

AGRICULTURAL SCIENCE
Ordinary and Higher Level courses

An assessment, to which 100 marks will be allotted, will be made of students options.

Soils

The formation of soils.

Principal rock groups.

Weathering of rocks.

Origin of soils: glaciation, derived soils, soils formed in situ, formation of peats.

Soil Texture

Size of particles as determined by mechanical analysis. Classification of soils.

Humus.

Use of geological maps.

Map study of soils in Ireland.

Local soil surveys.

Physical properties of soils.

Soil structure; soil air; soil density; soil temperature; soil water and soil water control.

Principles of soil cultivation with reference to tillage crops and grassland.

Chemical properties of soils.

Colloidal properties, pH and flocculation in relation to clay fraction and humus.

Base exchange.

Major and minor elements. Fertilisers and liming.

Living organisms and their effects.

Macro and micro organisms. Interdependence of animals and plants.

Decomposition of organic matter; carbon and nitrogen cycles.

Improving soil fertility.

The General Structure and Function of Plants

Elementary structure and life cycle of a bacterium, mould, fern, pine and flowering plant.

The plant cell – types of cells in different plant tissues as seen in roots, stems, leaves.

Cell division – mitosis, meiosis.

Parts of the flowering plant – function of each part.

The flower and seed production.

Structure of seed – monocot and dicot.

Germination and establishment.

Propagation of plants by vegetative means.

Plant physiology: osmosis, respiration, photosynthesis, transpiration, translocation, food storage.

Tests for food constituents.

Essential elements for normal growth.

Identification of plants of agricultural importance in the school environment and study of characteristics and habitat.

Principles of classification of plants. Ability to classify plants in at least six natural orders.

Farm Crops – Cereal and Roots

Cultivation of one cereal and one root crop or potatoes in order to illustrate the agricultural importance of the following:

Rotation.

Soil suitability.

Preparation of seed bed.

Nutrition.

Choice of variety.

Seed dressing.

Time, rate and method of seed sowing.

Establishment.

Diseases, pests, weed control, health.

Harvesting, yield, storage, food value and final use.

At least one scientific investigation should be carried out in both cases.

Farm Crops – Grassland

Study of inflorescence and vegetative system of the following grasses and clovers: Perennial Ryegrass, Cocksfoot, Timothy, Meadow Fescue, Crested Dogstail, Bent Grass, a Meadow Grass, Red Clover, White Clover.

Study of pastures (permanent and temporary leys) under the following headings:

Establishment – soil, seed bed, manuring, seeds mixtures.

Management.

Measurement of output of grassland in terms of total weight, dry matter, meat and milk.
Conservation of grassland products.
Factors influencing the feeding value of pasture, hay and silage.
Maintaining fertility.

Tree and Shelter

Hedgerow trees and shelterbelts in relation to farm animals and crops. Effects of shelter on early growth and total yield of farm crops.

Principles of Genetics

The cell – structure; mitosis; meiosis.

Mendel's laws.

Sex determination, sex linkage.

Mutations.

Heritable characters and selection for breeding – see plant and animal sections.

Structure and Function of the Animal Body

Diversity in animal life. Principles of classification.

Brief study of one representative of each of the following phyla:

Protozoa, Platyhelminthes, Nematoda, Annelida, Mollusca, Arthropoda (insect species), Chordata (mammalian species).

Classification of parasites studied elsewhere in the course.

Skeleton and muscle – simple anatomical treatment; composition of the bone; the skeleton as a storage organ.

Growth – bone, muscle and fat deposition in relation to age; composition of muscle and fat.

Circulation: the heart and blood vessels: composition and functions of the blood.

Respiration: mechanism of breathing; respiratory function of the blood.

Ingestion: structure of the mouth of a ruminant and non-ruminant – relevance to feeding habits.

Digestion: study of the digestive system of the ruminant, horse, pig and fowl; the digestive juices; the digestive enzymes.

Function of the kidney. Excretion.

Regulation of body temperature; normal temperature; heat production and body temperature in relation to microclimatic control; critical temperature of the pig and ox; consideration of farm buildings in relation to environmental temperature and humidity.

Nervous system and reflex mechanisms: the brain, nerve cells, reflexes.

The reproductive system: dissection of the rabbit – male and female.

The endocrine system: simple treatment of the pituitary, thyroid, parathyroid, thymus, pancreas, adrenals and gonads.

Transport and storage.

- (a) The blood and lymphatic systems.
- (b) Liver, adipose tissue and skeleton as storage organs.

The Cow

Common breeds, general characteristics.
Breeding principles.

The cow in production – feeding standards for maintenance, milk production and reproduction with special reference to winter feeding and grassland utilisation.

The common diseases – cause, symptoms, prevention and control – for oral examination.

Milk production – the udder; measurement of yield; composition of milk, factors influencing yield and composition; bacteriology in relation to clean milk production.
Milk products.

The calf – rearing for beef and herd replacement. General study of nutrition, growth, health and housing from birth to at least 12 months.

The Sheep

Common breeds, general characteristics. Breeding principles.

Nutrition, growth, care and health of lambs from birth to sixteen months.

Study of wool – types, growth, principal features, use.

Horse

Study of the horse (or pony) as a farm animal – for school assessment only.

Pig

Nutrition, management, environmental conditions, health

Sow – during pregnancy and lactation.

Bonham – birth to weaning.

Pig – weaning to slaughter.

Selection for breeding – based on genetical and visual assessment.

Factors affecting production costs.

Farm Buildings – *for school assessment only*

Ability to discuss farm buildings and to illustrate how they provide the environmental conditions required on the farm e.g. in regard to cattle and pigs. Emphasis on temperature, ventilation, insulation, planning for economy of labour.

Farm-House Environment – *for school assessment only*

The physical/aesthetic layout of the house in relation to the farm, farmyard and general surroundings.

NOTE: The examination in Agricultural Science will consist of (a) a written examination and (b) an assessment of the work of the candidate during the course. The assessment will be based on material set out in the syllabus and marks, to a total of 100, will be awarded under the headings set out hereunder.

- (1) Identification of plant and animal types associated with agriculture.
- (2) Practical experience with crops, livestock, house and farmyard layouts.
- (3) Investigations carried out relating to ecology, soil science, animal physiology, plant physiology, genetics and microbiology.