THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

134/2 **AGRICULTURE 2**

(For Both School and Private Candidates)

Time : 3 Hours **ANSWERS** **Year : 2003**

Instructions

1. This paper consists of sections **ten (10)** questions in sections A and B.
2. Answer **five (5)** questions choosing at least **two (2)** questions from each section.
3. Each question carries **twenty (20)** marks.
4. Cellular phones are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

SECTION A

CROP SCIENCE AND PRODUCTION

1. Differentiate between the following terms in plant breeding:
   (a) Mass selection and pure line selection
   Mass selection selects many phenotypically superior individuals and mixes their seed, maintaining variability; pure line selection isolates lines from selfing to produce uniform genotypes.
   (b) Progeny testing and performance testing
   Progeny testing evaluates parents based on offspring performance for heritable traits; performance testing directly assesses individuals under target conditions.
   (c) Gene pool and germplasm
   Gene pool is the total genetic diversity of a species; germplasm refers to the collected genetic material conserved for breeding use.
   (d) Hybrid vigour and inbreeding depression
   Hybrid vigour is improved performance in hybrids due to heterozygosity; inbreeding depression is reduced vigor from increased homozygosity exposing deleterious alleles.

2. Briefly explain the concept of crop rotation and its significance in controlling soil-borne diseases.
   Crop rotation alternates non-host and host crops to reduce build-up of soil pathogens, interrupting disease cycles and allowing natural decline of pathogen populations.

3. Describe the life cycle of a major insect pest of a staple crop in your country, and outline two methods to control it.
   Example: Maize stem borer life cycle—adult moth lays eggs on leaves, eggs hatch to larvae that bore into stems and feed for several instars, larvae pupate in stems or soil, and adults emerge to repeat cycle.
   Control methods: plant resistant or tolerant maize varieties and use pheromone traps or biological control agents like Trichogramma for egg parasitism.

4. Explain what is meant by biological control of weeds as used in crop protection. State three potential benefits and three limitations of this method.
   Biological control uses natural enemies—herbivorous insects, pathogens, or grazing animals—to suppress weed populations.
   Benefits: environmentally friendly, self-sustaining once established, and specific to target weed

reducing non-target damage.

Limitations: slow to establish and show effect, risk of non-target impacts if poorly tested, and effectiveness may be limited by climate or ecological interactions.

5. State four reasons why fungi are considered the most important group of plant pathogens, giving two examples of diseases they cause.

   Fungi have diverse life cycles and dispersal mechanisms, wide host ranges, produce durable spores that persist in soil, and cause major yield and quality losses.

   Examples: Fusarium wilt in tomatoes, Magnaporthe (rice blast) in rice.

SECTION B

LIVESTOCK SCIENCE AND PRODUCTION

6. Explain the meaning of the following terms as used in animal health:

   (a) Epidemiology

   The study of disease distribution, determinants, and control in animal populations.

   (b) Zoonotic disease

   A disease transmissible between animals and humans.

   (c) Etiology

   The cause or origin of a disease.

   (d) Quarantine

   Restriction of movement of animals or products to prevent disease introduction or spread.

7. Discuss the importance of a balanced ration in livestock production.

   A balanced ration meets nutritional needs for maintenance and production, optimizes growth and reproduction, reduces disease incidence, improves feed efficiency, and lowers production costs by avoiding over- or under-feeding.

8. Briefly explain five factors that predispose livestock to diseases.

   Poor nutrition weakens immunity.

   Overcrowding facilitates transmission.

   Poor sanitation and damp housing encourage pathogen survival.

   Stress from transport or handling lowers resistance.

   Presence of vectors or reservoir hosts increases exposure risk.

9. Outline the main events that occur in the different sections of the hen's reproductive tract during egg formation.

   Ovulation: ovary releases yolk (ovum).

   Infundibulum: captures ovum and is site of fertilization if sperm present.

   Magnum: secretes albumen around the yolk.

   Isthmus: forms shell membranes.

   Shell gland (uterus): deposits calcium carbonate shell and pigments.

   Vagina and cloaca: egg is oriented and expelled.

10. Differentiate between artificial selection and natural selection as applied in animal breeding.

    Artificial selection is human-directed choice of animals with desirable traits for breeding to improve productivity.

    Natural selection is environmental and survival-driven differential reproduction where traits beneficial for survival become more common without human intervention.