCP systems first may have held more positive attitudes towards both the initiative and HACCP in general. Similarly, they may
also have had less to do to implement HACCP, resulting in a lower financial or time commitment.

5.2.3. Response Rates.

A total of 334 unspoiled responses were received, a response rate of 33.4%. The attitudinal questionnaire achieved a response rate of 38.2% and the costing questionnaire a response rate of 28.6%. This variation is likely to reflect the more complex and thought intensive nature of the costing questionnaire. Without a follow up study of non-respondents or a parallel study of the last 1000 businesses to complete their HACCP systems, it was not possible to confirm the extent of any bias in the final sample of survey respondents. However, the range of attitudes expressed does not suggest that there is any undue positive or negative bias among respondents. Furthermore, the core results from the study, including the baseline characteristics of the businesses that responded, were not significantly different to those obtained from the study of Welsh butchers, lending further validity to the findings.

5.3. CONSUMER WILLINGNESS TO PAY METHODOLOGY.

5.3.1. The Choice of the Vickrey Auction.

The two main approaches to willingness to pay (WTP) estimation, contingent valuation (CV) and experimental auctions, were briefly described in Chapter 2.5.6. Despite their widespread use in the valuation of environmental goods or resources, CV methods are yet to be fully accepted by economists. Arguments against the use of the technique are discussed by Hutchinson et al. (1995) and focus particularly upon the reliability of the WTP valuations produced, the fundamental assumption being that the values derived from such studies are real rather than hypothetical (Blamey et al., 1995; Brent, 1996; Blumenschein et al., 1997).

The extreme view, as expressed by Diamond and Hausman (1994), is that CV simply cannot work in that it is not consistent with established economic theory. Blamey et al. (1995) suggest that the values produced have more to do with citizen judgement concerning desirable social goals rather than consumer preferences, referred to by Kahneman and Knetsch (1992) as the purchase of moral satisfaction. Exacerbating criticism of CV have been studies demonstrating the different values generated by the
various CV methods towards the same issue (Boyle et al., 1996; Jordan and Elnagheeb, 1994; Kealy and Turner, 1993; Ready et al., 1996). Nevertheless, Harrison (1992) defends CV and rejects the view of Kahneman and Knetsch. Carson and Mitchell (1995) also reject criticism of CV methods, arguing that problems with the approach are likely to be the result of flawed survey design rather than a fundamentally flawed approach.

The most common criticism specific to sequential bidding approaches is the issue of starting point bias, or what Gregory et al. (1995) refer to as anchoring and adjusting bias. Boyle et al. (1985) suggest that such bias can arise as the initial value used conveys information as to what the value of the commodity should be. Alternatively, if the initial value is far removed from the respondents true value then there may be the temptation to answer prematurely. This raises the question of where to start the bidding and whether different people should in fact be given different starting points. Meanwhile, the common complaint about open ended approaches is that they lack any realism of a true market situation and consequently respondents find it difficult to give an answer.

One problem highlighted by several studies is the discrepancy in WTP values generated by the use of the different contingent valuation methods towards the same issue (Jordan and Elnagheeb, 1994; Kealy and Turner, 1993; Ready et al., 1996). Boyle et al. (1996) compared the dichotomous choice and open-ended approaches and found that the mean willingness to pay values and their standard deviations were significantly higher within the dichotomous choice study. However, Loomis (1990) found no evidence to support any difference in reliability between the dichotomous choice and open ended methods. Meanwhile, others argue that of all three CV methods, dichotomous choice is the most realistic in that consumers are used to being presented with a price for a good and having the choice of either accepting or rejecting that price (Cooper and Loomis, 1992; Elnagheeb and Jordan, 1995; Li and Mattsson, 1995). Nevertheless, the luck of the draw in assigning the two thresholds for the referendum approach can produce a potentially wide variety of values (Cameron and Huppert, 1991; Kanninen, 1993). In order to minimise the risk of potentially misleading bidding thresholds, Cameron and Huppert (1991), Cooper and Loomis (1992) and Elnagheeb and Jordan (1995) stress the need for either large sample sizes and/or systematic processing of pretest data rather than ad hoc specification of bids.

In addition to these method specific criticisms, there are other general issues that potentially impact upon the WTP values produced by CV methods in general, even including the role of question order in the survey (Boyle et al. 1993) and the treatment of
‘don’t know’ responses (Wang, 1997). More technical are the concerns about part whole bias and embedding. Part whole bias refers to a situation whereby respondents may value a broader or narrower package than that intended by the researcher (Kahneman and Knetsch, 1992; Boyle et al., 1994; Diamond and Hausman, 1994). Schkade and Payne (1994) found evidence to suggest that other considerations come in to play beyond the issue in question. Boyle et al. (1994) suggest that this is likely to be a particular problem where respondents are asked for non-use values as may be the case in environmental valuation where they have limited experience or knowledge of the object being valued.

Embedding is slightly different in that it relates to the approach taken to produce WTP values (Kahneman and Knetsch, 1992). For example, respondents may be asked to value their WTP to access a group of environmental resources such as parks in a city. The value of a single park inferred from the aggregate value would most likely be less than if a single park had been studied in isolation. Also associated with part whole bias and embedding is the issue of substitution which implies that in order to value a particular ‘good’, respondents to surveys would have to also be aware of and able to value the potential alternatives (Cummings et al., 1994).

Accepting the potential difficulties in administering and analysing the results of CV studies, Diamond (1996) suggests that proper planning and where possible the use of multiple methods will help deliver greater confidence. Particular attention should be given to ensuring the plausibility of the scenario presented to survey respondents and to ensuring that this scenario has been accepted. Ajzen et al. (1996) found evidence to suggest that WTP increases with the quality of the information used to describe the good being valued although they also point out that people process information in different ways and will do so less carefully if they feel that the scenario is not particularly relevant to them. Consequently they advise that the same survey be carried out under different information conditions to counteract or at least estimate the level of information bias. Similar concerns about information provision and the understanding of respondents are expressed by Hutchinson et al. (1995).

The key advantage of the Vickrey experimental auction over CV is the fact that auctions use real goods, real money, repeated participation and information on market prices to create a more realistic scenario. Through the repeated bidding rounds, subjects appreciate the monetary consequences of their bidding and learn that revealing their true valuation is the dominant strategy (Shogren et al., 1994; Miyake, 1996; Buhr et al., 1993). By using
the second highest rather than highest price, therefore implying that any winning bidder does not pay or receive what they actually bid, incentives for false or strategic bids are not present (Coursey et al., 1987; Gregory and Furby, 1987). However, the method recognises that participants will not necessarily reveal their true preferences immediately, hence the need for repeated bidding rounds.

Although experimental auctions offer an alternative to CV methods, they do not represent a wholesale solution of their problems. Relative to CV, experimental auctions are constrained in their sample size because of the requirement for the availability of subjects and the costs of securing their involvement (Roosen et al., 1998). Although the use of real payments overcomes the hypothetical barrier within CV, Swallow (1994) points out that the experimental values produced remain contingent on the controlled experimental environment. Similarly, as demonstrated by Roosen et al. (1998), issues such as the provision of information, scenario development, part whole bias and embedding could still impact upon the WTP values obtained if the auctions are not well planned and controlled.

The final choice of the Vickrey auction method over a CV survey was partly based on the relative weight of the methodological criticisms levelled at CV methods and an appreciation that, not having a background as an economist with experience of this area, the risk of committing a methodological error would have been increased. The Vickrey auction approach offered a less risky approach as models of its implementation are relatively easy to follow as can be seen in the following section. Time pressures on the research also made the Vickrey approach advantageous as it was able to be planned, delivered and analysed in a considerably shorter space of time than would have been required by a CV survey.

5.3.2. The Experimental Design.

The precise methodology was developed from that used by Fox et al. (1995) in their analysis of consumer preferences for pork sandwiches. Variations on this approach have also formed the basis for a range of other food safety or food quality related willingness to pay studies (Elnagheeb et al., 1992; Shin et al., 1992; Buhr et al., 1993; Hoffman et al., 1993; Melton et al., 1996).

To familiarise participants with the experimental approach being used and in keeping with Buhr et al. (1993), Fox et al. (1995) and Melton et al. (1996), they were each endowed
with £1 and a common good, in this case a Mars bar. A different chocolate bar (Kit Kat Chunky) was then presented to participants who were asked to submit sealed bids indicating the amount, up to a maximum of the £1 endowment they had been given, that they would be willing to pay to exchange their Mars bar for the Kit Kat Chunky. Participants were advised that this process would be repeated on a further two occasions with a winning bidder selected at random from the winners in each round of bidding. Participants were also informed that the winning bidder would be the person submitting the highest bid but that the 'market price' that they would be required to pay would be the amount of the second highest bid.

Having completed three rounds of bidding with the chocolate bars and after ensuring that the auction process was fully understood, participants were endowed with a further £10 and told that in order to take the endowment home with them, they would be required to eat a ham sandwich (to be prepared in the adjoining kitchen facilities) made with sliced cooked ham purchased in a typical butchers shop. Participants were presented with an example of this ham (Sample A) and were told that it had not been tested in any way for its microbiological quality and therefore represents the usual food safety risks (the nature of which were determined by participants own risk perceptions). Participants were then shown another sample of sliced cooked ham (Sample B) and informed that one of them, the winning bidder, would be able to eat a sandwich made with this ham instead of Sample A. The two samples of meat were identical in every respect (and in reality had been purchased from the same source), however, participants were informed that the butcher from whom Sample B had been purchased was operating a HACCP system. Participants were then provided with the following information relating to the meat in sandwich B.

'Meat B has been produced and sold by businesses operating a Hazard Analysis Critical Control Point (HACCP) system which has been audited and verified by local authority environmental health officers. HACCP is a management system designed to deliver greater food safety by ensuring that a business is effectively controlling the risks posed by microbiological hazards (bacteria). By controlling food hazards at every point of a food operation, HACCP delivers a greater assurance that food being produced and sold is fit for consumption and of minimal risk of causing food poisoning.'

Participants were then asked to submit sealed bids to indicate the maximum amount they would be willing to pay to exchange the sandwich that they would be required to eat for one made with meat sample B. They were advised that this process would be carried out over fifteen rounds after which one round would be selected at random and the highest bidder in that round would have to pay the second highest bid price to exchange
sandwiches. After each round the participant number of the highest bidder was displayed along with the second highest bid value. After round five, participants were provided with the following information and the bidding continued.

'Official statistics show that every year almost 100,000 people suffer from food poisoning with estimates stating that the real level of food poisoning could be as high as 2.5 million cases per year, equivalent to approximately one in twenty of the UK population. The symptoms of food poisoning can range from the mild to the very severe. Short-term symptoms may include vomiting, diarrhoea, nausea, abdominal pain, paralysis of cranial nerves, and dehydration. In the longer term victims may also suffer from arthritis as a result and in the most severe cases food poisoning can be fatal. All of these symptoms are likely to be more severe among the old, young children and those whose immune systems are depressed because of illness.

Cooked meat products are high-risk foods and are commonly implicated in food poisoning outbreaks. For example, in 1996 one outbreak of E. coli O157 from a butchers shop in Scotland resulted in some 18 deaths, all aged over 60 and over 250 people were confirmed as having contracted the bacteria from the outbreak although the actual figure infected may have been nearer 500. The official government report into the circumstances surrounding the outbreak identified cross contamination of bacteria from raw to cooked meats as a key issue and recommended that the HACCP system be introduced in all high risk premises such as butchers shops in order to minimise the likelihood that such an outbreak could occur again. If properly implemented and run, HACCP would help ensure that such cross contamination could not occur whilst also ensuring that legal requirements for cooking / cooling and storage temperature requirements for both raw and cooked meats were being met. In achieving these goals, HACCP could significantly reduce the risk of contracting food poisoning from cooked meat products purchased in butchers shops.'

Finally, after bidding round ten was completed, participants were provided with further information about HACCP and the future licensing regulations relating to HACCP.

'Later this year, new licensing requirements will mean that all butchers shops or supermarkets selling raw and cooked meat products that are unwrapped will be required by law to have a fully documented HACCP system in place in order to gain a licence to trade. Even at the present time, all UK butchers shops or supermarkets, regardless of what products they are handling should by law have in place most, if not all of the food safety controls that a HACCP system would prescribe.

Existing regulations mean that all food businesses should already be managing food hygiene on the basis of the key principles that form a HACCP system, namely hazard analysis, control, monitoring and corrective action. If butchers do not already have these principles in place then they are contravening the law.'

Having read this information, five more bidding rounds when then carried out at the end of which a winner was selected at random from the 15 rounds of bidding. Although they had been advised that they would have to eat a sandwich to take away their £10 endowment,
participants were not required to do so because of potential legal concerns in the eventuality that they may have indeed contracted food poisoning as a result.

5.3.3. The Experimental Sample.

A convenience sample of twenty-two participants (six men and sixteen women), was recruited from a local church congregation. Participants had to be the main shopper in their household and had to have purchased sliced cooked meats from either a butchers shop or supermarket delicatessen counter within the previous month. A sample size of twenty-two was realistically as many as was manageable within one staging of the experiment and the experiment was carried out using the church facilities. Upon arrival, participants were asked to complete a brief questionnaire (Appendix Four). This identified a range of issues including personal and family status, their personal experience of food poisoning or food poisoning related symptoms, their food safety knowledge, awareness, perceived risk and attitudes in relation to various food safety issues and their purchasing habits relating to the products being auctioned. The purpose of this questionnaire was to enable some comparison of the trends in willingness to pay between subgroups of the sample.

5.3.4. Statistical Analysis.

As in Chapter Three, the results presented in this chapter for both the survey of butchers and the willingness to pay experiment were subjected to bivariate analysis. A range of statistically significant \( P < 0.05 \) associations are highlighted and these are again described in the text as reference numbers. A full breakdown of the statistical values and significance levels corresponding to each reference number is included at the end of the results section in Table 5.13.
5.4. **Butchers Survey Results.**

5.4.1. **Business Characteristics.**

For the purposes of the analysis, a part time food handler was counted as the equivalent of half a full time food handler and as in Chapter Three, food handlers were defined as those who handled or prepared food whether open / unwrapped or packaged.

The mean number of food handlers employed was 3.8 although half of the businesses employed three food handlers or less whilst over three quarters employed fewer than five food handlers. The maximum number of food handlers employed was 30.

The mean turnover (total income from goods and services sold) was £4030 per week although this ranged from £700 to £32,000. Over half the businesses had a weekly turnover of under £3000 and three-quarters had a weekly turnover of below £5000.

Most responding businesses (88%) were independent shops, whilst 5.1% were part of local chains and 4.7% were butchery / deli counters in larger stores. Whilst this trend in ownership may not be fully representative of the industry as a whole, it nevertheless demonstrates the prevailing nature of business ownership among butchers in England.

Table 5.1 shows the hygiene practices in place prior to HACCP implementation and indicates the percentage of managers who felt their business had already been carrying out any of the seven HACCP principles. Of the eight hygienic practices listed, the average number carried out was 5.4. One quarter of businesses were carrying out at least seven of the eight practices, but half had five or less. Almost all businesses were carrying out stock rotation although only 6% were using any microbiological testing. More businesses than not were carrying out the remaining six practices although a substantial percentage had no pest control programs, temperature monitoring of equipment or cleaning schedules in place prior to HACCP. A strong positive association was be identified between the numbers of food handlers employed and the range of hygiene practices previously in place.

The mean number of HACCP principles believed to have been in place before formal HACCP implementation was three, with half of businesses having three or less and 18% having six or seven. Only 22% of businesses identified that they had already carried out each of the first five HACCP principles, which are inherent in the 1995 Food Safety
Businesses that already had food hygiene training provisions in place tended to have implemented more of the principles of HACCP prior to taking part in the initiative.

Table 5.1. Hygiene Practices and Principles of HACCP in Place Prior to Formal HACCP Implementation (n = 334).

<table>
<thead>
<tr>
<th>Hygiene Practices</th>
<th>Principles of HACCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning schedules</td>
<td>Hazard analysis</td>
</tr>
<tr>
<td>Pest control programs</td>
<td>Identification of CCPs</td>
</tr>
<tr>
<td>Microbiological testing</td>
<td>Target levels / critical limits</td>
</tr>
<tr>
<td>Temperature monitoring (food)</td>
<td>Monitoring of CCPs</td>
</tr>
<tr>
<td>Temperature monitoring (equipment)</td>
<td>Corrective action</td>
</tr>
<tr>
<td>Inspection of incoming food deliveries</td>
<td>Verification</td>
</tr>
<tr>
<td>Food hygiene training</td>
<td>Documentation</td>
</tr>
<tr>
<td>Stock rotation</td>
<td></td>
</tr>
</tbody>
</table>


Table 5.2 describes the approaches taken towards the handling, manufacture and sale of cooked meat products. A total of 67% of businesses sold cooked meats that had been mostly manufactured on the premises whilst 23% tended to buy in most of their cooked meats from a supplier. The most common practice was for businesses to manufacture a limited range of cooked meat products for sale on the premises. In the majority of cases, these cooked meat products were sold open or unwrapped, whilst in almost two thirds of businesses that sold cooked meat products, these comprised less than 20% of business turnover. Kruskal Wallis tests showed that businesses generating a larger proportion of their turnover from cooked meat products were likely to be larger in terms of both the number of food handlers employed and their overall level of turnover.

Perhaps unsurprisingly given the additional food safety risks involved, businesses handling cooked meat products were more likely to have already had temperature monitoring procedures in place and were more likely to identify that they already monitored at CCPs. Meanwhile, those businesses manufacturing some cooked meats on the premises were even more likely to be monitoring at CCPs and those who predominantly bought in their cooked meats from outside were more likely to inspect incoming food deliveries.
Overall, 72% of responding businesses manufactured at least some cooked meat products on the premises with internal probes almost universally used to monitor the temperature of these products. Visual checks, though not necessarily scientific, were also used by most businesses to assist in ensuring the safety of manufactured products. However electronic temperature or timing displays were less common and only 7% of businesses carried out any sort of microbiological testing of their products.

Table 5.2. Trends in the Handling, Manufacture and Sale of Cooked Meat (CM) Products.

<table>
<thead>
<tr>
<th>Main practice relating to the handling of CM products (n = 334)</th>
<th>Do not sell</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manufacture and wholesale</td>
<td>9%</td>
</tr>
<tr>
<td></td>
<td>Manufacture wide range for sale on premises</td>
<td>17%</td>
</tr>
<tr>
<td></td>
<td>Manufacture limited range for sale on premises</td>
<td>41%</td>
</tr>
<tr>
<td></td>
<td>Buy in an extensive range for resale</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Buy in a limited range for resale</td>
<td>18%</td>
</tr>
<tr>
<td>Main method of sale of CM products (n = 300)</td>
<td>Pre-packaged by supplier</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td>Packaged on the premises for sale</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>Sold open / unwrapped</td>
<td>78%</td>
</tr>
<tr>
<td>Contribution of CM products to business turnover (n = 300).</td>
<td>0-10%</td>
<td>31%</td>
</tr>
<tr>
<td></td>
<td>11-20%</td>
<td>32%</td>
</tr>
<tr>
<td></td>
<td>21-30%</td>
<td>19%</td>
</tr>
<tr>
<td></td>
<td>+30%</td>
<td>18%</td>
</tr>
<tr>
<td>Safety measures taken in the manufacture of cooked meat (CM) products (n = 240)</td>
<td>Visual Checks</td>
<td>82%</td>
</tr>
<tr>
<td></td>
<td>Electronic Temperature Displays</td>
<td>48%</td>
</tr>
<tr>
<td></td>
<td>Electronic Timers</td>
<td>55%</td>
</tr>
<tr>
<td></td>
<td>Internal Temperature Probes</td>
<td>98%</td>
</tr>
<tr>
<td></td>
<td>Microbiological Testing</td>
<td>7%</td>
</tr>
</tbody>
</table>

Only 16% of businesses handling cooked meats indicated that they would be prepared to restrict themselves to the approach of buying in pre-wrapped cooked meat products to reduce the risks to food safety. Perhaps unsurprisingly, businesses that were currently selling cooked meat products open as their main mode of sale and those who gained a greater proportion of their turnover from cooked meat products were considerably less likely to express their willingness to adopt this approach.
5.4.3. Non-Recurring Costs and Time Spent Implementing HACCP.

Data on the costs and time incurred by HACCP were completed by 129 respondents. The average value to the business of each man-hour spent on the activities listed was estimated at £5.50 using figures from the 1998 New Earnings Survey (Office for National Statistics, 1998b).

The figures in Table 5.3 have been adjusted to remove one statistically outlying business that spent over £15,100 on purchasing new equipment and making physical changes to the shop layout, as a result of which the business also lost over £6000 of turnover because of the closure of the shop in order to carry out these changes. To include this data would have dramatically distorted the mean figures presented and provided an unfair reflection of the overall trends. Furthermore it is was also anticipated that the implementation of HACCP had in this case coincided with a major refurbishment, rather than this necessarily having been a direct effect of the HACCP implementation process.

The direct non-recurring costs of HACCP implementation averaged £420 per business, ranging to a maximum of £4235. The median figures demonstrate that at least half of the businesses faced direct costs amounting to £176 or less. New equipment comprised over three quarters of the average costs incurred. Training costs were the second greatest expense on average, although at least half of the businesses surveyed faced no such direct costs, reflecting the free nature of the HACCP training. Where such costs occurred these were predominantly the result of additional training provided to staff as part of the HACCP implementation process.

Across the sample, the direct costs of HACCP implementation comprised an average 18% of weekly business turnover although in over three quarters of cases these costs represented less than 20% of weekly turnover. Businesses spent an average of 62 man-hours implementing HACCP with training (28 hours) and planning (26 hours) making up the majority of this time. Direct capital costs were positively correlated with the time input made. The mean time spent on other activities was negligible with half of the businesses spending no time on each of the other activities listed.
Table 5.3. Non-Recurring Costs and Time Spent Planning and Implementing HACCP (n = 128).

<table>
<thead>
<tr>
<th>Cost Centre</th>
<th>DIRECT COST (£'s)</th>
<th></th>
<th></th>
<th>TIME (hours)</th>
<th></th>
<th></th>
<th>TOTAL COST (£'s) + TIME (1 hour = £5.50)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
<td>Min / Max</td>
<td>Mean</td>
<td>Median</td>
<td>Min / Max</td>
<td>Mean</td>
<td>Median</td>
</tr>
<tr>
<td>Equipment:</td>
<td>405</td>
<td>100</td>
<td>0 / 4100</td>
<td>5.2</td>
<td>1</td>
<td>0 / 100</td>
<td>433</td>
<td>100</td>
</tr>
<tr>
<td>Training:</td>
<td>42</td>
<td>0</td>
<td>0 / 500</td>
<td>28.4</td>
<td>22.5</td>
<td>5 / 147</td>
<td>198</td>
<td>146</td>
</tr>
<tr>
<td>Planning:</td>
<td>23</td>
<td>10</td>
<td>0 / 300</td>
<td>25.7</td>
<td>20</td>
<td>0 / 120</td>
<td>165</td>
<td>134</td>
</tr>
<tr>
<td>Wages / Lost Turnover:</td>
<td>36</td>
<td>0</td>
<td>0 / 500</td>
<td>0.2</td>
<td>0</td>
<td>0 / 20</td>
<td>37</td>
<td>0</td>
</tr>
<tr>
<td>Miscellaneous:</td>
<td>10</td>
<td>6</td>
<td>0 / 100</td>
<td>0.1</td>
<td>0</td>
<td>0 / 5</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Consultancy:</td>
<td>3</td>
<td>0</td>
<td>0 / 100</td>
<td>1.3</td>
<td>0</td>
<td>0 / 40</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Audits:</td>
<td>2</td>
<td>0</td>
<td>0 / 100</td>
<td>0.8</td>
<td>0</td>
<td>0 / 15</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>TOTALS</td>
<td>520</td>
<td>176</td>
<td>0 / 4235</td>
<td>61.5</td>
<td>49.5</td>
<td>15 / 347</td>
<td>859</td>
<td>513</td>
</tr>
</tbody>
</table>
If the average working week in the butchery industry is estimated at 41.2 hours (Office for National Statistics, 1998), then the total time spent implementing HACCP was calculated as representing an average 57% of the weekly man-hours available to each business, although this ranged up to a maximum of 442%. Based on a time cost of £5.50 per hour, the average total implementation cost to the businesses was £859, representing an average 32% of one weeks turnover per business. Notably, 81% of businesses spent no time or money auditing suppliers as part of the HACCP implementation process, whilst 78% spent no time or money on any consultancy in addition to that received as part of the initiative itself. These total costs were converted to represent a proportion of annual rather than weekly turnover. In 91% of businesses these total costs represented less than 1.5% of annual turnover and in 83% they represented less than 0.5%. The monetary value of the time spent on HACCP implementation made up over one third of the average total implementation cost at a value of £338. However, the average direct cost of extra wages or lost turnover identified by managers was much lower at £37, suggesting that much of the time spent on HACCP implementation was made up within the normal working week or the spare time of business managers.

Analysis of the costs and time spent on HACCP implementation against other business characteristics highlighted a number of interesting trends and significant statistical associations. Perhaps most notably, there was no negative association (P > 0.05) between the range of hygienic practices or HACCP principles in place prior to formal HACCP implementation. Indeed, businesses with a greater range of hygienic practices in place prior to the initiative were likely to have spent more time on their HACCP implementation as were those who in particular had temperature monitoring procedures and food hygiene training in place prior to their involvement in the initiative.

Reflecting general economies of scale, weekly turnover was positively associated with the direct costs of HACCP implementation, likewise the number of food handlers employed with the time spent on HACCP. However, the direct costs incurred represented a greater proportion of weekly turnover in those businesses with lower turnovers whilst the time spent represented a greater proportion of the weekly man hours available to businesses in those with less food handlers.
<table>
<thead>
<tr>
<th>Main Cooked Meat Handling Practice</th>
<th>Mean Total Cost (Cost + Time Value)</th>
<th>% of businesses falling within Department of Health (1998c) cost estimates (shown in brackets)</th>
<th>% of businesses falling below Department of Health (1998c) cost estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not sell cooked meat products (n = 18)</td>
<td>£473</td>
<td>84% (below £500)</td>
<td>N/A</td>
</tr>
<tr>
<td>Manufacture and wholesale CM products; Manufacture a wide range of cooked meat products; Manufacture a limited range of cooked meat products (n = 79) *</td>
<td>£1003</td>
<td>33% (£1000-£5000)</td>
<td>66%</td>
</tr>
<tr>
<td>Buy in an extensive range of CM products for resale (n = 6)</td>
<td>£521</td>
<td>67% (£500-£1500)</td>
<td>33%</td>
</tr>
<tr>
<td>Buy in a limited range of CM products for resale (n = 25)</td>
<td>£761</td>
<td>84% (below £1000)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* The three categories were amalgamated for this analysis to reflect those used in the Department of Health Cost Estimates

N/A = not applicable, no minimum cost stated.
Although most businesses handled cooked meat products, those that did not were likely to have spent less money and time on their implementation of HACCP. Meanwhile those businesses that actually manufactured cooked meat products on the premises were likely to have spent more money on equipment related costs and more time on training and general planning. Table 5.4 compares the mean implementation costs between businesses not handling cooked meat products and those that fell into the different categories as regards their predominant cooked meat handling practices as previously described in Table 5.2. Despite the differences seen in mean implementation costs, these did not prove statistically significant ($P > 0.05$). However, costs were clearly highest in businesses who predominantly manufactured the cooked meats that they sold, although the mean figure of £1003 was only marginally inside the Department of Health estimated band for this type of business with 66% falling below the estimated minimum cost. Although also not proving statistically significant, those among the group of predominantly manufacturing businesses that had already carried out hazard analysis faced total direct costs of £914 compared to the £1251 in those that had not done so.

### 5.4.4. Ongoing Costs and Time Spent on Food Hygiene Management.

The ongoing direct costs attributable to food hygiene and HACCP management averaged £30 per week (Table 5.5), most of which was cleaning costs and lost turnover as a result of product loss / spoilage, implying a loss of control over their systems. However, it should be noted that 49% of businesses identified no such weekly costs arising from product loss. Of these direct costs, cleaning comprised an average 0.5% of weekly turnover whilst the total costs identified averaged 1% of total weekly turnover.

An average of 25.9 man hours (24% of man hours available per business) was spent on the activities in Table 5.5. The majority of this time was taken up by cleaning, which at 18 man hours was calculated to take up an average 16% of the weekly man hours available per business. Meanwhile, at a total of 7.3 man-hours per business, the more overtly HACCP related activities of monitoring, recording and documentation took up an average of 7% of the available man-hours per week. When the time spent on HACCP and food hygiene management was costed, total running costs averaged £172 per week, the majority of which was the value of the time spent on the systems and procedures. These total costs represented an average 6% of weekly turnover whilst the total costs of cleaning at £112 represented 4% of the average weekly turnover.
<table>
<thead>
<tr>
<th>Cost Centre</th>
<th>DIRECT COST (£'s)</th>
<th>TIME (hours)</th>
<th>TOTAL COST (£'s) + TIME (1 hour = £5.50)</th>
<th>Businesses with zero cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
<td>Min / Max</td>
<td>Mean</td>
</tr>
<tr>
<td>Cleaning:</td>
<td>14</td>
<td>10</td>
<td>2 / 70</td>
<td>17.9</td>
</tr>
<tr>
<td>Monitoring:</td>
<td>&lt;0.5</td>
<td>0</td>
<td>0 / 10</td>
<td>5.4</td>
</tr>
<tr>
<td>Turnover:</td>
<td>15</td>
<td>3</td>
<td>0 / 300</td>
<td>-</td>
</tr>
<tr>
<td>Documentation:</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>1.9</td>
</tr>
<tr>
<td>Miscellaneous:</td>
<td>&lt;0.5</td>
<td>0</td>
<td>0 / 40</td>
<td>0.7</td>
</tr>
<tr>
<td>TOTALS</td>
<td>30</td>
<td>20</td>
<td>2 / 390</td>
<td>26</td>
</tr>
</tbody>
</table>
Unsurprisingly, businesses with greater numbers of food handlers were likely to spend significantly more money \(^4\) and time \(^5\) each week on food hygiene management and HACCP. However, reflecting economies of scale, where businesses employed greater numbers of food handlers, then the weekly time spent on these activities formed a significantly lower proportion of the overall man hours available per business \(^6\).

5.4.5. The Impact of HACCP Upon Ongoing Running Costs and Time.

Table 5.6 shows the extent to which the weekly running costs already discussed as well as staff wage bills or business turnover had changed as a direct impact of the introduction of HACCP. The average change in direct weekly costs had been an increase of £8 although the majority of this figure was made up of increases in staff wage bills which affected only 14% of the businesses surveyed. The value of this overall cost increase represented an average 0.3% of weekly turnover.

Direct cleaning costs increased by a maximum of £20 per week although the mean increase was negligible and in keeping with the other cost centres listed, at least 50% of businesses indicated no change in direct costs as a result of HACCP implementation. Interestingly some cost savings were highlighted as regards lost turnover from product loss or spoilage although the overall impact of HACCP upon this issue had been to increase costs, albeit that 86% of businesses indicated no change in this area. Similarly, only 3% of businesses noted any change in business turnover as a result of HACCP which ranged from an improved turnover of £115 to a lower turnover of the same amount.

None of the businesses surveyed identified any time savings as a result of HACCP implementation with an average increase in time spent on hygiene management of 5.4 hours per week, representing an average 5% of the man-hours available per business. The maximum increases in time spent on any one activity were 11 hours for monitoring and recording and 10 hours on cleaning.

As with implementation and running costs, increases in weekly time spent were given a monetary value, resulting in an average weekly cost increase of £38 per business. Overall, only 6% of businesses experienced no change in their overall weekly costs as a result of implementing HACCP.
<table>
<thead>
<tr>
<th></th>
<th>COST (£'s)</th>
<th>TIME (hours)</th>
<th>TOTAL COST (£'s) + TIME (1 hour = £5.50)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
<td>Min / Max</td>
</tr>
<tr>
<td>Monitoring &amp; Recording:</td>
<td>+0.5</td>
<td>0</td>
<td>0 / +10</td>
</tr>
<tr>
<td>Cleaning:</td>
<td>+2</td>
<td>0</td>
<td>0 / +20</td>
</tr>
<tr>
<td>Documentation:</td>
<td>+0</td>
<td>0</td>
<td>0 / 0</td>
</tr>
<tr>
<td>Staff Wage Bills:</td>
<td>+4</td>
<td>0</td>
<td>0 / +70</td>
</tr>
<tr>
<td>Corrective Action:</td>
<td>+2</td>
<td>0</td>
<td>-25 / +50</td>
</tr>
<tr>
<td>Miscellaneous:</td>
<td>+0</td>
<td>0</td>
<td>0 / 0</td>
</tr>
<tr>
<td>Weekly Turnover:</td>
<td>-0.5</td>
<td>0</td>
<td>-115 / +115</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>+8</td>
<td>0</td>
<td>-55 / +117</td>
</tr>
</tbody>
</table>
As a proportion of weekly turnover the changes in weekly costs represented an average 1%. Monitoring and documentation, key principles of HACCP were the two cost centres where businesses were most likely to have experienced an increase in overall weekly costs as a result of HACCP implementation with only 12% and 21% of businesses respectively having experienced no change.

Across the sample, there was no significant association between the overall increase in weekly time or costs as a result of HACCP implementation and the range of good hygiene practices or HACCP principles believed to have already been in place prior to formal implementation of the system (P > 0.05). However, further analysis showed that the increase in time spent on monitoring and recording or documentation was likely to have been greater where no documentation existed beforehand. Meanwhile, among businesses who predominantly manufactured their cooked meat products themselves, those who had already undertaken a hazard analysis prior to full HACCP implementation experienced a total cost increase of £35 compared to £60 in those that had not done so, although this did not prove significant. Other significant associations identified included the fact that the increase in weekly time spent as a proportion of the weekly man hours available was greater in businesses employing fewer food handlers. Also, the overall increase in cost and time spent was likely to have been larger in those businesses handling cooked meats who manufactured at least some of these products on the premises.

5.4.6. Managerial Attitudes Towards HACCP and the Accelerated HACCP Initiative.

Table 5.7 highlights the attitudes of business managers towards HACCP itself and their involvement in the HACCP initiative. Statements 1-6 deal with some of the possible issues relating to their actual involvement in the initiative, 7-24 focus on the HACCP system itself and in particular the costs and possible benefits of its use.

Opinion was split as to the availability of information on HACCP prior to the MLC initiative (statement 2) with businesses employing fewer food handlers being less likely to agree with this statement. However, 70% of managers, particularly those with fewer of the principles of HACCP already in place, agreed that nationally publicised food scares had made them more aware of the need for HACCP (statement 6) although 57% felt that butchers shops had been unfairly targeted by EHOs due to such scares (statement 3).
Overall, 48% of managers agreed that HACCP would not have been implemented if the business had been required to pay for the training and advice provided by the MLC (statement 5). Those previously carrying out greater numbers of HACCP principles and those employing greater numbers of food handlers were significantly less likely to agree. The majority (73%) agreed that HACCP could not have been implemented without the help of the MLC and their consultants (statement 1) although businesses with a greater range of good hygiene practices and HACCP principles already in place were less likely to have agreed. Meanwhile, almost all respondents agreed that the initiative should be repeated in other industry sectors such as catering (statement 4), with 92% agreeing that HACCP could be used by any food business (statement 13).

As regards the relative costs and benefits of HACCP, although only 37% agreed that the benefits of HACCP did not outweigh the costs (statement 11), only 26% disagreed with the rest undecided. Nevertheless, 48% did agree that HACCP was cheap to implement (statement 12) with only 27% disagreeing. However, some 11% did feel that the costs of implementing and running HACCP threatened their financial viability (statement 16), with managers of businesses with smaller turnovers and those who disagreed that HACCP was cheap to implement being significantly more likely to agree.

Despite the mixed responses as regards the general costs of HACCP, 78% agreed that food hygiene was under greater control since implementing HACCP. There was also majority agreement that the system had delivered other less tangible benefits. These included reducing the risk of causing a food poisoning outbreak (statement 15), improving stock control and reducing product loss (statement 18), ensuring compliance with legislation (statement 20), increasing staff awareness of food hygiene issues (statement 19) and easing customer concerns about food safety (statement 24). Further analysis of responses between different attitude statements suggested a degree of correlation as regards these less tangible benefits with those who agreed that food hygiene was under greater control being more likely to also agree with statements fifteen, eighteen, nineteen and twenty-four.

Although 71% disagreed that HACCP was difficult to apply to butchers shops (statement 17) and most agreed that HACCP simply reflected basic good hygiene practice (statement 8), 33% did agree that they would need further help in the future to maintain and update the system (statement 14).
Table 5.7. Managerial Attitudes Towards HACCP Implementation and the Accelerated HACCP Initiative (n = 191)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It would not have been possible to implement HACCP without the help provided by the MLC and their consultants.</td>
<td>27</td>
<td>46</td>
<td>13</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>2. Information on HACCP was widely available before getting involved with the MLC initiative.</td>
<td>3</td>
<td>31</td>
<td>16</td>
<td>43</td>
<td>7</td>
</tr>
<tr>
<td>3. Butchers shops have been unfairly targeted by EHOs due to recent food scares.</td>
<td>28</td>
<td>29</td>
<td>23</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>4. The HACCP initiative should be repeated in other sectors of the food industry, e.g. catering.</td>
<td>66</td>
<td>30</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5. HACCP would not have been implemented if the business had to pay for the training and advice provided by the MLC.</td>
<td>12</td>
<td>36</td>
<td>25</td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td>6. Nationally publicised food safety scares have increased my awareness of the need for systems like HACCP.</td>
<td>9</td>
<td>61</td>
<td>17</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>7. Food hygiene is under greater control since implementing HACCP.</td>
<td>29</td>
<td>49</td>
<td>14</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>8. The HACCP system simply reflects basic good hygiene practice.</td>
<td>18</td>
<td>63</td>
<td>7</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>9. HACCP will enable the business to win more customers.</td>
<td>3</td>
<td>23</td>
<td>43</td>
<td>25</td>
<td>6</td>
</tr>
<tr>
<td>10. HACCP has had little impact on the daily running of the business.</td>
<td>3</td>
<td>27</td>
<td>18</td>
<td>43</td>
<td>8</td>
</tr>
<tr>
<td>11. The benefits of implementing HACCP do not outweigh the costs.</td>
<td>5</td>
<td>32</td>
<td>38</td>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>12. HACCP is a cheap system to implement.</td>
<td>3</td>
<td>45</td>
<td>25</td>
<td>21</td>
<td>6</td>
</tr>
<tr>
<td>13. The HACCP system could be used in any type of food business</td>
<td>29</td>
<td>63</td>
<td>6</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>14. The business will not need any more help in the future to maintain and update the HACCP system.</td>
<td>6</td>
<td>27</td>
<td>32</td>
<td>33</td>
<td>2</td>
</tr>
<tr>
<td>15. The HACCP system reduces the risk of the business causing a food poisoning outbreak in the future.</td>
<td>28</td>
<td>55</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>16. The cost of implementing and running HACCP threatens the financial viability of the business</td>
<td>3</td>
<td>8</td>
<td>24</td>
<td>56</td>
<td>9</td>
</tr>
<tr>
<td>17. It is difficult to apply HACCP to butchers shops.</td>
<td>1</td>
<td>12</td>
<td>15</td>
<td>58</td>
<td>13</td>
</tr>
<tr>
<td>18. HACCP systems help stock control and reduce product loss.</td>
<td>6</td>
<td>48</td>
<td>18</td>
<td>25</td>
<td>4</td>
</tr>
<tr>
<td>19. HACCP systems increase staff awareness of food hygiene issues.</td>
<td>18</td>
<td>74</td>
<td>5</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>20. HACCP will help ensure our compliance with UK legislation.</td>
<td>13</td>
<td>72</td>
<td>8</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>21. It is difficult to get staff to change their food hygiene practices to incorporate the HACCP system.</td>
<td>1</td>
<td>15</td>
<td>22</td>
<td>55</td>
<td>8</td>
</tr>
<tr>
<td>22. It will be difficult to keep up with the documentation required by HACCP.</td>
<td>9</td>
<td>28</td>
<td>25</td>
<td>34</td>
<td>4</td>
</tr>
<tr>
<td>23. Customers would not tolerate price rises to cover costs of HACCP.</td>
<td>20</td>
<td>48</td>
<td>22</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>24. HACCP will help ease customer concerns about food safety.</td>
<td>7</td>
<td>51</td>
<td>25</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>25. Butchers shops present a high risk to food safety</td>
<td>4</td>
<td>24</td>
<td>14</td>
<td>41</td>
<td>17</td>
</tr>
</tbody>
</table>
Notably, those who felt HACCP was difficult to apply to butchers shops were less likely to have agreed that food hygiene was under greater control since its implementation \(^{43}\), suggesting that the difficulty that some businesses faced had resulted in a lack of any real impact upon food hygiene. Meanwhile, 37\% agreed that it would be difficult to keep up with the documentation required by the system (statement 22) with businesses that previously had fewer HACCP principles in place being significantly more likely to agree \(^{44}\). Difficulty in keeping up with documentation could be due in part to the correlation between this statement and that concerning the difficulty of getting staff to change their behaviour to incorporate HACCP (statement 21) \(^{45}\).

5.4.7. Improvements in HACCP / Food Hygiene Related Knowledge and Ability.

Business managers were asked about their perceived knowledge of HACCP and general food hygiene issues after having received their HACCP training and then to compare this retrospectively with their knowledge before training. Responses were categorised along a five-point scale as illustrated in Table 5.8.

The knowledge statement rated highest by participants pre-training was factors of hygiene essential for employees (statement 1) whilst of the specific elements of HACCP, statement 7 received the highest pre-training rating with overall knowledge of HACCP (statement 6) rated lowest. In general, pre-training ratings for general food hygiene issues (statements 1-5) were higher than for those more specific to HACCP (statements 6-11) although pre-training knowledge of Pennington Report recommendations (12) was also relatively low.

Managers in businesses operating greater numbers of HACCP principles and carrying out greater numbers of GHPs prior to the HACCP initiative provided significantly higher pre-training knowledge ratings for each of the twelve statements \((P < 0.05)\). The strongest of these correlations were with managers general knowledge of HACCP (statement 6) for both the numbers of HACCP principles \(^{46}\) and hygiene practices previously in place \(^{47}\).

Post-training ratings were broadly similar for each statement with the mean for each being at least 4.0 which equates to ‘much knowledge’ on the rating scale used. The improvements in managers rating of their knowledge post training proved strongly statistically significant \((P < 0.001)\) for each of the twelve statements, using Wilcoxon sign tests. The greatest improvements in the mean knowledge ratings were identified for
overall knowledge of the HACCP system (*statement 6*) and more specifically its record keeping/documentation systems (*statement 11*).

**Table 5.8.** Pre and Post Training Ratings of Managers' Own HACCP and Food Hygiene Related Knowledge \((n = 191)\).

<table>
<thead>
<tr>
<th>1. Factors of personal hygiene essential for employees.</th>
<th>Mean pre training rating</th>
<th>Mean post training rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Characteristics of potentially hazardous/high-risk foods.</td>
<td>3.9</td>
<td>4.3</td>
</tr>
<tr>
<td>3. Environmental conditions that encourage bacterial growth.</td>
<td>3.5</td>
<td>4.4</td>
</tr>
<tr>
<td>4. The legal requirements for food safety in butchers premises</td>
<td>3.4</td>
<td>4.3</td>
</tr>
<tr>
<td>5. Bacteria that can cause foodborne illness.</td>
<td>3.2</td>
<td>4.2</td>
</tr>
<tr>
<td>6. The Hazard Analysis Critical Control Point (HACCP) system.</td>
<td>3.2</td>
<td>4.2</td>
</tr>
<tr>
<td>7. Potential hazards and their severity within your business.</td>
<td>2.3</td>
<td>4.3</td>
</tr>
<tr>
<td>8. Requirements that must be met at each Critical Control Point to ensure the safety of food</td>
<td>3.4</td>
<td>4.3</td>
</tr>
<tr>
<td>9. Procedures for monitoring at Critical Control Points</td>
<td>2.7</td>
<td>4.3</td>
</tr>
<tr>
<td>10. Strategies for corrective action in HACCP due to loss of control at CCPs</td>
<td>2.7</td>
<td>4.3</td>
</tr>
<tr>
<td>11. HACCP record keeping/documentation systems</td>
<td>2.6</td>
<td>4.3</td>
</tr>
<tr>
<td>12. The recommendations of the Pennington Report for food safety in butchers premises.</td>
<td>2.6</td>
<td>4.3</td>
</tr>
</tbody>
</table>

*a* 1 = NO knowledge, 2 = LITTLE knowledge, 3 = MODERATE knowledge, 4 = MUCH knowledge, 5 = COMPLETE knowledge

Further analysis of these pre and post training knowledge ratings with the attitudes described in Table 5.7 highlighted a number of interesting correlations. For example, agreement with the fact that it would not have been possible to implement HACCP without the help provided by the MLC and its consultants was associated with lower pre training ratings for overall knowledge of HACCP (*statement 6*) \(^{49}\). Meanwhile, higher post training ratings for knowledge of the requirements that must be met at each Critical Control Point to ensure the safety of food (*statement 8*) were associated with agreement that HACCP reduced the risk of the business causing a food poisoning outbreak \(^{50}\).

Table 5.9 is essentially the same as Table 5.8 but focuses upon the perceived ability of managers to carry out certain tasks relating to HACCP. The ability statements rated highest by participants pre-training was the ability to minimise the risks of producing...
unsafe food (statement 5) and to identify when CCPs had not been met (statement 4) with the lowest ratings seen for the ability to train other employees to work within HACCP (statement 9).

Table 5.9. Pre and Post Training Ratings of Managers’ Own HACCP and Food Hygiene Related Capabilities (n = 191).

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean pre training rating</th>
<th>Mean post training rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Recognise potential hazards and assess their severity within your food business.</td>
<td>3.4</td>
<td>4.4</td>
</tr>
<tr>
<td>2. Identify Critical Control Points.</td>
<td>2.9</td>
<td>4.4</td>
</tr>
<tr>
<td>3. Take corrective action when something is wrong.</td>
<td>3.7</td>
<td>4.5</td>
</tr>
<tr>
<td>4. Identify when Critical Control Points (such as fridge/cooking temperatures) have not been met.</td>
<td>3.8</td>
<td>4.5</td>
</tr>
<tr>
<td>5. Minimise the risks of producing unsafe food.</td>
<td>3.8</td>
<td>4.5</td>
</tr>
<tr>
<td>6. Manage a HACCP system yourself from day to day.</td>
<td>2.5</td>
<td>4.4</td>
</tr>
<tr>
<td>7. Check/verify that the HACCP system is working.</td>
<td>2.5</td>
<td>4.4</td>
</tr>
<tr>
<td>8. Modify the HACCP plan to incorporate any changes in working practices, shop layouts, or product ranges.</td>
<td>2.5</td>
<td>4.3</td>
</tr>
<tr>
<td>9. Train other employees to work within HACCP</td>
<td>2.4</td>
<td>4.3</td>
</tr>
</tbody>
</table>

*1 = NO ability, 2 = LITTLE ability, 3 = MODERATE ability, 4 = MUCH ability, 5 = COMPLETE ability*

As with managers knowledge, pre-training ability ratings for each statement were likely to be significantly higher in businesses that had a larger number of HACCP principles or GHPs in place prior to introducing the system (P < 0.05). The strongest of these correlations were with managers ability to train employees to work within HACCP (statement 9) for both the numbers of HACCP principles and hygiene practices previously in place. Also akin to the trends in knowledge ratings, post-training ability ratings were broadly similar for each statement, whilst the improvements in managers rating of their ability post training again proved statistically significant (P < 0.001). The greatest improvement was in the ability to train employees to work within HACCP (statement 9). Managers perceived ability pre and post training was again tested against their attitudes towards HACCP. Perhaps most notably, agreement with the fact that it would not have been possible to implement HACCP without the help of the MLC was correlated with lower pre training ability ratings for each statement (P < 0.05). The strongest of these
correlations was with pre training ability to manage a HACCP system from day to day \((statement\ 6)\) \(^{54}\) where lower ratings were also correlated with agreement that HACCP would not have been implemented if businesses had been required to pay for the support received from the MLC.

Also of interest is the fact that the level of agreement with the fact that it would be difficult to keep up with the documentation required by HACCP was correlated with lower post training ratings for managers ability to manage a HACCP system from day to day \(^{55}\). Meanwhile, agreement with the fact that it is difficult to get staff to change their food hygiene practices to incorporate HACCP was correlated with lower post training ratings for the ability to train employees to work within HACCP \((statement\ 9)\) \(^{56}\), whilst disagreement that no future help would be required to maintain and update HACCP was correlated with lower post training ratings for the ability to modify the system \((statement\ 8)\) \(^{57}\). Further associations were also identified between the level of agreement that HACCP reduced the risk of causing a food poisoning outbreak and managers post training ability top minimise the risk of producing unsafe food \((statement\ 5)\) \(^{58}\).

Finally, the level of agreement with the fact that HACCP was difficult to apply to butchers shops was correlated with lower post training ratings for each of the nine ability statements \((P < 0.05)\). The most significant correlation concerned the ability to manage the system from day to day \((statement\ 6)\) \(^{59}\).

5.5. WILLINGNESS TO PAY (WTP) EXPERIMENTAL RESULTS.

5.5.1. Sample Characteristics.

Table 5.10 summarises the background data collected from WTP participants. With the sample size of only 22, these characteristics should not be assumed to reflect in any way the general population but provide a backdrop against which to evaluate the willingness to pay responses provided by participants. Despite its lack of size, the experimental sample selected were relatively diverse in their socio-demographic characteristics, experience of food poisoning, risk perceptions and food safety concerns.

Although the main purpose of this background data was to be able to compare against the willingness to pay of different participants, further analysis of this data, using non-
parametric statistical tests because of the small sample size, revealed several interesting trends. Where relationships were not able to be identified at a statistically significant level ($P < 0.05$), the small sample size means that these may nevertheless be present in the wider population, similarly those associations that were identified are not necessarily a fair reflection of trends within the wider population.

Table 5.10. Background Participant Data for the Consumer Willingness to Pay Experiment (n = 22)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (and range).</td>
<td>32 (19-66)</td>
</tr>
<tr>
<td>% with children aged under 16 living at home.</td>
<td>27%</td>
</tr>
<tr>
<td>% who reported having experienced food poisoning in the previous five years.</td>
<td>32%</td>
</tr>
<tr>
<td>% who had experienced some possible food poisoning symptoms in the previous five years.</td>
<td>78%</td>
</tr>
<tr>
<td>% who would eat cooked meats from their fridge at home that were past their sell by date.</td>
<td>23%</td>
</tr>
<tr>
<td>Frequency with which their household consumed sliced cooked meats</td>
<td></td>
</tr>
<tr>
<td>Less than once a week</td>
<td>18%</td>
</tr>
<tr>
<td>Once or twice a week</td>
<td>55%</td>
</tr>
<tr>
<td>Three or more times a week</td>
<td>27%</td>
</tr>
<tr>
<td>Description of their general health.</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>5%</td>
</tr>
<tr>
<td>Average</td>
<td>18%</td>
</tr>
<tr>
<td>Good</td>
<td>64%</td>
</tr>
<tr>
<td>Very Good</td>
<td>9%</td>
</tr>
<tr>
<td>Excellent</td>
<td>5%</td>
</tr>
<tr>
<td>Description of their own food safety awareness.</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>18%</td>
</tr>
<tr>
<td>Good</td>
<td>55%</td>
</tr>
<tr>
<td>Very Good</td>
<td>23%</td>
</tr>
<tr>
<td>Excellent</td>
<td>5%</td>
</tr>
<tr>
<td>Perception of the risk faced personally from food poisoning (1 = no risk, 10 = high risk).</td>
<td></td>
</tr>
<tr>
<td>Mean (Standard deviation)</td>
<td>4.7 (1.8)</td>
</tr>
<tr>
<td>Mode</td>
<td>4 (27%)</td>
</tr>
<tr>
<td>Perception of the control they have over food poisoning (1 = no control, 10 = total control).</td>
<td></td>
</tr>
<tr>
<td>Mean (Standard deviation)</td>
<td>6.2 (2.3)</td>
</tr>
<tr>
<td>Mode</td>
<td>8 (32%)</td>
</tr>
<tr>
<td>Ranked level of concern about food poisoning in relation to irradiation, genetic modification, pesticides / chemicals, artificial additives / colourings, growth hormones / antibiotics. (1 = most important issue, 6 = least important issue).</td>
<td></td>
</tr>
<tr>
<td>Mean rank</td>
<td>3.3</td>
</tr>
<tr>
<td>Ranked 1-2</td>
<td>36%</td>
</tr>
<tr>
<td>Ranked 3-4</td>
<td>32%</td>
</tr>
<tr>
<td>Ranked 5-6</td>
<td>32%</td>
</tr>
<tr>
<td>Ranked importance of food safety considerations in comparison to convenience, taste, price and choice. (1 = most important issue, 5 = least important issue).</td>
<td></td>
</tr>
<tr>
<td>Mean rank</td>
<td>2.4</td>
</tr>
<tr>
<td>Ranked 1-2</td>
<td>41%</td>
</tr>
<tr>
<td>Ranked 3-5</td>
<td>59%</td>
</tr>
</tbody>
</table>
Greater ranked importance attributed to food poisoning in relation to other food safety issues was associated with a greater number of food poisoning symptoms experienced by participants in the previous five years, higher risk perceptions relating to food poisoning and also with a greater frequency of consumption of cooked sliced meats. Participants perceived risk from food poisoning was also associated with the number of food poisoning symptoms they had experienced over the previous five years. This association between personal experience and perceived risk was also demonstrated by the fact that those who reported having actually suffered from food poisoning in the previous five years were likely to express higher risk perceptions towards food poisoning. One final point worth noting is that participants with children under sixteen were likely to attribute more importance to food safety in comparison to price, choice, convenience and taste when purchasing cooked meats although this did not quite prove statistically significant.

The relative diversity of the experimental sample is further supported by the attitudes expressed by participants (Table 5.11).

<table>
<thead>
<tr>
<th>Attitude statements</th>
<th>Agree</th>
<th>Neither agree/disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unwrapped cooked meats are just as safe as pre-packed products</td>
<td>41%</td>
<td>18%</td>
<td>41%</td>
</tr>
<tr>
<td>Food safety risks are over exaggerated</td>
<td>41%</td>
<td>18%</td>
<td>41%</td>
</tr>
<tr>
<td>The effects of food poisoning are unlikely to be serious</td>
<td>14%</td>
<td>9%</td>
<td>77%</td>
</tr>
<tr>
<td>Consumers should expect to pay extra to ensure the food they are sold is safe</td>
<td>36%</td>
<td>5%</td>
<td>59%</td>
</tr>
<tr>
<td>If people get food poisoning that is their own fault</td>
<td>5%</td>
<td>9%</td>
<td>86%</td>
</tr>
<tr>
<td>Food safety is not an important concern to me</td>
<td>14%</td>
<td>5%</td>
<td>82%</td>
</tr>
<tr>
<td>The responsibility for food safety lies with the food industry</td>
<td>36%</td>
<td>23%</td>
<td>41%</td>
</tr>
</tbody>
</table>

*Respondents were initially invited to respond on a 5 point scale from strongly agree to strongly disagree.

The most obvious ranges of attitudes were identified with regard to the relative safety of open and pre-packaged products, the possible over-exaggeration of food safety risks, whether consumers should expect to pay extra for food safety guarantees and whether or not responsibility for food safety lies with the food industry. Participants who ranked food safety as a more important concern when purchasing cooked meats expressed greater...
levels of disagreement with the statement that the effects of food poisoning were unlikely to be serious, as did those with children aged under sixteen. A similar trend was identified for those who believed that they faced a higher risk of food poisoning, although this did not prove statistically significant at the 95% confidence level. Meanwhile, those who consumed sliced cooked meats on a less frequent basis were more likely to agree that unwrapped cooked meats were as safe as pre-packed.

Other associations were identified between responses to the attitude statements themselves. For example, there was a negative association between the statements relating to the relative safety of unwrapped and pre-packed products and whether or not consumers should expect to pay more for food safety. This suggests that those who agree that they should expect to pay more may believe that pre-packed products are safer and are thus willing to pay extra for this packaging process. Finally, although most disagreed that if people get food poisoning it is their own fault, those who felt that food safety risks are over-exaggerated were less likely to disagree or to disagree strongly with this statement.

5.5.2. Willingness to Pay for HACCP.

Table 5.12 shows the mean willingness to pay of all 22 participants across the fifteen rounds of bidding. From a starting point of just above fourteen pence in round one, mean bids levelled off at around thirteen pence in rounds 2-5. Upon provision of the more detailed information about the incidence and consequences of food poisoning and the recommendations for HACCP in butchers shops made by the Pennington Report the mean bids increased consistently between rounds 6-10 to a peak of just a little more than nineteen pence. This trend highlights the increased competition for meat sample B in the light of the added value given to it by the information provided after round five. However, after bidding round ten when participants were informed about the presence of HACCP related guidelines within existing regulations, mean willingness to pay dropped off significantly in round 11 to levels below those even seen in rounds 1-5 and continued to decline to round 15 suggesting that participants were either more comfortable with the relative risks associated with meat sample A or less willing to pay any more for safety measures that were perceived as a legal requirement.

Table 5.12 also shows the range of bids and the proportion of zero bids provided in each bidding round as well as aggregated figures for the three sets of five rounds carried out under the different information. In addition to the trends in mean WTP across the fifteen
rounds, there are also noticeable trends in the range and proportion of zero bids. There was a consistent element of the sample population who recorded zero or low bids (less than five pence) throughout rounds 1-10. However, in the light of the information provided before round 11, the proportion of zero bidders doubled between rounds 10-11 and continued to increase to round 15 when over half of the sample recorded zero bids. At the same time, the range of bidding constricted from 74 pence between rounds 1-5 to only 53 pence in rounds 11-15.

Table 5.12. Trends in Consumer Willingness to Pay Across Fifteen Bidding Rounds (n = 22)

<table>
<thead>
<tr>
<th>Bidding Round</th>
<th>Mean Bid (£'s)</th>
<th>Highest Bid (£'s)</th>
<th>Market Value / 2nd Highest Bid (£'s)</th>
<th>Proportion of zero bids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1</td>
<td>0.143</td>
<td>0.9</td>
<td>0.5</td>
<td>23%</td>
</tr>
<tr>
<td>Round 2</td>
<td>0.131</td>
<td>0.7</td>
<td>0.3</td>
<td>18%</td>
</tr>
<tr>
<td>Round 3</td>
<td>0.129</td>
<td>0.7</td>
<td>0.27</td>
<td>18%</td>
</tr>
<tr>
<td>Round 4</td>
<td>0.129</td>
<td>0.7</td>
<td>0.29</td>
<td>23%</td>
</tr>
<tr>
<td>Round 5</td>
<td>0.133</td>
<td>0.7</td>
<td>0.31</td>
<td>23%</td>
</tr>
<tr>
<td>Aggregate Rounds 1-5</td>
<td>0.133</td>
<td>0.74</td>
<td>0.26</td>
<td>18%</td>
</tr>
<tr>
<td>Round 6</td>
<td>0.152</td>
<td>0.8</td>
<td>0.38</td>
<td>23%</td>
</tr>
<tr>
<td>Round 7</td>
<td>0.157</td>
<td>0.7</td>
<td>0.49</td>
<td>23%</td>
</tr>
<tr>
<td>Round 8</td>
<td>0.167</td>
<td>0.7</td>
<td>0.56</td>
<td>23%</td>
</tr>
<tr>
<td>Round 9</td>
<td>0.185</td>
<td>0.7</td>
<td>0.59</td>
<td>23%</td>
</tr>
<tr>
<td>Round 10</td>
<td>0.191</td>
<td>0.7</td>
<td>0.59</td>
<td>23%</td>
</tr>
<tr>
<td>Aggregate Rounds 6-10</td>
<td>0.158</td>
<td>0.72</td>
<td>0.52</td>
<td>23%</td>
</tr>
<tr>
<td>Round 11</td>
<td>0.113</td>
<td>0.5</td>
<td>0.45</td>
<td>46%</td>
</tr>
<tr>
<td>Round 12</td>
<td>0.108</td>
<td>0.5</td>
<td>0.45</td>
<td>50%</td>
</tr>
<tr>
<td>Round 13</td>
<td>0.106</td>
<td>0.55</td>
<td>0.4</td>
<td>50%</td>
</tr>
<tr>
<td>Round 14</td>
<td>0.104</td>
<td>0.55</td>
<td>0.4</td>
<td>55%</td>
</tr>
<tr>
<td>Round 15</td>
<td>0.103</td>
<td>0.55</td>
<td>0.4</td>
<td>55%</td>
</tr>
<tr>
<td>Aggregate Rounds 11-15</td>
<td>0.107</td>
<td>0.53</td>
<td>0.42</td>
<td>46%</td>
</tr>
</tbody>
</table>

Further statistical analysis of participants' willingness to pay against the background data described previously highlighted a number of statistically significant associations and
several other issues that were not significantly related, perhaps contrary to expectations. For example, the ranked importance attributed to food poisoning in relation to other food safety issues was not associated in any way with the trends in WTP in any of the fifteen rounds of bidding ($P > 0.5$). Income was another area that may have been expected to have impacted positively upon WTP and yet in none of the fifteen rounds were statistically significant correlations identified, although the strength of correlation did increase gradually from round six to a peak in round ten $^{72}$ before tailing off again in rounds 11-15.

Higher risk perceptions with respect to food poisoning appeared to be associated, in some bidding rounds at least, with higher WTP values. Although the association between risk perceptions and WTP was not significant in rounds 1-2 ($P > 0.1$), it was through rounds three $^{73}$, four $^{74}$ and five $^{75}$. This trend continued through rounds 6-10 and was reflected in the positive association between the aggregated WTP across these rounds and risk perceptions $^{76}$. However, in rounds 11-15 there were again no statistically significant associations between WTP and risk perceptions.

A greater importance attributed to food safety above considerations of price, choice, convenience and taste was consistently associated with higher WTP bids and unlike food poisoning risk perceptions, this association remained relatively constant throughout rounds one to five $^{77}$, six to ten $^{78}$ and eleven to fifteen $^{79}$. As regards peoples experience of food poisoning, although there did appear to be a weak association between such experience and WTP values, this did not prove statistically significant in any round ($P > 0.1$), however, given the size of the sample it is possible that similar trends on a larger population would have proved significant. Finally, confirming that bidding trends for individual participants followed similar trends across all rounds, extremely strong positive correlations were identified in the aggregated WTP between rounds one to five and six to ten $^{80}$, rounds six to ten and eleven to fifteen $^{81}$, and rounds one to five and eleven to fifteen $^{82}$. 
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$\rho_{n=333}$ = 0.156, P &lt; 0.005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>$t_{df=330}$ = 4.29, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>$\chi^2_{df=3}$ = 21.2, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>$\chi^2_{df=3}$ = 15.0, P &lt; 0.005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>$\chi^2_{df=1}$ = 16.9, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>$\chi^2_{df=1}$ = 6.3, P &lt; 0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>$\chi^2_{df=1}$ = 5.5, P &lt; 0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>$\chi^2_{df=1}$ = 4.8, P &lt; 0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>$\chi^2_{df=1}$ = 79.4, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>$\chi^2_{df=3}$ = 10.7, P &lt; 0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>$\rho_{n=120}$ = 0.5, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>$\rho_{n=120}$ = 0.27, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>$U_{N=99, N=10} = 880$, P = 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>$U_{N=105, N=10} = 762$, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>$\rho_{n=120}$ = 0.28, P = 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>$\rho_{n=120}$ = 0.43, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>$\rho_{n=120}$ = -0.37, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>$\rho_{n=120}$ = -0.47, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>$U_{N=111, N=10} = 634$, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>$U_{N=111, N=10} = 460$, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>$U_{N=86, N=25} = 707$, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>$U_{N=86, N=25} = 697$, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>$U_{N=86, N=25} = 478$, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>$\rho_{n=120}$ = 0.4, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>$\rho_{n=120}$ = 0.36, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>$\rho_{n=120}$ = -0.66, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>$U_{N=45, N=84} = 1445$, P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>$U_{N=45, N=84} = 1304$, P &lt; 0.005</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.13. Values for the Statistically Significant Relationships Quoted in Chapter 5.4 to 5.5.
5.6. DISCUSSION.

5.6.1. The Backdrop to HACCP Implementation.

Although 65% of the businesses surveyed reported having cleaning schedules in place prior to HACCP implementation, in a separate study of 98 butchers involved in the HACCP initiative, Worsfold (2001) found that formal documentation of cleaning and sanitation programmes was almost non-existent. Thus, it is also likely that in many of the businesses involved in this research, cleaning schedules, though present may not have been formally documented. The results in this chapter also suggest that practices such as temperature monitoring and inspection of incoming food deliveries were not being universally applied, raising doubts as to whether or not food safety risks were previously being adequately controlled.

Little and de Louvois (1998) had identified that the majority of the 1400 manufacturing butchers premises surveyed at least fulfilled the licensing conditions for physical separation of raw and cooked products, in order to minimise the risks of cross contamination. However, Worsfold (2001) also noted that only 2% of butchers actually employed separate staff to handle raw and cooked products. Given the size of most butchers shops, it is unsurprising that separate staff are not able to be employed to handle cooked products which, in the majority of businesses involved in this study, formed less than 20% of turnover. Similarly, Worsfold (2001) identified raw meat and poultry products as accounting for 75% of sales within the butchers shops surveyed and the Department of Health (1998c) had estimated that cooked meat products generally contributed between 10-25% of turnover in businesses that sold them.

Little and de Louvois (1998) identified that 72% of butchery managers appeared to have a basic understanding of the principles of HACCP. However, the extent to which these principles appeared to have been applied prior to formal HACCP implementation remained relatively patchy according to the results presented in this chapter. However, the managers surveyed were commenting retrospectively and had they been asked the same question prior to the initiative taking place, more may have stated that they had implemented these principles. In the light of the knowledge and experience gained from the initiative, managers may have felt less confident about the extent to which their previous practices comprised the principles of HACCP.
Possible bias in the final response set from whom these survey results were drawn is demonstrated by comparison with figures contained within the initial economic impact assessment for licensing produced by the Department of Health (1998c). These two sets of figures are compared in Table 5.14, with businesses involved in the HACCP initiative survey appearing more likely to be predominantly manufacturing, or manufacturing and wholesaling, their cooked meat products and less likely to have been buying cooked meats in from outside sources or to not have been selling cooked meat products at all.

**Table 5.14.** Cooked Meat Handling Trends in Butchers Shops Compared Between the HACCP Initiative Survey and a Department of Health Cost Assessment.

<table>
<thead>
<tr>
<th>Department of Health Cost Assessment</th>
<th>HACCP Initiative Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not sell cooked meat products</td>
<td>23%</td>
</tr>
<tr>
<td>Manufacture and wholesale CM products</td>
<td>5%</td>
</tr>
<tr>
<td>Manufacture wide range of CM’s for sale on premises</td>
<td>11%</td>
</tr>
<tr>
<td>Manufacture limited range of CM’s for sale on premises</td>
<td>24%</td>
</tr>
<tr>
<td>Buy in an extensive range of CM products for resale</td>
<td>9%</td>
</tr>
<tr>
<td>Buy in a limited range of CM products for resale</td>
<td>28%</td>
</tr>
</tbody>
</table>

These differences most likely reflect the increased importance of HACCP implementation for butchers manufacturing cooked meat products both from the point of those recruiting butchers for the Initiative and from the industry itself, resulting in their disproportionate representation within the survey sample. It is possible however, that over the course of the initiative these figures would have evened out to be more comparable with those of the Department of Health assessment. Similar issues would explain why the proportion of businesses not selling cooked meat products was significantly lower than across the industry in general although the very presence of such businesses within the initiative could be questioned as the priority for licensing was those who were at least handling a mix of raw and cooked meat products. Furthermore, among the businesses excluded from the Department of Health figures were butchery outlets in multiple retailers, or butchers operating from open stalls or vehicles, at least some of which were included in the responses from the survey.

**5.6.2. Motivations for HACCP Implementation.**

The attitudes expressed by the butchers surveyed suggested that without the help and support provided by the MLC HACCP initiative and the fact that this support was free of charge, the majority of butchers businesses did not believe they would have implemented
HACCP. This would seem to support the view of De Sitter and Van de Haar (1998) who suggested that most businesses would need such external incentives in order to implement HACCP. Nevertheless, managers also appeared willing to accept that their recognition of the need to move to systems such as HACCP had been enhanced by nationally publicised food safety scares, reflecting similar galvanising effects in the United States and Australia (Post, 1995; Peters, 1999).

Of course, with licensing on the horizon, most of these businesses would have been forced to have implement HACCP in order to obtain a licence to trade. With the survey results suggesting doubt as to the extent of managers' HACCP related knowledge and ability prior to the initiative, it is likely that most businesses saw the accelerated HACCP initiatives as an opportunity not to be missed in ensuring compliance with the licensing requirements.

5.6.3. Economic Impact of HACCP Implementation.

The Department of Health (1998c) had estimated that the non recurring HACCP implementation costs would range from 0.5% to 1.5% of annual turnover. Although the results in this chapter were presented in relation to weekly turnover, when divided over the course of a year, direct non-recurring costs were an average 0.35% of annual turnover. However, the Department of Health estimates did not make it clear whether or not time costs were included, which when included amounted to non-recurring costs equivalent to and average 0.62% of annual turnover. Nevertheless, even when the total cost measure was used, 66% of businesses that predominantly manufactured their own cooked meats for sale, the group of businesses predicted to face the greatest costs, fell below the minimum cost estimate of £1000 for this group. The one particular exception was the business excluded from the overall analysis that had spent over £15,000 on new equipment and physical changes to their business with the knock on effect of a loss of £6000 in turnover. This appeared to reflect the coincidence of HACCP with a more general facility upgrade, which as McEachern (1999) had noted often serve to bias the costs directly attributable to HACCP implementation.

Although the survey results would appear to suggest that non recurring costs were below original estimates, this may reflect the fact that the Department of Health figures assumed that no hazard analysis had previously been carried out. Yet, some 60% of businesses surveyed did claim to have conducted a hazard analysis and when compared for businesses predominantly manufacturing their own cooked meat products, businesses without a
previous hazard analysis did indeed face greater costs. The Department of Health figures were also based on estimated turnover of £1000 per week per employee, although this figure was broadly supported by the survey results with businesses employing an average equivalent of 3.8 food handlers and generating a mean weekly turnover of £4030.

That equipment related costs comprised the majority of the direct non recurring costs faced, reflected the trends from the case studies discussed in Chapter Four. It was suggested that these equipment related costs may not have been unique to the HACCP process and this may also have been true of the butchers surveyed. However, given the trends identified by Worsfold (2001), it is likely that many businesses would have been required to upgrade or add to their equipment to ensure physical separation, which would itself be likely to be a key element of the controls required by HACCP. Also reflecting the case study trends was the fact that although generally able to be absorbed without impacting upon other wage costs or productivity, the time commitment required to implement HACCP is every bit as significant as the direct capital investment. This was particularly true of the butchers where direct training and consultancy costs where negligible due to the support provided although it could also be said that this support reduced the amount of time that might otherwise have been spent planning the system.

No clear association could be identified between the extent of the hygienic practices or HACCP principles in place prior to involvement in the HACCP initiative and the costs incurred as a result of HACCP implementation. This would generally go against the generally accepted theory that costs will be proportionately greater where businesses were less developed beforehand (Department of Health, 1998c; Heyhoe and Associates Pty Ltd., 1999; McEachern, 1999; World Health Organisation, 1999). In fact, businesses that were more developed prior to their involvement in the initiative appeared to have spent more time on their HACCP implementation. This raises the concern that the businesses that arguably needed to pay most attention to improving their systems and practices were in fact those that did the least.

Although the cost and time commitments to HACCP implementation did increase with business size, there still appeared to be a general fixed level of cost which meant that relative to weekly turnover, implementation costs fell hardest on the smallest businesses, supporting the beliefs of among others, Antle (1996), Unnevehr and Jensen (1996), McEachern (1999) and Martin and Anderson (2000). Furthermore, the money and time devoted to HACCP would have been limited by the means of each business.
Consequently, the costs theoretically required to provide the ideal system may have had to be compromised in favour of the bottom line of the balance sheet, potentially compromising the effectiveness of the systems implemented. One possible example of this issue was the fact that 81% of businesses spent no time or money auditing suppliers. Yet, as one of the case study managers highlighted in Chapter Four, there is arguably little merit in a business operating HACCP if its suppliers are not doing likewise. Such trends may further account for the fact that the total costs measured were generally below the Department of Health estimates.

As with HACCP implementation, the ongoing costs and time required to manage the system, although reasonable, again impacted more heavily upon smaller businesses in relation to their turnover. The most time intensive activity was cleaning, accounting for an average 16% of man hours available. Based on an average working day of approximately eight hours, this would seem consistent with the fact that Worsfold (1999) identified that butchery staff typically spent an hour cleaning at the end of the day as well as more sporadic cleaning throughout. Although cleaning is not unique to HACCP, the fact that both cleaning costs and time increased as a result of HACCP implementation demonstrates the importance attributed to it by butchers HACCP plans and the contribution that effective cleaning can make towards food safety and HACCP (Setiabuhdi et al., 1997). Proper cleaning schedules were far from universally followed prior to the HACCP initiative and with butchers generally unwilling to restrict themselves to selling pre-packed cooked meat products, cleaning assumes an even more important role as a control measure.

As with implementation, the time required to manage the system from week to week appeared generally able to be found from within the normal working week, without the need for additional staff hours to be paid for. Furthermore the majority of the ongoing costs faced are seemingly little different to those incurred by the activities carried out prior to formal HACCP implementation. As with implementation costs however, it is entirely possible that businesses merely committed the minimum additional resources required, again potentially compromising the ongoing effectiveness of their systems. Nevertheless, the trends identified between groups provided some evidence, albeit limited, to suggest that businesses that were less developed prior to HACCP had experienced a greater increase in their ongoing cost and time commitments.
5.6.4. Consumer Willingness to Pay.

Given the apparent lack of direct economic benefits from HACCP implementation, the WTP experiment was designed to assess whether consumers may be willing to pay a premium for HACCP in butchers shops, potentially enabling businesses to recoup their initial capital investment. In the wake of the highly publicised BSE scare, Loader and Hobbs (1996) suggested that structural changes in the industry, in a similar way to the introduction of HACCP in butchers, could deliver more satisfied consumers willing to pay more for their increased confidence in the industry. The experimental results did suggest that typical consumers would be willing to pay a premium for food products sold by butchers shops that were operating a HACCP system, albeit that the extent of the average premium was relatively small. Nevertheless, the fact that a positive premium could be identified is consistent with other studies of willingness to pay for food safety or quality attributes, as summarised in Chapter 2.5.6.

The trends identified between rounds 1-10 of the bidding process support the hypothesis that willingness to pay is information sensitive (Fox et al., 1995; Ajzen et al., 1996). When participants were provided with greater levels of information about the likelihood of contracting food poisoning, the symptoms involved and the role that HACCP could play in preventing a repeat of the 1996 Lanarkshire outbreak, willingness to pay premiums increased consistently between rounds 6-10 of bidding as participants competed more strongly for the HACCP retailed product. This trend reflects that identified by Shin et al. (1992) who after providing scientific information on the risks of contracting Salmonella or Trichinella spiralis after round 10 of a 20 round experimental auction, witnessed an increase in WTP bids of 24% and 16% to reduce the risks of contracting these illnesses to one in a million. Mean bids for rounds 6-10 in the experiment described in this chapter were some 19% higher than in rounds 1-5.

However, information can clearly have both a positive and negative impact upon consumer willingness to pay. This was demonstrated as a result of the information outlining the impending licensing regulations for all butchers handling open raw and cooked meat products, provided after round 10 of bidding. This information also confirmed that butchers should already have been complying with the core principles of HACCP as a result of existing legislation (Department of Health, 1995). Provision of these details had a negative impact upon mean willingness to pay which fell from just over 19 pence in round ten to just over 11 pence in round eleven, a fall of 41%. There are two possible
explanations for this downwards trend. The first is that participants in the experiment were less concerned about the safety of product A from a non-HACCP environment when they learnt that the controls inherent in HACCP should nevertheless have been in place. The alternative possibility is that participants were unwilling to have to pay a premium for meat B when they heard that the conditions under which it was produced were to be a mandatory requirement rather than the voluntary choice of an individual business.

Nevertheless even in round 15, there remained 45% of participants willing to pay a premium for product B whose HACCP system had been verified and audited by local authority EHOs. Additional statistical analysis suggested that this willingness to pay was likely to be influenced by participants own experience of food poisoning and the extent to which they prioritised food safety above price, choice, convenience and taste. Whilst risk perceptions were also associated with bidding levels in rounds 1-10, the fact that this association weakened significantly after round 10 suggests that participants did indeed feel less concerned about the relative risks of product A after this point. These trends broadly reflect those identified by Henson (1996) who alongside demographic issues such as education levels and income, highlighted personal experience of food poisoning and beliefs and attitudes about foodborne risks as determinants in willingness to pay.

Although the sample size employed in this study prohibited more in depth analysis of the impact of different socio-demographic factors on willingness to pay, the results nevertheless confirm the belief that there are likely to be specific consumer segments who will be willing to pay the premiums involved in providing greater food safety assurances. Such market segmentation has been described by Baker and Crosbie (1993) and more recently Baker (1999) who identified four distinct groups of consumers, those who exhibited a strong preference for food safety, those who exhibited a more balanced desire for all product characteristics, those who were extremely price sensitive and those who had a strong preference for food quality. Yet, whilst the majority of butchers surveyed agreed that HACCP would ease customers food safety concerns, only 10% appeared to believe that customers would tolerate price rises to cover HACCP costs. Even if it could be proved that there were consumer segments who would tolerate such increases, with HACCP becoming a mandatory requirement it would appear that the extent of any premium that could be charged would be reduced, with an increasing proportion of consumers willing to pay no premium at all.
5.6.5. Intangible Benefits of HACCP.

As with the Chapter Four case studies, whilst the results from the butchers survey did not suggest particular direct economic benefits from HACCP implementation, the majority of managers recognised less tangible benefits which had seemingly lead many to indicate that the benefits of implementing HACCP outweighed the costs. Most notable of these was the fact that in 78% of cases, food hygiene was perceived as being under greater control since implementing HACCP, with the risk of food poisoning outbreaks also generally believed to have been reduced. Naturally, the main aim of HACCP for butchers was to reduce the risks to food safety from such premises and consequently, in the long term, seek to minimise the incidence of food poisoning attributable to the industry. If such goals were achieved, the benefits that could be felt, particularly at a societal level in terms of the health care, productivity and investigation costs arising from food poisoning outbreaks, could be substantial (Todd, 1987; Todd, 1989; Roberts et al., 1989; Sockett and Roberts, 1991; Sockett, 1993; Sockett, 1995; Australia New Zealand Food Authority, 1999).

In the United States, Roberts et al. (1996) estimated that a 10% reduction in illness and death related to meat and poultry would mean that within 20 years, the costs of implementing and enforcing the HACCP rule for US meat and poultry plants would be outweighed. Similarly, Buzby and Crutchfield (1997) estimated that a reduction in illness of 15-17% would be required to claw back costs over twenty years based on low estimates of the medical and productivity costs of illness, using top end estimates then the reduction in illness required would be only 4-5%. Although the value of life is notoriously difficult to calculate (Ford et al., 1995), Viscusi (1993) estimated the value at preventing even one death at five million US dollars. If the introduction of HACCP based licensing for UK butchers prevented another E. coli outbreak of the scale and impact seen in Lanarkshire, then the £19 million government investment in supporting the move to the licensing requirements would immediately represent value for money. Furthermore, the capital expenditure required by the industry would most likely pale into insignificance against the economic damage caused by such an outbreak either to individual businesses or the industry as a whole (Australia New Zealand Food Authority, 1999).

However, whether or not the implementation of HACCP has reduced the risk to food safety, is difficult to prove without microbiological verification of food products. In reality there is still a relative lack of empirical evidence to demonstrate how well HACCP works in practice to control food safety in real settings. Yet given the less than universal extent
to which practices such as cleaning schedules seemed to have previously been employed, a
trend supported by Worsfold (2001) who also identified a lack of physical separation of
equipment in some businesses, assuming that these gaps would have been addressed as
part of the introduction of HACCP, it is fair to assume that food safety risks have been
reduced.

In delivering this risk reduction, HACCP is clearly a vital tool given that businesses were
largely unwilling to undertake other measures such as limiting themselves to buying in pre-
wrapped cooked meat products for re-sale. Nevertheless, as previously discussed, there is
the danger that HACCP makes people complacent, naively thinking that suddenly all risks
are under control. Certainly it is concerning that in the wake of the initiative, only 28% of
butchers agreed that their sector of the industry presented a high risk to food safety with
58% disagreeing. This trend may result from butchers believing that they are no longer a
high risk business merely because they have implemented HACCP. True the risks to food
safety may have been reduced but the potential risks involved in the processes involved
remain as high as ever.

Although improved food safety is the ultimate goal of HACCP, the HACCP initiative may
have delivered a number of additional benefits, which although difficult to quantify are
nevertheless worthy of mention. For example, it is clear that without the help of the
initiative, many butchers would have struggled to implement HACCP systems to the scale
facilitated by the initiative, either because of the additional costs faced or their own lack of
knowledge or ability. Consequently, the initiative has enabled a far smoother transition to
the licensing regulations than would otherwise have been the case as well as providing
greater consistency between businesses (Heyhoe and Associates Pty Ltd., 1999).

The benefits of this smoother transition are not unique to the business community in that
the regulatory programme may benefit from being able to target minimal resources on
inspecting CCPs (Adams, 1994b), spare resources could therefore be shifted to the more
intensive investigation and reporting of outbreaks. After all this is the area least well
resourced and yet control measures rely on good surveillance (North, 1994). However,
there is a counter argument that needs to be recognised in that because EHOs were not
directly involved in the development of the HACCP system, inspection may therefore take
longer in the short term (de Sitter and Van de Haar, 1998). At the very least, there are
likely to be additional costs incurred in training EHOs to help enforce the new standards
(Australia New Zealand Food Authority, 1999).
6.7. CONCLUSIONS.

The research described in this chapter highlights the value of quantitative evaluations of programmes such as the accelerated HACCP initiative. The work carried out has provided data against which to assess the impact of the initiative as well as possible implications for future policy aimed at encouraging HACCP implementation in other industry sectors.

At the very least, it is thought that the accelerated HACCP initiative for English butchers will have had the effect of improving the level of basic hygiene practice across the industry, assuming that such improvements will have been identified as part of the process. Nevertheless, it is also apparent that without the training and support provided, combined with the stimulus of the licensing regulations that followed, the speed of development of HACCP within the butchery sector would otherwise have been severely compromised. Many businesses would clearly have been reluctant to support the additional cost burden of personal training or consultancy and would have been unable to effectively implement HACCP on the basis of their existing knowledge.

However, it is likely that some businesses were not yet ready for HACCP and will, as a result, struggle to maintain the system in the future without further external support. Indeed, a relatively substantial percentage of businesses indicated concerns about their ability to independently maintain and update their systems or to keep up with the documentation required, this despite the apparently significant improvements in HACCP related knowledge and ability delivered by the initiative. Furthermore, despite the obvious contribution of the initiative in reducing the burden of HACCP implementation for individual businesses, the results raise certain doubts as to whether businesses fully embraced HACCP or merely invested the minimum possible time and money to ensure that were able to obtain a licence to trade. This is particular concerning given that it would appear possible that those who arguably needed HACCP the most may not have invested in the system accordingly. With licensing acting as a key spur to HACCP implementation, it is possible that HACCP was seen by some as a means to an end, rather than an end in itself, raising questions as to the extent to which they will remain fully committed to the system in future.

Akin to the case study results presented in Chapter Four, the extent of any direct economic benefits arising from HACCP implementation was negligible. However, as with the case studies, a majority of managers were inclined to recognise the less tangible benefits of
HACCP, although perhaps in contrast to the case studies, only 26% appeared prepared to feel that the benefits of HACCP outweighed the costs. Attitudes to this issue may change over time as the initial burden of implementation is forgotten.

The willingness to pay results shed further light on the potential for businesses to profit from the introduction of HACCP as a part of licensing. Based on relatively limited information about HACCP and its potential role in enhancing food safety in butchers shops, a majority of the consumers involved in the experiment indicated that they would pay at least some premium for HACCP. However, it was also clear that upon receiving information relating to the now mandatory requirement for HACCP, either in full or in part, within all butchers shops, the premiums willing to be paid reduced considerably although still present to some extent.

Ultimately, it will be in the long term that the success of this initiative and the licensing regulations will be measured. These long term benefits are likely to be determined to some degree by the extent to which the requirements for HACCP can be enforced on an ongoing basis and the systems maintained and updated. Not only will many businesses require additional support in keeping up with their systems but those responsible for enforcing the licensing regulations will require considerable training to enable them to effectively and consistently verify the systems being operated. Whilst there are arguments against their use, this enforcement may be best achieved through the development and use of standardised HACCP audit tools, such as those recommended by Peters (1999) and Bryan et al. (1993).

If assessed on the basis of risk, then the catering sector would surely be the key target for future HACCP initiatives or specific licensing regulations as in the case of butchers. However, before any such investment were to made, the longer term impact of the initiative upon food safety within the butchery sector needs to be assessed to provide the necessary confidence to regulatory bodies to progress such action. This would be particularly important given that the catering sector is at least thirty times larger than the butchery sector, implying that any capital investment made by either the government or the industry would be considerably greater than that expended on the butchers initiative.
CHAPTER SIX: ENCOURAGING THE FUTURE ADOPTION OF HACCP

6.1. INTRODUCTION.

The survey results in Chapter Three represented the first real opportunity, since work carried out by the Audit Commission (1990), to evaluate trends in hygiene management across multiple sectors of the UK food industry. Furthermore, being the first survey to consider the adoption of HACCP across multiple sectors of the industry, the results provide a unique benchmark against which to assess the future uptake of the system.

Adding to the quantitative survey data, the follow up face-to-face interviews with business managers offered an invaluable opportunity to understand and expand upon some of the practical issues and attitudes that had shaped the trends identified by the survey. Even though limited to a small sample of business managers, the interview data represented a relatively wide range of perspectives from across the manufacturing, retail and catering sectors. It is anticipated that many of the views expressed are typical of wider segments of opinion across the UK food industry as a whole.

The development of a costing model and database to evaluate the economic impact of HACCP at an individual business level is a novel feature of this research. The availability of such data, either from within or beyond the UK, was previously limited. Again, the combination of quantitative and qualitative data through the case study approach enabled a deeper understanding of some of the motivating factors behind HACCP implementation, as well as some of the issues encountered during and since implementation of the system. Although limited to some extent by the reliance on self reported figures, further development of the costing model and input of data from a broader range of businesses would offer the potential to present individual managers with likely cost estimates based on other businesses sharing similar characteristics to their own. The flexibility of the database was demonstrated in handling the results from the accelerated HACCP initiative survey meaning that there is already a bank of data from over 230 businesses in England and Wales on which to build.

Although not originally planned for as part of the research, the advent of HACCP based licensing for retail butchers and the development of initiatives to accelerate HACCP implementation offered a unique opportunity for research. As noted in Chapter Two, the
role of direct regulation and more generic approaches to HACCP has at times been questioned. Consequently, the research presented in Chapter Five offered the opportunity to consider the impact of such approaches to HACCP implementation through a real life example. Without the research having been recommended, a valuable opportunity to evaluate the impact of such initiatives and HACCP implementation using a generic industry wide approach would have been lost. Indeed, it is unfortunate that no comprehensive evaluation had been planned by the Department of Health or the Meat and Livestock Commission prior to the introduction of the Initiative. This would have facilitated more rigorous identification of before and after trends in hygienic practice, knowledge and ability relating to HACCP, managerial attitudes, costs, benefits and even microbiological food quality. Nevertheless, the data gathered proved to be a valuable asset to the key stakeholders in the HACCP initiatives in both England and Wales.

1. Any future initiatives designed to hasten HACCP implementation in specific sectors of the food industry should have evaluation and impact assessment procedures built in to their initial development.

Finally, the willingness to pay experiment discussed in Chapter Five represented a rare attempt to evaluate the possible premiums that UK consumers would pay for additional guarantees of food safety. Certainly the research was the first known to have used an experimental approach focusing specifically upon the potential for marketing HACCP as the means of delivering enhanced food safety. Although necessarily limited in scope by cost and time considerations, the experimental results provide a valuable perspective on the question of whether retailers and caterers could potentially use HACCP as a positive marketing tool. The trends identified have implications for the extent to which mandatory HACCP would be able to be marketed to the same extent as voluntary HACCP.

Whilst the value of the research presented in this thesis is undeniable, there remains considerable scope for further in depth investigation of the barriers to HACCP, above and beyond that presented. With the wider adoption of HACCP playing an important role in the commitment of the Food Standards Agency (FSA) to reducing the incidence of food poisoning, measures to address these gaps in knowledge will need to be developed. Likewise, policies and strategies to encourage improved food safety control, in particular the wider implementation of HACCP, will be required.
Areas for action based on the findings of this research are proposed in the following sections. Indeed, the results and recommendations arising from this research have already informed the political debate through the delivery of a final project report to the then Ministry of Agriculture, Fisheries and Food and the dissemination of reports to the Department of Health based on the findings of the butchers survey presented in Chapter Five. Consequently, whilst several of these recommendations may have already been identified in some form as areas for action by the FSA itself (Food Standards Agency, 2001a), it is research such as that presented within this thesis that has enabled such actions to be grounded in primary evidence.

6.2. UNDERSTANDING AND ADDRESSING THE BARRIERS TO HACCP IMPLEMENTATION


As noted in Chapter Three, further progress with HACCP implementation is expected to have occurred over what is almost five years since the survey results were collected. Indeed, such improvement has been suggested by more recent research on the manufacturing and catering sectors (Panisello et al. 1999; Henson et al. 1999; Gillespie et al. 2000). The impact of HACCP based licensing for retail butchers would also be expected to have had some impact within the retail sector, albeit that butchers represent only a small percentage of the businesses in this sector.

In developing its recent strategy for the wider implementation of HACCP, the FSA presented more up to date estimates of the levels of HACCP implementation in setting its target of 30% HACCP implementation across the industry by 2004. However, these figures were based merely on local authority perceptions rather than primary evidence and there is clearly a need to objectively reassess levels of HACCP implementation and the ongoing factors influencing its use.

2. A follow up survey is recommended to assess food hygiene management trends, in particular awareness and uptake of HACCP, across the UK food industry.

Although the FSA has set out its intention to produce an annual report on HACCP implementation levels (Food Standards Agency, 2001a), it is unclear as to the methodology to be employed in collecting such information. It is surely insufficient for
the measurement of future progress towards key FSA targets to be dependent on purely subjective estimates.

3. Methods to collate ongoing and objective HACCP implementation statistics should be developed.

One possible approach would be for additional information to be added to the registers of food premises to indicate the HACCP ‘status’ of the business. This would clearly require a change in recording systems and would take time to fully update across the industry, but could probably be achieved for most businesses within two years through the routine inspection process.

6.2.2. Recognising the Size Constraints of Most Food Businesses.

In tackling the barriers to HACCP implementation, the ‘micro’ size of the majority of retail and catering businesses in particular should be fully recognised. The problems of business size in relation to HACCP have often been discussed in the context of small or small and medium sized enterprises (SMEs) as measured against wider industry definitions, potentially underestimating the real size constraints faced by most food businesses. As noted in Chapter Two, the World Health Organisation has already moved to a more flexible focus upon small and/or less developed businesses. However, the results from this research suggest the need to clarify the definitions used when considering the implications of regulation in general, and in particular measures to stimulate HACCP implementation.

4. It is proposed that the FSA develop a revised classification of business size unique to the food industry.

The results of this study suggest that the following may be appropriate based upon full time equivalent numbers of staff (Retail / Catering: 0-4 = micro, 5-9 = small, 10-49 = medium, 50+ = large; Manufacturing: 0-9 = micro, 11-24 = small, 25-99 = medium, 100+ = large).

6.2.3. The Lack of Perceived Need for HACCP.

The lack of perceived need for HACCP is a significant barrier confirmed by this research with many managers appearing to believe that the system is simply not applicable to them,
often regarding it as the domain of ‘big business’. There remains considerable scope to better communicate the view that HACCP is relevant to all businesses and in developing and promoting the means by which HACCP can be applied in a manner suitable to businesses of different sectors or sizes. Previous attempts to address this issue such as Assured Safe Catering did not appear to have had a particularly great impact but it is likely that general industry awareness of HACCP has improved since the mid 1990’s, to better facilitate such interventions.

5. Government and industry associations need to collaborate and give renewed stimulus to developing and promoting specific materials or systems designed to promote HACCP implementation across the industry, particularly in the retail and catering sectors.

In promoting an awareness of the need for HACCP, managerial perceptions of risk are also likely to require attention, particularly since the evidence presented in Chapter Three highlighted associations between HACCP implementation and managerial risk perceptions. However, the survey results highlighted an apparent breakdown in communication across much of the industry with managers’ risk perceptions often appearing contradictory to prevailing scientific opinion, trends in the causes of food poisoning and the frequency of environmental health inspection. The qualitative feedback from business managers suggested that psychological factors such as optimistic bias and the illusion of control may contribute to individuals’ perceptions of the food safety risks posed by their businesses.

6. Further psychological research is recommended to better describe, and explain the factors that contribute to managerial perceptions of risk.

7. Strategies need to be developed to better communicate an awareness and understanding of the concept of risk to industry managers.

Such strategies could potentially build upon the sort of self-diagnostic risk assessment systems developed by Coleman and Griffith (1998) as well as delivering improvements in the collection and dissemination of epidemiological data on the causes and origins of food poisoning.
6.2.4. General Levels of Good Hygiene Practice.

Sandrou and Arvanitoyannis (1999) have previously suggested that prior to developing HACCP, an assessment should first be made as to whether particular industry segments are ready to build on existing processes or whether attention should first be focused on basic hygiene practices. Although the majority of the businesses surveyed in Chapters Three and Five had implemented many general hygiene practices that would form the foundation of a more formal HACCP system, there were clearly also businesses where such practices were lacking. Likewise, it was apparent that the butchers surveyed in Chapter Five had often not been carrying out certain general good hygiene practices prior to the more formal implementation of HACCP.

Whilst there remains some debate as to the precise relationship between general good hygiene practice and HACCP, it is difficult to envisage that HACCP could be effectively implemented where such practices, and the culture that supports them, was not in place. Certainly, the results from the survey of butchers in Chapter Five suggested that those businesses starting from a lower point in terms of their general hygiene practice were more inclined to feel that HACCP could not have been implemented without the external support provided via the HACCP initiative. Consequently it is important that businesses are encouraged to at least get the basics right in terms of general good hygiene practice before attempting to embark on HACCP. It is also important that businesses implementing HACCP and their staff see the system as an addition to, rather than a replacement for this general hygiene practice. Inconsistencies in the baseline level of hygiene practice can cause particular problems in the consistent delivery of generic approaches such as the accelerated HACCP initiatives for butchers.

8. Existing industry guides to good hygiene practice need to be further developed in scope to address the diversity of businesses across the food industry, particularly within the catering sector, and to properly explain the relationship between good hygiene practice and HACCP.

6.2.5. Training Levels and Access to Expertise and Advice.

The Chapter Three survey results suggested that where businesses claimed to have implemented HACCP, if managers were trained to advanced levels in food hygiene or had received specific HACCP training then there was an increased likelihood of them having
implemented all of the seven principles of HACCP. However, it was also apparent that if advanced training was to be interpreted as the minimum requirement for effective HACCP implementation, then the majority of industry managers would be found wanting.

The human resources available to most food businesses, either in terms of knowledge or time, are likely to be further constrained by their generally limited size. This often means that even any knowledge or expertise available is likely to be concentrated upon a specific individual, most likely the owner-manager, or in the case of some catering establishments, possibly the head chef. Both the case studies and the butchers survey suggested that the time commitment required by HACCP may be just as significant a factor in HACCP implementation as the direct financial investment required. Employing external consultants to provide additional expertise and support is generally prohibitive for smaller businesses based on costs.

9. Government and industry trade associations should collaborate to help provide discounted training and consultancy support to smaller businesses wishing to implement HACCP.

This said, implementation of HACCP is not an end in itself, with the system needing to be maintained, verified and updated in the light of changes in business circumstances. Consequently, support provided initially in the set up of the system, such as in the case of the butchers sector, may prove unsustainable over a longer period, and yet as noted in the case of the butchers, many managers still appeared to lack confidence in their ability to independently maintain and update the system in future.

It is important to recognise that even the best laid HACCP system remains dependent for its success upon the individual behaviour of staff, either in terms of their general hygiene practice or their specific role in monitoring or critical control points, implementation of corrective actions and general documentation. It is therefore perhaps disappointing that even where the HACCP appeared to have been implemented, the Chapter Three survey results suggested a relatively limited commitment to providing general HACCP training for staff. Furthermore, although some encouragement can be drawn from the fact that the majority of managers agreed that food hygiene training was essential for all food handling staff, it is was clear that there were wide variations in the extent and nature of the actual training provided, both between and within industry sectors.
The current legal requirement to provide training to all food handlers commensurate with their work activities, whilst placing responsibility for determining training back with individual businesses, arguably provides insufficient clarity as to the real requirements for training. Likewise the definition of a food handler employed within the legislation is also open to individual interpretation, particularly in catering businesses where may not directly handle food but whose actions within the kitchen environment may pose as much of a risk as those of the chef preparing the meal.

10. The training requirements of the 1995 Food Safety (General Food Hygiene) Regulations should be revisited to clarify both the desirable levels and frequency of training for all food handlers and the definition of a food handler itself.

In encouraging managerial commitment to hygiene training, it is clear that many managers currently consider the benefits of formal hygiene training courses to be insufficient to offset the costs of providing such training. Even where training was provided, this often appeared likely to be on a one off basis, rather than as an ongoing commitment to human resource development.

11. There remains the need for further research and development of training models designed to convey risk based messages and proven to change food handling practices.

12. Local training providers should collaborate with industry associations to develop sector-specific hygiene clubs, allowing small businesses to achieve economies of scale in the costs of general hygiene and HACCP training provision.

6.2.6. Balancing the Costs and Benefits of HACCP.

As mentioned on several occasions throughout this thesis, in the absence of mandatory requirements, the extent of any management commitment to HACCP implementation will often come back to an individual assessment of the perceived costs and benefits of doing so. Many of the recommendations already made would go some way to at least reducing the likely costs of HACCP implementation.
The case studies described in Chapter Four demonstrate that HACCP systems are able to be implemented within the reasonable financial and time limitations in businesses large and small. In particular when training and consultancy is able to provided without a direct cost impact, the additional direct costs required by HACCP can be kept at a reasonably low level, as in the case of the butchers surveyed in Chapter Five. It is worth again noting that the main capital costs of HACCP were generally associated with new equipment and changes to the physical layout of the food premises studied, which it is possible may have been long overdue even without HACCP being implemented.

Despite the hypothesis that HACCP will be more expensive to implement where businesses were starting from a lower level in terms of their general hygiene systems and practices, this did not appear to be borne out by the butchers’ survey results. The suggestion was therefore that those who arguably needed to invest most in improving their management of food safety through HACCP were those that had dedicated the least time and money to its’ implementation. Given this trend, it is possible that the food safety benefits arising from the implementation of HACCP across the sector will have been limited by the resource commitment made by many businesses. It is thought likely that this will have been a recurring theme in HACCP implementation across the whole of the industry to date, with more hygiene conscious businesses, whilst potentially needing to do less to implement HACCP, being prepared to commit the full resource required to implement a full and effective system.

In order therefore to encourage wider adoption of HACCP and to secure sufficient commitment to ensure that the systems implemented are able to make a positive contribution to food safety, further research is clearly required to inform the cost versus benefit trade off, inevitable in management decisions to implement HACCP. Although the evidence presented in this thesis has in many ways been ground breaking, it represents only the tip of a much bigger iceberg.

13. Research is required to identify the likely failure costs to businesses implicated in food poisoning outbreaks.

14. Further examples from across the food industry are required to demonstrate the direct impact of HACCP upon microbiological food safety risks.
15. Additional case study research is required to identify businesses, particularly in the retail and catering sectors, that have been able to deliver tangible ongoing cost savings through HACCP implementation, possibly through increased trade or reduced product loss.

16. Ongoing research into the direct business costs of HACCP implementation, building an increased dataset for analysis and estimation of likely costs. Future research may be able to track the impact of HACCP during its implementation and use more objective cost measurements, in contrast to the approach described in this thesis.

17. Improved identification and communication of the societal benefits of reductions in food poisoning incidence is required.

18. The feasibility of incorporating HACCP as an element in business insurance policies needs to be investigated, to add to the potential financial benefits of HACCP implementation.

6.2.7. Developing HACCP as a Positive Marketing Tool.

For many of the manufacturers consulted, HACCP had become an inevitable requirement to at least maintain the support of their existing customer base and in some cases enabling new customers to be attracted. However, it is clear that similar customer pressures are not nearly so great a factor for most retail and catering businesses, although the willingness to pay study presented in Chapter Five did offer some possible encouragement. Whilst limited to a relatively small sample of consumers, the results suggested that a significant percentage of consumers appeared willing to pay some premium for the additional food safety guarantees offered by HACCP. Furthermore, the greater their awareness of the incidence of food poisoning, its severity and the potential contribution of HACCP and its status as the system of choice worldwide, the greater the premium to be paid. However, mandatory HACCP is likely to attract less willingness to pay with the added value of the system being lost.
19. Further research using larger samples and multiple methods is recommended to estimate the premia that UK consumers, either collectively or in market segments, may be willing to pay for improved food safety, in particular the use of HACCP.

The evidence provided by such research may support the belief that at least a proportion of consumers would be willing to pay more for, or make purchasing decisions on the grounds of food safety. However, to translate these decisions to the real market experience relies on consumers’ understanding of the benefits of the system and their ability to reliably identify businesses that had implemented the system. Consequently, if the UK government is serious in its commitment to HACCP, greater efforts will be required to promote HACCP to the consumer and facilitate business marketing of the system.

20. The FSA should seek to introduce and promote a voluntary system of food safety certification for all food businesses based, at least in part, on the management of effective HACCP systems.

In fact, the FSA is already addressing these issues with the recent announcement of a Food Hygiene Award Scheme for Wales (Food Standards Agency, 2002b) and consideration being given to developing a transparent register of food business convictions (Food Standards Agency, 2001d).

6.2.8. Improved Communication and Enforcement of the Requirements for HACCP Based Controls.

Whilst focusing upon the means by which future HACCP implementation can be encouraged, it is easy to forget that, with the exception of requirements for formal documentation and verification, the core principles of HACCP have been a legal requirement for all food businesses since the introduction of Food Safety (General Food Hygiene) Regulations (Department of Health, 1995). Consequently, the findings of both the general industry survey in Chapter Three and the butchers survey in Chapter Five provide a relatively strong indictment of the communication and enforcement of these regulations over the past seven years. The results collected suggest that a significant proportion of businesses involved in both surveys could either not identify, or did not believe that they had implemented the HACCP based requirements of this legislation.
Given these trends, one must therefore query the effectiveness of enforcement by local environmental health departments in ensuring that these requirements had been carried out. The suspicion would be that many businesses were determined to meet the requirements, even if they themselves did not overtly recognise this fact. Indeed, local authority responses to the recent FSA consultation on HACCP implementation levels would seem to confirm the belief that a substantial percentage of businesses still lacked hazard analysis based systems, whether documented or undocumented (Food Standards Agency, 2001a). This adds further fuel to the fire in effectively providing a recognition by local authorities that they had not been able to fully enforce the requirements of the 1995 Regulations.

In setting minimum standards of knowledge and experience in HACCP systems for local authority enforcement officers, the revised requirements of Code of Practice Number 19 of the 1990 Food Safety Act will hopefully help both in the flow of communication and true and consistent enforcement of the legal requirements both in the context of licensing for butchers and general HACCP based requirements for all businesses. This said, there is still some debate to be had as to whether EHOs should be expected to play the dual role as the educators and enforcers of food safety. The survey results in Chapter Three suggest however that there may be little alternative, particularly in communicating with many smaller businesses that may not belong to bodies such as trade associations.

6.2.9. Extending the Scope of HACCP Based Licensing.

Wider licensing of food businesses, although considered by the FSA, has been discounted in the short term due to both the likely timescale required, restrictions on the freedom of the UK to introduce such legislation prior to proposed European Regulations and the resource commitment required to inspect businesses and administer the scheme (Food Standards Agency, 2001a). Nevertheless, several of the managers questioned in the face-to-face interviews presented in Chapter Three clearly saw licensing as a reasonable requirement given the potential risks involved with the food industry. The butchers surveyed in Chapter Five were also generally in favour of repeating the HACCP initiative in other sectors of the food industry, although this belief is likely to have stemmed to some degree from the perception of having been unfairly targeted for licensing.

Beyond the practical issues of costs and timescales, a more pertinent reason for not extending licensing at this stage is arguably the relative lack of evidence as to the longer term success of HACCP implementation and licensing among butchers. Without such
ongoing evidence, it would be difficult to justify the undoubtedly high resources required to roll out similar initiatives en masse to other sectors.

21. Further research is required within the butchery sector to evaluate the ongoing maintenance of HACCP systems and their adequacy in controlling food safety. Mixed methods incorporating industry surveys and audit based approaches are recommended.

6.4. PROSPECTS FOR THE FUTURE.

The European Commission is fully expected to consolidate its food hygiene directives to see the requirement for fully documented HACCP systems across the majority of the food chain by 2004 (Food Standards Agency, 2001a). Although hygiene management may well have improved since the collection of the survey data presented in Chapter Three, the impact of any such future legislation upon the UK food industry would be extremely significant, particularly given the doubt cast upon current levels of HACCP use and even more general adherence to the HACCP based approach already implied within the 1995 Food Safety (General Food Hygiene) Regulations.

In attempting to stimulate the implementation of HACCP prior to such proposals, the UK government must, in the absence of direct legal compulsion for all businesses, also take responsibility for providing evidence to businesses to justify the need for, and benefits of adopting HACCP and providing encouragement to its implementation, particularly given that if the system were to impact upon the incidence of food poisoning, then it would largely be the government, through reduced health care costs, that would benefit most greatly. In promoting and enforcing the future use of the system, government needs to recognise that, as pointed out by one of the managers interviewed in this study, if they ignore the resource constraints placed upon the majority of food businesses and do nothing to help businesses overcome these constraints then the degree of attention paid to HACCP by most food businesses will be limited.

However, whilst this thesis has focused on the role of the food industry in controlling food safety, specifically through the implementation of HACCP, the role consumers play in the incidence of food poisoning should not be overlooked. It is improbable that wider HACCP implementation, certainly at the pace seemingly envisaged by the targets set by the FSA,
can alone achieve the 20% reduction in food poisoning incidence targeted. The food industry must take nevertheless accept its’ share of responsibility and recognise that new controls are needed to protect against modern day food safety risks.

This thesis provides a range of evidence with which to better understand the likely capacity of the UK food industry to implement HACCP and the inherent issues that will need to be addressed in order to encourage and secure adoption of the system in future. The value of the research to what has often been a largely theoretical debate is therefore unquestionable. Whilst limited in scope to the UK, the evidence provided and lessons learnt will also be of relevance worldwide as governments and industries increasingly move towards HACCP as the basis of their food safety control strategies.
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APPENDICES.

1. QUESTIONNAIRE FOR THE UK FOOD INDUSTRY SURVEY: CHAPTER THREE
1. What is the main function of your food business? (✓ one only)
   - Food manufacturer/processor
   - Food distributor / wholesaler
   - Food retailer (see also question 2 below)
   - Restaurant & Cafe / Take away
   - Public house
   - Hotel / Hostel / Residential Home
   - Caterer / Canteen Operator
   - Other (please specify)

2. FOOD RETAILERS ONLY.
   What is the precise nature of your food business
   - Supermarket / hypermarket
   - Fishmonger
   - Greengrocer
   - Baker
   - Butcher
   - General Stores
   - Other (please specify)

3. What is the status of your business? (✓ as applicable)
   - An independent organisation
   - Part of a local business chain
   - Part of a franchise organisation
   - Part of a national organisation
   - Part of a multi-national organisation
   - Local authority run operation

4. What level of risk to food safety do you believe your business represents? (✓ one only)
   - High Risk
   - Medium Risk
   - Low Risk
   - Don’t Know

5. What has informed you about the level of risk associated with your business? (✓ as applicable)
   - Newspapers / Magazines
   - Television / Radio
   - Environmental Health Officer
   - Industry codes of practice
   - Trade Associations / Trade journals
   - Other (please specify)

6. How would you describe your business’s approach to food hygiene? (✓ as applicable)
   - Common sense approach
   - Assured Safe Catering (ASC)
   - Full Hazard Analysis Critical Control Point System (HACCP)
   - Traditional Food Hygiene Policy
   - In house designed hygiene systems
   - Other (please specify)

7. Does your business document or record any of its food hygiene practices? (✓)
   - YES
   - NO
8. Which of the following food hygiene practices are carried out by your business? (✔ as applicable)

- Cleaning schedules
- Stock rotation
- Hazard analysis of food practices
- Temperature monitoring of foods
- Identification of critical control points regarding food safety
- Temperature monitoring of equipment
- Setting of critical limits and target values to ensure food safety
- Microbiological testing
- Implementation of effective control and monitoring of food control points
- Inspection of raw materials
- Corrective action taken to keep control of food safety
- Monitoring of staff for illness/infection
- Reviews of food hygiene practices because of new products or suppliers
- Periodic checks / verification that the hygiene policy is working

9. From what sources, if any, has your business received advice in helping to implement any of these practices? (✔ as applicable)

- No advice received
- Environmental Health Officers
- Local Authorities Coordinating Body on Food & Trading Standards (LACOTS)
- Trade Associations
- Other (please specify)

10. Would you appreciate more advice from any of these groups in managing food hygiene?

- NO
- YES (please specify)

11. Which group should take the greatest responsibility for food safety? (✔ one only)

- Consumers
- Caterers
- Government
- Farmers
- Manufacturers
- Local authorities
- Food retailers
- Distributors
- Other (please specify)

12. Does your business operate a Quality Assurance (QA) program?

- YES (go to Question 13)
- NO (go to Question 14)

13. If you do operate a Quality Assurance program then:

i) Has it been accredited?

- NO
- YES

   If YES by whom?

   [Blank space]

ii) Do your systems for managing food hygiene form part of the Quality Assurance program?

- YES
- NO

14. How many staff are employed by your business operation?

- 1 - 4
- 5 - 14
- 15 - 29
- 30 - 49
- 50 - 99
- 100 - 249
- 250 - 499
- 500+

15. Please estimate the number of food handlers you employ?

[Blank space] food handlers.

_A Food Handler is any person in a business who handles or prepares food, drink or ice whether open (unwrapped) or packaged._
16. Approximately how many of these food handlers are part time staff?

_________ part time staff.

17. Does your business employ temporary food handlers to assist at busy times of the year?

YES  ☐
NO  ☐

18. Please indicate, by ticking in the appropriate boxes, all the forms of food hygiene training given to the food handlers and managers within your business? (✔ as applicable)

<table>
<thead>
<tr>
<th></th>
<th>Not Induction Training</th>
<th>On The Job Training</th>
<th>Food Hygiene Refresher Course Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Time Food Handlers</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Part Time Food Handlers</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Temporary Food Handlers</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Managers/ Supervisors</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

19. Please also indicate all the levels at which any of these staff are qualified in food hygiene? (✔ as applicable)

<table>
<thead>
<tr>
<th></th>
<th>None Qualified</th>
<th>Basic/ Elementary</th>
<th>Intermediate</th>
<th>Advanced</th>
<th>HACCP Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Time Food Handlers</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Part Time Food Handlers</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Temporary Food Handlers</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Managers/ Supervisors</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

20. Who provides the food hygiene training for your staff? (✔ as applicable)

In House Staff ☐
Environmental Health Officers ☐
Local Colleges ☐
Other (please specify) ☐

21. Does your business assess its own training requirements?

YES  ☐
NO  ☐

22. How many different types of food products does your business handle?

1 - 4  ☐
5 - 19  ☐
20 - 49 ☐
50 - 99 ☐
1,000+ ☐

23. Does your business handle any of these food products? (✔ as applicable)

Cooked meats ☐
Ready made sandwiches ☐
Raw meats ☐
Cooked poultry ☐
Tinned foods ☐
Raw poultry ☐
Dairy produce ☐
Egg / cream bakery products ☐
UHT milk ☐
Cooked rice ☐
Cooked fish ☐
Raw fish ☐
Chilled ready meals ☐
Egg products ☐
None of these products ☐

24. How often is your business inspected by local authority environmental health officers?

Not yet inspected ☐
Every 1 - 6 months ☐
Every 7 - 12 months ☐
Every 13 - 18 months ☐
Every 18 months to two years ☐
Every two to three years ☐
Every three to five years ☐
25. The statements below reflect possible attitudes towards the management of food hygiene and other related issues. There are no right or wrong answers but please respond as indicated, according to your level of agreement or disagreement with each statement:

<table>
<thead>
<tr>
<th>Example: Raspberry fruit pastilles taste the nicest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strongly Agree</strong></td>
</tr>
<tr>
<td>a) The management of food hygiene in your business.....</td>
</tr>
<tr>
<td>i) .. is easy to maintain once implemented.</td>
</tr>
<tr>
<td>ii) .. increases trade by promoting a positive business image.</td>
</tr>
<tr>
<td>iii) .. is expensive to implement.</td>
</tr>
<tr>
<td>iv) .. helps improve the supervisory skills of managers.</td>
</tr>
<tr>
<td>v) .. creates a reduction in food spoilage/wastage.</td>
</tr>
<tr>
<td>vi) .. creates an unnecessarily time consuming workload.</td>
</tr>
<tr>
<td>vii) .. increases the shelf life of foods.</td>
</tr>
<tr>
<td>viii) .. increases long term business costs.</td>
</tr>
<tr>
<td>b) Formal food hygiene systems (e.g. HACCP / ASC ) are difficult to apply in a business of your size.</td>
</tr>
<tr>
<td>c) Food hygiene training enhances job satisfaction.</td>
</tr>
<tr>
<td>d) Formal food hygiene systems (e.g. HACCP / ASC ) are difficult to apply to your sector of the food industry.</td>
</tr>
<tr>
<td>e) Customers are willing to pay more for safer food products.</td>
</tr>
<tr>
<td>f) Food hygiene training is not worthwhile for part time staff.</td>
</tr>
<tr>
<td>g) Expert advice on food hygiene is too expensive.</td>
</tr>
<tr>
<td>h) Hands on training is the best way to acquire basic skills</td>
</tr>
<tr>
<td>i) Food hygiene training is not worthwhile for temporary staff</td>
</tr>
<tr>
<td>j) Media coverage of food scares over emphasise the risk to the public of the food they consume.</td>
</tr>
<tr>
<td>k) Food hygiene training is essential for all food handlers.</td>
</tr>
<tr>
<td>l) It is easy to motivate staff about food hygiene practices.</td>
</tr>
<tr>
<td>m) It is easy to get information on systems like HACCP / ASC.</td>
</tr>
<tr>
<td>n) Causing an outbreak of food poisoning would threaten the survival of your business.</td>
</tr>
</tbody>
</table>

26. How long has your business been in operation?  

27. What position do you hold within your business?

Thank you for taking the time and trouble to complete this questionnaire, please now return it to us using the pre-paid envelope provided.
2. EXAMPLE CASE STUDY DATA COLLECTION FORM: CHAPTER FOUR
SECTION A: GENERAL INFORMATION

Please answer all the questions carefully following the instructions given.

- Please fill in the following boxes to indicate the exact number and breakdown of the staff working within the business, including yourself. N.B. A Food Handler is any person in a business who handles or prepares food, whether open (unwrapped) or packaged.

  Full time food handlers = 
  Part time food handlers = 
  Other full time staff = 
  Other part time staff =

- How many, and what level of members of staff, e.g. managers / supervisors, were directly involved in setting up the HACCP system?

  Total numbers of staff involved → 
  Levels of staff involved→
  1. 
  2. 
  3. 
  4. 

- Have you or any of your staff obtained any formal qualifications which have included a knowledge of HACCP within them?

  NO 
  YES 
  (please state the level of qualification obtained)

- Which, if any, of these outside sources of advice were consulted to help implement HACCP? (tick as applicable)

  External consultants 
  Environmental Health Officers (EHOs) 
  LACOTS 
  Trade magazines / journals 
  Other (please specify)

- Which, if any, of the following procedures was the business carrying out BEFORE implementing the HACCP system? (please tick as applicable)

  Cleaning schedules 
  Temperature monitoring (food) 
  Pest control programs 
  Temperature monitoring (equipment) 
  Microbiological testing 
  Formal food hygiene training for staff 
  Stock rotation 
  Inspection of foodstuffs on delivery

- Please estimate both the average weekly turnover of the business, turnover being the income generated from the sales of goods and services, as well as the estimated profit margins gained on your products.

  Turnover → £ thousand: hundred: 
  Profit Margin → approx. % 

• Did you feel that the business was already carrying out any of the 7 HACCP elements in the course of its’ daily work BEFORE formally introducing the full HACCP system? (tick as applicable)

Identified hazards and assessed their severity and risk
Determined Critical Control Points (CCPs) for food safety
Specified target levels and critical limits to ensure control
Monitoring of critical control points
Corrective action if target levels and critical limits are not met
Verification that the system is functioning as planned
Documentation (record keeping) of food hygiene practices

• Please state the position you hold within your business →
(e.g. manager / owner / supervisor etc.)

When did you first implement your HACCP system (month and year)? →

---

SECTION B: ATTITUDES TOWARDS IMPLEMENTATION OF HACCP

This next section of the questionnaire surveys your attitudes towards the HACCP system, your views on it’s implementation and finally your feelings on some of the costs and benefits of the system. Please tick one box for each statement, as indicated by the example given, to express your strength of agreement or disagreement with each statement.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree or disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOR EXAMPLE,</td>
<td>&quot;Two heads are always better than one.&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our business deals with food hygiene better than the average food manufacturer.</td>
<td></td>
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</tr>
<tr>
<td>Food hygiene was not under control before implementing HACCP.</td>
<td></td>
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</tr>
<tr>
<td>The inclusion of HACCP in the Pennington Report will encourage businesses to adopt the system.</td>
<td></td>
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</tr>
<tr>
<td>The HACCP system involves little more than good hygienic practice.</td>
<td></td>
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<tr>
<td>HACCP will enable the business to win more customers.</td>
<td></td>
<td></td>
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<tr>
<td>HACCP has had little impact on the daily running of the business.</td>
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</tr>
<tr>
<td>The benefits of implementing HACCP outweigh the costs.</td>
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<tr>
<td>Hiring private consultants to help implement HACCP is too expensive.</td>
<td></td>
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</tr>
</tbody>
</table>

213
<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree or disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food hygiene is under greater control since implementing HACCP</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>The business lacked the knowledge / expertise to implement HACCP by itself.</td>
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</tr>
<tr>
<td>HACCP will ease our customers concerns about food hygiene / safety</td>
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</tr>
<tr>
<td>It is easy to make staff aware of the need for HACCP</td>
<td></td>
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</tr>
<tr>
<td>Introducing HACCP has been a waste of time and money</td>
<td></td>
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<tr>
<td>HACCP could be used by any type of food business</td>
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<tr>
<td>It is difficult to keep up to date with the documentation required by the system.</td>
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<tr>
<td>It is difficult to get staff to change their food hygiene practices</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>The business will not need any more help in the future to maintain and update the system.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>The day to day costs of running the business will be reduced as a direct result of HACCP.</td>
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<td></td>
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</tr>
<tr>
<td>The cost of implementing and running HACCP threatens the financial viability of the business.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>The HACCP system reduces the risk of the business causing a food poisoning / adulteration incident in the future.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The HACCP system is not easy to apply to small food manufacturers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HACCP systems help stock control and reduce product loss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The HACCP system will increase staff awareness of food hygiene issues</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Customers would tolerate price rises to cover the costs of implementing and running HACCP.</td>
<td></td>
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</tr>
<tr>
<td>HACCP is a cheap system to implement</td>
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<td></td>
</tr>
<tr>
<td>HACCP is easier to implement in low risk businesses</td>
<td></td>
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</tr>
<tr>
<td>Nationally publicised food safety scares have increased my awareness of the need for systems like HACCP.</td>
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</tr>
</tbody>
</table>
This section of the questionnaire deals with those things that the business carried out in order to prepare for the implementation of the new system: It covers issues such as business meetings, training courses, preparation of paperwork and the gathering of information about the business’s food handling practices as well as the hazards associated with those practices.

We recognise that precise figures might not be available so please provide estimates to the best of your knowledge. Naturally not all the questions will necessarily apply to your business depending on the individual approach taken.

Please fill in each section to the best of your knowledge, indicating the total time that may have been spent by all the staff, including yourself, who were involved in the activities listed and/or any direct financial costs incurred from these activities.

For example if 5 staff have been on a hygiene training course costing £10 per head and taking 5 hours each then under cost you would enter £50 and under time you would enter 25 hours in total.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>COST (£’s)</th>
<th>TIME (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of background information / paperwork by individuals for the HACCP plan, e.g. product specifications, flowcharts, cleaning schedules.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other formal staff meetings / brainstorming exercises to discuss HACCP.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional food hygiene / HACCP training given to staff specifically because of the new system. (include here the total costs and time spent both on the training itself and on any exams and fees)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any travel expenses for meetings, training courses or other activities associated with the HACCP system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs of and time spent consulting any other outside help / advice on HACCP, e.g. literature, books, external consultants, EHOs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any additional staff wages on top of the normal amount due to overtime payments or temporary staff employed as cover for the daily running of the business while staff were in HACCP meetings / training sessions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time and cost involved in recruiting any new staff required as a result of the HACCP system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any additional time not yet accounted for to draw up the specific details of the HACCP plan, e.g. hazard analysis, setting critical limits.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

USE THE SPACE BELOW TO DETAIL ANY OTHER TIME AND/OR COSTS SPENT ON PLANNING THE SYSTEM WHICH YOU HAVE NOT ACCOUNTED FOR ABOVE
SECTION D: TIME AND COSTS SPENT ON IMPLEMENTING HACCP

Section D follows the same format as seen previously in Section C. The difference is that this time we are asking you to detail the time and costs spent on actually implementing the system, these will involve such aspects as the loss of trade due to total or partial business closure, changes to the layout of the production area or new equipment.

Please calculate your estimates of costs and time spent in the same way as for section C.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>COST (£’)</th>
<th>TIME (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Total costs of and time spent purchasing / upgrading any equipment as a direct result of introducing the HACCP system. (Use the space below to give more precise details of exactly what types of new equipment were purchased and their costs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Costs and time spent making physical changes to the layout and fabric of the production area, e.g. floors, walls, ceilings, storage units, as a direct result of the HACCP system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Costs of lost turnover due to partial or total closure of the business in order to implement the system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Costs of wages paid to staff during periods of business closure due to any changes made.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Costs and time of auditing / inspecting suppliers as part of the initial implementation of HACCP.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Costs and time spent recruiting new suppliers as a result of these audits.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Costs and time of preparing documentation for record keeping.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

USE THE REMAINING SPACE TO DETAIL ANY OTHER TIME OR COSTS SPENT IMPLEMENTING THE SYSTEM WHICH HAVE NOT ALREADY BEEN COVERED IN THE SECTION ABOVE
SECTION E: ONGOING COSTS OF MAINTAINING AND RUNNING THE HACCP SYSTEM

Section E of the questionnaire deals with the ongoing running costs of the HACCP system.

We recognise that the system may only have been up and running for a very short while but again, simply answer each point to the best of your knowledge. This section has been divided to deal with each area of the store individually which will help provide greater detail for us about the costs involved as well as possibly making easier for you to fill in.

N.B. Be careful when completing this section to fill in costs and times on a WEEKLY basis unless otherwise indicated.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>COST (£’s)</th>
<th>TIME (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Total time spent per week cleaning / disinfecting the production area.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Estimate the total weekly cost of cleaning materials used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Total time spent per week checking incoming food products and vehicles on delivery.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Total weekly time and costs spent monitoring the condition of foods, checking date codes and rotating stock.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Total weekly time spent monitoring / recording cooking times and temperatures of food products.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Average weekly time spent on ongoing staff training / assessment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Total weekly time and costs associated with microbiological sampling and testing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Average weekly time spent carrying out corrective actions, e.g. phoning suppliers, extra cleaning etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Total weekly costs associated with corrective actions, e.g. phone bills, sale value of lost product etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Total weekly time spent updating HACCP records or amending the system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

USE THE REMAINING SPACE TO DETAIL ANY OTHER TIME OR COSTS SPENT RUNNING THE HACCP SYSTEM ON A WEEKLY BASIS IN ANY PART OF THE BUSINESS.
This final section follows on from some of the information provided in Section E, this time we are interested to know whether you believe HACCP has had the DIRECT EFFECT of either increasing or decreasing the time and money spent on managing food hygiene from week to week.

As you work through the following list please state whether you believe having HACCP in place has increased the time / costs spent on these activities, decreased them or whether they have remained level.

If you believe that having HACCP in place has either increased or decreased any of the costs and time involved in these activities then please indicate by how much in the column on the far right of the table. For example - if you believe HACCP has increased your cleaning costs from £30 to £35 pounds a week then you would circle INC and enter £5 in the right hand column to indicate the weekly increase of five pounds

If a particular activity or cost simply does not apply to your business and has never done then simply circle NOT APPLICABLE to indicate this. If no change in time or costs has been observed then circle LEVEL.

<table>
<thead>
<tr>
<th>ACTIVITY / COST</th>
<th>INCREASE / DECREASE / LEVEL / NOT APPLICABLE</th>
<th>CHANGED BY HOW MUCH?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The total time spent, per week, on cleaning and disinfecting the production equipment / area.</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ hrs</td>
</tr>
<tr>
<td>• The total weekly cost of the cleaning materials used.</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__£'s</td>
</tr>
<tr>
<td>• The total weekly time spent monitoring the condition of foods, checking dates and stock rotation</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ hrs</td>
</tr>
<tr>
<td>• The total weekly time spent inspecting food products upon delivery.</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ hrs</td>
</tr>
<tr>
<td>• Weekly time spent monitoring / recording cooking times and temperatures of products</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ hrs</td>
</tr>
<tr>
<td>• Weekly time spent on ongoing staff training and assessment.</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ £'s</td>
</tr>
<tr>
<td>• Weekly cost of microbiological testing.</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ hrs</td>
</tr>
<tr>
<td>• Weekly time spent on microbiological testing.</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ hrs</td>
</tr>
<tr>
<td>• Weekly time spent carrying out corrective actions</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ hrs</td>
</tr>
<tr>
<td>• Weekly costs associated with corrective actions</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ £'s</td>
</tr>
<tr>
<td>• Weekly time spent by management updating and collating food hygiene documentation</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ hrs</td>
</tr>
<tr>
<td>• Average expected monthly turnover of the business.</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ £'s</td>
</tr>
<tr>
<td>• Lost turnover / sales value of goods due to product wastage.</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ £'s</td>
</tr>
<tr>
<td>• Weekly staff wage bills.</td>
<td>INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>__ £'s</td>
</tr>
</tbody>
</table>
3. QUESTIONNAIRES FOR BUTCHERS' SURVEY: CHAPTER FIVE
Section A of the questionnaire asks you to provide some general data on the nature of your business and your business practices. Please answer all the questions as indicated by the instructions provided.

1. Please fill in the boxes below to indicate how many staff, including yourself, work within the business. [A Food Handler is anyone who handles or prepares food, whether unwrapped or packaged].

   Full time food handlers = [ ]  
   Part time food handlers = [ ]  
   Other full time staff = [ ]  
   Other part time staff = [ ]  

2. Which of the following best describes the geographical location of the business? (tick one only)

   Inner City Urban [ ]  
   Suburban [ ]  
   Rural [ ]  

3. Which, if any, of the following procedures was the business carrying out BEFORE you implemented the HACCP system? (please tick as many as are applicable)

   Cleaning schedules [ ]  
   Temperature monitoring (food) [ ]  
   Food hygiene training [ ]  
   Pest control programs [ ]  
   Temperature monitoring (equipment) [ ]  
   Stock rotation [ ]  
   Microbiological testing [ ]  
   Inspection of incoming food deliveries [ ]  
   None of these [ ]  

4. Which of the following definitions best describes the status of your business? (tick one only)

   Single / independent butchers shop [ ]  
   A market stall selling meat products [ ]  
   One of a local chain of butchers shops [ ]  
   One of a national chain of butchers [ ]  
   Butchery / deli counter in a larger store [ ]  
   Other (please specify) [ ]  

5. Was the business already carrying out any of the following 7 HACCP elements in the course of its daily work, BEFORE formally introducing them as part of the HACCP system? (tick yes / no for each)

   Identified hazards and assessed their severity and risk [ ]  
   YES [ ]  NO [ ]  
   Determined Critical Control Points (CCPs) for food safety [ ]  
   YES [ ]  NO [ ]  
   Specified target levels and critical limits to ensure control [ ]  
   YES [ ]  NO [ ]  
   Monitoring of critical control points [ ]  
   YES [ ]  NO [ ]  
   Corrective action if target levels and critical limits are not met [ ]  
   YES [ ]  NO [ ]  
   Verification that the system is functioning as planned [ ]  
   YES [ ]  NO [ ]  
   Documentation (record keeping) of food hygiene practices [ ]  
   YES [ ]  NO [ ]  

6. Which of the following statements best describes the business practice of your shop? (tick one only)

   Do not sell cooked meat products (Go straight to Question 11) [ ]  
   Manufacture & wholesale cooked meat and meat products. [ ]  
   Manufacture a wide range or cooked meat products for sale on premises only. [ ]  
   Manufacture a limited range of cooked meat products for sale on premises. [ ]  
   Buy in an extensive range of cooked meat products for resale. [ ]  
   Buy in a limited range of cooked meat products for resale. [ ]  

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7. Estimate the percentage of your weekly turnover accounted for by cooked meat products.
   (tick one only)

   - 0-10%
   - 11-20%
   - 21-30%
   - 31-40%
   - 41-50%
   - 51-60%
   - 61-70%
   - 71-80%
   - 81-90%
   - 91-100%

8. Does the business manufacture any of its own cooked meat products on the premises, e.g. roast chickens, meat pies, boiled ham?

   - YES
   - NO

   If YES, what measures are taken to ensure the safety of the cooked products? (tick as many as apply)

   - Visual checks of whether the foods are cooked
   - Electronic temperature displays on cooking equipment
   - Electronic timers on cooking equipment
   - Temperature probes for testing the internal temperature of food
   - Micro-biological testing
   - Other controls (e.g. manual timing)

9. The Pennington Report suggested that the risks to food safety from butchers might be reduced if they only sold cooked meat products which were pre-wrapped and prepared elsewhere and bought in. Would you be prepared for your business to adopt this approach?

   - YES
   - NO

10. Which of these descriptions best describes the cooked meat products you sell? (tick as applicable)

    - Pre-wrapped / packaged elsewhere and bought in.
    - Wrapped / packaged on the premises
    - Sold as unwrapped / open products.

11. Please estimate the average WEEKLY turnover of the business. (Turnover being the total income generated from the sale of goods and services)

    TURNOVER → £ ______ thousand: ______ hundred:

SECTION B: ATTITUDES TOWARDS THE IMPLEMENTATION OF HACCP

Section B, which carries on over the page, surveys your attitudes towards the implementation of HACCP in your business and your feelings about the costs and benefits of the system to you. Tick one box, as shown by the example given, to express your strength of agreement or disagreement with each statement.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

FOR EXAMPLE

- Two heads are always better than one.
- It would not have been possible to implement HACCP without the help provided by the MLC and their consultants.
- My business deals with food hygiene better than most butchers.
- Food hygiene is under greater control since implementing HACCP.
- HACCP was only implemented because other local butchers were not doing the same.
- Information on HACCP was widely available before getting involved with the MLC initiative.
- The HACCP system simply reflects basic good hygiene practice.
- Butchers shops have been unfairly targeted by EHOs due to recent food scares.
- HACCP will enable the business to win more customers.
- HACCP has had little impact on the daily running of the business.
- The HACCP initiative should be repeated in other sectors of the food industry, e.g. catering.
- The benefits of implementing HACCP do not outweigh the costs.
- HACCP is a cheap system to implement.
- The HACCP system could be used in any type of food business
- It will be difficult to keep up with the documentation required by HACCP.
- HACCP would not have been implemented if the business had to pay for the training and advice provided by the MLC.
- HACCP will help ensure our compliance with UK legislation.
- It is difficult to get staff to change their food hygiene practices to incorporate the HACCP system.
- It is acceptable to sell raw and cooked food from behind the same shop counter.
- It is unlikely that my business will still be trading in 5 years time.
- The business will not need any more help in the future to maintain and update the HACCP system.
- The HACCP system reduces the risk of the business causing a food poisoning outbreak in the future.
- The cost of implementing and running HACCP threatens the financial viability of the business.
- It is difficult to apply HACCP to butchers shops.
- Butchers shops present a high risk to food safety.
- HACCP systems help stock control and reduce product loss.
- HACCP systems increase staff awareness of food hygiene issues.
- Customers would not tolerate price rises to cover the costs of HACCP.
- Nationally publicised food safety scares have increased my awareness of the need for systems like HACCP.
- HACCP will help ease customer concerns about food safety.
SECTION C: HACCP / FOOD SAFETY KNOWLEDGE BEFORE & AFTER HACCP TRAINING

Please rate your own knowledge of the following aspects of HACCP and food safety in general both before and after the HACCP training. The purpose of this section is to try and assess whether or not you believe the training you received has improved your knowledge of and ability to manage a HACCP system.

First indicate the level of your knowledge after having received the training in HACCP and then compare this by rating the level of knowledge you believe you had before taking part in the training. Rate your knowledge from 1 to 5 using the codes listed below and circling the appropriate number for each statement both after and before the training.

1 = NO knowledge, 2 = LITTLE knowledge, 3 = MODERATE knowledge, 4 = MUCH knowledge, 5 = COMPLETE knowledge.

<table>
<thead>
<tr>
<th></th>
<th>After HACCP training</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXAMPLE:</strong> Knowledge of safe cooking temperatures for meat products.</td>
<td>Before HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Factors of personal hygiene essential for employees.</strong></td>
<td>After HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Characteristics of potentially hazardous / high risk foods.</strong></td>
<td>Before HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Potential hazards and their severity within your business.</strong></td>
<td>After HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Environmental conditions that encourage bacterial growth.</strong></td>
<td>Before HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Bacteria that can cause foodborne illness.</strong></td>
<td>After HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>The Hazard Analysis Critical Control Point (HACCP) system.</strong></td>
<td>Before HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Requirements that must be met at each Critical Control Point to ensure the safety of food.</strong></td>
<td>After HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Procedures for monitoring at Critical Control Points.</strong></td>
<td>Before HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Strategies for corrective action in HACCP due to a loss of control at CCPs.</strong></td>
<td>After HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>HACCP record keeping / documentation systems.</strong></td>
<td>Before HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>The recommendations of the Pennington Report for food safety in butchers premises.</strong></td>
<td>After HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>The legal requirements for food safety in butchers premises.</strong></td>
<td>Before HACCP training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
In the same way as in the previous table, please now indicate how you rate your ability to carry out the following tasks associated with HACCP and food safety in general since receiving the HACCP training and how this compares with what you feel about your ability before the training.

1 = NO ability, 2 = LITTLE ability, 3 = MODERATE ability, 4 = MUCH ability, 5 = COMPLETE ability.

<table>
<thead>
<tr>
<th>Task</th>
<th>Before HACCP training</th>
<th>After HACCP training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognise potential hazards and assess their severity within your food business.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Identify Critical Control Points (CCPs).</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Take corrective action when something is wrong.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Identify when CCPs (such as fridge / cooking temperatures) have not been met.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Minimise the risks of producing unsafe food.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Manage a HACCP system yourself from day to day.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Check / verify that the HACCP system is working.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Modify the HACCP plan to incorporate changes in working practices / shop layouts / product ranges.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Train other employees to work within HACCP</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

(Note: Half of the butchers questionnaires included the above sections B and C focusing on attitudes and improvements in HACCP related knowledge and ability. The other half of the butchers questionnaires replaced these issues with the following sections B-D focusing on costs)

SECTION B: TIME / COSTS SPENT PREPARING FOR THE IMPLEMENTATION OF HACCP

Section B considers what the business did specifically in order to prepare for and implement the HACCP system, covering issues such as business meetings, training and purchasing of new equipment.

Please fill in each section, indicating the total time that may have been spent by all the staff, including yourself, who were involved in the activities listed and / or any direct financial costs incurred from these activities. For example if 5 staff have been on a hygiene training course costing £10 per head, and taking 5 hours per person then under cost you would enter £50 and under time you would enter 25 hours in total. It is not necessary for you to convert the value of the 25 hours of staff time into a cost in £'s, simply enter the time spent and any additional capital costs.

It is important that any cost or time input is only mentioned once, if you believe you have already included a cost under another activity then please do not repeat that cost again. It might be difficult for you to provide exact figures for many of these cost and time factors so where necessary simply give estimates to the best of your knowledge. Even if the time spent formed part of your daily routine or spare time outside normal working hours, we would appreciate it if you can try and estimate this time input as best you can.
<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>COST (£'s)</th>
<th>TIME (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total staff <strong>time</strong> spent attending the HACCP training sessions provided</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>Additional staff <strong>time</strong> and <strong>costs</strong> spent on any further food hygiene training courses as a result of HACCP (include here any exams / course fees)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any travel <strong>costs</strong> resulting from these training sessions or any other activities associated with the HACCP system.</td>
<td></td>
<td>xxxxxxxxx</td>
</tr>
<tr>
<td>Other staff <strong>time</strong> outside of actual training sessions spent in either formal or informal meetings with the MLC or their consultants</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>Extra <strong>costs</strong> of staff wages on top of the normal amount due to overtime payments or temporary staff employed as cover for the daily running of the shop while staff were in HACCP meetings / training sessions.</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td><strong>Time and costs</strong> spent providing <strong>on the job</strong> training to familiarise staff with their individual responsibilities within the HACCP system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Time and any costs</strong> of preparing information / paperwork about the business for the MLC and their consultants to help design the HACCP system, e.g. product specifications, flowcharts, shop layout plans</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>Total staff <strong>time</strong> spent in any private planning meetings <strong>without</strong> the MLC or their consultants</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td><strong>Costs of and time</strong> spent gaining any other help / advice on HACCP independent of the MLC scheme, e.g. literature, books, external consultants.</td>
<td></td>
<td>xxxxxxxxx</td>
</tr>
<tr>
<td><strong>Costs and time</strong> of preparing documentation for record keeping.</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>Any other <strong>time or costs</strong> not already accounted for spent by individuals on the specific details of the HACCP plan, e.g. hazard analysis, setting critical limits</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td><strong>Costs of and time</strong> spent purchasing any new equipment, e.g. new chopping boards, knives, fridges, insectocuters, computers, microbiological testing equipment, thermometers etc., as required by the HACCP system.</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td><strong>Costs and time</strong> spent making physical changes to the layout and fabric of the shop, e.g. floors, walls, ceilings, as required by the HACCP system</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td><strong>Costs of lost turnover</strong> due to partial or total closure of the shop in order to implement the HACCP system.</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td><strong>Costs of wages</strong> paid to staff during periods of business closure.</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td><strong>Time and cost</strong> of recruiting any new staff required by the HACCP system.</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td><strong>Costs and time</strong> of auditing any suppliers.</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td><strong>Costs and time</strong> spent recruiting any new suppliers.</td>
<td>xxxxxxxxx</td>
<td></td>
</tr>
</tbody>
</table>

**USE THIS BOX TO DETAIL ANY IMPLEMENTATION COSTS / TIME NOT ALREADY MENTIONED**
SECTION C: ONGOING COSTS OF MAINTAINING AND RUNNING HACCP

Section C of the questionnaire deals with the current ongoing running costs of the HACCP system although the format of the questions is the same as section B.

We recognise that the system may only have been up and running for a very short while but again, simply answer each point to the best of your knowledge.

N.B. Be careful when completing this section to fill in costs and times on a WEEKLY basis unless otherwise indicated.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>COST (£'s)</th>
<th>TIME (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Estimate the total time spent, per week, on cleaning the equipment and the fabric of the shop.</td>
<td>→ xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>• Estimate the total weekly cost of the cleaning materials used.</td>
<td>→ xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>• Estimate the total weekly time spent monitoring and recording HACCP data such as fridge/food temperatures, cooking times, levels of cleaning.</td>
<td>→ xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>• Estimate the total weekly time involved in collating the HACCP information and updating the system.</td>
<td>→ xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>• Estimate the total weekly time spent inspecting food products on delivery</td>
<td>→ xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>• Total weekly time or costs spent assessing staff competence or providing any ongoing hygiene training</td>
<td>→ xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>• Weekly costs incurred from microbiological / ATP testing</td>
<td>→ xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>• Weekly time spent on microbiological / ATP testing</td>
<td>→ xxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>• Weekly value / cost of turnover lost due to product loss / spoilage</td>
<td>→ xxxxxxxxx</td>
<td></td>
</tr>
</tbody>
</table>

USE THE REMAINING SPACE ON THIS PAGE TO DETAIL ANY OTHER TIME OR COSTS SPENT RUNNING THE SYSTEM ON A WEEKLY BASIS IN ANY AREA OF THE BUSINESS.
SECTION D: INCREASES OR DECREASES IN REGULAR FOOD HYGIENE MANAGEMENT COSTS AS A DIRECT RESULT OF THE HACCP SYSTEM

This final section follows on from Section C. We would like to know whether HACCP has had the direct effect of either increasing or decreasing the time and money spent on managing food hygiene from week to week.

As you work through the following list please state whether you believe the HACCP system has increased the time / costs spent on the various factors listed, decreased them or whether they have remained level. If a particular activity does not apply to your business and has never done then simply circle NOT APPLICABLE to indicate this.

Then, if you believe that HACCP has either increased or decreased any of the costs and time involved then please show by how much in the column on the far right of the table.

For example, if the time spent cleaning the shop has increased from 4 hours before HACCP to 6 hours after HACCP then please enter 2 hours in the right hand column and circle INC. If no change has been seen in the time / cost of any of these activities then circle LEVEL and leave the right hand column blank.

<table>
<thead>
<tr>
<th>ACTIVITY / COST</th>
<th>INCREASE / DECREASE / LEVEL / NOT APPLICABLE (circle as appropriate)</th>
<th>CHANGED BY HOW MUCH?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The total time spent, per week, on cleaning the equipment and the fabric of the shop.</td>
<td>→ INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>_______ hours</td>
</tr>
<tr>
<td>• The total weekly cost of the cleaning materials used.</td>
<td>→ INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>_______ £’s</td>
</tr>
<tr>
<td>• The total weekly time spent monitoring and recording HACCP data, e.g. fridge temperatures.</td>
<td>→ INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>_______ hours</td>
</tr>
<tr>
<td>• The total weekly time spent collating HACCP data and updating the system.</td>
<td>→ INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>_______ hours</td>
</tr>
<tr>
<td>• The total weekly time spent inspecting food products upon delivery.</td>
<td>→ INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>_______ hours</td>
</tr>
<tr>
<td>• Average expected monthly turnover of the business.</td>
<td>→ INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>_______ £’s</td>
</tr>
<tr>
<td>• Weekly value of turnover lost due to product loss / spillage</td>
<td>→ INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>_______ £’s</td>
</tr>
<tr>
<td>• Weekly staff wage bills.</td>
<td>→ INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>_______ £’s</td>
</tr>
<tr>
<td>• Weekly cost of microbiological / ATP testing.</td>
<td>→ INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>_______ £’s</td>
</tr>
<tr>
<td>• Weekly time spent on microbiological / ATP testing</td>
<td>→ INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>_______ hours</td>
</tr>
<tr>
<td>• Weekly time spent by supervisors assessing staff competency or in ongoing training.</td>
<td>→ INC / DEC / LEVEL / NOT APPLICABLE</td>
<td>_______ hours</td>
</tr>
</tbody>
</table>
4. BACKGROUND CONSUMER QUESTIONNAIRE FOR THE WILLINGNESS TO PAY EXPERIMENT: CHAPTER FIVE
1. Please state your age in years.

__________________________ years.

2. What is your marital status? (√ one only)
   - Single (never married) □
   - Married □
   - Widowed □
   - Separated / divorced □

3. Please estimate your gross (pre-tax) family / household income per year?
   (√ one only, if you are a student then your household simply refers to your own income, this information is confidential)

£______________________’s per year.

4. Do you have children living with you who are under the age of 16? (√ one only)
   - Yes □
   - No □

5. Are you? (√ one only)
   - Male □
   - Female □

6. In your opinion have you suffered from food poisoning in the past 5 years. (√ one only)
   - Yes □
   - No □

7. Have you experienced any of these symptoms over the last 5 years, which you attributed to something you ate.
   (√ as applicable)
   - Upset stomach □
   - Diarrhoea □
   - Vomiting □
   - Nausea □

8. How would you describe your general health? (√ one only)
   - Excellent □
   - Very good □
   - Good □
   - Average □
   - Poor □

9. How would you describe your food safety knowledge / awareness? (√ one only)
   - Excellent □
   - Very good □
   - Good □
   - Average □
   - Poor □

10. Rank the following six food safety issues in order of the concern that you have about them.
    (1 = most concern and 6 = least concern, each issue must be given a separate ranking)
    - Irradiation of food: Rank ______
    - Genetic modification of food: Rank ______
    - Pesticides / chemicals in food: Rank ______
    - Food poisoning: Rank ______
    - Artificial additives/colourings: Rank ______
    - Growth hormones/antibiotics: Rank ______
    - in animals

11. On the scale of 1 to 10 below, please circle to indicate the risk that you believe you face from food poisoning.
    - No risk      High risk
      1 2 3 4 5 6 7 8 9 10

12. On the scale of 1 to 10 below, please circle to indicate the control that you believe you have over the risk of food poisoning.
    - No control      Total control
      1 2 3 4 5 6 7 8 9 10
13. How many times a week do you or members of your household consume sliced cooked meats such as ham or chicken? (This does not include buying pre-prepared sandwiches, one only).

- Less than once per week □
- One or two times per week □
- Three or four times per week □
- Five or six times a week □
- Everyday □

14. Where and in what form would you normally buy your sliced cooked meats? (one only)

- Supermarket (pre-packed) □
- Supermarket (unwrapped / sliced to order) □
- Butchers shops (pre-packed) □
- Butchers shops (unwrapped /sliced to order) □

15. Do you ever buy sliced cooked meats from independent butcher's shops?

- Yes □
- No □

16. When deciding where to buy your cooked meats from please rank the following five issues in the order of the importance that they bear on your decision (1 = most important and 5 = least important, each issue must be given a separate ranking)

- Price: Rank □
- Convenience: Rank □
- Food safety considerations: Rank □
- Range of choice available: Rank □
- Taste / quality: Rank □

17. Would you ever eat sliced cooked meats from your own fridge at home that had gone past their use by date?

- Yes □
- No □

18. The statements below reflect possible attitudes towards a range of issues. There are no right or wrong answers, simply respond according to your level of agreement or disagreement with each statement:

(One only for each statement)

1. It is safer to buy cooked meats from supermarkets than independent butchers shops □ □ □ □ □
2. Unwrapped cooked meats are just as safe as pre-packed products □ □ □ □ □
3. Cooked meats from butchers shops are cheaper than from the supermarket □ □ □ □ □
4. Cooked meats are generally safe to eat □ □ □ □ □
5. Food safety risks are over exaggerated □ □ □ □ □
6. The effects of food poisoning are unlikely to be serious □ □ □ □ □
7. Consumers should expect to pay extra to ensure the food they are sold is safe □ □ □ □ □
8. If people get food poisoning that is their own fault □ □ □ □ □
9. Food safety is not an important concern to me □ □ □ □ □
10. The responsibility for food safety lies with the food industry □ □ □ □ □
5. SUPPORTING PUBLICATIONS.


