CHRISTIAN SOCIAL SERVICES COMMISSION (CSSC)
NORTHERN ZONE JOINT EXAMINATIONS SYNDICATE (NZ- JES)
AGRICULTURE 2

MARKING SCHEME

1.(a) Factors

(i) Age of the animal **(3 marks):** Young animals require higher protein and energy content for growth and development. As animals mature, their nutrient requirements shift towards maintenance and reproduction. Examples: Calf starter feed vs. dairy cow feed.

(ii) Physiological status **(3 marks)**: Pregnant or lactating animals have increased nutrient demands, particularly for energy, protein, and minerals like calcium and phosphorus. Animals recovering from illness also need specialized diets. Examples: Dry cow feed vs. lactating cow feed.

(iii) Purpose of keeping the animals **(3 marks):** Animals kept for different purposes have varying nutritional needs. Meat animals require diets that promote rapid muscle growth, while dairy animals need diets that support milk production. Examples: Broiler finisher feed vs. layer hen feed.

(b) Young ruminants have a poorly developed rumen at birth. Their digestive system functions more like that of a monogastric animal, relying primarily on enzymatic digestion in the abomasum.**(01 mark**)

2. Factors determining the quality of silage

(i) Stage of maturity of the crop at harvest.

(ii) Moisture content at ensiling.

(iii) Effective fermentation (presence of lactic acid).

(iv) Absence of mold or undesirable bacteria.

(b) Merits and Demerits of Single-Species Pasture

Merits (4 marks):

(i) Easier to manage and fertilize.

(ii) More uniform yield and quality.

(iii) Better weed control due to monoculture.

(iv) Simplifies grazing management.

Demerits (4 marks):

(i) Less resilient to environmental stress.

(ii) Higher risk of pest and disease outbreaks.

(iii) Can lead to nutrient imbalances in the soil.

(iv) May not provide a balanced diet for animals.

3. (a) Short notes on: **(3 marks)**

(i) **Natural Mating**: Involves the direct mating of a male and female animal.

(ii) **Flock Mating**: Males are allowed to mate freely with multiple females in a flock.

(iii) **Hand Mating**: Controlled mating where a male and female are introduced for a limited time.

(b) Problems with Using Bulls for Service **(7 marks)**

(i) Spread of sexually transmitted diseases.
(ii) Difficulty in determining breeding dates accurately.
(iii) Risk of injury to cows or the bull.
(iv) Limited genetic improvement compared to AI.
(v) Potential for uncontrolled breeding and inbreeding.
(vi) Cost of maintaining a bull.
(vii) Danger to farm personnel.

4. (a) Causes of Abnormal Animal Health (4 marks)

(i) Infections: Bacteria, viruses, parasites, and fungi.
(ii) Nutritional deficiencies: Lack of essential nutrients.
(iii) Genetic disorders: Inherited conditions.
(iv) Environmental factors: Stress, toxins, and poor sanitation.

(b) Signs of Disease in Animals (6 marks)

(i) Loss of appetite.
(ii) Dullness or lethargy.
(iii) Abnormal body temperature.
(iv) Changes in respiration or heart rate.
(v) Discharge from eyes or nose.
(vi) Changes in behavior.
(vii) Abnormal Movements
(viii) Abnormal urination

5. (a) (i) Products produced organically have minimum chemical residuals.

(ii) Organic farming prevents the use of agrochemicals in the production of plants and livestock as these chemicals are harmful to the environment.

(iii) Organically produced products have relatively longer shelf life.

(iv) Practicing intercropping, crop rotation and minimal tillage lessen the cost of crop production along with improving fertility, structure and water holding capacity of the soil. (v) Organic agricultural production systems foster cycling of natural resources to conserve biodiversity, protect the environment, and promote ecological balance.

(vi) Animals and plants can live in the same place in a natural way which increases biodiversity.

Any five points (05marks)

(b) (i) Economic: By using precision farming platforms and machinery, expensive resources such as water, fertiliser, electricity, and time can be optimised, while boosting land productivity.

(ii) Environmental: The farmer can take care of his/her land through reduction in waste of fertilisers and herbicides, emissions and soil compaction. This result in conserving the environment.

(iii)Traceability: The best advice can be given to the farmer based on actual data collected, and not according to the farmer's memory or knowledge.

(iv) Communication across the value chain: Farmers are in a position to easily interact with extension workers for advice, customers of his/her farm produce and products while gaining added value.

(v) Regulation: It becomes easier for the farmer to comply with local regulations

1 marks @ =(05 marks)

6. (a) Roles of biotechnology in plants disease managements:

(i) Disease-resistant crops: Biotechnology allows the transfer of genes for disease resistance from wild relatives or other sources into crop plants, creating varieties that are naturally protected against specific pathogens.

(ii) Early and accurate diagnosis: Techniques like PCR and ELISA can detect pathogens in plants before symptoms appear, enabling timely intervention and preventing widespread outbreaks.

(iii) Understanding disease mechanisms: Biotechnology helps unravel the complex interactions between plants and pathogens at the molecular level, leading to the identification of key targets for disease control strategies.

(iv) Developing biopesticides: Biotechnology can be used to produce bio-based pesticides that are specific to target pathogens, reducing the reliance on harmful chemical pesticides.

(v) Enhancing plant immunity: Biotechnology can stimulate a plant's natural defense mechanisms, making it more resistant to a broad range of diseases.

(vi) Producing disease-free planting material: Techniques like tissue culture can eliminate pathogens from infected plants, ensuring that new plantings are healthy and productive.

(vii) Monitoring pathogen populations: Biotechnology helps track changes in pathogen populations, such as the emergence of new strains or resistance to fungicides, allowing for adaptive management strategies.

(viii) Developing vaccines for plants: Similar to vaccines in humans, biotechnology can be used to develop "plant vaccines" that prime a plant's immune system to respond quickly and effectively to future infections.

Any five points (05marks)

(b) Cultural Control of Rosette **(5 marks**)

(i) Planting resistant varieties.

(ii) Early planting.

(iii) Removal of infected plants.

(iv) Control of aphids (vector).

(v) Crop rotation.

1 marks @=(05 marks)

7. Weeds

(a) Weed Classification and Examples **(03 marks)**

(i) Annuals: Complete their life cycle in one year (e.g., pigweed, crabgrass).

(ii) Biennials: Complete their life cycle in two years (e.g., wild carrot, burdock).

(iii) Perennials: Live for more than two years (e.g., quackgrass, dandelion).

(b) Any seven (07) losses caused by weed in agriculture production process.

(i) They compete with crop plants for nutrients, soil moisture, and space and light thus, reducing crop yields.

(ii) Some weeds are parasitic to cultivated crops.

(iii) Weeds lower the quality of agricultural produce. This happens when weed seeds get mixed up with produce.

(iv) Some weeds harbour insect pests and disease causing organisms.

(v) Some weeds are allelopathic, that is, they release chemical substances which suppress or inhibit germination of crop seeds or growth of crop plants when they come into contact.

(vi) Some aquatic weeds can block irrigation channels making it difficult for water to flow freely in the irrigated land. They may also increase the rate of water loss through transpiration thus reducing irrigation efficiency.

(vii) Aquatic weeds may also deprive fish and other aquatic organisms of oxygen causing them to die.

(viii) Weeds lower the quality of pastures by reducing the palatability of herbage. They, therefore, reduce the carrying capacity of most pasture fields and feed intake for animals.

(ix) Some weeds irritate workers when the plant leaves get into contact with any part of their bare skin thus reducing the efficiency of farm labour.
(x) Weeds increase the cost of production through increased labour costs, purchase of herbicides, cleaning and/or sorting of contaminated produce, or impediment in harvesting of crops.
(xi) Weedy areas can host rodents that later attack crops.

Any seven (07) points (07marks)

8. Crop Pests

(a) Harmful Effects of Crop Pests (4 marks)

(i) Reduce crop yields.
(ii) Damage plant tissues.
(iii) Transmit diseases.
(iv) Increase production costs.
(v) Contaminate produce.
(vi) Reduce quality of produce.
(vii) Make crops unmarketable.
(viii) Cause post-harvest losses.

Any six (6) points = (03marks)

(b) Rules for Applying Pesticides

(i) Check the expiry date of the pesticide.
(ii) Carefully, read manufacturer's instructions and follow them.
(iii) Wear protective gears such as overall, breathing mask, goggles, gloves and boots.
(iv) Avoid inhaling the pesticide. This may occur when spraying or dusting along the wind. It is better to observe wind direction.
(v) Avoid pesticide drift to unintended crops and other plants. This can be achieved by avoiding spraying on windy days.
(vi) Never allow drift to feeds, food materials and water, thus avoid using food vessels like cups in measuring pesticides.
(vii) Wash your body and clothes thoroughly after handling pesticides.
(viii) Never smoke, eat or drink anything while spraying or dusting before
(ix) Thoroughly washing your body. Never blow or suck blocked nozzles.
(x) Dispose properly any left-overs and empty pesticide containers. Bury them deeply where they cannot contaminate water sources. Do not throw them in gardens, bushes or pasture land.
(xi) Clean the spraying equipment thoroughly after using particular pesticide since they may be used for applying different pesticide. This will help to protect the crop from being sprayed by unintended pesticide, for example, herbicide left in the spraying equipment that can harm the crop.
(xii) Wash the spraying equipment away from water sources which are used by animals and humans.
(xiii) Store all chemicals in safe and cool places, out of reach of children and away from food/feed store.
(xiv) Adhere to withdraw period, thus, allow the correct time to elapse before harvesting any sprayed crop or treated produce so that the chemical applied breaks down to safe levels.
(xv) Keep proper records of all chemical applications. This helps to avoid reapplying the chemicals to a crop that had already been treated. You also need to know the proper time to harvest and consume crop produce.

Any seven points = **(07 marks)**

9. (a) Pathological Diseases

Pathological diseases refer to any condition that disrupts the normal functioning of an organism, characterized by specific signs and symptoms. These diseases can stem from various factors, including infections, genetic abnormalities, environmental influences, or lifestyle choices. The study of pathological diseases, known as pathology, involves understanding the causes, mechanisms, and consequences of these conditions to develop effective treatments and preventive measures. **(1.5 marks**)

(b) Non-Pathological Agents

Non-pathological agents encompass factors that do not directly cause diseases but can still influence health and well-being. These agents can be physical, chemical, or biological in nature and may include elements like sunlight, air pollution, or dietary components. While not inherently harmful, exposure to non-pathological agents can contribute to disease development or affect an individual's overall health status. **(1.5 marks)**

(c) General Symptoms of viral disease (marks)

(i) Discoloration for example, vein clearing and yellowing;
(ii) Dwarfism, growth retardation of both individual parts and the whole plant;
(iii) Necrosis, wilting, and the appearance of annular stripes and spots;
(iv) Malformation (distortion) of plant parts such as the growth of shoots, distortion of leaves and flowers;
(v) Leaf chlorosis;
(vi) Leaf curling;
(vii) Mosaic (light green or yellow patches); and
(viii) Rosettes; development of the abnormally short internode.

(Any seven marks, 1marks @= 07 **marks)**

10. Plant Breeding

(a) Goodness of Plant Breeding

(i) Increased yields.
(ii) Improved nutritional value.
(iii) Resistance to pests and diseases.
(iv) Tolerance to environmental stress.
(v) Improved quality of produce.
(vi) Shorter growing season.
(vii) Adaptation to specific environments.
(viii) Enhanced marketability.
(ix) Increased uniformity of produce.
(x) Novel traits.

Any five (05) points = **(10 marks**)