

HCS612 – Final exam

Name.....

5 December 2002

Complete 10 of the following questions (clearly show which 2 questions you do not answer)

Each question is worth 10 points. 1 page of summary notes is allowed. Time allowed 1.5 hr

1) a) Define sustainability (1)

b) In 2-3 sentences describe how genetic engineering might affect grassland sustainability (3)

c) One frequently cited consequence of an unsustainable practice is reduced soil carbon. Is such a practice tolerable knowing that carbon levels can be restored by grasslands? (i.e. “its no problem, we can fix it anytime we want”) (3)

d) One frequently cited consequence of an unsustainable practice is reduced soil carbon. Is such a practice tolerable if we used a technology that offset losses resulting from reduced soil carbon (i.e. “its no problem, we can compensate for any losses with technology”) (3)

2) Livestock systems based on grazing have advantages and disadvantages compared to livestock systems based on feeding hay/silage.

Give 5 advantages

- a)
- b)
- c)
- d)
- e)

and give 5 disadvantages

- f)
- g)
- h)
- i)
- j)

3) a) What are 4 benefits of high biodiversity pastures?

- i)
- ii)
- iii)
- iv)

b) What are 4 disadvantages of high biodiversity pastures?

- v)
- vi)
- vii)
- viii)

c) What are 2 management implications you can suggest to a farmer using your knowledge of biodiversity?

- ix)
- x)

- 4) Select the best answer
- a) NDF is always
- greater than ADF
 - less than ADF
 - approximately equal to ADF
 - unrelated to ADF
- b) The Latin name for annual ryegrass is:
- Lolium temulentum*
 - Lolium multiflorum*
 - Lolium annua*
 - Lolium perenne*
- c) Endophyte is a toxic fungus of seed most closely related to:
- Fusarium
 - Dollar Spot
 - Ergot
 - Rust
- d) A 100 acre farm with 50 paddocks, 80 cows and a grazing rotation of 25 days will have:
- a stocking density of 20 cows/ac and a stocking rate of 20 cows/ac
 - a stocking density of 0.8 cows/ac and a stocking rate of 0.8 cows/ac
 - a stocking density of 20 cows/ac and a stocking rate of 0.8 cows/ac
 - a stocking density of 0.8 cows/ac and a stocking rate of 20 cows/ac
- e) Overgrazing occurs with:
- low frequency and low intensity grazing
 - low frequency and high intensity grazing
 - high frequency and low intensity grazing
 - high frequency and high intensity grazing
- f) Novel endophytes are specific races of an endophyte species that:
- are not transmitted by seed
 - do not produce ergovaline
 - increase drought tolerance
 - can infect all grass species
- g) Shannon's index is a measure of grassland biodiversity influenced by:
- species richness
 - species number and the relative abundance of species
 - relative abundance of species
 - none of the above
- h) The typical response of forage to applied nitrogen is:
- 1 lb DM/lb N
 - 5 lb DM/lb N
 - 20 lb DM/lb N
 - 50 lb DM/lb N
- i) The biggest limitation of forage for energy production from biomass is:
- high ash content
 - ensuring a year-round supply of biomass
 - the low cost of coal
 - all of the above
- j) The $-3/2$ tiller rule in grasslands relates to the slope of the relationship between:
- tiller size and tiller density
 - log tiller size and tiller density
 - log tiller size and log tiller density
 - tiller size and log tiller density

6) a) Upon graduation you have been fortunate to get a position as a grassland molecular ecologist. A farmer has asked your opinion as to whether he/she should plant a new grassland with high or low genetic diversity. In 3-4 sentences, what is your recommendation? Why? (4)

b) What are 3 methods that will ensure a high (or conversely, low) genetic diversity in a grassland seed-mix to be planted? (6)

7) Grasslands classically comprise a mixture of grasses and legumes.

a) What are two common grass-legume associations found in grasslands of the world? (2)

b) Legume's role in pastures is primarily to fix nitrogen for subsequent grass growth. What are 4 mechanisms by which nitrogen is made available to grasses – and indicate approximately how long each process takes (4)

i)

ii)

iii)

iv)

c) There are at least 7 factors affecting grass-legume balances. Describe briefly 4 of these factors. (4)

v)

vi)

vii)

viii)

8) a) Why is forage quality important for intensive animal production. (1)

b) What plant fiber component causes the difference between NDF and ADF? (2)

c) What is NIR? and how is it used? (3)

d) Describe two factors contributing to low forage quality (2)

e) Describe two factors contributing to high forage quality? (2)

9) a) What are the two main sources of carbon that have contributed to the increase in atmospheric carbon during the last 100 years (2)

b) What is the scope for grasslands to accumulate (sequester) additional carbon? (4)

c) What grassland management practices can increase carbon sequestration? (4)

10) a) In addition to providing forage for livestock, what are 4 other (non-traditional) uses of grasslands (4)

i.

ii.

iii.

iv.

e) Describe two of these uses in greater detail (2-3 sentences each) (6)

v.

vi.

11) a) What are four functions of roots in grasslands (4)

i)

ii)

iii)

iv)

b) What is the effect of water stress on root growth?(2)

c) What is the effect of grazing on root growth?(2)

d) What is the effect of low fertility on root growth?(2)

12) In 4-6 sentences, describe how information from this course might help you in your future career