Intro to Meat Goat Nutrition

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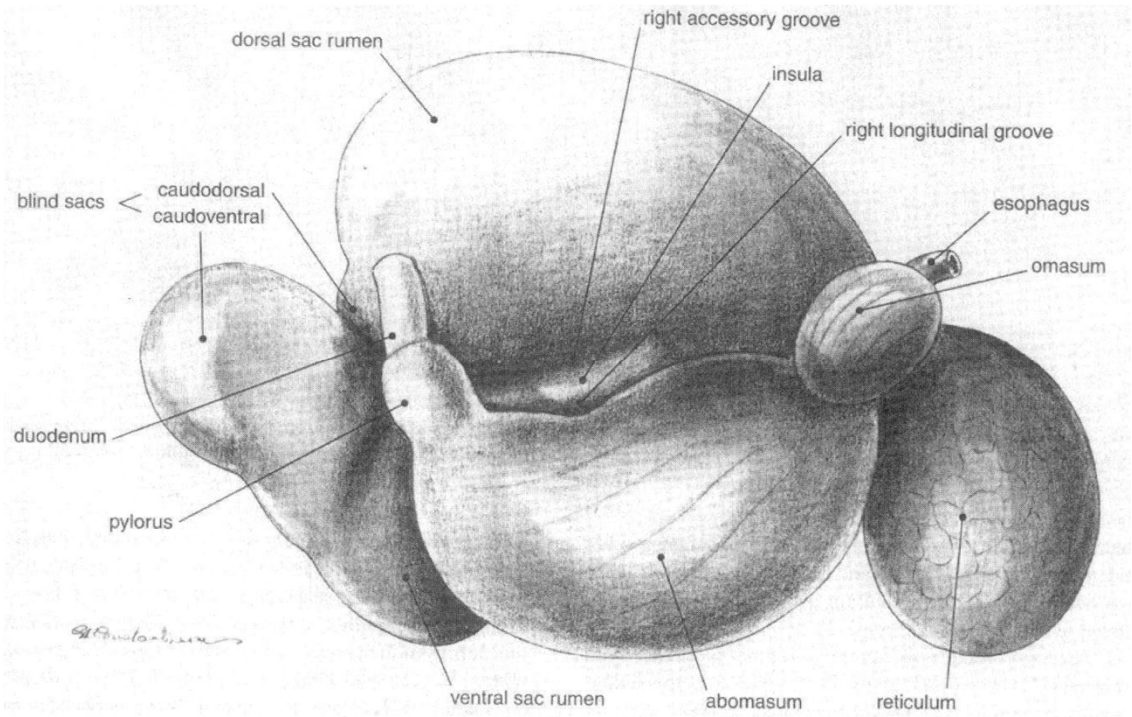
Overview

- The Ruminant Stomach
- Nutrients
- Sources of nutrients
- Nutrient requirements
- Practical feeding



The Ruminant Stomach

- **4 Compartments**
  - Reticulum
  - Rumen
  - Omasum
  - Abomasum (true stomach)
- **Microbial digestion**
  - Reticulo-rumen (the vat)
  - Absorption of some bacterial feed breakdown thru rumen wall
- **Large feed particle trap and H_2O absorption**
  - Omasum
- **Acidic digestion**
  - Abomasum
- **Enzymatic digestion/nutrient absorption**
  - Small intestine

Rumen Advantages

- Digestion of dietary fiber by bacteria
- Bacteria synthesize all B & K vitamins needed
- Also synthesize protein from nitrogen recycled in the body
- Detoxify anti-nutritional factors e.g. tannins
  - Browse utilization
- Newborns – first 3 compartments not developed
  - Allows absorption of colostrum antibodies & milk nutrients
  - Weaning dependent on development that is stimulated by fiber intake
- Unique to goats
  - Better ability to detoxify absorbed anti-nutritional factors
  - More resistant to bloat

Nutrients for Goats

- Water
- Roughage (fiber)
- Energy
- Protein
- Minerals
- Vitamins

Water

- The most essential nutrient
  - Intake (need) varies by . . .
    - Moisture in green feed
    - Lactation (2-3 gal) > Gestation > Maintenance (1/2 to 1 gal)
    - Late Gestation > Mid and early gestation
    - Triplets, twins > single
    - Milk type goats > meat type
    - Lactating goat: 1 quart for every pint
    - Summer > winter
- Keep it clean!

Roughage

- Should be primary source of feed intake
- Maintains healthy rumen function
- Less problems when goats are forage-fed
- Minimum amount of roughage is ½ lb. per 100 lbs. of body weight

Energy

- Needed in the most amount
- Usually the most limiting nutrient
- Excess is stored as fat
- Expressed as . . .
  - TDN – total digestible nutrients (%)
  - ME – metabolizable energy (mcal)
  - NE for maintenance, growth, lactation, and fiber production (mcal)
- Carbohydrates, fats, proteins

Sources of Energy

- **High**
  - Cereal grains (76-88%)
    Corn, barley, wheat, sorghum, rye, oats
  - By-product feeds (76-90%)
    Soy hulls, distiller's grains, corn gluten, wheat middlings
- **Moderate**
  - Corn silage (65-72%)
  - Haylage (50-60%)
  - Good quality pasture (60-70%)
  - Good quality hay (50-60%)
- **Low**
  - Low quality hay (40-50%)
  - Low quality pasture (< 50%)
  - Straw (40-48%)
  - By-products (<40%)
    cottonseed hulls, peanut hulls, oat hulls

Protein

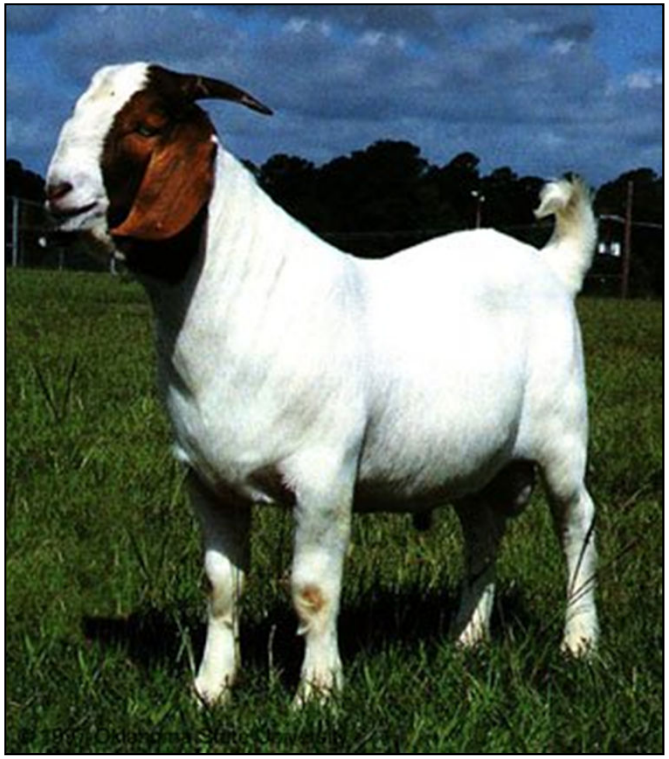
- Composed of amino acids
- Bypass or escape protein increases protein efficiency
- Quantity more important than quality
- Usually most expensive ingredient
- Excess protein is not stored in the body. It will be used inefficiently as energy
- Excess N is an environmental concern

Sources of Protein

- **Highest**
  - Protein meals (46-52%)
    Plant - soybean meal, cottonseed meal, peanut meal
  - Fish meal (66%)
  - Urea (NPN) (288%)
- **Moderate**
  - Alfalfa and other legume hays (13-28%)
- **Low**
  - Grass hay (10-12%)
  - Cereal grains (8-14%)
- **Lowest**
  - Poor quality hay (<10%)
  - Straw (3-5%)

Minerals

- Required in small quantities (grams)
  - Macro – salt, Ca, P, Mg, K, and S
  - Micro (trace) – Se, I, Cu, Fe, Mo, Cr, F, Zn, and Mn
- Balance of minerals is important
  - Example: Ca:P
- Many interactions
  - Example: Cu-Mo-S
- Sources:
  - Hay, pasture, grain
  - Mineral mixes, blocks, tubs



Sources of Calcium

High

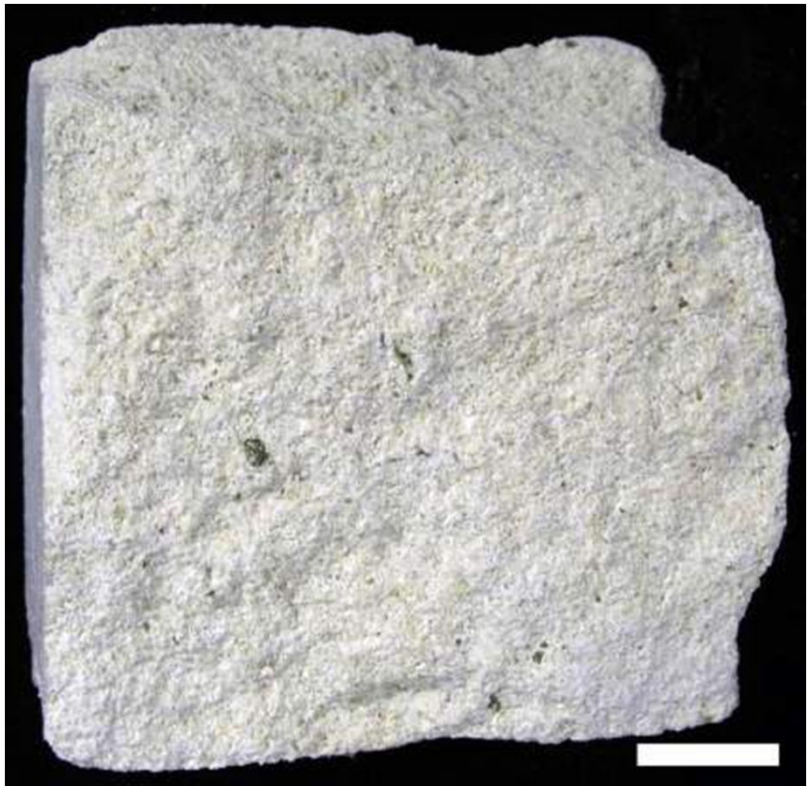
- Limestone (38%)
- Bonemeal (24%)
- Dicalcium phosphate (25%)

Moderate

- Alfalfa and other legume hays and pasture (1.2-1.7%)
- Soybean hulls (0.55%)
- Grass hay and pasture (0.3-0.6%)
- Protein meals (0.2-0.4%)

Poor

- Cereal grains (.02-.07%)



Vitamins

- Ruminants have a dietary requirement for Vitamin A, D, and E
- Vitamin K and B-vitamins are manufactured by the rumen
- No dietary requirement for Vitamin C or D
- Sources of vitamins
  - Natural sources
  - Vitamin packs
  - Mineral mixes, blocks, tubs

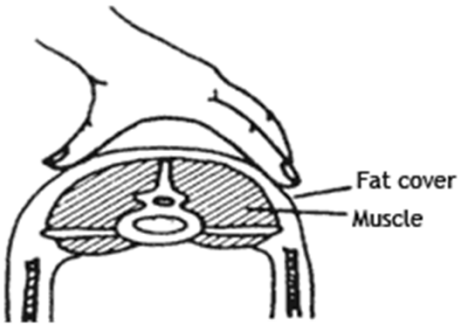
provided by Dr. An Peischel

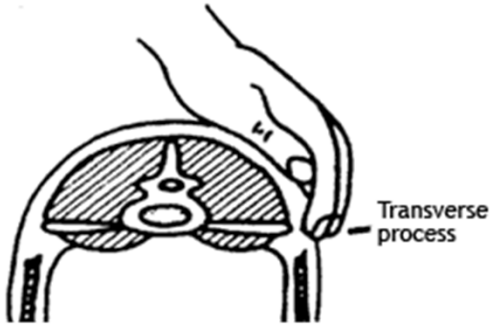
Nutrient Requirements Depend On …

- Size (weight)
- Age
- Stage and level of production
- Climate and environment
- Body condition

Body Condition Scoring (BCS)

- Used to evaluate the feeding program and the need for changes.
- Body condition is a better indicator of nutritional health than weight.
- The most important times to body condition score are breeding, late gestation, and weaning.
- Body condition scoring estimates fat and muscle on a scale of 1 to 5. Half scores are commonly used.
- 1 BCS equals 13% of the live weight of a female in moderate condition (3-3.5).
- Exact score is not important as the relative scores and the differences between scores.





Body Condition Scoring

BCS1

BCS2

BCS3

BCS4

BCS1

Body Condition Scoring

BCS1

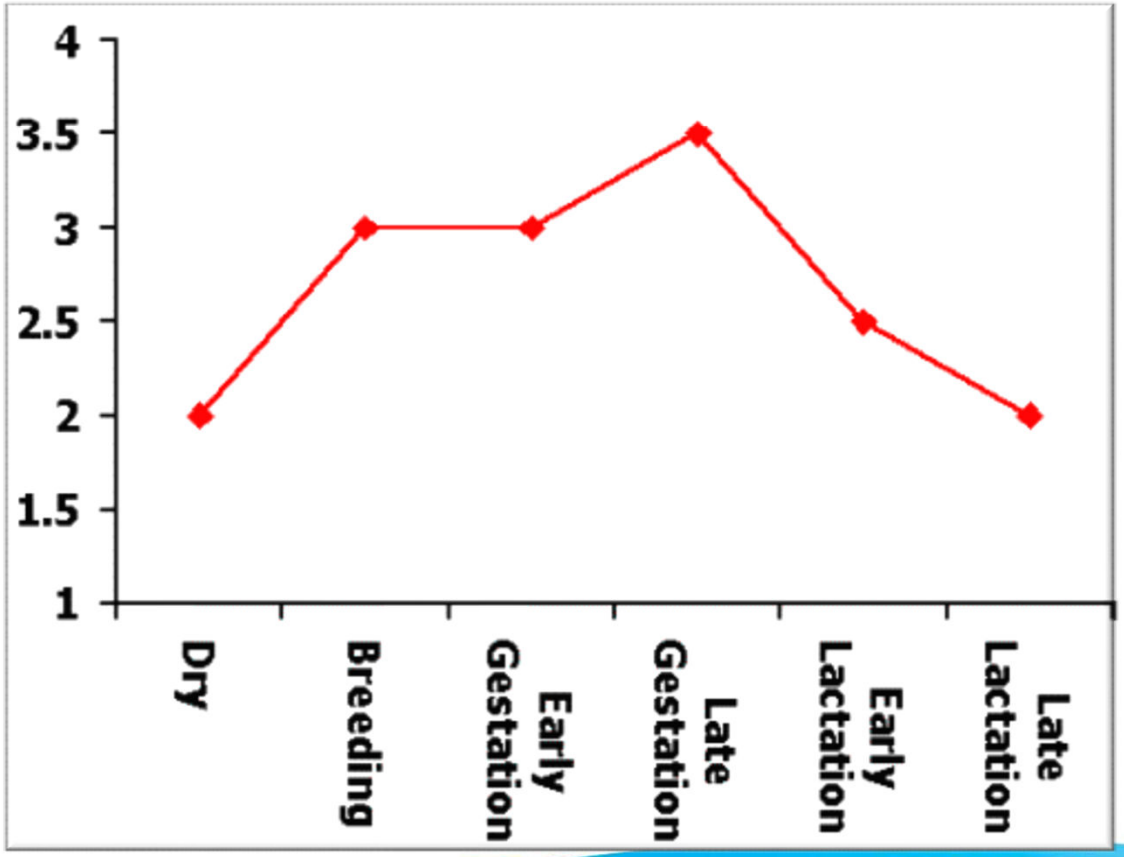
BCS3

BCS4

BCS2

BCS1

Stage & Body Condition Score



General Feeding

- Pasture and browse should provide majority of nutrients to goats
- Supplement pasture as needed
  - Free choice minerals
  - Late pregnancy
  - Early lactation
  - To increase growth rates
  - Flush does in poor body condition
  - Poor quality pasture
  - Drought
- Adequate feeder space

Trough Space

Type	Concentrate	Restricted Roughage	Ad Libitum Roughage
Adult goat > 132 lbs.	20 inches	10 inches	6 inches
Growing kid < 77 lbs.	16	8	6
Weaned kid < 44 lbs.	12	6	4

Practical Feeding

- Feed manufactured feeds
- Balance a ration
  - By hand (math)
    - Simultaneous equations (Algebra)
  - Use computer program
    http://www.sheepandgoat.com/software.html#ration
  - Use spreadsheet
    http://www.sheepandgoat.com/spreadsheets/RationEvaluator2004.xls
  - Web-based ration balancing
    http://www.luresext.edu/goats/research/nutr_calc.htm
- Feed by “rules of thumb”

Manufactured Feeds

- Blends of ingredients that are formulated to supply all (complete) or defined portions (supplement) of the requirements of targeted animal).
  - Complete feeds
  - Protein supplements or balancers
  - Mineral mixes, blocks, tubs
  - Use properly!

More expensive, but convenient and properly balanced.

Steps To Balancing A Ration

- Know nutrient requirements of animals (NRC tables)
- Know nutrient composition of feeds (test feed or use “book” values)
- Determine how much forage or hay you need to feed to meet the energy requirements
- Make sure the animal can consume the amount of forage or hay that you calculate she needs by looking up dry matter intake in NRC table
- Calculate how much protein, Ca, and P the hay is providing.
- Add supplement(s) to hay or pasture ration to provide the protein, Ca, and P that the hay lacks

"Rules Of Thumb"

Forage

- Feed 3 to 4 lbs. of grass hay (or pasture) during early and mid gestation.
- Feed 4 to 5 lbs. of average quality hay (or pasture) during late gestation.
- During late gestation, you may need to supplement Ca if feeding a grass hay (don't depend on free choice minerals).
- Save alfalfa hay for lactation when the female's nutritional needs are the highest.
- Feed poor quality hay prior to and after weaning.

Bigger amounts for big females and smaller amounts for smaller females.

Thumb Rules

Concentrate/grain

- No grain during early and mid pregnancy.
- Feed ½ to 1 lb. of grain per day to females during late gestation.
- Start with a ¼ lb. of grain and gradually increase amount of grain in diet.
- May need to feed more if you expect a birthing percentage greater than 200%.
- Grain can substitute for some of the hay in the ration, but be CAREFUL.

Thumb Rules

After parturition

- Plenty of water. Warm water in winter.
- Forage for the first few days.
- Take about a week to get the ewe/doe on full feed.

Thumb Rules

Lactation

- Feed 4 to 5 lbs. of your best quality hay + 1 lb. of grain for each offspring the female is nursing.
- Separate females into production groups: singles, twins, and triplets.
- If feeding alfalfa hay or another legume, the grain can be whole corn or barley.
- If feeding grass hay, you will need to supplement protein and calcium in the grain ration.

Additional Tips for Feeding

- Weigh feed
- Don’t rely on free choice minerals.
- Include Rumensin® or Deccox® in ration to prevent coccidiosis. **They are toxic to equines**
- Feed whole grains
- Split feedings if you’re feeding a lot of grain
- Separate animals into groups according to their nutritional needs
- Feed and manage doelings separate from mature females.
- Aim for moderate body condition scores.