

Advisory Leaflet Food Sampling A Guide to Microbiological Quality of Food Samples

Why do you take food samples?

[The Food Safety Act 1990](#) and [Regulation \(EC\) Number 178/2002](#) state that it is an offence for any food premises to sell and supply food which is

1. unfit for human consumption (Article 14)
2. so contaminated that it would not be reasonable to expect it to be used for human consumption (Article 14)
3. is not of the quality demanded by the purchaser (Section 14(i))

It is our job to ensure that food being sold in the City is safe to eat. This we do by taking routine samples. Other agencies such as Trading Standards and Government Departments may also take samples to check food composition and quality.

This leaflet explains what kind of organisms we are looking for, why we are looking for them and how to interpret the results.

How do you decide which food to sample?

We take part in various national and local food sampling programmes, along with colleagues in other local authorities. In addition we also sample foods that officers identify during routine food hygiene inspections as being particularly high risk, or where we have concerns about the way they are made or handled.

How are samples taken?

Some foods are bought “under cover” i.e. over the counter in the same way as a member of the public would buy them. This is so that we can test the standards at the point of sale. On other occasions we make ourselves known to the person selling the food particularly when we need to sample one part of a food product before other ingredients are added. For example we may want to examine a sandwich filling before it had been subject to handling during the sandwich making process.

Once the sampling officer has taken a sample from your premises, it is transported under temperature controlled conditions to the laboratory.

What Standards does the food have to comply with?

There are various types of microbiological criteria against which the laboratory can judge the quality and safety of the food. These are discussed below.

Microbiological Standards

These are bacteriological criteria which a product is required to meet by law. They are enforced by the regulatory agencies which have jurisdiction e.g. **Salford Environmental Services, DEFRA and the Food Standards Agency.**

Microbiological Guidelines

These are criteria used by regulatory authorities to monitor the effectiveness of a food process or system, and may be used to assess the microbiological quality of the end product, or an ingredient, or even the cleanliness of a food contact surface.

These criteria are **not** enforceable in themselves although a microbiologist may express an opinion as to whether or not any given set of results are acceptable or likely to constitute a risk to health. The Public Health Laboratory Service (PHLS) has produced a set of microbiological guidelines for a number of ready to eat food manufacturers and retailers are encouraged to meet these target levels. The Guidelines are discussed in more detail later in the leaflet.

Microbiological Specifications

These are criteria which a manufacturer or retailer may demand as a “condition of acceptance” from their supplier. These standards are agreed between the two parties and do not involve any regulatory agencies.

Microbiological guidelines for ready to eat foods

The type of micro-organism the laboratory will look for in a sample will depend upon the type of food being tested and how it was processed. There are a range of tests used for ready to eat foods and these are discussed below.

Aerobic colony count

This is a count of bacteria which includes those that occur naturally in most foods and those present through contamination. The count increases significantly over time in response to poor temperature control of a product. It is used to indicate the quality and potential keeping quality (freshness) of the product.

Indicator organisms

These are organisms, that although are not harmful in themselves, high levels in ready to eat foods indicate unhygienic processing procedures or post processing contamination through poor handling practices and failure to adequately protect the product. Post process contamination may be from personnel, dirty equipment, dirty packaging or general airborne contamination through leaving the product open to the atmosphere.

Enterobacteriaceae is a family of organisms, many of which live in the intestine of man and animals. Included in this family is the species **E.coli** (which include types of harmless and disease causing strains, such as **E.coli 0157**). Listeria species are also derived from the intestine of animals and are widespread in the environment. All these organisms in food are used as an indication of faecal contamination (via hands, bird droppings, infected water, contaminated ingredients or equipment etc).

Pathogens (see below) are bacteria which cause illnesses such as food poisoning

and gastro enteritis and also live in the intestines of man and animals. Therefore if indicator organisms are found then food poisoning bacteria may also be present.

Pathogens

These are organisms that cause illnesses such as food poisoning and there are individual tests used to confirm their presence. Pathogens include **Salmonella, Campylobacter, E.coli 0157, Clostridium perfringens, Clostridium botulinum, Staphylococcus aureus, Bacillus cereus and Listeria monocytogenes.**

Based on the results of these tests, ready to eat foods will be classified as one of the following - “**satisfactory**” - “**acceptable**” – “**unsatisfactory**” or – “**unacceptable/potentially hazardous**”.

Table 1 – Definitions of microbiological quality

Satisfactory	Good microbiological quality
Acceptable	Borderline limit of microbiological quality
Unsatisfactory	Further sampling may be necessary and officers may undertake further inspection of the premises to check hygiene practices are adequate
Unacceptable/potentially hazardous	Urgent attention is needed to locate the source of the problem. Such results may form the basis of prosecutions where they occur in more than 1 sample

In order to determine the microbiological quality of a particular food sample it is first put into one of five categories (see table 2).

Table 2 – Colony count categories for different types of ready-to-eat foods

Food group :	Category
Meat	
beef burgers, meat pies, pork pies, sausage rolls, scotch egg	1
faggots, kebabs, meat meals (shepherds pie, casseroles), un-sliced poultry, sausages (British)	2
sliced meat (beef, haslet, pork, poultry)	3
brawn, sliced meat (cooked ham, tongue) tripe and other offal	4
ham – raw (parma/country style) salami and fermented meat products, sausages (smoked)	5
Seafood	
herring/roll mop and other raw pickled fish	1
crustaceans (crab, lobster, prawns) other cooked fish, seafood meals	3
molluscs and other shellfish (cooked), smoked fish, taramasalata	4
Desserts	
mousse/dessert	1
cakes, pastries, slices and desserts without cream, tarts, flans and pies	2
cakes, pastries, slices and desserts with dairy cream, trifles	3
Savoury	
bhaji (onion, spinach, vegetable)	1
cheese-based bakery products, flan/quiche, mayonnaise/dressing, samosa	2
	3
pate (meat, seafood, vegetable) satay, spring rolls	
homous, tzatziki and other dips	4
bean curd, fermented foods	5

Food group : Vegetable	Category
vegetables and vegetable meals (cooked)	2
coleslaw, dried fruit and vegetables, rice	3
prepared mixed salads and crudities	4
fresh fruit and vegetables	5
Food group : Dairy	Category
ice cream, non dairy milk shakes, ice lollies, slush, sorbet	2
cheese, yoghurt/frozen yoghurt	5
Food group : Ready to eat meals	Category
pizza, pasta and other meals	2
Food group : Sandwiches and filled rolls	Category
without salad	4
with salad, with cheese	5

Table 3 – Guidelines for the microbiological quality of various read-to-eat foods

Criterion	Food Category (see table 2)	Microbiological quality (cfu/gram unless stated)			
		Satisfactory	Acceptable	Unsatisfactory	Unacceptable/potentially hazardous
Aerobic colony count	1	$<10^3$	10^3 to $<10^4$	$\geq 10^4$	N/A
	2	$<10^4$	10^4 to $<10^5$	$\geq 10^5$	N/A
	3	$<10^5$	10^5 to $<10^6$	$\geq 10^6$	N/A
	4	$<10^6$	10^6 to $<10^7$	$\geq 10^7$	N/A
	5	N/A	N/A	N/A	N/A
Indicator organisms					
Enterobacteriaceae	1 to 5	<100	100 to $<10^4$	$\geq 10^4$	N/A
E.coli & Listeria	1 to 5	<20	20 to 100	≥ 100	N/A
Pathogens					
Salmonella Campylobacter E.coli 0157 V. cholerae	1 to 5	Not detected in 25g			detected in 25g
V. parahaemolyticus	1 to 5	<20	20 to 100	100 to $<10^3$	$>10^3$
L. monocytogenes	1 to 5	<20	20 to <100	N/A	≥ 100
S. aureus C. perfringens	1 to 5	<20	20 to <100	100 to $<10^4$	$>10^4$
B. cereus & other Pathogenic Bacillus	1 to 5	$<10^3$	10^3 to $<10^4$	10^4 to $<10^5$	$\geq 10^5$

Tables 1 to 3 above are taken from the Public Health Laboratory Services Guidelines for the microbiological quality group of some ready-to-eat foods samples at the point of sale. PHLS ACFDP Working Group Communicable Diseases and Public Health September 2000. Volume 3. Number 3 163-167

Key

> equal to greater than < less than \geq greater than
 If we send you a sample result it may be written something like this:-

Aerobic colony count: 2.8×10^4 or $2.8 \times 10^+E4$. Both mean 28000

This figure is cfu/gram, a microbiological term which means the number of colony-forming units that have been counted in one gram of food

If you refer to table 3, you will see that an aerobic colony count of 10^4 would be considered as “unsatisfactory” for a food in category 1, whereas it would be deemed “acceptable “ for a food that falls within category 2 and “satisfactory” for category 3 and 4 foods.

How can I improve the quality and safety if the food I sell?

Are you handling food properly at every stage from delivery to sale? Does the way you handle food avoid contamination? Do you keep food in conditions that inhibit the growth of bacteria? Try asking yourself these and the following questions and see if there is anything else you could be doing to improve the microbiological quality of food you sell.

Delivery

Are you checking temperatures, date codes and condition of packaging on arrival?

Storage

Are you checking fridge/freezer temperatures? Do you have an efficient stock rotation system? Are the products kept covered and stored in a way that prevents contamination of any kind?

Preparation

Do your staff understand and practice food personal hygiene? Are your products prepared in a way that avoids contact with potentially contaminated equipment and raw foods? Is the equipment cleaned often enough and with the correct cleaning materials?

Cooking

Are the products cooked for the correct amount of time at the correct temperature?
Are temperatures checked using a probe thermometer?

Cooling

Are products cooled in the area free from contamination? Are products cooled within 1½ hours?

Display

Do your staff wash their hands after handling raw foods? Are separate utensils and cutting boards use when handling cooked meats? Are your food products covered with food grade quality wrapping to prevent environmental contamination?

Training

Are all your staff properly trained? Do your staff report illness to you?

**For further Advice/Information contact
Salford City Council, Environmental Services,
Turnpike House
631 Eccles New Road, Salford, M50 1SW
Telephone: 0161 737 0551
Email: environment@salford.gov.uk**

We would like to thank the staff of Royal Preston Hospital Microbiology Service & Wyre Borough Council for their assistance in producing this leaflet.