

- Which of the following best describes rough mountain and hill grazing land?
 - Poorer grasses, low stocking rate, high production levels
 - Poorer grasses, high stocking rate, high production levels
 - High-quality grasses, high stocking rate, low production levels
 - Poorer grasses, low stocking rate, low production levels
- Which of the following best describes permanent grassland?
 - Never ploughed, variable grass species, higher production than hill grazing
 - Reseeded annually, only one grass species, high stocking rate
 - Never ploughed, usually one grass species, high production levels
 - Reseeded annually, lowest stocking rate, lowest production levels
- Which of the following seeds are most likely to be sown in leys?
 - Meadow foxtail only
 - Italian ryegrass and clover
 - Clover only
 - Cocksfoot and clover
- After germination, what is the correct order of the phases of growth for a plant?
 - Elongation, vegetative, reproductive
 - Elongation, reproductive, vegetative
 - Vegetative, reproductive, elongation
 - Vegetative, elongation, reproductive
- In each phase plant growth is mainly concentrated in one area. Match the phase of growth with the part of the grass plant where most growth occurs during this stage.

Growth phase of plant	Part of grass plant where growth takes place
Vegetative	Seed head
Elongation	Stem
Reproduction	Tillers (leaves)

- A student carried out an experiment to determine the botanical composition of an old permanent pasture and a ley. In each field she threw a quadrat ten times and recorded the plant species that occurred in each quadrat. If she identified a plant species as present in six out of ten quadrats, she recorded the frequency of that plant as 60%. Her results showing the species found at each site and how frequently they occurred are shown in Table 17.5.

Table 17.5 Results							
Site	Dock	White clover	Perennial ryegrass	Nettle	Cocksfoot	Thistle	Ragwort
Field A		70%	100%				
Field B	60%	60%	100%	40%	50%	40%	30%

- Identify which field was the old permanent pasture and which was the ley.
 - Identify one plant species listed in Table 17.5 that would contribute nitrogen to the soil and a source of protein to a grazing animal's diet.
 - Identify three plant species in Table 17.5 that would be considered weeds.
 - Identify one plant species in Table 17.5 that is described as a noxious weed. State why this plant should be removed from a pasture.
 - Outline one way in which the old permanent pasture might be improved.
- What are the three main characteristics of grass that determine its agricultural importance?

8. What is meant by the following terms?
 - (a) Dry matter digestibility
 - (b) Dry matter intake
9. Why does the DMD value of a grass decline over the summer grazing period?
10. Explain why DMD value is an important characteristic of grass.
11. Read the passage below and answer the questions.

The benefits of quality silage in beef production systems

The potential benefit of improving grass silage DMD depends on the mix of livestock on the farm over the winter period. While 'national average' silage is suitable only for dry suckler cows requiring zero body condition score gain, farm systems requiring higher animal performance stand to benefit from raising silage DMD by at least 6–7 percentage points above this level.

This was demonstrated in a study conducted at Teagasc Grange Animal & Grassland Research and Innovation Centre (Table 17.6) which measured intake and live weight gains for cattle offered silages with a range of DMD values. Results showed that growing cattle fed high-quality silage (75% DMD) gained approximately 0.3 kg more live weight per day compared to those fed on silage at national average DMD (65%). The extra performance was due to a combination of higher daily DM intake (DMI) and greater feed energy value per kg of silage DM.

Table 17.6 Effect of silage quality on silage intake and daily weight gain in growing cattle

	First-cut silage quality			
	75	70	65	60
DMD%				
Harvest date	20 May	2 June	15 June	28 June
Silage yield (t DM per ha)	4.8	6.0	7.0	7.7
Dry matter intake (DMI) (kg/day)	9.0	8.3	7.6	7.0
Liveweight gain (kg/day)	0.83	0.66	0.49	0.31
Carcase gain (kg/day)	0.51	0.39	0.27	0.15
Feed efficiency (DMI/kg carcass gain)	17.6	21.1	28.1	46.7

The consequence of feeding the higher quality (75% versus 65% DMD) silage at farm level would include approximately 40 kg extra live weight gain over a 150-day housing period, a 2.0 to 2.5 kg reduction in daily concentrate intake for similar daily gain, and/or a shorter final finishing period. Interestingly, the efficiency of carcass gain per kg of DMI was also significantly improved with higher DMD silage, delivering potential environmental as well as economic advantages. Extract from 'Grass silage for beef production', Joe Patton; adapted and reproduced courtesy of Teagasc. Adapted by Simon Marsh, Principal Lecturer – Beef Cattle Specialist, Harper Adams University.



- (a) What percentage DMD is the national average for silage?
 - (b) Studies at Teagasc Grange showed an increase in liveweight gain of 0.3 kg/day when silage of what DMD percentage was fed to cattle in comparison to the national average of 65% DMD?
 - (c) What two reasons were given for the improved liveweight gain in the cattle consuming this silage?
 - (d) Identify the optimum date for cutting silage from the data above for the following:
 - (i) Highest DMD%
 - (ii) Highest silage yield.
 - (e) Give reasons why a farmer might cut grass for silage at 65% DMD rather than 75% DMD.
 - (f) Table 17.6 outlines the values measured in the study by Teagasc on DMD values for first cut silage during the growing season.
 - (i) Plot a graph showing silage yield versus DMD%. Is there a correlation between silage yield and DMD%?
 - (ii) Plot a graph of DMD% versus Liveweight gain (kg/day). Is there a correlation between DMD% and liveweight gain?
 - (g) Account for the digestibility of grass harvested for first-cut silage declining from 20 May to 28 June.
12. Explain why perennial ryegrass is considered superior to all other grasses for sowing.
 13. What conditions does perennial ryegrass need in order to grow satisfactorily?
 14. Italian ryegrass is 20% more productive than perennial ryegrass, while 95% of all grass seed sold for leys for grazing is perennial ryegrass species. Account for the popularity of perennial ryegrass and suggest reasons that a ley might be sown with Italian ryegrass.
 15. Compare the physical characteristics of red and white clover.
 16. Why is the presence of clover so important for grazing and grass growth?



17.9 Cattle grazing on clover-rich pasture

17. Describe the advantages of using hybrid grass species over Italian ryegrass on its own. Suggest a variety of clover suitable for:
 - (a) grazing
 - (b) silage production.
 Give reasons for your choices.
18. A farmer has sown a ley with a mixture of early, intermediate and late strains of perennial ryegrass along with clover. Account for the variety of heading out dates of perennial ryegrass sown and state three reasons why clover might be included in a seed mixture for a ley.
19. What type of seed mixture is used for sowing grass for silage? Explain why this seed mixture is used.