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Guidance on Sous Vide Cooking

TORBAY COUNCIL

Contents

Introduction

Sous vide is French for 'under vacuum' and describes a method of cooking in vacuum sealed plastic pouches at low temperatures for long periods. It differs from conventional cooking methods as the raw food is vacuum sealed in plastic pouches and the food is cooked using precisely controlled heating methods. This involves a different set of hazards and requires carefully considered precise control measures, very different to normal cooking techniques.

This method of cooking is said to maintain the integrity of the ingredients and therefore should produce foods with enhanced flavours. However, this method can also carry significant potential food safety risks and needs to be carefully controlled. The main issue with the use of sous vide is that it cooks food slowly, and as a result food spends a long time in the temperature danger zone where food poisoning bacteria can multiply. In addition, this method also involves the storage of food under low oxygen conditions which creates a risk in respect to the growth of *Clostridium botulinum*. Biological hazards are listed in the appendix; it describes key food borne pathogens that need to be considered. It is the food business operator's responsibility to identify pathogens that may be associated with their products and key control steps.

Legal Requirements

Regulation (EC) No 852/2004 (Article 5)

As a food business operator you are responsible for putting in place procedures to demonstrate safe working practices using sous vide. These must be documented as part of your food safety management system, for example within your hazard analysis (HACCP) or in addition to your Safer Food Better Business (SFBB) pack. **SFBB on its own is not suitable to cover sous vide cooking as it doesn't adequately consider all the hazards and control measures needed for this type of cooking.**

This should include:

- Identifying any hazards that must be prevented, eliminated or reduced to acceptable levels;
- Identifying control points and safe limits within your safe method steps, such as time and temperature controls;
- Establishing effective monitoring procedures;
- Establish corrective actions when monitoring indicates a problem;
- Document safe working methods which should include staff training.

Regulation (EC) 178/2002 Article 14

It is the responsibility of the food business operator to ensure the food they place on the market is safe. In order to comply with the above legislation you should introduce suitable controls for each process step, some examples are listed below.

Documentation requirements

The following list of potential steps could be the basis for your HACCP with regards to documenting general safe working methods. You could adopt these by reading through, adding any additional notes or crossing through those that do not apply to you, then signing to say that you have read and understood the points and that you will implement and follow them.

In addition to this you are required to write a specific validation for each product where you document the exact method to be followed each time for each product. See the **Inspection Checklist** (on page 12) to see what other records and paperwork you will need to produce and make available during an inspection.

Potential Steps in the Process of Sous Vide and Associated Controls

Consider these points for your general sous vide procedures as part of your HACCP. Adapt as necessary and sign at the end to show that you are following them.

1. Purchase

Specialist equipment should be used including:

- Water bath – consider design (stirrer, perforated bottom plate, how cleanable, how easy to empty, rack for separation, lid to prevent evaporation etc). It must be a commercially bought unit to ensure the temperatures are precisely controlled. It cannot be homemade.
- Vacuum packer - not dual use (see **https://www.food.gov.uk/business-industry/guidancenotes/hygguid/ecoliguide**). Well maintained so good sealing and vacuum and clean;
- Pouches/vacuum bags - puncture proof, suitable for temperature specification, heat sealable, food contact approved, get specification for them from suppliers to show suitable;
- Specialist sous vide needle thermometer and foam sealing tape – consider calibration by accredited laboratory e.g. every few years. Tape maintains pack integrity.

2. Suppliers and Delivery

- Supplier approval process undertaken for all foods – request copy of their HACCP, carry out site visit or check if they have a Food Hygiene Rating on **http://ratings.food.gov.uk/**.
- Fresh and high quality ingredients to lower microbial load.

- Delivery and storage usual monitoring and controls apply - food below 5°C and -18° with sufficient separation of raw and ready-to-eat (RTE) foods.
- Fish should be delivered on ice or frozen to kill parasites (at least -20ºc for 24 hours)
- Only foods accepted within their shelf life. All foods suitably covered and labelled with appropriate use by date.
- Clean and pest free delivery van.

3. Storage

- Fridges to be at 5°C or below, ideally food should be stored below 3°C to slow down the growth of food borne pathogens.
- Separation of raw and ready-to-eat foods, raw foods below or in separate unit.
- Effective stock rotation system, all foods covered and labelled with use by date.
- Packaging materials – labels, pouches, clingfilm and non-food ingredients etc – store separately for raw and RTE foods in clean environment.
- If necessary, decant foods from contaminated outer packaging and wrapping materials into business' own readily cleanable containers.

4. Preparation and assembly

- Limit the amount of time protein foods are kept at ambient temperature.
- Use separate preparation surfaces, chopping boards, utensils e.g. weighing scales, wrapping and packing materials for raw and RTE foods.
- Thoroughly clean and sanitise preparation surfaces before and after use. Use separate cleaning cloths and cleaning equipment for raw and RTE food prep areas.
- Good personal hygiene standards to be observed.
- Weigh (or measure) and prepare ingredients. Thorough washing and rinsing of fruit, vegetables, salad and herb ingredients, ideally in dedicated food wash sink or sanitised sink/bowl and colander. Herbs can be a source of bacteria e.g. *E.coli.*
- **Consider consistency of the portion as a control measure – weight, size and thickness are all important factors. Standardise all portions.**
- Marinating using alcohol or acid can cause vapour build up in the pouch and cause uneven heating of the product. Boil off the alcohol beforehand. Standardise marinade recipes for validation.
- Do not tenderise meats that you intend to serve rare e.g. primal whole cuts of beef and lamb as this introduces bacteria into the muscle of the meat.

5. Vacuum Packing

- **Use separate designated and clearly identifiable vacuum packers for raw and RTE foods.**
- The manufacturer's instructions for the vacuum packer must be followed.
- Staff to be trained in the use and cleaning of the vacuum packer. Keep training records.
- Food grade quality pouches to be used and be suitable for heating to the maximum temperature required.
- To be cleaned and sanitised before and after use with appropriate chemicals **BS EN 1276** or **13697** compliant.

- Follow the instructions for the food sealing system. Sealing bars to be in good condition.
- Food to be below 5°C prior to vacuum packing.
- Each pouch to be securely sealed and seal integrity to be checked for each pouch.
- Avoid air bubbles which can cause uneven cooking. Check each pouch.
- It is recommended vacuum packets of raw food are used as quickly as possible. See the Food Standards Agency's leaflet on Vacuum packed chilled **http://www.food.gov.uk/sites/default/files/multimedia/pdfs/publication/vacpack0708.pdf** foods for further guidance on appropriate shelf life.
- Label vacuum packed pouches with a date and ensure a secure seal on each pouch.
- Disposable gloves are recommended when vacuum packing to reduce bacteria.

6. Cooking

- Check equipment is working correctly on a regular basis, e.g. check the water bath temp with the probe.
- Don't rely on temperature readout on the water bath as an accurate measurement of water temperature. Monitoring to ensure correct time temperatures must be carried out of both the water bath and the core food temperature (thermal centre). To do this you will need to purchase a needle digital temperature probe. See *cooking core temperatures* on page 10.
- Thermal centre - slowest heating part of the product e.g. middle of thickest part. Core temperature must be identified for each product. Remember importance of standardising the size of portions to ensure consistency of required temperatures.
- Time/core food temperature/size of product combinations for each product must be documented. Variation in weights is critical to time temperature control. Different meats, cuts ingredients will heat at different rates. Carry out trials as necessary.
- **Total time a product should be placed in the water bath = time to water bath equilibrium (water warm up time) + time for product come up to correct temp once put in water (come up time) + desired cooking time**. This needs to be calculated once for each recipe mimicking worst case scenario and then checked using a calibrated needle temperature probe on a regular basis, for example once a month (prove it records for each dish – see monitoring record template in appendix).
- **Preheat** the water bath to the temperature before submerging sealed pouches (**water bath equilibrium**). Set the water bath 2.5°C above the target temperature of the food to help achieve the correct core temperature.
- Consider effect on water bath temperature if taking product straight from fridge – might take longer to warm up (**come up time**).
- Overloading of pouches in the water bath can lead to uneven cooking. Food must be completely submerged. Determine the maximum load and consider how to separate them and keep them submerged during water bath cooking e.g. using a rack. This is to allow the effective circulation of the warm water around each individual pouch for adequate cooking purposes. There must be no overlapping or tightly packed pouches.

- Time/temperature/size of product combinations for each product must be documented.
- Carefully remove the bags at the end of cooking and serve immediately or cool quickly.
- Change the water in the water bath frequently preferably after every use.
- More information on suitable cooking temperatures that would potentially kill bacteria, a **critical control point (CCP)**, can be found on page 10.

7. Cooling

- This may happen before or after the water bath cooking stage depending if you are part cooking to begin with. Aim to reduce temperature to 5°C within 30 minutes ideally (no more than 90 minutes).
- Chill rapidly in its vacuum pouch using:
    - Blast chiller
    - Ice bath/slush ice (ice hygiene important)
    - Keep chilled until ready for service or regeneration (5°C or below, ideally 3°C or less).
- Remember spores of *Clostridium botulinum* and *C. perfringens* can all survive a mild cooking process therefore minimising the shelf life is paramount.

8. Storage of cooked vacuum packed products

- Store pouches in a chiller or freezer (5°C or below, ideally 3°C or below) with room for air circulation around pouches.
- Ensure separate storage of raw and RTE products.
- Pouches should be clearly labelled with batch, production date and use by dates.
- If vacuum packed on the day of cooking and cooked in pouch then store for no more than 10 days (includes day of cooking). Ideally keep for less than this; recommended 3-5 days max.
- Ensure effective stock rotation to ensure that the use by date is not exceeded.

9. Reheating for service – water bath, oven or pan

- If reheating is your CCP ensure it is thoroughly cooked to 70°C for 2 minutes or equivalent. If food has not been previously cooked and properly cooled then this needs to be the CCP.
- If not reheating to a suitable core temperature that would potentially kill bacteria then treat the food as a ready to eat product during the reheating process. This means the previous cooking stage will need to be the CCP cooked to 70°C for 2 minutes or equivalent (see appropriate cooking temperatures on page 10).
- For thoroughly cooked and properly cooled foods (RTE food) it should be reheated to 60°C (product core temperature) within 2 hours in the water bath and then maintained at or above 63°C if hot held for any length of time.

10. Cleaning and disinfection

- All equipment involved in the sous vide process, including the vacuum packer and the water bath, must be cleaned and disinfected in between each use.
- Consider what chemicals are suitable to be used, the method (types of cloth, contact time etc) and document these. They should be food grade safe and any disinfectant or sanitizer used must at least meet the official standards of **BS EN1276:1997** (also known as **BS EN 1276:2009** products) or **BS EN 13697:2001**. You can check with your supplier that they meet the required standards.
- Train staff in these methods.

By completing this box you are signing to say you have reviewed these process steps for sous vide and associated controls (pages 2-4) and agree that you are going to fully implement them in your day-to -day operations and use them in conjunction with your documented standardised recipes for each item and your monitoring records. They must all be reviewed if there are any changes, such as new dishes added or change of equipment or staff.

Date: _____ **Signature:**_____

Review Date: _____ **Signature:**_____

YOU CAN HAVE YOUR OWN SOUS VIDE DOCUMENTED FOOD SAFETY MANAGEMENT SYSTEM, BUT IT MUST BE WRITTEN DOWN AND COVER ALL THESE AREAS, INCLUDING CRITICAL CONTROL POINTS.

Cooking: Core Temperatures

Campden BRI and the Food Standards Agency advises that a core temperature of not less than **60°C for 45 minutes** should be used for foods cooked under vacuum. This would be a critical limit for the CCP for cooking. The core food temperature/ thermal centre is the slowest heating part of the product e.g. middle of thickest part. Meat species affects thermal transfer so the fattier the meat the slower the core temperature will heat up. For example, pork is slower to heat up than lean beef.

For products that need to be cooked to destroy *Listeria monocytogenes*, *Salmonella, Ecoli 0157* or any other vegetative pathogen the food business operator will need to prove that the cooking process will enable food to reach a **core temperature** for the recommended time during cooking to ensure the food is safe to consume. The acceptable temperature/time combinations are:

- 60°C for 45 minutes
- 65°C for 10 minutes
- 70°C for 2 minutes
- 75°C for 30 seconds
- 80°C for 6 seconds

There is an exemption for sous vide burgers which must be cooked at a minimum of 60°C for at least 93 minutes to reduce the risk of E. coli 0157.

If high risk dishes are not going to reach a minimum core temperature of 60°C for 45 minutes or equivalent it will not be considered as a safe method of cooking. Therefore you must prove that the food is safe every time (unless the water bath cook is not the critical control point (CCP) of your hazard analysis). In this specific scenario you would require formal food microbiological sampling each time. There are a number of laboratories that carry out microbiological testing in the region. For further information contact your local Environmental Health Officer.

For example, it would not be a CCP at the water bath stage if the product is a ready-to-eat food due to a prior cooking process step or if the product will be cooked thoroughly after the water bath stage (equivalent to 70°C for 2 minutes).

Taking Core Temperatures

To take a temperature inside a vacuum packed pouch you can place special foam self sealing tape on the pouch; this will ensure that the vacuum pressure is not lost if the pouch is pierced with a fine needle temperature probe. Your equipment / packaging supplier should be able to provide you with further information. If the food does not reach the required core temperatures you must verify your safe methods, this could include further cooking processes or microbiological sampling. A normal digital probe will not be suitable to carry out this monitoring.

It is essential to know that your probe is working properly, so you can rely on its readings. It is strongly recommended that laboratory calibration for working thermometers should be carried out at least annually. Valid calibration certificates should be made available for inspecting officers.

At least on a monthly basis the working thermometers should be calibrated on the premises. The manufacturer's instructions should include details of how often a probe needs to be checked and how to tell if it is accurate. If the reading is outside this range, you should replace your probe or return it to the manufacturer to be calibrated. Record the results of your probe calibration checks in the monthly diary.

A simple way to check a digital probe is to put it in iced water and boiling water:
The readings in iced water should be between -1°C and 1°C.
The readings in boiling water should be between 99°C and 101°C using a pan of boiling water. **Do not use a kettle for this test.**

Specific Validation for Each Product

You should document the exact method to be followed each time for each product, including the following:

1. Recipe for each dish with specific quantities (weight and size per pouch, marinades, any preparation techniques, storage arrangements prior to cooking etc).
2. Identify the critical control point for this recipe and ensure it is controlled as necessary to eliminate the hazard.
3. Equipment – water bath specifics, pouches etc.
4. Maximum number of pouches allowed and any separation requirements.
5. What temperature the product enters the water bath. (Straight out of fridge or from room temperature?)
6. **Total time a product should be placed in the water bath= time to water bath equilibrium (warm up) + time for product come up to correct temp (come up time) + desired cooking time**. Document the time/temperature combination for each part of the equation. How will this be monitored and checked? Remember the come up time and the desired cooking temperatures must be measured from a core food temperature and must be a minimum of 60°C for 45 minutes.
7. Cooling method and timings if applicable. How monitored and recorded?
8. Storage arrangements and shelf life e.g. in pouch or decanted, temperature, labelling etc.
9. Reheating methods if applicable– temperature, how monitored and recorded?

Verification (using probe to check temperatures) can be carried out on one pouch of each batch each time to ensure it is adequately cooked through time and temperature. Alternatively, if the size of the food being cooked is always the same, then a validated cooking method could be used to ensure compliance. This method should be verified at regular intervals through temperature and time monitoring to ensure that the method still produces safe food, for example once a month.

Staff Training

Staff must be adequately trained to understand the risks involved (hazards and controls) in using the sous vide process and in how to use the equipment. They must be aware of and be able to follow the exact method each time that the food is cooked. They must be able to monitor and complete the relevant records and be aware what to do if any of the critical controls fail and what corrective action is required. Document this staff training and refresh at appropriate intervals.

Inspection Checklist

If you use sous vide as a cooking method in your business your Environmental Health Officer will want to see the following paperwork in addition to your documented food safety management system:

1. 'Suppliers List' for sous vide products including food and packaging;
2. Documented evidence of staff training on the sous vide process;
3. Vacuum Packer maintenance schedule/records – visual checks, service history, documented action taken if equipment failure;
4. Calibration records for the probe and water bath;
5. Documented general sous vide procedures and product specific recipe/methods that have been validated to show the product will be cooked safely;
6. Temperature records of the water, core time/ temperatures of foods, cooling records, storage time/temperatures and reheating time/temperature records (production monitoring verification records – see template);
7. Cleaning records for all equipment used in this process;
8. Any additional requirements will be discussed at the time of inspection.

Contact: Food and Safety Team, Torbay Council, Torquay Town Hall, Castle Circus, Torquay, Devon, TQ1 3DR Call Centre Tel: 01803 208025
www.torbay.gov.uk/index/yourbusiness/foodsafety

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Sous Vide Summary

Benefits of sous vide cooking include improved flavour, reduced shrinkage, portion control and if pasteurised, extended shelf life. BUT there are specific risks such as the survival of harmful bacteria and viruses which need to be controlled. It is your responsibility to do this.

Training is key to successful implementation of the use of sous vide

Hazard	Control	Monitoring	Critical limits	Corrective actions
Use of non food pouches	Use of correct food grade pouches, heat sealable, puncture proof, hot temp suitable etc.	Keep supplier specification. Inspect new pouches.		Dispose of faulty pouches.
Lack of vacuum	Repair and maintenance. Use of specialist needle probe, foam sealing tape and right pouches.	Annual service/ maintenance records. Check seals and vacuum suction.	If air bubbles in sealed vacuum pouch then discard or reseal.	Reseal pack. Repair vacuum packer.
Use of inappropriate water baths	Correct design, stirrer, rack for separation, lid to prevent evaporation etc. Purpose built unit. No overloading with pouches. Change water frequently. Adequate cleaning.	Maintenance/ service records. Water temp checks with probe – records. Cleaning records.	Number set at trial stage – as detailed in product specific validation method.	
Use of vacuum packer – cross contamination	You must use separate ones for raw and cooked foods. Staff training.	Staff training records.rds.		
Use of temperature probe	Needle thermometer and foam sealing tape. Calibration. Cleaning to prevent cross contamination.	Monthly – keep records.	-1^0c to + 1^0c from 0 or 100^0c.	If faulty send to accredited lab for formal calibration or replace probe.

Hazard	Control	Monitoring	Critical limits	Corrective actions
Ingredients	Quality of foods from approved or accredited suppliers. Checking dates and temperatures (ideally less than 5°C). Separation of raw and cooked.	Fridge temperatures daily – records kept. Daily	More than 8°c.	Dispose of stock depending on time above temperature.
Survival of bacteria, viruses, spores	Adequate cooking time and temperature applied during heating process. Identify critical control point in cooking process for product. Consistency of recipe such as portion size, weight and thickness – detailed in product specific validation method. Cleaning of surfaces and equipment – check chemicals comply with BS EN 1276 or 13697.	Probe per batch – records kept. *See monitoring record sheet template in the appendix.* Detailed recipes followed.	60°c for 45 mins 65°c for 10 mins 70°c for 2 mins 75°c for 30 secs 80°c for 6 secs **Exemption - sous vide burgers must be cooked at a minimum of 60°C for at least 93 minutes to reduce the risk of E. coli 0157.** **Any lower temperatures will not be considered as a cooking temperature and you need to control the risks another way**.	Further processing until temperature reached.
Survival of parasites (in raw fish)	Approved suppliers specialising in fish for raw consumption or freezing.	Freezing temperatures recorded.	-20°c for 24 hours.	Extend freezing time.
Growth of pathogenic bacteria	Rapid chilling using iced water bath or blast chiller, ideally within 30mins but no more than 90mins.	Take temperatures/time – keep records. *See monitoring record sheet template.*	Products must be chilled to below 8°c within 90 mins max.	Review cooling procedures. Cool in smaller batches.

Hazard	Control	Monitoring	Critical limits	Corrective actions
Growth of bacteria, moulds, yeasts and toxins in stored product	5 days shelf life max recommended for foods stored at less than 5^{o}c (if no other controls used). If a longer shelf life is proposed, testing may be required. Labelling of foods with a Use by Date.	Fridge temp monitoring – keep records.	Products must not exceed shelf life. If sealed pouch opened shorten shelf life.	Discard out of date food over 8^{0}c.
Inadequate reheating	70^{0}c for 2 mins (or equivalent) if previous processing stage was at a lower temperature. If previous stage reached temperatures listed above, reheating can be at a lower temperature as the product is treated as ready to eat.	Temperature of one per batch – keep records. *See monitoring record sheet template.*	70^{0}c for 2 mins (or equivalent).	Reheat to 70^{0}c for 2 mins (or equivalent).
Cross contamination	Separation of packaging materials, colour coded equipment e.g. chopping boards. Correct use of cleaning chemicals, (BS EN 1276 or 13697) and cloths – 2 stage clean approach and appropriate contact time. Covering and separation of raw and cooked foods. Staff training.	Visual checks. Appropriate signage where necessary. Staff training records.		Discard any food that is at risk from cross-contamination.

Appendix

1. Terminology Glossary

- **Calibration –** is the process of checking and adjusting equipment so that it measures accurately.
- **Control measures** – actions required to exclude, eliminate or reduce hazards to a safe level.
- **Corrective action** – the action taken when a critical limit is breached.
- **Critical control point (CCP)** – a step in a process which must be controlled to eliminate or reduce a hazard to an acceptable risk.
- **Critical limit** – the value of a monitored action which separates acceptable from unacceptable.
- **Hazard** – the potential to cause harm to the consumer and can be microbiological, chemical or physical.
- **Hazard Analysis (HACCP)** – a science-based food safety management system for systematically identifying hazards and risks of food production and the implementation of controls and monitoring procedures at points critical to food safety. Specified corrective action is taken if any measurements deviate from safe limits.
- **Monitoring** – planned observations and measurements of targets and critical limits at control points to confirm that the process is under control.
- **Pasteurization** - The act or process of heating a food to a specific temperature for a specific period of time in order to kill microorganisms that could cause disease (70°C for 2 minutes or equivalent).
- **Ready to eat (RTE)** – can be directly consumed without the application of any process designed to reduce/eliminate potentially harmful organisms (EC Regulation 2073).
- **Thermal Centre** – the coolest part of a product during cooking, usually the middle of the thickest part of the product, also called the core of the product.
- **Validation** – obtaining evidence (scientific, technical and/or observational) that a control measure or combination of control measures, if properly implemented on a consistent basis, is capable of controlling the hazards to a specific outcome in respect of a required level hazard control.
- **Verification** – procedures designed to establish if HACCP system is functioning as planned and is effective.

2. Biological Hazards

This section describes key food borne pathogens associated with sous vide products, with examples of the main types of food in which they can be found and how they can be controlled.

Clostridium botulinum - The anaerobic (absence of oxygen) conditions with sous vide cooking together with the relatively low cooking temperatures provides an opportunity in which *Clostridium botulinum* can survive and grow producing a toxin which is not destroyed by heat. Botulism is a serious illness that can lead to paralysis and death.
Sources - soil, vegetables, intestinal tracts of fish and mammals.
Example Food Sources – low acid processed foods, bottled vegetables, flavoured oils and vacuum packed products.
Growth Temperatures = 3°C to 50°C
pH = 4.6 to 9
Controls – low acid foods pH 4.5 or lower, strict heat treatment, e.g. botulinum cook (90°C for minimum of 10 mins), strict attention to the shelf life of chilled vacuum packed foods: 10 days maximum without additional controls; see the Food Standard Agency's guidance on vacuum packed chilled foods www.food.gov.uk/foodindustry/guidancenotes/foodguid/vacpac.

Clostridium perfringens - Spores can survive the normal cooking process and multiplication can occur if the temperature control is inadequate including cooling practices. Toxins form within 6 hours.
Sources – Soil, intestinal tracts of humans and animals, raw meat, dust and insects.
Example Food Sources – Beef (especially rolled joints), turkey, pork, chicken, cooked mince, gravy, soup, stews and sauces.
Growth Temperatures = 10°C to 52°C
pH = 5 to 8.9
Controls- Food should be consumed immediately after cooking, store food above 63°C, rapid cooling within 1.5 hours and thorough reheating of foods to 75°C for a minimum of 30 seconds or equivalent.

Listeria monocytogenes - is unusual as it can grow at refrigeration temperatures as well as room temperature. It can be a concern in ready to eat foods, for example, due to cross contamination.
Sources – soil, sewage, water, environmental sources, birds and mammals.
Example Food Sources – raw milk, soft mould ripened cheese, coleslaw, ice cream, raw and cooked meats, raw and undercooked poultry, raw and smoked fish, pate, salads and cook chill products.
Growth Temperature = minus 1.5°C to 42°C
pH = minimum 4.3
Controls – use food within date codes and applying short shelf lives, refrigerate between 0 and 5°C, thorough reheating of cook chill products, avoid cross contamination and wash fruit and vegetables including salads.

Salmonella spp. – can be killed by heating to a core temperature of 75°C for 30 seconds or equivalent.
Sources – water, soil, sewage, intestinal tracts of animals especially poultry and swine, raw meat, eggs and milk.
Example Food Sources – beef, turkey, pork, poultry, eggs, cheese, salad vegetables and raw milk.
Growth Temperature = 7°C to 47°C
pH = 3.8 to 9
Controls – Avoid use of raw eggs which are not fully cooked, thorough cooking of poultry, good temperature control.

Ecoli 0157 – the infection is caused by a low effective dose of this bacterium.
Sources – intestinal tract of humans and animals, sewage and water.
Example Food Sources – raw or rare meats and poultry, raw milk and milk products, unprocessed cheese, undercooked burgers, mince, cooked meats and seafood.
Controls – thorough cooking, careful handling to avoid cross-contamination.

Campylobacter spp. - is the most common cause of food poisoning in the UK. The bacteria are usually found on raw or undercooked meat (particularly poultry).
Sources – soil, sewage, poultry, water, animals, raw meat and raw milk; cats, dogs, rodents and some wild birds.
Example Food Sources – raw milk, raw or undercooked meats and water.
Growth Temperature = above 30°C
pH = 6.5 – 7.5
Controls – washing hands after handling raw meat and poultry, keep animals out of food businesses, avoid cross contamination, heat treatment of milk and thorough cooking.

Hepatitis A – is a virus that can cause liver disease if consumed.
Sources – can be found in animals such as pigs, shellfish, wild boar, deer, rabbits, contaminated water.
Example Food Sources – undercooked meats and shellfish, raw shellfish, contaminated drinking water.
Controls – thorough cooking, for example, heating pork to a core internal temperature of 71°C for 20 minutes is necessary to completely inactivate the virus.

Norovirus – highly infectious virus that causes gastroenteritis.
Sources – raw or lightly cooked shellfish.
Example Food Sources – oysters, bivalve molluscs, such as mussels.
Controls – good personal hygiene, especially regular and effective hand washing. 90°C for 90 seconds is sufficient to inactivate virus in shellfish. Avoid eating oysters and other raw shellfish if in a vulnerable group such as elderly, pregnant or in poor health.

Protozoa (Giardia/Cryptosporidium) – caused by microscopic parasites.
Sources – sewage, contaminated water, contaminated food.
Example Food Sources –transmitted through food either because of poor hand washing or food washed in contaminated water.
Controls – good personal hygiene, washing food in clean potable water, thoroughly cook as should be inactivated by 75°C for 30 seconds or equivalent.

DATE AND TIME	FOOD ITEM	IS IT PRECOOKED TEMP/TIME? CCP Y/N?	NUMBER OF ITEMS COOKED IN BATCH	CCP STAGE IN WATERBATH YES OR NO	WATERBATH TEMP AND TIME FOOD IN	FOOD CORE TEMP/ LENGTH OF TIME HELD AT THIS TEMP	RAPID COOL (C) OR SERVICE (S) NOTE COOLING TIME AND METHOD	IF COOLED WHAT SHELF LIFE APPLIED	REHEAT WATERBATH (W) PAN (P) / OVEN (O) NOTE TIME/ TEMP & IF CCP	ANY CORRECTIVE ACTION TAKEN?
25/11/2015 11:00	Chicken breast	No	6	Yes	68ºC 11:30	65ºC 1 hour	Cooled On ice in 30 minutes to 5ºC	3 days from today	Water bath for 45 minutes at 60ºC (core temp) then pan fried to serve **Not CCP**	No