

# 5.1 Food Production

Mr Curran · practical-science.com

## 1. KEY VOCABULARY

TERM	MEANING
Fermentation	Anaerobic respiration in microorganisms (e.g. yeast).
Fermenter	A vessel for growing microorganisms in controlled conditions.
Yield	The amount of useful product obtained.
Glasshouse	A structure that controls a crop's growing conditions.
Fish farming	Raising fish in enclosures to produce food efficiently.

## 2. WAYS TO INCREASE FOOD PRODUCTION

### WAYS WE INCREASE FOOD PRODUCTION

#### MICROORGANISMS

Yoghurt — bacteria ferment milk.  
Bread — yeast makes CO<sub>2</sub> so dough rises.  
Beer & wine — yeast ferments sugars to alcohol.

#### GLASSHOUSES & POLYTUNNELS

Control temperature, light and CO<sub>2</sub>.  
Add fertilisers for minerals.  
→ faster growth and bigger crop yields.

#### FISH FARMING

Fish kept in enclosures; fed controlled diet.  
Predators and disease kept out; water quality maintained → high yields of fish protein.

#### USING A FERMENTER

A large vessel where microorganisms are grown in controlled conditions (temperature, pH, oxygen, nutrients) — e.g. to make antibiotics.

## 3. MICROORGANISMS IN FOOD

**Yoghurt:** bacteria ferment the sugar in milk into lactic acid.  
**Bread:** yeast produces CO<sub>2</sub>, which makes the dough rise.  
**Beer & wine:** yeast ferments sugars into ethanol (alcohol).

## 4. GROWING CROPS & FISH

**Glasshouses / polytunnels:** let growers control temperature, light, CO<sub>2</sub> and add fertilisers — boosting photosynthesis and yield.  
**Fish farming:** fish are kept in enclosures, fed well, and protected from predators and disease.

## 5. THE FERMENTER

Microorganisms are grown in a fermenter with carefully controlled conditions:

- temperature kept at the optimum (a water jacket cools it)
- pH, oxygen and nutrient levels controlled
- kept sterile so no unwanted microbes compete

## 6. THE WHY

**Why conditions in a fermenter are controlled:** to keep the microorganisms growing at their fastest rate and to stop contamination spoiling the product.

**Why glasshouses raise yield:** removing the limiting factors of photosynthesis lets the crop grow as fast as possible.

## 7. COMMON EXAM MISTAKES

- ✗ "Yeast makes bread rise by producing oxygen."
- ✓ Yeast produces carbon dioxide, which makes dough rise.
- ✗ "A fermenter should be kept as hot as possible."
- ✓ Too hot denatures the enzymes — it is kept at the optimum.
- ✗ "Bacteria make yoghurt by fermenting it into alcohol."
- ✓ Bacteria ferment milk sugar into lactic acid, not alcohol.

## 8. SELF-CHECK · cover & quiz

Can you...

1. Explain how microorganisms are used to make yoghurt, bread and beer?
2. Explain how glasshouses increase crop yield?
3. Describe how fish farming increases food production?
4. List the conditions controlled inside a fermenter?
5. Explain why those conditions are controlled?