UACE P515/2 Principles and practices of agriculture2 2004

3hours

Instructions

- This paper consists of sections: **A, B, C, D and E**
- Answer **question 1** in section A and **four** other questions, selecting **one** from each of the sections **C, D and E.**
- Write your answers in the answer booklets provided
- Any additional question(s) answered will not be marked

SECTION A (20MARKS)

Question1 is compulsory

1. An experiment was carried out to investigate the behavior of plant tissue in sucrose solution. Five different plant tissues of the same volume ($5cm^3$) were each placed in different concentration of sucrose solution. After equilibrium was reached, the volumes of the tissues were measured. The results are shown in Table 1 below. Study the table and answer the questions that follow.

Table 1

Plant tissue	**Sucrose concentration (mol^{-1})**	**Initial volume (cm^3)**	**Final volume (cm^3)**
A	**0.1**	**5.0**	**5.0**
B	**0.2**	**5.0**	**3.0**
C	**0.3**	**5.0**	**7.0**
D	**0.4**	**5.0**	**6.0**
C	**0..5**	**5.0**	**4.0**

(a)(i) Describe the behavior of each of the plant tissues in their respective sucrose solutions.

(ii) Explain the behavior of each of the plant tissues discussed in (a)(i) above (16marks)

(b) Suggest what would happen to tissue A if it were transferred to sucrose solution of 0.3 mol^{-1}?(02marks)

(c) What conclusion can you draw from the above results regarding water movement into and within a plant? (02marks)

SECTION B (20 MARKS)

2. (a) Discuss factors that influence labor supply in agriculture. (12marks)

(b) Explain how the efficiency of labour may be improved on a farm. (08marks)

3. (a) Describe the functions of agricultural co-operatives in Uganda. (06 marks)

(b) Discuss the problems that co-operatives in Uganda face today. (14marks)

SECTION C (20 MARKS)

4 (a) Discuss the dangers associated with the pesticide use in agricultural production. (10marks)

(b) Outline the precautions to be taken by the farmer to ensure safe use of pesticides. (10marks)

5 (a) Outline the characteristics of a good pasture plant. (08marks

(b) Discuss the measures that could be taken to improve natural pasture for increased livestock production. (12 marks)

SECTION D (20 MARKS)

6. (a) Outline the objectives of breeding animals. (12marks)

(b) How can a farmer improve the breeding efficiency in his dairy herd? (08 marks)

7. Discuss the factors responsible for low beef production in Uganda (20marks)

SECTION E (20 MARKS)

8. (a) Explain the factors that affect the life span of tractor tyres. (14marks)

(b) How can the traction of tyres be increased. (06marks)

9. (a) Describe the working of the water cooling system of an engine.(14marks)

(b) Explain how an inefficient cooling system may lead to malfunctioning of engine. (06marks)

Suggested answers

2. An experiment was carried out to investigate the behavior of plant tissue in sucrose solution. Five different plant tissues of the same volume (5cm^3) were each placed in different concentration of sucrose solution. After equilibrium was reached, the volumes of the tissues were measured. The results are shown in Table 1 below. Study the table and answer the questions that follow.

Table 1

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D	**0.4**	**5.0**	**6.0**
E	**0.5**	**5.0**	**4.0**

(a)(i) Describe the behavior of each of the plant tissues in their respective sucrose solutions.

A – the volume of the plant tissue did not change

B – the volume decreased the plant tissue decreased from 50.cm^3 to 3.0cm^3.

C – the volume of the plant tissue increased from 5.0cm^3 to 7.0cm^3.

D - the volume of the plant tissue increased slightly from 5.0cm^3 to 6.0cm^3.

E – the volume of the plant tissue decreased slightly from 5.0 cm^3 to 4.0cm^3.

(ii) Explain the behavior of each of the plant tissues discussed in (a)(i) above (16marks)

A – the volume A remained unchanged because the external solution is isotonic thus, it had no net absorption nor loss of water causing no change in its volume

B – the volume B decreased because the external solution is hypertonic, thus it had a net loss of water to external solution causing a decrease in its volume

C – the volume C increased because the external solution is hypotonic, thus it had a net absorption of water from external solution causing an increase in its volume.

D – the volume D increased because the external solution is hypotonic, thus it had a net absorption of water from external solution causing an increase in its volume.

E – the volume E decreased because the external solution is hypertonic, thus it had a net loss of water to external solution causing a decrease in its volume

(b) Suggest what would happen to tissue A if it were transferred to sucrose solution of 0.3 mol^{-1}?(02marks)

It would decrease in volume because 0.3

(c) What conclusion can you draw from the above results regarding water movement into and within a plant? (02marks)

Water moves from a dilute solution to a concentrated solution through semipermeable membranes

SECTION B (20 MARKS)

2. (a) Discuss factors that influence labor supply in agriculture. (12marks)

- Health conditions of the workers: healthy workers are able to work long hours compared to sickly worker
- Motivation in terms of salaries and allowances.
- Good working conditions such as housing, transport and health allowances attract many laborers.
- Population size: a high population leads to provision of labor e.g. china
- Retirement age: high retirement age guarantees a high labor supply.
- Immigration and emigration (increases or decrease labor)
- Labor mobility: high labor mobility leads to high labor.
- Working time: as number of working time increases supply of labor also increases.
- Strength of trade unions: these can reduce the number of people employed by fixing a minimum wage.
- Nature of work: heavy and risky work attracts fewer laborers.
- Level of education and skills: highly skilled jobs have fewer workers
- Political stability: a stable country has more people willing to work than unstable country.
- Government policies such as minimum age of a laborer and minimum wage may reduce the number people employed
- Attitude toward agriculture
- Level of advertisement of agricultural work
- Rural-urban migration reduce supply of labor on the farms

(b) Explain how the efficiency of labour may be improved on a farm. (08marks)

- on job training
- effective supervision/management
- encouraging specialization
- providing incentives such as attractive salary
- improving technology
- timely payment of wages
- provision of job security
- division labor among employees
- favorable climate/temperature

3. (a) Describe the functions of agricultural co-operatives in Uganda. (06 marks)

- some provide loans to members
- bring together many farmers to achieve large scale farming
- promote education and training for members to achieve high levels of management.
- Provide market for farmers' produce by buying commodities from members
- Store produce before selling
- Provide employment to members such as accountants and managers
- Provide transport for the produce to the market
- Provide inputs to the farmers at subsidized prices

- Some process produce before selling thereby adding value
- Bargain good prices for farmers' produce
- Distribute dividends to members
-

(b) Discuss the problems that co-operatives in Uganda face today. (14marks)

- Members lack management skills
- Inadequate funds to support cooperative activities
- Corruption and embezzlement by manages
- Poor transport network to collect and sell produce
- Shortage of storage facilities
- Lack of preservation technology and facilities
- Price fluctuation reduce profit margins
- Political interference in the cooperatives' decision making leading to poor decisions.
- Political instability disorganizing activities of cooperative organizations causing losses.
- High competition from private business men
- High bank interest rate making the businesses unprofitable
- Lack collateral to secure loans
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SECTION C (20 MARKS)

4 (a) Discuss the dangers associated with the pesticide use in agricultural production. (10marks)

- They kill beneficial organism as well for example pollinator.
- They pollute the environment
- They lower the value and/quality of products
- Some pesticides can interfere with hormone systems, potentially leading to developmental and reproductive problems.
- They are poisonous to the farmer and livestock
- Lead to chemical resistant pests on prolonged use of same pesticide
- Some pesticides are inflammable and may cause fire hazards
- Some pesticides such as DDT accumulate in food chain leading to toxic levels and may eliminate organisms in top trophic levels.
- Exposure during pregnancy can increase the risk of birth defects and developmental delays in children.

(b) Outline the precautions to be taken by the farmer to ensure safe use of pesticides. (10marks)

- Read the instructions on the container or leaflet before using the pesticide
- Wear protective clothes such as overalls, gloves, rubber boots, head masks and eye shields.
- Chemical should be stored in safe places away from children.

- Do not eat or drink while working with pesticides
- Wash any spillage from your body as soon as possible
- Clean the equipment after use
- Dispose of empty containers safely as instructed by the manufacturer.
- Do not use empty containers for edible substances.

5 (a) Outline the characteristics of a good pasture plant. (08marks

- It should be easy to establish hence reducing cost involved in replacing the seeds that failed to establish.
- It should be able to provide herbage even in times of scarcity.
- It should be drought resistant. In order to meet this deep rooted species are always preferred.
- It should be easy to manage i.e. easy to plant, weed and harvest.
- It should be highly palatable so that the animals can take it.
- Should match with the nutrient requirement of animal.
- It should show a high resistance to grazing i.e. the species should be able to regenerate after grazing and persist for at least three years.
- It should be highly resistant to pest and diseases that can attack the pasture.
- Should be able to produce a large quantity of dry matter in a year for the animals to graze on.
- It should have a suitable height from the ground to allow easy grazing by the animal.
- It must be a pasture that can be easily mixed with other pasture species without having any effect on them or being affected.
- It should have readily available seeds that can be used for propagation.

(b) Discuss the measures that could be taken to improve natural pasture for increased livestock production. (12 marks)

- Fencing - The area should be fenced to exclude wild animals and intruders.
- Controlled grazing/Paddocking to facilitate rotational grazing to encourage efficient forage utilized and reduces over grazing.
- Remove bushes and dense tree canopy so that the pasture grasses can receive enough light.
- Bush control by slashing to remove dense canopy and facilitate sprouting during rainy season
- Control pests, diseases and parasites
- Weeds control – Poisonous and notorious weeds should be removed.
- Provision of water to animals – Watering points should be well distributed to avoid over grazing and trampling on pastures in some places.
- Draining marshy areas to reduce water logging

- Erosion control – Stolonferous grass spp should be planted on bear surface or in over grazed area to reduce soil erosion.
- Over sow – this is the introduction of improved forage spp more especially legumes in natural pasture to improve nutrient content.
- Establishing fodder bank that can be fed to animals when fresh herbage is scarce.
- Distribute salt licks evenly in a pasture to stop animals from creating small path in a pasture as they move to the point with the licks.
- Practice control burning so that all pasture with parasites are got rid of to give way for the young and nutritious forage.
- Spray the pasture with molasses to improve on their palatability.

SECTION D (20 MARKS)

6. (a) Outline the objectives of breeding animals. (12marks)

- To maintain desirable qualities in animals like increased number of eggs produced in chicken, high number of off springs born per animal,
- Produce animals with a high mothering ability i.e. low temperament and high milk production
- Produce highly fertile animals that can produce twins or many offspring
- Produce animals with a high growth rate
- Produce animals that can give a lot products like milk and eggs
- To come up with breeds that produce high quality meat, wool, milk and egg
- To produce breeds of animals that are resistant to parasites and diseases
- Produce animals with high feed conversion ratio.
- To produce animals with a high resistance to harsh environmental conditions
- To produce animals that can provide products for a long period of time

(b) How can a farmer improve the breeding efficiency in his dairy herd? (08 marks)

- **Good feeding**: Breeding animals should be fed well but excessive fattening should be avoided as it may reduce the fertility.
- **Observing the rest period:** Animals should be given a rest period of about 60 days to allow the uterus to return to normal
- **Insemination at the right time:** In case of artificial insemination, the cow should be inseminated towards the middle and late part of heat period as ovulation occurs 14 hours after the beginning of estrus.
- **Observation of animals on heat:** This should be done as early as possible more especially where artificial insemination is being used to avoid the animal missing service.

- **Veterinary Attention:** Animals that fail to conceive should be identified and examined to find out the causes and treated if possible.
- **Pregnancy diagnosis**: Animals should be diagnosed to find out whether they have conceived or not so that appropriate measures can be taken in time.
- **Keep accurate breeding records** for the herd to be used as reference were necessary
- Use **teaser bulls** for early detection of heat in farm animals for early service
- **Maintain a good ratio of bulls to females to avoid** over working the bulls which lowers fertility
- **Use correct techniques of artificial insemination** to ensure successful fertilization hence high breeding efficiency
- **Females with abnormal discharges** should examined and treated early enough
- **Know a complete breeding** history of the animals before buying it into the farm

7. Discuss the factors responsible for low beef production in Uganda (20marks)

- **Pests and diseases:** The tropical conditions favor the multiplication of the pests like tsetse flies and internal worms. These have caused a lot to farmers.
- **Lack of enough capital:** Most farmers in Uganda are poor and therefore can't afford expensive inputs like drugs, animal feeds etc.
- **Breeding:** In Uganda most animals are mated when they are still young and there is a lot of inbreeding which will affect the quality and quantity of livestock products.
- **Poor Housing:** There is no proper housing for livestock in Uganda and the animals are left to sleep outside where they are exposed to advanced environmental conditions which will affect their products.
- **Poor Record Keeping:** Most farms in Uganda lack records of individual animals and the farms in general. This makes selection for breeding and culling difficult (removal of unproductive animals in the farm)
- **Limited Extension Services:** Most farmers do not receive enough information on livestock management from extension staff. This is because extension workers are far and are not well facilitated.
- **Poor Marketing System:** The markets for livestock and their products are still few and scattered with fluctuating prices which discourage the farmers.
- **Poor Pastures:** Most of the pastures graded by the animals are of poor quality which lowers animal production
- **Insecurity and cattle rustling:** Some places in Uganda are politically insecure which leads to loss of life and property hence discouraging livestock production.
- **Harsh climate:** Long drought leads to inadequate water and pasture which lower animal production

SECTION E (20 MARKS)

8. (a) Explain the factors that affect the life span of tractor tyres. (14marks)

- **Quality of tyres:** High quality tyres usually last longer
- **Terrain:** rough or uneven terrain cause more wear and tear than smooth terrain
- **Load:** carrying heavier loads that the tyres are rated reduce their lifespan.
- **Inflation pressure:** inadequately inflated tyres reduces the lifespan
- **Management practices:** regular inspection, proper storage and timely repairs prolong tyres' lifespan
- **Speed:** driving at speeds higher than recommended generate a lot of heat that cause deterioration of tyres.
- **Environmental factors** such as extreme heat, sunlight and chemicals can degrade tyres.
- **Wheel alignment:** poor alignment may damage the tyres
- **Chassis status:** chassis in poor mechanical status impact on the life span of tyres
- **Poor driving habits** like quick acceleration or sudden braking reduce the life span of tyres
- **Weather Conditions:** driving in poor weather conditions like ice, snow, and rain can cause tires to wear quicker because they must work harder to maintain traction.
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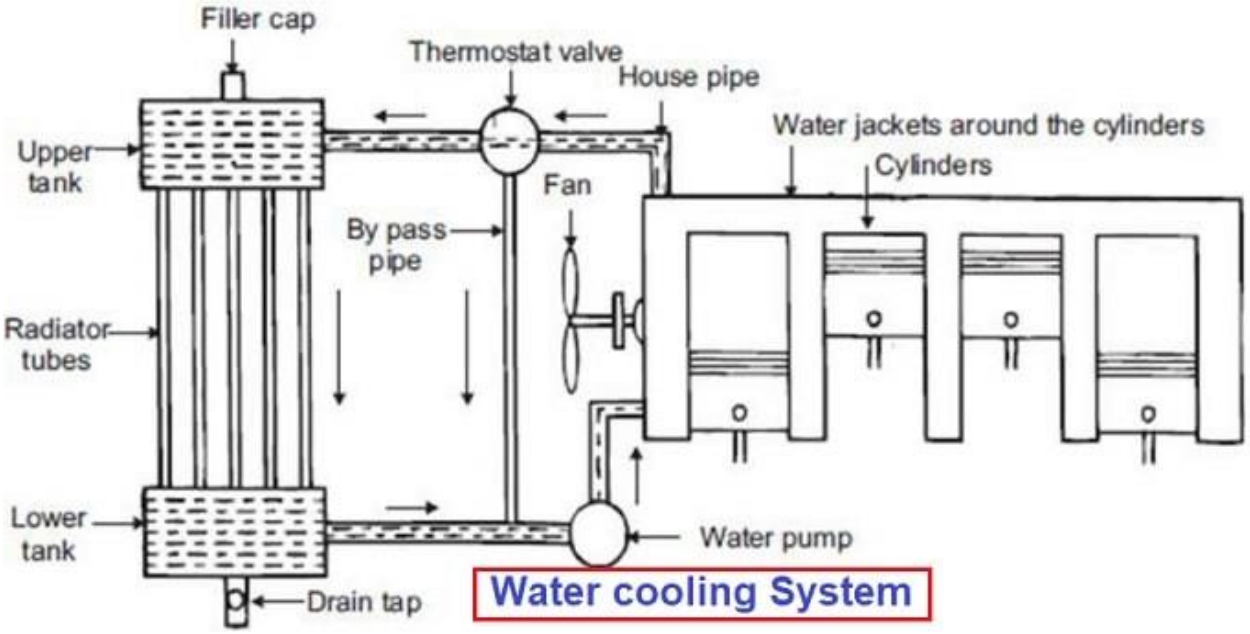
(b) How can the traction of tyres be increased. (06marks)

- **Proper Inflation**: Ensure your tyres are inflated to the correct pressure. Under-inflated tyres can cause excessive wear while over-inflated tyres reduce contact area with the graound.
- **Ballasting**: Adding weight to your tractor can help improve traction.
- Tyre chains: for operation on slippery or muddy terrain, tyre chain can provide addition grip.
- Dual wheels: installing dual wheels can increase the contact area with the ground, thus improving traction
- Tyre siping and growing: cutting additional slits or grooves in the tyre treads can improve traction, especially in wet or icy conditions
- Choosing the right tyres improves traction
- Driving at low speed
- Using sand. Gravels, stone or dry soil under the tyres on slippery ground.

9. (a) Describe the working of the water cooling system of an engine.(14marks)



Process

- Water pump pushes the coolant through the engine block and cylinder head where it absorbs head.
- The hot coolant flows to the radiator where heat is lost to the surrounding through the radiator fins. This is promoted by the fan that draws air through the radiator.
- The thermostat controls the flow of coolant to maintain the engine temperature

(b) Explain how an inefficient cooling system may lead to malfunctioning of engine. (06marks)

- Failure of Engine to start
- Engine Overheating
- Noise: the cooling system can be noisy due to dry bearings, loose pump shaft pulleys, loose shaft impellers, or two large end plates on the shaft. Some pumps require the addition of a special water pump lubricant to the coolant to eliminate operating noise.
- Poor Gas Mileage: if engine temperature is not appropriate there will a reduction in efficiency utilization of fuel
- Temperature gauge trips into the red zone indicating faulty cooling system
- **Coolant Leaks**: These can occur due to faulty hoses, a damaged radiator, or a failing water pump.
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END

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Thanks

Dr. Bbosa Science