ASSESSING AND REDUCING THE RISK OF CROSS CONTAMINATION OF FOOD STUFFS IN FOOD HANDLING ENVIRONMENTS.

FINAL REPORT

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C.J. Griffith, C. Davies, J. Breverton, E. Redmond and A.C. Peters

Food Research and Consultancy Unit (FRCU), University of Wales Institute, Cardiff, Colchester Avenue, Cardiff, CF32 9XR, South Wales, UK.

The investigations detailed in this report were carried out at the University of Wales Institute, Cardiff (UWIC)

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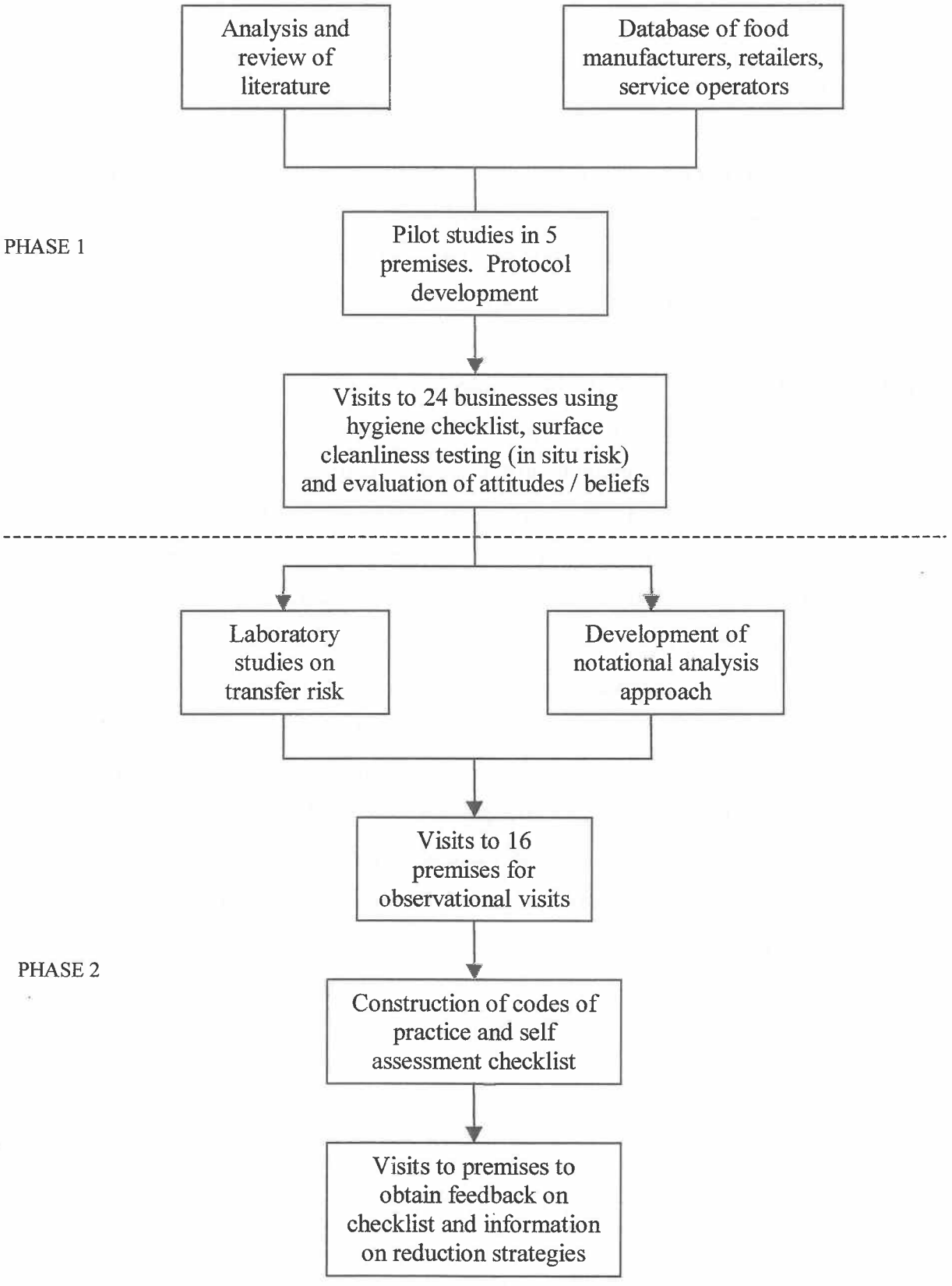
Glossary

ACC	Aerobic Colony Count – a measure of bacterial contamination
Adequate Handwashing and Drying	Immediate, thorough handwashing after touching raw chicken, or other contaminated object, using water and soap / detergent, followed by effective drying using a clean hand towel or disposable paper towel, (no contamination of the tap or environment.
ATP	Adenosive Triphosphate used as a marker of surface cleanliness
Benchmark Cleaning Values	Levels of cleaning obtained following good cleaning practices
cfu	Colony forming units (a measure of bacterial contamination)
Clean	Visibly free from obvious soil or food and / or when the numbers and type of microorganisms (microbial load) is at an acceptable level for use (Dillon and Griffith, 1999)
Contamination	The presence of pathogenic microorganisms in food, water or in other materials or in the environment or on the body surface of man or animal
Direct Contamination	The direct passage of pathogens from sources such as man, raw food and pets to high-risk foods or other surfaces (Worsfold and Griffith, 1996)
Cross Contamination	Any process or action which results in the contamination of a surface or food with additional objectionable materials
Donor	An object or surface with the ability to give / spread microorganisms to another surface
High Risk Food	High-risk foods are ready to eat foods which, under favourable conditions, support the multiplication of pathogenic bacteria and are intended for consumption without treatment which would destroy such organisms (Sprenger, 1999)
Indirect Contamination	Passage of pathogens via an intermediary vehicle to a previously uncontaminated food or surface. The main vehicles are hands, equipment, utensils, surfaces and cloths (Worsfold and Griffith, 1996)
Potential Contamination	A material / food / surface that in its natural state is not contaminated with pathogenic microorganisms, however, as a result of other actions / activities during food preparation may become contaminated.

Recipient	An object or surface with the ability to receive or be contaminated with microorganisms
Risk	The term risk may be used in a variety of contexts, e.g. high-risk food and high-risk consumer, in this document it is used to describe the probability of an event (cross contamination) occurring. Expressions of risk in the document may be qualitative or quantitative.

Flow Diagram of Research Activities



Executive Summary

Background

Notified cases of food poisoning have increased considerably over the past 20 years. The majority of cases are sporadic with only about 5% involving outbreaks. When outbreaks do occur they are investigated and contributory or risk factors identified and examined. A risk factor increasingly implicated is cross contamination. This can be defined as the transfer of microorganisms from one object to another and is of particular concern if the microorganisms have the ability to cause food poisoning and the object contaminated is ready to eat food. Cross contamination is less likely to be reported in outbreak investigations than other risk factors (e.g. undercooking) and maybe even more significant in sporadic cases and where any pathogenic microorganism has a low minimum infective dose (MID – smallest number of organisms required to make a person ill). Cross contamination involves donor and recipient objects, i.e., a microogranism must be transferred from something (donor) to something (recipient) and this can occur directly. Cross contamination can also be indirect i.e. organisms can, for example, be transferred from contaminated food to a ready to eat food via an intermediate object(s) such as a cloth, knife, hand, etc. Both types of cross contamination can be prevented by implementing appropriate food hygiene measures, e.g. handwashing, use of disposable paper towels, adequate cleaning. The extent and efficacy of preventative food hygiene measures is influenced by the design, construction and usage of food premises in conjunction with the adequacy of design and subsequent implementation of any food safety management systems.

Rationale and Objectives

Given the importance of cross contamination and the difficulties in determining the extent of cross contamination during food poisoning outbreaks, the project objectives were to:-

1. Analyse, identify and catalogue practices contributing to cross contamination and its prevention within a risk framework

2. Assess the extent of these practices during food handling

3. Determine food handlers' attitudes to these practices and investigate strategies to reduce cross contamination.

Approach

The project was undertaken in two phases:

Phase 1 was divided into 4 sub sections:

- Protocol development
- Audit of 24 (29) premises to assess potential for cross contamination using a hygiene audit checklist based on protocol development.
- Assessment of surface cleanliness using microbiological and rapid test methods (ATP)
- Preliminary assessment of food handlers attitudes and beliefs towards cross contamination using a likert based attitudinal scale.

Phase 2 was divided into 3 sub sections

- Risk transfer potential
- Observation and notational analysis
- Development and evaluation of cross contamination reduction strategies

Outcomes / Key Results

- Majority of businesses had documented food policies with written staff instructions. Food manufacturers (FM) 87%, Food retailing (FR) 75% and Food Service (FS – catering) 82%. Nearly all had cleaning schedules for high risk areas with staff receiving training in cleaning and personal hygiene

- High incidence of cleaning and other equipment common to high and low risk areas and high rates of transfer of cleaning and other equipment from low to high risk areas. Both could contribute to cross contamination

- Assessments of the cleanliness of 956 potential donor surfaces (environmental and food contact surfaces) indicated:

- visual assessment was a poor indicator of cleanliness
- using microbiological tests 74% of food contact and 78% of environmental surfaces were considered unclean
- using ATP indicated 73% of food contact and 67% of environmental surfaces would be considered unclean
- 82% and 70% of surfaces tested within 1 hour of cleaning were above critical limits using microbiological and ATP tests respectively.
- 28% of surfaces examined were wet and 19% of surfaces were not smooth / easily cleanable thus constituting a greater risk of cross contamination
- Hand contact surfaces were often above target microbiological values for clean surfaces and often highly contaminated: e.g.

Tap Handles (equipment sinks)	96% unclean 27% >12cfu/cm^2	Door Handles	77% unclean 23% >12cfu/cm^2
Fridge Handles	97% unclean 20% >12cfu/cm^2	Telephones	66% unclean 28% >12cfu/cm^2
Soap Dispensers	80% unclean 6% >12cfu/cm^2		

- Food contact surfaces were also often above target values and often highly contaminated.

Equipment / Utensils	77% unclean 38% >12cfu/cm^2	Conveyor Belt	77% unclean 40% >12cfu/cm^2
Chopping Board	87% unclean 38% >12cfu/cm^2	Meat Blade	65% unclean 25% >12cfu/cm^2

The flora often included bacteria of intestinal origin

- Cumulatively these data indicate a potentially large number of unclean or donor surfaces from which cross contamination could take place

- General beliefs about and attitudes towards cross contamination and its prevention were positive.34% of businesses believed cross contamination was important in causing food poisoning and 100% of businesses believed cleaning instructions were useful for management and staff. However, 13% believed handwashing took up to much time.

- 100% believed a quarterly news update on food poisoning and a cross contamination checklist would be useful sources of information

- The main perceived barriers to minimising cross contamination were lack of time (69%) and money (25%)

- Laboratory experiments indicated once contaminated hands could still transfer bacteria onto a surface up to 5 touch actions later. Clean hands could easily pick up bacteria from contaminated surfaces

- Chains of food handling actions - passages of time in which observation of food handlers took place and food handling activities recorded were studied using notational analysis. Details of decontamination activities (cleaning / handwashing) were also recorded as were the state of the surfaces touched wet: dry; contaminated: uncontaminated.

- Chains of food handling actions in food manufacturing were often long, however the risk of cross contamination with pathogenic organisms was considered low as the actions were usually of a repetitive nature and only involved a small range of relatively uncontaminated objects touched (90% of all actions involved 7 surfaces)

- Chains of food handling actions in food service were not as long, however the risk of cross contamination was considered much higher with a much larger range of potentially contaminated objects touched. (90% of all actions involved 20 surfaces)

- Hands were the most frequent vehicle of cross contamination and handwashing was infrequently and poorly performed

- In FS the top 10 most commonly touched items within the chain of handling actions were:

1. Container	6. Tray
2. Fridge Handle	7. Spoon
3. Ready to Eat Food	8. Cloth
4. Oven Handle	9. Knife
5. Work Surface	10. Pan

Touching raw food accounted for 2.4% of the actions.

- The data indicate considerable potential for cross contamination during food handling activities and non-implementation of basic preventative measures.

- In FS Top 10 items touched within 5 actions prior to handling ready to eat food without adequate decontamination were:

1. Container	6. Bin Lid
2. Ready to Eat Food	7. Work Surface
3. Knife	8. Food Packaging
4. Fridge Handle	9. Cloth
5. Chopping Board	10. Oven Handle

Touching raw food accounted for 3% of actions immediately prior to handling ready to eat food (with no decontamination)

- In FS Top 5 items most likely to be touched immediately after handling raw foods without decontamination:

    1. Chopping Board
    2. Raw Food
    3. Bin Lid
    4. Ready to Eat Food
    5. Tap Handle

- Overall, many surfaces touched immediately prior to ready to eat food were considered high risk with high microbial failure rates

- Managers of food premises were interviewed concerning cross contamination and its prevention.

    - a cross contamination self assessment checklist produced as part of the project was perceived to be a useful aid
    - a range of educational materials produced as part of the project were not perceived as particularly valuable

Implications and Recommendations

The data cumulatively indicate a large number of food handling actions being used, especially in food service, with the potential to cause cross contamination. Measures capable of controlling cross contamination, especially handwashing, were often poorly implemented. Cleaning programmes / schedules were used but were likely to be ineffective and cleaning equipment was often shared between high and low risk areas. General attitudes to preventing cross contamination were positive, attitudes towards specific control measures were less positive

The results from this project probably represent a "favourable" or positively biased sample with respect to food handling behaviour. A greater effort needs to be made to minimise cross contamination and this should be centred around basic hygiene practices, i.e. effective handwashing and separation of areas and equipment (including cleaning) for raw and cooked foods. This will involve behavioural change on the part of some food handlers and not simply the provision of information. Further work needs to refine the self assessment checklist developed within the project and strategies and materials for improving food handling practices and minimising cross contamination especially in food service need to be developed.

1. Introduction

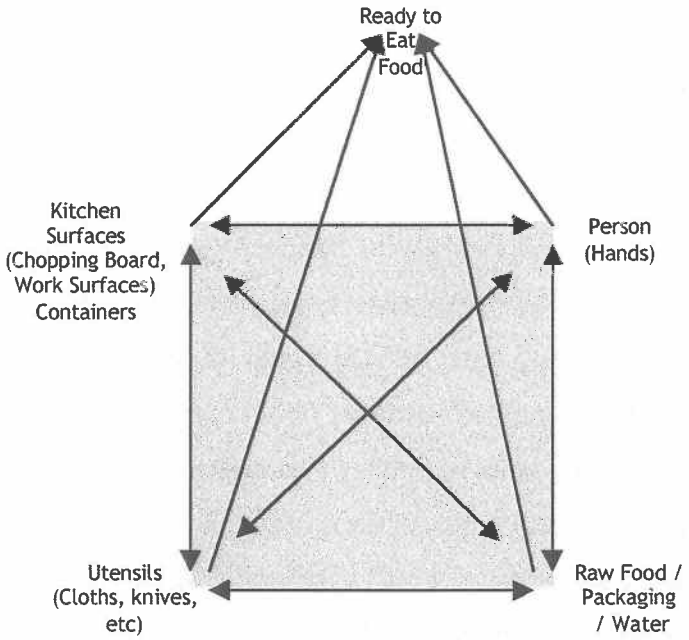
1.1 Background

Food poisoning and other gastrointestinal diseases are a major public health problem. It has been estimated that 95% of food poisoning cases are sporadic and thus causative or contributory factors (risk factors) are unlikely to be determined. Cases of food poisoning associated with outbreaks are investigated and cross contamination has been increasingly implicated as an important risk factor (Griffith 2000).

Once recent UK study (Evans 1998) implicated cross contamination as a contributory factor in 39% of general outbreaks. However, cross contamination is less likely to be remembered / reported than other risk factors and observational studies indicate the potential for cross contamination is likely to be much greater than epidemiological data suggest (Griffith 2000). This hypothesis is supported by indirect evidence. A number of studies, for example, have isolated potential food poisoning organisms from a wide variety of food handling premises / environments (Griffith 2000) even though there can be problems with isolation of pathogens in the presence of large numbers of other organisms. More recent work undertaken at UWIC (Harrison et al 2002a) has found that if sufficiently sensitive microbiological techniques are used then pathogens can be isolated from up to a third of food / hand contact surfaces after the handling of raw poultry. This is of particular concern as raw food and / or its packaging can be highly contaminated and contribute to cross contamination (Harrison et al, 2001). This risk may be compounded by the ability of bacteria to survive (Scott and Bloomfield 1990, Griffith et al 1999b) and spread during food handling (Humphrey 2001). Hands have been found to be a particularly good vehicle for spread of pathogens. A number of other studies (reviewed by Griffith et al 1999b) have used simulated food preparation and or marker organisms to assess cross contamination. Whilst such studies elucidate how cross contamination may take place, they do not indicate how frequently these practices occur in routine food handling or provide information on how effective potential decontamination procedures are in practice.

Cross contamination can be defined as any process or action which results in the contamination of a surface or food with additional objectionable materials. Of particular importance is when this objectionable material includes food borne pathogenic microorganisms and the food is ready to eat food (Fig 1, Table 1). However, transfer of pathogenic microorganisms onto other non-food surfaces or intermediates can also be of considerable concern, especially if the microroganisms have good survival properties and / or a low minimum infective dose (MID – smallest number of organisms adequate to establish an infection).

Figure 1 Routes of Cross Contamination



Decontamination and hygiene practices (cleaning, handwashing, etc.), if appropriately implemented at the correct time and frequency, should minimise microbial cross contamination and prevent pathogen spread. Evidence is available that both are often poorly implemented and that adequate microbial decontamination and cleaning is not achieved (Worsfold and Griffith 2001, Gibson et al 1999), although the linkages between surface contamination and cleanliness and food handling actions, during commercial food handling, have not been explored

Table 1. Examples Of Potential Cross Contamination Routes In Food Preparation Based Upon Figure 1

Direct Cross Contamination				
Donor Surface		Final Recipient Surface		Human
Raw Food	→	Hands	→	Mouth
Raw Food	→	Utensils	→	Mouth
Raw Food	→	Ready to Eat Food	→	Mouth

Indirect Cross Contamination						
Donor Surface		Intermediate Recipient Surface		Final Recipient Surface		Human
Raw Food	→	Surfaces	→	Utensils	→	Mouth
Raw Food	→	Surfaces	→	Ready to Eat Food	→	Mouth
Raw Food	→	Hand	→	Ready to Eat Foods	→	Mouth
Raw Food	→	Utensils	→	Ready to Eat Foods	→	Mouth
Raw Food	→	Utensils	→	Hands	→	Mouth

1.2 Aims and Objectives

The overall aim of the project was to assess the potential for cross contamination in food premises and how any risk could be reduced. More specifically the objectives were to:

1. Review the literature on cross contamination, epidemiological data on foods and premises implicated in food borne disease
2. Analyse, identify and catalogue practices likely to lead to cross contamination in a range of food handling environments
3. Analyse, identify and catalogue existing procedures for preventing cross contamination
4. Determine the microbiological risk posed by these practices (2 and 3) in situ.
5. Determine the microbiological risk posed by these practices (2 and 3) under laboratory conditions
6. Using data from 4 and 5, allocate a risk category to the observed practices
7. Devise sector specific codes of good practice
8. Using a notational analysis approach, determine the extent of these practices in different food establishments

9. Devise a cross contamination risk self assessment checklist specific for use in different sectors of the food industry
10. Incorporate results from 7 and 9 into sector specific communication strategies

2 Phase 1 – Audit Visits and Surface Testing

2.1 Introduction

Phase 1 was divided into 4 sub sections:

- Protocol development
- Audit of 24 (29) premises to assess potential for cross contamination using a hygiene audit checklist based on protocol development.
- Assessment of surface cleanliness using microbiological and rapid test methods (ATP)
- Preliminary assessment of food handlers' attitudes and beliefs towards cross contamination using a likert based attitudinal scale.

During the auditing, premises were visited for between 6-12 hours depending upon size and complexity and spread over 1 or 2 days.

2.2 Protocol Development

Five establishments were selected from the database of food companies held within UWIC and included food manufacturers and food service (catering), it also included some manufacturers who were also retailers. No large / multiple retailers were involved and all premises involved were identified as SMEs (<250 employees). Selected premises were visited and used to identify generic factors influencing the potential for cross contamination. Factors identified were used to develop a checklist based on:

- Management Systems / Documentation
- Cleaning Practices

- Cleaning Products
- Personal Hygiene
- Premises design, construction, general hygiene and handling practices
- Pest Control
- Training

2.3 Audit Visits Using Hygiene / Cross Contamination Checklist

The checklist developed is presented in Appendix 1. The checklist was used in visits to 24 food premises consisting of 14 manufacturing, 4 retailing and 11 food service (catering). It should be noted that some businesses were both manufacturing and retailing in which case 2 separate visits were made, thus the number of visits amounted to 29. This represents an opportunistic sample drawn from a list of food premises held at UWIC. It is not claimed that the sample is representative, a much larger number of premises would need to have been visited and this was precluded by the terms of the project. Indeed it is likely that the sample used was positively biased towards good hygiene practices by virtue of the business being on the UWIC list.

Results from the checklist visits are presented in Tables 2.1-2.7. Table 2.1 deals with Management Systems and Documentation. Table 2.2 Cleaning, Table 2.3 Cleaning Products, Table 2.4 Personal Hygiene, Table 2.5 Premises, Design, Construction and General Hygiene, Table 2.6 Pest Control, Table 2.7 Training. Sample size – 29 (14 Manufacturing (M), 4 Food Retailers (FR) and 11 Food Service /catering (FS)

In this and later sections all results have been rounded up or down to the nearest whole number, some columns may therefore not add up exactly to 100%

2.4 Results - Key points to emerge from audit checklist

2.4.1 The large majority of businesses had food safety policies (87% food manufacturing (M), 75% food retail (FR), 82% food service / catering (FS)) which were likely to be documented (93% M, 75% FR, 91% FS) and based upon a hazard analysis approach (93% M, 75% FR, 100% FS)

Table 2.1 Management Systems and Documentation

		Yes %	No %	Other or N/A
1.1 Does the establishment have a food safety policy?	M	87	13	
	FR	75	25	
	FS	82	18	
1.2 Does it use a hazard analysis approach?	M	73	27	
	FR	75	25	
	FS	91	9	
1.3 Are there written instructions for management and staff?	M	93	7	
	FR	75	25	
	FS	91	9	
1.4 Are regular meetings held to discuss Food Safety Policies?	M	87	13	
	FR	25	75	
	FS	91	9	
1.5 Is there a policy for maintaining Food Safety documentation?	M	87	13	
	FR	25	75	
	FS	91	9	

2.4.2 The audit data on cleaning provide a context for the surface test results (see 2.7). Cleaning was largely carried out by internal staff in manufacturing and food service (87% and 73% respectively) less so in retailing. However, the number of retailers in the present study was small (n=4). Cleaning schedules were widely used in manufacturing and food service (87%, 91% respectively) but less so in retailing (25%) The cleaning schedules were comprehensive detailing how, when and who should clean. Two audit questions (Q2.9, Q2.18) indicate greater residual moisture levels in food manufacturing environments than food retailing or food service. Over 90% of food manufacturers and food service claimed to monitor cleaning with records kept. High numbers of staff (87% M, 75% FR, 100% FS) claimed to receive training in cleaning. Facilities for handwashing were usually available with adequate facilities but were more likely to be poorly maintained in food service (36%)

Table 2.2 Cleaning

		Yes %	No %	Other or N/A
2.1 Is cleaning carried out by external contractors?	M	13	87	
	FR	50	50	
	FS	27	73	
2.2 Are cleaning schedules used ?	M	87	13	
	FR	25	75	
	FS	91	9	
2.3 Are cleaning schedules in place for all high risk areas of premises and equipment ?	M	87	13	
	FR	100	--	
	FS	91	9	
2.4 Are cleaning schedules used for equipment?	M	60	40	
	FR	50	50	
	FS	50	50	
2.5 Do cleaning schedules specify when equipment/premises are to be cleaned?	M	93	7	
	FR	75	25	
	FS	100		
2.6 Do cleaning schedules specify who is to do the cleaning?	M	67	27	6
	FR	75	25	
	FS	91	9	
2.7 Do cleaning schedules specify how equipment/premises are to be cleaned?	M	80	13	7
	FR	75	25	
	FS	91	9	
2.8 Do cleaning schedules specify what is to be cleaned?	M	80		20
	FS	100		
2.9 Are floor areas free from accumulating pools of water?	M	47	53	
	FR	100		
	FS	91	9	
2.10 Do cleaning schedules specify the use of disinfectant?	M	73	20	7
	FR	75	25	
	FS	91	9	
2.11 Is cleaning evaluated and corrective action specified?	M	93	7	
	FR	75	25	
	FS	91	9	
2.12 Are cleaning records kept?	M	93	7	
	FR	50	50	
	FS	91	9	
2.13 Are cleaning responsibilities for all staff clearly defined ?	M	100		
	FR	75	25	
	FS	100		
2.14 Does the establishment have a correct sequence of what is to be cleaned ?	M	100		
	FS	100		
2.15 Are cleaning materials & hazardous substances clearly labelled and secured?	M	87	13	
	FR	75	25	
	FS	100		
2.16 Do staff receive training in cleaning?	M	87	13	
	FR	75	25	
	FS	100		
2.17 Is the food preparation equipment sited so as to aid ease of cleaning?	M	80	20	
	FR	100		
	FS	91	9	
2.18 After cleaning are surfaces dry?	M	53	47	
	FR	100		
	FS	91	9	
2.19 Are separate washing facilities provided for food?	M	88	6	6
	FR	100		
	FS	100		

2.20 Are separate washing facilities provided for equipment?	M	93	7	
	FR	100		
	FS	91	9	
2.21 Are separate hand washing facilities provided?	M	100		
	FR	100		
	FS	100		
2.22 Is each hand washing area supplied with soap/antibacterial cleanser and hot water?	M	80	20	
	FR	100		
	FS	91	9	
2.23 Are hand washing facilities in good condition/ kept clean?	M	87	13	
	FR	100		
	FS	64	36	

2.4.3 Equipment and control of cleaning chemicals were generally appropriate. However, some results (Q3.7, Q3.8, Q3.9 and Q3.10) indicated possible cross contamination from low to high risk areas via cleaning equipment / utensils (often wet).

Table 2.3 Cleaning products Used

		Yes %	No %	Other or N/A
3.1 Is personal protective equipment for cleaning readily available?	M	93	7	
	FR	100		
	FS	91	9	
3.2 Are cleaning chemicals used appropriately and at appropriate concentrations?	M	100		
	FS	100		
3.3 Can staff explain the need for appropriate disinfection procedures?	M	88	6	6
	FR	75	25	
	FS	100		
3.4 Are procedures specified for the cleaning of equipment.	M	100		
	FR	50	50	
	FS	100		
3.5 Are disinfectant dilution rates monitored?	M	73	20	7
	FR	75	25	
	FS	91	9	
3.6 Are the general facilities for storing cleaning equipment and materials acceptable?	M	87	13	
	FR	75	25	
	FS	100		
3.7 Are there separate cleaning implements for different risk areas?	M	67	33	
	FR	75	25	
	FS	73	27	
3.8 Is cleaning equipment for low risk foods stored separately from cleaning equipment for high risk foods?	M	47	47	6
	FR	75	25	
	FS	73	27	
3.9 Is the cleaning equipment stored dry?	M	47	53	
	FR	50	50	
	FS	64	36	
3.10 Are the cleaning materials/equipment colour coded?	M	53	47	
	FR	25	75	
	FS	82	18	
3.11 Are biocides readily available?	M	87	13	
	FR	100		
	FS	100		

2.4.4 Procedures to manage personal hygiene were widely used and staff generally appeared hygienic (adequate protective clothing, no jewellery, clean appearance) although in food retailing and service, visitors were often not required to wear protective clothing (50%, 54% respectively). There was some evidence of cigarette smoking on the premises (14% M, 9% FS).

Table 2.4 Personal Hygiene

		Yes %	No %	N/A % (other)
4.1 Is a system in place for reporting illness?	M	93	7	
	FR	100		
	FS	100		
4.2 Do staff display good personal hygiene?	M	87	13	
	FR	100		
	FS	91	9	
4.3 Are all food handlers wearing clean and suitable protective clothing?	M	93	7	
	FR	100		
	FS	91	9	
4.4 Are staff changing/locker facilities provided?	M	87	13	
	FR	50	50	
	FS	100		
4.5 Are all food handlers free from open cuts or wounds?	M	100		
	FR	100		
	FS	100		
4.6 Are visitors required to wear appropriate protective clothing?	M	93	7	
	FR	50	50	
	FS	54	46	
4.7 Is there evidence of cigarette smoking on the food premises?	M	14	86	
	FR		100	
	FS	9	91	

2.4.5 Premises were generally hygienically constructed (e.g. responses to Q5.1-5.7). Whilst low and high risk areas were generally well separated (100% M, 75% FR, 92% FS), there was considerable opportunities (Q5.10 – 5.14) for cross contamination via equipment, e.g. common equipment for low and high risk areas, 43% M, 75% FR, 73% FS, transfer between high and low risk areas, 36% M, 100% FR, 55% FS). Chopping boards were often found to be not easily cleanable or in poor condition

Wiping / dish cloths were widely used (50% M, 100% FR, 55% FS). These were often dirty (14% M, 25% FR, 36% FS) and wet (manufacturing 36%, retailing 100%, food service 37%) and infrequently cleaned (see Q5.21). Roughly half of food manufacturers (50%) and caterers (55%) used disposable cloths. Disposable gloves were often available (93% M, 75% FR, 73% FS).

Table 2.5 Premises: design, construction and general hygiene

		Yes %	No %	Other or N/A
5.1 Are premises constructed of impervious, non-toxic materials to an appropriate height?	M	87	13	
	FR	75	25	
	FS	100		
5.2 Are floors designed and constructed to allow adequate and appropriate drainage and cleaning?	M	80	20	
	FR	75	25	
	FS	100		
5.3 Are ceilings and overhead fixtures designed and constructed to minimise accumulation of dirt and prevent ingress of pests?	M	87	13	
	FR	75	25	
	FS	100		
5.4 Do drains have surfaces that can be easily cleaned?	M	93	7	
	FR	100		
	FS	100		

5.5 What are work surfaces constructed from ?	Stainless Steel	Plastic	Other or N/A
M	88	6	6
FR	100		
FS	100		

		Yes	No	Other or N/A
5.6 Are work surfaces constructed joint free?	M	93	7	
	FR	100		
	FS	100		
5.7 Are work surfaces smooth and impervious?	M	88	6	6
	FR	100		
	FS	100		
5.8 Is there physical separation of low and high risk foods on delivery?	M	100		
	FR	75	25	
	FS	92	8	
5.9 Is equipment generally clean and in a good state of repair?	M	86	14	
	FR	100		
	FS	100		
5.10 Can staff move easily from low to high risk areas during production/processing?	M	50	50	
	FR	100		
	FS	82	18	
5.11 Is equipment transferred from low to high risk areas?	M	36	57	7
	FR	100		
	FS	55	45	
5.12 Is there equipment common to low and high risk food areas e.g. telephone/cold store	M	43	50	7
	FR	75	25	
	FS	73	27	
5.13 Are there colour coded knives?	M	22	57	21
	FR		100	
	FS	73	27	
5.14 Are separate chopping boards used for high and low risk areas?	M	29	29	42
	FR		100	
	FS	73	27	
5.15 Are chopping boards in good condition / easily cleanable?	M	43	14	43
	FR	50	25	25
	FS	73	27	
5.16 Are there colour coded chopping boards?	M	21	36	43
	FR	50	25	25
	FS	91	9	

5.17 Nature of material for chopping boards used?		Wood	Plastic	Marble	Other
			50	21	21
	M	25	50		
	FR	9	91		
	FS				

5.18 Are wiping / dish cloths used?		Yes	No	N/A
	M	50	29	21
	FR	100		
	FS	55	45	

5.19 Are wiping / dish cloths visually clean or dirty?		Clean	Dirty	N/A
	M	36	14	50
	FR	75	25	
	FS	28	72	

5.20 Are wiping / dish cloths visually wet or dry?		Wet	Dry	N/A
	M	36	14	50
	FR	100		
	FS	27	73	

5.21 How frequently are dish cloths cleaned?		Daily	2 days	3 days	4 days	5 days	Weekly	N/A
	M	50		14				36
	FR	100						
	FS	73		18			9	

		Yes	No	N/A
5.22 Can cloths move between high and low risk areas?	M	27	73	
	FR	50	50	
	FS	64	36	
5.23 Are apron cloths worn?	M	27	73	
	FR	50	50	
	FS	64	36	
5.24 Are cloths disposable?	M	50	14	36
	FR	25	75	
	FS	55	45	
5.25 Are staff provided with disposable gloves?	M	93	7	
	FR	75	25	
	FS	73	27	
5.26 Are wipes or solutions used for the sterilisation of temperature probes?	M	79	21	
	FR	100		
	FS	82	18	
5.27 Is ventilation provided in food preparation areas?	M	79	21	
	FR	100		
	FS	91	9	
5.28 Are all food preparation areas well lit?	M	86	14	
	FR	100		
	FS	91	9	
5.29 Are facilities provided for the storage of waste internally?	M	93	7	
	FR	75	25	
	FS	100		
5.30 Are facilities provided for the storage of waste externally?	M	93	7	
	FR	100		
	7	100		

2.4.6 Pest Control

Pest infection control strategies were in place (93% M, 100% FR, 91% FS) and there was little evidence of actual infestations (7% M, 0% FR, 9% FS).

Table 2.6 Pest Control

		Yes %	No %	N/A %
6.1 Is there a preventative pest control programme?	M	93	7	
	FR	100		
	FS	91	9	
6.2 Are procedures in place to detect and report pest infestation at an early stage?	M	93	7	
	FR	100		
	FS	91	9	
6.3 Is there evidence of pest infestation e.g. flies?	M	7	93	
	FR		100	
	FS	9	91	
6.4 Are mechanisms in place to prevent pests from gaining access?	M	60	40	
	FS	50	50	
6.5 Can pests gain access to food/water on premises?	M	20	60	20
	FS		100	
6.6 Are there vermin proof containers for storage of raw materials?	M	79	21	
	FR	75	25	
	FS	100		
6.7 Are raw materials stored off the floor?	M	93	7	
	FR	100		
	FS	100		

2.4.7 Training

Staff generally received hygiene training (7.1 - 7.5). Training usually covered cross contamination (87% M, 75% FR, 91% FS) although updating was often poor (53% M, 25% FR, 91% FS).

Table 2.7 Training

		Yes %	No %	N/A %
7.1 Have all staff received induction training within 4 weeks of commencement of employment?	M	88	6	6
	FR	75	25	
	FS	100		
7.2 Do induction sessions include basic cleaning skills and health and safety awareness?	M	93		7
	FR	75	25	
	FS	100		
7.3 Have the staff received externally certificated training in Basic Food Hygiene?	M	93	7	
	FR	75	25	
	FS	91	9	
7.4 Have staff received training specifically on preventing cross-contamination?	M	87	13	
	FR	75	25	
	FS	91	9	
7.5 Is training updated annually?	M	53	47	
	FR	25	75	
	FS	91	9	

2.5 General Discussion of Audit Data

The audit visits were made to an opportunistic sample and were not intended to be representative of industry as a whole or any sector of it. This especially relates to the catering sector which is a particularly diverse both by size and type. The catering sample included one hotel with the rest representing institutional catering. No ethnic or other restaurants / takeaways were visited. As such, the sample is likely to be biased favourably with respect to good hygiene practices and this is indicated by some of the results. For example, the data on use of a food safety system based upon a hazard analysis approach for food manufacturers is in line with national data but this is not the case for food service (Mortlock et al 1999). Businesses in the sample visited were much more likely to have adopted a HACCP approach than would be considered the norm. Confidence in management systems has been shown to correlate with better microbiological food quality and standards of hygiene are likely to be better if a documented system is used (Welsh Food Microbiological Forum 2001). Possession of a documented food safety system suggests thought and planning, which are indicators of a positive attitude towards food hygiene, and the results of these visits therefore are likely to represent a more "ideal" industry perspective, particularly for food service.

A clean working environment (general and food contact surfaces) helps to minimise cross contamination although there is evidence that cleaning is often poorly carried out (Worsfold and Griffith 2001). Cross contamination from dirty environments (plus survival of environmental organisms, e.g. Listeria spp) is aided by the presence of moisture and food manufacturing was more likely to provide a wetter environment. This may be a reflection of the use of different cleaning practices, e.g. pressure sprays. Although cleaning was evaluated and monitored, the monitoring in all cases was visual assessment and the records kept were not the results obtained from the cleaning, rather that cleaning had been attempted / carried out.

The level of separation found between high and low risk areas was higher than other studies but aspects of the management systems, documentation, sharing of common equipment and cleaning materials between high and low risk areas is similar to other reports (Sagoo et al 2002)

High numbers of staff claimed to receive training in cleaning but on discussion with operatives the training would be considered very minimal covering, in most cases, only what was to be done. Cleaning was unlikely to be validated (i.e. proven to work) and operatives' understanding of cleaning and the different stages involved was poor. Cleaning equipment can act as a vector, transferring pathogens from low to high risk areas especially if left wet. Table 2.8 summarises reasons obtained from this and other studies why cleaning may be ineffective.

Table 2.8 Reasons Why Cleaning Maybe Ineffective

Reasons	
Inadequate time Inadequate removal of soil	Lack of validation or incorrect implementation or both
Surface / object not in cleaning schedule	
Incorrect cleaning product formulation	
Dirty cleaning equipment	
Recontamination from dirty cloth	
Contaminated water used in cleaning	

Colour coding helps to prevent common use of equipment e.g. knives or chopping boards in both high and low risk areas yet was not always used by businesses (FM 57% and 36% respectively). Collectively, the results indicate considerable potential for transfer and survival of microorganisms, including pathogens, on cleaning equipment. Similarly, wiping / dish cloths, which can often be contaminated, were likely to be wet and dirty with considerable potential to contaminate food preparation surfaces (Hilton and Austin 2000)

None of the premises had a visual pest infestation problem, although greater measures could have been taken to prevent pest entry. Staff had received training at levels greater than typical for industry (Mortlock et al 2000) and training did cover cross contamination. However, when questioned operatives, whilst knowing the principles of cross contamination, often could / did not apply these to specific situations.

A summary of findings and implications is contained in Table 2.36

2.6 Surface Testing

Background

At the same time as the audits were performed, assessments were made of surface cleanliness initially by visual examination. Additional tests were performed using a range of microbiological methods (i.e. detection of cultivatable microorganisms) using dip slides for aerobic colony counts (ACC), Enterobacteriaceae (VRBG Agar), as well as additional methods including a rapid coliform test. Dip slides can be used quantitatively or semi-quantitatively (higher counts) and have been found to be superior to swabbing for detecting lower numbers of organisms and determining Pass or Fail after cleaning flat surfaces (Moore and Griffith 2002a). Irregular shaped surfaces, e.g. hand contact surfaces, were swabbed onto dip slides. Not all types of microbiological tests were used on all occasions. Cultivation for Enterobacteriaceae or coliforms was performed when it was felt useful or appropriate

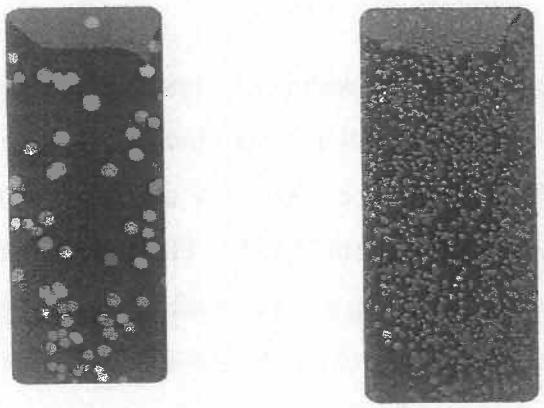
ATP bioluminescence was also used to assess surface cleanliness. Results were obtained within minutes and are a truer measure of surface cleanliness than microbiological contamination, (Dillon and Griffith 1999) especially in high risk areas (Moore and Griffith 2002b). ATP is found in both food debris and microorganisms and has been found to be useful in evaluating cleaning regimes (Worsfold and Griffith 2001).

The assessment sheet used for surface testing is contained in Appendix 2. In all, depending on the specific tests used, 960 food or environmental contact surfaces were tested using three or more techniques (including visual assessment)

Using visual assessment the presence of food or any other matter on a surface was considered dirty. Using dip slides $<2.5 cfu/cm^2$ has been used as a benchmark value (Griffith et al 2000, Worsfold and Griffith 2001) and is similar to that recommended by the Swedish Food Standards Agency (1998). An ATP value of below 500 Relative Light Units (RLUs) has been recommended for the instrument used in the present

study (Griffith et al 2000, Worsfold and Griffith 2001). Work involving testing a wide variety of over 2000 clean surfaces endorses these benchmark values (Griffith et al 1999a).

Figure 2 Dip Slide Surfaces – Aerobic Colony Counts (ACC)



5/cm^2 45/cm^2

Data on surface cleanliness was collected to:

- provide a measure of the effectiveness of the cleaning procedures described during auditing
- provide a snapshot of surface cleanliness during food preparation / production
- inform the notational analysis in Phase 2 of the project
- help in the process of risk assessment
- determine if some surfaces were cleanable

2.7 Results of Surface Testing

Tables 2.9 to 2.12 present data on the cleanliness of both food contact and environmental surfaces (any non food contact surface within a food preparation area) collected by visual, microbiological and ATP bioluminescence methods. Visual assessment was an indicator of gross visual contamination only and did not provide an accurate measure of surface cleanliness with 52% of food contact and 64% of environmental services passing. This compared to failure rates of 84% (microbiological) and 73% (ATP) for food contact and 78% and 67% for environmental surfaces respectively. Additionally, the degree of contamination was a concern with 26% of ACC counts being greater than 12cfu/cm^2 for food contact

surfaces with some counts in excess of 250cfu/cm^2. Mean ATP values were 34,328 RLUs for food contact and 14,504 RLUs for environmental surfaces with numerous values exceeding the maximum limit (500,000) for the instrument. There were no significant differences for cleanliness by size of institution. Non smooth surfaces were more likely to fail using visual or ATP assessments (tables 2.17 – 2.19). There were no significant differences in failure rates by industry sector if ACC were used but manufacturers were significantly less likely to fail than retailers or caterers if ATP was used. Retailers had the highest mean ATP values, the mean for manufacturing was distorted by a large number of very bad fails within one company. Retailers also had the highest number of heavily contaminated surfaces (>12cfu/cm^2). Twenty eight percent of sites overall were wet and wet sites were also more likely to be classed as visually dirty. Failure rates for ACC and ATP were unaffected by the presence of moisture although the wet sites were more likely to be heavily contaminated (>12cfu/cm^2) by microorganisms then dry sites (35% compared to 21%).

Table 2.24 presents ACC for different objects / surface types ranked by failure rate although values of n vary considerably. High failure rates from high numbers of samples were found for fridge handles, tap handles, freezer handles and chopping boards. High failure rates from lower sample numbers were found for hands, bin lids and cloths. High failure rates from high numbers of samples using ATP (Table 2.25) were found for tap handles, shelves and fridge handles.

Some types of materials were more likely to fail than others but comparisons are difficult due to differences in (some cases small) sample numbers. Thirty six percent of stainless steel surfaces, a widely used material in food premises, failed visually compared to 65% of wood surfaces but fewer were sampled. This compares to failure rates of 79% using ACC and 67% ATP for stainless steel and 69% and 62% for wood (see table 2.29).

Using ACC, 82% of sites were considered failing within an hour of cleaning and 70% using ATP. Higher microbial counts were obtained as the time after cleaning extended beyond 5 hours. The fact that 18% of surfaces and 30% of surfaces were still considered clean using ACC and ATP respectively within an hour of cleaning

indicates that benchmark values were not unrealistic theoretical ideals but could be attained and that the surfaces were cleanable. A limited number of enterobacterial counts were obtained (approximately 20% of the number of ACCs counted) and these were high, especially in food retailing and food service (Table 2.32). The presence of coliforms on a wide range of surfaces was confirmed by the use of a rapid coliform test (table 2.33)

Table 2.9. Visual Inspection Results for Food Contact and Environmental Surfaces – All Sites

Surface Type	N = sample size	Clean (pass)		Dirty (Fail)	
		n	%	n	%
Food Contact Surfaces	390	203	52	187	48
Environmental Surfaces	566	364	64	202	36

Table 2.10 Aerobic Colony Counts (ACC) for Food Contact and Environmental Surfaces – All Sites

Surface Type	Sample size N	<2.5 cfu cm^2		2.5 cfu cm^2		12 cfu cm^2		>12 cfu cm^2		FAIL >2.5 cfu cm^2	
		n	%	n	%	n	%	n	%	n	%
Food Contact Surfaces	330	54	16	104	32	85	26	87	26	276	84
Environmental Surfaces	530	118	22	178	34	111	21	123	23	412	78

Table 2.11 ATP Results for Food and Environmental Contact Surfaces – All Sites

Surface Type	Sample size n	Mean	Min	Max	Standard Deviation	Pass < = CL		Fail > = CL	
						n	%	n	%
Food Contact Surfaces	379	24328	6	500000	750101	104	27	275	73
Environmental Surfaces	558	14504	9	500000	52248	183	33	375	67

Table 2.12 Comparison of % Failure Rates for Food and Environmental Contact Surfaces by Method.

	ATP Failure Rate		ACC Failure rate		Visual Inspection Failure Rate	
	n	%	n	%	n	%
Food Contact Surfaces	275	73	276	84	187	48
Environmental Surfaces	375	67	412	78	202	36

Table 2.13 Aerobic Colony Count (ACC) Results by Sector – All Sites

Sector	Sample size N	<2.5 cfu cm^2		2.5 cfu cm^2		12 cfu cm^2		>12 cfu cm^2		FAIL >2.5 cfu cm^2	
		n	%	n	%	n	%	n	%	n	%
Manufacturer (14 companies)	401	85	21	113	28	77	19	126	32	316	79
Food Retailer (4 companies)	123	28	23	34	28	15	12	46	67	95	78
Food Service (11 companies)	336	59	18	135	40	104	31	38	11	277	78

Table 2.14 ATP Results by Sector – All Sites

Surface Type	Sample size N	Mean	Min	Max	Standard Deviation	Pass <= CL		Fail > = CL	
						n	%	n	%
Manufacturer (14 companies)	475	18007	6	500000	61938	185	39	290	61
Food Retailer (4 companies)	126	37303	14	500000	95289	28	22	98	78
Food Service (11 companies)	336	12043	9	500000	44160	74	22	262	78

Table 2.15 Aerobic Colony Counts (ACC) Results for Size of Business – All Sites

Size of Business	Sample size N	<2.5 cfu m^2		2.5 cfu cm^2		>12 cfu cm^2		<12 cfu cm^2		FAIL >2.5 cfu cm^2	
		n	%	n	%	n	%	n	%	n	%
Less than 10	557	101	18	199	36	134	24	123	22	456	82
10 – 20	57	25	44	19	33	9	16	4	7	32	56
21 – 50	111	26	23	25	23	27	24	33	30	85	77
101 – 200	40	12	30	8	20	5	12	15	18	28	70
More than 200	95	8	8	31	33	21	22	35	37	87	92

Table 2.16 ATP Results for Size of Business – All Sites

Size of Business	Sample size N	Mean	Min	Max	Standard Deviation	Pass <= CL		Fail > = CL	
						n	%	n	%
Less than 10	577	20990	9	500000	66900	14	25	433	75
10 – 20	60	16894	10	248572	39179	15	25	45	75
21 – 50	145	9271	6	500000	46570	75	52	70	48
101 – 200	43	42741	107	500000	92290	3	7	40	93
More than 200	113	9116	6	500000	50446	50	44	63	56

Table 2.17 Visual Inspection for Surface Types - All Sites

Surface Type	N = sample size	Clean (pass)		Dirty (Fail)	
		n	%	n	%
Smooth	776	506	65	270	35
Not smooth	180	61	34	119	66

Table 2.18 Aerobic Colony Counts (ACC) Results for Surface Type – All Sites

Surface Type	Sample size N	<2.5 cfu cm^2		2.5 cfu cm^2		12 cfu cm^2		>12 cfu cm^2		FAIL >2.5 cfu cm^2	
		n	%	n	%	n	%	n	%	n	%
Smooth	693	131	19	235	34	165	24	162	23	562	81
Not Smooth	167	41	24	47	28	31	19	48	29	126	76

Table 2.19 ATP Results for Surface Type - All Sites

Surface Type	Sample size N	Mean	Min	Max	Standard Deviation	Pass < = CL		Fail > = CL	
						n	%	n	%
Smooth	765	15782	6	500000	57634	247	32	518	68
Not Smooth	173	30427	17	500000	80218	40	23	133	77

Table 2.20 Visual Inspection Results by Presence of Moisture – All Sites

Moisture Present	N = sample size	Clean (pass)		Dirty (Fail)	
		n	%	n	%
Dry	693	430	62	263	38
Wet	263	137	52	126	48

Table 2.21 Aerobic Colony Count Results by Presence of Moisture – All Sites

Moisture Present	Sample size N	<2.5 cfu cm^2		2.5 cfu cm^2		12 cfu cm^2		>12 cfu cm^2		FAIL >2.5 cfu cm^2	
		n	%	n	%	n	%	n	%	n	%
Dry	642	126	20	225	35	157	24	134	21	516	80
Wet	218	46	21	57	26	39	18	76	35	172	79

Table 2.22 ATP Results by Presence of Moisture - All Sites

Moisture Present	Sample size N	Mean	Min	Max	Standard Deviation	Pass < = CL		Fail > = CL	
						n	%	n	%
Dry	682	14094	6	500000	52941	210	31	472	69
Wet	256	30176	10	500000	82082	77	30	179	70

Table 2.23 Comparison of % Failure for Presence of Moisture using ATP, ACC & Visual Inspection

Moisture Present	ATP Failure Rate		ACC Failure Rate		Visual Inspection Failure Rate	
	n	%	%	n	%	n
Dry	482	70	516	80	263	38
Wet	168	66	172	79	126	48

Table 2.24 Aerobic Colony Count Results by Surface Type – All Sites

Item Type	Sample size	<2.5 cfu cm^2		2.5 cfu cm^2		12 cfu cm^2		>12 cfu cm^2		FAIL >2.5 cfu cm^2	
	N	n	%	n	%	n	%	n	%	n	%
Hands	9			3	33	4	45	2	22	9	100
Bin Lid	8			1	12	4	50	3	38	8	100
Draining Board	6			2	33	4	67			6	100
Cleaning Equipment	5			2	40	2	40	1	20	54	100
Hose Pipe	5		1	20	1	20	3	60		5	100
Plate	5			5	100					5	100
Miscellaneous	3			2	67	1	33			3	100
Till	2					2	100			2	100
Tin Opener	2			2	100					2	100
Cupboard Handle	1			1	100					1	100
Fridge Handle	30	1	3	8	27	15	50	6	20	29	97
Tap Handle (Equipment)	52	2	4	15	29	21	40	14	27	50	96
Floor	25	1	4	6	24	3	12	15	60	24	96
Cloth	13	1	7	2	15	5	39	5	39	12	93
Freezer Handle	19	2	11	5	26	5	26	7	37	17	89
Work Surface / Counter	8	1	12			3	38	4	50	7	88
Microwave Handle	8	1	12	5	63	2	25			7	88
Chopping Board	39	5	13	10	26	9	23	15	38	34	87
Scales	15	2	13	6	40	3	20	4	27	13	87
Container	36	5	14	15	42	9	23	7	19	31	84
Tap Handle (Wash Basin)	29	4	14	4	14	12	41	9	31	25	84
Shelves	26	4	15	14	54	6	23	2	8	22	85
Oven Handle	20	3	15	10	50	4	20	3	5	17	85
Plastic Door Strips	25	4	16	9	36	6	24	6	24	21	86
Table	56	10	18	15	27	19	34	12	21	46	82
Soap Dispenser	15	3	20	7	47	4	27	1	6	12	80
Bowl	5	1	20	4	80					4	80
Microwave	5	1	20	4	80					4	80
Sink	5	1	20	1	20			3	60	4	80
Equipment	86	20	23	21	24	13	15	32	38	66	77
Hand Equipment	43	10	23	13	42	8	19	7	16	33	77
Conveyor Belt	35	8	23	7	20	6	17	14	40	27	77
Door	13	3	23	7	54			3	23	10	77
Jug	4	1	25	3	75					3	75
Pan	21	6	29	9	43	4	19	2	9	15	71
Tray	33	11	33	11	33	7	12	4	22	22	67
Door Handle	12	4	33	5	42			3	25	8	67
Toaster	3	1	33	1	33			1	33	2	67
Telephone	11	4	36	4	36			3	28	7	66
Meat Blade	20	7	35	4	20	1	20	5	25	13	65
Bin	5	2	40	3	60					3	60
Bucket	5	2	40	2	40	1	20			3	60
Ceiling	5	2	40	3	60					3	60
Knife	12	5	42	5	42	2	16			7	58
Oven Door	7	3	43	4	57					4	57
Packaging	9	4	45	2	22	1	11	2	22	5	56
Wall	58	26	45	14	24	7	12	11	19	32	55
Toilet Door Handle (Mens)	1	1	100							0	0

Table 2.25 ATP Results by Surface Type – All Sites

Item Type	Sample size N	Mean	Min	Max	Standard Deviation	Pass <= CL		Fail >= CL	
						n	%	n	%
Door Handle	12	24240	112	155417	43288	0	0	12	100
Bowl	5	8240	1416	27819	11055			5	100
Microwave	5	5754	402	11909	5505			5	100
Till	2	19117	11052	27181	11405	0	0	2	100
Tin Opener	2	366	9	723	505	0	0	2	100
Cupboard Handle	1	500000						1	100
Toilet Tap Handle (Mens)	1	2039				0	0	1	100
Tap Handle (Wash Basin)	30	18115	185	142762	30210	3	10	27	90
Shelves	27	29189	208	308829	75016	3	11	24	89
Fridge Handle	32	41354	13	500000	93244	4	13	28	87
Microwave Handle	8	8674	860	27969	9382	1	13	7	87
Floor	25	53378	85	500000	114882	4	16	21	84
Draining Board	6	2346	29	8030	3195	1	17	5	83
Tap Handle (Equipment)	60	17311	6	191220	32569	11	18	49	82
Oven Handle	20	16879	553	136226	31586	4	20	16	80
Sink	5	1484	222	4047	1546	1	20	4	80
Counter	9	72577	33	408008	142773	2	23	1	78
Cloth	13	51200	32	500000	136189	3	23	10	77
Hands	28	33138	27	500000	100395	7	25	21	75
Jug	4	263	162	527	176	1	25	3	75
Soap Dispenser	19	5814	6	60565	13843	4	27	11	73
Scales	15	39948	48	500000	128455	4	27	11	73
Plastic Door Strips	28	24361	67	500000	93682	8	29	20	71
Oven Door	7	1128	21	3694	1218	2	29	5	71
Table	57	6097	9	106737	15890	17	30	40	70
Wall	60	23434	21	259114	58887	13	21	47	69
Door	13	41732	49	245534	80664	4	31	9	69
Hand Utensils	45	27381	14	500000	104209	15	33	30	67
Pan	21	1512	28	9528	2198	7	33	14	67
Knife	12	378	10	1870	589	4	33	8	67
Toaster	3	3356	360	5962	2821	1	33	2	67
Conveyor Belt	39	13208	9	128828	32183	13	35	24	65
Telephone	11	23042	306	162509	47019	4	36	7	64
Bin Lid	8	11072	62	29828	9530	3	68	5	62
Chopping Board	39	9877	17	189692	37020	15	39	24	61
Container	36	6674	22	63357	12558	14	39	22	61
Meat Blade	20	27328	42	500000	111310	8	40	12	60
Bin	5	6995	10	32498	14265	2	40	3	60
Plate	5	457	120	1175	423	2	40	3	60
Freezer Handle	19	33882	98	198778	57484	8	42	11	58
Packaging	11	735	14	4442	1307	5	46	6	54
Equipment	101	6462	14	121038	19769	48	48	53	52
Tray	33	6016	11	127472	23370	16	50	16	50
Hose Pipe	8	9229	302	64544	22391	4	50	4	50
Toilet Door Handle (Ladies)	2	425	349	500	107	1	50	1	50
Cleaning Equipment	5	19686	184	80339	34239	3	60	2	40
Miscellaneous	8	2145	107	8916	3270	5	63	3	37
Bucket	6	863	37	4221	1664	4	67	2	33
Ceiling	5	2009	40	9541	4211	4	80	1	20
Toilet Door Handle (Mens)	3	361	59	767	365	2	100	1	0
Toilet Tap Handle (Ladies)	1	3186					100	1	100

Table. 2.26 Visual Inspection by Type of Material Sampled – All Sites

Material Sampled	N = sample size	Clean (pass)		Dirty (Fail)	
		n	%	n	%
Stainless Steel	490	311	64	179	36
Plastic	263	154	59	109	41
Metal	52	25	48	27	52
Tile	25	15	60	10	40
Brick	21	6	29	15	71
Wood	17	6	35	11	65
Cloth	9	4	44	5	56
Rubber	10	7	70	3	30
Skin	9	9	100	0	0
Laminate	8	3	33	6	67
Foil	6	5	83	1	17
Formica	5	5	100	0	0
Iron	4	1	25	3	75
Tin	4	3	75	1	25
Cotton	3	0	0	3	100
Glass	3	2	67	1	33
Copper	3	1	33	2	67
Marble	2	0	0	2	100
Cellulose	1	1	50	1	50
Polystyrene	1	1	100	0	0
Nylon	1	0	0	1	100

Table 2.27 Aerobic Colony Count Results by Type of Material Sampled – All Sites

Material Sampled	Sample size	<2.5 cfu cm^2		2.5 cfu cm^2		12 cfu cm^2		>12 cfu cm^2		FAIL >2.5 cfu cm^2	
	N	n	%	n	%	n	%	n	%	n	%
Stainless Steel	432	92	21	133	31	112	26	95	22	340	79
Plastic	242	33	14	90	37	56	23	63	26	209	86
Metal	51	11	22	20	39	9	17	11	22	40	78
Tile	25	7	28	10	40	3	12	5	20	18	72
Brick	20	7	35	4	20	0	0	9	45	13	65
Wood	16	5	31	6	37	2	13	3	19	11	69
Fibre Glass	12	7	58	0	0	1	9	4	33	5	42
Cloth	9	1	11	1	11	4	45	3	33	8	89
Rubber	9	1	11	1	11	1	11	6	67	8	89
Skin	9	2	22	2	22	2	22	3	34	7	78
Laminate	6	0	0	5	83	1	17	0	0	6	100
Foil	5	3	60	0	0	1	20	1	20	2	40
Formica	3	0	0	2	67	1	33	0	0	3	100
Iron	3	0	0	0	0	1	33	2	67	3	100
Tin	3	0	0	0	0	1	33	2	67	3	100
Cotton	3	1	33	1	33	0	0	1	33	2	67
Glass	3	0	0	3	100	0	0	0	0	3	100
Copper	3	0	0	2	67	0	0	1	33	3	100
Marble	2	0	0	1	50	0	0	1	50	2	100
Cellulose	2	1	50	1	50	0	0	0	0	1	50
Polystyrene	1	1	100	0	0	0	0	0	0	0	0
Nylon	1	0	0	0	1	100	0	0	0	1	100

Table 2.28 ATP Results by Type of Material Sampled – All Sites

Material Sampled	Sample size N	Mean	Min	Max	Standard Deviation	Pass <= CL		Fail >= CL	
						n	%	n	%
Stainless Steel	481	15380	6	500000	54206	149	31	332	69
Plastic	258	22063	9	500000	74692	76	30	182	70
Metal	52	10337	6	155417	25524	19	37	33	63
Tile	25	6176	21	34445	8078	4	16	21	84
Brick	21	69383	236	500000	123425	1	5	20	95
Wood	16	36155	31	179141	58747	4	25	12	75
Fibre Glass	13	24805	30	224104	62774	3	23	10	77
Cloth	9	70105	432	500000	163184	3	33	6	67
Rubber	9	1377	125	3776	1494	5	56	4	44
Skin	9	2745	114	8998	3235	4	44	5	56
Laminate	8	656	40	3249	1132	6	75	2	25
Foil	6	934	120	3172	1164	3	50	3	50
Formica	5	1752	17	4048	2002	1	20	4	80
Iron	4	23980	2618	80929	38220	0	0	4	100
Tin	4	4645	107	100038	5227	2	50	2	50
Cotton	3	4340	2623	7397	2654	1	33	2	67
Glass	3	410	234	632	203	1	33	2	67
Copper	2	15339	83	30595	21575	1	50	1	50
Marble	2	1794	762	2825	1459	0	0	2	100
Cellulose	1	248572				0	0	1	100
Polystyrene	1	203				0	0	1	100
Nylon	1	80339				1	100	0	0

Table 2.29 Comparison of % Failure Rates for Type of Material Sampled using ATP, ACC and Visual Inspection

Material Sampled	ATP Failure Rate		ACC Failure Rate		Visual Inspection Failure Rate	
	n	%	n	%	n	%
Stainless Steel	332	67	340	79	179	36
Plastic	182	75	209	86	109	41
Metal	33	65	40	78	27	52
Tile	21	84	18	72	10	40
Brick	20	95	13	65	15	71
Wood	12	62	11	69	11	65
Cloth	6	78	8	89	5	56
Rubber	4	67	7	89	3	30
Skin	5	78	7	78	0	0
Laminate	2	25	6	100	6	67
Foil	3	50	2	40	1	17
Formica	4	60		100	0	0
Iron	4	100	3	100	3	75
Tin	2	50	3	100	1	25
Cotton	2	100	2	67	3	100
Glass	2	33	3	100	1	33
Copper	1	50	3	100	2	67
Marble	2	100	2	100	2	100
Cellulose	1	100	1	50	1	50
Polystyrene	1	0	0	0	0	0
Nylon	0	100	1	100	1	100

Table 2.30 ACC Results by Time Last Cleaned – All Sites

Time Last Cleaned	Sample size N	<2.5 cfu cm^2		2.5 cfu cm^2		12 cfu cm^2		>12 cfu cm^2		FAIL >2.5 cfu cm^2	
		n	%	n	%	n	%	n	%	n	%
Up to 1 hour	465	85	18	162	35	111	24	107	23	380	82
>1hr - 2 hrs	22	5	23	8	37	4	18	5	23	17	77
>2hrs - 3 hrs	0										
>3hrs - 4 hrs	12	3	25	0	0	5	42	4	33	9	75
>4 hrs - 5 hrs	1							1	100	1	100
>5 hrs - 6 hrs	20	4	20	5	25	3	15	8	40	16	80
>6 hrs - 7 hrs	53	4	7	11	21	9	17	29	57	49	92
>6 hrs - <24 hrs	272	64	23	93	34	61	22	54	20	208	76

Table 2.31 ATP Results by Time Last Cleaned – All Sites

Time Last Cleaned	Sample size N	Mean	Min	Max	Standard Deviation	Pass < = CL		Fail > = CL	
						n	%	n	%
Up to 1 hour	510	13497	9	500000	50599	157	31	353	70
>1hr - 2 hrs	23	22562	14	500000	104089	16	70	7	30
>2hrs - 3 hrs	1	500000						1	100
>3hrs - 4 hrs	16	4176	29	45590	11423	9	56	7	44
>4 hrs - 5 hrs	2	6102	5249	6955	1206			2	100
>5 hrs - 6 hrs	24	42748	26	500000	104828	4	13	20	87
>6 hrs - 7 hrs	57	30506	6	500000	97592	15	26	42	74
>6 hrs - <24 hrs	290	500000	6	500000	60634	82	28	208	72

Table 2.32 Enterobacteriacae Counts by Sector

Sector		VRBGA						
		<2.5 cfu / cm^2	2.5 cfu / cm^2	12cfu / cm^2	40cfu / cm^2	100cfu / cm^2	250 cfu / cm^2	Total
Manufacturer	count	117	26	28	19	1	5	196
	% within sector	60%	13%	14%	10%	1%	3%	100%
Food Retailer	count	55	26	9	17	5	11	123
	% within sector	45%	21%	7%	14%	4%	9%	100%
Food Service	count	16	8	6	3			33
	% within sector	49%	24%	18%	9%			100%
	count	188	60	43	39	6	16	352
	% within sector	53%	17%	12%	11%	2%	5%	100%

Table 2.33 Presence of Coliform (Rapid Test) by Site

Item	COLIFORM			
	Negative		Positive	
	n	%	n	%
Bowl	1	100		--
Bin Lid		--	19	100
Bucket	1	100		--
Container	2	40	3	60
Chopping Board	5	50	5	50
Ceiling		--	1	100
Cupboard Handle		--	1	100
Cloth		--	3	100
Counter	1	100		--
Conveyor Belt	4	50	4	50
Door	1	33	2	67
Draining Board		--	2	100
Door Handle	3	75	1	25
Equipment	11	65	6	35
Freezer Handle		--	2	100
Floor		--	6	100
Hands	6	43	8	57
Hand Equipment	1	13	7	88
Hose Pipe		--	1	100
Knife	2	67	1	33
Meat Blade		--	3	100
Microwave Handle	1	100		--
Oven Handle	3	60	2	40
Oven Door		--	1	100
Pan	3	75	1	25
Plastic Door Strips	3	43	4	57
Plate		--	1	100
Fridge Handle		--	4	100
Scales	4	80	1	20
Soap Dispenser		--	2	100
Shelves	1	20	4	80
Telephone	2	50	2	50
Table	5	50	5	50
Tap Handle Equipment	6	40	9	60
Tap Handle Hand Wash		--	4	100
Till	1	100		--
Tin Opener	1	100		--
Toaster	2	100		--
Tray	2	50	2	50
Wall	7	64	4	36
Total	79	43	103	57

2.8 General Discussion of Surface Testing Results

The results describe the cleanliness of 960 food and environmental surfaces in use in food preparation areas which overall were poor. Visual assessment, still widely used in retailing and food service as a means for checking cleanliness, was a poor indicator of microbiological or chemical cleanliness. The failure of visual assessment to detect

unclean surfaces is similar to other studies (Griffith et al 2002, Worsfold and Griffith 2001, Moore and Griffith, 2002b). Some surfaces, passed as visually clean, could in reality have ATP counts >500,000 and microbial counts >250 cfu/cm^2 – this is 5 times more contaminated than the numbers shown in Figure 2. Many of the bacteria found on the aerobic colony counts were of intestinal origin. Some surfaces, e.g. bin lids, cloths, fridge handles yielded 100% positive for the presence of coliforms.

Whilst many larger food manufacturers will both validate and more accurately monitor cleaning activities, this is much less likely in food service and smaller manufacturers. However, a new range of lower cost, non-instrument, based rapid cleaning tests are now available and consideration should be given to introducing these into smaller food companies.

Of concern from the results is both the high number of failures relative to the benchmark values and the high levels of contamination of some surfaces. Overall 3% of surfaces tested had counts in excess of 250 cfu/cm^2. Of additional concern was the rapid recontamination (or failure of original cleaning, see Table 2.8) with 82% of surfaces failing microbiologically within 1 hour of cleaning.

Environmental contact surfaces are important as they can, in turn, lead to contamination of food contact surfaces (Dillon and Griffith 1999) and include hand contact surfaces. Contact with a contaminated surface can quickly lead to recontamination of hands after washing / drying (Harrison et al 2002) (see also section 3.2) especially if the surface is wet. These results should therefore be considered in relation to the findings on transfer potential and touch actions in phase 2.

Reasons for failure to clean properly have been given in Table 2.8 but these must be considered within the context of the cultural surroundings and status attached to cleaning, especially in food service operations (Griffith 2000). Cleaning is perceived as low status with low pay and difficult and inconvenient at times of peak demand.

2.9 Attitudes and Beliefs Concerning Cross Contamination

An understanding of managers' and food handlers' beliefs and attitudes relating to cross contamination can help to explain their practices and actions and help to formulate preventative communication strategies

To determine attitudes and beliefs a series of statements relating to cross contamination and the work of the project was constructed. These were initially piloted in the 5 premises used in the preliminary stage of Phase 1 (see 2.2). These were amended and subsequently given to the managers of each of the premises visited during the audit / surface testing phase. In response to the findings from early visits a series of additional questions were added to the basic list for use in the latter stages (this is reflected in the different values for n in the tables).

The questions posed related to aspects of cross contamination and their perceived importance. Other questions included perceived useful sources of information, barriers to minimising cross contamination and the value of a self assessment checklist. A 5 point Likert scale was used to collect the data. For ease of presentation, this has been condensed to a three point scale (Agree, Neither agree or disagree, Disagree) for some of the results. Results are presented as mean score for each question as well as % in each category.

2.10 Attitude Results and Key Points

The mean scores for each of the sectors are presented in table 2.34 and there were no significant differences by sector. Overall, all people responding expressed broadly positive beliefs and attitudes concerning cross contamination and its prevention.

The importance of handwashing as a means of preventing cross contamination was recognised. However, 13% thought it took up too much time. Respondents were undecided about the best constructional material for chopping boards with nearly 20% considering it unnecessary to have separate chopping boards for meat and vegetables.

Only 57% preferred disposable items to dish cloths, colour coding was not considered important by nearly 20% of respondents who also felt that sanitising equipment and utensils was a waste of time. Written cleaning instructions were considered useful by all and surface cleanliness was perceived to be important in contributing to food poisoning (93%) and useful in marketing

The results indicate a very positive support for more information on cross contamination with 97% supporting the idea of a quarterly news update and 100% stating workshops would be useful. Trade associations were not perceived as particularly useful sources of information but environmental health officers were (91%) . Approximately 75% were in favour of a documented HACCP system with 62% believing not enough emphasis was placed on cleaning.

Respondents were given freedom to express their views on the most likely barriers to minimising cross contamination. These were summarised and categorised with 69% stating lack of time or related issues and 25% stating money were the main barriers. Other reasons were given by only 6% of respondents.

2.11 General Discussion of Attitudes and Beliefs

Food handlers, when questioned, often express positive beliefs and attitudes towards general aspects of food safety whilst being less positive about very specific actions / activities (Coleman et al 2000) and to some extent this is reflected by the views of the respondents in this study. The main reason why measures designed to minimise cross contamination could not be implemented was lack of time and this is supported by other studies at UWIC (Griffith et al 2001). This is particularly likely to be a problem in food service when businesses work to order rather than to stock (as in food manufacturing). Attitudes towards chopping boards and dish cloths and some reluctance to use disposable paper towels could explain some of the results obtained during surface testing. There was a desire for further information on cross contamination and food safety. Self assessment checklists, which have proved useful to the catering industry (Coleman and Griffith 1998) were thought to be useful aids. Such checklists also help managers / operatives to overcome false impressions of risk

and appreciate the level of risk posed by their premises / operations. See Table 2.36 for summary of findings and implications.

Table 2.34 Combined Attitude and Belief Scores by Sector (21 questions)

	N= Sample Size	Minimum Score	Maximum Score	Mean Score
Manufacturing	5	46	58	51
Food Retail	4	54	60	57
Food Service	7	49	62	60

Table 2.35 Attitudes and Beliefs Summary Table: Combined Results for Both Questionnaires – All Sectors

Belief Statement	N in sample	Mean Score	Agree		Neither agree nor disagree		Disagree	
			N	%	N	%	N	%
1. Handwashing prevents cross contamination?	16	3.00	16	100				
2. Handwashing takes up too much time	16	2.69	2	13	1	6	13	81
3. Using different chopping boards for raw meat and ready to eat vegetables is not necessary	16	2.62	3	19			13	81
4. I would prefer to use a wooden chopping board than a plastic chopping board	16	2.50	2	12	4	25	10	63
5. I don't think that it makes any difference drying equipment after washing with or without a T-towel	16	3.00					16	100
6. I would rather use dish cloths than disposable cloths or paper towels	16	2.44	2	12	5	31	56	57
7. I think that it is more hygienic to use disposable gloves during food preparation	16	2.19	9	56	1	6	6	38
8. I don't think it is necessary to have colour coded cleaning equipment	16	2.75	1	6	2	13	13	81
9. I think it is important to have colour coded equipment such as knives	16	2.81	3	19	13	81		
10. Protective clothing should be worn at all times in food establishments	16	2.94	15	94	1	6		
11. All food handlers in food establishments should wear protective hats	16	2.69	13	81	1	6	2	13
12. I think that sanitising utensils and equipment is a waste of time	16	2.63	3	19			13	81
13. Not enough time is spent cleaning environmental areas such as door handles and fridge handles	16	2.94	15	94	1	6		
14. There is too much legislation regarding cleaning and cleaning schedules	16	2.19	2	13	9	57	5	31
15. Surfaces / premises are generally cleaner if external cleaning contractors are used	29	2.28	5	17	11	38	13	45

16. It is not necessary to sanitise work surfaces before preparing ready to eat foods	29	2.83	2	7	1	3	26	90
17. It is useful to have written cleaning instructions for management and staff	29	3.00	29	100				
18. Cleanliness of surfaces makes little difference to food poisoning	29	2.86	2	7			27	93
19. Clean surfaces present a good impression for marketing a business	29	2.90	27	94	1	3	1	3
20. Cross-contamination is relatively unimportant in causing food poisoning	29	2.93			2	7	27	93
21. Clean as you go is a good policy	29	2.93	28	97			1	3
Attitude Statement								
1. I would find a quarterly news update on food poisoning a useful source of information	35	2.94	34	97			1	3
2. Work shops on hygiene and cross contamination would be useful	16	3.00	16	100				
3. I don't think trade associations are likely to be useful sources of information	16	2.38	2	13	6	37	8	50
4. I think Environmental Health Officers are useful sources of information	35	2.91	32	91	3	7		
5. I don't think that it is necessary to have a documented policy, such as HACCP in all food establishments	16	2.56	3	19	1	6	12	75
6. Not enough emphasis is placed on cleaning in the work place	16	2.44	10	`62	3	19	3	19
7. I think the Food Standards Agency is a waste of time and money	16	2.75	1	6	2	13	13	81
8. It would be useful to have a cross contamination checklist	19	3.00	19	100				

	Time		Money		Other	
	N	%	N	%	n	%
What is the main barrier preventing you from minimising cross contamination	11	69	4	25	1	6

Table 2.36 Findings and Implications – Phase 1

Findings	Implications (for project and FSA)
Sample business had better than would be expected documented systems	May indicate positive bias for later results
Cleaning equipment could be left wet and be common to high and low risk areas	Could result in cross contamination Could contribute to high surface readings in test results
Visual Assessment was the only method used by industry to assess cleaning	Visual assessment known to be poor indicator of real cleanliness. Indicates lack of strategic approach to evaluating cleaning and could contribute to high test results.
Cleaning process poorly understood	Staff unlikely to be able to apply / adapt knowledge to interpret results or apply to new situations. Failure to clean effectively
Wiping cloths, often wet, contaminated	Could contribute to poor cleaning , cross contamination and high surface counts.
Staff and equipment could move between or were common to high and low risk areas, high use of apron cloths	Ease of cross contamination, could lead to high test results.
Visual inspection is a poor indicator of surface cleanliness or microbiological contamination	There is a need to monitor cleaning more carefully, ideally using an integrated approach or new low cost non instrument test methods
Approximately 28% of surfaces were considered wet	Presence of moisture aids cross contamination and microbial survival
High numbers of food contact and environmental surfaces in use would be considered unclean and often highly contaminated	Could contribute to cross contamination of ready to eat foods. Recommend greater use of low cost cleaning tests.
Hand contact surfaces were often highly contaminated	Could contribute to cross contamination of ready to eat foods if hand decontamination actions were not appropriately performed.
Surfaces were quickly recontaminated after cleaning (often within 1 hour)	Illustrate the need for clean as you go practices, the need to separate high and low risk with no common hand contact surfaces.
General positive attitudes to preventing cross contamination with a need for more information	Need to find optimum ways of communicating food safety to industry. Further develop industry guides. Encourage EHOs to provide information on food safety
Cross contamination checklist perceived as useful	Develop a cross contamination self assessment check list for Phase 2
Some reluctance, to use disposable items (12%), use separate chopping boards (19%) and sanitising equipment (19%)	Practices designed to reduce / minimise cross contamination not highly valued. Need to incorporate in hygiene messages / campaigns. Helps to explain some high microbial counts.
Some confusion over best chopping boards and use of diposable cloths	Develop standard operating procedures / advice for industry and incorporate into industry guides
Emphasise the need and benefits of frequent, appropriate and adequate handwashing	Develop industry guides and SOPs Deliver hygiene education campaign emphasising importance / benefits of handwashing.
Lack of time for implementing measures	Educate managers / owners about the need for adequate staffing levels at busy times, problems with management systems at peak order times in cleaning. Educate all about the consequences of failure to implement.

3 Phase 2: Observation and the Development of Risk Reduction Strategies

3.1 Introduction

Phase 1 of the project collected information on food handlers' management of food safety (with particular reference to cross contamination) combined with data on the state of cleanliness / level of contamination of a wide range of food contact and environmental surfaces as well as attitudes and beliefs concerning cross contamination. Collectively this information provides a good background for the study of food handling practices. It is the handling practices – composed of many individual, but linked, food handling actions – in combination with levels of surface contamination and potential for microbial transfer which underpin the risk of cross contamination. This information can then be used as the basis for the development of cross contamination reduction strategies. Phase 2 was divided into three sections:

1. Risk Transfer Potential
2. Observation and Notational Analysis
3. Development and Evaluation of Cross Contamination Reduction Strategies

3.2 Transfer Potential and Risk Under Laboratory Conditions

3.2.1 Background

A number of microbiological studies have attempted to investigate the potential or probability of some food handling actions resulting in cross contamination as well as the efficacy of various methods of decontamination. A key factor emerging from these and other studies was the importance of moisture on one of the contact surfaces and these have been reviewed (Griffith 1999b). Whilst cross contamination can still occur between dry surfaces, the presence of moisture is thought to considerably increase the probability of it taking place. Phase 1 identified likely contaminated sites including many hand contact surfaces (potential donor surfaces) to be found in food handling environments and the observational analysis (section 3.5) reveals the frequency with which these are touched. To link these two sets of data

together information was needed on the likely risk / transfer potential from contaminated to clean surfaces and back and the following experiments were performed to determine:

Transmission potential from contaminated hands onto ready to eat food and kitchen sites

Transmission potential from contaminated surfaces (raw foods and kitchen sites) to clean hands

The efficacy of handwashing procedures

The microbiological methods used have been described previously (Griffith et al 1999b, Harrison et al 2002a, Redmond et al 2001)) and were performed on 5 separate individuals (to accommodate individual variation) for five replicates. The methods involved touching either contaminated raw food (chicken) or an artificially contaminated kitchen site. Participants washed their hands prior to undertaking the experiment and were checked to be free from coliforms before touching the contaminated surface. The ability of cleaned, washed hands as well as the effects of rinsing and handwashing on the above were investigated.

3.2.2 Results

Donor Studies

Tables 3.1 and 3.2 indicate the donor studies and show the qualitative transfer (in presence / absence) of coliforms from a contaminated hand. The results indicate that coliforms from contaminated fingers can easily be transmitted onto other surfaces for over five touch actions after being initially contaminated. This was less when the origin of the contamination was a contaminated surface rather than raw food and this was likely to be due to a lower initial inoculum and / or less moisture present.

Table 3.1 Transfer Potential Donor Studies – Raw Poultry

Number of Touches After Contact with Raw Poultry	Instances Coliforms Recoverable		Number of Touches After Contact with Raw Poultry	Instances Coliforms Recoverable	
	n	%		n	%
1	25	100	9	3	12
2	25	100	10	1	4
3	25	100	11	3	12
4	25	100	12	1	4
5	25	100	13	2	8
6	24	96	14	-	0
7	23	92	15	-	0
8	11	44			

Table 3.2 Transfer Potential Donor Studies – Contaminated Surfaces

Number of Touches After Contact with Contaminated Surface	Instances Coliforms Recoverable		Number of Touches After Contact with Contaminated Surface	Instances Coliforms Recoverable	
	n	%		n	%
1	25	100	9	-	0
2	24	96	10	-	0
3	24	96	11	-	0
4	23	92	12	-	0
5	20	80	13	-	0
6	15	25	14	-	0
7	3	12	15	-	0
8	1	4			

Recipient Studies

Kitchen surfaces were contaminated with low levels of coliforms to mimic indirect cross contamination. Raw poultry was used to represent raw food. These sites were then touched with clean, washed hands to determine the frequency with which coliforms could be recovered from the hands.

Table 3.3 Transfer Potential Recipient Studies

Contaminated Kitchen Site Raw Food	Instances Coliforms Recoverable	
	n	%
Knife Handle	8	32
Bin Lid	5	20
Tap Handle	3	12
Raw Food	25	100

Handwashing Studies

Hands naturally contaminated with coliforms after handling raw chicken were rinsed under running warm water or washed (but not dried) using good practice. The hands were tested at this stage for coliforms as was a kitchen surface they were allowed to touch (chopping board). The experiment was repeated but included drying on a clean hand towel after which the hands and drying towel were also tested. The results are presented in Table 3.4. Handwashing without drying is not completely effective at removing coliforms but was if a drying stage was included. Rinsing hands under warm water left the hands contaminated and with the ability to cross contaminate other surfaces (56%) as well as any drying towel (60%)

Table 3.4 Efficiency of Different Handwashing Attempts and Ability to Remove Coliforms from Hands

	Rinsing		Handwashing	
	n	%	n	%
Hands (no drying)	25	100	4	16
Hands (drying)	19	76	0	0
Chopping Board (no drying)	14	56	1	4
Chopping Board (drying)	2	8	0	0
Drying Towel	15	60	0	0

n= number of instances hands were contaminated

3.3 General Discussion of Transfer Potential and Risk Under Laboratory Conditions

A short series of experiments were conducted under laboratory conditions to investigate the risk of transfer and persistence of coliforms from raw food or contaminated kitchen surfaces onto hands and from contaminated surfaces onto clean hands. Overall the results confirm previous studies on the survival and transferability of microorganisms from fingers and hands (Pether and Gilbert 1971) where survival times were found, after initial contamination, to be in excess of 3 hours. The results, donor studies and recipient studies indicate that hands, once themselves contaminated, can in turn contaminate other surfaces for up to 10 touches later, although the probability of this occurring decreases after 5 or 6 touches. Clean hands, in turn, can then be re-contaminated after touching raw foods or contaminated surfaces. This

validates the value of tracking 5 touch actions and objects during the notational analysis and recording this as high risk if the hands were contaminated. No attempt was made to quantify the amount / number of microorganisms transferred, although other work at UWIC would indicate transfer rates of about 10% and that Campylobacter was easier to recover than Salmonella in similar experiments (Harrison et al 2002a). Cumulatively the data indicate ease of spreadability of microroganisms within environments from point sources and help explain how wide spread and easily contamination builds up in food handling environments.

The studies on handwashing efficacy (Table 3.4) generally support other work evaluating the importance of hand drying and the need to use a soap / detergent (Michaels 2001 a, b). Rinsing alone will therefore be regarded as inadequate during the notational analysis, with the risk of cross contamination far greater without drying. Drying rinsed hands sets up a potential source of pathogens as the towels themselves (60%) can become contaminated and further work is required both on survival of organisms and their spreadability from towels.

3.4 Observation and Notational Analysis

This part of Phase 2 concerns the complete observation of food handling practices within the different food handling environments. Few studies have attempted to assess cross contamination in this way. Simple observations, i.e. the recording of specific food safety practices is useful but has limitations for assessing cross contamination. The notational analysis approach used in this project was based on earlier work carried out in a Department of Health funded project (Griffith et al 1999b). Notational analysis is a technique for objectively and systematically monitoring and recording actions and events representing them using a series of shorthand codes. In its basic form it has been used for centuries although the technique became refined during the 1960's for use in sports analysis (Hughes and Franks 1997). More recently these have often included video recording and computer software for data collection and analysis. Whilst providing the highest quality data, this was discounted for use within this project for ethical reasons and reasons of validity, i.e. the need to obtain management agreement to record people's actions and the effect this may have had on food handling practices in small businesses. A system

of hand notation was therefore developed and used to record the handling actions of staff within the different food environments and sectors. The hand notational system was based on potential donor, intermediate and recipient surfaces with a record of the state of the surfaces (wet/dry, contaminated / uncontaminated) along with any decontamination actions used and an assessment of their adequacy.

3.5 Observation and Notational Analysis Results

3.5.1 Results All Sectors

Tables 3.5 – 3.7 present data on the food handling actions observed in 16 premises, 7 food service, 6 food manufacturers and 3 retailers in individual 1 hour periods. Tables 3.8 onwards report food service data only.

Table 3.5 indicates the number of actions recorded in each of the premises by sector. Food manufacturers consistently had the highest number of observations per observational session, however these mostly consisted of a large number of long chains of repetitive actions in which food was repeatedly touched but with little potential for cross contamination (i.e. what touched the food was likely to be dry and uncontaminated). This was distinct from food service where although the chains of actions were shorter, within the chains a much larger number of potentially contaminated objects were touched and with much greater potential for cross contamination of ready to eat foods (Tables 3.6 and 3.7).

Food service food handling consisted of relatively short chains of actions but with a higher number of wet and potentially contaminated surfaces touched originating from a much wider range of kitchen objects / surfaces (Tables 3.6 and 3.7). This results in a much higher risk of cross contamination during food handling in food service operations, therefore the remaining detailed data, unless otherwise specified concentrates on food service only. Only a small amount of data was obtained for food retailing but the data obtained would indicate food retailing cross contamination risk to be less than food service but greater than food manufacturing.

Table 3.5 Number of Actions Observed in 1 Hour of Observation by Sector.

Sector	Number of Observations	Percentage Total Observations	Mean Number of Actions Per Establishment
Food Manufacturing	3813	63%	635
Food Retailing	505	7%	168
Food Service	1766	31%	251
Total Nos	6082		

Table 3.6 Number and Variety of Different Objects Touched During Observation Sessions by Sector

Sector	100% Observation	90% Observation
Food Manufacturing	29	7
Food Retailing	26	14
Food Service	42	20

Table 3.7 Surface Conditions During Observations by Sector

Sector	Visual Condition of Touched Surface	Number of Actions	%
Food Manufacturing	Clean and Wet	23	<1
	Clean and Dry	2555	67
	Dirty and Wet	190	5
	Dirty and Dry	991	27
	Total	3813	100
Food Retailing	Clean and Wet	20	4
	Clean and Dry	301	60
	Dirty and Wet	166	33
	Dirty and Dry	18	4
	Total	505	100
Food Service	Clean and Wet	371	21
	Clean and Dry	963	55
	Dirty and Wet	394	22
	Dirty and Dry	40	2
	Total	1766	100

3.5.2 Results – Food Service

Table 3.8 to Table 3.13 represent data obtained from 1766 observations in 7 food service establishments.

Table 3.8 indicates out of all objects / surfaces that come into contact with ready to eat food during food service handling, the vast majority of touches involved hands. From the data, hands constituted the greatest potential threat of cross contamination. Hands touch other surfaces in the kitchen, many of

which could be contaminated, (see Tables 2.24 and 2.33) and unless adequately washed could present a cross contamination risk. Table 3.9 indicates the attempts at handwashing during food handling in food service operations.

Table 3.8 Objects Most Likely to Touch Ready to Eat Food in Food Service

Object	Number of Actions	%
Hands	1641	93
Cloth	82	5
Equipment / Surfaces	32	2
Other	11	<1
Total	1766	

Table 3.9 Handwashing Attempts During Food Handling

	Number of Actions	%
Appropriate	5	<1
Inappropriate	42	2
No attempt	1719	97
Total	1766	100

Table 3.10 Total number of Times Specified Surfaces Touched During Food Handling Chains in Food Service

	Frequency	Percent (%)		Frequency	Percent (%)
Container	245	13.9	Paper	18	1.0
Fridge Handle	137	7.8	Temp Probe	18	1.0
Ready to Eat Food	132	7.5	Foil	15	1.0
Oven Handle	116	6.6	Pen	15	1.0
Work Surface	105	6.0	Microwave Handle	13	<1
Tray	101	5.7	Anti Bac Spray	11	<1
Spoon	98	5.6	Dishwasher	10	<1
Cloth	86	4.9	Freezer Handle	10	<1
Knife	86	4.9	Microwave	7	<1
Pan	81	4.6	Shelves	7	<1
Bin Lid	72	4.1	Till	7	<1
Packaging	70	4.0	Tin Opener	6	<1
Chopping Board	59	3.3	Telephone	5	<1
Raw Food	42	2.4	Box	2	<1
Tap Handle	42	2.4	Door Handle	2	<1
Equipment	37	2.1	Knife	2	<1
Jug	27	1.5	Table	2	<1
Pan Lid	23	1.3	Others	10	<1
Hands	22	1.2			
Person	18	1.0	Total	1766	100

Table 3.11 Overall Items Touched in Rank Order, for Five Handling Actions, Prior to Handling Ready to Eat Food Without Adequate Decontamination

	Frequency	Percent (%)		Frequency	Percent (%)
Container	158	23	Microwave Handle	9	1
Ready to Eat Food	102	15	Pan	9	1
Knife	80	12	Tap Handle	9	1
Fridge Handle	52	8	Freezer Handle	7	1
Chopping Board	31	5	Foil	6	<1
Bin Lid	30	4	Dishwasher	6	<1
Work Surface	30	4	Plate	5	<1
Packaging	24	4	Pen	4	<1
Cloth	24	4	Cling Film	2	<1
Oven Handle	23	4	Person	2	<1
Tray	21	3	Table	2	<1
Spoon	13	2	Tin Opener	2	<1
Equipment	11	2	Temp Probe	1	<1
Raw Food	10	1	TOTAL:	673	100

Table 3.12 Items Touches Prior to Handling Ready to Eat Food Without Adequate Decontamination (up to 5 actions)*

Item Touched	Frequency of Objects Touched by Hands Prior to Touching Ready to Eat Food in Order									
	1st		2nd		3rd		4th		5th	
	n	%	n	%	n	%	n	%	n	%
Bin Lid	6	4	3	2	9	7	8	6	4	3
Chopping Board	4	3	6	4	12	9	5	4	4	3
Cling Film					1	1			1	1
Cloth	4	3			2	2	7	5	11	9
Container	43	30	32	23	25	18	30	22	28	22
Dishwasher			4	3					2	7
Equipment	3	2	1	1	3	2	4	3		
Foil	2	1	2	1			2	2		
Fridge Handle	13	9	10	7	15	11	9	7	5	4
Freezer Handle	1	1	5	3			1	1		
Knife	24	17	21	15	15	11	8	6	12	10
Microwave Handle	2	1	2	1	2	2	1	1	2	2
Oven Handle	3	2	9	7	3	2	5	4	3	2
Pan	2	1			1	1	3	2	3	2
Packaging	7	5	2	1	4	3	5	4	6	5
Person			2	1						
Pen							4	3		
Plate	1	1	2	1			1	1	1	1
Raw Food	4	3			1	1	5	4		
Ready to Eat Food	12	8	22	16	26	19	21	16	21	17
Spoon	2	1	5	4			3	2	3	2
Table					1	1			1	1
Tap Handle					1	1	4	3	4	3
Temp Probe							1	1		
Tin Opener			1	1					1	1
Tray	4	3	4	3	4	3	2	2	7	6
Work Surface	6	4	6	4	8	6	5	4	5	4

* For example, after touching raw food only one chain was less than 5 actions and hands were adequately decontaminated in less than 2% of cases within 5 actions of touching the raw food.

Table 3.13 Cross Contamination of Items by Hand Contact as a Result of Touching Raw Foods without Decontamination (Up to 5 objects later)

Item Touched	Frequency of Objects Touched by Hands Contaminated by Raw Food In Order									
	1st		2nd		3rd		4th		5th	
	n	%	n	%	n	%	n	%	n	%
Bin Lid	8	21	2	5						
Chopping Board	9	24	10	27	3	8	3	8	5	13
Cloth	1	3	1	3			3	8		
Container			1	3	6	16	8	22	4	11
Dishwasher			5	13						
Equipment	1	3					1	3	1	3
Fridge Handle					3	8			9	24
Knife					6	16	3	8		
Microwave									1	3
Oven Handle	1	3			1	2			4	11
Pan	1	3			1	3			1	3
Raw Food	9	24	4	11	8	22				
Ready to Eat Food	4	11			1	3	5	13		
Spoon			1	3			2	8		
Tap Handle	3	8	3	8					2	5
Till							1	2		
Tray	1	3	6	16	8	21	1	3	1	3
Work Surface			4	11			9	24	9	24
	38		37		37		37		37	

Tables 3.10 to 3.12 contain data on touch actions in food handling chains including ready to eat foods as well as touch actions involving intermediates and raw foods, i.e. potential pathogen donor or source of pathogen. These results are intended as a guide only as they varied by the nature of the work in progress. The tables contain data only for up to 5 objects touched (immediately before or after touching ready to eat or raw food), although in reality they could be much longer and up to 40 in length with possible contamination after more than five touches (see Table 3.1 and 3.2).

3.6 General Discussion of Observational Data

The potential / likelihood for cross contamination is a function of the frequency with which an item is touched, how contaminated it is likely to be, whether wet or dry, the microbial transfer rates all modified by the number and adequacy of decontamination events. This section has indicated the frequency with which kitchen surfaces or objects are touched, specifically immediately **before handling ready to eat foods** and immediately **after touching raw foods** in relation to the frequency and adequacy of decontamination actions.

Chains of handling actions in food service were shorter the manufacturing or retailing and were dominated by hand actions. They were more likely to involve hands touching dirty wet surfaces of a wider variety of origins and were rarely accompanied by adequate handwashing. Collectively, this makes hand actions the most important vehicle for cross contamination in the food industry and handwashing the most important means for reducing it. Potentially the results could be even worse as whether a surface was clean or dirty was based on a visual assessment which is likely to be a serious underestimate (see Table 2.12). These findings support those from two other recently submitted FSA reports on the importance of cross contamination and the role of hands, and should be viewed within the context of the data from section 2.4.5 indicating that often high and low risk catering production areas share common facilities (Table 2.5) with high microbial contamination and transfer rates (see Table 2.24 and 3.1). For example, in Table 3.14 observational data for 5 actions prior to touching ready to eat food has been combined with surface microbial contamination failure rates.

Table 3.14 Frequency of Touching in Relation to Surface Microbial Failure Rates

	Object / Surface with % of Touches*	Microbial Failure Rate (%)**
Container	23	84
Ready to Eat Food	15	
Knife	12	58
Fridge Handle	8	97
Chopping Board	5	87
Bin Lid	4	100
Work Surface	4	88
Packaging	4	56
Cloth	4	93
Tray	3	67
Oven Handle	3	85
Spoon	2	
Equipment	2	100
Raw Food	1.5	100
Hand	100	100

* from Table 3.11
** from Table 2.24

With the exception of ready to eat food, which was presumed to be uncontaminated, all surfaces touched with any degree of frequency had microbial failure rates in excess of 56%, with three having failure rates of 100%. Decontamination activities were infrequently implemented with only 2 decontamination actions attempted for every 38 handling actions and only 1 appropriately attempted event for every 353 actions. This probably accounts for the 100% failure rate when hands were tested in phase 1 of the study. For food service, this presents a picture of infrequently washed and potentially contaminated hands frequently touching ready to eat food. It must be accepted that the microbial transfer rates were based on general counts rather than the presence of pathogens, however such sites could often have high enterobacterial / coliform counts (Table 2.32 and 2.33) which can be used as a marker of hygiene standards. The premises visited are likely to be typical and should be considered within the context of 387,000 food service establishments, usually employing multiple staff preparing food 365 days of the year, coupled with the admission that in-spite of training, food handlers often do not implement food safety practices they know they should use (Clayton et al 2002). Sufficient pathogens to cause illness must be transferred and subsequently survive, however even if pathogens were only involved in a small percentage of cases, the potential for cross contamination is considerable and is likely to be compounded within food service by meeting peak demands at meal times, the failure to maintain handwashing facilities in food service establishments (section

2.4.2) and failure to separate high and low risk appropriately with the sharing of common equipment (section 2.4.5)

3.7 Development and Evaluation of Cross Contamination Reduction Strategies

3.7.1 Background

Key points to emerge from phase 1 concerned the sharing of hand contact surfaces and cleaning materials common to high and low risk areas, plus the often high contamination levels of these surfaces. This was coupled with a poor understanding of cleaning and a rapid recontamination of surfaces post cleaning. General attitudes to prevention of cross contamination were positive but attitudes towards specific measures were less positive and lack of time was seen as critical to non-implementation. This work linked into the early part of phase 2 which indicated that hands were the main vehicle of cross contamination being involved in chains of food handling actions often with minimal and poor decontamination. Hands could easily acquire microbial contamination and spread this to a wide range of other sites. Appropriate handwashing practices eliminated this risk. In general there was far less risk of cross contamination in manufacturing, further work needs to be undertaken in retailing and other food service operations but the latter seems to present particular cross contamination risks.

This information was used as the basis for constructing a code of practice and a self assessment checklist for use within the food industry. In turn these were presented / piloted in industry using semi-structured interviews.

3.7.2 Code of Practice

Cross Contamination Code of Practice

Cross contamination is an important risk factor in causing food poisoning, [especially in catering establishments]. Preventing cross contamination involves everyone who handles food. Managers should provide adequate facilities and time to allow operatives to practise all appropriate control measures and the following code of practice will help you minimise cross contamination.

1. Take cross contamination and all the specific actions that can prevent it taking place seriously - your business and someone's life could depend on it. The risk of cross contamination applies to your business.

2. Ensure cross contamination and its prevention is included within your hazard analysis and hygiene practices.

3. Design premises to separate high and low risk activities. Eliminate, or reduce, movement between the two areas as well as shared cleaning and food equipment and materials. Do not allow the sharing of common hand contact surfaces between the two. If high and low risk areas cannot be completely separated, ensure hands are properly washed and equipment disposed of or cleaned every time movement occurs.

4. Hands are the easiest means to cross contaminate food, make sure hand habits and practices are hygienic. Remember, hand contact surfaces in food premises [kitchens] rapidly become contaminated. Think cross contamination before you touch ready to eat food! [The opportunities for hands to cause cross contamination are particularly great in food service / catering operations]. Hands, once contaminated, can contaminate many other surfaces up to 5 or more touch actions later.
5.

Ensure staff know and understand why handwashing and drying is important as well as how and when it is to be carried out. Appropriate hand cleaning facilities need to be available and disposable paper towels for hand drying are preferable. Rinsing contaminated hands under warm water is not adequate.

6. Implement, as far as possible, a clean as you go policy. Provide adequate, clean, separate equipment for high and low risk areas. Surfaces need to be cleaned thoroughly with adequate time for disinfection and drying. [Investigate new methods for testing surface cleanliness]. Implement a policy using visual and rapid methods for testing surface cleanliness. Remember to include hand contact surfaces in your cleaning schedules.

7. Use the self assessment checklist to assess the risk of cross contamination in your premises.

[Food service only]

3.7.3 Cross Contamination Self Assessment Checklist

A self assessment checklist, based on the original audit used in phase 1, but modified in the light of the other results, was constructed (see Appendix 4)

3.7.4 Possible Educational / Communication Materials

A range of possible materials for communicating and informing food handlers about cross contamination were constructed. These were based on intervention materials suggested by consumer focus groups and consisted of leaflets (2), posters (9) and fridge magnets (15) (see Appendix 5)

3.7.5 The code of practice, checklist and intervention materials were used as the basis for eight semi-structured interviews (see Appendix 6) with relevant managers from food manufacturing and food service, to gain information on:

- Attitudes towards cross contamination
- Managing and assessing risks
- Self assessment checklist and code of practice
- Intervention materials (posters, leaflets)

Both the checklist and code of practice were applied for sector types during the interviews.

3.8 Results of Semi-Structured Interviews

3.8.1 Attitudes Towards Cross Contamination

Views on Cross Contamination

Interviewees stated unanimously that Cross Contamination (CC) was a very important issue. The majority expressed concern over its control, with many stating that as managers they felt they took the issue more seriously than their staff. The commonest reason given for this viewpoint was that due to their position of responsibility, they would be accountable in the event of anything going wrong. In addition, they felt they were more aware of the possible consequences for them and their respective establishments if they received complaints from customers relating to food contamination. Relevant quotes included :

"..I'm the person who is responsible for everything, so if anything goes wrong, the buck stops here"

"..we are all very aware of it.....it's been made very clear to us that it's really important"

" I'm pretty enthusiastic about it and I try and clamp down on it"

"It's very important, particularly with more high risk foods"

The vast majority stated that with good staff training, control measures and careful monitoring, CC was not an insurmountable problem and that it could be managed effectively. However, a substantial number also made the comment that no matter how good these preventative measures were, it was extremely difficult to guard against occasional human error :

"..... you're always going to be in a position that individuals don't realise what they've done."

".... We all know the theory, yet it's so easy to not do something you're supposed to, like remembering to use the correct knife"

Staff Attitudes Towards Cross Contamination

Staff training staff was referred to as one of the most important factors in shaping peoples' attitude to CC. Several individuals commented that without proper knowledge of Food Hygiene, it was impossible for staff to understand CC and develop a positive attitude to its control. The majority also added that training needed to be regularly updated and that managers needed to be constantly reinforcing the message of good food hygiene practice. Other factors referred to as important in affecting attitudes in the workplace included, the attitude and working practices of the supervisor and direct experience of a CC incident.

"Training is very important – a lot of people come to us with no hygiene training at all"

"Training is really important as that's when you become aware"

"If staff aren't informed, you can't expect them to do anything about it"

" it doesn't matter what courses they go on, you still have to drive them as a supervisor"

"...it has to be constantly drummed into our staff.."

Interviewees, on the whole, were confident that staff did understand the issue of CC as a direct result of having been trained. However, while most were equally confident that staff took the issue seriously, a minority reported that that they felt their staff didn't take it seriously enough. Lack of understanding, low motivation and low pay were stated as possible reasons.

"... people aren't really bothered - they're in a low paid job and probably don't want to be there"

"Rather than say 'I don't understand', they have a habit of saying they do. I watch them and they still have a habit of doing silly things"

None of the interviewees were surprised that evidence suggested that while general attitudes are positive, specific attitudes are less so. Some attributed this to the dichotomy between theory and practice.

"I suppose the paperwork makes you have to be like this [having strict controls], but in reality it doesn't always happen"

"I'm not surprised that everybody knows what they should be doing, but they do something else"

3.8.2 Managing & Assessing Risks

The majority of people interviewed felt that CC was a major contributory factor in food poisoning incidents. Some felt that the official figure of 39% of general food poisoning outbreaks having a CC element was quite low and would have expected this to be higher.

"I thought it would have been higher, I wonder what the other causes were?"

"I would have thought it would be about 50% in general"

A HACCP system was in place in all establishments where interviewees worked. Those that were providing a service in specialist environments or who supplied produce to major companies were also subject to rigorous external audits. Some of these establishments also had specialist Quality Assurance Staff either on a full time or part time basis.

The actual systems described by interviewees for assessing and monitoring CC risks ranged from highly structured formal systems to more informally based arrangements. The more formal systems used checklists, cleaning schedules, staff questionnaires, recording systems and incorporated regular audits and reviews. At the more informal end, checklists were also used along with systems such as zone responsibilities delegated to staff. All interviewees commented on how important direct observation of staff and working processes were in identifying problems and making improvements. Some managers expressed the importance of actively involving staff in the assessment and monitoring process in order to encourage commitment. The view was commonly expressed that, the process of checking, reviewing procedures and making improvements has to be a continuous one in order to keep up with change, especially for the larger establishments.

"You have to constantly analyse everything you do"

"HACCP is something you have to have by law, it's not a document you can put together and then ignore"

"You cannot be complacent, you have to look at people's practices and see what needs to be done"

The majority of interviewees were satisfied with the systems that were in place for assessing and managing CC, although a few were in the process of implementing changes that would improve them, and a minority felt that more could or should be done.

"It works particularly well, especially having someone employed to check QAA"

"I think we have improved [our systems] a lot since we've all been trained"

"I think the analysis (HACCP) could be used more fully than it is"

In terms of identifying potential vehicles of CC the most commonly cited ones were : people (hands), equipment, utensils , chopping boards, knives and preparation surfaces. The majority of interviewees referred to people as being an important factor in potentially contributing to CC, some went on to highlight the problem of personal hygiene of staff members, especially with regard to hand-washing practices.
"Sometimes people come out of the toilet and I have to say 'excuse me you haven't washed your hands'

"They wear jewellery and that can cause cross contamination"

"We use gloves, but I think that can give a false sense of security sometimes"

".....you can have as many controls as you like but you can't take the human link out of the chain – you only have to have one or two people with questionable practices that can cause cross contamination"

"cloths – they're a nightmare !"

In comparing their establishments with others in relation to assessing and managing risks, there was a diverse range of opinions given, which varied depending upon factors such as sector, size of business, product and customer group. A substantial number asserted that due to a combination of these factors that they took the issue of CC more seriously. Others felt that they didn't have the knowledge to attempt a comparison.

"The restaurant side of the business is so hard – I do feel for them"

"People in the private sector, I think are more concerned with monetary returns"

"In talking to others, I'm quite impressed with this company"

"Difficult to say – there are some establishments like major hotels which take it very seriously, and there are smaller outlets that don't"

In considering the advantages of assessing the risks of CC, interviewees measured this in a variety of ways , but with emphasis tending to be placed on elimination and avoidance of CC and hence the protection and safety of customers/clients. Many referred to the need for their organisations to protect themselves legally, to ensure that statutory regulations were complied with. Financial security was another commonly mentioned factor, in that contracts could be put in jeopardy if CC was not assessed and controlled effectively.

"The benefits (of assessing risks) are not loosing time recalling products and not costing us money"

"If you assess risks you can actively control them and eliminate any problems of contamination"

"Legal and financial, there is a huge financial implication is a contract was lost because of problems"

"Knowing that you are protecting the public"

"I think it creates a better environment for the staff knowing that they're doing what they should and not having to worry about it – it boosts morale"

3.8.3 Self Assessment Checklist and Code of Practice

The majority of individuals interviewed thought that the overall style of the checklist and code of practice was good. Some felt the checklist was too long and too detailed and that in order to make it more user friendly, it could be customised to suit individual establishments, leaving out sections that weren't applicable. The suggestion was also made that a column could be added to record the existence of evidence for some of the more important items, to make the document more substantial. The points scoring system was considered by some to be a useful tool.

"I like the points scoring system – just having a record of what you do on paper would be an advantage"

"It's very good, but it's a case of how you'd manage to check all of this"

"If 'yes' is being ticked, there needs to be evidence, if 'No' is ticked then do they know what to do to be able to say 'yes' next time?"

The questions were felt to be clear, concise and uncomplicated. Interviewees liked the "closed question" style which they felt prompted unambiguous answers.

"They're good because you don't have to think too hard about them"

"They're asking yes or no – do you or don't you – that's good"

"They're simple, and straightforward, nothing complicated"

The range of topics covered by the checklist and code of practice was felt by the majority to be about right. Suggestions for improvement included, more detailed questions on Pest Control and a slightly shorter section on Cleaning.
"I think it's trying to cover too wide a spectrum of food premises"

The possible uses for the assessment checklist fell into two groups. The majority, saw it being used as an audit tool by managers to check that relevant procedures were in place and were being followed. It was felt that using a standard tool such as this on a regular basis would allow for a consistent approach to hazard analysis and would ensure that every detail was covered. It was widely agreed that having a record of audits undertaken was a good thing especially if backed up by evidence to support it. The other way in which some people saw it being used was as a questionnaire for staff to consolidate training after returning to the workplace.

"It looks like a decision tree for HACCP and Critical Control points"

"The manager could use it as an audit to check and see what procedures they have in place, and what they need to do"

" It's a good idea, people might do audits in different ways, so this would be consistent"

"I think that it would be a good idea to give it to new staff after they've settled in to see what training they need"

"You could send staff on the basic (Hygiene Course) then after a week of being back in work they could fill this in as a sort of backup"

The only potential problem that was identified in using a Self Assessment Checklist was the time needed to do it. Observation was the other commonly quoted alternative to undertaking a paper based audit of CC risks, but as mentioned previously, many interviewees felt that a combination of observation and formal audits were the most effective way of managing and assessing risks. The code of practice was liked by managers although they were less sure how it would be used, some thought it could be incorporated into hygiene policies and others thought it could be distributed to all food handlers.

"We use checklists a lot, but when we're verifying systems, we walk around and have a look"

"Spot checks are a good way of checking!"

3.8.4 Communication

The majority of people interviewed stated that information on CC should come from the manager. Depending on the individual's position within the organisation, this was either a direct referral to themselves to more senior managers, or both.

"It's got to come from the top and filter down"

"Every manager should make sure staff are aware, and send them on the necessary training"

"It has to be from a technical perspective, someone with the knowledge to do it"

Several people felt that Government bodies such as MAFF (DEFRA) and the FSA should be more pro-active in the way that information and literature is provided to the food industry. The comment was made that as smaller organisations were less likely to seek out information on food safety, that this should be sent direct to all food premises registered with the Local Authority free of charge.

"Management and then perhaps Government bodies such as DEFRA (MAFF) and FSA."

"I think information should be sent out by Government bodies, small companies aren't going to go out and seek information on cross contamination if they've not already thought about it."

"I think the Government should send out information automatically, it used to annoy me that we had to pay for it, it doesn't happen so much now though."

" This new FSA or whatever they call it should be more proactive in sending information out"

EHOs were mentioned by some interviewees as being an important source of information, although it was also felt that there weren't enough of them in order for them to play as full a role as desired in education and information provision put in the field.

"I'm a firm believer that more money should be put into providing more EHOs – I know of restaurants that haven't been visited in 5 years"

Access to information on food safety wasn't a problem for the majority of interviewees. Information was obtained from a variety of sources such as trade journals, professional associations, the Internet and commercial publishing companies. The cost of providing information for staff was an issue for some, limiting the range of access to materials.

The actual communication of information on food safety wasn't a problem for the majority of managers. However, in a minority of establishments staff attitudes did pose a barrier to successful and meaningful communication on food safety . Literacy was also referred to as an communications issue by a small number.

"We have 'Now Wash Your Hands' notices, but it doesn't make any difference, they still don't"

"They're quite difficult to teach, especially as a lot of them are older than me, they don't listen, they don't care"

3.8.5 Display Materials

However good the standard of food safety behaviour of their staff, most interviewees felt that it was important that they were constantly reminded of good practice. All of the establishments visited, used some form or other of notices and posters. In the majority of cases these were short instruction type reminders such as "Now Wash Your Hands" signs or Colour Coding Keys for boards and knives.

There was a wide variety of opinion on the benefits of using posters as a means of communicating information. Some felt that posters were not at all useful, as people became "immune" to them. Others felt that anything other than a short "do it" type of message wouldn't be read at all. It was agreed by most that if posters were to be considered, the message needed to be predominantly visual , with minimal text, and large in size.

Where posters were used , these tended to be of the cartoon type which was a style favoured by the majority of interviewees rather than the real life photograph types as given in the samples – humour was seen as an important way of getting the message across by several individuals. It was fairly common for establishments to make up their own posters using leaflets or information taken from Trade Journals, or using organisation specific procedures and checklists to meet their needs.

It was apparent that there was no one "good" format for communicating food safety information by poster, due to the varied nature of the food industry, and the individual views of establishments.

More specific comments on intervention materials are presented:

Leaflets

Interviewees were not overly interested in the leaflets and it was difficult in some cases to prompt comments, especially for the board and knife washing one, which is why there are so few comments.

Hand-washing
- Could use for induction
- Too many pictures, difficult to tell which bit of text goes with which picture – prefer cartoon style
- Don't like the instructions – they're not good practice - too domestic.
- A bit patronising, although visual messages are good for some older staff or those with language difficulties.
- Message not strong enough, wouldn't inspire you to open it. Needs to concentrate on the Why not the How
- Too domestic

Chopping Board
- Could use for induction

Washing
- Would never spray bleach directly onto any food surface, it's too strong and is a contaminant itself. Raw chicken isn't an appropriate picture for us.
- Message isn't strong enough.
- Too domestic

Posters

All interviewees chose the largest size of poster, saying the others would be far too small. Many gave only general comments about posters, rather than specific comments about each one, so the comments are patchy. Several people commented that they preferred cartoon style pictures to photographs. Many companies produced their own tailor made posters and notices with specific instructions or warnings.

A
- Message needs to be emphasised more.
- Clear message, like the big cross
- Not appropriate for (our) business
- It's good, but the picture isn't brilliant
- Don't like it-need something with far more impact. Don't like the cross, it tells me "don't put the lettuce there". I'd want a before and after. Make the message strong and hard hitting ,because the result of cc is so big
- Good for a domestic setting, the message stands out
- Text isn't relevant, we don't have separate fridges

B
- Using colour coded boards and knives would make it more appealing and would add more information
- Message is clear but not colourful enough. Use of coloured chopping boards and knives would improve it.
- Difficult to get this message across
- OK. But in the picture – you have a package there which could be contaminated through handling. The idea of separate pictures is good. The arrow needs a message on it with an instruction on why you need to keep them separate.
- Clear
- OK

C
- Would use
- Pictures are boring and arrows too overpowering
- Not appropriate in industrial setting
- Not relevant to the business
- It's totally wrong – you wouldn't spray a board with bleach because of chemical contamination
- Stages are clear
- Wouldn't use bleach !

D
- Not clear enough, arrow stands out too much
- You wouldn't run a bowl of water to wash your hands, you'd use knee taps
- Don't like this. Even if raw meat was used here, how would you find a bowl without contaminating it and the taps in the first place.
- OK for a domestic setting.
- Arrows stand out well !
- Too long, people wouldn't bother to read it

E
- Not eye catching enough
- This shows CC clearly
- Not relevant
- Good – very graphic
- Not bad
- EFG, good simple message but would use a variety of contaminants, so that people don't just associate the risk with chicken.
- EFG people can relate to these
- EFG Don't know about these, it does make you think.

F
- Not eye catching enough
- Shows CC clearly, but the fact it's a bin may make people wonder what's wrong with putting bacteria on a bin – a different picture would be more appropriate.
- This is ok although a lot of bins are foot operated
- Don't really need the text

G
- Too bland – could combine E F & G on one poster
- Shows CC clearly but the tap version is better
- Good
- Good

H
- Too much information
- Too much writing – hard to know if the message is about all raw meats or just Chicken , if so the picture is too specific
- Not relevant in this business

- Too specific. Could give the message that other raw meats are safe and it's only chicken that's the problem.
- H&I Too much information. Need to be more precise – Do this, Don't Do That. Too may Questions
- Too much writing, you need a short visual message
- Too long, staff wouldn't read them

I
- Too much information
- The sink pictures don't come across very well, they're too small even on the big one, If you can't see the detail from a distance then it wouldn't work.
- Don't like the use of bleach, setting is too domestic.
- Too detailed, people wouldn't stop to read it. May be useful as a training resource
- Too much writing, you need a short visual message
- Bleach again !

J
- Too much writing.
- Too complicated to work out
- Too detailed, people wouldn't stop to read it. May be useful as a training resource
- Not hard hitting enough. Prefer the cartoon type approach. When you need to present a lot of information a table format is easier to read and humour works really well.
- OK

Fridge Magnets

Most interviewees said that fridge magnets wouldn't be applicable in a commercial/industrial setting as they posed a possible hazard (i.e. falling off). Given that they wouldn't use them, most didn't comment on them.

LIKED

F	But not as magnets, to use above the sink as stickers
H	OK, but with the colour coding as in the poster OK
J	Nice and clear
L	Nice and clear

3.9 Discussion of Semi-Structured Interviews

Use of the semi-structured interviews both provided feedback on the code of practice, self assessment checklist and intervention materials as well as providing some qualitative data indicating industry's views.

The results supported earlier findings that cross contamination, in general, was perceived as important. Managers felt it was their responsibility but in-spite of efforts they might take, e.g. training, it was difficult to account for handler / human error. Factors influencing food handling practices were affected by training which was valued as well as the standards set by supervisors. This supports work in the FSA project B02004 (Griffith et al 2001) that cultural norms, i.e. culture of the kitchen (Sheppard et al 1990) are important elements in whether or not hygiene practices are implemented. The importance of hands and handwashing in cross contamination was recognised.

The code of practice and self assessment checklist were generally liked by industry. Participants were less sure how the code of practice might be used, other than in documented policies or distributed to food handlers to help set standards. The self assessment checklist was seen as more practical and this is a similar finding to the use of more general self assessment checklists for use in catering (Coleman and Griffith 1998).

Results from the interviews supported the earlier attitudinal work with a perceived need for more information from a central body / government agency.

Overall the display materials presented at the interviews were not well liked but there was no general agreement on the best format for communicating cross contamination and reminding operatives to implement control measures.

Table 3.15 Findings and Implications – Phase 2

Findings	Implications (for project and FSA)
Hands, once contaminated, could contaminate surfaces up to 9 touch actions later	Importance of handwashing after handling a contaminated surface validates the use of 5 touch actions during the notational analysis. Information needs to be conveyed to food handlers..
Clean, washed hands could be relatively easily contaminated after touching a contaminated object (e.g. 100% raw foods, 20% bin lids)	Importance of handwashing prior to handling ready to eat foods. Importance of cleaning practices in food handling environments
Effective decontamination requires appropriate washing and drying. After only rinsing contaminated hands, the hands remain contaminated and the drying towel becomes easily contaminated with bacteria	Failure to implement washing and drying of contaminated hands causes a risk of cross contamination Rinsing will be regarded as inadequate decontamination during the notational analysis work Further work is needed to study survival of organisms and their spreadibility from hand drying towels Disposable paper towels for hand drying reduce the risk of cross contamination
Chains of Food handling Actions were longest in food manufacturing but were usually repetitive involving few types of surfaces which were likely to be clean and dry	Cross contamination is less likely in food manufacturing
Food service handling chains involved the greatest variety of touched objects of which a relatively high percentage (22%) were dirty, wet surfaces	Food service likely to have the greatest potential for cross contamination
Food retailing involved a smaller variety of surfaces than food service but were the most likely to involve wet and dirty surfaces. However, only 3 retailers were visited	Further data needed but sufficient cause for concern.
Hands were the most likely surface / object to touch ready to eat foods	Hands greatest potential for cross contamination
Handwashing was infrequently attempted and rarely performed appropriately during food handling (<3%)	A potentially very effective cross contamination reduction practice was infrequently and appropriately implemented Campaigns aimed at operatives and managers to improve handwashing compliance need to be designed and implemented
Surfaces / items touched prior to touching ready to eat food were likely to be contaminated, e.g. fridge handles touched 8% of total touches had a 97% microbial failure rate.	Need for better compliance and understanding of hand actions. Need for cleaning protocols to include hand contact surfaces. Need to separate equipment / contact surfaces for high and low risk areas.
Handwashing was poor after touching raw foods which were adequately decontaminated in less than 2% of cases within 5 actions..	Better handwashing compliance and separation of high and low risk areas

Qualitative data supported earlier findings on industry's attitudes to cross contamination, i.e. positive general attitudes	Need to make information, mechanisms and prevention of cross contamination seem specific to each individual type or category of business
Training was perceived as important in achieving compliance	Ensure training courses provide an understanding of what cross contamination is and how it can be prevented in specific circumstances
Managers and supervisors are important in setting standards	Government, local authorities, trade association to stress importance of positive management standards and the need to ensure managers lead by good example.
Managers admitted they could not always rely on operatives to implement correct procedures	Further work on the psychology of food handling behaviour
The self assessment checklist developed as part of the project was liked by industry	Refine, develop and publish the checklist with possible use of industry bodies, e.g. HCIMA
Need for more information from Government bodies on cross contamination and its prevention	Ensure cross contamination is well covered in revised industry guide to good practice. Modify and further develop a range of intervention materials using feedback from people in industry

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Appendices

Cross Contamination / Hygiene Audit Checklist

1.0 Overview and Documentation:

Establishment.....

		Y	N	NA	
1.1	Does the establishment have a food safety policy?	❐	❐		
1.2	Does it use a hazard analysis approach?	❐	❐		
1.3	Are there written instructions for management and staff?	❐	❐	❐	.....
1.4	Are regular meetings held to discuss Food Safety Policies?	❐	❐	❐	.....
1.5	Is there a policy for maintaining Food Safety documentation?	❐	❐	❐	.....

2.0 Cleaning:

2.1	Is cleaning carried out by external contractors?	❐	❐	❐	.....
2.2	Are cleaning schedules used ?	❐	❐	❐	.....
2.3	Are cleaning schedules in place for all high risk areas of premises and equipment?	❐	❐	❐	.....
2.4	Are cleaning schedules used for equipment?	❐	❐	❐	.....
2.5	Do cleaning schedules specify when equipment/premises are to be cleaned?	❐	❐	❐	.....
2.6	Do cleaning schedules specify who is to do the cleaning?	❐	❐	❐	.....
2.7	Do cleaning schedules specify how equipment/premises are to be cleaned?	❐	❐	❐	.....
2.8	Do cleaning schedules specify what is to be cleaned?	❐	❐	❐	.....
2.9	Are floor areas free from accumulating pools of water?	❐	❐	❐	.....
2.10	Do cleaning schedules specify the use of disinfectant?	❐	❐	❐	.....
2.11	Is cleaning evaluated and corrective action specified?	❐	❐	❐	.....
2.12	Are cleaning records kept?	❐	❐	❐	.....
2.13	Are cleaning responsibilities for all staff clearly defined ?	❐	❐	❐	.....
2.14	Does the establishment have a correct sequence of what is to be cleaned?	❐	❐	❐	.....
2.15	Are cleaning materials & hazardous substances clearly labelled and secured?	❐	❐	❐	.....
2.16	Do staff receive training in cleaning?	❐	❐	❐	.....
2.17	Is the food preparation equipment sited so as to aid ease of cleaning?	❐	❐	❐	.....
2.18	After cleaning are surfaces dry?	❐	❐	❐	.....
2.19	Are separate washing facilities provided for food?	❐	❐	❐	.....

		Y	N	NA
2.20	Are separate washing facilities provided for equipment?	❒	❒	❒
2.21	Are separate hand washing facilities provided?	❒	❒	❒
2.22	Is each hand washing area supplied with soap/antibacterial cleanser and hot water?	❒	❒	❒
2.23	Are hand washing facilities in good condition/ kept clean?	❒	❒	❒
3.0	**Cleaning products used:**			
3.1	Is personal protective equipment for cleaning readily available?	❒	❒	❒
3.2	Are cleaning chemicals used appropriately and at appropriate concentration?	❒	❒	❒
3.3	Can staff explain the need for appropriate disinfection procedures?	❒	❒	❒
3.4	Are procedures specified for the cleaning of equipment?	❒	❒	❒
3.5	Are disinfectant dilution rates monitored?	❒	❒	❒
3.6	Are the general facilities for storing cleaning equipment and materials acceptable?	❒	❒	❒
3.7	Are there separate cleaning implements for different risk areas?	❒	❒	❒
3.8	Is cleaning equipment for low risk foods stored separately from cleaning equipment for high risk foods?	❒	❒	❒
3.9	Is the cleaning equipment stored dry?	❒	❒	❒
3.10	Are the cleaning materials/equipment colour coded?	❒	❒	❒
3.11	Are biocide's readily available?	❒	❒	❒
4.0	**Personal Hygiene:**			
4.1	Is a system in place for reporting illness?	❒	❒	❒
4.2	Do staff display good personal hygiene?	❒	❒	❒
4.3	Are all food handlers wearing clean and suitable protective clothing?	❒	❒	❒
4.4	Are staff changing/locker facilities provided?	❒	❒	❒
4.5	Are all food handlers free from open cuts or wounds?	❒	❒	❒
4.6	Are visitors required to wear appropriate protective clothing?	❒	❒	❒
4.7	Is there evidence of cigarette smoking on the food premises?	❒	❒	❒
5.0	**Premises: design, construction and general hygiene**			
5.1	Are premises constructed of impervious, non-toxic materials to an appropriate height?	❒	❒	❒
5.2	Are floors designed and constructed to allow adequate and appropriate drainage and cleaning?	❒	❒	❒

5.3 Are ceilings and overhead fixtures designed and constructed to minimise accumulation of dirt and prevent ingress of pests? ❒ ❒ ❒.....

5.4 Do drains have surfaces that can be easily cleaned? ❒ ❒ ❒.....

5.5 What are work surfaces constructed from?

Stainless Steel ❒	Formica ❒	Plastic ❒

		Y	N	NA
5.6	Are work surfaces constructed joint free?	❒	❒	❒.....
5.7	Are work surfaces smooth and impervious?	❒	❒	❒.....
5.8	Is there physical separation of low and high risk foods on delivery?	❒	❒	❒.....
5.9	Is equipment generally clean and in good state of repair?	❒	❒	❒.....
5.10	Can staff move easily from low to high risk areas during production/processing?	❒	❒	❒.....
5.10	Is equipment transferred from low to high risk areas?	❒	❒	❒.....
5.12	Is there equipment common to low and high risk food areas E.g. telephone/cold store	❒	❒	❒.....
5.13	Are there colour coded knives?	❒	❒	❒.....
5.14	Are separate chopping boards used for used for high and low risk areas ?	❒	❒	❒.....
5.15	Are chopping boards in good condition / easily cleanable?	❒	❒	❒.....
5.16	Are there colour coded chopping boards?	❒	❒	❒.....
5.17	Nature of material for chopping boards?	❒	❒	❒.....
5.18	Are wiping / dish cloths used?	❒	❒	❒.....
5.19	Are wiping / dish cloths visually clean or dirty?	❒	❒	❒.....
5.20	Are wiping / dish cloths visually wet or dry?	❒	❒	❒.....
5.21	How frequently are dish cloths cleaned?	❒	❒	❒.....
5.22	Can cloths move between high and low risk areas?	❒	❒	❒.....
5.23	Are apron cloths worn?	❒	❒	❒.....
5.24	Are cloths disposable?	❒	❒	❒.....
5.25	Are staff provided with disposable gloves?	❒	❒	❒.....
5.26	Are wipes or solutions used for the sterilisation of temperature probes?	❒	❒	❒.....
5.27	Is ventilation provided in food preparation areas?	❒	❒	❒.....
5.28	Are all food preparation areas well lit?	❒	❒	❒.....
5.29	Are facilities provided for the storage of waste internally?	❒	❒	❒.....

5.30	Are facilities provided for the storage of waste externally?	❒ ❒ ❒.....

6.0 Pest Control:

6.1	Is there a preventative pest control programme?	❒ ❒ ❒.....
6.2	Are procedures in place to detect and report pest infestation at an early stage?	❒ ❒ ❒.....
6.3	Is there evidence of pest infestation e.g. fly's?	❒ ❒ ❒.....
6.4	Are mechanisms in place to prevent pests from gaining access?	❒ ❒ ❒.....
6.5	Can pests gain access to food / water on premises?	❒ ❒ ❒.....
6.6	Are there vermin proof containers for storage of raw materials?	❒ ❒ ❒.....
6.7	Are raw materials stored off the floor?	❒ ❒ ❒.....

7.0 Training:

7.1	Have all staff received induction training within 4 weeks of commencement of employment?	❒ ❒ ❒.....
7.2	Do induction sessions include basic cleaning skills and health and safety awareness?	❒ ❒ ❒.....
7.3	Have staff formal received training from external sources?	❒ ❒ ❒.....
7.4	Have the staff received any formal training in Basic Food Hygiene?	❒ ❒ ❒.....
7.5	Have staff received training specifically on preventing cross-contamination?	❒ ❒ ❒.....
7.6	Is training updated annually?	❒ ❒ ❒.....

Surface Testing / Assessment Sheet

Name of Establishment: ..... **Date:** .....

	1	2	3	4	5	6	7	8
Item last cleaned								
Item is to be used								
100cm^2								
Contact								
Material Sampled								
Nature of Surface								
Stained								
Visual								
Moisture								
PCA								
VRBGA								
ATP								
Coliforms – One shot								

Codes

Last Cleaned		When item is to be used		Material Sampled				Nature of Surface		Stained		Visual Inspection		Presence of Moisture	
<1 hr	1	<1 hr	1	Stain-steel	1	Iron	14	Smooth	1	Not stained	1	Clean	1	Dry	1
>1hr - 2hrs	2	>1hr - 2hrs	2	Metal	2	Tiles	15	Chipped	2	Slightly stained	2	Dirty	2	Wet	2
>2hrs - 3hrs	3	>2hrs - 3hrs	3	Wood	3	Marble	16	Cracked	3	Moderately stained	3				
>3hrs - 4hrs	4	>3hrs - 4hrs	4	Plastic	4	Tin	17	Scored	4	Heavily Stained	4				
>4hrs - 5hrs	5	>4hrs - 5hrs	5	Laminate	5	Cotton	18	Rough	5	Needs Replacing	5				
>5hrs - 6hrs	6	>5hrs - 6hrs	6	Porcelain	6	Formica	19								
>6hrs - 7hrd	7	>6hrs - 7hrd	7	Cloth	7	Glass	20								
>7hrs-24hrs	8	>7hrs-24hrs	8	Rubber	8	Polystyrene	21								
				Fibre Glass	9	China	22								
				Rubber	10	Foil	23								
				Copper	11	Nylon	24								
				Brick	12	Skin	25								
				Cellulose	13										

Attitudes and Beliefs on Cleaning

Name of Establishment: ..... **Date:** .....

BELIEFS

		Strongly Agree ↓	Agree ↓	Neither Agree or Disagree ↓	Disagree ↓	Strongly Disagree ↓
E.g.	It is essential to wash hands before preparing food	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
1.	Handwashing prevents cross contamination	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
2.	Handwashing takes up too much time	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
3.	Using different chopping boards for raw meat and ready to eat vegetables is not necessary	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
4.	I would prefer a wooden chopping board than a plastic chopping board	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
5.	I don't think it makes any difference drying equipment after washing it with or without paper towels	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
6.	I would rather use dish clothes than disposable cloths or paper towels	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
7.	I would rather use dish cloths than disposable gloves during food preparation	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
8.	I don't think it is necessary to have colour coded cleaning equipment	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
9.	I think it is important to have colour coded equipment such as knives	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
10.	Protective clothing should be worn at all times in food safety establishments	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
11.	All food handlers in food establishments should wear protective hats	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
12.	I think that sanitising utensils and equipment is a waste of time	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
13.	Not enough time is spent cleaning environmental areas such as door handles and fridge handles	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
14.	There is too much legislation regarding cleaning and cleaning schedules	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
15.	Surfaces / premises are generally cleaner if external cleaning contractors are used	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

16.	It is not necessary to sanitise work surfaces before preparing ready to eat foods	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒
17.	It is useful to have written cleaning instructions for management and staff.	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒
18.	Cleanliness of surfaces makes little difference to food poisoning	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒
19.	Clean surfaces present a good impression for marketing a business	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒
20.	Cross contamination is relatively unimportant in causing food poisoning	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒
21.	Clean as you go is a good policy	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒

ATTITUDES

1.	I would find a quarterly news update on food poisoning a useful source of information	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒
2.	Workshops on hygiene and cross contamination would be useful	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒
3.	I don't think trade associations are likely to be useful sources of information	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒
4.	I think Environmental Health Officers are useful sources of information	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒
5.	I don't think that it is necessary to have a documented policy, such as HACCP, in all food establishments	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒
6.	Not enough emphasis is placed on cleaning in the work place	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒
7.	I think the Food Standard Agency is a waste of time and money	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒
8.	It would be useful to have a cross contamination checklist	1 ❒	2 ❒	3 ❒	4 ❒	5 ❒

What is the main barrier(s) preventing you from minimising cross contamination?

_____

_____

_____

APPENDIX 4

Cross Contamination Self Assessment Checklist

1. Background

Cross contamination, the transfer of micro-organisms to previously uncontaminated food or objects, is frequently implicated as a contributing risk factor in food poisoning. However, even this is likely to be a significant underestimation.

Evidence is available that whilst the general importance of cross contamination is accepted the implications and risk of specific actions as a cause of cross contamination are poorly understood.

The following includes preliminary questions in section 2, then in section 3 a self assessment checklist, designed to help you gauge the possible extent or potential for cross contamination within your business.

The checklist in section 3 can be made quantitative by simply allocating 2 marks for a "no" and 0 for a "yes" or not applicable, with 1 for "don't know". The higher the score the more likely cross contamination is to take place. The checklist is divided into the following areas:

Food Safety Management Systems
Cleaning
Premises and Preparation Practices
Personal Hygiene

The process of completing the checklist is designed to benefit your business, there are no prizes for the scores achieved and thus no point in being unrealistic or unduly optimistic. The real prize comes in producing safe food consistently within your business

Whilst the overall score indicates the likelihood of cross contamination even one yes answer could lead to cross contamination and contribute to a case of food poisoning!

2. Preliminary Questions

	YES	NO	N/A
Does you business handle raw foods, (unprocessed meat, poultry or eggs)?	☐	☐	☐
Does your business serve ready-to-eat foods?	☐	☐	☐
Is the ready to eat food you handle capable of being contaminated? (i.e. not completely protected from contamination at all times)	☐	☐	☐
Is the ready to eat food capable of supporting the growth of, or allowing the survival of, food poisoning organisms?	☐	☐	☐
Are there occasions when much larger quantities of food than normal are prepared / handled? e.g. functions,	☐	☐	☐

The following self assessment questions will be of particular importance for people who can answer yes to 2 or more of the above questions.

3. Self Assessment

(score 2 for no, 1 for don't know or 0 for yes)

3.1 Food Safety Management Systems

	YES	NO	N/A	DON'T KNOW	SCORE
Does the business have a documented food safety system?	☐	☐	☐	☐	☐
Does the business have a HACCP system?	☐	☐	☐	☐	☐
Was the HACCP system developed internally?	☐	☐	☐	☐	☐

Is the HACCP plan the basis of normal working practices?	☐	☐	☐	☐	☐
Is / has the HACCP system been audited / verified?	☐	☐	☐	☐	☐
Is the prevention of cross contamination of ready to eat food covered by the HACCP plan?	☐	☐	☐	☐	☐
Has the EHO always considered cross contamination to be dealt with appropriately in your business?	☐	☐	☐	☐	☐
Are pest control prevention programmes in place?	☐	☐	☐	☐	☐
				Total Section Score	☐

3.2 Cleaning

	YES	NO	N/A	DON'T KNOW	SCORE
Do you operate a "clean as you go" policy?	☐	☐	☐	☐	☐
Are cleaning schedules in use for all high risk areas?	☐	☐	☐	☐	☐
Is cleaning efficacy monitored visually?	☐	☐	☐	☐	☐
Is cleaning efficacy monitored using other techniques? (e.g. microbiological, protein, ATP)	☐	☐	☐	☐	☐
Have cleaning schedules been validated?	☐	☐	☐	☐	☐
Are results of cleaning recorded?	☐	☐	☐	☐	☐
Do staff receive training in cleaning?	☐	☐	☐	☐	☐
Is drying considered within the cleaning programmes?	☐	☐	☐	☐	☐
Is drying performed using air / disposable items? (e.g. cloths, towels)	☐	☐	☐	☐	☐
Are single use items always disposed of immediately after use? (e.g. cloths)	☐	☐	☐	☐	☐
Do cleaning schedules specify corrective action if cleaning is unsatisfactory?	☐	☐	☐	☐	☐
Do cleaning schedules specify the use of biocides? (disinfectants, sanitisers, germicides)	☐	☐	☐	☐	☐
Do cleaning schedules specify how biocides are to be made up correctly?	☐	☐	☐	☐	☐

Do cleaning schedules specify a "contact time" for biocides?	☐	☐	☐	☐	☐
Do cleaning schedules specify the use of freshly made up biocides?	☐	☐	☐	☐	☐
Do cleaning schedules specify / include hand contact sites?	☐	☐	☐	☐	☐
Do cleaning schedules identify who is responsible for checking cleanliness?	☐	☐	☐	☐	☐
Do cleaning schedules specify the use of disposable or clean cloths / equipment / water?	☐	☐	☐	☐	☐
Are separate cleaning materials used for high and low risk areas?	☐	☐	☐	☐	☐
Are cleaning equipment / utensils colour coded for high and low risk areas?	☐	☐	☐	☐	☐
Is it **impossible** for equipment / utensils from low risk areas to find their way into high risk areas?	☐	☐	☐	☐	☐
				Total Section Score	☐

3.3 Premises and Preparation Practices

	YES	NO	N/A	DON'T KNOW	SCORE
Are premises constructed of easily cleanable materials and finishes?	☐	☐	☐	☐	☐
Are surfaces in contact with food easily cleanable? (smooth, joint free, impervious, good condition)	☐	☐	☐	☐	☐
Are premises designed to separate high and low risk foods?*	☐	☐	☐	☐	☐
Are high and low risk foods separated at all times?	☐	☐	☐	☐	☐
Are staff prevented from moving between high and low risk areas?	☐	☐	☐	☐	☐
Do staff observe precautions and restrictions concerning movement between high and lo risk areas?*	☐	☐	☐	☐	☐
If staff move between high and low risk areas do they change protective clothing and wash hands?	☐	☐	☐	☐	☐
Is it impossible for food equipment / utensils to move between high and low risk areas?*	☐	☐	☐	☐	☐

**High risk foods – unpackaged ready to eat foods able to support growth / survival of bacteria*
Low risk foods – foods will receive some sort of further processing (e.g. heat – cooking) to make them safe

**High risk areas – where high risk foods are prepared / handled*
Low risk areas – where low foods are prepared / handled

Are cloths / towels prevented from moving between high and low risk areas?	☐	☐	☐	☐	☐
Are you sure no equipment / utensils / cloths move between high and low risk areas?	☐	☐	☐	☐	☐
Is food preparation equipment colour coded for high and low risk areas?	☐	☐	☐	☐	☐
Are disposable cloths / equipment used when possible?	☐	☐	☐	☐	☐
Are hand contact surfaces separate for high and low risk areas? (e.g. telephone, cash register, door handles, fridge handles, etc.)	☐	☐	☐	☐	☐
Do food handlers have general purpose cloths attached to their waist / belt?	☐	☐	☐	☐	☐
Are sinks and facilities available for hand-washing:					
- On entering a food preparation area	☐	☐	☐	☐	☐
- In toilets	☐	☐	☐	☐	☐
- Near to where raw foods are handled	☐	☐	☐	☐	☐
- Near to where ready to eat foods are kept	☐	☐	☐	☐	☐
Are sinks equipped with "no hand contact" taps?	☐	☐	☐	☐	☐
Are signs reminding staff of hand-washing visible in relevant areas (near sinks, entrances etc.)?	☐	☐	☐	☐	☐
Is packaging from raw food disposed of promptly?	☐	☐	☐	☐	☐
Is ready to eat food protected from contamination during storage?	☐	☐	☐	☐	☐
Is ready to eat food protected from contamination during preparation?	☐	☐	☐	☐	☐
Is food protected from cross contamination during display?	☐	☐	☐	☐	☐
Is there ever a delay (longer than 4 hrs) between ready to eat foods being prepared and served?	☐	☐	☐	☐	☐
Are signs concerning "no smoking" and "hand-washing" on display?	☐	☐	☐	☐	☐
Is food stored where appropriate, off the floor and in vermin proof containers?	☐	☐	☐	☐	☐
Is raw food stored in a way designed to prevent contamination of food, people and surfaces?	☐	☐	☐	☐	☐
				Total Section Score	☐

3.4 Personal Hygiene

	YES	NO	N/A	DON'T KNOW	SCORE
Is a system in place for reporting staff illnesses?	☐	☐	☐	☐	☐
Is the system for reporting illnesses used?	☐	☐	☐	☐	☐
Do staff report stomach upsets, infected cuts, nasal discharge, etc?	☐	☐	☐	☐	☐
Are staff prevented from working if suffering any of the above?	☐	☐	☐	☐	☐
Do staff wear adequate and sufficient protective clothing (outer protection, head protection)?	☐	☐	☐	☐	☐
Is the wearing of protective clothing outside production areas prevented?	☐	☐	☐	☐	☐
Do staff wash hands (soap and water) and dry after the following:	☐	☐	☐	☐	☐
- Visiting the toilet	☐	☐	☐	☐	☐
- Smoking	☐	☐	☐	☐	☐
- Blowing nose	☐	☐	☐	☐	☐
- Touching :					
- Raw food	☐	☐	☐	☐	☐
- Bins / bin lids	☐	☐	☐	☐	☐
- Floors	☐	☐	☐	☐	☐
- Telephones	☐	☐	☐	☐	☐
- Raw Food Packaging	☐	☐	☐	☐	☐
- Other contaminated objects?	☐	☐	☐	☐	☐
Are disposable paper towels used for hand drying?	☐	☐	☐	☐	☐
Are tongs used for dispensing food?	☐	☐	☐	☐	☐
Are gloves in good condition and changed if a high risk object is touched?	☐	☐	☐	☐	☐
Are waterproof dressings used?	☐	☐	☐	☐	☐
Do staff wear waterproof dressings when necessary?	☐	☐	☐	☐	☐
Have staff been trained in hygiene?	☐	☐	☐	☐	☐

Do staff receive training updates?	☐	☐	☐	☐	☐
Have staff received training / instructions specifically on cross contamination?	☐	☐	☐	☐	☐

Total Section Score ☐

Overall Total Score ☐

Overall % score* ☐

*(number of yes answers ÷number of applicable questions answered multiplied by 100)

Types of Intervention Materials

Posters sized A4, A3.

1. The transfer of bacteria from raw chicken to a bin lid.
2. The transfer of bacteria from raw chicken to a telephone handle.
3. The transfer of bacteria from raw chicken to a tap handle.
4. Separate .. don't cross contaminate!
5. Be smart .... keep foods apart.
6. Safe handwashing ..... after handling raw meat.
7. Safe handwashing .... after handling raw meat
8. Safe chopping board use after preparation of raw meat.
9. Safe chopping board use.

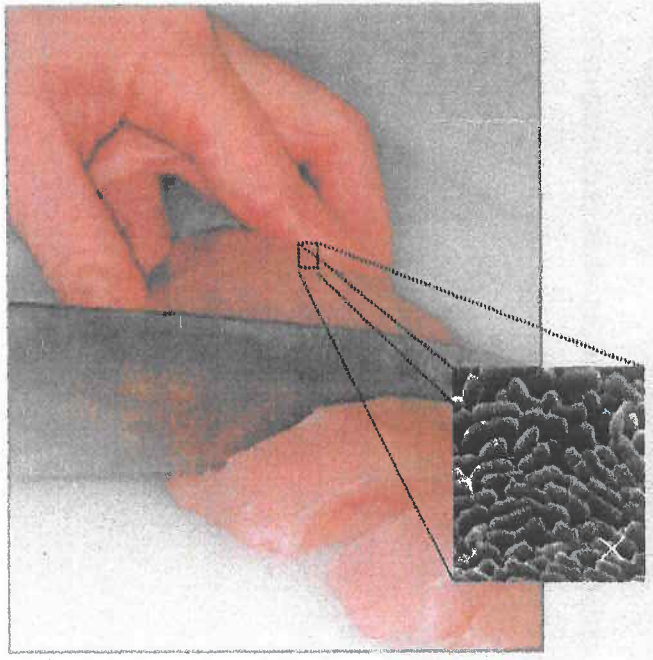
Laminated magnets:

1. The transfer of bacteria from raw chicken to a telephone handle.
2. The transfer of bacteria from raw chicken to a bin lid.
3. The transfer of bacteria from raw chicken to a tap handle.
4. Safe handwashing .... after handling raw meat
5. Safe chopping board use after preparation of raw meat.
6. Be smart .... keep foods apart.
7. Separate .. don't cross contaminate!

Leaflets:

1. Food Handler Advice: Safe use of chopping boards and knives when preparing raw chicken.
2. Food Handler Advice: Effective hand-washing after handling raw chicken.

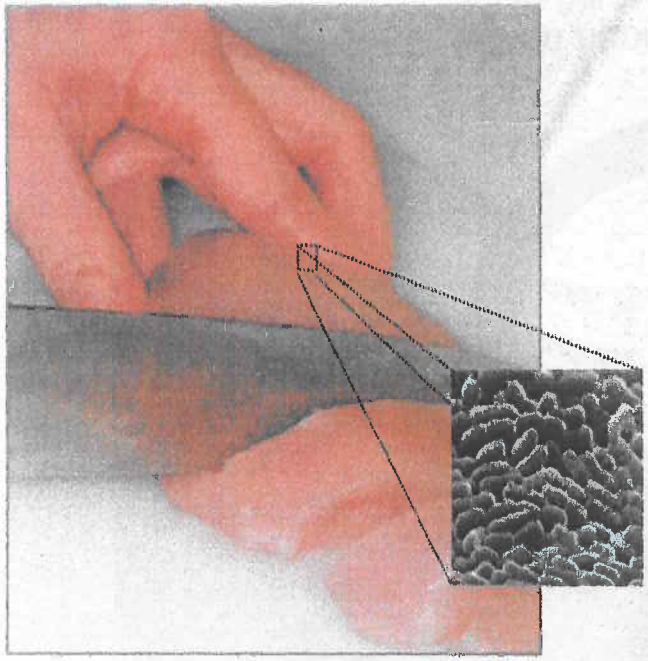
The transfer of bacteria from raw chicken to a bin lid.



When handling raw meat, harmful food poisoning bacteria such as *Salmonella* (×) are transferred to a food handlers' hands.

If the bin lid is touched before handwashing, the harmful bacteria are transferred to the bin lid.

The transfer of bacteria from raw chicken to a telephone handle.



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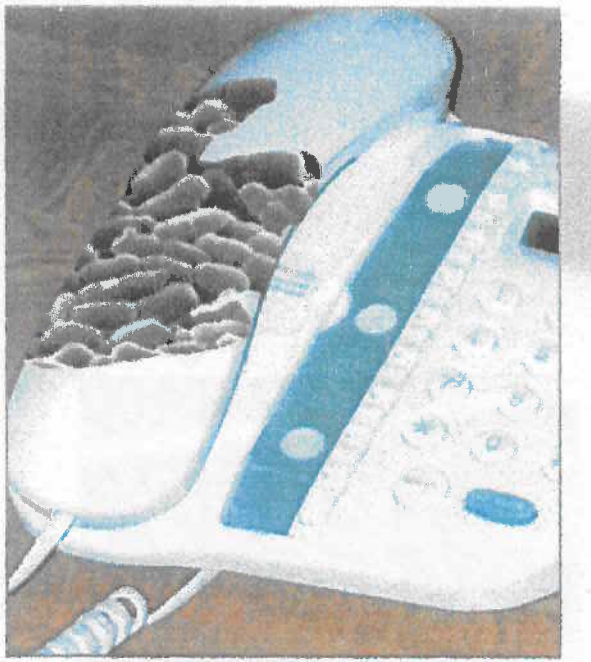
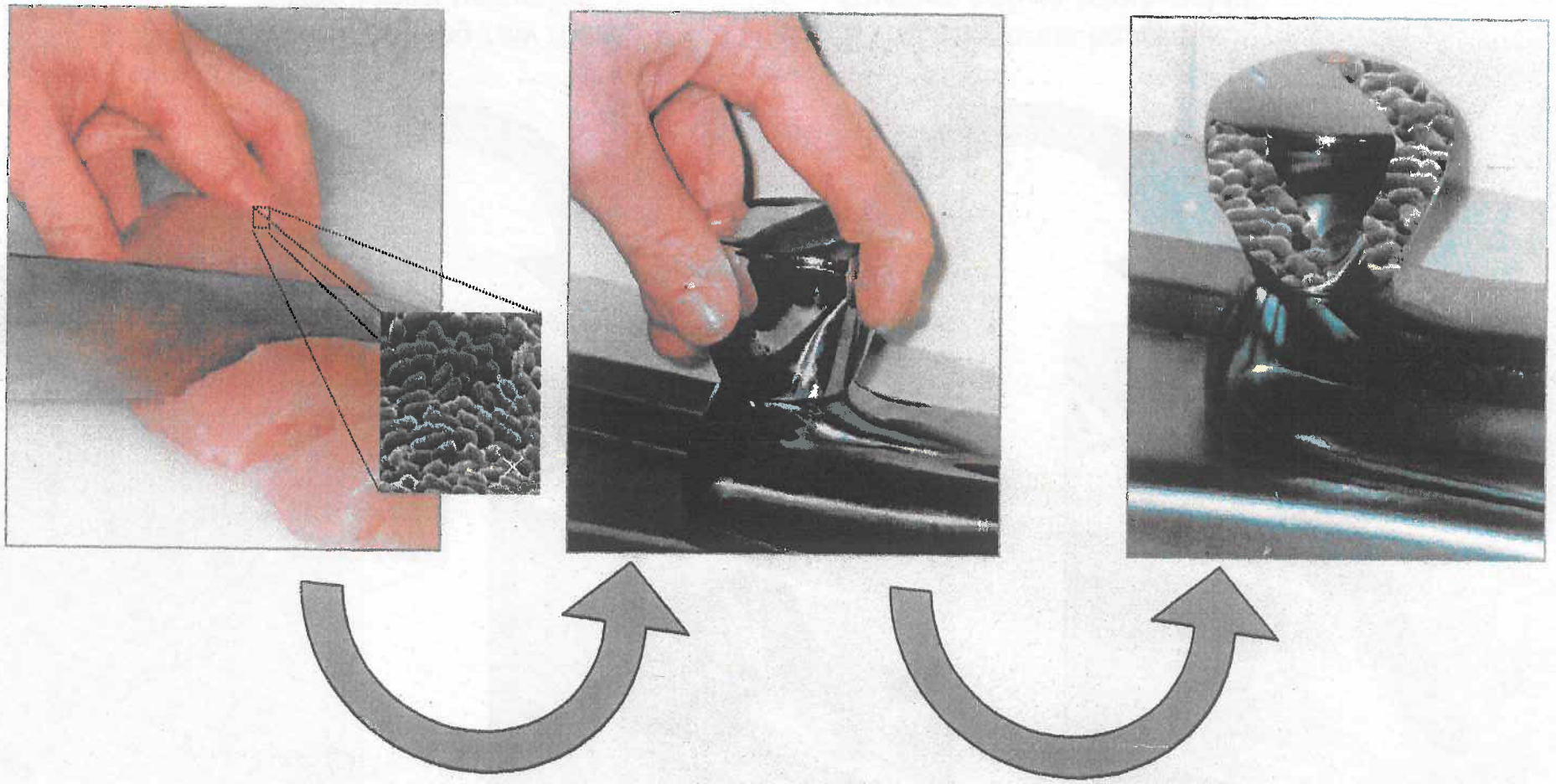


The transfer of bacteria from raw chicken to a tap handle.



When handling raw meat, harmful food poisoning bacteria such as *Salmonella* (×) are transferred to a food handlers' hands.

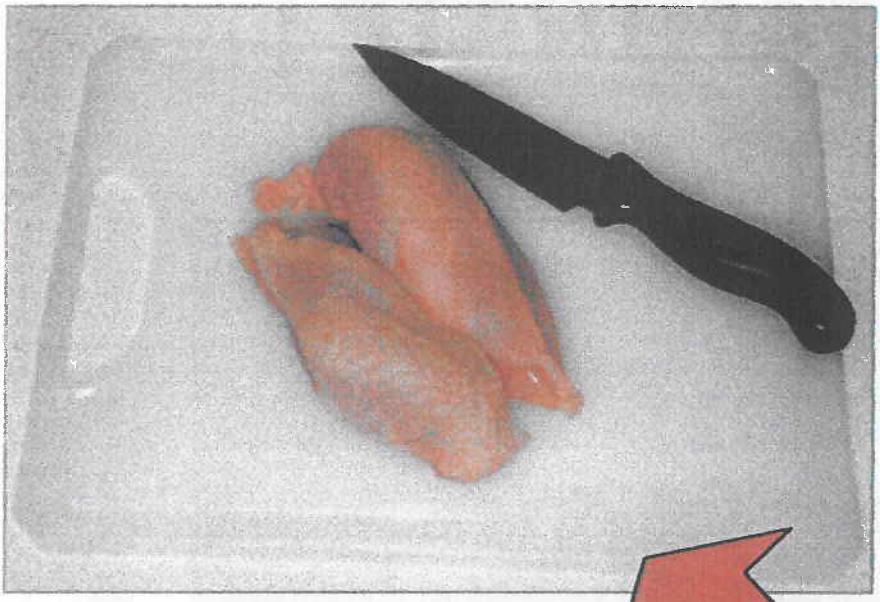
If the tap is touched before handwashing, the harmful bacteria are transferred to the tap handle.

SEPARATE ... DON'T CROSS CONTAMINATE !

Make sure all raw meat is stored covered and in a separate fridge from cooked or ready to eat foods.

Be smart ...

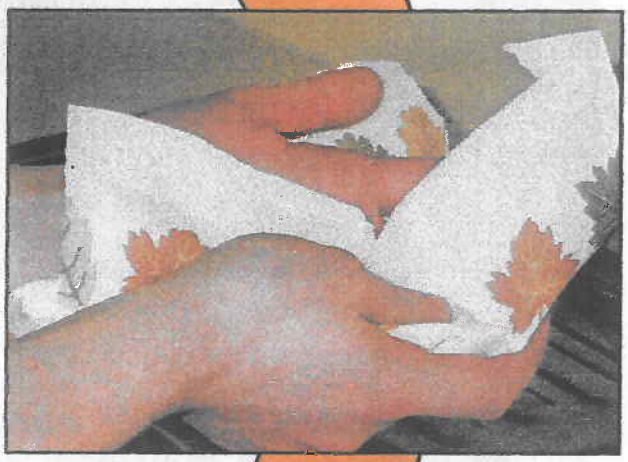
... keep foods apart



DON'T CROSS CONTAMINATE

Safe handwashing ...

Immediately after handling raw meat, immerse hands into a bowl of hand-hot water with detergent.



Dry hands thoroughly using a disposable paper towel.

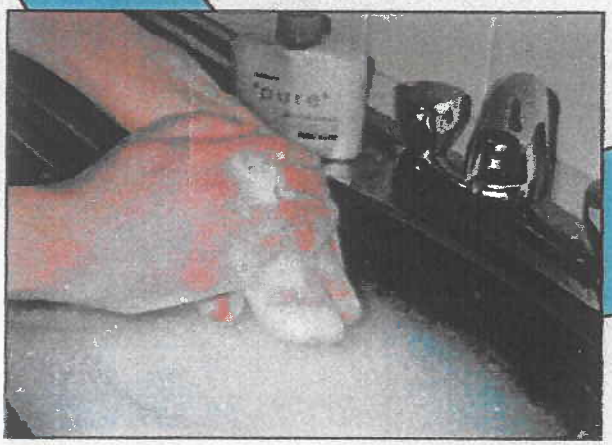
Rub hands together when immersed in the clean, soapy water and later hands on both sides using soap / detergent.

... after handling raw meat

Safe handwashing ...

Immediately after handling raw meat, immerse hands into a bowl of hand-hot water with detergent.

Rub hands together when immersed in the clean, soapy water and later hands on both sides using soap / detergent.



Dry hands thoroughly using a disposable paper towel.

... after handling raw meat

Safe chopping board use after preparation of raw meat

1. After raw meat has been on the chopping board scrub board clean using hot water and detergent.

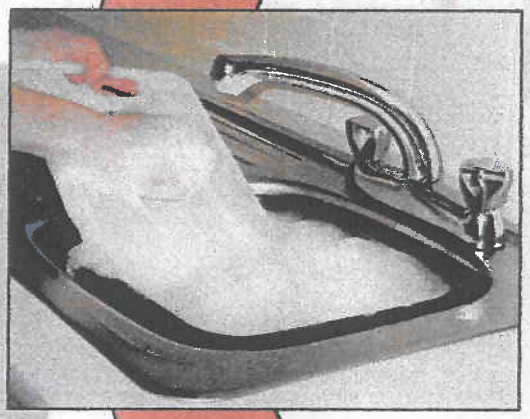
2. Rinse detergent from the board and then spray with bleach, or other cleaner.

3. Dry board using a disposable paper towel.

Washing and drying chopping boards

Safe chopping board use

1. After raw meat has been on the chopping board scrub board clean using hot water and detergent.

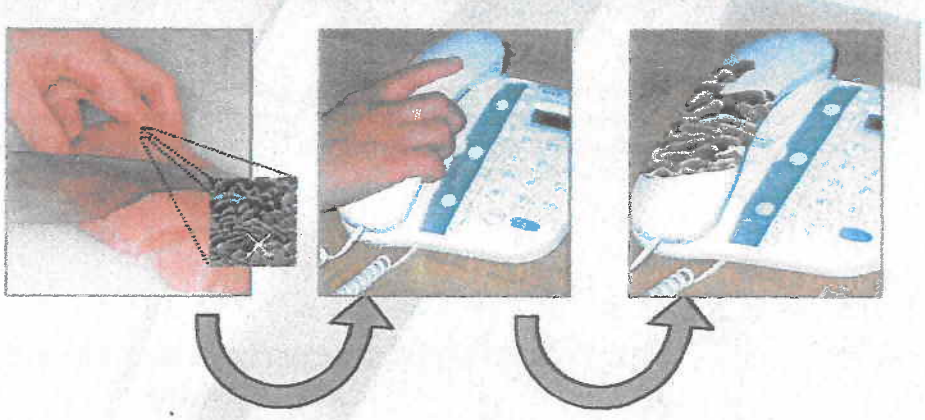


2. Rinse detergent from the board and then spray with bleach, or other cleaner.

3. Dry board using a disposable paper towel.

Washing and drying chopping boards

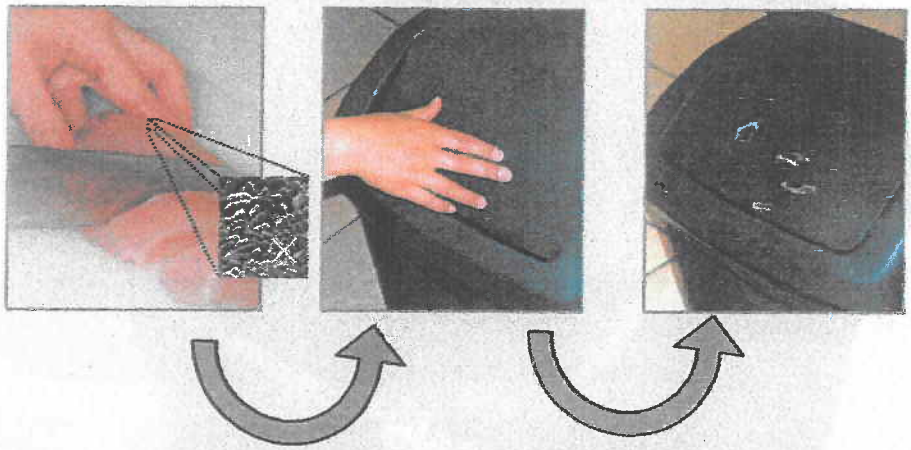
The transfer of bacteria from raw chicken to a telephone handle.



When handling raw meat, harmful food poisoning bacteria such as *Salmonella* (×) are transferred to a food handlers' hands.

If the telephone handle is touched before handwashing, the harmful bacteria are transferred to the telephone handle.

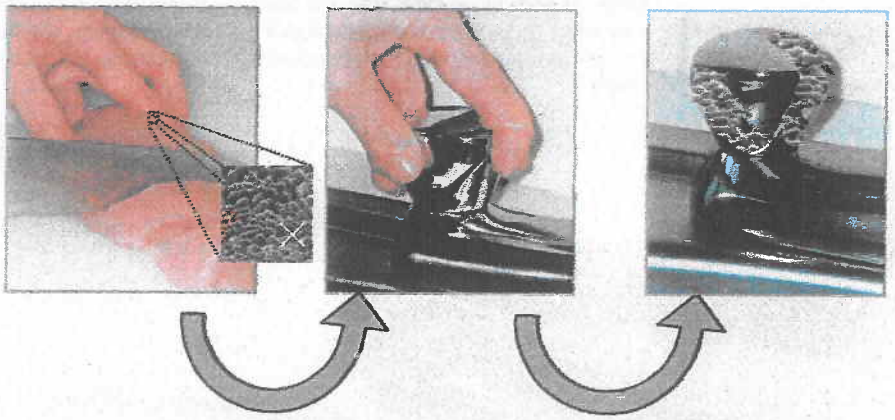
The transfer of bacteria from raw chicken to a bin lid.



When handling raw meat, harmful food poisoning bacteria such as *Salmonella* (×) are transferred to a food handlers' hands.

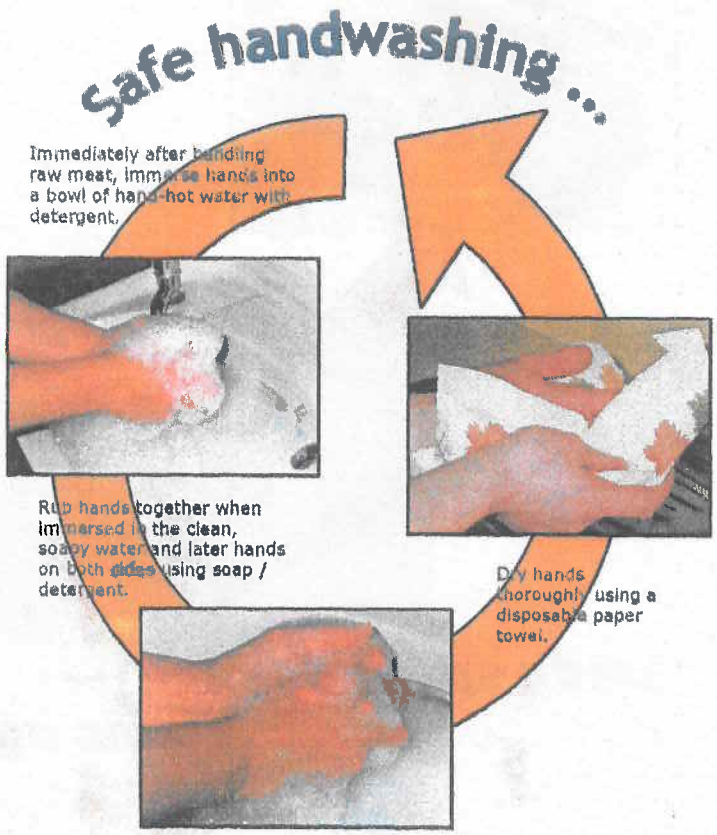
If the bin lid is touched before handwashing, the harmful bacteria are transferred to the bin lid.

The transfer of bacteria from raw chicken to a tap handle.

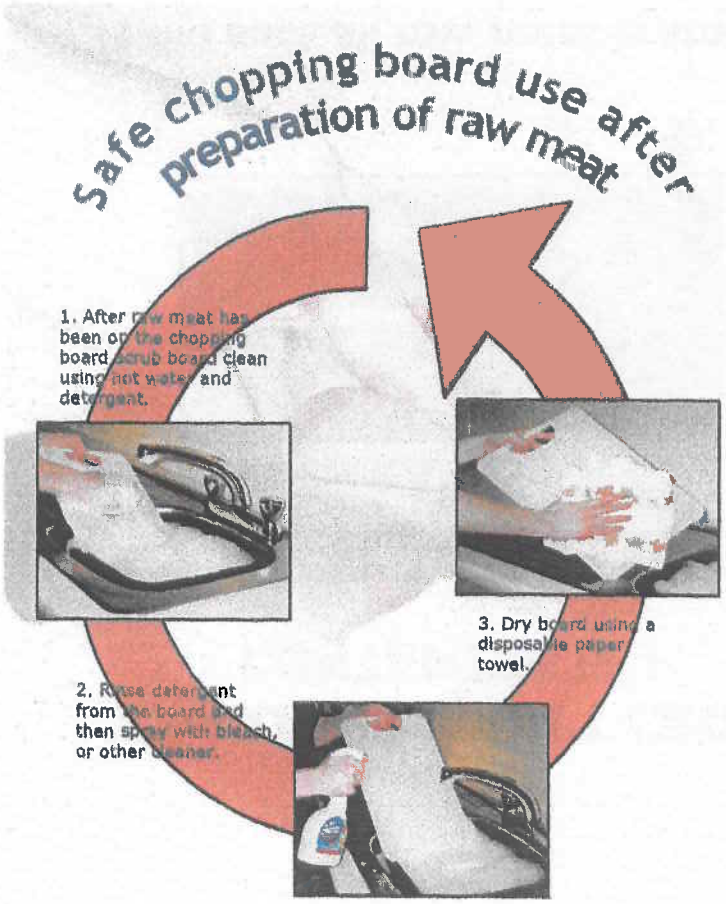


When handling raw meat, harmful food poisoning bacteria such as *Salmonella* (×) are transferred to a food handlers' hands.

If the tap is touched before handwashing, the harmful bacteria are transferred to the tap handle.



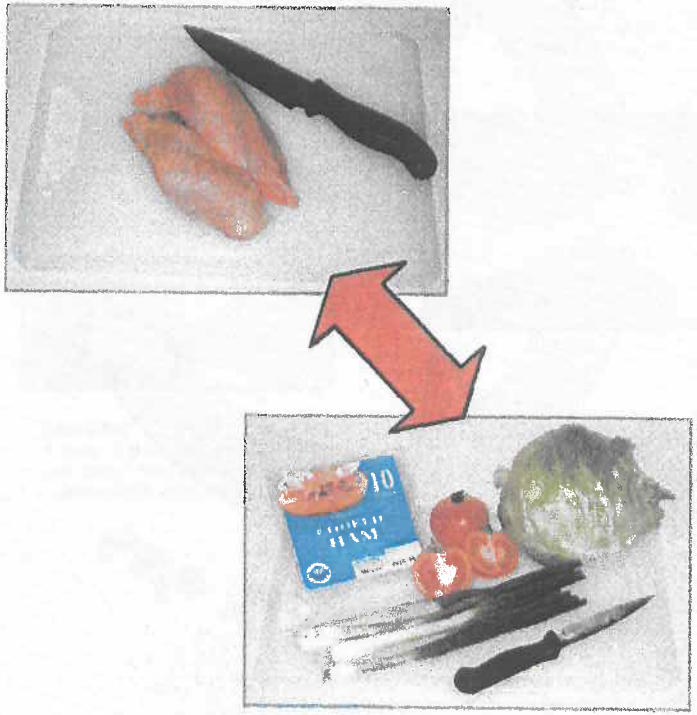
... after handling raw meat



Washing and drying chopping boards

Be smart ...

... keep foods apart

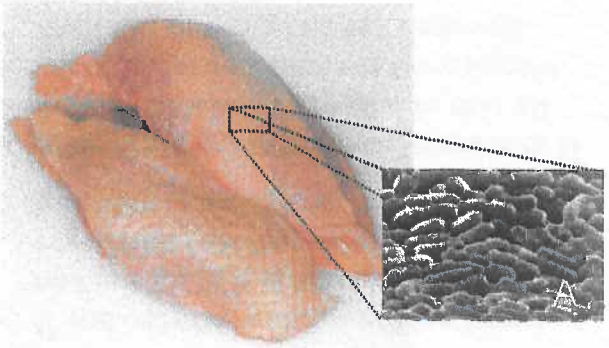


DON'T
CROSS CONTAMINATE

SEPARATE ... DON'T CROSS CONTAMINATE !

Make sure all raw meat is stored covered and in a separate fridge from cooked or ready to eat foods.

Raw chicken risks and facts



- Picture (A) shows harmful germs such as Salmonella, which are often on raw chicken.
- 80% raw chickens are naturally contaminated with harmful germs.
- It is easy to control harmful germs by following proper hygiene practices in your kitchen.

Food poisoning illness

This is a description of the symptoms experienced by a local lady who suffered food poisoning after eating food that had been contaminated from raw chicken:

'I had it so badly that I couldn't keep anything down. The vomiting was terrible, the doctor came out a few times and I was grey. I couldn't walk around, it was terrible. I was bad ..... really, really ill.'

Gwyneth, from Cardiff

Simple steps for use of chopping boards and knives when preparing raw chicken.

✓ Always prepare salad vegetables and cooked meat before touching raw chicken.

✓ Keep raw chicken away from salad vegetables and cooked meat.

✓ Wash chopping boards and knives immediately after use.

✓ Wash contaminated chopping board and knife using hand hot water and washing-up liquid and scrub using a scourer / brush.

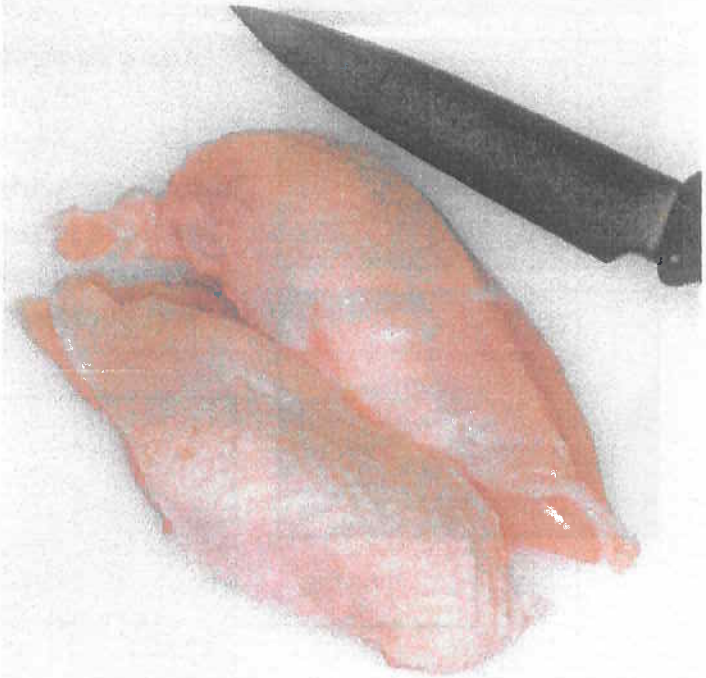
✓ Spray bleach onto the washed chopping board and knife, then rinse using hand hot water.

✓ Dry chopping board and knife using a disposable paper towel.

Make sure you get it right!

FOOD HANDLER ADVICE

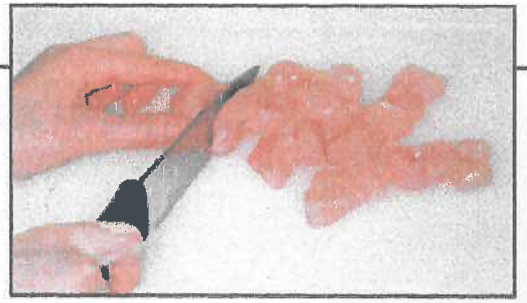
Safe use of chopping boards and knives when preparing raw chicken.



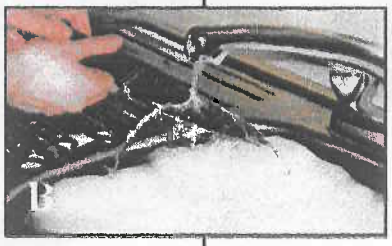
Step by step effective chopping board and knife hygiene

- ✓ Keep raw chicken away from salad vegetables / cooked meat.
- ✓ If possible, use separate chopping boards and knives for raw chicken and salad vegetables / cooked meat.

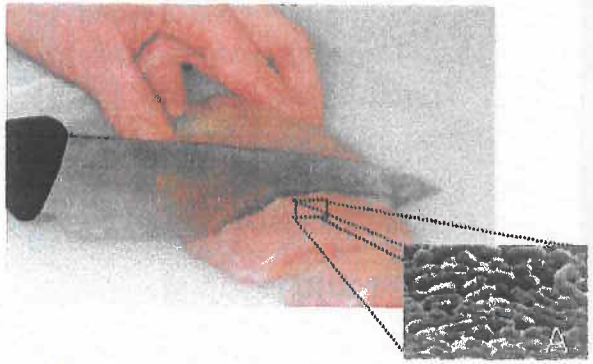
- ✓ If you only have one chopping board and one knife it is best to prepare salad vegetables / cooked meat before touching raw chicken.
- ✓ After cutting raw chicken, steps A to D need to be followed to ensure that all harmful germs that have been spread from the raw chicken are removed.



- ✓ Immediately after chopping raw chicken put chopping board / knife into washing up bowl of hot water with washing up liquid. Scrub using a scourer or brush (A).
- ✓ Rinse soap from chopping board and knife (B).
- ✓ Spray bleach onto the washed chopping board and knife (C), then rinse with hot water.
- ✓ Dry using a disposable paper towel (E).



Hand-washing and raw chicken risks.



- Picture (A) shows harmful germs such as Salmonella, which are often on raw chicken.
- After touching raw chicken 100% hands have been found to be contaminated with harmful germs.
- Rinsing hands with water alone does not remove harmful germs.

- It is easy to control harmful germs by following proper hand-washing practices in your kitchen.

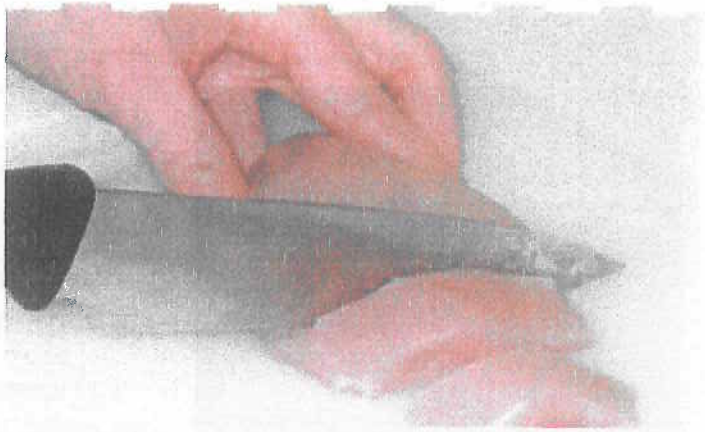
'I had it so badly that I couldn't keep anything down. The vomiting was terrible, the doctor came out a few times and I was grey. I couldn't walk around, it was terrible. I was bad .. really, really ill.'
Gwyneth, from Cardiff

Simple steps for effective hand-washing after touching raw chicken.

- ✓ Before opening raw chicken packaging fill a washing up bowl of hand hot, soapy water.
- ✓ Wash hands using soap or washing-up liquid immediately after touching raw chicken.
- ✓ To stop the spreading of germs from raw chicken do not touch the tap handle with contaminated hands.
- ✓ Make sure soap is lathered all over both hands.
- ✓ Rinse hands with clean water.
- ✓ Dry hands using a disposable paper towel.

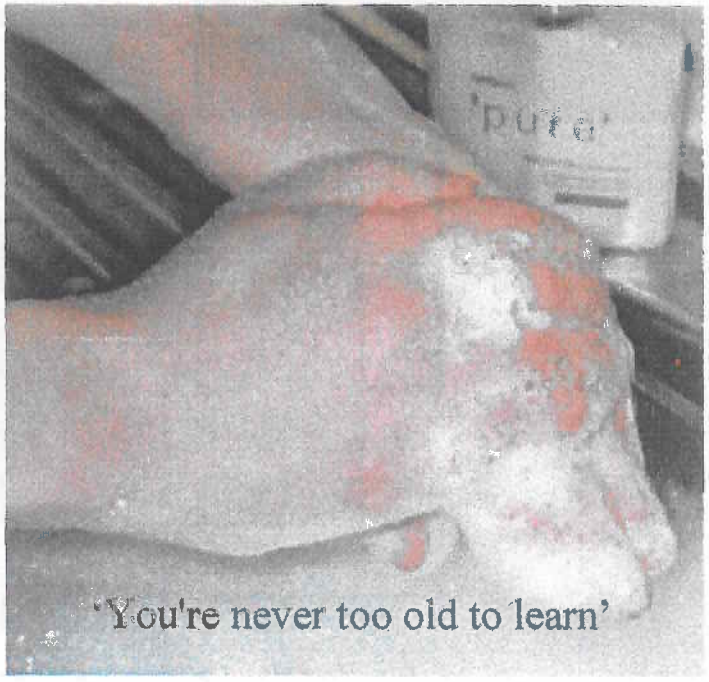
Make sure you get it right!

Prepared by FRCU© 2001

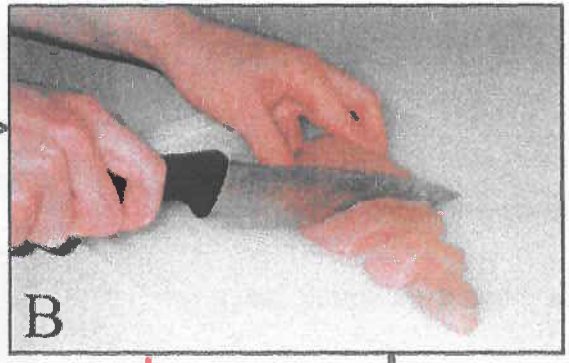


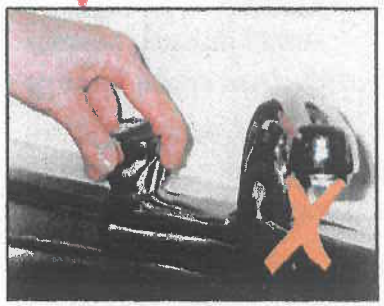
FOOD HANDLER ADVICE

Effective hand-washing after handling raw chicken.



Step by step effective hand-washing after handling raw chicken.





✗ Do <u>not</u> touch the tap with contaminated fingers, because harmful germs may be spread onto the tap handle.

✓ After touching raw chicken (B) immerse hands <u>immediately</u> into a bowl of hand hot soapy water (C).

✓ Rub hands together when immersed in the soapy water.

✓ Use soap or washing-up liquid to wash hands (D).

✓ Lather hands on both sides with soap or washing-up liquid for several seconds (E).

✓ Rinse hands using the washing up water.

✓ Dry hands using a disposable paper towel (F).

Helpful hint !

✓ To avoid transferring germs to the tap handle, fill a washing-up bowl with hand, hot soapy water (A) before opening raw chicken packaging.

Cross Contamination Interview Schedule

Introduction

As explained on the telephone - the purpose of this interview is to :

- **obtain information on attitudes & perceptions towards cross contamination;**
- **to assess the usefulness of a Self Assessment Tool;**
- **to look at ways in which information on cross contamination can be provided for staff"**

These are being undertaken as part of a larger research project funded by the FSA on Food Hygiene which is now nearing completion.

Confidentiality of information you provide is assured ie comments will not be attributed to either an individual or an establishment in the writing up.

We are offering all participants a preview of resulting report

We would like to ask your permission to use tape recorder in order to capture the maximum amount of information, it makes an interview very disjointed to have to stop and write down what you are saying . Again we assure you complete confidentiality - that tapes will be wiped immediately after transcription, which will be done as soon as I return back to base, at which point any references to you or your organisation will have been removed..

Just to explain about the format of the interview. I'm following a set structure so that as far as possible we can collect the same information from all participants.

It may be that it appears we have already discussed the answer to a question as we proceed through the interview. However I will stick to the questioning plan, and if you feel you've already covered this topic then please just say so, but it may be a similar question in a different context, so I may well prompt you !!

SECTION 1 Attitudes Towards Cross Contamination

1. **Do you understand what is meant by the term "Cross Contamination" ?**

   Prompt - how would you describe it briefly ?

   Show card "Cross contamination is the transfer of harmful micro-organisms from a contaminated object (eg raw food) to an uncontaminated object (e.g. cooked food) "

2. **What views do you have on the issue of Cross Contamination ?**

   Prompt - for instance its importance ?
   - what do you think contributes to CC ?

3. **Evidence suggests that while general attitudes are positive, specific attitudes are less so – does that surprise you ? (*explain further if necessary)***

   Prompt - why ?

   - **How typical do you think your beliefs are compared to other establishments ?**

   Prompt - much the same / better / worse ?

   - **What do you think shapes people's attitudes towards cross contamination ?**

   Prompt - their experiences
   - the training / education they've received
   - coverage in the media etc

6. **How much of a concern is C.C. in your establishment ?**

   Prompt - what is the most important factor giving rise to concern ?
   (eg: type of business, premises, number of staff...)

7. **How often are you made aware of cross contamination in your role ?**

   Prompt -what prompts you to consider it as a specific issue ?

8. **Do staff understand what cross contamination means and how it occurs ?**

   Prompt - how do YOU know this ?

9. **Do staff know what the risks are?**

   Prompt - how would THEY know this ?

10. **Do you think staff take the issue of cross contamination seriously ?**

    Prompt - How is this demonstrated ?

SECTION 2 Managing & Assessing Risks

1. **How much of a contributory factor do you think CC plays in food poisoning?**

   Prompt - would it surprise you to learn that 39% of general outbreaks of Food Poisoning had an element of CC and that this is likely to be underestimated ?
   - why ?

2. **Do you know what the risks are for your establishment ?**

   Prompt - Yes / No ?

3. **How are the risks of cross contamination assessed ?**

   Prompt - who does the assessment?
   - how often is this done?

4. **Do you have any systems in place for managing cross contamination and food safety ?**

   Prompt -if so what are they ? (HACCP, ISO9000, TQM)

5. **Do you think this/these systems are effective in managing cross contamination ?**

   Prompt -what seems to work well / what doesn't work so well ?

6. **What are the main sources of contamination in your establishment ?**

7. **What do you think are the main vehicles of potential cross contamination ?**

   Prompt -hands, equipment etc?
   - why do these stand out ?

8. **Do you think that YOUR establishment in general is good at assessing its own CC risks ?**

   Prompt - Yes / No ?
   - Why ?

9. **Do you think that OTHER establishments in general are good at assessing their own CC risks ?**

   Prompt - Yes / No ?
   - Why ?

10. **How practical is it to identify the risks of CC ?**

    Prompt - what are the difficulties ?
    - what makes the task easier ?

11. What would you say are the main benefits of assessing risks ?

Prompt - to the organisation ?
- to the consumers ?

12. Do you think that establishments in general are good at assessing their own risks ?

Prompt - (yes or no) why is this ?

SECTION 3 Self Assessment Checklist and Code of Practice

I'm now going to show you items which have been drawn up as a result of research undertaken by the FRCU in the area of cross contamination.. I'd like you to look through them briefly for a few minutes – then I'll ask you some general questions about what you think of them:

1. What do you think of the overall style?

Prompt - what would improve it ?

2. What do you think about the way the questions are phrased ?

Prompt - are they clear ?
- what improvements could be made ?

3. What do you think about the range of topics / areas covered ?

Prompt - what could be included ?
- what could be omitted ?

4. How could you see these being used ?

Prompt - how often, by who ?

5. What would be the possible advantages in using these ?

6. What would be the problems in using these ?

7. Are there any alternative ways to ensure that risks are assessed effectively ?

Prompt - what might these be ?

SECTION 4 Communication

1. **Who's role do you think it is to provide information on cross contamination ?**

   Prompt - inside / outside the establishment ?

2. **Do you have any difficulties in obtaining information on CC ?**

   Prompt - what are these (money, source etc)

   Prompt - how could these be overcome ?

3. **Are there any problems in communicating information on cross contamination to staff ?**

   Prompt -what are they?
   -what would help you get around these ?

4. **Do you currently use any Food Hygiene posters or other sources of information in the workplace ?**

   Prompt - if so what are they ?
   - where are they from ?

SECTION 5 Interventions (Leaflets, Posters & Magnets)

1. **Do you think that staff need to improve their Food Safety behaviour ?**

   Prompt - Yes / No
   -Why ?

2. **Do you think that staff could do with reminding of good Food Safety behaviour ?**

I'm now going to show you a selection of leaflets, posters and fridge magnets that may be useful in reminding people of good food safety behaviour

Leaflets (2)

- What do you think about giving leaflets such as these to staff ?

- Would they be appropriate for the level of understanding of staff ?

- Are they too simple / too complicated ?

- Do they contain the sorts of information you think your staff need ?

- If not – what information is needed ?

Posters (9)

I have 9 sets of posters, for each set there are 3 sizes S M L

For each set could you tell me :

- Which size do you prefer & why ?

- What do you like / dislike about each poster ?

- Would you like more text or less text ?

- Are the pictures appropriate ?

- How could the poster be improved to suit your needs ?

- Is there anything like this already displayed in your kitchen/s ?

- Do you think this poster would help staff improve their food safety behaviour ?

ALSO - There are 2 sets of instructions regarding the washing of Knives /Chopping Boards and hands. What do you think about the usefulness of these ?

Magnets (15)

Each magnet has a letter on it . Can you have a look through them and sort them into 2 piles
: those you like
: those you don't like :

Why have you chosen these ? (Like)

What is it about these that doesn't appeal to you ? (Dislike)

Conclusion

Thank you for taking the time to be interviewed – I've now completed my questions.

Now that the tape is off – is there anything that you'd like to add before I leave ?

The report will take a good few weeks to produce, in the meantime if you have any

queries relating to the interview please do give me a ring