

Beyond the Hay Days
2nd Edition

Study Guide: Questions Only

Chapter 1: The Art of Nutrition

1. Horse nutrition has been called both an art and science. How can it be both?

Chapter 2: Feeding as a Function of Design

1. Contrast the way horses feed in nature with how they are usually fed today.
2. How does a horse's digestive system differ from a cow's?
3. As a percent of its body weight, how much forage (on a dry matter basis) does a horse need each day?
4. What is the role of insoluble fiber in the diet?

Chapter 3: Energy: Fuel for the Equine Engine

1. Name the three classes of nutrients that provide energy for a horse's metabolism.
2. What is digestible energy (DE)?
3. What molecule supplies all of a horse's (and any other living thing's) metabolic energy?
4. Which mode of respiration requires oxygen? Which mode is more efficient? Of glucose, fats and proteins, which one can only be burned anaerobically? Which mode is for fast, intense activity?

Chapter 4: Nutrients that Supply Energy

1. Which class of nutrients supply most of a horse's energy?
2. What is glycogen and why is it important?
3. Which three elements make up carbohydrates? And where does the name carbohydrate come from?
4. How do fats differ from carbohydrates?
5. Which of the three energy-supplying nutrients (carbohydrates, fats and proteins) is the most energy dense? How much more?
6. How can supplemental fat enhance a feeding program? Are there possible drawbacks?
7. Can a horse synthesize the omega fatty acids? Of the three (omega-3, -6 and -9 fatty acids), which is the most important, and why?
8. What is a good natural source of omega-3 and -6?
9. What are amino acids?
10. What makes an amino acid "essential"? How many are considered essential to the horse?
11. Why is protein important in the diet? Name a few signs of a horse lacking in protein.
12. Which class of horse requires the least protein? The most?
13. What is the range, as a percentage of total dry feed intake, of protein requirements?
14. Hays vary widely in their protein content. All things being equal, which common hay contains the most protein, and which hays the least?
15. What are good sources of supplemental protein?
16. What would be the purpose of feeding supplemental lysine?
17. What is urea? Is it wise to feed it to your horse? Why or why not?

EXTRA: Give an example of a non-digestible protein.

Chapter 5: Putting Things Into Perspective with a Bigger and Better Trojan Horse

1. What does PPM stand for? What nutrients are guaranteed in PPM?
2. How many micrograms in a milligram?
3. How many milligrams in a pound?
4. What does “IU/lb.” mean? What nutrients are guaranteed in IU/lb?

Chapter 6: The Fundamentals: Energy and Protein Requirements

1. What classifies a horse as a maintenance horse? Give some examples of maintenance horses.
2. What types of stress would increase a maintenance horse’s nutritional requirements?
3. What special considerations should be given to older horses?
4. Compared to a maintenance horse, how much more energy is required by a performance horse? How much more protein?
5. What are some of the feeding concerns of performance horses?
6. How should you adjust the feeding program for a performance horse coming out of training?
7. At what point in her term will a mare in foal begin to require extra feed?
8. In addition to energy and protein, which two nutrients should be supplied in abundance to a lactating mare?
9. In what way should you alter a mare’s feeding program, shortly before weaning her foal?
10. What is the rationale for creep feeding a foal?
11. What type of feed should you put in a creep feeder?

12. At six months of age, how does a weanling compare to its estimated adult size in terms of height and weight?
13. How should the feeding program be adjusted as a young horse grows toward adulthood?

Chapter 7: Enzymes: Catalysts of Life

1. What class of molecules are enzymes?
2. How are they able to catalyze reactions that would not often take place at normal body temperatures?

Chapter 8: Minerals: Elemental Necessities

1. What are some of the advantages of feeding supplemental minerals?
2. What is the most common problem caused by a skewed calcium-to-phosphorus ratio in young horses?
3. Which is most likely to be overfed, calcium or phosphorus? Why?
4. Which sources of calcium are better absorbed by the horse?
5. Name two substances that reduce calcium absorption in the horse.
6. Give three functions of calcium, in addition to bone formation.
7. What is a good inorganic source of phosphorus?
8. Name some functions of phosphorus, in addition to bone formation and maintenance.
9. Between hay and grain, which generally supplies more calcium? More phosphorus?
10. What ubiquitous natural compound contains magnesium?
11. Which forage is the best source of magnesium? Which inorganic compounds?
12. Beside skeletal formation, what are some of magnesium's roles in the horse?

13. What are some of the symptoms of inadequate amounts of magnesium in the diet?
14. List three factors that can limit magnesium absorption.
15. How can an excess of calcium limit magnesium absorption?
16. Briefly, how can insufficient dietary magnesium cause lumpy fat deposits?
17. Which two amino acids contain sulfur? Which two vitamins?
18. Where is the greatest concentration of sulfur in the body of the horse?
19. What is a good source of sulfur?
20. What is the role of potassium in the body?
21. Which feeds are high in potassium? Which are low?
22. Why is supplemental salt important?
23. What are the signs of too little salt in the diet?

EXTRA: Why would a horse need more salt per pound of body weight than a dog?
24. Generally, are trace minerals better absorbed from organic or inorganic sources? Which trace mineral is an exception?
25. By what processes does soil become depleted of minerals?
26. Why are trace minerals better absorbed when bound to an organic substrate?
27. What is the primary difference between polysaccharide and amino acid complexes on the one hand, and chelates and proteينات on the other.
28. Why should you use caution when feeding chelate and proteينات?
29. What is cobalt's solitary role in the physiology of the horse?
30. List a few factors that can limit copper absorption.
31. Which types of hay generally contains the most copper?
32. How is iodine utilized in the body?
33. What are the symptoms of an iodine deficiency? Which horses are most likely to be affected?

34. What is iron's most notable role in the body?
35. All things being equal, should a horseman worry more about too much iron or too little? Explain your answer.
36. What kinds of imbalances can result from too much iron?
37. What are some of the roles of manganese in the body of the horse?
38. How is zinc utilized in the horse? Why should it be supplemented?
39. Which vitamin requires selenium for proper function?
40. What is the maintenance requirement for selenium? The maximum tolerable amount?

Chapter 9: Vitamins: The Missing Puzzle Pieces

1. How do vitamins differ from other nutrients thus far discussed?
2. What is the source of naturally occurring vitamin A?
3. What is vitamin A's role in the body of the horse?
4. What is the best source of vitamin A?
5. Where is vitamin A stored in the body?
6. What makes vitamin D unique among the vitamins?
7. Which minerals does vitamin D regulate?
8. Which horses would be most likely to benefit from vitamin D supplementation?
9. How does vitamin E protect living cells?
10. How does vitamin E work with the mineral selenium?
11. What is the recommended amount of vitamin E in the ration?
12. How much tocopherol, on average is available in grains and forages?

13. Why is vitamin K not considered to be of dietary significance?
14. What is the purpose of vitamin K?
15. Explain how a horse's thiamin (vitamin B₁) requirements are linked to its caloric needs.
16. Which horses can be most helped by thiamin supplementation?
17. What is riboflavin's role in the body of the horse?
18. What is the purpose of niacin?
19. From what sources does a horse acquire niacin?
20. Pantothenic acid, a constituent of coenzyme A, is needed for the synthesis of which two types of compounds?
21. In addition to its role in energy metabolism, pyridoxine (vitamin B₆) is crucial for the formation of _____?
22. Why would you be more likely to be deficient in riboflavin than your horse?
23. Which horses might benefit from the supplementation of folic acid?
24. Which compound essential to the normal function of the nervous system is synthesized from choline?
25. Which trace mineral is needed for the production of vitamin B₁₂?
26. Why is supplementation with vitamin B₁₂ generally considered unnecessary?
27. Why is the substance we know as "vitamin C" labeled "ascorbic acid" on equine feed labels?
28. What is the primary metabolic role of ascorbic acid?
29. Why is dietary ascorbic acid of so little value to the horse?
30. Why would someone feel compelled to feed a biotin supplement, even if the horse was shown to have normal biotin concentrations in the blood?

Chapter 10: Exotic Nutrients

1. What are MSM's undisputed metabolic roles?
2. From what source would a horse obtain naturally occurring MSM?
3. What is dimethylglycine's (DMG) role in energy metabolism?
4. Explain the relationship of chondroitin sulfates to glucosamine.
5. If your goal were to increase the concentration of GAGs in your horse's body, would it make more sense to feed chondroitin sulfates or glucosamine? Why?
6. What might be the benefit of feeding bromelain to a performance horse?

Chapter 11: Closing Considerations: The Basics

1. Why do older horses sometimes need to have their teeth floated?
2. What treatable malady has been cited as the major cause of colic?
3. What is the cause of sand colic?
4. How can sand colic be prevented?
5. In cold weather, why is hay better at creating body heat than grain?
6. What should you look for when buying hay?
7. What often fatal condition can result from feeding a horse grass clippings?
8. On average, how much more energy is contained in cereal grains than hay? Which cereal grain contains the most digestible energy?
9. Of the eight basics of a good feeding program, only three are related directly to feed. What are the other five?

Practice Formulas

Percent to Milligrams per Day

1. If you are feeding 4 pounds of a sweet feed that guarantees 0.012% zinc, how many milligrams of zinc are you feeding per day?

Percent to Grams per Day

2. How many grams of calcium are in 5 pounds of feed with a 0.6% calcium content?

PPM to Milligrams per Day

3. If you are feeding your horse two ounces per day of a supplement that guarantees 8500 PPM of iron, how many milligrams of iron is the horse getting?

Total Protein in a Ration

4. Let's say you are feeding 14 pounds of hay that is 12.5% protein and 6 pounds of supplemental sweet feed that is 16% protein. What is the protein percentage of the entire ration?
5. How many grams of protein are in the ration listed above?