MIDTERM EXAM ADVS/WILD – 5860 March 6, 2008

Name _____ Score (100 pts) _____

1. (8 pts) List four direct and four indirect economic losses caused by poisonous plants.

Direct	Indirect
Death	**Fencing**
Weight Loss / Decreased Growth Rate/Emaciation/wasting	**Herding – labor costs**
Reproductive alterations	**altering grazing systems**
Abortions	**Increased Veterinary costs**
Disrupted estrus cycles in females	**increased replacement animals**
Reduced libido & spermatogenesis in males	**reduced land values**
Photosensitization	
Compromised immune system	

2. (5 pts) Paracelsus (1493-1541) said:

"All substances are **POISONS**; there is none which is not a **POISON**. The right **DOSE** differentiates a **POISON** from a **REMEDY**."

3. (2 pts) When are cattle most likely to graze needles of ponderosa pine and at what stage of pregnancy are they most likely to cause reproductive loss?

a.) Early fall snow storms and second trimester of pregnancy.
b.) After a major spring storm and second trimester of pregnancy.
c.) During a later winter snow storm and during days 70 –120 of gestation.
d.) **During a late winter snow storm and in the last trimester of pregnancy**.
e.) All of the above

4. (2 pts) Explain the difference between an antagonist and an agonist and list a plant-derived example of each.

-an agonist a compound that produces a biological effect, or activates a receptor – Ex. anabasine
-an antagonist is a compound that opposes the actions of an agonist, or inhibits or block a receptor – Ex. Methyllycaconitine (MLA)

5. (2 pts) What are the <u>two</u> fundamental questions an analytical chemist attempts to answer in his/her research on poisonous plants.

What is the toxin? Qualitative
How much toxin is present? Quantitative

6. (6 pts) List the steps involved in bioassay guided fractionation to identify a toxin in a plant.

Chemical Extraction
Test extracts or residue with appropriate bioassay
Continue fractionation of + materials
Assay new fractions
Identification of chemical components
Assay of individual components
Confirmation of toxic compound in large animal

7. (2 pts) You are investigating a plant poisoning in cattle and have obtained numerous samples. How should the samples be stored? In your answer, be sure to address the storage procedures for whole blood.

Whole blood should be refrigerated. Freezing of whole blood will cause the cells to lyse and should not be done. All other samples should be frozen.

8. (3 pts) List 3 management procedures that can be used to decrease the probability of sheep being poisoned on halogeton.

Keep animals well fed and watered
Avoid trailing, watering, unloading, holding, sheep where halogeton is present.
Supplement Calcium
Adapt them slowly to halogeton graze shadscale which is low in oxalates

9. (2 pts) In the space provided below, compare and contrast the placental types of humans and cattle. Be sure to address the implications of placental structure on fetal exposure to toxins.

Cattle have a cotyledonary placenta with 6,7 layers, humans have a discoid placenta with 2,3 layers. The fewer placental layers, the more permeable the placenta is to toxins. Therefore, the human fetus has a greater potential for exposure to toxins.

10. (4 pts) Which of the following provide an absolute diagnoses of a plant poisoning.

a. The presence of a poisonous plant in the pasture.
b. Observed clinical signs similar to those seen in animals poisoned with a specific plant.
c. The identification of pathologic lesions that are similar to those described in animals poisoned with a specific plant.
d. Obtaining direct evidence of plant ingestion (plant fragments or cells in ingesta or feces).
e. Obtaining indirect evidence of plant ingestion (chromatographic or immunologic detection of the plant toxin in animal tissue or the feed).
f. None of the Above

11. (8 pts) List two plants known to cause birth defects, describe the defects, indicate susceptible livestock species, and indicate the susceptible period of gestation.

Plant	Animal	Defect	Days of gestation
Veratrum	**Sheep**	**cyclopia**	**14**
		Collapsed trachea	**31-33**
		Limb defects	**33-35**
Lupine	**Cow**	**Twisted limbs neck, spine**	**40-100**
		cleft palate	

12. (4 pts) List 4 noxious weeds that are toxic and the poison syndromes they cause.

White top (Hoary Cress)	**Photosensitization**
Russian Knapweed	**Chewing disease**
Yellow starthistle	**Chewing disease**
Perennial pepperweed (tall white top)	**Liver damage, Photosensitization**
Leafy spurge	**GI Irritation**
St. Johns Wort	**Primary Photosentization**

13. (2 pts) Lesions produced by poisonous plants are unique and easily differentiated from those produced by other natural and infectious diseases. True or **False**.

14. (4 pts) List the four levels of physiological response to insult and give an example of each.

Molecular response
Change in protein, DNA, RNA, lipid, carbohydrate

Tissue response
Loss of function, necrosis, inflammation

Animal response
Sick animal, change in appetite, loss in weight, organ failure, death

Herd response
Stocking rate, economic loss

15. (2 pts) Anagyrine will cause birth defects in cows, goats and sheep while ammodendrine is only teratogenic in cattle. True or **False**

16. (4 pts) What are 4 factors that effect susceptibility of pyrrolizidine toxicity?

Age – Neonates most susceptible
Species
Sex – males more susceptibile
Nutritional status

17. (6 pts) List six samples to be collected when investigating a potential plant poisoning of animals.
    a. **Liver**
    b. **Kidney**
    c. **Stomach/rumen contents**
    d. **Abdominal fat**
    e. **Urine**
    f. **Eye**
    g. **Brain**
    h. **Small/large intestine contents**
    i. **Hay, water, forage**

18. (3 pts) Provide three reasons why broom snakeweed is so competitive with other plants that it will take over and dominate a site?

Alleopathic – alters environment by secreting chemicals that inhibit other plant growth.
2 Tier root system – deep tap root, network of lateral roots.
Prolific Seed Producer

19. (3 pts) Explain the symbiotic relationship between tall fescue and its endophyte

Plant provides nutrients for endophyte
Endophyte provides protection against
Insect predation
Nematode predation
Drought and temperature induced stresses

20. (2 pts) List all the different livestock species that may abort due to consumption of ponderosa pine needles.

Cows (and buffalo)

21. (2 pts) Define noxious weed: **A plant designated <u>by law</u> as undesirable and requiring control.**

22. (2 pts) Danger from grass tetany is present when what ratio exceeds 2.2?

K/(Ca + Mg)

23. (2 pts) How are most animals poisoned by pyrrolizidine alkaloid containing plants?

Feed Contamination

24. (2 pts) **<u>Invasive noxious weeds</u>** are proving to be the single greatest threat to natural ecosystems in the western USA.

25. (18 pts) Match the plants with their botanical name, toxin, toxin class, poison syndrome, habitat, and ecological status. List the number of each attribute. Some boxes require more than one answer (number).

Common Name	Botanical Name	Toxin	Toxin Class	Poison Syndrome	Habitat	Ecological status
Halogeton	*Halogeton glomeratus*	Sodium oxalate	Oxalate	Acute death	Salt-desert shrub	Alien / invader
Lupine	*Lupinus* spp.	Anagyrine	Quinolizidine alkaloid	Birth defects	Sagebrush steppe	Seral / increaser
Ponderosa pine	*Pinus ponderosa*	Isocupressic acid	Diterpene acid	Abortion	Conifer	Pristine / climax
Broom snakeweed	*Gutierrezia sarothrae*	Diterpene acids	Diterpene acid	Abortion	Short-grass prairie Sagebrush steppe	Seral / increaser
Riddells groundsel	*Senecio riddellii*	Riddelline	Pyrrolizidine alkaloids	Liver damage wasting	Tall grass prairie	Seral / increaser
Tall fescue	*Festuca arundinaceae*	Ergovaline	Ergot alkaloids	Summer slump	Improved pastures	Introduced