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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

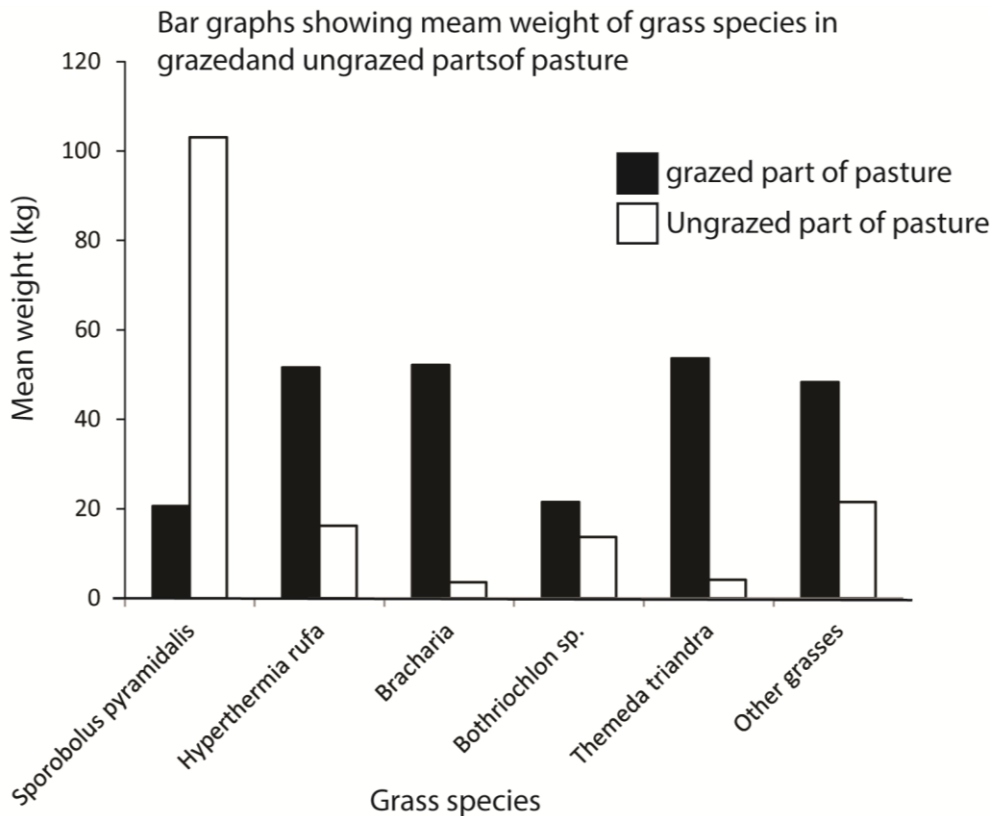
SECTION A (20MARKS)

Question1 is compulsory

1. An experiment was carried out on a pasture in which part of the pasture was not grazed while the other was grazed. The abundance by weight of certain grass species in the grazed and ungrazed parts of pasture was determined after 12 months. Shoots of each grass species were harvested, dried and weighed to determine the weight.

Grass species	Ungrazed part of pasture Mean weight(kg)	Grazed part of pasture Mean weight(kg)
Sporobolus pyramidalis	20.6	103.1
Hyperthermia rufa	51.6	16.2
Bracharia	52.2	3.6
Bothriochlon sp.	21.5	13.7
Themeda triandra	53.6	4.1
Other grasses	48.3	21.5

- (a) Using the data in the table, construct a bar graph to illustrate the relative abundance of grass species in the grazes and ungrazed parts of the pasture. (10marks)



(b) Explain the differences in abundance of the different grass species in the grazed and ungrazed parts of the pasture. (06marks)

- Mean weight pasture abundance of different grass species is high in ungrazed pastures are compared to grazed pastures except for *sporobolus pyramidalis* spp. This is because they are grazed on by animals and hence reduces their mean weight and abundance unlike in ungrazed pasture.
- For *Sporobolus pyramidalis* spp. Is ungrazed because it is unpalatable thus survives and flourish in grazed part of the pasture due to lack of competition after the other species are grazed
- *Bracharia* and *Themeda triandra* are highly palatable and are very susceptible to grazing pressure hence low abundance
- Other grasses constitute a mixture of unpalatable, averagely palatable and very highly palatable (endangered species) and grazing is selective in this case.

(c) Suggest how you would improve the balance of grass species in the pasture. (04marks)

- Removal of unpalatable or poisonous pasture
- Control weeds
- Irrigation to improve moisture content and boost growth during drought
- Planting desirable species
- Rotational grazing to allow pasture recovery from grazing
- Rehabilitating areas with poor vegetation
- Fertilizer application
- Promoting the growth of desirable plants
- Consider reseeding or renovation

- Paddocking /fencing to control grazing

SECTION B (20 MARKS)

CROP PRODUCTION

2. (a) Explain the characteristics of weeds that have led to their successful growth on arable land.

(14marks)

- Rapid rate of growth and maturation
- Drought resistant
- Resistant to pest and disease
- Some are parasitic
- Produce large volume of seed to increase their chance of survival
- Vegetative reproduction allows weeds to develop from any part of the plant
- Weeds employ various mechanisms of dispersal using wind, water, animals and self-dispersal mechanisms.
- Produce poisonous substances to crops
- Can obtain nitrogen from carnivorous behavior
- Are protected by structures such thorns and itching hairs that protect them herbivores.
- Some are resistant to herbicides

- (b) Outline the advantages of chemical method of weed control. (06 marks)

- Requires less labour
- It's effective where mechanical tillage is impossible
- Preserve the soil structure
- Herbicides can be applied before the weeds grow unlike other methods of weed control, it is possible to apply herbicides in the pre-plant and pre-emergence stages.
- Herbicides can get rid of deep-rooted weeds
- Herbicides prevent weeds from growing for a long time
- Herbicides can get rid of structurally similar weeds

3. (a) Explain the roles played by each of the following in soil formation.

(i) temperature (04marks)

- Alternate expansion and contraction of rock surfaces due to temperature changes of day and night cause cracking of rocks to form soil

- Increase in temperature results in evaporation of soil moisture of soil moisture to form rain which is a weathering agent
- Increase in temperature promotes activities of soil organisms that cause biological weathering
- High temperature causes peeling of the rock surface (exfoliation)
- Low temperature at high altitude cause solidification water into ice that exert pressure and cause rocks to crack

(ii) rain fall (04marks)

- Rain drops dislodges particles from rocks to form soil
- Flow of rain water carry solids that knock particle from parent rocks.
- Rain dissolves carbon dioxide and sulphur dioxide forming acid solution which dissolve rocks.
- Rain provide water used by soil organisms in decomposed organic matter.
- Running water helps to remove accumulated materials from rocks surface thus exposing rocks to agents of weathering.

(iii) parental material (04marks)

- It determines the type of soil formed for example sand stone gives rise to sandy soil while volcanic ash give rise to very fine soils.
- Parental material affects the colour of the soil formed
- Parent material determines the ease of weathering i.e. soft rocks such as igneous rocks are easier to breakdown.
- Parent material influences the rate of soil profile development
- Parent material determines the depth of soil formed. For example, soft igneous rocks produce deeper and more fertile soils than hard sedimentary rocks

(iv) living organisms (04marks)

- Roots of trees grow in the cracks widen the cracks causing the rocks to split
- Burrowing animals e.g. rodents breakdown soft rocks and help in soil profile mixing.
- Living organisms like bacteria and fungi carry out decomposition of dead plants and animals remain leading to soil formation.
- Animal hooves break the rock surface that they walk on.
- The termites are able to convert wood into soil because they have the cellulose enzymes in their guts which act on cellulose in wood.
- The vegetative cover protects the soil surface from soil erosion hence minimizing soil loss.
- Living organisms die and decompose to form soil
- Earth worms grind up mineral particles important in soil formation

- Fungi and algae colonize the rocks and secrete chemicals which dissolve rocks.

(b) Outline the significance of good soil structure in plant growth (04marks)

- It controls the passage of water through the soil i.e. granular structure enables a more rapid downward flow of water than planty structure
- It controls aeration of soil
- It controls soil temperature
- It regulate water holding capacity
- Controls soil pH by controlling air passage
- It controls workability of the soil; single, loose grained soil is easier to work than sticky heavy soils.
- It control root soil penetration
- Control soil erosion; loose soil is easily eroded.
- Controls the ability of soil to hold nutrients

SECTION C (20 MARKS)

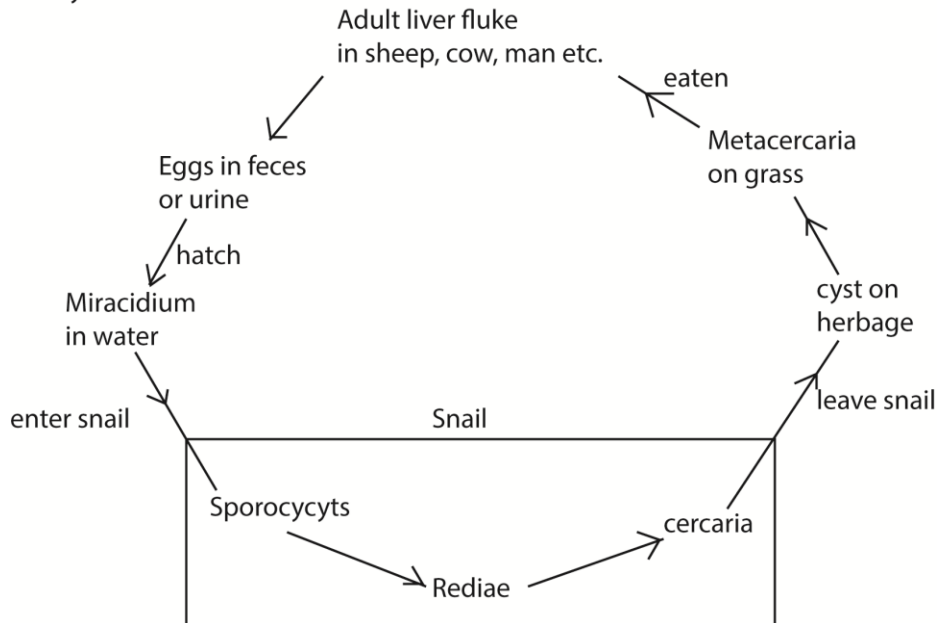
ANIMAL PRODUCTION

4 (a) Explain ways in which parasites are harmful to livestock (06marks).

- Some vectors for example tsetse fly transmit nagana
- Damage skin promoting infection
- Suck blood causing anaemia
- Cause loss of weight/emanciation
- Cause irritation and discomfort
- Retard growth
- Weaken animals immune system promoting disease
- Reduced appetite
- Diarrhea and constipation

(b) With the aid of a labeled diagram, describe the life cycle of a liver fluke. (14marks)

Life cycle of liver fluke



- Adult fluke in the liver and bile duct lay eggs, the eggs enter into the intestine and passed out in feces.
- The eggs develop into the first larva stage called miracidium
- The miracidium swims in water and enters into a water snail (*Liminaea truncatula*)
- In the snail miracidium changes into a sporocyst, then into a larva form redia.
- Rediae migrate into digestive gland of the snail where it grows into another larva stage called cercaria.
- The cercaria leave the snail into water to the grass and turns into a cyst which changes into infective stage the metacercaria
- Metacercaria is ingested by the cycle repeats.

5 (a) Explain the process of milk secretion and milk let-down. (12marks)

Milk secretion

- Milk is secreted by the secretory cells called alveoli secretory cells in the udder under the influence of prolactin hormone from the anterior pituitary gland
- Milk is made from the nutrients eaten by the animal like blood sugar, amino acids and fatty acids
- Vitamins and minerals can be added to milk from blood
- The manufactured milk can be stored in cavities of the alveoli and small ducts

Milk let down

This is down flow of milk from the udder to the lowest part of the teat or it is process by which milk is removed from the alveoli and small duct systems to the lower part of the udder i.e. gland cistern and teat canal.

Process of milk let down

- When the udder is stimulated, by washing with warm water or suckling by the calf, a message is sent to the anterior part of the brain through the spinal cord.
- A hormone called oxytocin is released in the blood stream from the anterior pituitary gland.
- When the hormone reaches the udders it causes contraction of muscles surrounding the alveoli
- The squeezing action forces the milk into the gland and teat cisterns
- The action of suckling / milking will bring the milk outside.

Ways of stimulating milk let down

- Taking the cow to the milking parlor
- Massaging the udder or washing it with warm water
- Noise or rattling of milk buckets
- Feeding of the on concentrates cow in the milking parlor
- Approach of milking time
- Presence of the calf at the milking place

(b) Outline various ways in which the quality of milk may be reduced.

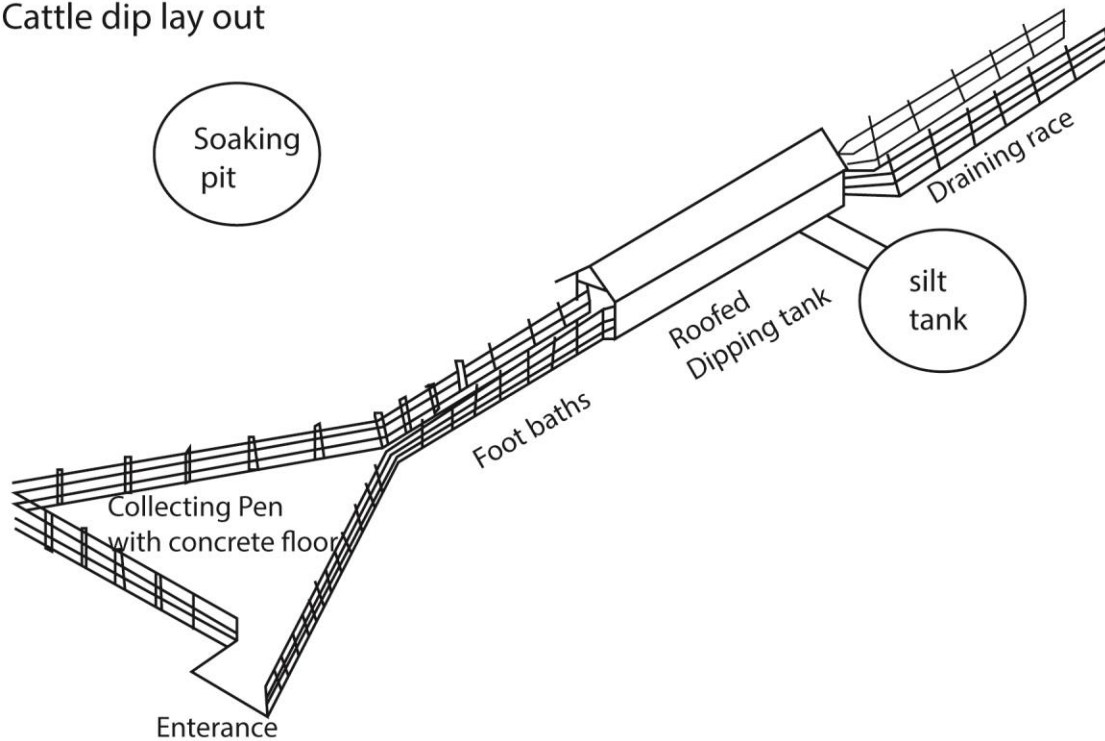
- Bacterial contamination
- Poor sanitation or use poorly cleaned milk containers
- Animal diet such as that which contains wild onion or garlic
- Environmental factors such as poor ventilation in the barn can lead to a 'barny' odor in milk. Actually milk has ability absorb flavors from the environment
- Metabolic disorders such as ketosis can cause the milk to have unusual smell, like acetone while milk that contain lipase easily become rancid
- Oxidation: exposure to light or metals can cause the milk to oxidize, leading to cardboard-like or metallic smell.
- Sulfur compounds: Milk contains small amounts of sulfur-containing compounds, like methionine and cysteine, which can produce a slightly sulfurous or "eggy" smell when broken down.
- Milk can get bad odor due to treatment with some drugs

SECTION D (20 MARKS)

AGRICULTURAL ENGINEERING

6. (a) Describe the functions of different parts of cattle dip. (12marks)

Cattle dip lay out



- **Plunge/dipping Tank:** A narrow channel where animals walk, immersing them in progressively deeper liquid until fully submerged (except for their heads to breathe). The channel then becomes shallower as the animal exits.
- **Holding Yard/collecting pen:** An area where livestock gather before entering the dip.
- **Foot Bath:** A shallow pool where animals' feet are treated with acaricides.
- **Jump:** A barrier that prevents animals from turning back once they enter the dip.
- **Dip Tank:** The main structure where animals are immersed in liquid containing parasiticides.
- **Draining Race:** A channel where excess dip solution drains off.
- **Silt Trap Outlet:** Collects sediment and prevents clogging.
- **Roof:** Provides shade and protects the dip solution from sunlight.
- **Water Tank:** Stores water for diluting the dip solution.
- **Soaking pit:** a pit where used dip solution is disposed of.

(b) What safety precautions should be taken when dipping cattle? (08marks)

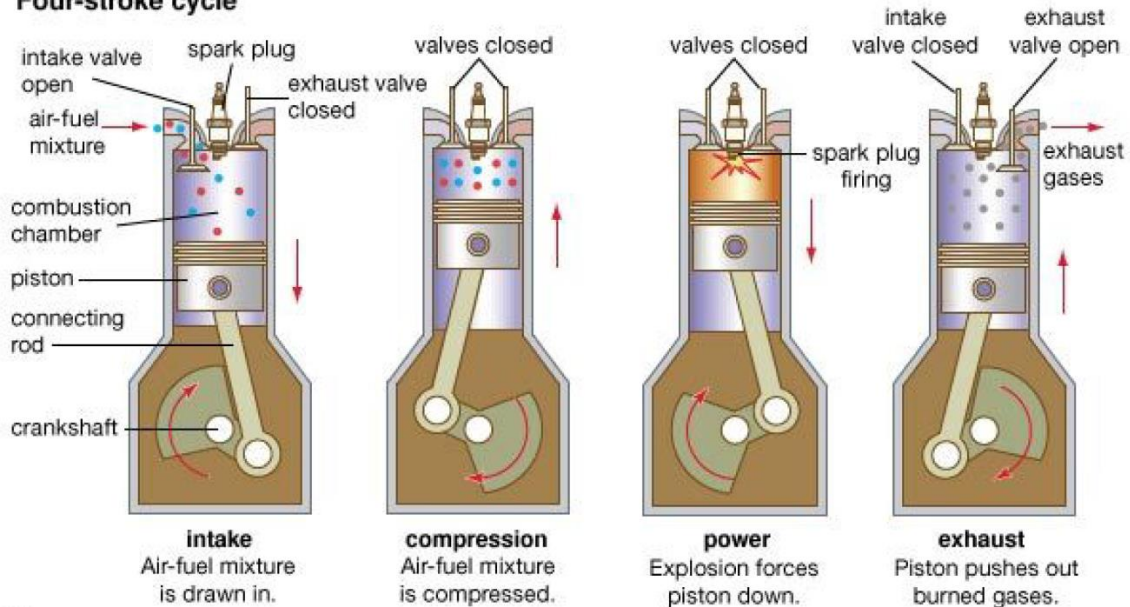
- Sick and heavily pregnant animals should not be dipped
- Use rope to pull out failing animals

- Use guide rails to protect yourself from being harmed by animals
- Wear protective clothes to protect for harm from Acaricide
- Wash any spills of Acaricide from your body as soon as possible
- Clean the safety gadgets after use
- Chemical should be stored in safe places away from children.
- Do not eat or drink while dipping animals
- Clean the equipment after use
- Dispose of empty containers safely as instructed by the manufacturer.
- Do not use empty containers for edible substances.

7. (a) Describe the principle of operation of a 4-stroke petrol engine. (12marks)

- In a four-stroke engine each piston is equipped with at least two valves, one to admit air or air-fuel mixture and the second to exhaust spent gases after ignition.
- The opening and closing of these valves is mechanically synchronized with the movement of the piston backwards and forward.
- The four –stroke cycles derives its name from the four identifiable movements of the piston in the chamber, two of expansion and two of compression, for each full power cycle:

Four-stroke cycle



- Intake stroke: the intake valve is open, is open, fuel –air mixture is drawn in with a downward stroke
- Compression stroke: as the piston moves upwards, the fuel-air mixture is compressed
- Power stroke: after the fuel is compressed, it is ignited to produce the engine power
- Exhaust stroke: the exhaust value opens and the exhaust gasses exit the cylinder

(b) Outline the difference between the 2-stroke and 4-stroke engines?. (08marks)

- A four-stroke engine goes through four stages or two complete revolution to complete one power stroke, while a two-stroke engine goes through two stages or one complete revolution to complete one power stroke,
- A two-stroke produces higher torque than four stroke
- Two-stroke engine combines more function in one piston movement i.e. during the upwards movement of the piston (compressing the air/fuel/oil mixture) in the combustion chamber, underneath the piston a fresh mixture of air/fuel/oil is drawn in the hermetically closed.
- Two stroke engine weigh less than four stroke
- Two stroke engine lacks valve system
- During operation, the two stroke engine crates less friction on parts and thus has high efficiency
- Two stroke engine consumes more fuel
- Two stroke engine cause more vibration and noise
- Two stroke engine produces less power
- Two stroke engine has a shorter life span

SECTION e (20 MARKS)

AGRICULTURAL ECONOMICS

8. (a) Explain the functions of marketing. (12marks)

Market functions embrace activities aimed at identifying, satisfying and retaining customers while achieving organization goals they include

- **Promotion** to introduce, educate and create awareness to new customers about the benefits of your brands and entice them to buy
- **Selling** is a marketing function that guides marketers entice buyers to buy.
- **Product management** to ensure that quality is in-built into the product and assess the usefulness of the product
- **Pricing** i.e. choosing the right competitive price that can support company's operations
- **Marketing information management** involves collect, process and making decision about product information from the market including that of substitutes.
- **Financing** or looking for the source of capital
- **Distribution:** ensuring products reach the final consumer.

(b) What problems are experienced by Uganda farmers in marketing their agricultural product? (08marks)

- Bulkiness of the products making it difficult to transport to places where they are demanded

- Inelasticity of demand
- Most agricultural products are perishable
- Completion from synthetic substitutes
- Lack of preservation facilities
- Price fluctuation
- Insecurity
- Production small quantities
- Lack of method of preservation to sell in time of scarcity
- Poor transport system that fails transportation of agricultural products
- Long biological lag makes it difficult to increase supply in short run
- Weather uncertainties may disrupting production
- Use of poor technology leading to low production
- Low production due to few farmers
- Seasonality making them to be in excess in certain part of the year and in short supply in the other part of the year e.g. grasshoppers (ensenene)
- Lack of storage facilities store excess
- Lack of inputs such as land

9. (a) Explain why farmers should be encourage to keep records. (09marks)

- Tracking animal and worker healthy
- Ensuring tax compliance
- Tracking revenue and expenses
- Financial requirements for lenders, government agencies and insurance
- Farm planning and forecasting based on previous performance
- Enable improvements on the farming methods
- Help detect fraudulent practices on a farm
- To show economic status of a farm

(b) What information would you expect to find the livestock breeding records of a dairy farm?
(05marks)

- Number of dairy cattle
- Amount of milk per cow per day
- Number of worker
- Feed rations per cattle
- Cost of feeds
- Selling price of milk per liter
- Cost of feeders and water troughs

(c) Why is it necessary to assess the efficiency of a farm regularly? (06marks)

- To find out whether the farm is making profit or loss
- To determine growth
- To identify weakness in order to improve on efficiency

END

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Thanks

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