



# Leaving Certificate Agricultural Science

*'Maintaining Natural Resources through  
Organic Food Production'* webinar resource

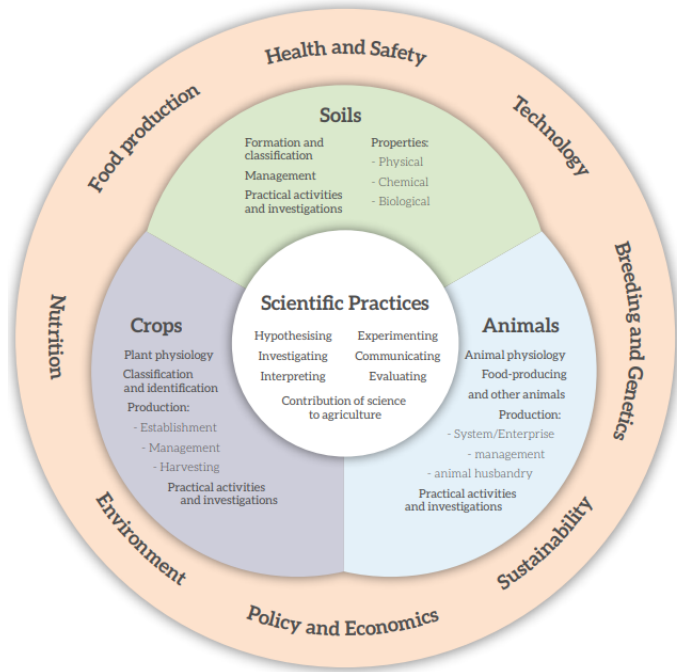


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## Structure of the Specification

(pg 11, Agricultural Science Specification)





## Keywords

<b>Organic farming</b>	Agricultural system that uses ecologically based pest controls and biological fertilizers derived largely from animal and plant wastes and nitrogen-fixing cover crops.
<b>Conventional farming</b>	A farming system that relies on chemical intervention to fight pests and weeds and provide plant nutrition.
<b>Limitations</b>	Factors that control how possible something is.
<b>Added value</b>	The amount by which the value of an article is increased at each stage of its production.
<b>Niche market</b>	A small, specialized market for a particular product or service.
<b>Artisan produce</b>	Product's that are that made in a traditional manner.
<b>pH</b>	A measure of the concentration of hydrogen ions in a solution.
<b>Organic matter</b>	Soil organic matter (SOM) is the portion of soil that is composed of living and dead things in various states of decomposition, such as plant roots and microbes.
<b>Permanent pasture</b>	Permanent grassland is land used permanently (for several consecutive years, normally 5 years or more) to grow herbaceous fodder, forage or energy purpose crops, through cultivation (sown) or naturally.
<b>Crop rotation</b>	Crop rotation is the practice of growing a series of different types of crops in the same area across a sequence of growing seasons.
<b>Farmyard Manure</b>	Farmyard manure is a decomposed mixture of dung and urine with straw and litter used as bedding material and residues from the fodder fed to cattle, sheep and other livestock.

<b>Tap root</b>	Straight tapering root growing vertically downwards and forming the centre from which subsidiary rootlets spring.
<b>Mulch</b>	material (such as decaying leaves, bark, or compost) spread around or over a plant to enrich or insulate the soil.
<b>Cover crops</b>	In agriculture, cover crops are plants that are planted to cover the soil rather than for the purpose of being harvested. Cover crops manage soil erosion, soil fertility, soil quality, water, weeds, pests and diseases.
<b>Nematodes</b>	They are unsegmented vermiform animals. The epidermis has dorsal and ventral nerve cords. The Nematodes present in the soil feed on the bacteria, fungi, and other nematodes, and play an important role in nutrient recycling.
<b>Micro fauna</b>	Microfauna, small, often microscopic animals, especially those inhabiting the soil, an organ, or other localized habitat.
<b>Min till</b>	A method of cultivation in which ploughing is not carried out.
<b>Compaction</b>	Compaction of soil is the compression of soil particles into a smaller volume, which reduces the size of pore space available for air and water.
<b>Nitrogen fixation</b>	Nitrogen fixation is the conversion of free nitrogen to nitrogen combined with other elements; specifically regarding soils, the assimilation of atmospheric nitrogen from the soil air by soil organisms to produce nitrogen compounds that eventually become available to plants.
<b>Symbiotic relationship</b>	Symbiosis is defined as a close, prolonged association between two or more different biological species. This relationship can be symbiotic (mutualistic), where both parties involved benefit from the interaction, or it can be parasitic, where one party benefits while the other is harmed.

<b>Metabolic exudate</b>	Plants release a set of chemical compounds, called exudates, into the rhizosphere, under normal conditions and in response to environmental stimuli and surrounding soil organisms.
<b>Monocrop</b>	A practice where a field is used for production of pure stands of one crop only.
<b>Mumic matter</b>	Organic molecules that play essential roles in improving soil properties and plant growth.
<b>One pass system</b>	One pass means less fuel, less labor, less tractor and equipment maintenance, and less time required for tillage. It not only lowers costs but leads to better crop yields due to less compaction.
<b>Flag leaf</b>	First leaf below the inflorescence.
<b>Established</b>	A well developed crop with a defined root system.
<b>Certified seed</b>	Certified Seed is a fully traceable, weed-free, guaranteed seed product with superior quality to alternatives and is part of a world-wide quality assurance system.
<b>Milling</b>	Milling is the process of grinding, cutting, pressing, or crushing a material in a special machine.
<b>Premium category</b>	Premium price obtained for product.
<b>Continuous tillage</b>	The practice of continuous tillage sees a crop being sown successively.
<b>Windrow composting</b>	Windrow composting is the production of compost by piling organic matter or biodegradable waste, such as animal manure and crop residues, in long rows.



You have been asked to give a talk about organic food production to a group of farmers. As part of your research you listened to Pat and John Lalor to learn information about how they produce organic oats and beef on their farm.



Take notes for each section on things you have learned using the guiding activities and write down any questions you may have for Pat or John to ask at the Q & A session.



\*Please note: this resource can be used as one entire video or the videos can be used in separate lessons and will be available on [www.lcagscience.ie](http://www.lcagscience.ie) or maybe use in flipped classroom or bring videos into 'Ed Puzzle' and include your guiding questions.

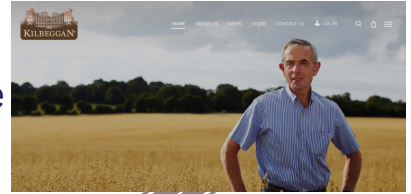




## Introduction: Farm Profile

**Pat and John Lalor**  
**Tillage and Beef Organic family farm**  
**Kilbeggan, Co. Westmeath**

1965, Pat attended agricultural college



2010, started selling own oats - 'Kilbeggan Organic Porridge'



1999, converted from conventional farming to organic farming



2014, started selling handmade oat cookies



2015, John (Pat's son) returned home to help run the family farm



<https://kilbegganorganicfoods.com/>







## Video 1: Introduction - Farm Profile

- Outline Pat's decision for converting from conventional farming to organic farming and which enterprise (tillage or beef) did he focus on.

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- State some of the limitations to their enterprise.

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- Explain how Pat carried out his research into organic farming.

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- Explain how Pat add value to his produce.

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- Pat said they were '*happy to remain artisan producers*'. Outline what he means by this statement.

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- Explain niche market.

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- List the two main products produced on the farm.

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- Why can retailer charge a premium for artisan craft products?

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- Further questions:



## Video 2: Soil and Soil Management on Lalor's Farm

During the video, write down the main points outlined under each heading.

Cues (key concepts /points)	Notes (main points during listening)
Soil type	
Soil test	
Soil health	
Nutrients	
Biological features (including earthworms)	

<b>Cues (key concepts/points)</b>	<b>Notes (main points during listening)</b>
<b>Effect of ploughing</b>	
<b>N Fixation / Red Clover</b>	
<b>Rotation</b>	
<b>Weed, disease and pest control</b>	
<b>Biodiversity</b>	

## Video 2 & 3: Crop Varieties Sown on Lalor's Farm

**A**



**B**



**C**

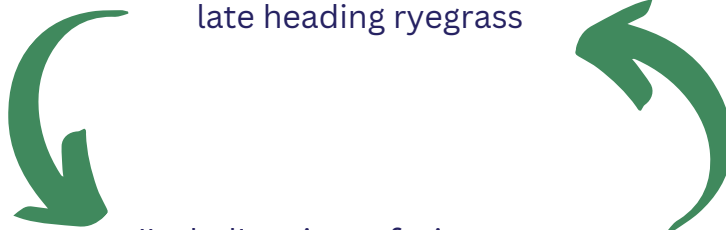


Complete the table which follows:

	Crop	Reason for Including the Rotation
<b>A</b>		
<b>B</b>		
<b>C</b>		

### 2 Year Rotation

75% red clover, 10% white clover and 15% late heading ryegrass



'Isabel' variety of winter oats

Explain why this rotation works on this farm:



## 'Isabel' is the variety of winter oats used on Lalor's farm

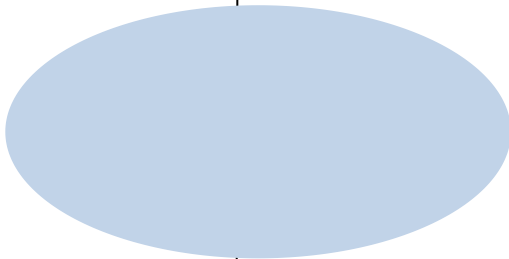


Research this variety of winter organic oats to determine the reasons why this variety is chosen on the farm.















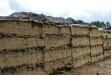
### Video 3: Crop Production - Oats and Red & White Clover / Ryegrass

<p><b>Things that I have learned</b></p>	<p><b>Things that I found interesting</b></p>
	<p><b>Questions I still have</b></p>



## Video 4: Red Clover and Silage

Write brief information notes on each of the following:

<p><b>Soil texture and its importance</b></p> 	<p><b>Tap root of clover</b></p> 	<p><b>Reason for including white clover in mix</b></p> 
<p><b>Managing red clover</b></p> 	<p><b>Sowing late heading perennial ryegrass</b></p> 	<p><b>Effect of soil temperature and harvesting</b></p> 
		
<p><b>Managing silage making (harvest)</b></p> 	<p><b>Sowing red clover</b></p> 	<p><b>Sward mix</b></p> 
<p><b>Harvest date / stage of growth</b></p> 	<p><b>Mulching v Topping</b></p> 	<p><b>Silage pit</b></p> 



## Video 4: Red Clover and Silage



Analyse the red clover silage analysis report recently carried out on the farm and answer the questions which follow.

KILBEGGAN ORGANIC FOODS  
KILBEGGAN ORGANIC FOODS  
BALLARD  
KILBEGGAN  
CO WESTMEATH  
IRELAND

Lab No : 23EN000023  
Sample Type : SILAGE SAMPLE  
Sample I.D. : SILAGE 2ND CUT FAR OPEN PIT  
Owner Name : BALLARD ORGANIC FARM  
Date Sampled : 04/01/2023  
Date Received : 05/01/2023

### Nutritional Analysis Test Report

#### Nutritional Analysis

Test Method : P7.2.002 Quantitative analysis of nutritional parameters in forages using near-infrared reflectance (NIR) spectroscopy

Analysis Date: 05/01/2023

	<u>As Received</u>
Moisture (%)	72.3
Dry Matter (%)	27.7
pH	3.3

	<u>As Received</u>		<u>DM Basis</u>	
	<u>%</u>	<u>g/kg</u>	<u>%</u>	<u>g/kg</u>
Crude Protein	4.8	48.5	17.5	175.0
Nitrogen	0.8	7.8	2.8	28.0
Neutral Detergent Fibre (NDF)	3.7	37.4	13.5	135.0
Acid Detergent Fibre (ADF)	3.4	33.5	12.1	121.0
Ash.	3.4	34.1	12.3	123.0

Additional Information: Predicted DMD: 79.33

<p><b>Explain 'quantitative analysis'.</b></p>	
<p><b>State the DM, pH, protein and the predicted DMD content of the silage and outline their meaning in relation to silage quality.</b></p>	





## Video 4: Red Clover and Silage



Further research into red clover silage:



**Red clover and its management**  
Teagasc (2017)



**Red Clover Silage Measure 2022**  
Department of Agriculture Food and Marine (2022)

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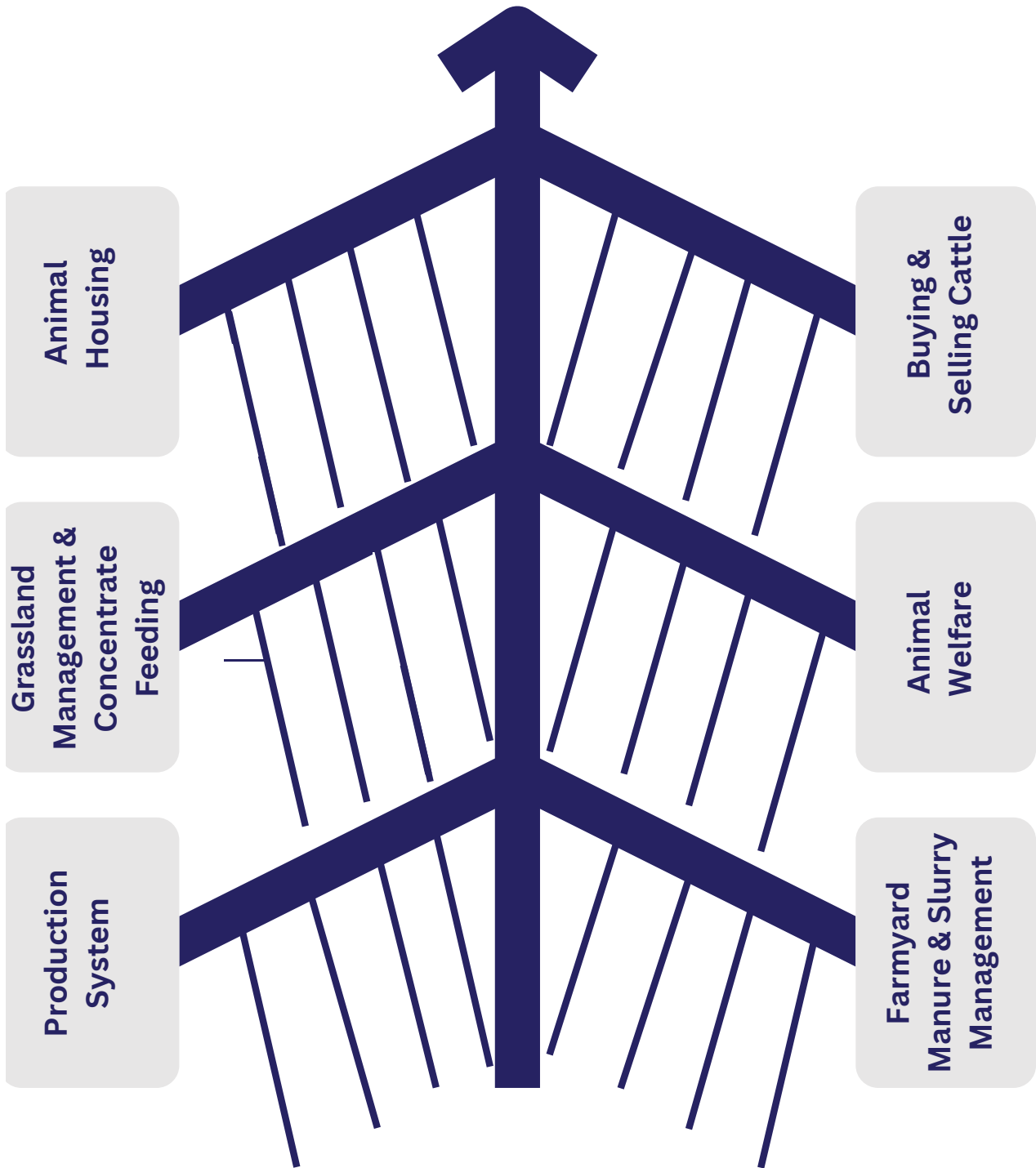
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## Video 5: Organic Beef Enterprise







An Roinn Oideachais  
Department of Education



Dublin West Education Centre  
Ionad Oideachais Bhaile Átha Cliath Thiar

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