

EQUINE NUTRITION AND INGREDIENT SELECTION

Characteristics of the Equine

- Non-ruminant herbivores
- ~ 65% of digestive capacity in the hindgut
- Continual grazers
 - ◆ Frequent, small meals

Digestive System

- Foregut
 - ◆ Mouth
 - ◆ Esophagus
 - ◆ Stomach
 - ◆ Small intestine
- Hindgut
 - ◆ Large intestine
 - ◆ Cecum
 - ◆ Large colon
 - ◆ Small colon
 - ◆ Rectum

Foregut

- Mouth
 - ◆ Mastication (chewing)
 - ◆ Salivation
- Esophagus
 - ◆ Peristalsis
- Stomach
 - ◆ Hydrochloric acid (HCl) → begin protein breakdown
 - ◆ Gastric juices → begin fat breakdown

Foregut

- Small intestine → *major nutrient absorption site*
 - ◆ Soluble carbohydrates (CHOs) → simple sugars (energy)
 - ◆ Proteins → amino acids
 - ◆ Fats → fatty acids
 - ◆ Fat soluble vitamins (A, D, E, K)
 - ◆ Ca, Zn and Mg
 - ◆ Some P absorption
 - ◆ Some B vitamin absorption

Hindgut

- Large intestine (cecum and colon)
 - ◆ Cellulose (insoluble CHOs) → volatile fatty acids (energy)
 - ◆ B vitamin production
 - ◆ Water absorption
- Rectum
 - ◆ Indigestible material

	<h2 style="text-align: center;">Classes of Nutrients</h2> <ul style="list-style-type: none">■ Water■ Energy■ Protein■ Vitamins■ Minerals
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	<h2 style="text-align: center;">Water</h2> <ul style="list-style-type: none">■ Essential to body temperature regulation■ 10 – 12 gallons/day■ Intake affected by:<ul style="list-style-type: none">◆ Air temp◆ Exercise◆ Lactation◆ Dry matter (DM) intake
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	<h2 style="text-align: center;">Energy</h2> <ul style="list-style-type: none">■ Derived from:<ul style="list-style-type: none">◆ 1st CHO◆ 2nd Fats◆ 3rd Protein■ Abundant CHO (forage) intake makes it primary energy source
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	<h2 style="text-align: center;">Protein</h2> <ul style="list-style-type: none">■ Essential for:<ul style="list-style-type: none">◆ Growth◆ Muscle development◆ Reproduction◆ Lactation◆ Body tissue repair◆ Skin and hair development■ Lysine
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	<h2 style="text-align: center;">Vitamins</h2> <ul style="list-style-type: none">■ Essential for a variety of functions<ul style="list-style-type: none">◆ Catalyst for metabolism■ Fat-soluble<ul style="list-style-type: none">◆ A, D, E, K◆ Potential for toxicity■ Water-soluble<ul style="list-style-type: none">◆ B-complex◆ Continuous supply is necessary
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	<h2 style="text-align: center;">Vitamin A</h2> <ul style="list-style-type: none">■ Deficiency<ul style="list-style-type: none">◆ Vision impairment◆ Rough, dry skin◆ Brittle hair coat■ Toxicity<ul style="list-style-type: none">◆ Bone fragility
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Minerals

- Macro minerals
 - ◆ Calcium (Ca)
 - ◆ Phosphorus (P)
 - ◆ Sodium (Na)
 - ◆ Chlorine (Cl)
- Micro or trace minerals
 - ◆ Iodine (I)
 - ◆ Iron (Fe)
 - ◆ Selenium (Se)
 - ◆ Zinc (Zn)
 - ◆ Manganese (Mn)
 - ◆ Copper (Cu)

Minerals

- Ca and P for bone development and maintenance
- Ratio is most important
- Ideal Ca:P is 1.5:1.0
- Between 1:1 and 3:1 is acceptable
- Low Ca and high P → “big head”

Ingredient Selection

- Roughages
- Concentrates
- Supplements

Roughages

- High in fiber
- Low in energy
- Examples:
 - ◆ Pasture grass
 - ◆ Hay

Concentrates

- Low in fiber
- High in energy
- Example:
 - ◆ Grain

Supplements

- To balance rations
 - ◆ Proteins
 - ◆ Minerals
 - ◆ Vitamins

Roughages

- Pasture
- Grass hay
- Legume hay

Grass Hay

- Less costly than legume hay
- Less dusty than legume hay
- Examples:
 - ◆ Brome
 - ◆ Fescue
 - ◆ Timothy
 - ◆ Bermuda grass

Oregon Grasses

- Timothy
- Orchardgrass
- Brome

Legume Hay

- Higher energy, protein, and Ca than grass hays
- More costly
- Examples:
 - ◆ Alfalfa
 - ◆ Clover

Hay Selection (MTLFC)

- Maturity
- Texture
- Leafiness
- Free of:
 - ◆ Dust
 - ◆ Mold
 - ◆ Weeds
 - ◆ Insects
 - ◆ Blister beetle (cantharidin) → alfalfa
- Color

Concentrates

- Oats
- Corn
- Barley
- Sorghum (Milo)
- Molasses

Concentrate Selection

- Oats
 - ◆ High fiber → lower digestibility
 - ◆ Higher protein quantity and quality than corn
 - ◆ More expensive
- Corn
 - ◆ High energy
 - ◆ Lower protein than oats
 - ◆ Easier to overfeed
 - ◆ Cheaper

Concentrate Selection

- Barley
 - ◆ Between corn and oats in:
 - ◆ Energy
 - ◆ Protein
 - ◆ Fiber
- Sorghum (Milo)
 - ◆ Similar to corn in:
 - ◆ Energy
 - ◆ Protein
 - ◆ Fiber

Concentrate Selection

- Molasses
 - ◆ Palatability
 - ◆ Dust reduction
 - ◆ Expensive energy source
 - ◆ Low in protein

Supplement Selection

- Protein
 - ◆ Soybean meal
 - ◆ Canola meal
- Ca and P
 - ◆ Dicalcium phosphate
 - ◆ Limestone
- Vitamin A
 - ◆ Beta-carotene
- Fats
 - ◆ Vegetable
 - ◆ Animal

Pre-mixed Grains

- Balanced ration
- Do not add supplements or dilute

Complete Feeds

- Feed contains all nutrient requirements
- Recommended to feed hay
 - ◆ Reduce boredom
- Do not add supplements or dilute



Summary

- Digestive system
 - 6 classes of nutrients
 - ◆ Water
 - ◆ CHO
 - ◆ Fats
 - ◆ Protein
 - ◆ Vitamins
 - ◆ Minerals
 - Roughages
 - Concentrates
- Energy