

Food processing and production

Below are two practice questions; the first question shows students responses and examiner feedback; the second question is for you to try yourself.

Chapter 11: Practice question 1 (with student responses and examiner feedback)



Discuss how the processing involved in the production of pasteurised and UHT milk affects the sensory characteristics. Evaluate their use in food preparation and cooking. (10 marks)

Responses

The following responses were provided by students. The level and detail within the responses increases. More examples, with reasons, have been provided that allow students to achieve higher marks. The use of subject-specific language shows more informed understanding of the subject content.

Basic level response

Milk has to be heated up to stop it going off. In pasteurised milk it is heated to about 70°C then cooled down. The flavour isn't really changed. In UHT milk, it is heated higher than pasteurised milk for only about 1 second. Its flavour isn't really changed. (3 marks)

Examiner feedback (3 marks)

This is a basic answer, the student has understood the basic differences between the heat treatment for the two milk types and has explained them in terms of the processing method. There is some attempt to include the temperatures involved, but further explanation is required for additional marks.

Medium level response

Both types of milk are heated to make them safe to drink because microbes are killed. They are also forced through a type of sieve to break up the fat so the texture and flavour is the same all the way through. Pasteurised milk is heated up to 72°C for about 15 seconds then it has to be cooled. UHT milk is heated to about 132°C for a very short time and cooled down and put in cartons. It can be stored at room temperature, which is useful, but pasteurised milk has to stay in the fridge. The flavour of both types of milk is not changed very much by heating them up and the vitamins are not really damaged much. Both types of milk can be used in the same way as each other in cooking, e.g. in roux sauces and batters. (5 marks)

Examiner feedback (5 marks)

The student has explained quite well how the processing of each milk type is carried out. Some attempt is made to compare and evaluate the two types of milk. There is good use of some key terms, which are used to demonstrate good understanding in the processing of milk and its uses in cooking.

High level response

Fresh milk has to be heat treated to kill harmful bacteria and make it safe to drink. Before it is heated, the milk is homogenised. This means it is forced under pressure through a very fine sieve, which breaks up the fat droplets into very small pieces that stay suspended throughout the milk and don't separate. This means that the milk has the same texture and flavour all the way through.

Pasteurised milk is made by heating the homogenised milk very quickly in a heat exchanger to 72°C for 15 seconds, then it is very rapidly cooled to 4°C. This keeps the milk fresh. The pasteurisation process does not noticeably affect the flavour or the colour of the milk, and it has little effect on the nutrients in the milk.

UHT milk is made by heating the homogenised milk very quickly in a heat exchanger to 132°C for 1 second, then it is rapidly cooled and packed into special multi-layered storage packs. These are sealed and the milk can be kept unopened at room temperature until it is opened – unlike pasteurised milk, which would go sour very quickly if it was not refrigerated. The UHT method has little effect on the flavour of the milk or the nutrients. However, after about 6 months in storage, up to 60% of the vitamin B12 in the milk may be lost.

Both of these milks can be used in many recipes in the same way as each other, for example, in sauces, custards, soups, cakes, scones, batters, etc. (10 marks)

Examiner feedback (10 marks)

This is a detailed response showing thorough understanding of the relationship between the processing and production of these milks and how they affect the sensory characteristics. Clear evaluation has taken place – the response is logical and includes key terms. Technical details are used and interpreted correctly and accurately. The student has combined the processing and cooking aspects very well indeed.

Mark scheme

For 8–10 marks: The response shows **thorough** knowledge and understanding of both types of milk. The answer gives several detailed comparisons and evaluates the uses. It relates to **at least five** of the points below. Clear examples have been given

For 5–7 marks: The response shows **good** knowledge and understanding of both types of milk. The answer gives several reasons that relate to **3–4** of the points below. Examples have been given.

For 0–4 marks: The response shows **some** knowledge and understanding of both types of milk. The answer gives some reasons that relate to **2–3** of the points below.

Points to include in the answer

- Fresh milk is usually **heat treated** to kill pathogenic bacteria and make the milk safe to drink for several days if it is stored from 0°C to below 5°C.
- Milk is usually **homogenised** during heat treatment.
- This means processing it to prevent the cream from rising to the surface of the milk; this gives it a consistent texture and flavour.
- When fresh milk is left to stand, the natural fat in it will separate from the rest of the liquid and rise to the surface.
- **Homogenisation** forces the milk, under **pressure**, through thousands of tiny holes; this breaks up the fat and prevents it from separating out.
- There are different types of heat treatment.
- **For pasteurised milk:**
 - The milk is heated very quickly in a **heat exchanger** to a temperature of **72°C for 15 seconds**, then very rapidly cooled to below 10°C (usually to 4°C).
 - Pasteurisation does not significantly affect the flavour or colour of the milk and has little effect on the nutrients in the milk.
- **For UHT milk:**
 - The milk is heated very quickly in a **heat exchanger** to a temperature of **132°C for 1 second**, then rapidly cooled and packed inside special multi-layered storage packs.
 - These packs are completely sealed, so the milk can be stored un-opened and at ambient (room) temperature for several months (it is often called **long-life milk**).
 - Once it is opened, UHT milk must be stored in a refrigerator and consumed within a few days.
 - The UHT method has little effect on the flavour of the milk or its nutrients. However, after about 6 months in storage, up to 60% of the vitamin B12 in the milk may be lost.

Food processing and production**Chapter 11: Practice question 2**

Analyse and evaluate the effect of cooking on green leafy vegetables. (10 marks)

Chapter 11: Mark scheme for practice question 2



Analyse and evaluate the effect of cooking on green leafy vegetables. (10 marks)

Mark scheme

For 8–10 marks: The response shows **thorough** knowledge and understanding of the effect of cooking on green leafy vegetables. The answer gives several detailed comparisons and evaluates the effect on the nutritional value during preparation and cooking and is related to **at least five** of the points below. Clear examples have been given.

For 5–7 marks: The answer shows **good** knowledge and understanding of the effect of cooking on green leafy vegetables. The answer gives several reasons that relate to **3–4** of the points below. Examples have been stated.

For 0–4 marks : The response shows **some** knowledge and understanding of the effect of cooking on green leafy vegetables. The answer gives some reasons that relate to **2–3** of the points below.

Points to include in the answer

- When vegetables are cooked they become more digestible and tender, due to the softening of the complex carbohydrate cellulose in the cell walls.
- During cooking the green colour of the vegetables is intensified; over-cooking will result in a yellowish colour.
- Some nutrients in green leafy vegetables, especially the water-soluble B group vitamins and vitamin C, dissolve in water. The longer vegetables are submerged in water, the more vitamins seep out. The loss of vitamins is increased when these vegetables are also exposed to heat, such as during boiling.
- Vitamin C (ascorbic acid) is readily destroyed during cooking. As it is soluble in water it leaches out into the cooking liquid. It is also rapidly oxidised, particularly in alkaline (salty) conditions. If necessary, salt should be added after cooking, not during.
- Green, leafy vegetables should be stored in a cool, dark place and only prepared just before cooking or serving, as oxidation will occur after the flesh of the vegetable is cut or bruised. The enzyme oxidase is released during the chopping of these vegetables and this can cause deterioration. The enzyme is destroyed at temperatures over 60°C.

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- Decreasing the amount of water you use when boiling vegetables can drastically decrease the loss of nutrients. Most vegetables do not require much water to cook. For example, green beans only need to cook for 4 minutes in enough water to cover the bottom of the pan. Being aware of the amount of time and water needed to boil a vegetable will help you avoid excessive exposure to water and heat.
- Since vegetables have different requirements, boil vegetables separately to avoid overcooking one while the other cooks. If necessary, you can combine vegetables in your recipe after they have all been cooked. Do not discard water used for boiling vegetables. You can retain the nutrients that seeped into the water by finding a way to consume it, such as making it the base of a soup or stew.
- Another option to minimise nutrient loss is to cook your vegetables by a method that does not involve water. Microwaving, steaming and stir-frying are some alternatives to boiling. Microwaving is a quick and convenient way to cook green vegetables that minimises nutrient loss through the absence of water, as well as shorter exposure to heat. Although steaming involves water, the vegetables are rapidly cooked, using only the steam without actual contact with the water. Finally, stir-frying uses dry heat to cook the vegetables and provide the added benefit of a crisp texture, for example, when preparing kale and pak choi.