THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

ADVANCED CRTIFICATE OF SECONDARY EDUCATION EXAMINATION

134/2 **AGRICULTURE 2**

(For Both School and Private Candidates)

Time: 3 Hours. **ANSWER** **Year: 2023**

Instructions

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

1. Analyse five ways of controlling the plant diseases.

One way of controlling plant diseases is through crop rotation. This involves planting different crops in a sequence on the same piece of land, which helps to break the life cycles of pathogens that are host-specific. For instance, rotating maize with legumes can reduce fungal diseases that target cereals.

Another way is the use of resistant crop varieties. Breeding and selecting plants that have natural resistance against certain diseases minimizes losses since such plants can withstand or tolerate infections better. For example, growing cassava varieties resistant to mosaic disease reduces spread.

Application of fungicides and other chemical treatments is also effective in controlling plant diseases. These chemicals either kill the pathogens directly or prevent them from infecting crops. However, they should be used carefully to avoid resistance build-up and environmental pollution.

Sanitation practices help to reduce disease occurrence. Removing crop residues, weeding, and cleaning farm tools eliminates sources of infection such as spores and bacteria that may survive in the soil or debris. This lowers the chances of pathogens spreading from one season to another.

Biological control is another method, where beneficial organisms are used to suppress disease-causing pathogens. For instance, certain fungi and bacteria can outcompete or destroy harmful organisms in the soil. This method is environmentally friendly and sustainable for long-term disease management.

2. Account for blossom end rot diseases in tomato using the following guidelines:
   (a) cause of the disease
   Blossom end rot in tomatoes is caused by calcium deficiency in the fruit tissue. This occurs when calcium supply to the developing fruits is inadequate, often due to irregular watering or imbalanced soil fertility.

(b) Major symptoms of the diseases
The main symptom is the appearance of water-soaked spots at the blossom end of the fruit, which later turn dark brown to black and leathery. The affected fruits may also become deformed and are usually unmarketable, reducing yield quality.

(c) Control measures of the diseases
To control blossom end rot, farmers should ensure consistent irrigation to prevent fluctuations in soil

moisture. Applying lime or calcium-based fertilizers improves calcium availability. Mulching helps to conserve soil moisture, while avoiding excessive nitrogen prevents competition between vegetative growth and calcium uptake.

3. (a) Suggest four ways that can be employed by a farmer to control weeds that grow aggressively and multiply quickly.
   One way is mechanical control, which includes hand weeding, hoeing, and mowing. These methods physically remove weeds from the field before they flower and set seeds, reducing their spread.

Another way is cultural control, such as practicing timely planting and crop rotation. Planting early allows crops to establish before weeds dominate, while crop rotation disrupts the weed life cycle.

The use of cover crops is also effective. Crops like legumes or fast-growing grasses can shade out weeds, reducing their access to sunlight and nutrients, thereby suppressing their growth.

Chemical control using herbicides can also be applied for aggressive weeds. Selective herbicides kill specific weeds without harming the main crop, while non-selective herbicides clear the entire field before planting. Care must be taken to avoid herbicide resistance.

(b) Examine six disadvantages of the chemical weed control.
Chemical weed control can lead to herbicide resistance, where weeds adapt and no longer respond to the chemicals, making them harder to manage in the future.

It can cause environmental pollution, as chemicals may leach into water bodies, affecting aquatic organisms and contaminating drinking water sources.

Herbicides may harm non-target plants, including nearby crops or beneficial vegetation, leading to reduced biodiversity.

They are also expensive, especially for small-scale farmers who may not afford continuous purchase of effective chemicals.

Improper use of herbicides may leave toxic residues on crops, posing health risks to consumers and reducing marketability.

In addition, frequent herbicide use can disturb soil microorganisms, reducing soil fertility and long-term productivity of the land.

4. Suggest the damages that might be caused by each of the following pests to the crop they attack based on their mode of feeding:
   (a) Maize stalk borer
   Maize stalk borers damage crops by boring into stems and feeding on internal tissues. This weakens the plant, reduces nutrient flow, and may cause lodging, leading to significant yield losses.

   (b) Cotton stainer
   Cotton stainers pierce and suck plant juices from cotton bolls. Their feeding introduces stains and fungal spores, reducing the fiber quality and making the cotton less valuable in the market.

   (c) Leaf hopper
   Leaf hoppers damage crops by piercing leaves and sucking sap, which leads to yellowing, stunted growth, and transmission of viral diseases. Prolonged infestation reduces photosynthetic ability and lowers yields.

5. (a) Briefly explain the breeding method to be employed to perform the resistance breeding.
   The breeding method commonly employed is hybridization, where two parent plants with desirable traits are crossed to produce offspring with improved resistance. For example, crossing a disease-susceptible but high-yielding plant with a resistant but low-yielding plant produces varieties combining both traits.

   (b) Give seven steps to be involved in performing the selected method.
   The first step is the selection of suitable parent plants, where one has resistance traits and the other has good yield or quality traits.

   The second step is emasculation, which involves removing anthers from the female parent to prevent self-pollination.

   The third step is bagging the emasculated flowers to avoid contamination by unwanted pollen.

   The fourth step is controlled pollination, where pollen from the chosen male parent is applied to the female parent's stigma.

   The fifth step is re-bagging to protect the fertilized flowers until seed development is complete.

The sixth step is harvesting hybrid seeds from the mature fruits of the female parent.

The seventh step is testing and evaluating the offspring in the field to identify individuals that express both high yield and resistance, which are then selected for further breeding or distribution.

6. (a) Give a reason why the chicken do not need teeth during the digestion.
   Chickens do not need teeth because their digestive system has specialized organs that take over the role of chewing. The beak is adapted for pecking and breaking food into small pieces that can be swallowed easily. Once swallowed, food is temporarily stored in the crop, then later passed to the gizzard.

   The gizzard acts as a powerful grinding organ. It contains strong muscles and often small stones or grit that the chicken swallows. These grind the food into fine particles, replacing the role that teeth would normally play in mammals. Therefore, the absence of teeth does not affect the efficiency of digestion in chickens since the gizzard performs this function.

   (b) Describe the digestive system of the chicken.
   The digestive system of the chicken begins with the beak, which is used to pick and break food into swallowable pieces. The food then passes down the esophagus into the crop, which serves as a storage chamber where food can soften and undergo limited fermentation.

   From the crop, food moves into the proventriculus, which is the glandular stomach. Here digestive juices and enzymes such as hydrochloric acid and pepsin begin chemical digestion of proteins. This step is equivalent to the function of the stomach in mammals.

   After the proventriculus, the food enters the gizzard. The gizzard has thick muscular walls and contains grit or stones swallowed by the chicken. It physically grinds and crushes food, making it ready for effective digestion and absorption in the intestines.

   The digested material then passes into the small intestine, consisting of the duodenum, jejunum, and ileum. In these sections, enzymes from the pancreas and bile from the liver continue digestion of proteins, fats, and carbohydrates, while absorption of nutrients into the bloodstream takes place through the intestinal lining.

   The large intestine is short but plays a role in absorbing water and electrolytes. It also leads to the cloaca, where undigested food, uric acid, and other waste products are collected before being expelled through the vent. Thus, the chicken's digestive system is specialized and efficient without the need for teeth.

7. (a) Suggest six observable signs that help to identify unhealthy animals.
   An unhealthy animal often shows loss of appetite, where it refuses to eat or drink as usual. This leads to weakness and weight loss.

Another sign is abnormal posture and movement. Sick animals may stand with a humped back, lie down excessively, or walk with difficulty due to pain or weakness.

The coat or skin condition is also an indicator. Healthy animals have smooth and shiny coats, but sick ones develop rough, dull, or falling hair, and the skin may show wounds or sores.

Eyes and nose discharge are common in unhealthy animals. Mucus, pus, or watery discharge indicates infections or respiratory illnesses. Healthy animals usually have bright eyes and a dry nose.

Unhealthy animals may also show irregular breathing. They may breathe heavily, cough persistently, or make abnormal sounds, which point to respiratory diseases.

Finally, unusual behavior such as isolation, restlessness, or aggression may appear. Animals that normally socialize may separate themselves when sick, which is a natural instinct to protect the herd.

(b) Analyse four effects of parasites on animals.
Parasites weaken animals by sucking blood or feeding on body tissues, which causes anemia and reduces body strength. This lowers productivity in terms of milk, meat, or work performance.

They also transmit diseases such as trypanosomiasis by tsetse flies or babesiosis by ticks. This increases mortality rates and treatment costs.

Parasites damage the skin, hide, or fleece. For example, mange mites cause skin lesions and lice reduce the quality of hides. This lowers the market value of animal products.

Lastly, parasite infestation reduces feed efficiency. Internal parasites like worms compete for nutrients inside the digestive system, leaving the host malnourished even when feed is adequate. This slows growth and delays maturity.

8. (a) Give three limitations of natural pastures.
   Natural pastures often have low nutritional quality. The grasses and plants may not provide balanced protein, energy, and mineral requirements for high production.

They are also seasonal, depending on rainfall. During the dry season, natural pastures dry up and cannot sustain animals, leading to feed shortages.

Another limitation is the presence of undesirable weeds and pests. Some plants are unpalatable or even poisonous to animals, reducing both safety and productivity.

(b) Give seven reasons for establishing a mixture of grass-legume pastures.
A mixture of grass and legumes improves nutritional balance. Legumes are rich in proteins, while grasses provide energy, together ensuring better animal growth.

Legumes fix atmospheric nitrogen into the soil, which improves soil fertility and benefits the grasses growing alongside them. This reduces the need for artificial fertilizers.

The mixture increases pasture yield since legumes and grasses utilize soil resources differently. Their combination maximizes biomass production.

It enhances resistance to drought and environmental stress. When grasses are weak in dry conditions, legumes may survive, ensuring continuity of feed.

Mixed pastures also improve soil cover and reduce erosion. The root systems of grasses bind soil while legumes provide ground cover, protecting against land degradation.

They provide a variety of forage that improves palatability. Animals prefer mixed pastures and therefore consume more feed, improving intake and performance.

Finally, grass-legume pastures contribute to sustainable farming. They reduce reliance on chemical inputs and maintain long-term soil health for continuous production.

9. Explain five major causes of the failure of the artificial insemination in cows.
   Artificial insemination may fail due to poor heat detection. If the farmer inseminates the cow at the wrong time, the egg may not be ready for fertilization, leading to failure.

It may also fail due to poor handling of semen. Semen that is exposed to heat, light, or contamination loses its viability and cannot fertilize the egg.

Incompetence of the inseminator is another cause. Improper placement of semen into the wrong part of the reproductive tract reduces the chances of conception.

Diseases or reproductive disorders in cows also cause failures. Infections in the uterus or blocked fallopian tubes hinder fertilization and implantation.

Nutritional deficiencies reduce fertility. Lack of essential minerals and vitamins weakens reproductive health, making conception difficult even after insemination.

10. Evaluate five benefits of genetic engineering in animal production.
    Genetic engineering improves disease resistance in animals. Genes that provide immunity can be introduced, reducing losses from outbreaks.

It enhances productivity traits such as milk yield, growth rate, and feed conversion efficiency. This allows farmers to obtain more products with fewer resources.

Genetic engineering enables the production of animals that tolerate harsh climates. This is useful in areas with extreme heat, cold, or poor-quality feed.

It also helps in producing transgenic animals that can provide pharmaceutical products like insulin or antibodies, contributing to human health.

Finally, genetic engineering preserves rare or endangered breeds by transferring desirable traits into more common ones. This ensures biodiversity and long-term sustainability in animal farming.