

Guidance on Sous Vide Cooking

General Information

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 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.



Biological Hazards

This section describes key food borne pathogens associated with sous vide products, examples of the main types of food in which they can be found and how they can be controlled. It is the food business operator's responsibility to identify pathogens that may be associated with their products and key control steps.

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 Vehicles – 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, strict attention to the shelf life of chilled vacuum packed foods: 10 days maximum without additional controls; see Food Standard Agency, www.food.gov.uk/foodindustry/guidancenotes/foodquid/vacpac

Clostridium perfringens- Spores can survive the normal cooking process and multiplication can occur if the temperature control is inadequate. Toxins form within 6 hours; this is the maximum time food can be cooked in the danger temperature of 10°C to 52°C without further controls.

Sources – soil, intestinal tracts of humans and animals, raw meat, dust and insects.

Example Food Vehicles – 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.

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 Vehicles – raw milk, soft mould ripened cheese, coleslaw, ice cream, raw and cooked meats, raw and undercooked poultry, raw and smoked fish, pâté, salads and cook chill products.

Growth Temperature = minus 1.5°C to 42°C

pH = minimum 4.3

Controls – use food within date codes, 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 70°C for 2 minutes or equivalent.

Source – water, soil, sewage, intestinal tracts of animals especially poultry and swine, raw meat, eggs and milk.

Example Food vehicle – 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, temperature control.

Ecoli 0157 – the infection is caused by a low effective dose.

Source – intestinal tract of humans and animals, sewage and water.

Example Food Vehicle – 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.

Source – soil, sewage, poultry, water, animals, raw meat and raw milk; cats, dogs, rodents and some wild birds.

Example Food vehicle – 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.

Legal Requirements

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

As a food business operator you are responsible for identifying all hazards within a process and putting in place measurable controls to eliminate the risks.

Controls must be based on sound scientific principles.

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 must introduce suitable controls for each process step, some examples are listed below (this list is not exhaustive).

Purchase

- Specialist equipment should be used including water bath, pouches and sous vide thermometer. The water bath must have a cut off if the water runs dry.
- Use high quality fresh ingredients from a reputable supplier.

Storage

- Food should be stored below 3°C to slow down the growth of food borne pathogens.

Vacuum Packing

- Food quality packaging to be used.
- Follow the instructions for the food sealing system.
- Avoid air bubbles which can cause uneven cooking.
- Preheat the water bath to the temperature before submerging sealed bags.
- A separate vacuum packer for raw foods and cooked foods is required.
- It is recommended vacuum packets of raw food are used within 2 days.
- Label vacuum packed pouches with a date and ensure a secure seal on each pouch.

Cooking

- Calibrate equipment including water baths and probes regularly.
- Time/temperature/size of product combinations for each product must be documented. Variation in weights is critical to time temperature control.
- Monitoring to ensure correct time temperatures must be carried out of both the water bath and the core temperature.
- The storage of food under vacuum allows the potential for *Clostridium* bacteria to grow some of which produce toxins that may not be de-natured by pan searing before service and can have very severe effects.
- Overloading of pouches in the water bath can lead to uneven cooking. Food must be completely submerged.
- Set the water bath 2.5°C above the target temperature of the food to achieve the correct core temperature.
- Carefully remove the bags at the end of cooking and serve immediately or cool quickly.
- Change the water in the water bath frequently.

Cooking: Core Temperature

- Campden BRI advises that a core temperature of not less than **60°C for 45 minutes** should be used for foods under vacuum.
- For products that need to be cooked to destroy *Listeria monocytogenes*, *Salmonella*, *E. coli* 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 temperatures 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

If high risk dishes are not going to reach a minimum core temperature of 60°C for 45 minutes or equivalent you must verify your safe methods. This could be achieved by having foods microbiologically tested.

Chilling - Chill food to < 3°C within 90 minutes

Storage - Food that has been vacuum packed and subjected to sous vide cook/ chill should be used within 10 days of packaging

Reheating -Time/temperature/size of product combinations for each product must be documented.

Hygiene - Disposable gloves are recommended when vacuum packing to reduce bacterial loading

Staff training and records must be documented.

Taking Core Temperatures

To take a temperature inside a vacuum packed pouch you can place special foam 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. Alternatively you can take a core temperature by opening one of the vacuum packed pouches as seen below.



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.

Sampling

There are a number of laboratories that carry out microbiological testing in the region. For further information contact your local Environmental Health Department.

Your 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:

- Suppliers List for sous vide products including food and packaging
- Documented safe methods for each product and information on how the methods have been validated to show the product will be safe (this includes time, temperature and sizes for all sous vide products)
- Calibration records for the probe and water bath
- Temperature records of the water, core time/ temperatures of foods, cooling records, storage time/temperatures and reheating time/temperature records
- Evidence of staff training on the sous vide process
- Any additional requirements will be discussed at the time of inspection.

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