Chapter 6. Nutrition of Ruminants

I. Feeding Considerations:

A. Less efficient in converting concentrates, but more efficient in converting roughages - - A valuable “niche”.

1. Approx. 50% of Ag land in U.S. is rangelands, pastures, timber, ... for grazing

2. B. Approx. 25% of croplands used for temporary grazing, hay, silage, ... 

3. C. Utilize roughage by-products (stalks, straws, cobs, hulls, ...)

<table>
<thead>
<tr>
<th>Animal</th>
<th>Feeding Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steer</td>
<td>6:1</td>
</tr>
<tr>
<td>Rabbit</td>
<td>3:1</td>
</tr>
<tr>
<td>Broiler</td>
<td>2:1</td>
</tr>
</tbody>
</table>
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Ruminants evolved on a roughage- or forage-based diet

Key Nutrients required:

1. Energy (roughages or concentrates)
2. Protein (N for microbes)
3. Vitamins A, D & E
4. Minerals

For ruminants – nutrition is simplified!
This mineral is designed to be fed to beef cattle on green growing (vegetative) spring or summer pastures.

**GUARANTEED ANALYSIS:**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Min. %</th>
<th>Max. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>15.5</td>
<td>16.5</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>5.0</td>
<td>5.6</td>
</tr>
<tr>
<td>Salt</td>
<td>15.0</td>
<td>16.0</td>
</tr>
<tr>
<td>Sodium</td>
<td>5.8</td>
<td>6.3</td>
</tr>
<tr>
<td>Magnesium</td>
<td>5.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Potassium</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Cobalt</td>
<td>20 PPM</td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td>2,500 PPM</td>
<td></td>
</tr>
<tr>
<td>Iodine</td>
<td>200 PPM</td>
<td>26 PPM</td>
</tr>
<tr>
<td>Manganese</td>
<td>4,000 PPM</td>
<td></td>
</tr>
<tr>
<td>Selenium</td>
<td>26 PPM</td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td>4,500 PPM</td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td>100,000 IU/LB</td>
<td></td>
</tr>
<tr>
<td>Vitamin E</td>
<td>110 IU/LB</td>
<td></td>
</tr>
</tbody>
</table>

**INGREDIENTS:**

- Calcium Carbonate
- Dicalcium Phosphate
- Monocalcium Phosphate
- Magnesium Oxide
- Potassium Chloride
- Manganese Sulfate
- Zinc Oxide
- Zinc Sulfate
- Ferric Sulfate
- Copper Sulfate
- Ethylenediamine
- Dihydricolide
- Cobalt Carbonate
- Processed Grain By-products
- Molasses Products
- Animal Fat
- Vitamin A Supplement
- Vitamin D Supplement
- Vitamin E Supplement
- Menadione Sodium Bisulfite Complex
- Natural and Artificial Colors Added
- Soybean Oil

**FEEDING DIRECTIONS:**

Feed to beef cows grazing mature forage at the rate of 2 to 4 oz per head per day. It may be necessary to limit mineral intake for the first 2 or 3 weeks. Allow 1 block for every 20 to 25 head of cattle. Place where cattle gather, such as near a water source. Although not required with Superior All-Weather Technology, feeding mineral in a covered feeder offers additional protection from the elements. Provide plenty of fresh, clean water at all times.
### II. Nutrient Requirements:

Ex. Table 6-2

<table>
<thead>
<tr>
<th></th>
<th>CP,%</th>
<th>NE&lt;sub&gt;g&lt;/sub&gt;*</th>
<th>Ca,%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Finishing steer</strong></td>
<td>10.1</td>
<td>1.41</td>
<td>0.41</td>
</tr>
<tr>
<td>(880 lb/ADG=3 lbs/day/FI=18 lbs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Growing heifer</strong></td>
<td>16.0</td>
<td>1.08</td>
<td>0.52</td>
</tr>
<tr>
<td>(220 lb/ADG=1.76 lbs/day/FI=6.6 lbs)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*NE<sub>g</sub> units: mcal/kg
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Nutrient Requirements of Beef Cattle, Dairy Cattle, Goats, and Sheep
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III. Feed Intake Factors:
1. Bulkiness
2. Moisture content
3. Palatability
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IV. Rations for Finishing Ruminant Animals:

Feeding tips –

1. Use complete diets
2. Ratio of concentrates to roughage
3. Mineral & Vitamin supplements & Additives
4. Avoid “Feedlot Diseases”
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V. Formulating Rations:

Blackboard demonstration –

Feedlot steer:
BW - 750 lb
Feed intake – 18 lbs
ADG – 3 lbs/day

Sorghum grain 50.3%
Corn silage 42.6%
Comm. Suppl. 7.1%
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Silage Making

Source: UK Agriculture
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VI. Feeding Beef & Dairy Heifers:

1. Colostrum (<24 hours)
2. Milk Replacer (>24 hours)
3. Calf Starter (day 4)
4. Grain/Quality Hay (<6 mos)
5. Roughage/Grain (6-12 mos)
6. Roughage (>12 mos)

Overfeeding of energy, “overnutrition” must be avoided (early fat deposition in the udder).
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VII. Feeding Dairy Cows: Factors –
1. Body weight
2. Milk production level
3. Butterfat composition
4. Stage of pregnancy
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VII. Feeding Dairy Cows: (cont.)

High quality roughage and palatability is the key –
• 2 to 3 lbs (dry matter) in roughage/100 lbs of BW

Roughage feeding guidelines:
1. No <1.5% in roughage (dry matter) of BW
2. No <17% CF diet
3. No <21% ADF
4. At least 1/3 of total ration consist of coarse roughage
5. Adequate calcium to prevent “milk fever”
Water Facts:

- Milk is 87% water
- It takes 4-5 gallons of water to produce 1 gallon of milk
- A dairy cow will drink ~30-40 gallons of water/day
- Importance of clean and cool water is emphasized
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- Dairy ration:
  - 1,320 lb BW
  - 66 lb milk yield
  - 3.5% butterfat
  - Early pregnant

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>DM, lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn silage</td>
<td>17.6</td>
</tr>
<tr>
<td>Alfalfa hay</td>
<td>11.0</td>
</tr>
<tr>
<td>Sorghum grain</td>
<td>11.0</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>4.0</td>
</tr>
<tr>
<td>Dicalcium phos.</td>
<td>.11</td>
</tr>
<tr>
<td>TMS</td>
<td>.003</td>
</tr>
</tbody>
</table>

43.71 lbs
Pregnancy: (only for last trimester)

Gradual introduction of grain:

1. Energy for fetus
2. Adaptation of rumen organisms*
3. Energy for lactation

*Bacteria, fungi, yeasts, protozoa, actinomyces, etc.

Actinomyces – A class of bacteria that are gram positive and anaerobic.
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