

Instructions:

Complete 10 questions; Question #1 (required) and 9 others
All questions are worth the same: 10 points per question.
Show all computational work and units where applicable.
'Closed book' exam; one page of notes is allowed.

Question 1 (Required)

For your favorite forage species, state:

- Common name (0)
- Latin/Scientific name (1):
- One common cultivar (1):

Write one key point on each of the following:

The most distinguishing morphological feature to identify the species (2)

.....

What is the main advantage that makes this your favorite forage (2):

.....

The biggest disadvantage or limitation of this species (2):

.....

One important management issue for using this species (2):

.....

Question 2

For the species that you identified in Question 1, write 5 bullet-style points describing more detailed aspects of the species not mentioned in Question 1. For example, sensitivity/tolerance to the environment/climate, drought/freeze tolerance, grazing suitability, insect/disease tolerance, feed quality, fertilizer requirements, insect/disease issues or other details.

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

Question 3

If you work in extension you are certain to get E-mails such as below. In 5 sentences, what reply would you send back to this producer? (continue on the back page if you need more space)

"> Hello. We have a small alpaca farm, and are considering
> fertilizing the pasture this year. The local coop suggested a 10-
> 10-10 blend. Is this acceptable, and how long should we leave the
> animals off pasture after applying it? Thank you much!"

Question 4

Forages frequently encounter drought. In what 5 ways are the effects of drought more significant or unique for forages compared to other crops?

a)

b)

c)

d)

e)

Question 7

Based on your (and other groups) experience in the greenhouse project, complete the following sentences.

- a) Emergence of legumes was usually grasses
[faster than....., slower than....., equal to...]
- b) Emergence of perennial ryegrass was usually..... annual ryegrass
[faster than....., slower than....., equal to...]
- c) The ideal planting depth for forages is inch(es)
- d) Excessive fertilizer in close proximity to germinating seed is likely to
[promote growth, slow germination, 'burn' the seedling]
- e) Within grasses, species with larger seed size are likely to germinate
species with smaller seed size.
[faster than....., slower than....., equal to...]

Question 8

Following harvest and once in the silo or bunker, there are 4 main stages involved in silage fermentation. Describe the main process (2 processes for (3)) during each of the following phases, AND give one management option to improve silage quality during that phase:

	phase	Main process	Management option
1	aerobic phase (2)		
2	lag phase (2)		
3	fermentation phase (4)	i) ii)	
4	stable phase (2)		

Question 9

(Use the back of this sheet if you need more room for computations)

An alfalfa hay field produces 4 tons/acre/year.

a) If the harvested hay contains 3.0% K, how many pounds of K is removed from an acre in one year? (2)

b) On that same acre, how many pounds of 12-31-20 fertilizer would be required to replace the K lost by crop removal? (4)

c) Three fertilizers have the following characteristics. For each fertilizer, calculate the cost per unit K_2O (\$/pound K_2O) (3)

Fertilizer	% K_2O	\$/ton	\$/lb K_2O
19-19-19	19%	\$218	a) _____
6-15-40	40%	\$175	b) _____
12-31-20	20%	\$205	c) _____

d) Which fertilizer is the cheapest source of potash? (1)

Question 10 – Multiple Choice Circle the correct answer. Each question = 1 point.

10.1: A rhizome is:

- a) An underground/burrowing stem
- b) An above-ground/creeping stem
- c) A part of all grass plants
- d) A part of all broadleaf plants

10.2: The Latin name for annual ryegrass is:

- a) *Lolium multiflorum*
- b) *Lolium hybridum*
- c) *Lolium perenne*
- d) None of these

10.3: Compared to warm-season C4 grasses, cool season (C3) species are:

- a) more tolerant of dry conditions and low carbon dioxide concentrations
- b) less tolerant of dry conditions and low carbon dioxide concentrations
- c) more drought tolerant, but less tolerant of high temperatures (30 C)
- d) less drought tolerant, but more tolerant of high temperatures (30 C)

10.4: The most important reserve for initial growth of forages in early spring is:

- a) stored protein
- b) stored carbohydrates
- c) lignin deposits
- d) soil carbon dioxide

10.5: The most volatile and water soluble nutrient is:

- a) NO_3^-
- b) SO_4^{2-}
- c) C
- d) Ca^{+2}

10.6: The most important mechanism for loss of P from grassland is:

- a) Volatilization
- b) Leaching below the root zone
- c) Adhering to soil particles washed into a waterway
- d) All of the above

10.7: A fertilizer labeled with the specifications 6-15-40 contains:

- a) 40% K_2O
- b) 6% NO_3^-
- c) 15% NH_4^+
- d) 15% P

10.8: Endophyte fungi are found in the following forage species:

- a) all legume species
- b) Kentucky bluegrass and tall fescue
- c) Ryegrass and tall fescue
- d) Orchardgrass and ryegrass

10.9: Freezing tolerance and winter survival in alfalfa is improved by:

- a) application of high N fertilizers to promote fall growth
- b) use of endophytes to help strengthen alfalfa stands in general
- c) application of K fertilizers to enhance osmoprotection
- d) close cutting right before winter sets in

10.10: Kentucky 31 (K31) is a common variety of:

- a) white clover
- b) crimson clover
- c) Kentucky bluegrass
- d) tall fescue

Question 11

Give 10 differences between C3 (cool season) and C4 (warm season) grasses

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)
- i)
- j)

Question 12

a) What is endophyte? (2)

b) Name one forage species that can be infected with endophyte (1)

c) Name one forage species that does not have endophyte (1)

d) What are two animal symptoms of endophyte toxicity? (2)

e) Currently there is an emphasis to have endophyte-free forage. What are two sources of contamination in “clean” forage. (2)

f) What are novel (non-toxic) endophytes? (2)