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**Browsing Academy**

# **NUTRITION OVERVIEW: FACTORS AFFECTING NUTRITIONAL REQUIREMENTS**

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## **Nutritional Requirements**

The factors affecting nutritional balance vary widely and affect the efficiency of nutrient utilization.

- Environment (climate, rainfall distribution and amount, temperature)
- Breed of goat
- Age and Sex of goats
- Body weight and Body condition of goat
- Physiological status – maintenance, growth, lactation, gestation, breeding
- Quality and Quantity of diet on offer (vegetation type, digestibility, supplement)
- Activity and Exercise (topography, altitude, distance)

## **Energy Physiological Priorities**

Energy has the number one effect on successful reproduction. Body condition scoring is a valuable tool when used before breeding, before kidding and at weaning.

- Basal metabolism – maintain all of the normal body functions
- Activity
- Growth
- Energy reserves (muscle fiber growth and fetal growth)
- Pregnancy
- Lactation
- Energy reserves (milk fat)
- Estrus cycle – initiation of pregnancy (hormonal synchronization and ovulation)
- Excess energy reserves (deposition of internal body fat)
- Deficiency symptoms include decreased production, loss of body weight, stillborns, poor milk production, and low fertility

### **Body Condition Score (BSC)**

Thin	1 – extremely poor, severely emaciated, weak
	2 – extremely thin, poor
	3 – very thin, frame visible, wasting
Moderate	4 – slightly thin, some ribs visible
	5 – moderate, spinous processes smooth, frame covered
	6 – good body cover with smooth, round spinous processes
Fat	7 – frame not visible, fleshy
	8 – obese, ribs cannot be felt
	9 – extremely obese, severely overconditioned

### **Protein Physiological Priorities**

Protein is a component of all animal tissue with the highest concentration in muscle tissue, organs, brain, etc.

- support body maintenance and colonization of rumen micro-organisms
- requirements are highest during the growth phase
- requirements increase during gestation and lactation
- biological functions: enzyme and hormone reactions
  - oxygen transport and vision
  - muscle contractions
  - antibodies (colostrum, placental fluids)

Deficiencies can affect productivity, fertility, birth of underweight kids with poor livability and poor milk production.

### **Nutrition Management and Production**

- Age, weight, body condition score and breed of the doe
- Weather and climatic conditions
- Specific geographic area nutrient deficiencies (soils, plants)
- Physiological stage of production of the goat
- Stress, Stress, Stress

There are four ‘stages’ of production. The availability, palpability, digestibility, metabolism and absorption of balanced nutrients affects reproductive success; birth weight, birth numbers, milkability, weaning weight and rebreeding.

### **Post kidding**

- high energy (milkfat) and protein (colostrum) requirements
- doe is lactating (calcium, phosphorus)
- uterine involution (hormonal re-balancing)
- estrus cycle to commence for re-breeding

### **Lactating and Pregnant**

- moderate to high energy and protein requirements
- growth of the young doelings to genetic potential
- weight gain of young kids

### **Mid-gestation**

- weaning of kids and drying-off doe
- fetal development slowly progressing

### **Last trimester of pregnancy**

- 80% of fetal growth takes place
- doe gaining weight or lower birthweight of kids results
- decreased milk production, decreased kid health, vigor and disease resistance
- stressful time, abortion possible
- higher death loss of kids at weaning due to inefficient immune system development

Stage Two will be affected by your breeding program schedule depending on breeding

- twice a year
- three times in two years
- annually

### **Nutrition Management Tips**

- Shorten the kidding season
  - easier feeding and management plan
  - more uniform kids with higher marketability
  - less light weight kids
- Feed bred doelings separate
  - require higher protein levels
  - feed to gain body weight – at least 75% of mature body weight should be gained by breeding time
  - increase in kid health
  - breed as yearlings – heat cycle will be stronger and increased number twinning
- Feed doelings separate after kidding
  - enhancement of genetic potential
  - cycle and re-breed sooner (with the main doe mob)
  - replacement of calcium and phosphorus levels within the body (bone)
- Gestating does
  - supplement with higher protein and higher energy (can feed roughages but analyze for nutrient composition)

- Other
  - Artificial insemination
  - Ultrasound
  - EPD – estimated progeny differences
  - Embryo transfer

## Mineral Nutrition

*Six major or 'macro' inorganic mineral elements* necessary in goat nutrition.

- **Calcium (Ca)** – growth and milk production, maintain pregnancy, increases
  - vitamin D3 absorption, maintains blood pressure and has a secondary effect on hormones
  - needs to be in a 2.5 to 1 calcium: phosphorus ratio
- **Phosphorus (P)** – pre- and post- partum growth, conception rate, feed consumption and milk protein
  - monosodium phosphate is 65% absorbable
- **Magnesium (Mg), Potassium (K), and Sodium (Na)**
  - availability is very important – Mg (20% absorbable), K (90% absorbable) and Na (80% absorbable)
  - with high K levels, there is a reduction in the Mg absorbed
  - needs to be a 4 to 1 sodium:potassium ratio
- **Sulfur (S)** – necessary for protein metabolism (especially when using urea)
  - plants with high tannin levels have low sulfur levels
  - needs to be a 1 to 10 sulfur:nitrogen ratio

*Eight trace or 'micro' inorganic mineral elements* necessary in goat nutrition.

- **Iron (Fe)** - green feed, animal origin feeds
  - vital for blood oxygen carrying capacity
  - copper deficiency decreases iron utilization
- **Copper (Cu)** - reacts with Mo, Ca, S and Fe
- **Iodine (I)** - deficiency causes goiter and delays fetal development and production of lung surfactant
- **Manganese (Mn)** - skeletal growth, enzyme co-factor
- **Zinc (Zn)** - vitamin A interaction, enhances the immune system
  - need a 4 to 1 zinc:iron ratio

- **Selenium (Se)** - protects tissues against oxidative damage
  - high sulfur levels, cause a decrease in selenium availability
  - copper reduces selenium availability
  - deficiency can result in premature births, dead kids at parturition, retained placenta and rapid weight loss
  
- **Cobalt (Co)** - synthesized to true vitamin B12 therefore high utilization of propionic acid (energy)
  - granite rock soils are low in cobalt and side effects can be runny eyes and anemia
  
- **Molybdenum (Mo)** - reduction of iron ( $Fe^{3+}$  to  $Fe^{2+}$  to Fe)

### **Vitamin Nutrition**

- Vitamin D – bone mineralization, active transport of calcium and phosphorus
  
- Vitamin A – vision and epithelial cell growth
  - deficiency can cause weak kids and abortions
  
- Vitamin E – important during gestation and lactation
  - deficiency sign is reproductive failure and testicular atrophy