AVS 305
Exam #1
October 4 or 5, 1999

1. Why is the study of nutrition important to animal agriculture? 3 pts
   The better nutrition an animal receives the more it will be able to produce (milk, meat, etc.). Feed is the greatest cost in animal agriculture so we want to minimize input while maximizing output.

2. What is the difference between undernutrition and a nutritional deficiency? 3 pts
   Undernutrition is not getting enough to eat - hungry
   Nutritional deficiency is when something or things are missing in the diet.

3. Where do plants get their amino acids from? 3 pts
   Photosynthesis - converting energy from the sun into nitrogen.
  植物蛋白质 are not the same as animal, they are able to synthesize the energy they need from photosynthesis.

4. Why are leaves more nutritious than stems? 3 pts
   The leaves contain less lignin which makes them easier to digest than the stem, if an animal can digest them easier they can extract the nutrients easier.

5. What is the equation for apparent digestibility? 3 pts
   Apparent digestibility = \frac{\text{amount fed}}{\text{daily weight gain}} \times 100

6. What is the role of hydrochloric acid in protein digestion? 3 pts
   It breaks down the bonds making proteins into peptides - cleaves big chunks off the protein activation of pepsin to pepsin.

7. What makes legumes special? 3 pts
   They are dicots instead of monocots.
   Sx atmospheric N.

8. Describe the Total Digestible Nutrient (TDN) method to estimate feed energy. 5 pts
   TDN takes into account digestibility
   TLIV = (LCP + (LCC + LNFE) + (2.25 EE)

RESERVED
Prep 00
Van Derwell
9. Name any bacteria that reside within the rumen. 3 pts

Streptococcus Bovis

10. What is NDF and ADF and what do each measure? 6 pts

They are both detergent systems used to determine cellulose.

NDF = Neutral detergent factor - cellulose, hemicellulose, hemicellulose, lignin

ADF = Acid detergent factor - cellulose & lignin

11. Why is 6.25 used in crude protein analysis? 3 pts

That is what is estimated from the Nitrogen to be crude protein.

The Nitrogen content is what is used to determine the crude protein.

12. Describe how to measure digestibility of a feed. 4 pts

You can use chemical tests - proximate analysis or in vitro tests.

You can run production trials where you measure the feed going in and the waste coming out (face intake).

Feed them 4 weeks trial.

% Digestibility = \( \frac{\% \text{ DM} - (\% \text{ CP} + \% \text{ CF} + \% \text{ Ash} + \% \text{ EE})}{\% \text{ DM}} \times 100 \)

13. Describe the differences in regulation of feed intake between ruminants and nonruminants? 4 pts

Ruminants: low in energy, low in forage, they rely on gut fill

High in energy, high in forage, they will meet energy demands

Nonruminants: most of the time they will eat to meet energy demands, which is thought to be controlled by leptin from

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

<table>
<thead>
<tr>
<th>Species</th>
<th>Site of Fermentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep</td>
<td>rumen</td>
</tr>
<tr>
<td>Pig</td>
<td>colon</td>
</tr>
<tr>
<td>Dog</td>
<td>colon</td>
</tr>
<tr>
<td>Horse</td>
<td>colon</td>
</tr>
<tr>
<td>Rat</td>
<td>colon</td>
</tr>
<tr>
<td>Human</td>
<td>colon</td>
</tr>
</tbody>
</table>
15. You have a 1 kg of a feed that is 10% fat, 30% protein and 60% carbohydrate. Estimate its energy content. [you must show your work, it is not necessary to give amount] 5 pts
\[
(1) (1000) = 100(9) + 300(64) + 600(4)
\]
\[
900 + 1200 + 2400 = 4500 \text{ cal or } 45 \text{ kcal}
\]

16. What are cofactors? Give an example of one. 4 pts
- Something that allows us to determine the content of an important nutrient - Ether Extract is what is used to determine how much fat is in the substance. The fat binds to the and that is how we measure it.
- Substances that aid in an enzymatic reaction - enable enzyme to be active.

17. What is the effect of pelleting a poor quality (high fiber) roughage on voluntary intake? 3 pts
- It increases voluntary intake - cause them to eat more of it.

18. What is protein turnover? 3 pts
- As when protein is broken down and reused to synthesize new products, a continuous cycle of degradation and construction of proteins as the (Protein = Synthesis - Degradation) animal uses them for growth.

19. What is the effect of ambient temperature on evaporative water loss? 3 pts
- The higher the ambient temperature the more water is lost through evaporation - the animal evaporate more water to keep cooler.

20. Describe how a horse obtains energy from a diet of grass. 5 pts
- Since horses are colonic fermentors or post gastric fermentors, they do not obtain energy from the cellulose in the grass. Ruminants can absorb the cellulose energy from the grass because they have microbes in their rumen to break down the cellulose. The horse gets its energy from the absorption of fats in the colon intestine before the hind intestine.
21. Describe protein digestion in a dog. 4 pts

\[
\text{Stomach:}\begin{cases}
\text{Protein} \\
\text{Peptides}
\end{cases}
\leq \text{pepsin - HCl} \rightarrow \text{break down large chains into peptides.}
\]

\[
\text{Small Intestine:}\begin{cases}
\text{Peptides} \\
\text{Carboxy-peptidase} \rightarrow \text{break off smaller chains from each end of the peptides to make amino acids.}
\end{cases}
\]

22. Describe lipid digestion in nonruminants. 5 pts

Bile is what emulsifies the fat droplets so that the cholesterol can bind to it. Once the fat droplets are small, they are easier to digest and absorb.

Bile = made in the liver, stored in the gall bladder.

Pancreatic lipase = breaks down triglycerides into monoglycerides. They are absorbed through the wall of the small intestine and reformed into triglycerides again.

23. What is the role of the pancreas in digestion? 4 pts

The pancreatic lipase is what breaks down the triglycerides into monoglycerides. It also secretes bicarbonate which neutralizes the HCl that comes from the stomach into the small intestine.
24. Describe carbohydrate digestion in the ruminant fed a diet based on forage. 4 pts

Carbohydrate digestion in the ruminant is based on the microbes in the rumen. They are what break down the cellulose into fermentable carbohydrates. The more forage that is fed to a ruminant, the more microbes will exist in the rumen (they like a continuous supply of cellulose.) As long as there is a sufficient amount of microbes in the rumen, the animal will digest and absorb more of the carbohydrates in digestion.

25. Outline the net energy system. Describe where AND why losses occur. 8 pts