

Agricultural Science

Science is everywhere, Agricultural Science shows how.



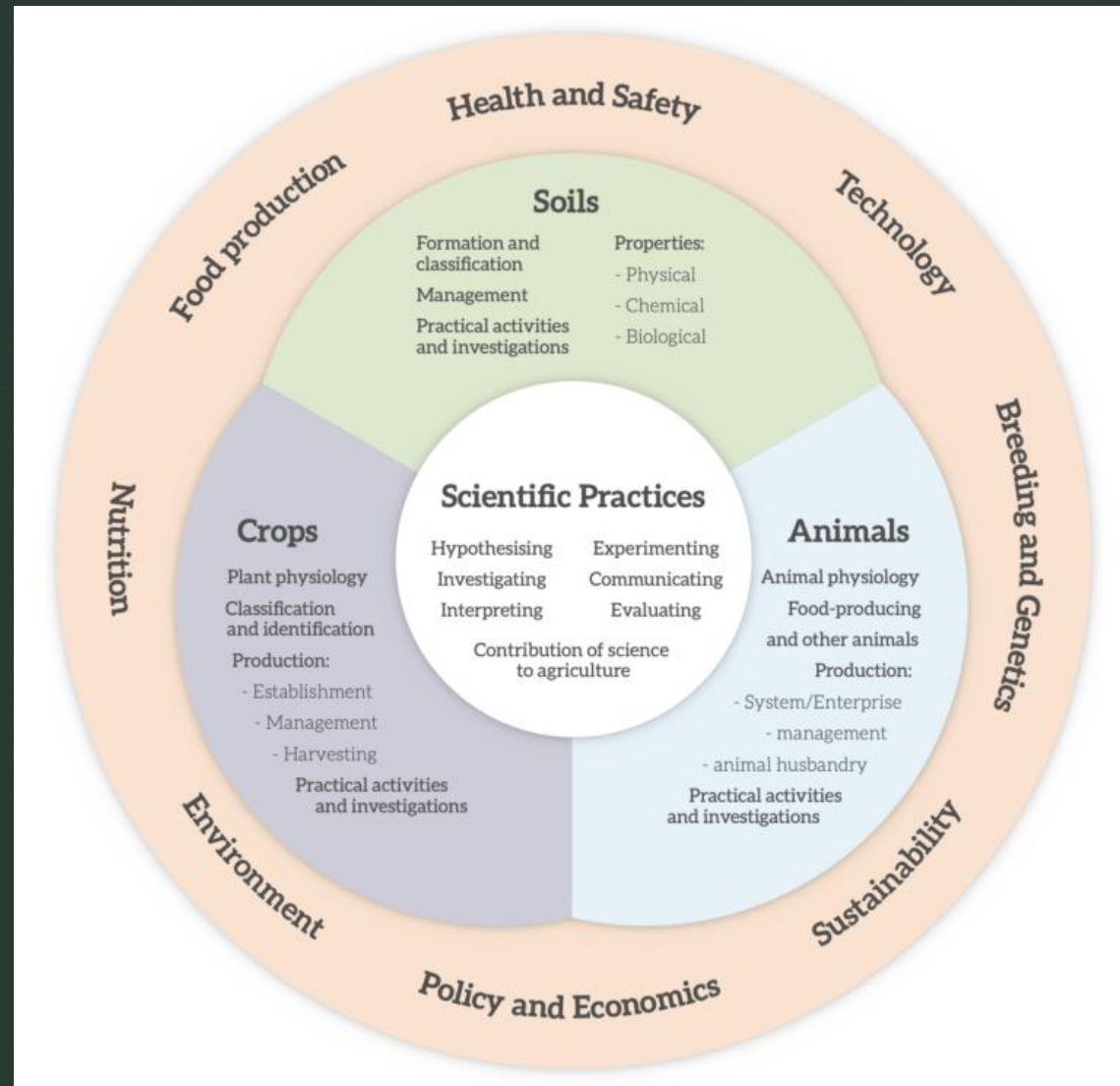
Course Overview



- Agricultural Science is a broad course. It is a popular subject in both urban and rural areas. It gives students a modern understanding of the **agri-food sector**, the **science** behind **animal and plants** and how food moves from farm to fork in a sustainable way. It also reflects how quickly **technology is reshaping agriculture**, with students learning about **drones, sensors, data analysis, genetics, and precision farming**. We also look at EU policies and economics in Irish Agriculture

Course Curriculum

The ***Leaving Certificate Agricultural Science*** curriculum is designed to provide pupils with the necessary skills, practical experience and knowledge in a range of agricultural and scientific principles. The subject involves the study of the science and technology underlying the principles and practices of agriculture in Ireland. It aims to develop knowledge, skills and attitudes that promote the sustainability of agricultural resources, and places emphasis on the managed use of these resources.





■ THE STRANDS

- There are 4 strands throughout the course:
- Strand 1: scientific practices
- Strand 2: Soils
- Strand 3: Crops
- Strand 4: animals



■ STRAND 1: SCIENTIFIC PRACTICES

- • Hypothesising and
- experimenting
- • Evaluating evidence
- and communicating
- • Working safely

STRAND 3: CROPS

- Plant physiology
- Applied plant genetics
- Plant Classification
- Principles of crop production and management
- Barley
- Potatoes
- Catch crop kale (HL)/ Energy crop Miscanthus (HL)
- Grassland characteristics, grazing, management, sowing, reseeding & conservation

STRAND 2: SOILS

- Soil formation and classification
- Physical characteristics of soil
- Chemical characteristics of soil
- Biological characteristics of soil
- Soil management

STRAND 4: ANIMALS

- Animal nutrition and physiology
- Animal reproduction and genetics
- Dairy
- Beef
- Sheep
- Pigs
- Animal health and disease
- Environmental impact of agriculture

Mandatory activities and Coursework.

MANDATORY ACTIVITIES • 22

experiments (19 OL 22 HL) • Individual
investigative study (IIS) worth 25% • Final
exam 75%

The mandatory activities develop skills
needed for the 25% project — data
collection, analysis, and clear
communication.

Guidance and feedback is given to students
throughout the duration of their project.

5.1a	To determine the soil texture of a soil sample by hand testing	74
5.1b	To determine the soil texture of a soil sample by sedimentation	75
5.1c	To determine the soil texture of a soil sample using a soil sieve	76
5.2	To calculate the percentage water content of a soil sample	83
5.3a	To demonstrate capillarity in a compacted soil and an uncompacted soil	84
5.3b	To compare the infiltration rate of a compacted soil and an uncompacted soil	86
6.1	To show flocculation in a soil sample	93
6.2	To demonstrate cation exchange capacity in a soil H (Higher Level only)	95
6.3	To determine the pH of a soil	96
7.1	To determine the percentage organic matter in a soil sample and convert that to organic carbon	103
7.2	To isolate and grow bacteria from clover root nodules	108
7.3	To show the activity of earthworms in a soil and estimate the number of earthworms in a pasture	110
10.1	To investigate the complexity associated with the genetic inheritance of traits by hybridising two varieties to determine the rate of transfer of the required trait to the next progeny	160
12.1	To compare plant uniformity from certified and uncertified seed H (Higher Level only)	185
12.2	To investigate the effect of weather and soil conditions on the percentage germination of an agricultural seed	189
12.3	To investigate the effect of nutrients on the growth of a sample of plants and measure the biomass of these plants above and below ground	192
14.1	To determine the dry matter (DM) content of different potato varieties	228
17.1	To investigate the botanical composition of an old permanent pasture or a new ley	253
17.2	To investigate the dry matter (DM) content of grass	257
19.1	To compare the establishment of grass with that of one other crop H (Higher Level only)	283
26.1	To investigate the quality of a sample of milk over time	378
32.1	To plan the layout of a farm	506

Weekly study guides and revision aid

Students get access to weekly study guides with exam focused questions and a revision guide.

AGRICULTURAL SCIENCE STUDY GUIDES 2025-2026



WEEK 19: sustainable farm practices

LEARNING OUTCOMES:

- 4.3.2.a.4 discuss management practices for delivering sustainable and environmentally friendly production systems.
- 4.3.3.a.2 describe a farm you have studied in terms of best layout practice, encompassing economic, health and safety, social, and environmental sustainability aspects

Risk farmers face increasing pressure to balance productivity with environmental responsibility. This article provides evidence-based strategies for improving sustainability across six major agricultural enterprises: dairy, beef, tillage, pig, sheep, and grassland management. Implementation of these strategies can reduce environmental impact while maintaining economic viability.



1. Dairy farming sustainability

Feed efficiency and nutrition management

- Optimise forage quality: Invest in soil testing and targeted fertilisation to improve grass and silage nutritional value. This can reduce concentrate requirements by 10-15%.
- Precision feeding: use milk composition data to tailor rations to individual cow requirements which in turn minimises feed waste.
- Incorporate legumes: introduce clover and other nitrogen-fixing plants to reduce synthetic fertiliser dependency by up to 30%.

Methane reduction strategies

- Breeding for efficiency: select animals with lower methane production per unit of milk produced. This is now included as a trait on EB1.

- Improved grazing management: rotational grazing increases forage digestibility and reduces methane per kilogram of milk.

- Water and effluent management**
- Slurry storage: maintain minimum four-month storage capacity to optimise application timing.
- Apply slurry using LESS application methods.

- Energy efficiency**
- Renewable energy: install solar panels or small wind turbines to offset electricity costs.
- Efficient milking equipment: upgrade to variable-speed vacuum pumps and automatic cluster removal systems.
- Heat recovery: capture waste heat from milk cooling for water heating.



2. Beef and sheep farming sustainability

Grassland-based production

- Mixed grazing: rotate/integrate cattle with sheep to improve parasite control and forage utilisation.
- Multi-species swards: including legumes like clover in grazing swards to utilise atmospheric nitrogen, improve forage nutritional value and reduce concentrate feeding.
- Rotational grazing: implement planned grazing rotations to improve forage quality and animal health.
- Parasite management: use rotational grazing to break parasite life cycles and reduce anthelmintic dependency.

Herd/flock management and genetics

- Breeding for efficiency: select animals with lower feed conversion ratios and improved disease resistance.
- Age at slaughter: optimise finishing age to balance growth efficiency with market requirements.
- Crossbreeding programmes: use terminal sires to improve feed conversion and reduce produc-

tion time - hybrid vigour.

- Maternal efficiency: breed replacements with high milk production and good mothering ability
- Preventive health: implement vaccination programs and biosecurity measures to reduce disease incidence

Manure management

- Anaerobic digestion: process manure to generate biogas for energy while producing nutrient-rich digestate.
- Targeted application: use soil testing to apply manure only where nutrients are needed.

Biodiversity enhancement

- Hedgerow management: maintain and plant hedgerows to provide wildlife habitat and reduce wind erosion.
- Buffer zones: establish vegetation strips along waterways to filter runoff and prevent erosion.
- Wildflower margins: dedicate 5-10% of farm area to native wildflower strips for pollinator support.

4. Pig farming sustainability

Feed efficiency and sourcing

- Precision feeding: implement phase-feeding programmes that match nutrient supply to pig requirements at different growth stages.
- Manure and nutrient management.
- Biogas production: implement anaerobic digestion to generate renewable energy from pig manure.

Housing and welfare

- Improved ventilation: install automated systems to optimise air quality and reduce ammonia emissions.

- Outdoor systems: consider outdoor pig production to reduce housing costs and improve animal welfare.

Water management

- Water efficiency: install low-flow drinkers and monitor usage to reduce consumption by 10-15%.
- Rainwater harvesting: capture roof water for non-potable uses like equipment washing.

5. Grassland management sustainability

Soil health and carbon sequestration

- Soil testing: conduct regular soil analysis to optimise pH and nutrient levels.
- Reduced compaction: minimise heavy machinery use or grazing heavy animals poaching land, during wet conditions to preserve soil structure.

Fertiliser management

- Targeted application: use soil and

tissue testing to apply only required nutrient levels.

- Legume integration: include clover and other nitrogen-fixing plants to reduce synthetic nitrogen by 30-50%.
- Manure utilisation: maximise use of farm-produced manure to reduce purchased fertiliser requirements.

Grazing management

- Rotational grazing: move animals frequently to allow adequate plant recovery and improve forage quality.

Student activities

Answer the following leaving certificate questions related to sustainability. The marking scheme for each question is provided below.

Question 1

2023 Ordinary Level - Section 2 - Question 13 - Part a - (i)

- Answer (a) and (b) with either (c) or (d).
- (a) (i) Fertilising grassland is an important aspect of ensuring farm sustainability. Outline reasons why fertilising is recommended.

Question 2

2021 - Higher Level - Section 1 - Question 5

- Named crop:
- (a) Describe two ways in which the production of your chosen crop contributes to sustainability.

1.
2.

Question 3

2023 - Higher Level Deferred Exam Paper - Section A - Question 4

Read the article and answer the questions which follow.

Natural Capital and Other Resources

Agriculture is the world's largest user of freshwater, accounting for 70% of global freshwater use. There are large differences in water use between regions and farming systems. In more temperate regions like Ireland, the interface between agriculture and water is predominantly defined by the impact of farming on the quality of drinking and surface waters. Here, the prevention of eutrophication, caused by excess nutrient losses to water, represents one of the main challenges to sustainability.



(Adapted from 'European Technology-Forecast Report 2020, 2022')

- (a) Explain the underlined term.

- (b) State two agricultural practices which could be used to reduce eutrophication.

1.
2.

Farm Visits

- Students get the opportunity to visit farms and put theory into practice. There is 3 educational trips over the duration of the course including two visits to a farm in North County Dublin.
- Students get an opportunity to gain a close up and practical experience including lambing sheep, animal husbandry and grassland management.



Transition year



Students get the opportunity to visit Airfield Estate and farm in Dundrum for an educational workshop and to have a close up experience with farm animals.



Students complete project work and experiments.

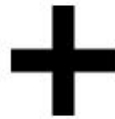


Student cover topics such as food production, ruminant digestive systems, Invasive plant species and soil health.



Angus schools' competition

Two students from Manor House entered the Angus Schools competition when they were in TY. They were selected as winners and were very fortunate to receive 5 angus calves which they reared for 18 months.



Career Opportunities

- The study of agricultural science can lead to many exciting and rewarding careers across the agriculture and food sectors. Ireland has an ever growing and evolving agri-food sector exporting to 180 markets worldwide.
- These include careers such as **agriculture, education, sustainability, general science and food science studies, veterinary, environmental studies, horticulture, marine science, microbiology, genetics, zoology and botany**. Agricultural science is also accepted as a science subject for access to many third level courses.



–Useful resources

[Agricultural Science – Scoilnet](#)

[Agricultural Science | Curriculum Online](#)

[Schools Hub : Irish Farmers Journal – For the Latest Farming News in Ireland](#)