**What is a nutrient?**

Chemical substance that provide to an organism requirements to do their essential physiological functions

- Proper nutrition is essential for effective animal performance in all growth stages
- **Maintenance** of life and **production** (Key word).

**Classification of nutrients**

- **Energy**
  - Fat and oils (F)
  - Carbohydrates (Starch) (C)

- **Protein (P)**
  - All

- **Minerals**
  - Macro Minerals – Ca, P, Mg, Na, Cl, K, S.
  - Micro Minerals – Co, Cu, Fe, I, Mn, Mo, Se, Zn – Occur In
  - Ca: about 1:1 atom size to sheep

- **Vitamins**
  - Soluble in water
  - Soluble in lipids

- **Water**

---

**Forage types (categories)**

- **Categories**
  - Legumes
  - 14,000 species
  - Grasses
  - 6,000 species

- **Forage classification (practical method)**
  - Warm season
  - Cool season

- True classification is based on their physiology:
  - C4 (mostly warm-season forages)
  - C3 (mostly cool-season forages) species.

---

**Dry Matter (DM)**

Feeds vary in water content

- Dry matter concentration for:
  - Hay should be approximately 85%–92%
  - Haylage 40%–60%
  - Silage 30%–40%
  - Fresh pasture can be <20%

**Dry Matter Intake (DMI)**

- Refers to the portion of the forage after water is excluded
- Lbs or kg 1 lbs=2.2 kg
**Total Digestible Nutrients (TDN)**

A good way to estimate energy density of a feed (Sum of nutrients)

- Growing beef require between 65-75% TDN
- Most forages have at least 18% of Crude fiber
- Ask your feed dealer for this value (not on feed tag)

**Good quality forages**

- Legume hay can have roughly CP (18–22%)
- Grass hay can have CP (10–16%)

---

**Total Digestible Nutrients Forage Quality**

- Diagram showing forage quality

---

**Metabolizable Energy (ME)**

Measure of energy content of a feed.

- More precise way to evaluate energy density of feed, swine and beef cattle
- How much energy is available for the animal to use
- Measure in Mcal/lbs

---

**Crude protein and amino acids**

- Crude Protein
  - Estimates how much protein in a feed, but doesn’t tell how much can actually be used by the animal
  - Amounts different between species and stage of growth
  - Info on feed tag

- Amino Acids
  - Specific ones are supplemented for monogastric
    - Lysine (Pigs, horses, Cows)
  - Methionine (Lactating cows)
Formulation Ration (Pearson Square)

Formulation Mix Ration (Pearson Square)

Formulation Ration (Pearson Square)

Formulation Ration (Drought Feed)

What information is missing (TDN)?

Assessment of Livestock

Body Condition Score

- Assessment of the fat cover
- Best indicator of near-term nutritional needs
- Thin 1-3
- Moderate 4-6
- Fat 7-9.
Body Condition Score

3  5  6

Types of Animal Digestive Systems

Monogastrics
- Hogs
- Cats
- Dogs
- Humans

Ruminants
- Cows
- Sheep
- Goats
- Alpacas

Pseudo-ruminants

Differences
- Cecum
- Colom
- Microorganisms

Digestive System (Monogastric)

Voluntary Intake
- Energy
- Starch breakdown
- Lipolysis
- Protein
- AA

Ruminants

Difference
- Stomach
  - Split 4 compartments
- CHOS (Sugar and Fats)
  - Bacteria’s in the rumen:
    - Fats (galactoypids, TG, phospholipids)
    - Absorption Small intestine
  - Sugars
    - Produce Volatile Fatty Acids
    - Propionic
    - Acetic
    - Butyric
Ruminants

- Protein
- Microbial protein
- Ammonia and AA
Digestion produces energy loss
- Heat
- Gas
- Vitamins, minerals, water
- Absorb in the small intestine

Nutrient Requirements for animals by stage

Nutrient needs for animals by stages

<table>
<thead>
<tr>
<th>Nutrient Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock Class</td>
</tr>
<tr>
<td>Dry cow and heifers</td>
</tr>
<tr>
<td>Lactating cow</td>
</tr>
<tr>
<td>Bulls</td>
</tr>
<tr>
<td>Growing cattle</td>
</tr>
<tr>
<td>400lbs</td>
</tr>
<tr>
<td>600lbs</td>
</tr>
<tr>
<td>800lbs</td>
</tr>
<tr>
<td>Finishing cattle</td>
</tr>
<tr>
<td>1,200-lbs</td>
</tr>
<tr>
<td>Dairy cattle</td>
</tr>
<tr>
<td>Horses</td>
</tr>
<tr>
<td>Sheep and goats (for every 100 lbs)</td>
</tr>
</tbody>
</table>
### Dietary Protein and Energy Requirements of Goats

<table>
<thead>
<tr>
<th>Class of Goat</th>
<th>% Ash. Food Intake/day lb</th>
<th>% Crude Protein</th>
<th>% TCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing doeling, 45 lb</td>
<td>2.5</td>
<td>8.8</td>
<td>56</td>
</tr>
<tr>
<td>Growing male kid, 66 lb</td>
<td>2.5</td>
<td>9.0</td>
<td>57</td>
</tr>
<tr>
<td>Yearling doe, 90 lbs</td>
<td>4.6</td>
<td>10.0</td>
<td>56</td>
</tr>
<tr>
<td>3 years old doe, 110 lb</td>
<td>5.0</td>
<td>11.3</td>
<td>69</td>
</tr>
<tr>
<td>Mature buck, 200 lb</td>
<td>5.5</td>
<td>8.8</td>
<td>55</td>
</tr>
<tr>
<td>Dairy doe, 150 lb</td>
<td>7.5</td>
<td>11.6</td>
<td>71</td>
</tr>
</tbody>
</table>

### Practical Feeding Recommendations for feeding Goats

<table>
<thead>
<tr>
<th>% Protein</th>
<th>% TCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing Ede, dry does, and bucks</td>
<td>6-10</td>
</tr>
<tr>
<td>Pregnant goats</td>
<td>8-10</td>
</tr>
<tr>
<td>Lactating goats</td>
<td>12-13</td>
</tr>
</tbody>
</table>

### Practical Feeding Recommendations for feeding Horses

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Early Lactation/Calving/Mid Pregnancy</th>
<th>Late Pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>11-12</td>
<td>6-7</td>
</tr>
<tr>
<td>ME</td>
<td>50-55</td>
<td>35-40</td>
</tr>
<tr>
<td>Crude Protein</td>
<td>10-12</td>
<td>6-7</td>
</tr>
<tr>
<td>% TCM</td>
<td>7-8</td>
<td>6</td>
</tr>
</tbody>
</table>

### Summary

- Nutrient requirements for growth stage
- Total Digestible Nutrient
- CP
- ME
- Livestock species
- Forage availability
- Animal stocking rate
- Season

### Reference:

- Pastures and Forage Crops for Horses. [Link](http://edis.ifas.ufl.edu/pdfs/AA/AA21600.pdf)
- Basic Nutritional Guidelines for Equine Management. [Link](http://edis.ifas.ufl.edu/pdfs/AN/AN23500.pdf)
- How to Feed a Horse: Understanding Basic Principles of Horse Nutrition. [Link](https://edis.ifas.ufl.edu/pdfs/AN/AN28600.pdf)
- The Digestive Tract of the Pig. [Link](http://edis.ifas.ufl.edu/pdfs/AN/AN01200.pdf)
- Nutritive Value Parameters: [Link](http://edis.ifas.ufl.edu/pdfs/AA/AA19200.pdf)