Name _____ Class

Biotechnology 02

How do you make cheese?

Cheese is made from the milk of animals, including cows, goats, and sheep. Different types and flavours of cheese can be made using different species of bacteria and moulds.

To make cheese, bacteria are added to milk. The bacteria then ferment lactose, a type of sugar found in milk. During fermentation, the lactose is converted into lactic acid. This acid gives cheese its tangy taste.

Lactobacillus

$C_{12}H_{22}O_{11}$

Smaller Sugars e.g.: Galactose/Glucose

Lactic Acid

$C_6H_{12}O_6 > 2\ C_3H_6O_3$ + ENERGY

Lactic Acid gives the cheese its tangy taste

Rennet (Protease enzyme Chymosin)

After the milk has been acidified, Rennet is added. This causes the proteins in the milk to form a curd and allows the liquid to separate and run off as whey.

Curds are pressed to make solid cheese

Cheese 'matures' over time

Milk is heated to HIGH temperature to kill harmful bacteria

PASTEURISATION

Friendly / Useful bacteria added

Milk is kept warm for several hours. Bacteria multiply - LACTOSE converts to LACTIC ACID

LACTIC ACID curdles the MILK into YOGHURT ...

... and prevents the growth of harmful bacteria (keeps longer)

Similarities between cheese- and yoghurt-making:

both made using bacteria

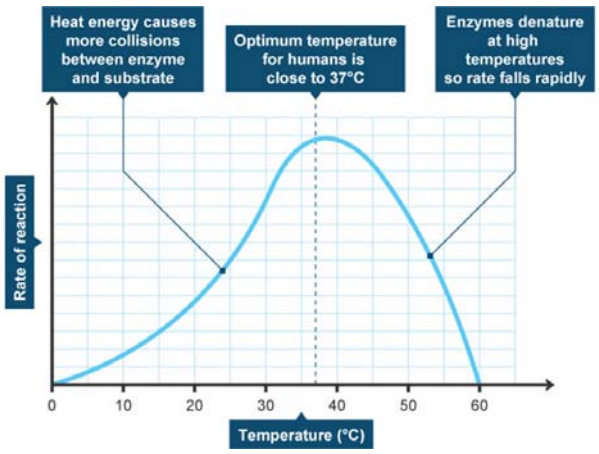
both made using milk

both involve fermentation

lactose is fermented to lactic acid

Remember from Biotechnology 01 the Glucose Fermentation to Ethanol process.

Glucose + Yeast —-> Ethanol + Carbon Dioxide + Energy



Note that yeast activity works best at an optimum temperature, around 37 C, above or below this the yeast will become DENATURED (damaged) and will not be able to perform its function.

Differences between cheese- and yoghurt-making:

rennet is required to manufacture cheese (to provide the enzymes required to curdle the milk)

cheese (curds) needs to be separated from the resulting liquid (whey)

yoghurt needs to be kept warm during its production

the milk used for making yoghurt is pasteurised beforehand