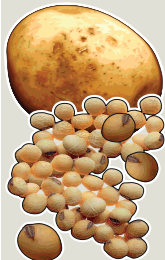
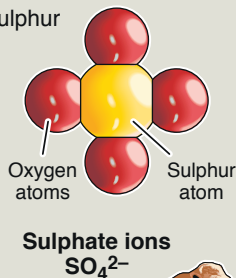
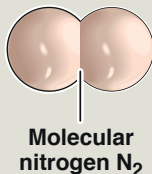
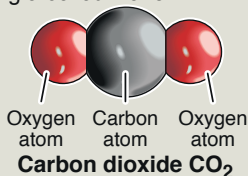


# Food without photosynthesis

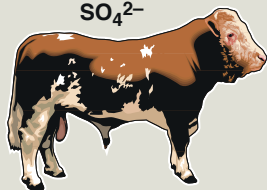
A source of protein created by bacteria from carbon dioxide, water and renewable energy is more efficient than photosynthesis used by plants

**Chemical structure of food:** Carbon, nitrogen and sulphur make up bulk of nutrients, but must first be made digestible by another organism – plant, animal or single-celled life form – which humans can then eat

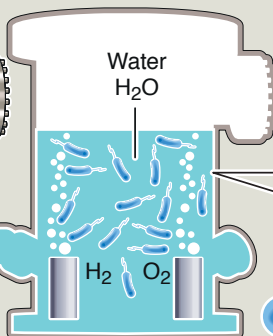
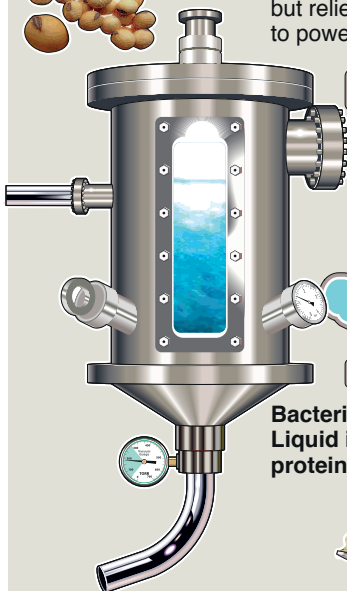


**Agriculture:** Photosynthesis-dependent food production converts  $\text{CO}_2$  to edible biomass

**Livestock:** Convert indigestible cellulose – plant materials like grass and leaves – into food



**Chemosynthesis:** Analogous to photosynthesis, but relies on chemical energy instead of sunlight to power  $\text{CO}_2$  fixation



**Bioreactor:** Hydrogen gas – generated by electrolysis of water –  $\text{CO}_2$  and trace elements are bubbled through liquid containing hydrogen-oxidizing bacteria

**Bacteria:** Eat nutrients and multiply, thickening liquid. Liquid is dried to create powder that is 50% protein, 20-25% carbohydrates and 5-10% fats

