

# FACTFILE: GCE NUTRITION & FOOD SCIENCE

## FOODS THAT POSE THE GREATEST RISK OF FOOD-BORNE ILLNESS



### Foods that pose the greatest risk of food-borne illness

#### Learning outcome

- Identify and discuss the foods that pose the greatest risk of food-borne illness.

#### Introduction

The term 'foodborne illness' is defined by the World Health Organisation (WHO) as 'diseases, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food or water'. Any type of food can be a risk if it is cross-contaminated, however, there are a number of high-risk food. These are ready-to-eat food that support the growth of pathogenic bacteria and are intended for consumption without further processing or cooking.

#### Microbial contamination

Mould often occurs if food is stored at the wrong temperature, at high humidity or beyond its recommended shelf-life. Viruses may be brought into food premises on raw foods such as shellfish which have been bought from an unapproved source. Bacterial contamination is the most significant in terms of microbial food poisoning and food-borne illnesses.

#### Poultry

##### Food Safety Risk

Campylobacter and salmonella live in the intestines of poultry which can be transmitted via their faeces into the human food chain. When poultry

are eviscerated\* there can be transfer of bacteria from one infected bird to several others, so proper disinfection of equipment is vital. The feeding of infected foodstuffs to poultry can result in large numbers of chickens carrying food poisoning bacteria. According to the Food Standards Agency (FSA) campylobacter is the main cause of gastroenteritis in the developed world. It is likely that eating undercooked poultry or cross-contamination from raw poultry meat are important vehicles of infection.

*\*Evisceration, i.e. the removal of the offal, the stomach or intestines which may burst.*

##### Cooking

Poultry must be cooked to a core temperature of at least 70°C for 2 minutes, stuffing temperature must reach 75°C. A meat thermometer measures the internal temperature to assure that a safe temperature has been reached and that harmful bacteria have been destroyed. Pierce the thickest part of the bird and the juices should run clear, for a whole bird the thickest part is the leg between the drumstick and the breast. Cut the meat open with a clean knife to check it is piping hot all the way through – it should be steaming, cooking instructions should be followed thoroughly. Food should be thoroughly defrosted before cooking, the outside of the food could be cooked, but the centre might not be, which means it could contain harmful bacteria. Never use a marinade that has been used on raw chicken to baste chicken as it cooks - this is just another form of cross-contamination.

### Purchase

Pack raw poultry separately from ready-to-eat foods to avoid cross-contamination. If using reusable bags keep one bag for raw meats only. Purchase raw poultry at end of shopping trip and bring home as soon as possible. Cool bags will help with temperature control and avoid the temperature danger zone.

### Storage

To prevent cross-contamination store raw poultry and ready-to-eat foods separately, place in sealable containers at the bottom of fridge so that it cannot drip onto other foods. Keep poultry correctly chilled in the fridge as this slows down the growth of bacteria, 5°C or less. Avoid 'the danger zone' (5°C and 63°C) when bacteria can multiply rapidly. Don't over-pack the fridge, as this can stop cool air from circulating freely and the fridge may not keep the poultry properly chilled. Store leftovers in the fridge within two hours of cooking and eat them within 2-3 days, placing in small containers allows for quicker cooling. Don't eat food after its use-by date. When pre-packaged foods, such as cooked poultry are opened, the use-by date no longer applies and the food label will advise that the product should be consumed within a specified number of days – normally 2 or 3.

### Preparation

Campylobacter can last on kitchen surfaces for up to 1 hour and E. coli can last for up to 24 hours - good practice to wash cutting boards, knives and other utensils with hot soapy water immediately after preparing raw poultry or use a different board for raw poultry. Always clean as you go, especially when handling raw poultry and then handling ready-to-eat foods. If a dishcloth is used with raw poultry change straight away or use paper towels. Packaging should be disposed of carefully as it can be contaminated with bacteria. Do not wash raw poultry – any harmful bacteria will be killed by thorough cooking, and washing may splash harmful bacteria around the kitchen. Defrosting in the fridge is the safest option, put the wrapped poultry on the bottom shelf and leave to thaw slowly, place in a container deep enough to collect all the juices.

## Fruit and Vegetables

### Food Safety Risk

Fruit and vegetables can be contaminated with E.coli, salmonella and listeria via water, soil, manure or droppings from birds and animals. Root crops and leafy vegetables sold loose are likely to have the most soil on the outside, a common source of E. coli O157.

Pre-packed salads are a common cause of food poisoning as they can harbour microbes, moulds and viruses if they haven't been processed in a sanitary environment. The FSA has deemed it necessary to provide guidance on salad washing. There have been outbreaks of food-borne illness associated with raw and lightly cooked sprouts (e.g. bean sprouts). The warm, moist conditions required to grow sprouts are ideal for the rapid growth of bacteria. Melons have been the source of salmonella poisoning as bacteria on the surface of the melon is transferred to the flesh while it is being cut up, or if melons are washed in contaminated water. When fruits and vegetables are fresh-squeezed or used raw, bacteria can be present. Unless the produce or the juice has been pasteurised to destroy any harmful bacteria.



### Purchase

Use a reputable supplier and avoid bruised or damaged produce. Freshly squeezed fruit and vegetable juices should be pasteurised. For bagged salad leaves select the best use-by date, avoid mushy leaves and if inflated don't buy.

### Preparation

Fruits and vegetables that are not ready-to-eat require adequate washing and/or processing (for example peeling or cooking) to remove soil which may contain E. coli. To clean submerge in water and rub thoroughly as opposed to running under the tap - allows for better removal of bacteria and reduces the risk of cross-contamination due to a lower level of potential splashing. Disinfect sink after washing root vegetables and before using for salad items. Fruits and vegetables that are ready-to-eat have been subjected to controlled procedures to ensure that they do not present a risk to health. It is not necessary to re-wash and is not recommended as it could introduce an additional cross-contamination risk. The FSA advise that beansprouts can be eaten raw if they are labelled "ready-to-eat". All other sprouts should be cooked thoroughly until steaming hot throughout.

## Storage

Soiled vegetables should be kept away from other produce to avoid cross-contamination, for example, fruits such as strawberries or raspberries which are likely to be consumed raw.

When salad has been washed keep in a clean container with a lid on and away from other raw food to stop transfer of bacteria. Always wash hands before touching salads or fresh fruit to avoid passing on bacteria, if at all possible avoid touching with bare hands – use tongs etc.

## Eggs

### Food Safety Risk

Eggs can carry bacteria such as salmonella on their shells or within the egg. Salmonella infections are on the increase across Europe. The World Health Organisation (WHO) recommends that raw egg should be viewed as a potentially hazardous ingredient which should not be used in foods which will receive no further heat treatment. However, the majority of UK eggs are now produced under the British Lion scheme (vaccinated against salmonella) with the FSA confirming they are the only eggs that are safe to be consumed runny, or even raw, by vulnerable groups. These groups should still avoid raw or lightly cooked eggs that are: not British Lion stamped; not hen's eggs (e.g. duck or quail eggs); from outside the UK.



### Purchase

Select quality assured eggs - British Lion Brand. Open the carton and check that the eggs are clean, and not cracked as dirt or bacteria might have got inside. Select those with the longest date mark.

### Storage

Place in the fridge or in a cool, dry place, storing eggs at a constant cool temperature will help to keep them safe. If stored in the fridge, use the egg tray, this helps to keep eggs separate from other

ready-to-eat foods and avoid cross contamination, alternatively keep them in their carton. Some experts advise not to store on the fridge door, but in the main body of the fridge to ensure a consistent and cool temperature. Discard after the use-by date. Eat dishes containing eggs as soon as possible, or cool quickly and keep in the fridge for up to two days.

### Cooking

When handling eggs, always ensure that hands, surfaces and utensils that come into contact with raw egg or shells are washed thoroughly in warm, soapy water, to prevent cross contamination. Eggs can be eaten a day or two after their 'best before' date as long as they are cooked thoroughly until both yolk and white are solid, or if they are used in dishes where they will be fully cooked. Foods that are made with raw eggs and then not cooked, or only lightly cooked, should be stored in a fridge and consumed within 2 days. Duck eggs need to be handled and cooked with greater care than quality assured hen's eggs - fully cooked so that both the yolk and white are solid, requiring a longer cooking time as they are larger than hen's eggs.

## Shellfish

### Food Safety Risk

Shellfish such as mussels and oysters are filter feeders. They operate a bi-valve system, whereby water is taken in through one valve, filtered through their flesh and then discharged through the second valve. This method of feeding can often result in bacteria and viruses accumulating in the flesh. The fact that shellfish are often eaten raw or lightly cooked makes them a common source of food poisoning from harmful viruses (norovirus) and bacteria (E.coli). Many species of shellfish contain potent toxins which can cause food poisoning. The toxins are caused by bacteria and viruses which invade shellfish via consumption of contaminated algae or marine organisms in the surrounding water. Unlike many other hazards these toxins will not be broken down or removed during cooking. Shellfish should be reared in clean waters and properly treated before use. Treatment includes:

- **Depuration** - placing the live shellfish in fresh salty water so that the bacteria in their bodies will filter back into the water.
- **UV treatment** - placing live shellfish in water tanks with ultra violet lights.

### Cooking

Thorough cooking will destroy any bacteria present

including norovirus. One exception is oysters which many people eat raw; they will pose a risk as they can contain norovirus. Shellfish should change in colour and texture when cooked properly - prawns turn from blue/grey to pink. If using ready-cooked prawns, serve cold or reheat until they are piping hot all the way through. Do not eat clams or mussels that do not open when cooked, it is likely that they have died, and are not safe to eat. Discard live shellfish if their shell has a crack or break, or if the shells are open and don't close when tapped – indicates high risk. The FSA advises that older people, pregnant women, very young children and people who are unwell should avoid eating raw or lightly cooked shellfish to reduce their risk of getting food poisoning.

### Purchase

Buying from reputable sources will ensure they have been treated correctly. Don't buy cooked shellfish that is touching raw fish. When shopping, pick up shellfish last and refrigerate as soon as possible, it can go off very quickly in the temperature danger zone. Avoid frozen seafood if the packaging is damaged. Don't buy frozen fish products that are above the frost line in the store's freezer. Selecting shellfish in modified packaging for example, vacuum packing will reduce the risk of cross contamination.

### Storage

Placing in the fridge as soon as possible will prevent them from decomposing and producing histamines which cause food poisoning. Put in containers on bottom shelf of fridge to prevent cross-contamination. Don't put mussels, oysters, clams or any other live shellfish into airtight containers as they need to breathe. Don't store shellfish in water as they will drown and become unsafe.

### Preparation

Wash hands thoroughly before and after handling shellfish. Don't allow the shellfish or fluid from them to come into contact with cooked or ready-to-eat food. Use separate plates and utensils for preparing the shellfish. Thaw frozen shellfish in the fridge overnight. If marinating, put in the fridge and throw the marinade away after removing the shellfish.

## Red Meat

### Food Safety Risk

Animals carry bacteria such as salmonella and E. coli on their hides (skin) and in their intestines,

although to a lesser extent than poultry. The transfer of bacteria can occur during the slaughtering process when the hide is removed. If care is not taken, any faecal matter on the hide can come into contact with the flesh. During evisceration bacteria from the gut can contaminate the raw meat. When a rare steak is seared these bacteria are killed, making the steak safe to eat. If meat is minced to produce burgers, sausages, etc. any harmful bacteria from the surface of the raw meat spreads throughout the burger. Unless the food is cooked right through, these bacteria can remain alive on the inside. This applies to all minced meat, even good quality or expensive meat. Listeria occurs in meat products such as pates and salami. E coli can be found in undercooked beef, particularly beef burgers.

### Purchase

Contamination can happen right at the start of the process, when animals are slaughtered. There is no way of knowing which animals are carrying harmful bacteria in their gut. The quality or expense of the meat bought doesn't make any difference to the potential risk of contamination. However, Northern Ireland Farm Quality Assured red meat is guaranteed to be wholesome, safe and free from unnatural substances.

### Cooking

Meat needs to be cooked so the inside is pink rather than red, and any juices from it run clear, cook to above 75°C. An exception to this rule applies to whole cuts of meat such as steak which can be eaten whilst still red inside (rare). The outside of the steak will have been sealed at a high temperature killing any bacteria on the surface.



Red meat should be handled in a similar way to poultry to avoid food-borne illness. Hygienic practices, good temperature control and avoiding cross-contamination are crucial.



## Dairy Products

### Food Safety Risk

Milk is a highly nutritious food for pathogenic bacteria. European Food Safety Authority (EFSA) concluded that raw milk can be a source of harmful bacteria – mainly campylobacter, salmonella and E. coli and listeria. Raw drinking milk can only be sold directly to the consumer by registered milk production farms. The FSA advise that raw or unpasteurised milk and cream may contain harmful bacteria and people with a weaker immune system who are vulnerable to food poisoning should not consume it. Pasteurised milk must be used in food preparation - milk is heated to 72°C for 15 seconds and then cooled rapidly to reduce the numbers of micro-organisms in food to a safe level. Pasteurisation is also used for other dairy products such as cream and yoghurts. Milk can be contaminated at any point in the milk production process. It is the responsibility of the food business operator (milk producer) to identify these points and implement control measures to protect milk from contamination.

Hard cheeses, yoghurt and butter are low risk because of their acidity and lack of moisture. However, mould-ripened soft cheeses (Brie and Camembert) along with soft blue cheeses (Danish blue, Gorgonzola) and any unpasteurised soft cheeses may allow growth of Listeria. Listeriosis in pregnancy can cause complications, and may result in miscarriage. These cheeses can be used as part of a cooked recipe as listeria is killed by cooking.

Guidelines for keeping dairy foods safe are similar to other high-risk food. Hygienic practices, good temperature control and avoiding cross-contamination are crucial. Some additional points for dairy foods include:

- Purchase milk and milk products at the end of shopping trip, especially in hot weather. Select the longest use-by date.
- Store in the fridge below 5°C and discard dairy products after the use-by date.
- It is recommended not to store milk in the fridge door where it is susceptible to warmer temperatures from opening and closing the door.
- Unused milk poured out of its container should never be returned to its original container.

## Herbs and spices

### Food Safety Risk

These minor food ingredients have a huge potential to contaminate a wide range of products due to their wide-spread use. Herbs can be a source of salmonella and E.coli from soil, they are grown low to the ground and typically eaten raw. Spices contain oils and are susceptible to contamination from pests, bacteria and moulds. The global market for herbs and spices is complex with diverse supply chains and products being sourced from a variety of businesses ranging from large scale producers to smallholders. Many herbs and spices grow wild and are farmed in villages - traditional method of drying spices and herbs under the sun exposes them to the risk of contamination. There are often many intermediaries in the supply chain from farmer, collector to middle-man before arrival at the processor. Contamination can occur at various points along the production and supply chain: impure soil; unhygienic handling; filthy storage premises; and incorrect packaging.

Prevention of microbial contamination lies in the application of good hygiene practices during growing, harvesting and processing from farm to fork, and effective decontamination. Many spice and herb suppliers apply control processes based on steam or dry heat treatments.

Irradiation can be used to kill the bacteria that cause food poisoning. Unlike other forms of heat treatment irradiation only raises the temperature of food by a few degrees and so there is less impact e.g. the irradiation of spices does not change their flavour or aroma. Dried aromatic herbs, spices and vegetable seasonings can be irradiated in the UK. The importance of correct food handling practices and usage of herbs and spices by end users cannot be overemphasised:

- Add spices before cooking when possible. Any bacteria are likely to be killed by the high heat.
- If using herbs in a dish that's prepared cold, such as coriander in guacamole or basil in pesto wash them carefully even organic herbs can harbour bacteria such as E. coli.
- Keep dried herbs and spices in a cool dry place as water encourages growth of bacteria.
- Buy spices in small amounts and use them quickly. The safest choice is to buy whole spices, and grind them as and when needed.
- When shopping for fresh herbs, choose those that are completely clean and free of soil. At home, cut off and discard any bruised stems or leaves which can be a source of bacteria.

- Just like other perishable foods, refrigerate fresh herbs as soon as you get home.
- When cutting or chopping, use a separate cutting board designated only for fruits and vegetables to ensure that they don't become contaminated with bacteria from raw meat, poultry or seafood.

### Suggested activities:

1. Explore why each of the following foods pose a high risk of food-borne illness:
  - poultry
  - eggs
  - shellfish
  - red meat
  - dairy products
  - herbs and spices
  - fresh fruit and vegetables.
2. Research the above foods to find current cases of food-borne illness.
3. Produce a factsheet/poster highlighting how the risk of food-borne illness could be prevented.

