

Draft Specification Template Version 5 (18 October 2011)

Agriculture and Land Use

Unit 1 Soil, Crops and Habitats

This unit enables the student to gain an understanding of plants and recognize the key role of plants in the food chain starting with an appreciation of the composition of soil and its importance in the production of plant crops. Through fieldwork and practical experience students will learn how to identify native species within a variety of habitats as well as developing knowledge of the contribution that plants make to maintaining a balanced environment.

This unit aims to raise student awareness of the diverse types of farming employed across Northern Ireland and the impact of a range of influencing factors on the production systems used. In addition students will explore the use of machinery to support modern agriculture in regard to food production, harvesting, distribution and reduction of labour. Finally students will be encouraged to analyse the impact of agricultural practices upon the natural environment and consider how modern farming can limit this impact while at the same time enhancing biodiversity and promoting sustainability.

Content	Learning Outcomes
Composition of soil	<p>Students should be able to:</p> <ul style="list-style-type: none">• describe the advantages of different types of soil (i.e. clay, sandy, silty, peaty, chalky, loamy)• identify the factors contributing to soil type and location within Northern Ireland (limited to uplands versus lowlands)• differentiate between sandy soil and clay soil and give examples of those crops which are most appropriate to each soil type• identify three distinct soil samples – sand, clay, loam

Content	Learning Outcomes
	<ul style="list-style-type: none"> • demonstrate knowledge and understanding of the optimum factors appropriate to plant growth to be found in loam • identify different soil profiles and highlight topsoil and subsoil within a soil profile • demonstrate practical experience of soil-testing using soil sieves or other separation techniques and appreciate the contribution of particle size to soil type i.e. sandy, large particles; clay, very small particles; loam, range of particle sizes • apply this practical knowledge of particle size to land-use e.g. soil with larger particles is more easily drained • demonstrate practical experience of soil-testing using pH testing and identify crops appropriate to acid, alkaline and neutral soils • explain how essential elements, Nitrogen, Potassium and Phosphorous promote the healthy growth of plants • know that the labeling on a fertilizer bag provides information about the relative proportions of Nitrogen, Potassium and Phosphorus contained within • demonstrate a knowledge and understanding of the nitrogen cycle
Composts	<ul style="list-style-type: none"> • state the principal ingredients of compost and provide examples of the main types of compost used by gardeners and horticulturalists. • recognize and understand that composts can be made without soil/ peat • describe the advantages and disadvantages of using soilless and peat-free composts • identify the technology associated with growing plants

Content	Learning Outcomes
	without soil (hydroponics)
Plant growth	<ul style="list-style-type: none"> • describe the function of the root, stem and leaves • define germination and state conditions necessary for germination • investigate the factors affecting germination using experimentation, for example, water, oxygen, light, temperature
Photosynthesis	<ul style="list-style-type: none"> • state the word equation for photosynthesis • investigate how the rate of photosynthesis is affected by light, water and Carbon Dioxide
Plant life cycle	<ul style="list-style-type: none"> • recognise annual, biennial, and perennial life cycles
Plant reproduction, pollination and fertilization	<ul style="list-style-type: none"> • label a diagram of a simple flower, stating the functions of each labeled part • describe the difference between wind pollinated flowers and insect pollinated flowers • compare and contrast wind and insect pollination • use labelled diagrams to describe the process of pollination and fertilization • evaluate the impact of recent downward trends in bee populations
Crop production	<ul style="list-style-type: none"> • identify on a map of N Ireland those areas of the country principally associated with wheat, potato and apple production. • list the key factors that can impact positively and negatively on crop yield e.g. weather, soils, crop rotation,

Content	Learning Outcomes
	<p>pests and diseases</p> <ul style="list-style-type: none"> • define what is meant by Genetically Modified (GM) crops and discuss the reasons why the planting of these crops can be considered contentious • draw up an outline management plan for <u>one</u> common farm crop (choose from cereal, potatoes, fruit or vegetable) to include consideration of the following; <ul style="list-style-type: none"> a) site/ location, soil type, soil fertility, seed bed preparation, seed sowing, crop nutrition, pest, disease and weed control, b) storage, distribution and processing of the crop from farm store to supermarket c) main costs associated with the different phases of production d) the main types of machinery used to support production • outline the differences that organic production would make to the management plan
<p>Care and management of the countryside</p>	<ul style="list-style-type: none"> • define the terms habitat, ecosystem, biodiversity, abiotic and biotic factors • for <u>one</u> of the following habitats <ul style="list-style-type: none"> - improved grassland (including sports turf) - unimproved grassland - deciduous or coniferous forests - wetland or bog <p>(a) measure and record abiotic factors such as soil pH, light levels, wind speed and temperature</p> <p>(b) explore, using appropriate sampling equipment (quadrat, pitfall trap, sweep net, pooter), the</p>

Content	Learning Outcomes
	<p>biodiversity of plants and animals</p> <p>(c) use the data collected to explain the distribution of species within the habitat and evaluate the validity of this data</p> <p>(d) assess how species found in the habitat are adapted to living there, for example:</p> <ul style="list-style-type: none">○ bluebells growing on a forest floor○ gorse growing in dry areas○ curlew feeding in wetland areas○ white clover on grassland areas

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Content	Learning Outcomes
<p>Care and management of the countryside</p>	<ul style="list-style-type: none"> • evaluate the benefits to farmers, the general public and future generations of initiatives to enhance biodiversity, for example, financial incentives, sustainable agriculture, public recreational areas • describe how farmers can minimize the impact on ecosystems and improve biodiversity by <ul style="list-style-type: none"> - preventing soil erosion - restoring and establishing hedges - minimising soil compaction - creating and managing habitats - reducing reliance on chemicals - protection of species • list a variety of plant species which can be used in hedging, for e.g. hawthorn, hazel, dog rose, guelder rose, holly, rowan, oak and cherry • define the term ‘priority species’ • recognise the following examples of priority species and identify their respective habitats, Yellowhammer, Irish hare, Red squirrel, Lapwing, Barn Owl • define the term conservation and understand how those working on the land can support conservation initiatives by practicing sustainable agriculture, for e.g. crop diversification, use of animals to maintain soil and vegetation quality • identify principal site designations (e.g. ASSI, SPA) and understand the management implications arising from these designations
<p>Renewable energy and climate change</p>	<ul style="list-style-type: none"> • give examples of how energy is used on a farm • understand the term biomass and give examples of crops that can be grown for this purpose • investigate the suitability of producing energy from renewable sources such as wind, water, sun and energy

Content	Learning Outcomes
	<p>crops (biomass), giving consideration to location, cost, efficiency and impact on the environment</p> <ul style="list-style-type: none"> • discuss the effect of climate change on weather patterns • evaluate the impact of climate change on <ul style="list-style-type: none"> ○ crops grown within the UK ○ the incidence of pests and diseases on crops ○ the role of farmers in “flood risk management” • describe some of the ways by which farmers can reduce their carbon footprint, for e.g. increased woodland planting, careful • management of specific habitats and energy conservation
<p>Careers</p>	<ul style="list-style-type: none"> • identify a range of careers within the agri-food and land use sectors in which knowledge gained in this unit could be applied • understand the need for ongoing training of those working in the agriculture and land sector in skills such as: people management, business innovation, applied technology and health and safety

Unit 2 Animals on the Land

Over 60% of the population of Northern Ireland is classified as rural, and farming, along with land-based industries make a significant contribution to the local economy. This unit aims to educate students about the main animal species that are kept commercially in Northern Ireland. The unit focuses on the key aspects of husbandry of poultry and either sheep or cattle, including nutrition, health and breeding. Students will understand how choices relating to, for example, breeding and feeding affect farming profitability. In keeping with our changing society students will learn how farming is adapting to meet increasing environmental concerns about land use and will consider aspects of sustainability at farm level including farm diversification.

Content	Learning Outcomes
Caring for animals	<p>Students should be able to:</p> <ul style="list-style-type: none">• name the five basic welfare needs (freedoms) of farm animals, (i.e. freedom from:- thirst/malnutrition, discomfort, disease, abnormal behaviour, fear/distress)• outline five characteristic signs of a healthy animal and an unhealthy animal

Content	Learning Outcomes
Chickens/Poultry	<ul style="list-style-type: none"> • name three types of birds commonly farmed on a commercial basis • outline the characteristics of modern and traditional breeds • identify and describe the function of the key parts of the avian digestive tract • describe the differences between meat and egg producing chickens • understand the breeding and lifecycle of chickens • know how to incubate an egg (taking into consideration health and welfare concerns) • label a diagram of the interior of an egg, to include, albumen, egg cell, vitelline membrane, yolk, air pocket, shell, chalazae) • describe the advantages and disadvantages of intensive and extensive systems including organic, with reference to; the environment, animal welfare, cost, yield, artificial inputs and breed

Content	Learning Outcomes
Livestock Farming	Choosing either cattle or sheep, students should be able to:
Breeding and reproduction in animals	<ul style="list-style-type: none"> • label a diagram showing the male and female reproductive systems • describe how different fertilisation methods take place (natural fertilisation, Artificial Insemination and embryo transfer) and evaluate the advantages and disadvantages of each fertilisation method • discuss the benefits of colostrum over ordinary milk, and the advantages and disadvantages of mother and young staying together for a time • describe the main features of a lactation curve • understand why different sexes of animal are kept for different lengths of time • distinguish between commercial and traditional breeds • describe, with examples, how selective breeding of farm animals using traits such as growth rate, milk yield, conformation and hardiness has led to the development of different breeds
Animal nutrition	<ul style="list-style-type: none"> • identify and describe the function of the key parts of the ruminant digestive tract • understand what is meant by Dry Matter Intake (DMI) and relate DMI to nutritional needs • evaluate the differences between maintenance rations and production rations • describe and explain the uses of various food sources such as succulents, fibre (roughage), concentrates and minerals • discuss how the nutritional requirements of animals vary depending on species, sex, breed, age and stage of pregnancy

Content	Learning Outcomes
Animal health and welfare	<ul style="list-style-type: none"> • describe the cause, symptoms, prevention, and treatment of mastitis in cows or fluke in sheep • be aware of the effects of tuberculosis, brucellosis, foot & mouth on farm animals and explain the impact of these diseases on the agricultural economy • describe how and why the government and other agencies try to limit the spread of tuberculosis, brucellosis, foot & mouth • know how to approach and safely carry out routine health checks on farm animals • explain how to move large animals safely from farm to farm and over large distances (include legal requirements)
Animal production systems	<ul style="list-style-type: none"> • describe the advantages and disadvantages of intensive and extensive systems including organic, with reference to the environment, animal welfare, cost, yield, artificial inputs and breed • discuss the need for consumer food choices in relation to economic, ethical and cultural differences • explore the main grazing systems (e.g. rotational, set stocking etc) used on Northern Ireland farms • consider how the time of year and stage of grass maturity affects the grass' nutritional value • describe the basics of silage-making practised on Northern Ireland farms
Food processing and marketing	<p>Choose one product from, cow's milk, sheep/lamb meat or beef</p> <ul style="list-style-type: none"> • explain how the product is made ready to leave the farm and then subsequently transported and stored after it has left the farm • know and understand what happens at each stage of food processing from farm to supermarket shelf to include; <ul style="list-style-type: none"> Milk - quality control, pasteurization, homogenization Meat - quality control, slaughtering, butchering

Content	Learning Outcomes
Farm Economics	<ul style="list-style-type: none"> • describe methods by which the product can be preserved for later use e.g. dried, vacuumed packed, tinned, cured • be aware of the secondary processes which can be carried out on the product e.g. milk to cheese or yoghurt, sheep's intestines to sausage casings or lamb meat to kebab meat • define the terms income, cost and profit and calculate cost and profit margins • investigate the principal costs associated with keeping animals • describe what farm diversification is and why it can be beneficial to the farmer and the economy • discuss ways that farms have diversified in Northern Ireland with particular reference to tourism and energy production • understand how farmers benefit from the Northern Ireland Farm Quality Assurance Scheme and the Countryside Management Scheme, and identify some of the changes needed to comply with these schemes • state the advantages and disadvantages of the Single Farm Payment as a financial support to farm businesses • describe how technology such as Auto ID collars/tags, computer based record keeping programs, pedometers for heat detection and Animal and Public Health Information System (APHIS) have been adopted by the agricultural industry and state the benefits to farm businesses
Pollution and farm waste	<ul style="list-style-type: none"> • outline the main sources of farm pollution, such as silage effluent, excessive application of fertilizers and animal waste, smell from spreading slurry, noise from farm machinery • recognise that the European Union controls the disposal of farm wastes through the Nitrates Directive and Nitrate Vulnerable Zones • define eutrophication and using Lough Neagh as an example, explain how over application of fertilizers can lead to eutrophication

Content	Learning Outcomes
	<ul style="list-style-type: none"> • describe how farmers can reduce pollution from animal waste and effluent with reference to slurry application using a dribble bar or injection and dirty water irrigation • explain how reed beds can be used to clean dirty water and assess the viability of using this system on farms • demonstrate knowledge and understanding of how technology, such as GPS on tractors, allows for more accurate application of fertilizers and pesticides • use secondary sources of data, for example biological oxygen demand (BOD) values, to analyse how pollution affects the natural environment • use invertebrate indicator species such as, worms, leeches, mayfly nymphs, damselfly nymphs, caddis fly larvae and dragonfly nymphs, to assess the level of pollution in water samples • discuss the potential to produce energy on farms through anaerobic digestion of animal waste

GCSE Agriculture and Land Use

Assessment objectives

AO1

Recall, select and communicate knowledge and understanding of science

AO2

Apply skills, knowledge and understanding of science in applied and other contexts

AO3

Analyse and evaluate evidence, make reasoned judgements and draw conclusions based on evidence

	AO1	AO2	AO3	Total
Unit 1 Soils, Crops & Habitats	8%	9%	3%	20%
Unit 2 Animals on the Land	8%	9%	3%	20%
Controlled Assessment	12%	25%	23%	60%
Total GCSE	28%	43%	29%	100%