NUTRITION
Ruminant

- Rumen
- Reticulum
- Omasum
- Abomasum

Ruminant not developed for 1.5 - 2 mos.
NUTRITION

- Principle function is to digest and absorb nutrients from the diet
- Rumen and Reticulum are capable of microbial fermentation
- Can use dietary protein as well as NPN
  + Uses nitrogen and ammonia as the source for amino acids
NUTRITION

- Climate
- Age
- Exercise
- Body condition
- Reproduction
- Flushing
- Replacement ewes
- Gestation
- Lactation
- Lamb BW
CLASSES OF NUTRIENTS

- Water
- Protein
- Energy - Carbohydrates (CHO)
- Fat
- Minerals
- Vitamins
WATER

- Single most important nutrient
- No water, no feed intake
- Factors affecting water intake
- Feed intake, nitrogen intake, mineral intake and environmental temperature
- Rise in water requirements above 70 F
- Urinary Calculi
- Water - 1 gal./day for mature sheep
  - 1/2 gal./day for lambs
PROTEIN

- Protein through good pasture and legumes

- Regardless of type, amount is most important
  + lbs vs %

- Supplements: SBM, CSM, Linseed meal, peanut meal, sunflower meal (35-45 % CP)

- Legumes are an excellent source of protein for sheep
ENERGY

- Energy through grain and roughages
- Net energy or TDN
- Grain and Protein suppl. = 70-80 % TDN
- Hay = 40-55 % TDN
- Feed for energy first
- Energy is especially important in late pregnancy
MINERALS

Ca and P

- Balance is more important than amount
  - Ratio should be at least 2:1, 2 parts Ca : 1 part P
- Most forages are adequate for Ca and P
- Legumes are excellent sources for Ca
- Mature forages are low in P
- Therefore, consideration of P is needed, esp. for gestating and lactating ewes
- .29% P is needed for lactating ewes
- Sources: bonemeal, defluourinated rock phosphate, dical, Na tripoly PO4
**MINERALS**

**Salt, NaCl** - Sheep can tolerate 1.0 to 1.3 % salt, but cannot tolerate over 1.5 % for very long
  + Intake of grain may be limited by adding 10-25% salt

**Copper (Cu)** essential for life, required for normal iron metabolism, synthesis of elastin and collagen, melanin production and integrity of the central nervous system, wool production, effective immune response.
  + Sheep require about 5 ppm; 25 ppm toxic
**MINERALS**

**Magnesium**— necessary for the metabolism of Calcium and Phosphorous, bone formation

**Manganese (Mn)** required for skeletal development and reproductive efficiency

**Molybdenum (Mo)**
- Forms an insoluble complex with Cu to prevent copper absorption
  - If molybdenum levels are low (less than 1 ppm), sheep are more susceptible to Cu toxicity. If Mo intakes exceed 10 ppm, Cu deficiency may occur on diets that would normally be adequate.
**MINERALS**

**Cobalt (Co)**

- Essential to the synthesis of vitamin B-12. In sheep and goats, 0.1 ppm is considered adequate.
- Increases bacterial fiber digestion.
- Cobalt should be ingested daily. Added to the salt at a level of 5.45 g/100 lb of salt, fed free-choice.
- Deficiency signs include loss of appetite, emaciation, weakness, anemia, and decreased production.
**MINERALS**

**Iodine (I)**

- Necessary for the formation of thyroxine, a hormone of the thyroid gland
- Deficiency
  - enlargement of the thyroid gland (goiter)
  - kids may be born weak or dead.
- Deficiencies are readily corrected by feeding iodized salt
Iron (Fe)

- Component of blood hemoglobin that is required for oxygen transport.
- Required for some enzyme systems
- Deficiencies seldom occur in mature grazing animals, but may in young goat kids because of their minimal body stores of iron at birth
- If an iron deficiency is observed in young kids on a milk diet, injection of iron-dextran (150 mg) at 2 to 3 weeks intervals. Ferrous sulfate and ferric citrate are recommended for incorporations in rations at a level of 45 ppm
MINERALS

Potassium
Required for maintenance of cell fluid volume, pH and osmotic relationships within the cell, vital to muscle contraction

Selenium (Se)
- Essential, but only in minute amounts
- Necessary for Vitamin E utilization
- Sheep and goats, are susceptible to selenium toxicity. Selenium toxicity occurs from prolonged consumption of plants containing over 3 ppm selenium
Zinc (Zn)

Essential for protein synthesis for skeletal growth and development, immunity, antibody titers, inflammatory response and protein synthesis to support hoof wall growth and repair

Must be supplied continuously because little is stored in the body in readily available form

Minimum ration requirements of 10 ppm. Levels of 1,000 ppm may be toxic.

Deficiency symptoms include reduced feed intake, weight loss, stiffness of joints, excessive salivation, swelling of the feet and horny overgrowth, small testicles, and low libido
VITAMINS

- Vitamins are needed in small amounts. Small ruminants require vitamins A, D and E, whereas vitamin K and all the B vitamins are manufactured in the rumen.

- **Vitamin A** - eyesight, fertility, fight infections, keeps skin surface and internal organs healthy

- **Vitamin D** – Sunshine Vitamin, bone growth and health, Absorption of Ca

- **Vitamin E** (fat soluble) – antioxidant, metabolic regulator, utilization dependent upon adequate Se

- **Vitamin K** - blood to clot

- **Thiamine**—(B1) coenzyme in energy metabolism, appetite, growth, important in the prevention of polioencephalomalacia

- **B12** - Essential in protein metabolism
**OTHER FEED ADDITIVES**

- **Yeast** – Enhances digestive efficiency, feed intake, mineral availability and overall rumen health

- **Kelp** - source of long chain n-3 Fatty Acids, Tannins (natural anthelminetic)

- **Ammonium Chloride**– Urinary Acidifier
OTHER FEED ADDITIVES

- **Direct-Fed Microbials (DFM) – Probiotics** - imperative for efficient utilization of nutrients and the production of vitamins and organic acids

- **Sodium Bicarbonate (Rumen Buffer)** help resist changes in the acidity of the digestive tract

- **Coccidiostats and antibiotics**
NUTRIENT DEFICIENCIES

- Slow growth
- Loss of weight
- Reproductive failure
- Decreased milk production
- Increased mortality
- Reduced resistance to parasites and diseases
Problems
- urinary calculi - mineral deposits
- poisonous plants
- preg. disease - undernourishment in late preg.
- expelled vagina or rectal prolapse
Grasses- mature vs young plants
  + Mature is lower in protein and TDN
  + Mature - Lignin and cellulose increases

Browse- a broad leaf woody plant, a shrub, a bush or a tree of small stature. Protein only decreases slightly with maturity

Forbs- broad leaf herbaceous plants (weeds). They are between grasses and browse in most respects
FEEDING MILK REPLACER

- Lambs that are orphans due to death of the ewe or udder disfunction, etc.
- Case of triplets
- Symptoms of progressive weakness during the first week
- Bummer or orphan lambs that are stealing milk from other ewes than their mother
- Make sure they had colostrum – 6-8 OZ. min.
The decision to switch the lambs from the ewe to the milk replacer should be the sooner the better.

- Place in a warm dry enclosed area.
- Lambs should not be able to see or hear their mother.
- Do not place with other lambs if possible.
- Inject Iron, Vit. A, D, E and Se.
- Make sure the milk replacer contains antibiotic.
MILK REPLACERS

- 25-30 % fat, 20-25 % protein, and 30-35 % lactose
- Should be diluted with water to a minimum of 17-20 % Dry Matter (usually 1.75 - 2.0 lb milk replacer per gallon of water)
- Mix powder in warm water and cool to 33 F
- Warm milk may be needed to start at first, but move to feeding cold milk
- In a self feeding system, each will consume ~ 2-4 pt
MILK REPLACERS

- Utensils must be kept clean
- Provide plenty of fresh water
- Creep feeding dry or solid food can start at about 3 weeks of age, but 4 weeks is better
- Double check the cost vs weight offset
CREEP FEEDING

- Used when weaning at less than 60 days
- When twins are born late in the lambing season
- May be beneficial in times of drought or marketed as slaughter rather than feeders
- Start should be started about 10 after birth
- If not 0.5 lb intake per day from day 20 to weaning, it will probably be beneficial
- Rations do not have to be complex
Wool growth is affected by age, temperature change, lactation, parturition, hormone implantation.

Most limiting nutritional factor in range sheep production is insufficient amount of energy.

Rations below 80% of NRC protein levels will affect wool production.