Name_____________________

1. List **four** criteria that a good forage quality index should meet. (4 points)

2. List **three** conditions that must apply for forage quality to be defined by voluntary feed intake and nutritive value (3 points)

3. If you have a forage with RFV, QI\textsubscript{cattle} and RFQ values of 110, 1.0 and 115, respectively,

   a. Would this be classified as a high, medium or low quality forage? (1 point)

   b. How would feeding this forage as the sole feed affect the weight gain of beef cattle? (2 points)
4. Which of the proximate analysis methods do you consider to be the most misleading for forage analysis? Justify your answer and briefly describe a newer method that overcomes the shortcomings of the proximate analysis method. (6 points)
5. What are the assumptions underlying the analysis of crude protein by the Kjeldahl technique, and why are these assumptions questionable? (4 points)

6. Contaminants can result in an overestimation of the NDF concentration of a feedstuff.
   a. Name three of such contaminants and name a feedstuff that usually has high concentrations of each of your named contaminants. (3 points)
   b. Describe how each of the three contaminants can be removed during the NDF assay. (3 points)

7. Lignin questions:
   a. Name one gravimetric assay for lignin and one difference assay. (2 points)
   b. Which of the methods that you listed above is more accurate? (1 point)
   c. What causes the inaccuracy of the less accurate of the two methods? (1 point)
8. What is the difference between apparent and true digestibility? (3 points)

9. Why is it necessary to have an adaptation period before a digestibility trial and how long should the period last? (3 points)

10. Name five criteria that an ideal in vitro digestibility method should meet and indicate the extent to which a method of your choice meets these criteria. (5 points)

11. What is (are) the main reason(s) for conducting in situ degradability assays, and why are such assays integral for describing the protein requirements of ruminants? (5 points)
12. Name four advantages of the gas production technique over the in situ degradability technique? (4 points)

13. Describe three problems associated with the fermentation gas production technique. (3 points)

14. Describe the main steps involved in developing a good near infrared reflectance spectroscopy calibration for a new grass cultivar. (6 points)
15. List three internal markers that are used in passage rate studies and discuss the problems associated with using each of the markers you mention. (6 points)

1. **Bonus question**
   Can cannulae be inserted in rats? (4 points)