Food & Health

Diet & Food Production

*(a) define the term balanced diet;*

**A diet that contains all the nutrients of the nutrients requires for health and growth in the correct proportions.**

*(b) explain how consumption of an unbalanced diet can lead to malnutrition, with reference to obesity;*

**Malnutrition is caused by an unbalanced diet.**

**Obesity is called by consuming too much energy and the excess energy is deposited as fat in the adipose tissues.**

**Obesity is the condition in which excess fat deposition impairs health and it usually defined when a person has a BMI of 30 or over.**

*(c) discuss the possible links between diet and coronary heart disease (CHD);*

**Excess salt in the diet decreases the water potential of the blood. As a result, more water is held in**

**the blood and blood pressure increases. This can lead to hypertension, which can damage the inner lining of the arteries, which is one of the early steps in the process of atherosclerosis**

**Saturated fats are accepted to be more harmful than unsaturated fats**

*(d) discuss the possible effects of a high blood cholesterol level on the heart and circulatory system, with*

*reference to high-density lipoproteins (HDL) and low-density lipoprotein (LDL);*

**Cholesterols are transported around the body in the form of lipoproteins.**

**LDL**

**Carry cholesterol from liver to cells and there are receptors for LDLs on the cells**

**LDLs raise blood cholesterol**

**Therefore increase deposition of fats and cholesterol under the endothelium of an artery and form atheromas**

**HDL**

**Carry cholesterol from tissues to the liver and there are receptors for HDLs on liver cells**

**HDLs lower blood) cholesterol**

**Therefore reduce deposition of fats and cholesterol and so decrease the formation and risk of atheromas**

**Saturated fats decrease the activity of LDL receptors, so as the blood LDL concentration rises; less is removed from the blood, resulting in higher concentrations of LDL in the blood, which are then deposited on the artery walls.**

*(e) explain that humans depend on plants for food as they are the basis of all food chains. (No details of food*

*chains are required);*

**Plants can carry out photosynthesis to convert light energy to chemical energy. They also absorb**

**plants from the soil and manufacture a range of other biological molecules. Herbivores make use of**

**these biological molecules when they eat and digest food. Humans eat both plants and herbivores,**

**gaining our nutrition both directly and indirectly.**

*(f) outline how selective breeding is used to produce crop plants with high yields, disease resistance and pest*

*resistance;*

**A pair of plants which display the desired characteristics are allowed to reproduce.**

**The offspring produced are sorted carefully to select those with the best combination of characteristics and only those offspring are allowed to reproduce.**

**If this careful selection and controlled reproduction continues for many generations, the required characteristic becomes more exaggerated. e.g. Tomatoes have been bred with improved disease resistance**

*(g) outline how selective breeding is used to produce domestic animals with high productivity;*

**A pair of animals which display the desired characteristics are allowed to reproduce.**

**The offspring produced are sorted carefully to select those with the best combination of characteristics and only those offspring are allowed to reproduce.**

**If this careful selection and controlled reproduction continues for many generations, the required characteristic becomes more exaggerated. e.g. chickens bred for eggs lay over 300 eggs a year, whereas their unselective relatives can lay only 20-30**

**Disadvantages**

**Growth may be too rapid**

**Possibility of increased susceptibility to disease**

**Can cause inbreeding**

**It reduces genetic variation**

*(h) describe how the use of fertilisers and pesticides with plants and the use of antibiotics with animals can*

*increase food production;*

*Fertilisers*

**Replace minerals in the soil which may have been removed by the previous crops. They**

**contain Nitrate, Phosphate and Potassium. They increase the rate of growth and therefore the yield.**

*Pesticides*

**Kill organisms that cause diseases in crops. These organisms would reduce yield or kill the**

**crop. Many crops are sprayed with fungicides to reduce fungal growth in the leaves or**

**roots. Sheep are dipped to kill ticks.**

*Antibiotics*

**Infected animals can be treated with antibiotics to reduce the spread amongst animals that**

**are intensively farmed in close proximity to each other. Such diseases could reduce the**

**growth performance of the animals and may impair reproduction.**

*(i) describe the advantages and disadvantages of using microorganisms to make food for human*

*consumption;*

**Advantages**

**- Production of protein can be many times faster than that of animal or plant protein**

**- Production can be increased or decreased according to demand**

**- No animal welfare issues**

**- They provide a good source of protein for vegetarians**

**- The protein contains no animal fat or cholesterol**

**- Single-cell protein production could be combined with removal of waste products**

**Disadvantages**

**- Many people may not want to eat fungal protein that has been grown on waste**

**- The microorganisms are grown in huge fermenters and need to be isolated from the**

**material on which they grow**

**- The protein has to be purified to ensure it is uncontaminated**

**- The conditions needed to grow the useful organisms are ideal for pathogenic organisms.**

**Care needs to be taken to ensure that the culture is not infected**

**- The protein does not have the taste or texture of traditional protein sources**

*(j) outline how the following can be used to prevent food spoilage by microorganisms*

**Food spoilage is caused when** **bacteria reproduce and secrete enzymes to digested the protein to amino acids, the triglycerides to fatty acids and the starch to glucose.**

**The bacteria also produce toxins and waste products which cause changes in the appearance, smell, texture and taste of food.**

*salting,*

**Bacteria die due to lack of water as water leaves them by osmosis because of a lower water potential outside the cell**

*adding sugar,*

**Bacteria die due to lack of water as water leaves them by osmosis because of a lower water potential outside the cell**

pickling ,

**Acid pH denatures any microorganism’s proteins and therefore enzymes. The substrate no longer fits the active site**

*freezing*,

**Bacteria, reproduce more slowly so fewer bacteria will be present. This means less toxins and waste are produced and less enzymes are secreted. Enzyme action will be slower as the substrate and enzymes have less kinetic energy and fewer enzyme-substrate complexes will be formed.**

*heat treatment*

**Denatures any microorganism’s proteins and therefore enzymes. The substrate no longer fits the active site**

*irradiation*

**Kills organisms by disrupting their DNA structure causing mutations**