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 CHO) → volatile fatty acids (energy)
  - B vitamin production
  - Water absorption
- Rectum
  - Indigestible material
Classes of Nutrients
- Water
- Energy
- Protein
- Vitamins
- Minerals

Water
- Essential to body temperature regulation
- 10 – 12 gallons/day
- Intake affected by:
  - Air temp
  - Exercise
  - Lactation
  - Dry matter (DM) intake

Energy
- Derived from:
  - 1st CHO
  - 2nd Fats
  - 3rd Protein
- Abundant CHO (forage) intake makes it primary energy source

Protein
- Essential for:
  - Growth
  - Muscle development
  - Reproduction
  - Lactation
  - Body tissue repair
  - Skin and hair development
  - Lysine

Vitamins
- Essential for a variety of functions
  - Catalyst for metabolism
  - Fat-soluble
    - A, D, E, K
    - Potential for toxicity
  - Water-soluble
    - B-complex
    - Continuous supply is necessary

Vitamin A
- Deficiency
  - Vision impairment
  - Rough, dry skin
  - Brittle hair coat
- Toxicity
  - Bone fragility
### 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
- Calcium 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**
  - 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