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UACE P515/2 Principles and practices of agriculture2 2006

3hours

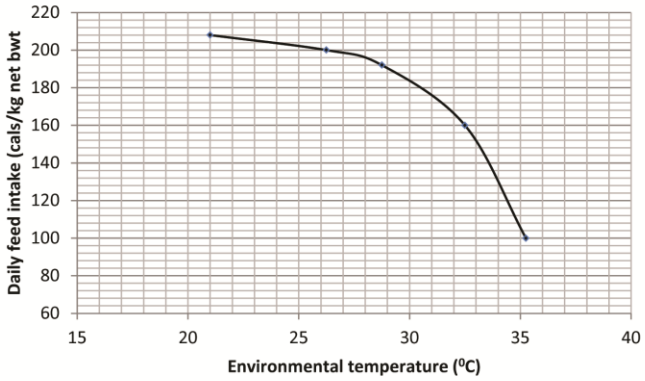
Instructions

- 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. The figure below shows the relationship between environmental temperature and daily feed intake by layers per unit of metabolic body weight. Use it to answer the questions that follow.



(a) How does the environmental temperature affects the daily feed intake in layers (01marks)
(b) Suggest explanation for the effect of environmental temperature on the daily feed intake in layers. (02marks)

(c) From the graph, what would be the consequences of high environmental temperature on the performance of layers? (03marks)

(d) (i) Birds are endotherms. What is importance of these characteristic? (05 marks)
(ii) As endotherms, how do poultry react to high environmental temperatures? (02marks)

(e) From the figure, suggest consideration to be taken in formulation of feeds and construction of houses for poultry bird in hot climate. (07marks)

SECTION B (20 MARKS)

CROP PRODUCTION

2. (a) Explain the benefits of draining agricultural land. (06marks)

(b) What problems may result from draining agricultural land? (10 marks)

(c) Outline the disadvantage of using surface drainage channels is draining land. (04marks)

3. (a) Outline the various ways in which pests cause damage to crops. (08marks)

(b) Explain the various cultural methods of controlling crop pests (12marks)

SECTION C (20 MARKS)

ANIMAL PRODUCTION

4(a) Explain the measures that farmers should take to ensure the production of good quality eggs.

(12 marks)

(b) Outline the conditions necessary for proper hatching of eggs. (08marks)

5(a) What is meant by breeding efficiency of a herd? (02marks)

(b) Outline the criteria used in measuring breeding efficiency. (03marks)

(c) Explain the management practices that can be used to improve the breeding efficiency of a herd (15marks)

SECTION D (20 MARKS)

AGRICULTURAL ENGINEERING

6. (a) Describe the functional differences between disc ploughs and mould board ploughs. (10marks)

(b) Explain the factors that affect the performance of farm machinery. (10marks)

7. (a) With the help of a diagram, show the arrangement of the component of the fuel system of a diesel engine. (08marks)

(b) Explain how diesel flows from the tank to engine. (08marks)

(c) How would you ensure efficient performance of the fuel system of a diesel engine? (04marks)

SECTION e (20 MARKS)

AGRICULTURAL ECONOMICS

8. (a) Explain why a farmer should make a budget before starting an enterprise. (10marks)

(b) Outline the steps a farmer would follow when making a complete budget for setting up a dairy farm. (05marks)

(c) What limitations do farmers face when making farm budget? (05marks)

9. (a) What is meant by elasticity of demand? (02marks)

(b) John bought 20 eggs when the price was 100 shillings per egg. When the price rose to 150 shilling per egg, he bought 15 eggs

(i) Calculate the elasticity of demand.(06marks)

(ii) What type of elasticity is John's demand for eggs? (02marks)

Give a reason for your answer. (02marks)

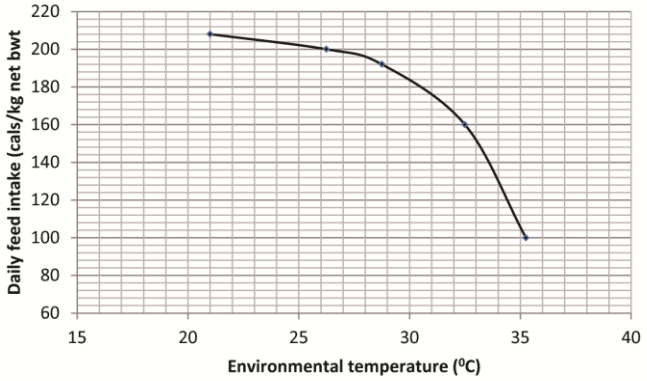
(c) What are the factors that affect the quantity of a commodity demanded for? (06marks)

(d) Outline the benefits of controlling of market system by government. (04marks)

END

Suggested answers

2. The figure below shows the relationship between environmental temperature and daily feed intake by layers per unit of metabolic body weight. Use it to answer the questions that follow.



(a) How does the environmental temperature affect the daily feed intake in layers? (01mark)
Feed intake decreases ad the environmental temperature increases

(b) Suggest explanation for the effect of environmental temperature on the daily feed intake in layers. (02marks)
When the environmental temperature rises the metabolic rate of the birds falls due to decrease in the rate of heat loss.

(c) From the graph, what would be the consequences of high environmental temperature on the performance of layers? (03marks)
- Egg laying would drop
- Reduced feed intake
- Increased water intake
- Layers become stress/uncomfortable

(d) (i) Birds are endotherms. What is importance of these characteristic? (05marks)
Maintenance of constant body temperature and activity over a wide range of temperature range.

(ii) As endotherms, how do poultry react to high environmental temperatures? (02 marks)
- They pant or open their beaks to allow heat loss
- They flap their wing
- Seek shade
- Bathe in sand
- Become thirst and drink water

(e) From the figure, suggest consideration to be taken in formulation of feeds and construction of houses for poultry bird in hot climate. (07marks)
Consideration of feed formulation
- Feed should be wholesome not to harm birds
- Balance to cater for nutritional requirements of the layers
- Easily digestible to provide nutrients easily
- Palatable to attract the birds to eat it.

Consideration of construction of houses for poultry birds in hot climate

- Ensure proper ventilation
- Consider direction of sun rays to avoid over heating
- The height of the roof should be high enough
- Use roofing material that reflect heat or are insulators to prevent heating of the house.

SECTION B (20 MARKS)

CROP PRODUCTION

2. (a) Explain the benefits of draining agricultural land. (06marks)

- Improves soil aeration
- Prevents buildup of toxic substance from decomposition of organic matter.
- Cause favorable soil temperature that promote germination and plant growth
- Frees soil of excess water
- Make the soil lighter and easy to till
- Helps control pests and diseases
- Discourage leaching
- Facilitate growth of plants that do not require water logged conditions
- Reduces soil erosion
- Prevents rotting of roots.
- Prevents accumulation of toxins

(b) What problems may result from draining agricultural land? (10 marks)

- May lower water table
- May lead to death of water loving organisms such as frogs
- Lead to loss of dissolved nutrients
- May dry up soil
- May cause unfavorably high temperature
- Salinization of the soil surface
- Upset ecosystem

(c) Outline the disadvantage of using surface drainage channels is draining land. (04marks)

- Waste land since channels are constructed on the soil surface
- Ditches interfere with agricultural operations and livestock movement
- The open channels are prone to silting
- Expensive to maintain
- Require leveling before water can flow into the drains.

3. (a) Outline the various ways in which pests cause damage to crops. (08marks)

- Eat the buds, flowers, shoot, fruits e.g. grasshopper, caterpillars and beetles eat leaves/cause defoliation
- They bore into fruits and seeds e.g. bean bruchid, maize weevil etc. and eat inside causing holes, discoloring the tubers and causing them to have bitter taste e.g. sweet potato weevils.
- Suck plant sap and reduce plant vigour e.g. aphids, mearly bugs and scales
- Transmit diseases e.g. maize leaf hopper, white flies etc.
- Change crop's growth habits e.g. sorghum shoot flies
- Cause loss of quality of crops
- They penetrate and damage plant roots thus preventing absorption of water and nutrients
- They reduce the yield of crops.

(b) Explain the various cultural methods of controlling crop pests (12marks)

- Proper seed bed preparation: repeated tillage either exposes soil borne pests to their natural enemies on the surface or buries the pests very deep in the soil where they are suffocated and die.
- Crop rotation: this controls pests which feed on specific crops; by not growing such crops, pests either migrate or die due to lack of food
- Closed seasons: this involves foregoing cropping seasons without planting so as to control the build-up of pests in the field. Cropping is suspended for specific period to derive pests out of the host plants.
- Use of resistant crop varieties that tolerate pests. The resistant varieties have characteristics such as hairiness, thick or hard epidermis, unattractive color and/or smell to the pest and early maturation
- Destruction of crop residues after harvesting to eliminate breeding sites and kill the pests.
- Use of certified seeds and planting materials that carry no pests
- Regular weeding of the crops to eliminate breeding, hiding sites and alternative hosts.
- Proper spacing reduces spread of pests from one crop to another
- Proper pruning removes infected branches and micro habitats for the pests
- Thinning prevents overcrowding and spreading of pests
- Proper application of fertilizers ensures that crops grow faster or are able to tolerate pests
- Rogueing eradicates pests by removing and destroying pest affected crops from the garden.
- Mulching especially with black polythene controls nematodes in pineapple fields.
- Timely planting ensures that the crops grow and mature before destructive stages of the pest.
- Timely harvesting prevents attack of mature grains such as in millet, sorghum, rice and maize.

- Destroying volunteer plants i.e. plants that provide alternative source of food or breeding ground.
- Intercropping discourages spreading of pest from one crop to another and some crops like tobacco produce natural pest repellants.

SECTION C (20 MARKS)

ANIMAL PRODUCTION

4(a) Explain the measures that farmers should take to ensure the production of good quality eggs.

(12 marks)

- Keep nest clean. Maintaining clean nesting material will reduce microbial exposure when the egg is first laid.
- Collect eggs regularly at least daily and preferably twice a day to prevent breakage and possible contamination from fecal material and dirt.
- Clean dirty with water and dried immediately
- Store eggs in clean packaging materials.
- Storage conditions temperature 4 – 8^0C and humidity 60 – 80%
- Feed layers on proper feed rations
- Sell first laid egg first
- Cushion the nest box to prevent egg breakage
- Sell/eat before spoiled
- Proper handling to prevent them from breaking.

(b) Outline the conditions necessary for proper hatching of eggs. (08marks)

- **Temperature: t**his has to be effectively controlled between 32.2^{0}C – 37.2^{0}C. Higher temperatures can cause death of embryos especially from the 19th day of incubation onwards. Chicks hatched from high temperatures are smaller, lack alertness, have crooked toes, and necks. While low temperatures cause late and poor hatchability of eggs.
- **Humidity: c**hicken eggs require humidity of 60% during the first 18 days, then 70% later. Low humidity causes excessive loss of moisture from eggs resulting into small and hard chicks. High humidity may result into large chicks and may delay hatching.
- **Air supply:** 21% oxygen is required in the incubator to allow adequate gas exchange between the embryo and out side
- **Turning of eggs:** Eggs should be turned for the first 18 days of incubation once every 3hrs. After 18 days there must be no turning. This prevents embryos from sticking to one side
- Egg must not have any defects like cracks and double yolks since such may not hatch

- Providing a good nesting place to avoid breakage of eggs
- Ensuring that the place of incubation is free from pests and vermin
- Providing a balanced diet for the broody hen in natural incubation

5(a) What is meant by breeding efficiency of a herd? (02marks)

This is the ability with which the herd is able to reproduce and multiply

(b) Outline the criteria used in measuring breeding efficiency. (03marks)

- -**Calving interval:** This is the period between calving. Normally it is about 12 -13 months. In order to get a good calving interval, a rest period of 60 days should be given for the animal.
- **Age of heifer at first calving** which should be 24 months. A higher age indicates a low breeding efficiency
- **Services per conception**. The ideal ratio should be 1.6-1.8 and is measured by Number of services
- Number of animals that conceive in a herd
- **Percentage of cows that calve within a year**. A high percentage indicates a high breeding efficiency
- **Number of days a cow is pregnant in a year**. The more the days, the higher the breeding efficiency
- **The percentage of non-returns**. Non-returns arise when the service is done and pregnancy does not occur. A low percentage of non indicates a high breeding efficiency and vice versa

(c) Explain the management practices that can be used to improve the breeding efficiency

of a herd (15marks)

- **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

SECTION D (20 MARKS)

AGRICULTURAL ENGINEERING

6. (a) Describe the functional differences between disc ploughs and mould board ploughs. (10marks)

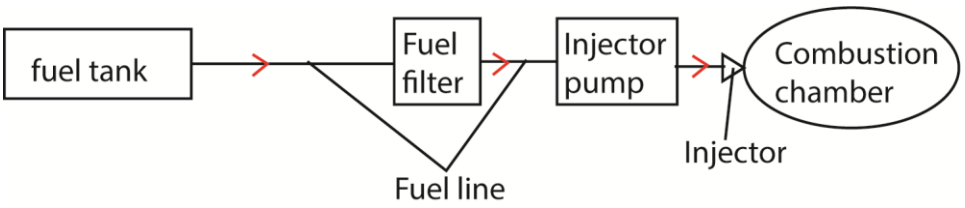
Disc plough	**Mould board plough**
Disc plough can roll over obstacle	It glides as long as it plough
It requires less power to pull	It requires more power to pull
Has poor inversion of furrow slices	Has good inversion of furrow
Produces rough seed bed which requires secondary cultivation	Produces relatively smooth seed bed which do not require
Can be used to plough in areas with a lot of trash	Cannot be used to plough in area with a lot of trash
The rolling action prevents it getting stuck and breaking	Plough gets stuck and can break easily
Requires less tractor power to pull the implement	Requires more tractor power to pull implement

(b) Explain the factors that affect the performance of farm machinery. (10marks)

- **Friction:** this is the resistance to movement when two surfaces are moving against each other. Some power is lost as the result of friction. Thus when the friction is high the efficiency of the machine is lowered. Fiction may be reduced by lubrication and/or making the surface smooth
- **Amount of load:** too much load on the machine reduces the efficiency of the machine. Machines should be loaded according to manufacturer's recommendation
- **Conditions of the machine:** efficiency is high when a machine is in good mechanical conditions
- **Skills of the operator:** high efficiency is achieved when the machine is operated according to manufacturer's recommendation
- **Type of the machine:** different machine have different inbuilt efficiency
- **Type of work:** machines are designed to perform specific function where they can perform best
- **Level of maintenance and servicing:** well-maintained machine retain high efficiency than faulty machines
- **Quality of a machine**
- Regular cleaning
- Replacement of worn out parts.

- **Topography:** machine work well on gentle slope than on steep slopes.
- **Nature of vegetation cover:** machine work well with little sparse vegetation than dense thick vegetation
- **Soil type:** machines work efficiently in light soils than in heavy soils.
- **Field conditions such** as presence of heavy stones and trees stamps retard the efficiency of a machine

7. (a) With the help of a diagram, show the arrangement of the component of the fuel system of a diesel engine. (08marks)



(b) Explain how diesel flows from the tank to engine. (08marks)

- Fuel tank stores fuel
- Fuel lines transports fuel from tank to the filter
- Fuel filter filters diesel
- Diesel fuel pumps diesel at high pressure to fuel injector
- Diesel injector delivers atomized fuel into the combustion chamber/cylinder

(c) How would you ensure efficient performance of the fuel system of a diesel engine? (04marks)

- Keep fuel system clean
- Change filter regularly
- Change oil regularly

SECTION e (20 MARKS)

AGRICULTURAL ECONOMICS

8. (a) Explain why a farmer should make a budget before starting an enterprise. (10marks)

- To estimate required production resources in form of labor, capital and inputs.
- To estimate profitability of the farm enterprise.
- To attract funding from money lenders such as banks
- To direct or control expenditure in the business to enable high profitability.
- To provide basis of performance appraisal
- To exploit idle resources
- To set goals and provide direction to the managers of the farm.

(b) Outline the steps a farmer would follow when making a complete budget for setting up a dairy farm. (05marks)

- Identify and state objectives
- List all available resources
- Estimate the size of land to estimate the number of livestock or planting materials required
- Estimate inputs and labor
- Work out estimates for the cost of inputs
- Estimate the value of expected revenue
- Estimate profit

(c) What limitations do farmers face when making farm budget? (05marks)

- Lack of skill
- Illiteracy of among farmers in developing countries
- Lack of information on prices and sources of inputs
- Price instability
- Risks and uncertainties
- budget making is tedious
- limited funding sources
- Failure to follow the proposed budget

9. (a) What is meant by elasticity of demand? (02marks)

It the degree of responsiveness of demand to changes in price.

(b) John bought 20 eggs when the price was 100 shillings per egg. When the price rose to 150 shilling per egg, he bought 15 eggs

(i) Calculate the elasticity of demand. (06marks)

$= \frac{percentage\ change\ in\ demand}{percentage\ change\ in\ price}$

$= \left(\frac{20-15}{20} x100\right) \div \left(\frac{150-100}{100} x100\right)$

$= \frac{5}{20} x \frac{100}{50}$

=0.5

(ii) What type of elasticity is John's demand for eggs? (02marks)

It is inelastic

Give a reason for your answer. (02marks)

Elasticity of demand is greater than zero but less than 1

(c) What are the factors that affect the quantity of a commodity demanded for? (06marks)

- **The price of the commodity. The** higher the price, the lower the quantity demanded and the lower the price, the higher the quantity demanded of the commodity.
- **The nature of tastes and preferences**. Favorable tastes and preferences by the consumer increase the quantity demanded of the commodity but unfavorable tastes and preferences decrease the quantity demanded.
- **The price of related commodities.** An increase in the price of **the substitute** increases the demand for the commodity in question but a reduction in the price of the substitute reduces the demand for the commodity in question. For example increase in price of rice may increase the quantity of maize flour demanded.
- **Price of complements**. An increase in the price of the complement leads to a fall in the demand of the commodity in question and a fall in the price of the complement leads to an increase in demand for the commodity in question. For instance increase in the price of electricity reduces the number bulbs bought.
- **Government policy.** An increase in taxes on the commodity by the government leads to a decline in quantity demanded of the commodity but subsidization to consumers by the government encourages the consumption of the commodity and therefore quantity demanded Increases.
- **Population size and structure.** A population comprised of a big percentage of middle- and high-income earners increases the quantity demanded of the commodity but a population with a big percentage of low-income earners leads to a fall in quantity demanded of the commodity.
- **The nature of income distribution.** Even distribution of income among the consumers increases the quantity demanded of the commodity but uneven distribution of income reduces the demand for the commodity.
- **The level of the consumers' income.** This depends on the nature of the commodity, that is, normal good, a necessity or an inferior good.

(d) Outline the benefits of controlling of market system by government. (04marks)

- Ensure market is not monopolized by a single buyer/seller encourages more seller and buyers in the market and allow competition and fair prices
- Stabilizes prices
- Ensures the quality of products
- Ensures easy revenue collection
- Protects consumers from exploitations

END

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