Food and beverage management preservation systems management essay

1. Introduction

Preservation systems that extend the delivery and storage time are cook-chill, cook-freeze and sous vide.

2. Preservation systems

2. 1 Cook-chill

The term cook-chill refers to a catering system that involves the full cooking of food, followed by blast chilling and chilled storage at between 0°C and 3°C. The food can be stored for up to 5 days. Food is distributed in refrigerated vehicles and reheated before service. The principle feature of a blast chiller is that it is capable of rapidly reducing the temperature of hot foods to low, safe temperatures. Therefore, they make it easier for caterers to comply with food safety and temperature control legislations. Cook-chill systems can also reduce the risk of food poisoning and the growth of bacteria in foods.

The procedures and key features of cook-chill:

If you purchase raw materials that are poor quality, they are not going to improve with cooking. It is very important, that you make sure your supplier only supplies you with high quality products and, if necessary, check their storage, handling and distribution methods. 7

Having received good quality raw materials, keep them in a safe storage before they are used.

Pre-preparation of foods, avoiding cross-contamination by staff handling the different types of raw foods. At the preparation stage, basic Food Hygiene Regulations and HACCP Guidelines apply.

It is vital to cook the food at a temperature of 70°C for at least 2 minutes. This is to ensure that any pathogenic micro-organisms that may be present are destroyed. 7

Once after the food is cooked, the chilling process must start as soon as possible and at most within 30 minutes, leaving time for hot portioning prior to chilling. 7 However, handling of food should be kept to a minimum to avoid cross-contamination.

All food should be chilled to between 0°C and 3°C within 90 minutes of being placed in a blast chiller. This is not only to ensure safety, but also preserves the appearance, texture, flavour and nutritional value of food. 7

Chilled food should be stored in a dedicated refrigerated storage cabinet at a temperature of between 0°C and 3°C, in order to control the growth of micro-organisms. You should use a refrigerated cabinet or cold room designed for chilled food storage, and use it solely for your cook-chill products.

In a centralised cook-chill system, the food is supplied to one or more other locations; the dishes must be transported to the other site whilst in their chilled state, kept below 5°C. The use of refrigerated vehicles is recommended, or at the very least, pre-chilled insulated containers for short journeys. 7

Cooked and chilled foods that are to be eaten cold or at room temperature, should be consumed within 30 minutes of removal from storage. 7 If the food is to be reheated to 70°C, this should start within 30 minutes after the food is removed from the chilled storage. Regeneration must take place close to the point of consumption.

2. 2 Cook-freeze

The term cook-freeze refers to a catering system that involves the full cooking of food, followed by blast freezing and storage of food at a controlled low temperature of -18°C/-22°C, before controlled and thorough thawing and regeneration prior to service. Food can be stored for 2 months at this controlled temperature. For a cook-freeze system, you require a blast freezer rather than a blast chiller, suitable storage for frozen foods and, preferably, a controlled thawing cabinet. Blast freezing can also be used for raw materials and semi manufactured products.

The procedures and key features of cook-freeze:

Raw food should be purchased using a standard purchasing specification to ensure quality and consistency.

All foods should be kept under strict temperature control, in hygienic and clean conditions until required for preparation.

Pre-preparation of foods, avoiding cross-contamination by staff handling the different types of raw foods.

Cooking should be ideally done in batches. At times it may be necessary to adjust the recipes to account for large scale batch production and to account for chemical changes in the food and a result of storage for up to eight weeks at very low temperatures.

Within a time limit of 30 minutes, all hot food should be portioned into single or multi-portions prior to freezing.

In order to preserve food quality and prevent any growth of bacteria all cooked food should be placed in a blast freezer within 30 minutes of final cooking and being portioned. The blast freeze cycle transforms the liquid present in the food into microcrystals which do not damage the tissue structure of the product and ensures the quality of the food is maintained so that you still have a high quality product after defrosting.

The shelf-life of pre-cooked frozen food varies according to type but in cold storage, it may be stored up to 8 weeks without any significant loss of nutrients or palatability.

All distribution should take place using chilled insulated containers for any short journeys or refrigerated vehicles for longer journeys.

Frozen food can be thawed to 3°C prior to being regenerated or be regenerated directly from its frozen state. Food should be heated to a minimum of 70°C for at least 2 minutes. Any foods regenerated and not consumed must be destroyed and not reheated or returned to a refrigerator.

2. 3 Sous-vide

The term sous-vide refers to a catering system that involves the preparation of quality raw foods, pre-cooking if necessary, packing food in high-barrier plastic bags, vacuum sealing the bags and cooking the food in the vacuum sealed pouches. Food is then stored in the pouches at a controlled temperature of between 0°C and 3°C, for up to 21 days.

The sous-vide method increases the potential shelf-life of normal cook-chill/cook-freeze in three ways:

By removing the air from the plastic bags or pouches the growth of most bacteria is restricted.

The food is cooked at pasteurization temperatures aiding the destruction of most micro-organisms.

The food being sealed within the bags or pouches is protected during storage and regeneration from any cross-contamination.

The procedures and key features of sous-vide:

Fresh ingredients must be used for sous-vide cooking because it can lower initial microbial levels, increasing shelf life and product freshness.

Vacuum plastic pouches of raw food must not be kept for more than two days before sous-vide pasteurization above 60°C commences.

In sous-vide cooking areas, separate preparation areas for raw food and cooked food must be allocated. All utensils and working surfaces must be kept hygienically clean by sterilization.

When new recipes are developed, exact temperatures, cooking time and procedures must be recorded, and must be followed precisely by the staff.

All sous-vide equipment must be maintained and checked regularly. Vacuum plastic pouches should be checked for leakage.

Attention must be given to accurate temperature control and monitoring as sous-vide especially since foods lack chemical preservatives, which normally arrest biological activity in processed foods.

Main temperatures should be measured with a temperature thermometer, which should be hygienically cleaned.

Cooking temperatures must not exceed 70°C to make sure that the juiciness of the food is not gone.

Vacuum plastic pouches must be labelled with description of contents and name of the staff who prepared the food, date of pasteurisation and expiration.

Sous-vide food must be cooled to 3. 3°C or below in less than 2 hours and consumed within the specified shelf-life storage time. C

Sous-vide food must be stored at 3°C or below. C

Proper and accurate control over refrigerator temperatures must be maintained.

When serving sous-vide food, the regeneration heat used must be the same as that required in traditional cooking.

3. Advantages & disadvantages of the preservation systems

Advantages of cook-chill system

Disadvantages of cook-chill system

Batch processing that involves minimal processing. Having a greater control over portioning and reduced wastage.

Production separated from consumption. Therefore, the business can fully utilised staff time, saving costs.

Central purchasing with bulk buying discount, benefitting the business.

Chiller storage is cheaper to install and run than freezer storage. 4

Blast chillers are cheaper to install and run than blast freezers. 4

Thawing time is eliminated.

Extended shelf life in the distribution chain. Foods are chilled and then regenerated on site, solving the problem of moving hot foods.

Regeneration systems are simpler – infrared and steam convention ovens are mostly used and only 12 minutes is required to reheat all foods.

Anaerobic environment that prevents the growth of aerobic spoilage organisms. 5

Minimises processing impact on sensory and nutritional qualities. Keeping its freshness.

Standards maintained provide quality food to customers.

Allows for a foodservice director to have coveted control in all arenas-cost, convenience, labour and quality.

No system is too small to adapt to cook-chill. 4

Microbiological spoilage due to:

Temperature abuse;

Insufficient pasteurization; or

Aerobic spoilage.

Product shelf lives that are shorter than those demanded by the retailer, consumer and commercial caterer, due to exposure to oxygen during various preparation stages.

Loss of sensory quality due to non-rapid chilling.

Chilled storage is product dependent, for instance, vegetables may develop acidy / pungent flavours within 2 days.

Risk to public health if not managed as a system. D Adequate refrigeration must be maintained at all times.

Advantages of cook-freeze system

Disadvantages of cook-freeze system

Simplified employee scheduling. Skilled employees work eight-hour shifts, Mondays – Fridays. B

Separate items can be prepared in batches, limiting the number of times the item needs to be prepared.

There are no more peak production workloads, ensuring that employees can be used consistently during their shifts without the added stress of peak production. B Since workers are separated from the consumption area, the workers would not feel pressured to work faster, not like the chefs in a kitchen during peak hours.

Batch preparation can reduce labour costs.

Seasonal purchasing provides considerable savings.

Extended shelf life in the distribution chain. Foods are frozen and then regenerated on site, solving the problem of moving hot foods.

Delivery to units will be far less frequent. 4 Since batches can be delivered in one large amount in freezer vehicles.

Long term planning of production and menus become possible. 4

Less dependence on price fluctuations.

More suitable for vending machines incorporating microwave. 4

Equipment costs are high, requiring additional freezer space, packaging supplies, reheating equipment.

Employees who are required to work weekends may be resentful of employees who don’t work weekends. B

Large ice crystals formed can damage food, dry it out, and break down the physical structure. 6 The food may lose its appearance, causing dissatisfaction among the guests.

Thawing is required.

Not all frozen foods can be successfully prepared without extensively modifying the ingredients or recipes. Certain foods lose their flavour or texture after freezing.

Advantages of sous-vide system

Disadvantages of sous-vide system

The flavour, palatability and nutrients are improved, relative to normal processing, because all the contents are held within the sealed pouch. Therefore, customers can benefit from more nutritious foods.

Less additives / preservatives needed.

Reduced risk of cross-contamination because of the pouches used that provide a convenient package for safe handling and distribution.

Wider variety of produced goods, giving more choices to customers.

Shrinkage of the cooked product is reduced, increasing the yield by up to 20% compared to normal cooking.

Reduced oxygen packaging retards the oxidative rancidity of fats and oils.

Batch processing that involves minimal processing. Having a greater control over portioning and reduced wastage.

Centralised production, saving staff time and costs.

Has a longer shelf life than cook-chill, of up to 21 days.

Can offer a flexible production method to catering unites of all sizes with particular applications to a la carte and function menus.

Spoilage is often not visible.

Microbiological spoilage due to:

Temperature abuse;

Insufficient pasteurization; or

Aerobic spoilage.

Exceptionally high standards of hygiene are fundamental.

Product safety is dependent on proper handling and processing.

Sous-vide involves higher set-up capital and operating costs than cook-chill.

Adequate refrigeration must be maintained at all times.

Extra cost to consumer.

Complete meals cannot be produced as certain foods need to be processed differently, for instance, meat and vegetables.

4. Effects of each method on appearance, nutritional value & flavour

4. 1 Cook-chill

Cook-chill is a healthy way of preparing food. One major advantage is that chilled foods are less perishable and retain nutrients longer than foods cooked and held at serving temperatures for relatively long periods in the cook-and-serve systems. Damaging bacteria is rendered dormant 6 in cook-chill systems, minimising food spoilage.

Colour, texture, flavour, structure and nutritional value are locked in. 6 Chilled foods often look more attractive than frozen foods and therefore can be successfully used in cook-chill vending situations.

Delicate food surfaces such as pasta and fruit are protected, as rapid chilling stops an “ ice skin” forming 6 which can instead dehydrate and damage the products’ psychical structure and appearance.

Information on nutrient losses in cook-chill catering systems is reviewed, which is limited and conflicting. In general, it suggests losses of vitamin C, and possibly other labile nutrients appear to be significant in cook-chill systems. A

One major drawback is that not all chilled foods can be successfully prepared without extensively modifying the ingredients or recipes. Some foods may

lose their flavour or texture after chilling. Food, which should have a crisp texture, cannot be prepared by cook-chilling. Chilling the food causes the food to lose its crispness.

4. 2 Cook-freeze

Cook-freeze is very similar to cook-chill, except that the food is frozen not chilled in this system. Blast freezing helps to keep food looking good. The slower the food freezes, the larger the ice crystals form; and large ice crystals can damage food, dry it out, and break down the physical structure 6 causing the food to lose its attractive appearance. Textural changes may occur; soft fruits can become mushy because the cell structure of the fruit collapses. For instance, a food that may not be as good after freezing is strawberries, they often go soft after freezing. Some other foods that are unsuitable for freezing are eggs, cream, potatoes, sauces and cheese.

During blanching of fruit and vegetables, ascorbic acid (vitamin C) and thiamin (B1) are vulnerable. Nutrients in the form of thaw drip may be lost when foods are thawed, for example, thiamine from meat. However, cook-freeze systems result in better vitamin C retention than conventional systems with significant warm-holding periods. A

One major advantage just like cook-chill is that frozen foods are less perishable and retain nutrients longer than foods cooked and held at serving temperatures for relatively long periods in the cook-and-serve systems. One major drawback is that not all frozen foods can be successfully prepared without extensively modifying the ingredients or recipes. As mentioned from above, certain foods lose their flavour or texture after freezing.

4. 3 Sous-vide

Most of the benefits of sous-vide systems are directly related to the fact that food is placed in a sealed pouch; reducing exposure to oxygen, and cooked at low temperatures. The overall effect is accurate control over oxygen, heat and added water. Heat, oxygen and water are mostly responsible for reducing the nutritional values of conventionally prepared foods.

As a low heat / flameless cooking method, little additional fat is required during cooking to prevent food containing proteins from sticking to cooking surfaces. Any additional lipids are mainly for the enhancement of texture and flavour. Because of the plastic pouch, oxidation is greatly reduced, keeping the qualities of vital acids such as polyunsaturated fats.

The plastic pouch prevents the loss of flavours and moisture. In fact, flavours are amplified, and fewer preservatives and flavouring such as spices and less salt are required, lowering the overall sodium content of sous-vide foods. Water-soluble minerals are lost into cooking water, decreasing the mineral content of foods processed by conventional means. The pouch minimises mineral loss, preserving the mineral content of fresh foods.

Regardless of cooking process, many vitamins destabilize during heat treatment. Research indicates that vitamin C retention decreases to 85% after pasteurization and chilled storage for 5 days versus raw product of the same age. A Sous-vide provides the highest retention of vitamins versus steaming, boiling and other cooking methods.

As with all foods, nutritional profile is greatly affected by freshness and minimal processing intervals. Menu items prepared in restaurant using sous-

vide highlight lively flavours and fresh textures, making healthy food more “ lively” to consume. Sous-vide cooking maintains valuable nutritional values of fresh and wholesome foods.

5. Conclusion

The nutrients that provide us energy and help us be healthy also cause our food to spoil. There are many micro-organisms in the environment that get their nutrition from these nutrients. As these micro-organisms start disintegrating the nutrients, they set off the process of food spoilage. Understanding the vital role that micro-organisms play in spoiling food, numerous methods of food preservation have been developed. All these methods work by changing one or a few conditions, such as temperature, water / moisture or oxygen in the food, or in the environment in which the food is kept. Changing or altering these factors hinders the growth of these micro-organisms, and hence prevents food spoilage, enhance / maintain flavours, appearance and texture.