1. Why do legumes contain more protein than grasses? 3 pts
   Because legumes have less structural carbohydrates and tend to need more protein for their (legumes') nutrition. Protein is used for reproductive utilization.

2. Name two measurements to assess efficiency of feed utilization. 4 pts
   Apparent digestibility/feed to dry matter intake/allow analysis of feed in - feed out = utilized gain production trial - allows to see whether animal uses feed to produce greater amount of certain product.

3. In the stomach of the dog, protein digestion is initiated by the enzyme pepsin (pepsiragen) which is activated by secretion of HCl. 4 pts

4. State two ways in which ruminal microorganisms are vital for the nutrition of their host. 6 pts
   Give: Nitrogen in last quantities
   Provide B vitamins

5. What is the greatest source of metabolic water? 3 pts
   Conversion of glucose to energy

6. What important digestive function is performed by the bicarbonate salts secreted in pancreatic juice? 3 pts
   They neutralize any HCl. No longer needed in small intestine.

7. Show the general relation between dry matter digestibility (DMD) and lignin content of forages. 3 pts

8. What is the major factor influencing voluntary feed intake in ruminants fed high energy, concentrate-type diets? 3 pts
   The major factor is whether energy obtained is at or above 2.5 kcal/lb. This seems to be the number where animals try to stay.
9. The MHA (Microbial Housing Association) is revising its regulations for housing of rumen microbes and have hired you as a consultant. Outline your recommendations to ensure that the microbial population is adequately housed. 6 pts

   - A warm climate 39°C ± 2°C
   - Garbage removal
   - VFA and other compounds made by microbes
   - Adequate nutrition: needed nutrients that will support and allow growth of microbes

10. Show the general relation between dietary energy content and voluntary feed intake in nonruminants. 3 pts

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<table>
<thead>
<tr>
<th>Intake</th>
<th>Dietary energy concentration</th>
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<td>↑</td>
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11. What is TDN? How is it calculated? What is it used for? 2 pts each

   Total digestible nutrients

   TDN: \( \% \text{ Digestible Fiber} + \% \text{ Digestable Protein} + 2.5 \% \text{ EE} + \% \text{ Nitrogen free extract} \)

   It is used to determine the quality of a feed by determining after proximate analysis (Hemicel system) whether a feed is readily used by an animal (digestible)

   RESERVOIR
   Vet: 00
   van Derwell
12. Outline the processes of postgastric digestion of dietary lipid. 6 pts

Lipid Droplet

\[ \text{Triglyceride} \]

\[ \text{Bile salts (Na}^+ \text{, K}^+) \]

\[ \text{Pancreatic lipase} \]

\[ \text{Monoglyceride} \]

\[ \text{Cell wall (in small intestine)} \]

\[ \text{Triglyceride} \]

Chylomicron \[ \rightarrow \] Lacteal \[ \rightarrow \] Liver

13. Where is the bulk of carbohydrate absorbed from in a nonruminant? 3 pts

Small intestine (duodenum)

14. List the principal site of fermentation for the following species. 6 pts

Cattle \[ \text{Rumen (postgastric)} \]

Dog \[ \text{Colon (postgastric)} \]

Pig \[ \text{Colon (postgastric)} \]

Human \[ \text{Colon (postgastric)} \]

Horse \[ \text{Colon (postgastric)} \]

Rabbit \[ \text{Cecum (postgastric)} \]

15. You are an accomplished researcher and have just completed a rumen in situ "cloth bag" study looking at digestibility of a forage versus a concentrate. Plot the amount of material left in the cloth bags over time for both the forage and concentrate. Label your curves. 5 pts

16. Give 1 positive and 1 negative effect of heat treatment on nutritive value of feeds. 6 pts

Positive

It can cause gelatinization of certain feeds thus allowing easier absorption.

Negative

Can cause a Maillard reaction or caramelization of nutrients thus allowing less use of other nutrients.

PRE VET 00
Van Der Weill
17. What is the effect of pelleting a poor quality (high fiber) roughage on voluntary intake? 3 pts
   It increases voluntary intake (according to graph, the increase is pretty large)

18. What is metabolic turnover? 3 pts
   Metabolic turnover is the producing of certain compounds such as proteins, using them, breaking them down to amino acids and resynthesized new compounds from the constituent molecules.

19. What is the relationship between total body water content and body fat content? 3 pts
   Total body water content increases as body fat content decreases. The more fat the more body water (example is women and water retention compared to men and ratio of fat in women to fat in men)
   & I like your example!

20. List the 4 compartments of the ruminant stomach and give a function for each. 8 pts
   Reticulum - controls bolus creation and regurgitation
   Rumen - breaks down cellulose/hemicellulose
   Omasum - takes out water of chyme
   Abomasum - starts to break down through enzymes and HCL any chyme passed from omasum

21. Is aerobic or anaerobic fermentation more efficient? 2 pts Why? 2 pts
   Aerobic fermentation is more efficient because it uses oxygen as a factor in stimulating breakdown. It is up around 85% for humans while it is much lower in ruminants (60%)
   - anaerobic has heat + gas loss
   \[ \text{Prevet 00 van derwell} \]
22. Outline protein digestion in the small intestine. 5 pts

    Protein
    ↓ pepsin
    ↓ peptide
    ↓ carboxypeptidase
    ↓ aminopeptidase
    Amino Acid

    absorption

23. Describe 2 properties or functions of water in nutrition. 4 pts

    It acts as a lubricant for passage of material through the body.
    It controls thermal regulation by having an extremely high specific heat.