UACE P515/2 Principles and practices of agriculture2 2005

3hours

Instructions

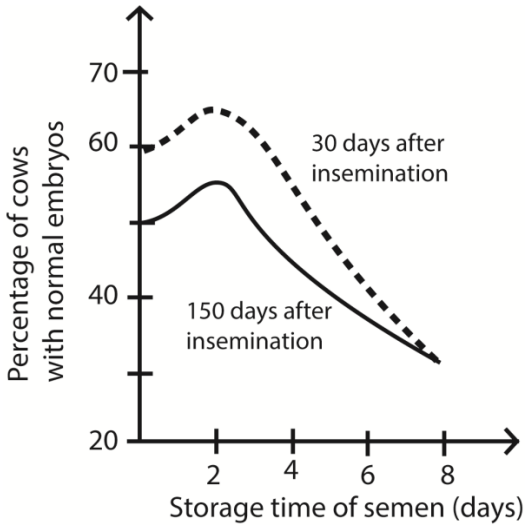
- This paper consists of sections: **A, B, C, D and E**
- Answer **question 1** in section A and four other questions, selecting **one** from each of the sections **C, D and E.**
- Write your answers in the answer booklets provided
- Any additional question(s) answered will not be marked

SECTION A (20MARKS)

Question1 is compulsory

1. Bull semen can be stored at 4^0C but the viability of sperm cells changes with time. The viability can be determined by calculating the percentage of cows with normal embryo 30days and 150 days after insemination

   The figure below shows the effect of storing semen at 4^0C on viability of different length of time after ejaculation.



(a) (i) Describe the relationship between storage time of semen and the production of normal embryos at 30 and 150 days (04marks)

(ii) Give an explanation for the relationship between storage time of semen and production of normal embryos. (03marks)

(b) Semen can be deep-frozen and stored at -196^{0}C. When semen is stored at this temperature for 12 months, the percentage of cows with normal embryos 30 days after insemination is about 66%.

(i) Suggest three reasons why regardless of the method of storage, insemination does not result in 100% of cows with normal embryos. (03marks)

(ii) Suggest why the two methods of storage have different effects on normal embryo production 30 days after insemination. (02marks)

(c) Before being stored, bull semen is diluted using a buffer solution. Suggest advantages of storing semen in this way.(04marks)

(d) Describe the procedure that would be used to artificially inseminate a cow with store semen. (04marks)

SECTION B (20 MARKS)

CROP PRODUCTION

2. (a) Give reasons to justify government efforts to protect forests. (12marks)

(b) Suggest measures that could be taken to conserve Uganda's forests (08 marks)

3. (a) Describe the characteristics of a good pasture plant. (10marks)

(b) Explain how you would improve and maintain a natural pasture (10marks)

SECTION C (20 MARKS)

ANIMAL PRODUCTION

4 (a) Give reasons for castrating calves (06marks).

(b) Describe two commonly used method of castrating bull calves. (08marks)

5 State the causes and describe the mode of transmission, symptoms and control os each of the following livestock diseases

(a) Anthrax (05marks)
(b) Trypanosomiasis (nagana) (05marks)
(c) Newcastle (05marks)
(d) Mastitis (05marks)

SECTION D (20 MARKS)

AGRICULTURAL ENGINEERING

6. (a) Why are storage structures necessary on a farm. (06marks)

(b) Explain the factors to be considered when constructing a crop storage structure. (14marks)

7. (a) Explain the success of oxen-cultivation in northern and eastern Uganda. (12marks)

(b) What are limitation of using oxen as a source of farm power?. (08marks)

SECTION e (20 MARKS)

AGRICULTURAL ECONOMICS

8. Describe five types of cost an investor in farming enterprise considers in order to maximize profits. (20marks)

9. (a) Discuss the measure that could be taken by Uganda government to stabilize the market prices of agriculture products (12marks)

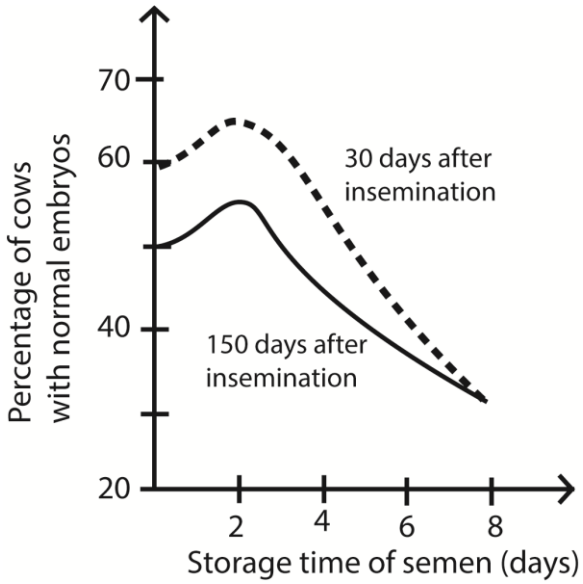
(b) What problems would be encountered in implementing the measures you have discussed in (a) above? (08marks

END

Suggested answers

2. Bull semen can be stored at 4^0C but the viability of sperm cells changes with time. The viability can be determined by calculating the percentage of cows with normal embryo 30days and 150 days after insemination

The figure below shows the effect of storing semen at 4^0C on viability of different length of time after ejaculation.



(e) (i) Describe the relationship between storage time of semen and the production of normal embryos at 30 and 150 days (04marks)

In both, at 30days and 150 days, production of normal embryos increases and reaches a peak on the second day and then decrease steeply to the 8th day. However, the sperms stored for 150 days produces lower normal embryos than those stored for 30 days.

(ii) Give an explanation for the relationship between storage time of semen and production of normal embryos. (03marks)

The longer sperms are stored the lower the chances of producing normal embryos because they use up their energy reserves required to fertilize the ova.

(f) Semen can be deep-frozen and stored at -196^{0}C. When semen is stored at this temperature for 12 months, the percentage of cows with normal embryos 30 days after insemination is about 66%.

(iii) Suggest three reasons why regardless of the method of storage, insemination does not result in 100% of cows with normal embryos. (03marks)

- The sperms may not be 100% viable from the bull
- Sperm incompatibility in the cow

- Destruction of sperms during the process of insemination.
- Poor insemination techniques
- Low sperm count in the bull's semen

(iv) Suggest why the two methods of storage have different effects on normal embryo production 30 days after insemination. (02marks)
At high temperature (4^0C) sperms have high metabolism and use up their energy stores earlier than when store at -196^0C and thus sperms stored at 4^0C produce fewer normal embryos that those at -196^0C for the same storage time.

(g) Before being stored, bull semen is diluted using a buffer solution. Suggest advantages of storing semen in this way.(04marks)

- Dilution increases the volume of semen which allows more cows to be inseminated.
- The buffer solution provides favorable conditions for the survival of sperms

(h) Describe the procedure that would be used to artificially inseminate a cow with store semen. (04marks)
- Restrain the cow.
- Put the catheter in warm water to activate the semen and load on the insemination gun.
- Put on hand gloves and lubricate then.
- Insert the left hand to the vagina to locate and hold the cervix.
- Gently push the pipette containing the semen into the cow's vagina and cross the cervix.
- Press the plunger on the catheter to release the semen.
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SECTION B (20 MARKS)

CROP PRODUCTION

2. (a) Give reasons to justify government efforts to protect forests. (12marks)

- Source of government revenue from local taxes on forestry industries.
- Sources of fuel(firewood/charcoal)
- Source food/fruits for human and wild animals
- Forest favor rainfall in an area
- Forest support wild life that attracts foreign exchange from tourists.
- Trees absorb and trap excess carbon dioxide prevent global warming
- Trees provide timber for local usage e.g. for furniture and building

- Forestry contribute to diversification of the economy
- Forests reduce soil erosion
- Trees provide raw materials such poles and timber in construction industry.
- Source of medicinal products such as quinine for malaria.
- Provision of employment from cutting, loading, and transportation of tree/logs
- Forestry has encouraged development of social services such as road and railway network, HEP etc.
- Forests attract foreign investment.

(b) Suggest measures that could be taken to conserve Uganda's forests (08 marks)

- Afforestation
- Re-afforestation
- Controlled exploitation of forestry resources
- Introduce fast growing tree species
- Forest protection legislation
- Use of alternative source of energy such as electricity, solar energy, biogas etc.
- Educating the public to plant trees, and protect the available forests
- Training official forest worker on efficient utilization of forests
- Encouraging agroforestry
- Carry out research in forestry
- Pests and disease control

3. (a) Describe the characteristics of a good pasture plant. (10marks)

- It should be easy to establish hence reducing cost involved in replacing the seeds that failed to establish.
- Should not be poisonous to animals
- It should be able to maintain high growth rate throughout the year, with less fluctuation between peak periods.
- 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) Explain how you would improve and maintain a natural pasture (10marks)

- 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 and control vector and pest and diseases
- 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.
- Plant trees to provide shade

SECTION C (20 MARKS)

ANIMAL PRODUCTION

4 (a) Give reasons for castrating calves (06marks).

- To prevent the bad smell especially in the Billy goats.
- To prevent undesirable males from breeding.
- To make the animal docile and easy to work.
- To improve meat quality
- Castrated animals grow faster and produce quality meat.
- Castration increases the quality of wool in sheep as more nutrients are channeled to the development of the wool.
- It helps in the control of venereal diseases like contagious abortion.
- It controls inbreeding on the farm when males born on the farm are castrated.

(b) Describe two commonly used method of castrating bull calves. (08marks)

(i) Open castration:

This is where the scrotum is opened to remove the testicles. It can also be referred to as surgical operation.

This requires a sharp knife or blade to split the scrotum vertically up to the bottom for better bleeding.

Procedure of carrying out open castration:

- The animal should be restrained first using ropes.
- Wash your hands using clean water and soap or wear clean gloves.
- The scrotum of the animals should be washed and disinfected using clean warm water and soap
- Dry the scrotum using a clean hand towel
- Apply a localized anesthesia around the scrotum to reduce pain
- Pull and squeeze the scrotum to locate the testes
- Use a clean blade or knife to cut the scrotum vertically in order to remove the testes.
- Pull the spermatic cords out and tie it using a clean string
- Cut the spermatic cord just below the knot to release the testis
- Repeat the same procedure to remove the second testis
- Seal the wound to stop bleeding by using a hot iron
- Apply fly repellants on the wound to keep a way flies
- Apply antibiotic cream to stop the wound from becoming septic
- Release the animal and keep it in reach for easy supervision

(ii) **Castration using a burdizzo**

The **Burdizzo** is the name brand of a company that makes castration device which employs a large clamp designed to break the blood vessels leading into the testicles. Once the blood supply to the testicles is lost, testicular necrosis occurs, and the testicles shrink, soften, and eventually deteriorate completely.

- Restrain the animal using ropes and cast it down
- Pull the scrotum down wards to locate the spermatic cords, ducts and nerves
- Open the jaws of the burdizzo by pressing the handles out wards
- Place the burdizzo at the “neck” of the scrotum
- Press the handles of the burdizzo in wards to lock the jaws and crush the spermatic cords, ducts and nerves
- Open the jaws of the burdizzo and remove it from the crushed area
- Release the animal after the operation

- Keep the animal within reach for easy supervision

(iii) Castration using a rubber ring:

Here a strong rubber band is straightened using an **elastrator** and fixed around the "neck" of the scrotum. This cuts off blood supply to the scrotum and the testes which eventually degenerate and fall off after sometime. It's the most painful method of castration though very effective. The farmer doesn't expect any development of the scrotum for a life time.

5. State the causes and describe the mode of transmission, symptoms and control os each of the following livestock diseases

(a) Anthrax (05marks)

Cause: bacteria (bacillus anthracis)

Mode of transmission: contact with tissues/ fluids of infected animals

Symptoms

- High fever
- Dysentery
- Brown up/swollen stomach
- Blood oozes from all the body openings after death
- Loss of appetite
- Absence of rigor mortis in dead animal
- Sudden death within 24 hours
- Blood stained feces

Control

- Early treatment with antibiotics
- Vaccination annually
- Dispose of dead animals completely
- Never open up carcass that show symptoms of anthrax
- Report suspected cases to veterinary department
- Exercise quarantine
- Do not eat carcass

(b) Trypanosomiasis (nagana) (05marks)

Cause: protozoa

Mode of transmission: vector is tsetse fly

Symptoms

- Fever
- Loss of appetite
- Anemia and may lick soil
- Running nose
- Emaciation

- Death after several weeks
- Swollen lymph nodes
- Dullness

Control

- Clear bushes
- Treat with drugs
- Spraying tsetse fly
- Trap tsetse flies
- vaccinate

(c) Newcastle (05marks)

Cause: virus (myxovirus)

Mode of transmission:

- contact with diseased animals
- contaminated feeds and water
- airborne droplets

Symptoms

- loss of appetite
- bending of neck
- sudden death
- watery yellowish green diarrhea
- marked drop in egg production
- thick mucus discharge from the mouth
- difficult breathing/sneezing/ rattling sound
- staggering/paralysis with drooping wings

Control

- kill the whole flock and disinfect the house
- vaccinate every six months
- avoid contact with infected birds
- avoid introducing new birds to the flock
- restrict visitors
- exercise quarantine

(d) Mastitis (05marks)

Cause: bacteria

Mode of transmission: contact with milk from infected animal

Symptoms

- Pus or blood in milk
- Drop in milk production

- Swollen udder and teats/inflammation
- Animal reject suckling or milking
- Hardened quarters/adder/tissue

Control

- Treat with antibiotics
- Strict hygiene
- Use of right milking technique

SECTION D (20 MARKS)

AGRICULTURAL ENGINEERING

6. (a) Why are storage structures necessary on a farm. (06marks)

- They protect farm machinery from bad weather and theft
- They increase the value of the farm
- They reduce wastage on a farm by storing excess produce
- They increase profitability by storing farm produce until a good price
- Maintain the quality of the produce stored properly
- Allow timely harvesting

(b) Explain the factors to be considered when constructing a crop storage structure. (14marks)

- Should be readily accessible for farm operations such farm vehicles
- Should have reasonable size to suit intended use
- Should contain firefighting equipment
- Should be well-ventilated for proper aeration
- Should be lockable for security
- Should be fireproof.
- Should have leak free roof to keep the store dry
- Should have strong walls
- Should be protected from pests
- Should have leak free roof to keep inside dry
- Should have concrete floor to minimize dust and dampness
- Should have enough light.

7. (a) Explain the success of oxen-cultivation in northern and eastern Uganda. (12marks)

- Availability of hardy draught animals and necessary equipment

- Availability of skilled man power in use of oxen cultivation
- Long experience in use of oxen cultivation
- Good climate
- Presence of light soils that can easily be worked with oxen
- Presence of pests and disease resistant animals
- Availability of land for farming and grazing
- Short and light vegetation
- Relatively flat land that is easy to plough
- Presence of veterinary services

(b) What are limitation of using oxen as a source of farm power?. (08marks)

- Unavailability of draught animals
- Conservativeness of some farmers to adopt to draught technology
- Availability of alternative sources of power like human labor.
- Lack of capital to purchase draught animals
- Pests and disease
- Lack of skills to use draught animals on the farm
- Poor climate leading to lack of feeds to draught animals
- Presence of heavy soils in most parts of the country.
- Presence of poor topography characterized by steep slopes and ragged terrain
- Thick and tall vegetation that interfere with animal's work
- Expensive veterinary services
- Unsupportive government policy such high taxation on ox-drawn equipment.

SECTION e (20 MARKS)

AGRICULTURAL ECONOMICS

8. Describe five types of cost an investor in farming enterprise considers in order to maximize profits. (20marks)

- **Fixed costs / overhead costs / unavoidable costs.**

  These are expenses that a farmer has to meet whether in production or not. They include interest on loans, rent, depreciation, salaries for permanent workers.

- **Variable costs / prime costs.**

These are expenses that depend on the level of output or vary with output e.g. costs for inputs (pesticides, seeds) wages for casual workers increase in output increases the variable costs.

- **Implicit cost.**

These are expenses that are indirect or costs of owned resources e.g. own labor, family labor etc. They are valued using their opportunity cost. NB. They are not included in the calculations of profits of the farm of accounting.

- **Explicit costs**

These are direct costs paid for resources / bought or hired.

- **opportunity cost**

This is a cost for the best alternative foregone in making a decision e.g. if a farmer foregoes poultry farming and takes on dairy then the opportunity cost is that one for poultry.

- **Total valuable cost (TVC)**

This is the total of the cost of all valuable resources used in production (price x quantity)

- Total fixed cost

This is the value of all the indirect cost of fixed resources used in production. Its constant at all levels of output.

- **Total costs**

It's the sum of all the fixed and variable costs at each level of output i.e. total cost will = total variable cost + total fixed cost.

- **Average variable cost**

It's the amount spent on variable inputs per unit of output, i.e.

$$AVC = \frac{TVC}{Y\ (Output)}$$

- **Average fixed cost.**

It's the cost of the fixed resources per unit of output.

$$AFC = \frac{TfC}{Y\ (Output)}$$

- **Average total cost**

It's the total cost of all resources (Fixed and variable) per unit of output.

$$ATC = \frac{AVC + TfC}{Y\ (Output)}$$

- **Marginal cost**

This is the change in total cost resulting from a change in one unit of output i.e. it's the cost of producing an additional unit of output.

- **Marginal product.**

This is output created by using one additional unit of a factor of production.

- Nominal cost

This is the cost of production converted into monetary terms. It is financial expenses incurred by a farm in the production processes. They include salaries, cost of seed, depreciation rent , transport etc.

- Real costs

These are non-monetary costs of production. They include sacrifices that have been made by producer in order to produce, the time and effort spent to make production possible and the leisure foregone in order to produce commodities

9. (a) Discuss the measure that could be taken by Uganda government to stabilize the market prices of agriculture products (12marks)

- **Buffer stocks.** The government should buy up part of the supply when output is in excess, store this surplus and later sells it to the consumer in times of reduced supply.
- **Stabilization fund**. The government through marketing boards can maintain or increase prices of agricultural products, depending on world market prices. If profits are made, they are saved and used to stabilize prices and incomes of the farmers.
- A variety of agricultural activities should be introduced e.g. crop farming, poultry, animal husbandry etc. to reduce over dependence on one or a few sources of agricultural income in a bid to stabilize farmers' income.
- **Encourage formation of cooperatives** to bargain fair prices
- **Introduce irrigation schemes** to ensure continuous supply of agricultural products.

- **Stability in prices of agriculture** can also be attained by improving transport system to enable easy marketing
- There is a need to improve, **develop and expand storage facilities** to accommodate excess output in agriculture.
- **Price control**. Government should establish the minimum and maximum prices for agricultural output.
- **Market expansion**. Government should expand agricultural output market through economic integrations
- encourage further diversification of agriculture
- Encourage processing to increase value and shelf-life
- Dissemination of marketing information to the farmers.

(b) What problems would be encountered in implementing the measures you have discussed in (a) above? (08marks

- conflicts with the policy of liberalization
- standardization of quality and quantity of the produce
- inadequate funding
- poor road and communication network
- need to process agricultural produce and extend self-life
- shortage of storage facilities
- competition from synthetic substitutes
- lack enough market for the produce
- high illiteracy rate among farmers
- subsistence production/low product quantities
- limited diversification of agricultural production
- corruption and embezzlement

END