

Leaving Certificate Higher Level Grassland Questions

2012

8. (b) "There will always be a role for hay in Irish farming"
- (i) Defend this statement.
 - (ii) Outline **three** principal steps in conserving grass as hay.

[Marking Scheme2012](#)

2011

Option Two

3. (a) Describe **four** grassland management practices used to achieve high quality silage.
- (c) (i) Outline the main features of strip-grazing.

[Marking Scheme2011](#)

2010

5. (b) (i) Suggest **four** reasons why dairy farmers find it necessary to reseed their paddocks on a regular basis.
(ii) Suggest a suitable seed mixture that could be used when re-seeding a paddock.
- (c) Explain the significance of the leaf-to-stem ratio in relation to silage quality
8. (c) Highlight the main differences between ... the following pair:
(iii) *zero grazing* and *creep grazing*

[Marking Scheme2010](#)

2009

1. (a) (i) To which plant family does clover belong?
(ii) Give **two** agriculturally important characteristics of clover.
- (j) Name any **two** plant species or varieties of herbage to be included in a grass-seed mixture for the production of a permanent pasture.

Option Two

3. (c) Describe how the digestibility of a grass sward changes during the growing season.

[Marking Scheme2009](#)

2008

1. (j) State the benefits of using hybrid ryegrasses over the use of Italian ryegrass on its own.

Option Two

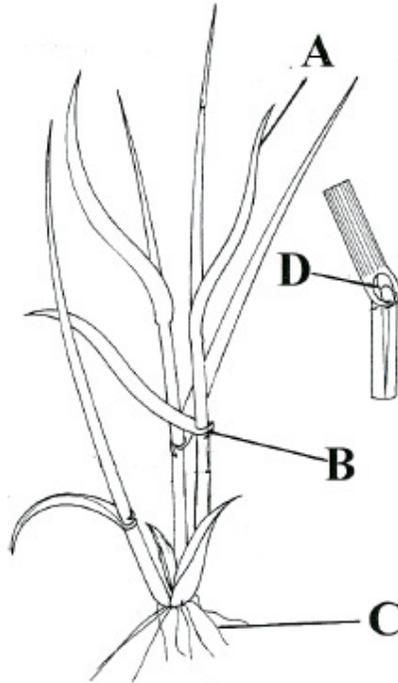
3. (a) (i) Give one benefit of reseeding grassland.
(ii) Explain the term tillering.
(iii) Mention **two** ways by which the farmer can encourage the tillering process.
(iv) Give **two** reasons for the process of "topping" grassland during the grazing season.

- (b) (i) Explain the “leader-follower” grazing system and give **two** reasons why it is used by farmers.
(ii) Give **two** reasons for including clover in a seed-mixture for pasture.
- (c) Outline how a farmer can provide the optimal conditions for bacteria to produce high quality silage.
4. Describe a laboratory or field method to determine ... the following:
(a) The percentage of sugars in a sample of grass.

[Marking Scheme2008](#)

2007

4. Describe a laboratory or field experiment in relation to ... the following:
(c) The botanical composition of an old permanent pasture.
5. (a) The diagram below is of a generalised grass plant. Name the parts labelled A, B, C and D as shown on the diagram.



- (b) Discuss **two** advantages of including grass as a crop in an arable rotation.
- (c) Describe the characteristics of a grass plant at the ideal stage of growth for grazing.
- (d) Compare the feeding quality of silage (cut in May) and hay (cut in July).
Give typical values to illustrate your answer.
9. Give a scientific explanation for ... the following:
(a) High levels of leatherjackets in a crop following grass.

[Marking Scheme2007](#)

2006

Option 1

3. (c) Describe how each of the following factors influences the production of a grazed sward:
- (i) Soil type
 - (ii) Management practices
 - (iii) Season.
4. Describe a laboratory or field method to show ... the following:
- (b) The extraction of pigments from a sample of grass.
5. (a) Explain why the botanical composition of a permanent ley differs from that of a temporary ley.
- (b) Discuss **two** advantages of including grass as a crop in an arable crop rotation.
6. (a) (i) Identify **three** characteristics which could be used to determine the merit of an individual species of grass in agriculture.
- (ii) Describe an experiment that could be used to determine one of the characteristics mentioned in part (i).

[Marking Scheme2006](#)

2005

1. (b) State **three** factors of a grass flower that enable wind pollination to occur.
5. The table below shows research data for first cut grass that was harvested at different dates.

Harvest date	15 May	29 May	13 June	27 June
Silage yield (t DM/ha)	4.0	5.2	6.6	7.8
Silage digestibility (% DMD ²)	75	70	65	60
Silage intake (kg DM/day)	9.0	8.3	7.6	7.0
Carcass gain (kg/day)	0.51	0.39	0.27	0.15

[Source: Teagasc]

- (a) (i) Account for the increase in yield over time.
- (ii) Explain the variation in digestibility of the various samples of first-cut silage.
- (iii) Account for the decrease on the carcass gain per day.
- (b) Explain the importance of each of the following in the preservation of grass as silage:
- (i) Presence of sugars in the grass,
 - (ii) Absence of air during ensiling,
 - (iii) Use of additives,
 - (iv) Wilting the grass.
- (c) Describe a method used to measure the percentage sugar in a sample of grass.
6. (a) Write notes on the “leader – follower” grazing system used in a calf to beef enterprise.

8. (c) (i) Describe the fertiliser application programme for grassland which is cut twice during the growing season for silage.
- (ii) Explain the contribution of clover to the fertility of the soil and to the feeding value of the herbage within a sward.
9. Give a scientific explanation for ... the following:
- (d) A high incidence of leather jacket damage in a cereal following grass.

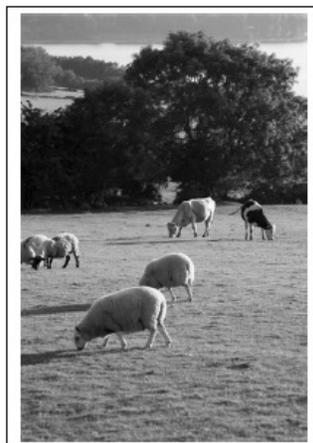
[Marking Scheme2005](#)

2004

1. (g) State **three** differences between red clover and white clover.

Option one

3. (a) Discuss the implication of the heavy use of nitrogenous fertilisers on pasture.
4. Describe a laboratory or field method to show ... the following:
- (b) An estimation of the protein content in a sample of silage.
5. Recently your school has received a gift of ten hectares of very old and neglected pasture.
- (a) (i) Describe a method that could be used to determine the botanical composition of this pasture.
- (ii) List **four** plants commonly found in this type of pasture.
- (b) Suggest a suitable seed mixture of at least **two** species that could be used to make this pasture more productive in the future. Give reasons for your choice.
- (c) Describe **two** methods by which the seed mixture you have mentioned in (b) above could be introduced into the pasture without ploughing the area involved.
6. (a) (i) Name the grazing system shown in photograph E.
- (ii) Describe the advantages of this grazing system.



E

9. Give a scientific explanation for ... the following:
- (a) The leader-follower system of grazing.
 - (c) The rolling or trampling of grass when making silage.

[Marking_Scheme2004](#)

2003

1. (a) Explain ... the following terms: (3) Tillering

Option One

3. (b) Describe how the feeding quality of grass changes as the grass matures.

Option Two

3. (a) Explain how (1) grass yield and (2) stocking rate influence production in a summer grazing beef system.
- (b) Describe with the aid of labelled diagrams why a farmer would use rotational grazing instead of set-stocking in a beef rearing enterprise.
4. Describe a laboratory or field method to show ... the following:
- (c) The productivity of an area of grassland.
9. Give a scientific explanation for ... the following:
- (a) The addition of molasses to grass during the making of silage.

[Marking_Scheme2003](#)

2002

1. (c) Use of artificial fertilisers may result in "run off" from grassland.
State **three** ways farmers could minimise this.

Option 1

3. (b) With the aid of labelled diagrams compare and contrast strip grazing and paddock grazing on a dairy farm.
- (c) Explain why cattle and sheep grazing together have better growth rates than when grazed separately.
4. Describe a **laboratory method** use to show ... the following:
- (1) The estimation of sugars in grass for silage.
6. (a) Using named examples, describe the vegetation on fallow land,
(1) after a period of one year and (2) after a period of a further two years.
- (b) A farmer wishes to achieve a very high productive grass sward on a recently sown ley. Give advice to the farmer under each of the following headings:

- (1) Importance of tillering
- (2) Weed control
- (3) Soil fertility

8. (b) Outline a laboratory method to identify **two** differences in quality of samples of silage from **two** separate farms.

[Marking Scheme2002](#)

2001

1. (d) Explain the term "tillering" and outline the conditions which promote it.

Option 2

3. (b) Explain the contrasting approaches used in the conservation of grass for winter feed as
(i) silage, (ii) hay.

4. Describe a laboratory or field method used to determine ... the following:
(c) The diversity of plant life found in an old meadow

8. (a) Discuss the importance of clover in a pasture under the following headings:
(i) nitrogen status of the soil,
(ii) ground cover by vegetation,
(iii) nutrient value of the herbage,
(iv) ground water pollution.

[Marking Scheme2001](#)

2000

1. (a) State two characteristics which assist in identifying a grass species.

(j) Describe the characteristics of a temporary ley.

Option 1

3. (a) Describe the practices used in good grassland management to achieve the following:
(i) weed control (ii) a high yielding grass sward.

Option 2

3. (b) Explain how the growth habit and production of a grass sward changes over the growing season.

- (c) State the principal management practices used to ensure good establishment following the reseeding of a pasture.

4. Describe a laboratory method used to determine ... the following:
(iii) the effect of an additive on ensiled grass.

6. (b) Explain how controlled grazing helps to conserve the quality of a ley.

1999

1. (j) Describe the characteristics of permanent grassland

Option 1

3. (a) Mention the advantages to a farmer of producing silage in round bales as compared to wedge clamping in a silo.
- (b) Explain how the percentage moisture in grass at ensiling may influence each of the following:
- (i) quality of the silage,
 - (ii) effluent production.
- (c) Describe the factors which influence the decision relating to the level of grazing and the amount of hay or silage to be produced on a farm
6. (a) Explain why a rotational grazing system may be more productive than a set-stocking system in a beef rearing enterprise.
- (b) Describe a field investigation you carried out to examine the effects of grazing on the growth of a range of desirable plants in permanent grassland.
9. Give a scientific explanation for ... the following:
- (d) A high incidence of tussocks of unproductive grasses in a pasture sward.

1998

1. (a) State whether the cellulose in a grass plant is a protein or a carbohydrate and give a reason for your answer.
- (e) Mention any two substances, other than water, present in silage effluent.

Option One

3. (b) "The feeding value of silage depends primarily on the quality of the grass ensiled." Explain.

Option Two

3. (a) Explain the importance of healthy leaves on a grass plant.
- (b) Describe the cultivation practices necessary to improve the quality of an old pasture sward.

1997

1. (d) Describe one identifying characteristic, during the inflorescence stage, of each of the following farm plants: (i) Clover, (ii) Perennial ryegrass, (iii) Meadow foxtail.

Option 1

3. (c) Describe a laboratory or field investigation you carried out to determine the optimum sowing rate for a temporary lea.
4. Describe a laboratory method used to determine ... the following:
 - (ii) The range of pigments in a grass plant.
5. (c) Outline the factors which contribute to an increased growth rate in animals in a mixed grazing enterprise.
6. (b) Describe the various grazing management methods which might be used in a beef cattle enterprise.
 - (c) Explain how the fertiliser application programme varies for grassland which is cut, repeatedly, for silage.
9. Give a scientific explanation for ... the following:
 - (ii) The controlled spreading of farmyard slurry on grassland.
 - (iii) A change in the composition of grass material over the growing season.

1996

Option One

3. (a) Describe any management practices which are essential for optimum growth in a pasture sward.
 - (b) Briefly explain the role of a named additive in the conservation of grass.
 - (c) Describe any three factors which may influence the feeding of silage rather than hay to milch cows.

Option Two

3. (a) Name any two distinct species of grass and, in each case, describe how their structure is adapted for survival in their own particular habitat.
 - (b) Describe a laboratory method used for the extraction of chlorophyll from grass.
 - (c) Draw a simple graph to illustrate how the cellulose content of a grass plant alters as it matures.
5. (a) Compare and contrast temporary and permanent pastures under each of the following headings:
 - (i) Composition of the sward.
 - (ii) Suitability for conservation,

(iii) Grazing management,

9. Give a scientific explanation for the following:

(a) Baling and storage of hay immediately after drying.

2012 Marking Scheme

8. (b) (i) Good dry source for livestock / can be fed to cattle, sheep and horses / does not cause pollution / lower cost / no plastic waste / no preservatives needed / develops rumen in calves (scratch factor) / convenience 3 x 4m

2011 Marking Scheme

3. (a) Grassland management; use high quality species of ryegrass or clover / fertilise / close for min 6 weeks / cut at leafy stage or high DMD or heading-out (stage) / reseed frequently / remove weeds / lime / drain / named grazing system 6m+4m+3m+3m
- (c) (i) Strip grazing; a movable electric fence / advanced each day / back fence / movable water supply 3m+1m
- (ii) Adv; cheap / get fresh material each day / better utilisation of crops / avoids frost damage / better L.W.G. 4m + 2m
- Disadv; damage to soil structure / pollution / dirty / runback for animals / footrot-disease / teeth damage from stones / labour intensive 4m + 2m

2010 Marking Scheme

5. (b) (i) RESEEDING WHY?
fertility has fallen/ pH-lime status has fallen/ overgrazing/ undergrazing (dieback)/ persistence of spp. weakens/ weed infestation (docks from repeated slurry applications)/ poaching/ to keep up d.m. output (productivity)/ improve palatability/ improve digestibility/ more nutritious grass/ clover to fix nitrogen/ REPS (nitrogen directive) 4 (4m)
- (ii) perennial ryegrass spp/ Italian rye grass (accept rye grass if alone)/ clover/ Timothy/ cocksfoot 4m + 4m
- (c) LEAF-STEM
sugars are in leaf/ fibre (cellulose) is in stem/ if too much stem- preservation will be poor/ additives will be needed/ too much stem DMD will be low (leafy DMD is high)/ more protein in leaf 4m+4m
8. (c) (ii) ZERO GRAZING
animals kept inside/ on a feedlot/ grass or other forage is cut/ and brought to animals/ no poaching/ less energy wasted by animals/ labour intensive
CREEP GRAZING
In sheep or cattle systems/ a gap in fence/ allows young animals access to a clean (worm free) field/ good grass available/ returns to suckle/ access denied to mothers 2 (2m+2m)

2009 Marking Scheme

1. (a) (i) Leguminosae (Papilionaceae or Legume) 4m
(ii) N-fixing/ increased protein content of sward/ improved digestibility/
better ground cover (weed control)/ better palatability/ more productivity/
green fertiliser/ REPS/ less chemical use (organic farming) 3m + 3m
- (j) Perennial ryegrass (PRG) spp/ or named varieties/ Clover/ Timothy/ Cocksfoot/
Meadow fescue/ Tetraploid ryegrasses. Any two. **Not** Italian ryegrass or RVPs 5m + 5m

Option Two

3. (c) At leafy stage most of the CHO in grass is soluble sugars (higher DMD)/ >70%/ as grass
matures sugar is converted to cellulose/ cellulose has much lower DMD than sugar/
< 50%/ at heading date most sugar has been converted to fibre/ results in decrease in
feeding value of grass (DMD falls)/ by 0.5% per day after Any four 4 (4m)

2008 Marking Scheme

1. (j) hybrid vigour/ more persistent than Italian/ more herbage than Italian 6m + 4m

Option Two

3. (a) (i) improves yield/ improves quality of pasture 3m
(ii) ability of grasses to produce side shoots from base of plant (or diagram) 3m
(iii) cutting/ topping/ rolling/ grazing/ fertilising 2 (3m)
(iv) improvement of herbage/ weed control/ recycling of nutrients/ tillering 2 (3m)
- (b) (i) calves graze ahead of older cattle 3m
best quality for calves/ parasite control/ better utilisation of grass 2 (3m)
(ii) palatable/ fixes N/ high protein/ saves cost of fertiliser/ Nitrates directive
(pollution)/ increase production/ ground cover/ high mineral content/ REPS 2 (3m)
4. (a) Chop/ dry grass/ place in plastic bag/ roll up to remove air/ place in freezer/
remove when frozen/ squeeze drop of cell sap/ place in refractometer/ read off
percentage sugar on scale/ repeat or average 6 (4m)

2007 Marking Scheme

4. (c) quadrat/ transect/ random throw or numbers/ repeat/ identify species or name
Species/ record/ percentage cover or frequency/ display or present result 6 (4m)
5. (a) A = blade or leaf or lamina B = auricle or collar
C = root D = ligule 4 (3m)
- (b) improves soil structure / helps control weeds / helps prevent disease /
Adds organic matter / improves fertility / animal feed 6m + 3m
- (c) leafy / digestible / high protein / not stemmy (young grass) / before ear emergence /
(not flowering) / indication of length or height 3 (3m)
- (d) any **two** factors
- ❖ dry matter / lower in silage (higher in hay) / 70-80% in hay or 20-25% in silage
 - ❖ protein / higher in silage (lower in hay) / 14-18% in silage or 10% in hay
 - ❖ DMD / higher in silage (lower in hay) / 70%+ in silage
 - ❖ Fibre / lower in silage (higher in hay) / 30% in silage
 - ❖ metabolisable energy / higher in silage (lower in hay) / 10mJ/kg in silage
or 9mJ/kg in hay 2x 3 (3m)
9. (a) grassland natural habitat of crane fly / lays eggs in grass / larvae emerge /
feed on vegetation 6m + 3m + 3m

2006 Marking Scheme

Option One

3. (c) (i) Name of soil type / affects drainage / aeration / fertility / temperature /
pH 3m
How soil type influences sward 3m
- (ii) Grazing system / fertilising / weed control / drainage / pest control /
liming / topping / re-seeding 3m
How management practice influences sward 3m
- (iii) Day length / light intensity / temperature / amount of rainfall 3m
How seasonal factor influences sward 3m
4. (b) named apparatus / grind grass leaves / boil grass leaves / in alcohol /
place drop of extract on chromatography (filter) paper / concentrate drop /
solvent in covered gas jar / place end of paper in solvent (acetone +
petroleum ether) / pigments separated / name of one pigment 6 (4m)

5. (a) more aggressive varieties in temporary ley / more weeds in permanent ley /
one more fertilised than the other / seeds sown in temporary ley / name of
plant in correct context any three 6m + 2 (3m)
- (b) provides a break in tillage crops (rotation) / disease control /
improves soil structure / increases soil organic matter / provides grazing /
cheap food source any two 6m + 3m
6. (a) (i) palatability / digestibility / productivity / aggressiveness / persistence /
heading out date / nutrient level / purpose – silage or hay or grass any three 3 (3m)
- (ii) description of experiment any four relevant points 4 (3m)

2005 Marking Scheme

1. (b) long (hanging) stamens / reduced petals / feathery stigmas / light
pollen grains / large amount of pollen any three (3m + 3m + 4m)
5. (a) (i) longer growing period / increased photosynthesis / increased
day length / increasing temperature any two 2 (3m)
- (ii) grass develops flower / lower leaf to stem ratio / higher percentage
of cellulose / reduction in starch any two 2 (3m)
- (iii) lower intake / less digestible food / protein content reduced any two 2 (3m)
- (b) 6m + 3 (3m)
- (i) substrate for bacteria / converted to lactic acid any one
- (ii) for anaerobic bacteria / prevents rotting any one
- (iii) inoculants add bacteria / acids keep pH low and help preservation /
sugars as food for bacteria / enzymes catalyse fermentation any one
- (iv) dispenses with need for additives / less effluent / less waste /
raises dry matter content / raises sugar levels any one
- (c) sample of fresh grass / place in plastic bag and roll (remove air) /
place in freezer (to burst cells) / squeeze drop of cell sap /
on refractometer / read / get readings for two further drops /
get average reading any four 6m + 3 (3m)
6. (a) calves and weanlings first into each paddock / yearlings follow /
two year olds follow / calves are selective grazers on young grass /

- better use of grass / level of parasitic worm infestation reduced
[may be described diagrammatically] any four 2(3m)+2 (6m)
8. (c) (i) time of fertilising / named fertiliser / applied for each cut /
100-200kg per hectare for first cut / at reduced rate for 2nd cut
(80-100kg for second cut) / to maintain perennial ryegrass / keep weed free /
P & K built up slowly over 2-5 years / 26kg of P / 110 kg of K / etc.
[halve kg for unit] any three 3 (3m)
- (ii) bacteria in root nodules / fix nitrogen (makes nitrogen available
for plants) 3m
raises protein content of feed 3m
9. (d) adult crane fly lays eggs on grass / larva of the crane fly /
feeds on grasses / cereals and grasses similar plants 4m + 8m

2004 Marking Scheme

1. (g) colour / height / growth habit / any valid difference any three 4m+3m+3m
red clover: has red-pink flower / taller / has erect growth habit /
has creeping growth habit / has hairy stem and leaves /
is not as aggressive / is not as persistent / not as good at nitrogen fixation /
not as good quality / bigger leaves

Option One

3. (a) kills clover / more chlorophyll / greener grass / increased cost /
pollution from leaching or runoff / volatilisation / susceptibility to disease /
better growth / lodging any four 4 (4m)
4. (b) weigh sample / separate leaf from stem/ leaf to stem ratio/ ratio proportional to
protein
OR
Kjeldahl method to detect N/ protein is 16%/ % protein =/ %N x 100/16 4 (6m)
5. (a) (i) line transect and/ or quadrat/ throw or place/ use key or identify/ count numbers
or estimate percentage cover any three 3m+3m+2m
(ii) dock/ dandelion/ nettle/ buttercup/ daisy/ ragwort/ cocksfoot/ meadow foxtail/
Yorkshire fog/ etc. any four 4 (2m)
- (b) species: perennial ryegrass/ white clover/ red clover/ Italian ryegrass/ Timothy 2 (4m)
reasons: (as appropriate) productive/ persistent/ nutritious/ palatable/ persistent/
increases protein level/ adds nitrates 2 (4m)

- (c) direct drilling/ kill grass (herbicide)/ drill/ add fertiliser/ add slug pellets 2 (4m)
 stitching in/ slit drilling/ don't kill grass/ set back old pasture (heavy grazing or
 cut back on N)/ seeder or drill/ add fertiliser/ add slug pellets [allow any method
 not involving ploughing that gets seeds into ground] 2 (4m)
6. (a) (i) mixed grazing 4m
 (ii) better daily weight gain/ more output per ha/ better control of parasites/
 named parasite/ better use of grass/ sheep eat around dung pats/ sheep
 grazing increases tillering/ different dung and urine any four 4 (3m)
9. (a) young calves on fresh grass/ more palatable/ easier to digest/ less parasites 6m + 6m
 (c) trampling or rolling expels air/ anaerobic conditions needed for fermentation or
 for bacteria/ better quality silage (must refer to pH) 6m + 6m

2003 Marking Scheme

1. (a) Tillering – growth of side shoots 6m

Option One

3. (b) digestibility (D-value)/ degree to which food (grass) is retained and used by animal/
 changes with time/ decreases after flowering/ decrease in soluble carbohydrates
 (starch or sugar)/ increase in fibre/ variation between species. any three 2(6m) + 4m

Option Two

3. (a) 1. greater yield gives greater production/ high quality grass produces maximum LWG/
 higher dry matter yield from high value crop any two 2(4m)
 2. under-stocking leaves grass uneaten (wasted)/ more stemmy growth/ correct
 stocking rate/ livestock unit per area/ increased stocking rate in summer/
 overstocking leads to overgrazing/ little growth overall/ weakens desirable
 species/ encourages rosette type weeds/ decreases production any two 2(4m)

4. (c) measure area of grassland/ enclose area/ mow the grass from the top/
 find mass of the grass removed/ record/ repeat this over defined time/ total mass
 of grass is a measure of productivity

OR

measure area of grassland/ enclose (fence) area/ allow cows graze on grass/ milk
 cows regularly/ measure the amount of milk/ record/ total amount of milk is a measure
 of productivity

OR

measure area of grassland/ enclose (fence) area/ weigh a number of cattle/ record/

allow cattle to graze on grass/ reweigh cattle after a fixed period/ weight increase
 is a measure of productivity any six 6(4m)

9. (a) carbohydrate stimulant (adding sugar)/ for *Lactobacillus* or *Streptococcus*/
 ensures lactic acid production/ avoids butyric acid production/ better silage 2(6m)

2002 Marking Scheme

1. (c) "Run off" = do not apply during period of heavy rain/ apply fertiliser at proper rate/
 use correct fertiliser/ applied during periods of rapid grass growth (growing season)/
 keep away from streams/ other valid point 5m + 3m + 2m

Option One

3. (b) *Compare and contrast strip and paddock grazing on a dairy farm*
 Diagram Strip Grazing (0, 1, 3m)
 Diagram Paddock Grazing (0, 1, 3m)

Headings	Strip Grazing	Paddock Grazing
Labour	Back fence increases labour	Less labour
Fresh Grass	Fresh strip of herbage daily	20-25 paddocks/ fresh strip of herbage daily
Cost	Not as costly but high labour plus problems with containing stock with electric fences means not as commonly used	Expensive system – need for fencing, permanent roadways/ high income from dairy justify the cost
Fertiliser	Grazed land spread with N fertiliser	Each paddock spread with N fertiliser once animals removed
Water Supply	Movable water supply	Permanent water supply
Fences	Movable electric fencing	Permanent fences
Back Fence	Use of back fence which prevents regrazing and treading of regrowth	
Stock Return	Stock return 3-4 weeks later	Once the last paddock is grazed the first paddock has reached the correct growth stage and stock are returned/ rotational grazing

5(2m)

(c) Better growth rate mixed grazing
 close grazing habit of sheep increases tillering/ a denser sward and increase DM production/
 sheep eat the long unpalatable grass around the dung pats which cows will not touch/
 more recycling of nutrients/ nature of sheep dung and urine composition 4 (4m)

4. 1. *The estimation of sugars in grass for silage*

Aim: To test the sugar content in grass for silage

Method: dry sample of grass/ place sample in plastic bag/ roll bag to remove air/ place in a freezer until frozen/ remove from freezer/ cells have burst releasing sap/ squeeze out a drop and place in a refractometer/ obtain reading and two further reading on two other drops

Results: Calculate the mean reading/ estimate the % soluble carbohydrate

Conclusion: Knowing the carbohydrate concentration will allow you estimate the amount of additive required

Any valid points 5(4m)

Results/ Conclusions 4m

6. (a) 1. *After one year*

Name of plants 3m + 3m

Reason for named plants 1m + 1m

Annual weeds/ annual grasses/ possibility of some shrubs/ (bramble, hawthorn, hazel, blackthorn, birch)

(Species named will depend on location)

2. *After a further two years*

Name of plants 3m + 3m

Reason for named plants 1m + 1m

Perennials/ Shrubs (as above)/ permanent weeds/ forest species trees seedlings (saplings), oak, ash/ Succession occurring and continuing

(b) 1. *Importance of Tillering*

Good grassland establishment/ helps develop a close sward with a well developed root mat/ supports grazing animals/ prevent poaching/ achieve by grazing newly sown pastures with light stock e.g. calves or sheep/ they encourage tillering by defoliation and/ or damage to the main shoots of the grass plants through grazing/ repeated grazing and/ or topping encourages tillering of grass and prevents weeds from seeding themselves

2. *Weed control*

Grazing or topping encourages tillering of grass and prevents weeds from seeding themselves/ annual weeds will disappear at the end of first year/ perennial weeds example dock could be a problem, grazing and topping will help to control them/ if persistent spray with a selective herbicide/ spray with a herbicide before sowing after old sward has been grazed bare or mowed/ avoid too much slurry – will burn out grass and allow dock growth on bare patches/ docks like the high potassium levels in slurry/ weeds like rag worth can be pulled out by hand

3. *Soil Fertility*

Test soil/ drill fertiliser into grassland at sowing/ fertility must be kept high in period of establishment to encourage sown grass to tiller well/ apply NPK/ pH (lime) – not too acidic

3(2m)

2m+2m+1m

8. (b) *Laboratory method to identify 2 differences in quality of samples of silage from 2 separate farms*

Any **two** differences = e.g. Dry matter content/ colour/ smell/ texture/ pH/ water

Method = 5 x 2m for each pf the two methods described

Freshly cut face of the silage pit/ remove the samples/ compare observations from each of the two samples using any two of the following

➤ *make a visual assessment of colour*

if colour is brown black it is **overheated**/ had too much air in the vegetation at making/ use younger leafier grass and roll more carefully to prevent it/ poor feeding value

if dark green too much **butyric acid**/ cut to wet or lush or not enough additive used/ ensile dry and wilted and add an additive/ poor to moderate feeding value

if light yellowish green – **lactic acid**/ lactic acid bacteria dominant at ensiling or correct amounts of acid additive used/ good quality

➤ *Hold the sample close to the nose for smell*

if smells sweat like burnt sugar it is **overheated**/ had too much air in the vegetation at making/ use younger leafier grass and roll more carefully to prevent it/ poor feeding value

if smells unpleasant, rancid too much **butyric acid**/ cut to wet or lush or not enough additive used/ ensile dry and wilted and add an additive/ poor to moderate feeding value

if little smell, sharp and vinegary **lactic acid**/ lactic acid bacteria dominant at ensiling or correct amounts of acid additive used/ good quality

➤ *Feel the samples – rub leave stems between finger and thumb for texture*

if dryish it is **overheated**/ had too much air in the vegetation at making/ use younger leafier grass and roll more carefully to prevent it/ poor feeding value

if slimy (soft tissues easily rubbed from fibres) too much **butyric acid**/ cut to wet or lush or not enough additive used/ ensile dry and wilted and add an additive/ poor to moderate feeding value

if firm (soft tissues not easily rubbed from fibres) **lactic acid**/ lactic acid bacteria dominant at ensiling or correct amounts of acid additives used/ good quality

➤ *Squeeze sample in one hand/ wring the sample using two hands – DM content*

If liquid can be squeezed using one hand poor quality/ less than 20%

Liquid wrung out with two hands good quality/ 20-25%

Liquid cannot be remove by hand very good quality/ greater than 25%

➤ *Touch the tip of tongue to samples or squeeze out sufficient liquid to measure*

pH using a pH meter

If pH is not sharp to tongue greater or equal to 5 too much **butyric acid**/ cut too wet or lush or not enough additive used/ ensile dry and wilted and add additive/ poor to moderate feeding value

If pH is sharply acid less than 5 **lactic acid**/ lactic acid bacteria dominant at ensiling or correct amounts of acid additive used/ good quality

2001 Marking Scheme

1. (d) Explain Tillering = growth of new shoots from axillary buds in grasses 5m
Conditions (any one) = grazing/ harvesting/ topping/ high soil fertility 5m

Option Two

3. (b) *Grass conservation as winter feed*
Silage
cut earlier/ control bacteria/ fungi/ micro-organisms by air removal/ acid production acidification 2 (4m)
Hay
cut late/ control micro-organisms by water removal/ drying 2 (4m)

4. (c) *Diversity of plant life in an old meadow*
Aim: To determine that certain plants are found within an old meadow.
Methods: Use of quadrat (random or non random)/ transect/ collection of plants/ identification keys/ list plants found/ place in families
Results: illustrate some results found (table or graph or words) from different areas within the meadow
Conclusions: Does the meadow show diversity or not Any 5 (4m)
Result/ Conclusion 4m

8. (c) *Distinguish between the importance of clover*
(i) Clover fixes atmospheric N to nitrate for the plant to make protein/
Improves the N status of the soil 6m
(ii) Spreads out via stolons/ fills up space/ reduce weeds within pasture/
good cover 6m
(iii) Clover is higher than grass in protein/ high mineral 6m
(iv) the ability to change N from one form to another and reduce the effect of N getting
into the ground water/ reduces pollution/ reduces the need for artificial nitrates 6m