**Unit 4: Biotechnology**

**What is biotechnology?**

Producing a product or process making use of an organism, component of an organism or any other biological system.

**Role of biotechnology in food industry**

The most popular use case of biotechnology in the food industry is with the production of yogurt, but biotechnology has a lot of functions across the food industry. Such as:

* **Enhanced food safety –** biotechnology can be used to detect foodborne pathogens and bacteria and as well as remove it, making the food safer.
* **Food preservation –** microorganisms can produce natural preservatives which extends the shelf lifetime of products.
* **Developing alternative sources of protein –** it is easier now to develop plant-based and cell-cultured meat product, providing sustainable and ethical food options.

**Steps in the production of alcohol, beer, wine, yoghurt, cheese and bread**

**Beer**

1. **Malting –** barley grains are harvested and allowed to soak in water to start germination. Then after, the grains are dried at room temperature or roasted in an oven. Producing ***barley malt.***
2. **Mashing –** the barley malt is cracked open then mixed with hot water to convert and extract the sugars, forming a liquid called ***wort***.
3. **Boiling –** the wort is boiled with hops to add bitterness and flavor to the beer.
4. **Fermentation –** the wort is cooled and yeast is added, this mixture is allowed to ferment for several days producing ***alcohol*** and ***carbon dioxide.***
5. **Aging –** the beer is then conditioned for several weeks to allow the flavors and aromas to develop.

**Yoghurt**

1. **Heating –** milk is heated for sterilization.
2. **Inoculation –** a starter culture of live bacteria is added.
3. **Fermentation –** the bacteria then ferments the lactose sugar, producing ***lactic acid,*** which makes the milk to thicken producing yoghurt.

**Health benefits of yoghurt**

* Helps ***boost*** the immune system
* Is ***rich in calcium*** which gives you ***strong*** bones, reducing risk of osteoporosis.
* Yoghurt has ***anti-inflammatory*** properties.

**Difference between homogenized and pasteurized**

**Homogenization** is a process that involves breaking down the fat globules in milk into smaller distributed particles.

**Pasteurization** is a process that involves heating a food or beverage to a specific temperature for a certain duration to kill harmful bacteria or parasites.

**Roles in yoghurt**

* **Homogenization –** this process breaks down the fat droplets and stops them from separating.
* **Pasteurization –** this process heats the yoghurt to a temperature to kill harmful bacteria.

**Uses of biotechnology in fuel production**

* **Biofuels –** such as ethanol are produced from fermented sugars.
* **Waste conversion –** microorganisms are able to break down waste materials which turns them into useful biofuels.

**Fermentation**