

# **Beyond the Hay Days**

**Refreshingly Simple Horse Nutrition**

UPDATED & EXPANDED 2ND EDITION

## **APPENDIX B HELPFUL FORMULAS & CONVERSION FACTORS**

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### HELPFUL FORMULAS & CONVERSION FACTORS

In preparing the tables for this book I used several different mathematical conversions to put the information into forms that were readily understandable. Many of them were intuitive, others were not. For those who do not work with these units on a daily basis, I will give a few formulas that should enable anyone to translate a feed label into easier terms, and thereby formulate their own rations.

Feed labels are a marriage of metric and avoirdupois units, which is a mixed blessing. People who are familiar with the metric system find it logical and easy to use. Every unit is a power of ten above or below another unit. Units of volume are equivalent to units of liquid measure, such that a cubic centimeter (cc) is the same volume as a milliliter (ml), which makes 1000 cc's equivalent to a liter. Furthermore, the metric system is based on the specific gravity of water at standard temperature and pressure, which means that one gram of water occupies one cc (or one milliliter) of space, and one liter (1000 cc's) of water weighs one kilogram. (By contrast, how many people know how many cubic inches are in one gallon of water?)

This is all well and good, except that most of us were brought up thinking in ounces, pounds, feet, inches, pints, quarts, and gallons. Whenever we see grams, the brain asks for ounces. Unfortunately, ounces just do not work when dealing with small quantities, such as the amount of copper in a pound of sweet feed.

#### **Metric Conversion Factors**

- One Pound = 16 ounces
- One ounce = 28.35 grams
- One pound = 453.6 grams
- One pound = 453,600 milligrams
- One pound = 0.45 kilograms
- One gram = 1000 milligrams
- One kilogram = 1000 grams
- One kilogram = 2.2 pounds

It is much easier to say "18.5 milligrams" than "1/1532nd of an ounce."

Like it or not, the metric system is a fact of life when it comes to horse feeds, and the horseman who takes the time to become familiar with it will be miles (or kilometers) ahead of the neighbor down the road, who doesn't.

## Percent to Milligrams per Day

Percentages are used extensively in feed labeling. Protein, fat, fiber, calcium, phosphorus, magnesium and salt are always guaranteed in percentages, and often other minerals will be, too.

### QUESTION

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?

### SOLUTION

- Convert pounds of feed to milligrams:**  
 $4 \text{ lbs.} \times 453,600 \text{ mg./lb.} = 1,814,400 \text{ milligrams}$   
(see chart on page 148 for conversion factor)
- Convert percentage of zinc to actual value:**  
(divide by 100, or move the decimal point 2 places to the left)  
 $0.012\% \div 100 = .00012$
- Multiply total milligrams (#1) by the number from #2:**  
 $1,814,400 \text{ mg.} \times .00012 = 217.728 \text{ mg. of zinc in}$   
 $4 \text{ pounds of feed.}$

### YOUR TURN

- Convert pounds of feed to milligrams:**  
\_\_\_ lbs.  $\times$  453,600 mg./lb. = \_\_\_\_\_ mg.
- Convert percentage of nutrient to actual value:**  
\_\_\_ %  $\div$  100 = \_\_\_\_\_
- Multiply total milligrams (#1) by the number from #2:**  
\_\_\_\_\_ mg.  $\times$  \_\_\_\_\_ = \_\_\_\_\_ mg. in \_\_\_ lbs.

## Percent to Grams per Day

It works just the same with minerals like calcium, except that we use grams instead of milligrams.

### QUESTION

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

### SOLUTION

**1. Convert pounds of feed to grams:**

$$5 \text{ lbs.} \times 453.6 \text{ g./lb.} = 2268 \text{ grams}$$

*(see chart on page 148 for conversion factor)*

**2. Convert percentage to actual value:**

(divide by 100, or move the decimal point 2 places to the left)

$$0.6\% \div 100 = .006$$

**3. Multiply total grams (#1) by the number from #2:**

$$2268 \text{ g.} \times .006 = 13.608 \text{ grams of calcium in 5 lbs. of feed}$$

### YOUR TURN

**1. Convert pounds of feed to grams:**

$$\underline{\quad} \text{ lbs.} \times 453.6 \text{ g./lb.} = \underline{\hspace{2cm}} \text{ g.}$$

**2. Convert percentage of nutrient to actual value:**

$$\underline{\quad} \% \div 100 = \underline{\hspace{2cm}}$$

**3. Multiply total grams (#1) by the number from #2:**

$$\underline{\hspace{2cm}} \text{ g.} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ grams in } \underline{\quad} \text{ lbs.}$$

## PPM to Milligrams per Day

Trace minerals, such as zinc, copper, iron, etc., should be guaranteed as PPM, or “parts per million”.

### QUESTION

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?

### SOLUTION

- Convert ounces of supplement to grams:**  
 $2 \text{ ounces} \times 28.35 \text{ g./oz.} = 56.7 \text{ grams}$   
(see chart on page 148 for conversion factor)
- Convert grams (#1) to milligrams:**  
(multiply by 1000, or move the decimal point 3 places to the right)  
 $56.7 \text{ grams} \times 1000 = 56,700 \text{ milligrams}$
- Convert PPM to actual value:**  
(divide by 1,000,000 or move the decimal point 6 places to the left)  
 $8500 \text{ PPM} \div 1,000,000 = .008500 \text{ or } .0085$
- Multiply total milligrams (#2) by the number from #3:**  
 $56,700 \text{ mg.} \times .0085 = 481.95 \text{ milligrams of iron in 2 ounces of supplement}$

### YOUR TURN

- Convert ounces of supplement to grams:**  
\_\_\_ ounces  $\times$  28.35 g./oz. = \_\_\_ grams
- Convert grams (#1) to milligrams:**  
\_\_\_ grams  $\times$  1000 = \_\_\_\_\_ milligrams
- Convert PPM to actual value:**  
\_\_\_\_\_ PPM  $\div$  1,000,000 = \_\_\_\_\_
- Multiply total milligrams (#2) by the number from #3:**  
\_\_\_\_\_ mg.  $\times$  \_\_\_\_\_ = \_\_\_\_\_ milligrams

## Total Protein in a Ration

### QUESTION

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?

### SOLUTION

1. **Find the protein factor for each feed:**

$$14 \text{ lbs. hay} \times 12.5\% \text{ protein} = 175$$

$$6 \text{ lbs. sweet feed} \times 16\% \text{ protein} = 96$$

2. **Add the protein factors and the total pounds:**

$$\text{protein factors: } 175 + 96 = 271$$

$$14 \text{ lbs.} + 6 \text{ lbs.} = 20 \text{ lbs.}$$

3. **Divide total protein factor by total pounds:**

$$271 \div 20 \text{ lbs.} = 13.55\% \text{ protein in the entire ration.}$$

### QUESTION

How many grams of protein are in the ration listed above?

### SOLUTION

1. **Convert total pounds to grams:**

$$20 \text{ lbs.} \times 453.6 \text{ g./lb.} = 9072 \text{ grams}$$

2. **Convert total percentage to actual value:**

(divide by 100, or move the decimal point 2 places to the left)

$$13.55\% \div 100 = .1355$$

3. **Multiply total grams (#1) by the number from #2:**

$$9072 \text{ g.} \times .1355 = 1229.3 \text{ grams of protein in the entire ration.}$$