

**THE UNIVERSITY OF MELBOURNE**

**Semester 1, 2004 Assessment**

**208-203 ECOLOGY AND MANAGEMENT OF GRAZING SYSTEMS**

Time allowed: Three hours

This paper has 2 pages

**ANSWER FIVE (5) QUESTIONS. ALL QUESTIONS ARE OF EQUAL VALUE**

1. Answer **EITHER** Part A) **OR** Part B).

A) Annual grass species such as barley grass, silver grass and winter grass are common invaders of pastures in southern Australia. With reference to the population biology of annual plants, explain how these species are able to reproduce from year to year and to spread through the pasture. What are some of the management interventions that could be used to disrupt the regeneration of these species by targeting critical stages in their life cycle?

OR

B) Describe the function of the tiller of perennial grass plants. Your answer should draw out how the tiller contributes to the growth of the plant (and therefore the yield of the pasture) and the regeneration of the plant (and therefore the persistence of the population).

2. In the past 2 decades, researchers have uncovered a complex three-way interaction between the perennial ryegrass plant, endophytic fungi ('ryegrass endophyte') associated with the plant, and animal health. What is the ryegrass endophyte, and what effects does it have on the growth of the plant and on animals grazing ryegrass pastures infected with the endophyte? How can some of the negative effects of the endophyte on animal health be overcome?

3. What is meant by the term 'tissue turnover' when applied to the analysis of pasture growth dynamics? Illustrate how tissue turnover processes:

- are related to the different phases (I, II and III) of the regrowth of pastures following grazing;
- account for the phenomenon of ceiling yield in pastures; and
- can be used to develop a simple indicator that farmers can use to determine the optimum point at which to graze grass-dominant pastures during regrowth

4. Pasture intake by grazing animals is a key factor influencing animal nutrition and production. Approximately how much pasture dry matter would you expect a) a mature ewe of 55 kg liveweight and b) a steer of 400 kg liveweight to consume per day? What factors will affect the amount of pasture *actually* consumed by these animals on a daily basis? Consider both pasture management and animal factors in your answer.

5. A major objective of pasture improvement practices commonly used in the medium-high rainfall zones of Victoria is to change pasture composition toward dominance by improved grass species, along with good legume content, and thereby increase pasture growth. The application of fertilizers, especially phosphatic fertilizers, is a very common practice in pasture improvement programs. Grasses generally provide the bulk of feed in pastures, and the main nutrient that limits grass growth is nitrogen (N). So, if N is the main nutrient limiting total pasture growth, why is phosphorus (P) the main nutrient applied in fertilizer?

6. Pasture mass (in kg DM / ha, also referred to as pasture cover) is an important indicator of the status of a grazing system at key stages during an annual cycle. The presence of too much or too little pasture at critical times of the year may indicate that the system is getting out of control.

- a) describe some of the techniques farmers can use to determine pasture mass;
- b) explain why it is important for producers to know, in approximate terms, the pasture mass present across the grazing area. Consider both pasture growth and animal management/production outcomes in your answer; and
- c) in relation to animal management/production, what other information about the pasture is needed in order to predict the likely productivity of animals grazing the pasture?

7. Answer **EITHER** Part A) **OR** Part B)

A) Why is stocking rate such an important factor in determining the productivity of grazing systems? Your answer should consider effects of stocking rate on both pasture and animal production.

OR

B) The concept of 'pasture zones' has been developed as a way of representing the relationships between pasture species and environmental factors. Describe the commonly-recognised pasture zones of Victoria, including their geographical location, the main pasture species commonly found in them, and the reasons why those species predominate. For two of the zones you have identified, give the range of total annual pasture production (in kg DM / ha / year) that might be expected, and describe the types of animal production enterprises commonly supported by those pastures.

END OF EXAMINATION