

ORDINARY LEVEL**Section A****10 Questions @ 10 marks each****100 Marks****Question 1 Answer (a) OR (b)**

- (a) Identify the following breeds from the list

Breed A:	Blackface mountain
Breed B:	Large white
Breed C:	Saddleback
Breed D:	Suffolk
Breed E:	Texel

5 x 2m = 10m**OR**

- (b) (i) Identify the following breeds of cattle shown.

Breed A:	Limousine
Breed B:	Charolais
Breed C:	Hereford
Breed D:	Aberdeen Angus

4 x 2m = 8m

- (ii) Beef breeds have a rectangular conformation. Explain the underlined term
 - The shape of the animal, making reference to structure and appearance
 - **Accept other valid answers **2m**

Question 2

A student wanted to investigate the conditions needed for seed germination.

- (a) Outline how the student would carry out this experiment

3 x 2m = 6m

Any three valid points

- Measure known mass of soil using electronic balance
- Place in seed tray
- Add known amount of seeds to the soil
- Add water to the seeds as appropriate
- Provide the seeds with oxygen and a suitable temperature (room temperature is suitable)
- Observe over 3-4 weeks and record results
- **Accept other suitable points/methods

- (b) Explain the term germination **2m**
 The re-growth/ development of a seed after a period of dormancy
 - **Accept other valid answers

- (c) State **two** factors needed for germination to take place

2 x 1m = 2m

- Water
- Oxygen
- Suitable temperature
- Dormancy complete

Question 3

The image shown below is the organelle in plants that is responsible for photosynthesis.

- (a) Name the organelle shown in the diagram.
Chloroplast (2m)
- (b) State the pigment found in the organelle shown in part (a) that is required for photosynthesis to take place
Chlorophyll (2m)
- (c) Complete the equation for photosynthesis
Carbon dioxide + Water → Glucose + **Oxygen**
 Carbon dioxide (**2m**)
 Oxygen (**2m**)
 **must be in correct order for full marks
- (d) Water is transported in plants by the process of osmosis. Define Osmosis
 - Movement of water from an area of high water concentration to a low concentration across a semi permeable membrane
 - **Accept other valid answers (**2m**)

Question 4

Indicate if the following are true or false by placing a tick in the correct box.

The first one has been done as an example.

		True	False
Example	Sheep are monogastric animals		✓
(i)	Perennial ryegrass can be identified by the presence of awns		✓
(ii)	Loam soils contain equal amounts of sand, silt and clay	✓	
(iii)	Tillering is the production of side shoots in grass plants	✓	
(iv)	Dairy breeds have a block/rectangular shape		✓
(v)	An iron pan is often present in podzol soils	✓	

5 x 2m = 10

Question 5 Answer (a) OR (b)

- (a) (i) Identify each of the following plants which are often found on Irish farms.

PLANT A :	PLANT B :	PLANT C:
Thistle (accept spear thistle)	Ragwort	Cow parsley

3 x 2m = 6m

- (ii) Outline **two ways** that farmers can prevent the build up of weeds on their farms

Any two valid answers:

- Use of herbicides
- Correct seedbed preparation
- Crop rotation
- Reseeding pastures
- Having crops in fields rather than allow them to lie fallow
- Use of certified seeds
- **Accept other valid answers

2 x 2m = 4m

OR

- (b) Describe with the aid of a labelled diagram how to determine the soil texture of a soil sample by sedimentation.

Any four valid points 4 x 2m = 8m

2m for correct labelled diagram

10m in total

- Add soil sample to a beaker with water in it and stir using glass rod
- Add this suspension to a graduated cylinder
- Place a stopper on top of graduated cylinder and shade mixture
- Leave for 1-2 days and Observe the layers that form
- Record volume of each layer and then calculate the percentage of sand, silt and clay present in sample
- Use the soil triangle to identify the type of soil present

Diagram should show set up including graduated cylinder/ stirring rod/ soil layers

Question 6 Answer (a) OR (b)

- (a) Farm accidents are common in Irish agriculture. The Health and Safety Authority (HSA) have created the Farm Safety Action Plan 2021 – 2024 to reduce the number of accidents that are occurring in this sector.
- (i) **Identify one piece** of farm machinery that may be involved in a farm accident. For the named piece of machinery **explain an accident** that may occur with use and outline a **safety precaution** that can be in place to prevent accidents
Machinery (2m), accident (2m), safety precaution (2m) **3 x 2m = 6m**

Machinery	Accident	Safety precaution
PTO shaft	Not attached correctly and may attach to loose clothing which may cause limb loss	Make sure it is attached correctly with cover in place
Slurry agitator	Someone could slip while agitation process is ongoing	Ensure that the area around the agitation point is kept clear and dry
Chain saw	Could damage limbs if used incorrectly	Wear protective equipment and have chainsaw training
Tractor	Not using mirrors when operating tractor – could run over someone	Use mirrors at all times and be aware of others on farm

**accept other valid answers

- (ii) Livestock can also be involved in serious farm accidents. Name **one** animal that could be a danger on farms. Give a reason for your answer.
Animal (1m) and danger (1m)
- Male bull – high testosterone levels so can be aggressive at times/
 - Cow after calving – can be protective over new calf and may become aggressive/
 - Male bullock – castrated animal but high muscle mass content so can be strong and cause injury
 - Young calves can knock someone over as they may be nervous about new surroundings
- **accept other valid responses
- (iii) State **one** way that the numbers of serious farm accidents can be reduced in Irish agriculture.
One valid answer (2m)
- Farm safety campaigns
 - Education programmes in schools
 - Education and training for farmers
 - Refresher courses

OR

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(b) The photographs below show equipment commonly used on Irish farms.

- (i) Name the **two** pieces of equipment in the photographs above and state **one** function for each piece of equipment named.

Correct equipment (2 x 1m), correct function (2 x 2m)

6m in total

Equipment 1 : bolus gun

Function : used to give bolus tablets to animals

Equipment 2 : burdizzo

Function : used to castrate male animals

- (iii) The 5 freedoms are important in maintaining correct animal welfare and standards on farms. List and explain any **two** of the freedoms.

Any two freedoms 2 x 2m = 4m

4m in total

- Freedom from hunger, thirst and malnutrition/
- Freedom from discomfort /
- Freedom from pain, injury and disease /
- Freedom to express normal patterns of behaviour /
- Freedom from fear and distress/

Question 7

(a) Complete the sentences below using words from the list.

- (i) Afforestation
- (ii) Eutrophication
- (iii) Niche market
- (iv) Reclaimed land
- (v) Volatilisation

5 x 2m = 10m

Question 8

Explain why each of the principles are important in optimising soil health

5 x 2m = 10m

Principle	Importance relating to soil health
Keep soil covered	<ul style="list-style-type: none"> – Adds to soil health and fertility/ – Adds to biodiversity in soil and on farm / – Prevents the build up of weeds and pests / – Provides food for insects that are present in soil/ – Reduces soil erosion and run off – **Accept other valid reasons
Maintain living root year round	<ul style="list-style-type: none"> – Adds to soil health and fertility/ – Adds to biodiversity in soil and on farm / – Prevents the build up of weeds and pests / – Introduces new micro and macro organisms to soil / – **Accept other valid reasons
Integrate livestock	<ul style="list-style-type: none"> – Adds to soil health and fertility/ – Adds to biodiversity in soil and on farm / – Animal waste adds valuable nutrients to soil, which helps with crop growth/ – Plants and animals have a symbiotic relationship/ – **Accept other valid reasons
Maximise crop diversity	<ul style="list-style-type: none"> – Adds to soil health and fertility/ – Adds to biodiversity in soil and on farm / – Prevents nutrients being leached from soil every year / – **Accept other valid reasons
Minimise soil disturbance	<ul style="list-style-type: none"> – Adds to soil health and fertility/ – Adds to biodiversity in soil and on farm / – Min till operations prevent soil compaction which prevents flooding occurring/ – Improved soil structure / – Less harm to earthworms which are needed for drainage and aeration in soil / – Better crop growth / – **Accept other valid reasons

Question 9

The pie chart shows the share of Irish exports (€ billion) in 2023. Use the information in the chart to answer the following questions.

- (a) Name the sector that had the greatest income from exports in 2023.
(2m)
Dairy sector
- (b) Name the sector that had the lowest income from exports in 2023.
(2m)
Horticulture and cereals
- (c) Prepared Consumer Foods created €3.1 billion for the Irish economy in 2023. Explain why there would be such a demand for these foods
Any one valid reason **(2m)**
 - Convenience for customers/
 - Good nutrition in food /
 - Good availability of food in supermarkets/
 - Nutritional information provided on package which appeals to consumers/****Accept other valid reasons**
- (d) Is the data shown in this chart qualitative or quantitative data? Tick the correct answer.
2m for quantitative
Quantitative data ✓
- (e) Is the data presented from a reliable source? Give a reason for your answer
Yes **(1m)**
Any valid reason **(1m)**
 - Numerical data shown/
 - Scientific terminology used /
 - Irish Farmers Journal are a reliable source as they employ vets and scientists

Question 10 Answer (a) OR (b)

- (a) Read the following passage and answer the questions that follow.
- (i) State **two consequences** of sheep presenting with blowfly.
Any two valid answers 2 x 1m = (2m)
 - skin irritation/
 - pain/
 - secondary bacterial infections on the sheep/
 - increase in veterinary costs for the farmer/
 - loss in animal production.
- (ii) Why do blowflies lay eggs on sheep?
(2m)
Blowflies lay eggs on sheep as the fleece acts as a nice incubator for the eggs and larva (maggots) to develop

- (iii) How could a farmer prevent blowfly strike in their flock?

Any one valid answer (2m)

- Good hygiene/
- Use of insecticides/
- Shearing sheep/
- Dagging/
- Tail docking/

- (iv) Distinguish between the underlined terms.

2m for each correct explanation (2 x 2m = 4m)

Dagging: the removal of wool around the tail area to prevent the build up of faeces and infection

Docking: shortening of the sheep tail to prevent infections

**Accept other valid answers

OR

- (b) Answer the following questions on animal genetics

- (i) What is genetic modification?

(2m)

Altering an organism's DNA for the purpose of improvement or to correct a defect in the organism.

**Accept other valid answers

- (ii) List **one potential benefit and one potential risk** of using genetic modification in animal production.

Benefits – any one valid answer (2m)

- Increased disease resistance/
- Enhanced growth rates and productivity/
- New animal products created /
- Increased prolificacy/
- Improved feed conversion efficiency/

Risks - any one valid answer (2m)

- Unintended health effects on the animals/
- Potential ecological impacts if genetically modified animals were to interbreed with wild populations/
- Risk that introduced gene might be over expressed which could affect health of the animal/

- (iii) Discuss the ethical issues relating to animal genetics.

Any one valid answer (4m)

- Animal welfare/
- Animal health and spread of disease/
- New strains of disease spreading and affecting animals/

Question 11

Read the following passage from the Irish Farmers Journal and answer the questions that follow.

- (a) What percentage decrease in light levels is mentioned in the text?

30% (2m)

- (b) Why do you think light levels are important for strawberry growth?

Increased photosynthesis rates (2m)

- (c) How might the decrease in strawberry production affect consumers and the market?

Any one valid reason (2m)

- Increase in cost due to supply issues /
- Lack of availability of crop /
- Lower revenue for producers/
- Less exports will be available /
- **accept other valid answers

- (d) What are some potential solutions for farmers like Jimmy facing similar weather-related challenges?

Any one valid reason (2m)

- Use of greenhouses/
- Artificial light to enhance photosynthesis/
- Temperature regulation in greenhouses – thermostats/
- **accept other valid answers

- (e) Sandy soils are commonly found in southerly counties such as Wexford. Why are sandy soils favourable for crop production?

Any one valid reason (2m)

- Large pore space so air and water can move/
- Good aeration/
- Good drainage/
- Root penetration/

Question 12

The following images show the BCS of different dairy cows.

- (a) Explain the term BCS.
- Body condition score/
- Muscle to fat ratio/
(2m)
- (b) Select the appropriate BCS for dairy animals at mating by naming one of the pictures A to E shown above.
Picture C (2m)
- (c) Comment on **two** issues associated with low BCS in dairy animals as seen in picture A.
Any two valid answers 2 x 2m = (4m)
- Poor fertility /
- Prone to disease and infection/
- Loss of condition/
- Poor milk quality and quantity/
- Calving difficulties/
- Mortality/
- Reduction in profits for farmer /
- **Accept other valid answers
- (d) The Animal Health and Welfare Act 2013 was published to outline correct standards for animal welfare in Ireland. Animal welfare has improved in recent years but there are still issues that remain. Apart from a low BCS, state **one** other way that dairy animals can be mistreated on farms.
Any valid answer (2m)
- No access to fresh water/
- No access to appropriate food/
- Overcrowding/
- Poor hygiene in sheds/
- Abuse from farmers when handling animals/
- **Accept other valid answers

Section B**200 MARKS****Each question carries 50 Marks****Question 13 Answer (a) and (b) with (c) OR (d)**

(a) The botanical composition varies throughout different areas of permanent pasture and leys.

- (i) Explain the underlined terms.

2 x 2m = 4m

Permanent pasture – an area of land that is found on hillsides suitable for grazing. / Variety of different plant species present

Ley – A ley is sown by the farmer, it is used for grazing livestock and is regularly reseeded by farmers /

Mainly only 1-2 plant species present here. Mainly perennial and Italian ryegrass

- (ii) What do you understand by the term botanical composition?

4m

The range of grasses, plants and other vegetation present

**Accept other valid answers

- (iii) Name **two** common types of productive grass plants found on Irish farms.

2 x 2m = 4m

- Perennial ryegrass
- Italian ryegrass

- (iv) Clover is also a plant that is commonly found in grassland swards. State **two advantages** of the presence of clover in grassland areas.

Any two advantages 2 x 2m = 4m

- Good source of protein/
- Fixes nitrogen, reducing the need for artificial fertiliser, reducing costs/
- Provides increased productivity, palatability and digestibility in the sward/
- Reduces the use of chemicals, particularly for organic farmers/
- High mineral content./
- **Accept other valid answers

- (iv) Hedgerows are also present on many farms. State **two** benefits of the presence of hedgerows.

Any two benefits 2 x 2m = 4m

- Provides shelter for animals/
- Biodiversity /
- Food source for animals /
- Habitat for organisms/
- Flooding control/
- Important for landscape/
- Stock enclosure
- **Accept other valid answers

- (b) (i)** Reseeding grassland is common practice for farmers. Despite the cost and workload involved, reseeding areas has many benefits. Describe **one** of these benefits.

Any valid benefit 2m

- Weed infestation/
- Low ryegrass content/
- High content of poor-quality grasses
- Addition of clover/
- Animal and machinery activity – compaction/
- Poor soil fertility/

- (ii)** List **two** pieces of machinery that may be commonly used when reseeding an area

Any two (2 x 2m) = 4m

- Tractor/
- Plough/
- Harrow- disc or chain/
- Subsoiler/
- Combine drill/
- Roller

** accept other valid answers

- (iii)** Outline how a farmer would carry out undersowing when re-seed pastures.

Any two valid points 2 x 2m = 4m

- Plough to a depth of 15-18cm/
- Harrow land /
- Fertilise land using correct fertiliser /
- Roll land to form a firm seedbed /
- Sow grass seed after cereal crop using a drill/
- Use the chain harrow to cover the seeds /
- Roll land again to make seedbed firm.

- (iv)** Silage production is a task that is carried out by the majority of farmers every year. Good silage quality is important for crop palatability during the winter months. Below are the steps that should be followed to produce a good silage crop. Place these in order by writing the number beside each step. The first one is done as an example

5 x 2m = 10 m

Close the field up to 6 weeks before cutting and apply appropriate fertiliser	Step 1
Allow grass to wilt for 1-2 days	Step 3
Cover with polyethene plastic tightly to ensure anaerobic conditions are present	Step 6
Cut grass using a mower	Step 2
Heap the grass when it is brought to the pit and remove any large lumps of grass	Step 5
Collect the crop from the field and bring grass to the pit	Step 4

- (c)** Zero grazing is a method of grazing that has become popular with some farmers in recent years.

- (i) Explain the term zero grazing.

2m

Zero grazing is a system where cattle are housed all year round/
Grass or other forage crops are cut and brought to the livestock, where they are fed indoors. /
Cattle do not graze the land.

- (ii) Discuss **one** advantage and **one** disadvantage of this practice on farms.

Advantage (2m), disadvantage (2m)

Advantage	Disadvantage
Better nutrition for animals/ Less prone to diseases such as liver fluke/ Reduces overgrazing/ Reduces soil compaction / Reduces soil erosion /	Initial cost of setting up/ Steady supply of fodder needed/ Increased labour/ Diseases in shed can spread easily

** accept other valid answers

- (iii) List **one** safety concern associated with zero grazing

2m

Safety when using zero grazer and tractor

- (iv) How do you think zero grazing could be improved or made more accessible to farmers?

2m

- Providing better access to training/
- Access to financial support and subsidies for initial setup costs/
- Community programs to share knowledge./
- Improvements in technology

OR

- (d)** Peter farms 50 Texel sheep on his farm along with 85 dry stock beef cows. He has recently purchased 15 18-month-old bullocks. He is concerned that he will not have enough herbage for all his animals on the farm. Calculate how much herbage Peter would need to feed all animals on his farm.

1 LU requires 12 tonnes of herbage per year

- (i) Calculate how much herbage Peter would need on his farm to feed all named animals.

8m for calculation - 4m for calculating total LU, 4m for calculating herbage needed

Calculations -

$$\text{Sheep : } 50 \times 0.15 = 7.5\text{LU}$$

$$\text{Cattle : } 85 \times 1 = 85\text{LU}$$

$$18 \text{ month old bullock : } 15 \times 0.6 = 9\text{LU}$$

$$7.5+85+9 = 101.5 \text{ LU (4m)}$$

$$101.5 \times 12 \text{ tonnes} = \mathbf{1218 \text{ tonnes herbage needed (4m)}}$$

- (ii) Explain the term livestock unit

2m

A livestock unit (LU) is a measurement of livestock grazing and measures the feed required for different animals.

Question 14

- (a) Soil health is one of the main factors that leads to adequate crop growth. Understanding the factors that affect soil health is important for farmers.

- (i) Explain what is meant by the term soil pH.

4m

pH is a measure of the acidity or alkalinity of a soil. It refers to the concentration of hydrogen ions in a solution.

- (ii) Place a tick in the correct box that shows the optimum pH for crop growth.

2m for tick at 6.0-7.5

pH levels	Optimum
4.0 – 5.9	
6.0 – 7.5	✓
7.6 – 9.0	

- (iii) Outline **two** issues that may arise when the soil pH is either too low or too high.

Any two valid answers 2 x 2m = 4m

- Reduced crop growth/
- Plants unable to absorb nutrients and minerals/
- Damage to earthworms/
- Soil biodiversity reduced /
- ** accept other valid answers

Ben is concerned that the soil in some areas on his farm are not as productive as they were some years ago. He has decided to check a number of factors including examining the soil pH a number of areas on the farm.

- (iv) Describe how Ben would determine the pH of a soil sample on his farm. Use a diagram to support your answer.

Any three points to explain method 3 x 2m = 6m

- Add soil sample to beaker/
- Add distilled water to beaker and mix with glass rod/
- Calibrate the pH meter with distilled water before carrying out test/
- Place pH probe in suspension/
- Record results /
- Clean probe with distilled water after use

Labelled diagram 2m – include: pH meter, soil water suspension, distilled water

** accept other valid methods of assessing soil pH but this would be the most commonly used at LC level

- (v) Variables and controls are important features of scientific experiments. State the independent variable, dependent variable and control from this experiment. Write your answer in the table below.

2m for each (3 x 2m = 6m)

Independent variable	Type pf soil examined
Dependent variable	Soil pH
Control	<ul style="list-style-type: none"> - Mass of soil used - Equipment used

- (vi) State **one** source of error that Ben may have encountered when carrying out this experiment.

Any one valid error 4m

- Small sample size of soil/
- Not calibrating pH meter before use/
- Not leaving probe in for allocated time /
- **Accept other valid answers

- (b)** Soil testing is carried out commonly by farmers to optimise the productivity of their land as it can give valuable information about the mineral content of the soil that will enable farmers to apply the correct type pf fertiliser to their land.

- (i) Name the piece of equipment that is commonly used to collect soil samples.

4m

Soil augur

- (ii) Correct procedures must be followed during soil testing. Identify **one** area of the field where soil samples should be taken from and **one** area that should be avoided when collecting samples

2 x 2m = 4m

Area to collect soil samples from (2m)	Area to avoid collecting samples from (2m)
<ul style="list-style-type: none"> - Centre of field / - Area not poached / - Take in W shape 	<ul style="list-style-type: none"> - Gateways / - Roadways / - Area near feeding trough / - Area near water trough/ - Poached land

Ben got soil testing carried out on different areas of land throughout the farm to give him a better understanding of how productive the soil was. Below is a soil index reference sheet (table 1) and results from one of the main fields he uses for silage cutting (table 2). Analyse the tables and use the information to answer the questions that follow.

Table 1:

Soil index reference sheet				
Soil index	Description	Response to fertiliser	Soil test range for each index (mg/l)	
			P	K
1	Very low	Definitely	0 – 3.0	0-50
2	Low	Likely	3.1-5.0	51-100
3	Medium	Unlikely	5.1-8.0	101-150
4	High	None	>8.1	>151

Table 2:

Field 1 – Permanent pasture used for silage production						
Nutrient	Level	Very low (1)	Low (2)	Medium (3)	Sufficient (4)	Fertiliser recom- mendations
pH	7.7					None
P	2.6 mg/l					40kg/hA
K	124 mg/l					125kg/hA
Mg						

- (iii) State the P and K soil indexes for field 1
4m for each correct score (2 x 4m = 8m)

Nutrient	Soil Index – field 1
P	1
K	3

- (iv) Name the other soil macronutrient present in table 2 above. Explain the role of this substance in soils.

Name of nutrient (2m), Function (2m)

Name: Magnesium (accept Mg)

Role: chlorophyll formation / aids in photosynthesis

- (v) Name **one** other macronutrient that may be present in soils that is not listed in table 2 above.

Any one valid answer 2m

- Nitrogen (accept N)/
- Calcium (accept Ca)/
- Sulphur (accept S)

Question 15

(a) Boyne Valley Blue Cheese, manufactured in Co. Meath, is an example of artisan produce.

(i) Explain the term artisan produce.

2m

- Artisanal produce refers to food and drink products made in limited quantities using traditional methods/
- products are often handmade and emphasise quality produce

**Accept other valid answers

(ii) Write down **one** advantage and **one** disadvantage to the consumer of consuming artisan produce such as Boyne Valley Blue.

Advantage (2m), disadvantage (2m)

Advantage	Disadvantage
<ul style="list-style-type: none"> - Supports local economies/ - Superior taste/ - Environmentally friendly practices when producing 	<ul style="list-style-type: none"> - More expensive/ - May be difficult to locate/ - Limited quantities

(iii) Name **another** example of artisan produce that you have studied apart from the one named in the question.

Any one valid example 2m

Burren smokehouse/

Achill sea salt/

Praline chocolate shop/

Freezin Freisian ice cream/

**Accept other valid examples

(b) Kevin and Lucy have been running a dairy farm in County Cork for 20 years. Recently, they have been considering transitioning to organic farming to improve animal welfare. You are an agricultural advisor and must assist Kevin and Lucy with their potential transition to organic farming. You should create a plan to assist them with the process. Your plan should include the following points:

- Explain what organic farming is
- Outline some of the benefits associated with it
- Describe any challenges that Kevin and Lucy might face.
- Discuss the impact that this style of farming will have on the local economy

Organic farming (2m) - An agricultural activity that does not rely on chemical fertilisers, pesticides, genetically modified crops and livestock antibiotics.

Benefits of organic farming (8m)

- Improved animal welfare – better feed quality/ more space for animals/ stress free environment/ strict health protocols
- Environmental impact – reduced chemical use/ reduced water pollution and eutrophication
- Market opportunities – greater income as produce sells for higher price/ greater consumer interest so expansion is an option

Challenges of organic farming (8m)

- Regulatory compliance – record keeping and documentation is essential
- Cost of set up – infrastructure needed/ organic feeds/ new equipment needed
- Training required – education and training needed to optimise benefits from this sector

Impact on local economy (2m)

- Employment opportunities/
- Less pollution/ eutrophication or damage to environment in local area/
- Increased access to fresh organic produce – health benefits

(c) The following data was published by the Irish Farmers Journal to illustrate the use of Splash plate and LESS on Irish farms in recent years.

(i) What do the letters LESS stand for in relation to slurry application?

4m

Low Emissions Slurry Spreading

(ii) List two reasons why farmers would use LESS methods of slurry spreading other than the Splash plate method

Any TWO reasons (2 x 4m = 8m)

- Less odour released into atmosphere//
- Even spread of the slurry on land//
- Recycling of waste //
- Sustainable practice in farming//
- Reduction in ammonia emissions//
- Reduction in amount of chemical fertiliser needed//
- Reduction in costs for farmer //
- Less water pollution
- **Accept other correct reasons

(iii) Discuss on the trends from the year 2021 – 2023 in relation to slurry spreading methods as shown in the graph above.

4m

- Increase in number of farmers using LESS from 2021 – 2023/
- Decrease in number of farmers using splash plate from 2021 – 2023

(iv) Is the data presented in this chart an example of primary or secondary data for the readers of this newspaper? Give a reason for your answer

Secondary data (2m)

Reason **(2m)** – farmer did not conduct research themselves/
Research conducted by another source

(v) Name **another** way that the information shown could be presented.

(2m)

- Line graph with two distinct lines/
- Table format

Question 16

- (a) The first half of 2024 was a very difficult period for many farmers as poor weather conditions delayed grass growth in many parts of the country. Heavy falls of rain and poor growing conditions meant that farmers were behind in relation to grazing and grass conservation.

- (i) Explain how wet weather conditions affects grass growth and conservation?

Any valid answer 2m

- Grass unable to grow/
- Poor crop yield/
- Unable to add slurry or fertiliser due to risk of soil compaction/
- Unable to mow or collect silage due to risk of soil compaction/

- (ii) State **one** agricultural process that is weather dependent apart from grassland conservation and grazing.

Any valid answer 2m

- Fertiliser spreading/
- L.E.S./
- Reseeding/
- Ploughing land
- ** accept other valid answers

- (iii) Silage making is one of the most common methods of grassland conservation used in Ireland today. Correct conditions are needed to ensure that the crop will provide nutrition to animals during the winter months.

Compare good and poor-quality silage by completing the table below.

2m for each correct box completed in table (8 x 2m = 16m)

	Good quality silage	Bad quality silage
Bacteria present	Lactobacillus	Clostridium
Acid present	Lactic acid	Butyric acid
Colour	Golden brown colour	Olive green colour
pH of crop	3.8 – 4.2 (accept answers in this range)	5-6 (accept answers in this range)

(b) Study the information provided in the table and use it to answer the questions that follow.

- (i) Using the data in the table, plot a suitable graph outlining the relationship between harvest date and silage yield (silage tDM per Ha)
12m in total (2m x-axis labelled as harvest date, 2m y-axis labelled as silage yield, 8m for correctly plotting data)
**Bar or line graph are suitable to plot information
- (ii) Based on the table above, how does harvest date affect the %DMD of the silage as it progresses through the summer months?
2m for valid answer
 - %DMD decreases during summer months/
 - Higher in May than at end of June
- (iii) How does harvest date affect the yield of the silage?
2m for valid answer
 - Yield increases during summer months/
 - Lower in May than at end of June
- (iv) Is there a link between silage intake and daily live weight gain?
2m for valid answer
Greater LWG when intake of silage greater
- (v) Based on the data provided, what date would you advise farmers to cut their silage? Justify your answers with relevant points from the table.
2m for valid answer
 - Early (May 20) as the DMD is at its highest then – most nutritious for animals/
 - Early cutting also allows for second cut to take place later in the season for extra fodder

(c) Farmers may also want to assess the Dry Matter (DM) content of grass before making it into silage. Place the numbers 2 to 6 in the table below to outline the correct method used to measure the Dry Matter (DM) content of grass.

The first step has been done as an example

2m for each correct box completed in table (5 x 2m = 10m)

Procedure	Step number
Dry off and find the mass using an electronic balance	2
Heat in the oven at 100°C	4
Cut a sample of fresh grass	1
Remove beaker every 10 minutes until mass is constant	5
Add grass to a beaker and again find the mass using an electronic balance	3
Calculate the Dry Matter of the sample	6

Question 17

Answer (a) and (b) with (c) or (d)

- (a) The following text is adapted from an article in the Irish Farmers Journal. Use the information in the article to answer the questions that follow

- (i) How many grams (g) were calves growing less than their diets allowed?

2m

140g/day

- (ii) Outline any **two** environmental features of calf-rearing housing that would optimise animal health and welfare.

Any two valid answers (2 x 4m = 8m)

- Good ventilation/
- Adequate space/
- Stress free environment/
- Access to fresh water /
- Clean area with good hygiene/
- Appropriate temperature /
- Adequate lighting/
- Dry - good drainage on floors
- **Accept other valid answers

- (iii) Study the photo that accompanies the text in part (a). Name two features of suitable housing that are present in the photo.

Any two valid answers (2 x 4m = 8m)

- Fresh bedding/
- Good lighting/
- Adequate space for animals/
- High ceiling's for ventilation/
- Animals secure in pens
- **Accept other valid answers

- (iv) Calf jackets are commonly used on farms nationwide to keep young calves warm. Suggest **one other** way that farmers could use to keep calves warm during cold weather.

Any valid answer (2m)

- Infrared lamp/
- Calf igloo housing/
- Low ceilings to keep in warmth/
- Straw bedding/

- (b) Colostrum is produced by lactating dairy cows and has many benefits for young calves.

Immunoglobulins (IgG) are a type of antibody that enters the calves body through colostrum. Analyse the graph and answer the questions that follow.

- (i) What level of immunoglobulins (IgG) caused the greatest mortality level in young calves?

(2m)

<800

- (ii) What conclusion can you come up with in relation to levels of immunoglobulins (antibodies) in the calf's body and the mortality rate? Use data from the graph to support your answer.

Any valid answer (2m). Must use data from graph for full marks

Lower levels of IgG leads to greater mortality

- (iii) Compare the physical appearance of colostrum and regular milk.
Colostrum description 2m, regular milk description 2m (4m total)
Colostrum: yellow liquid/ thick in consistency
Regular milk: white liquid/ thinner in consistency
- (iv) Dairy cows also produce large quantities of good quality milk. This depends on a number of factors. Describe **three** factors affecting milk yield in dairy cattle.

Any three factors (3 x 4m = 12m)

- **Breed of cattle :** Holstein – Friesen have large milk yields (5800Kg per year), compared to Jersey (4000Kg per annum).
- **Age of a cow:** Cows reach their peak yields at six years old, decreasing from then on. A cow on her first lactation produces around 75% of her peak yield.
- **Time in lactation period:** Cows will produce most of the milk in the first two months. After reaching their lactation peak, milk yields will reduce.
- **Diet:** Poorly nourished cattle will produce low yields, however animals fed on a high plane of nutrition will produce large numbers of yields
- **Frequency of milking :** Cows milked more frequently will also produce high yields of milk. Cattle that are milked more than twice daily will be prone to infections such as mastitis. This bacterial infection will affect the productivity of a dairy herd

** accept other valid answers

- (c) (i)** Mastitis is a disease that can affect milk production on dairy farms. State the cause, symptoms, treatment and prevention of this disease.

Cause (2m)

- Bacterial infection //
- *E. coli* or *Streptococcus uberis*//
- Poor hygiene conditions in animal housing // etc.
- ** accept other acceptable answers

Symptoms (2m)

- Red swollen udder/
- Foul smelling milk/
- Tender to touch udder/
- Decrease in milk yield /
- ** accept other acceptable answers

Treatment (2m)

- Antibiotics//
- Dry off cows to ensure no milk loss //
- Use dry cow treatment on animals // etc.
- ** accept other acceptable answers

Prevention (2m)

- Use of dry cow treatment during drying off//
- Use teat disinfectant regularly//
- Change milk liners in machine so no bacteria present//
- Ensure that milk machine working and serviced regularly//
- Cull animals who have mastitis presently// etc.
- ** accept other acceptable answers

- (ii) Discuss the economic impact of mastitis on dairy farms.

Any one valid answer (2m)

- Increased veterinary costs/
- Reduce milk yields/
- Reduce farm income and profits/
- Reduction in herd number if animals have to be culled/
- ** accept other acceptable answers

OR

- (d)** Answer the following questions in relation to dairy animals.

5 x 2m = 10 m total

- (i) Which of the following represents the gestation length of a dairy cow?
Place a tick (✓) in the correct box.

283 days	✓
273 days	
293 days	

- (ii) Which of the following represents duration of oestrus (standing heat) in a dairy cow?
Place a tick (✓) in the correct box.

18 hours	✓
24 hours	
36 hours	

- (iii) Which of the following represents the weight of a dairy calf at birth?
Place a tick (✓) in the correct box.

30 – 40kg	
40 – 50 kg	✓
50 – 60 kg	

- (iv) Which of the following represents the duration of oestrus cycle?
Place a tick (✓) in the correct box.

17 days	
19 days	
21 days	✓

- (v) Which of the following represents the correct BCS for a dairy cow at mating?
Place a tick (✓) in the correct box.

3.0	
3.5	✓
4.0	

Question 18

- (a) Read the following article published by Teagasc and use the information in it to answer the questions that follow.
- (i) What percentage of Ireland's total agricultural output is made up of beef farming?
25% (2m)
 - (ii) What is the total size of the national breeding herd in Ireland?
6.6 million animals (2m)
 - (iii) In 2020, what percentage of Ireland's beef production was exported?
90 % (2m)
 - (iv) What factors give Ireland a competitive advantage in beef farming?
Ability to produce large quantities of grass for animals **(2m)**
 - (v) What was the average suckler income in 2021 and what was a significant source of this income?
€10,927; derived from direct support payments like CAP (2m)
 - (vi) Explain the underlined terms in the extract above.
4m each (2 x 4m = 8m)

Common Agricultural Policy (CAP)

- The agricultural policy of the EU/
- Implements a system of subsidies and financial supports for farmers
- **Accept other appropriate answers

Sustainability

- This means it will last into the future for future generations
- **Accept other appropriate answers

- (vii) Greenhouse gases (GHG) are referred to in the article. Give one example of a Greenhouse gas that affects the environment.

Any one valid answer 2m

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)

- (viii) Grass is one of the most popular crops on farms that animals eat and it has many benefits. Outline two of these benefits

 $2 \times 2\text{m} = 4\text{m}$

- Grass-based beef production systems are more sustainable as they have a low greenhouse gas level than TMR system used.
- Lower carbon footprint.
- Distinct flavour of meat.
- Higher concentration of CLA and omega 3 in grass-fed beef.
- High CLA have beneficial health effects.

- (b) (i)** Beef farmers must carefully select animals with desirable traits to get good produce from these animals. List 3 desirable traits that a beef farmer looks for in animals.

Any three traits (3 x 2m = 6m)

- Good fertility/
- High milk yields/
- Calving ease/
- Long life span /
- High calf survival rates/
- Conformation/
- Good hindquarters/
- Long back/
- Wide torso/
- **Accept other appropriate answers

- (ii)** Good breeding strategies are also needed on beef farms to allow for offspring with desirable traits to be produced. The use of a stock bull and A.I. (artificial insemination) are two methods commonly used by beef farmers. For each method state one advantage and one disadvantage.

2m for each correct advantage and disadvantage (4 x 2m = 8m)

Stock bull

Advantages	Disadvantages
<ul style="list-style-type: none"> • Bull on farm so has easy access to cows • No extra cost to farmer for repeat inseminations 	<ul style="list-style-type: none"> • Dangerous • Experienced person needed • Expensive initially to purchase bull • Only one breed can be used on farm • Inbreeding may occur

A.I.

Advantages	Disadvantages
<ul style="list-style-type: none"> • Different breeds available • High EBI of animals • Can improve the genetic performance of herd • Can choose one for mating with heifers (AA) • Easy calving • Reduces mortality associated with calving • Less labour needed • Cost efficient for small farms 	<ul style="list-style-type: none"> • Experienced person needed • Heat period may have passed (AM PM rule) • AI may not be successful first time

-
- (iii) Outline the management of a beef calf from birth to 6 weeks under the following headings:
4m for each heading (3 x 4m = 12m)

Feeding management:

- Access to fresh water/
- Colostrum given at birth – up to 2L in first 3 hours/
- Calf left with mother to get milk/
- Milk replacer may be needed if cow if not producing enough milk initially
- **Accept other valid points

Housing management:

- Housed with mother/
- Straw bedding/
- Access to fresh water/
- Adequate space in pens/
- Adequate lighting in shed/
- Well ventilated to prevent infection /
- **Accept other valid points

Health management:

- Spray navel with iodine or disinfectant to prevent navel ill/
- Tagged within 20 days/
- Tested for BVD/
- Registered on AIM system /
- Dehorn within 3 weeks/
- **Accept other valid points