

Nutritional Effects on *GOAT HEALTH*



By

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INTRODUCTION

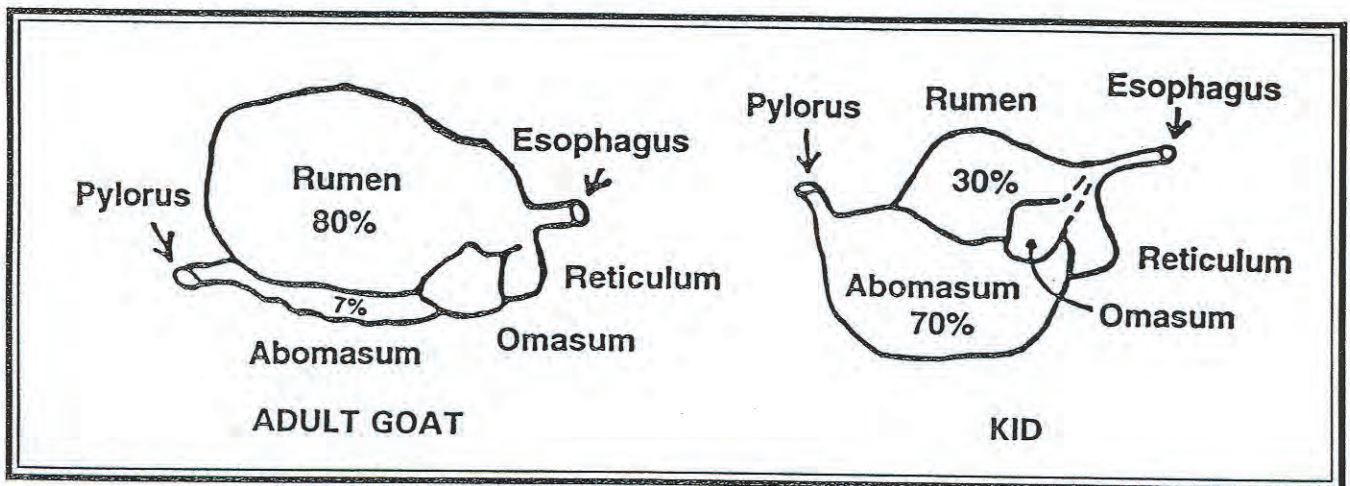
Goats are hardy, resourceful ruminant animals that live and produce for several years when adequately fed. Being ruminants, they convert forages, forbs (weeds) and browse into meat, milk and fiber. Either by artificial or natural selection, certain genotypes produce more effectively in one environment than in others. The environment of temperature and rainfall is not provided by man. Management, however, is. Utilizing feedstuffs that are readily available and providing nutrition for goats that is the least costly is how money is made in a goat operation.

The nutritional requirements of goats have been

determined for each stage of production. Providing these nutrients on a constant basis allows for the optimization of the genetic response in breeds and crossbreeds of goats, especially meat and milk producing breeds.

We must keep in mind that in a ruminant, we are feeding the microbes in the rumen. Also, we need to remember that the newborn kid functions as a single stomached animal (like humans and pigs). The rumen is sterile at birth and gradually as the kid begins to eat hay, grain or grass, the rumen expands and becomes functional. The rumen is usually fully functional between 6 and 10 weeks of age (Figure 1).

FIGURE 1



FEED NUTRIENTS

Energy

Nonmilking and milking goats can often meet their energy needs by grazing if the nutrient composition of the forage is high for example, legumes. Sources of energy are grass, alfalfa, and (starch and cellulose) grains. Lactating (milking) does with the genetic capability for giving large quantities of milk require supplemental nutrients. Inadequate diets of lactating ewes will lead to weight loss, infertility and reduced production.

Protein

High quality protein feeds such as soybean meal or by-pass protein such as blood meal and fish meal are needed in the diet of high producing goats. High quality legume hay which contains 16 to 20 percent crude protein is usually sufficient.

Other nutrients required are calcium, phosphorus, magnesium, selenium, and vitamins A, D and E. In a ruminant animal, the microorganisms synthesize B and K vitamins.

In the kid, vitamins B and K must be provided as they begin life with a nonfunctional rumen.

Fat

A level of 1.5 - 2.5 percent fat in a grain mixture is normal.

Feed Additives

Goat owners should avoid feed additives that make extravagant claims. There is no research to show that goats require any miracle feed supplement or "organic" health feeds. These additives can be expensive and offer no advantage over other supplements. They often cost so much that the profit goes out of the enterprise.

Some grain mixtures for growing kids are shown in Table 1.

Some of the problems that result from insufficient nutrient compositions of feed or grazing are the following:

Table 2.

Sample mixtures for milking does and bucks are shown in Table 2.

Table 1. SAMPLE GRAIN MIXTURES FOR GROWING KIDS

Ingredients	1	2	3	4
	Level of Protein in finished mix			
	14%	16%	18%	20%
	Pounds			
Rolled Corn	900	800	720	656
Crimped Oats	421	300	240	200
Beet/Citrus Pulp	200	200	200	200
Dried Brewer's Grain	---	150	200	200
40% Protein Supplement	300	---	516	---
Soybean Meal	---	356	---	600
Molasses	150	150	100	100
Trace Mineralized Salt	10	20	10	20
Dicalcium Phosphate	---	10	10	20
Monosodium Phosphate	15	10	---	---
Magnesium Oxide	4	4	4	4
Ton	2,000	2,000	2,000	2,000

Table 2. SAMPLE MIXTURES

1. 13.5% of crude protein (to be used with good quality hay).	
Crushed oats	75 pounds
Cracked corn	75 pounds
Wheat bran	25 pounds
Soybean oil meal	25 pounds
Salt	2 pounds
2. 16.0% of crude protein (to be used with fair-to-poor hay).	
Crushed oats	65 pounds
Cracked corn	65 pounds
Wheat bran	20 pounds
Soybean oil meal	50 pounds
Salt	2 pounds

The second formula is more suitable for high producing kids and does and instances where only fair quality grass or mixed-legume grass hays are available; otherwise the first formula is satisfactory and usually less expensive.

ACIDOSIS (grain overload)

Cause

- a. Excessive ingestion of grain or moderate amounts by animals not accustomed to grain or by hungry animals.
- b. Grain fermentation results in abnormally high levels of D-lactic acid and lactate.
- c. The rumen pH falls to 4.0 to 4.5

Signs

- a. Occur 6-12 hours after grain ingestion
- b. Associated with indigestion and dehydration.
- c. Off-feed, irritability, dullness.
- d. Distended, paralyzed rumen.
- e. Profuse diarrhea, dehydration, sunken eyes.
- f. Incoordination, collapse, coma, death.
- g. Recovered animals often results in founder.

Treatment

- a. Empty rumen, either with stomach tube or surgery.
- b. Mineral oil and antacids.
- c. Electrolytes and buffers to correct dehydration and acidosis.
- d. Fluid treatment may need to be supplemented and antibiotics, antihistamines, steroids, and calcium borogluconate, depending on severity of clinical signs.

Prevention

- a. Remove the offending cause: properly managed feedbunks are best prevention.
- b. Do not offer free-choice grain to unaccustomed, hungry or starving goats.
- c. Ionophers (e.g.: Bovatec) in concentrate, at recommended level, are useful.

BLOAT

Cause

- a. Interaction of several factors in rumen:
 - reduction of gas elimination
 - increased gas production from fermentation
- b. Associated with:
 - lush, rapidly growing legumes
 - changes in diet composition
- c. May follow oral antibacterial treatment. Impaired gas elimination from solid objects lodged in esophagus or esophageal groove.

Signs

- a. Distention of rumen (LEFT side of animal)
- b. Often is moderate, with no great consequences.

c. If progressive:

- respiratory distress
- profuse salivation
- bluish mucous membranes
- prostration...death from asphyxiation

Treatment

- a. Remove offending cause; usually feed
- b. Relieve ruminal pressure:
 - stomach tube
 - trocharization of LEFT paralumbar fossa (a "last" resort)
 - Defoaming agents: vegetable oils are usually as effective as more expensive commercial preparation
 - May use surfactants (e.g.: Poloxalene, Therabloat, etc.)

Prevention

- a. Knowledge of circumstances leading to bloat and avoidance of source.
- b. Pasture management, especially legume pastures.
- c. Poloxalene blocks: relative value, although quite useful when flocks are first turned into pasture.
- d. Bovatec (lasolacid) in concentrate, at recommended level, is useful.
- e. Increase salt intake to increase water consumption.

CALCIUM DEFICIENCY IN PREGNANT DOES

Cause

- a. Lack of free access to mineral supplement containing calcium.
- b. Winter grazing of forages low in Ca.
 - prolonged residue grazing during open winter.
- c. Feeding forages low in Ca (straws, corn, silage...)

Signs

- a. Affected does are lethargic and recumbent with no previous signs of other illness.
- b. Depression, inappetence, muscle tremors and weakness late in gestation.
- c. Serum calcium level less than half its normal value.
- d. Signs mimic "Pregnancy Disease".

Treatment

- a. Results are "dramatic", as in Milk Fever of dairy cows.

- b. 200 ml of calcium gluconate, I.V.s, **slowly**, (results occur in 15-30 min.)
- c. Untreated does usually die in 12-18 hours.

Prevention

- a. Free-choice limestone, mixed with 1/3 salt.
- b. Specially needed if feeding forages low in Ca or if does are grazing "residues" during open winters.

GOITER

Cause

- a. "Simple" goiter (known also as "colloid" goiter) of newborn kids is due to iodine deficiency in the pregnant doe's diet. Often, salt is sold without iodine included. Iodine should be added to the mineral mix of goats.

Signs

- a. Defined, symmetrical enlargement of the thyroid gland.
- b. The thyroid gland is located in the ventral part of the "throat latch" in the upper part of the trachea (wind-pipe).
- c. Affected does have a swollen throat, kids are often born with little or no hair, act weak and often succumb to starvation.

Treatment

- a. Does not improve chances of survival.

Prevention

- a. Stabilized iodized salt in diet of gestating does.
- b. Salt mix should contain at least 0.007% available iodine.

POLIO (Polioencephalomalacia)

Cause

- a. Usually a digestive upset which:
 - impairs thiamine (vitamin B₁) production, or
 - hampers thiamine absorption.
 - results in thiamine destruction before its absorption
- b. Thiamine is indispensable for the vital functioning of the brain...if thiamine is unavailable or its required level is decreased, the **brain cortex degenerates**.

Signs

- a. Clinical signs are the result of brain degeneration:
 - incoordination
 - depression
 - prostration

- arrested ruminal movement
- blindness
- b. Fever is usually absent.
- c. May at times be easily confused with enterotoxemia.

Treatment

- a. Thiamine (B₁) is the specific treatment.
- b. Affected goats should receive (preferably intravenously) 1 ½ gm to 2 gm thiamine, depending on size and severity of condition.
- c. Treatment should be repeated every 6 hours for at least 24 hours.
- d. Thiamine may be provided alone or in a B-complex preparation.
- e. Recovery is not always complete. Animals severely affected for more than 24 hours cannot be expected to respond adequately to treatment.
- f. Do not administer dextrose IV's to affected animals, because their carbohydrate metabolism is impaired.

Prevention

- a. Slowly increase dietary carbohydrates (concentrate) intake, especially for feedlot kids.
- b. May consider supplemental dietary thiamine: 100-200 mg/head/day for 7-10 days, during periods of high risk.

PREGNANCY DISEASE (Ketosis)

Cause

- a. "A disease of men, the symptoms of which are seen in goats."
- b. Inadequate carbohydrate (concentrate, energy) intake during late pregnancy.
- c. Common in both older does with poor teeth and doelings carrying twins.
- d. Overfat does carrying twins or triplets appear more susceptible than does in poor condition or those with single kids.
- e. Stress, storms, transport, fasting, excessive heat, etc., aggravate the adverse effects of poor nutrition.
- f. Basically, pregnancy disease results from hypoglycemia leading to ketosis, liver degeneration and decreased liver glycogen.

Signs

- a. Affected does exhibit signs of impaired nervous function:
 - listlessness

- lack of appetite
 - aimless walking
 - leaning against objects
 - twitching of ears, eyes, tail, etc.
 - grinding of teeth
 - blindness
 - progressive loss of reflexes
 - paralysis: laying on chest
 - coma...death
- b. The usual course of the disease lasts from 2 to 5 days.
- c. Mortality rate may be as high as 80% regardless of treatment.

Treatment

- a. Seldom effective. May try the following:
- b. Glucose-producing substances, such as
- glycerol, or
 - propylene glycol
- c. Intravenous dextrose.
- d. Removal of kids by C-section usually increases survival rates. May need to abort kids to save doe.
- e. **Should also administer glucocorticoids.**
- f. Vitamin B₁₂ to increase appetite.
- g. Good nursing, such as plenty of water and stomach tube administration of finely ground quality hay.
- h. Insulin is **contraindicated**. Glucose treatment may be used only in conjunction with glycerol or propylene glycol.

Prevention

- a. Prevention of pregnancy disease can be achieved only through adequate nutrition of the breeding herd.
- b. Prevent obesity in early pregnancy.
- c. Adequate energy intake is paramount, especially during the last 6-8 weeks of gestation.
- d. Avoidance of stress is also necessary.

PROLAPSES

Cause

- a. Rectal prolapse is seen mainly in creep fed or feedlot kids especially meat breeds such as the Boer. The role of coughing and heredity cannot be overlooked. Estrogenic substances may trigger the problem, although cough, parasites and loose stools are usually complicating factors.
- b. Vaginal prolapse is primarily observed among fat pregnant does and those eating large quantities of

roughage. Susceptibility is influenced by heredity. Common among doelings.

Treatment and Control

- a. Treatment of prolapses vary from repositioning to amputation. Suturing or retainers may be used.
- b. For all practical purposes, the prevention of these problems requires:
- adequate management of diet, both quantity and quality.
 - consistent culling of individuals affected either rectal or vaginal prolapses. The odds are that a young doeling with rectal prolapse will have a prolapsed vagina come kidding time.
- c. Suturing of rectal prolapse is only a temporary solution. Permanent correction requires amputation (may use "rectal" rings).

RICKETS

Cause

- a. A disease of young kids associated with:
- inadequate calcium or phosphorus, or vitamin D intake
 - any disruption of the Ca:P balance
- b. Calcium, phosphorus and vitamin D are required for:
- bone formation, and
 - bone growth

Signs

- a. Lameness associated with enlargement of the ends of fast growing bones.
- b. Deformities of long bones which bear the body weight.
- c. Weak, demineralized bones which may break easily. Sometimes lambs act as if paralyzed because of the severe pain associated with fractures. The head of the femur (by the hip socket) is a common site of fractures, as well as the ribs.

Treatment

- a. Effective treatment requires:
- accurate diagnosis
 - careful evaluation of the diet and correction of diet deficiencies or imbalances. Vitamin D without calcium or phosphorus will make the problem worse and vice versa.

Prevention

- a. Adequate nutrition of gestating does and doelings.
- b. If in doubt, have the ration analyzed, balanced and properly supplemented with calcium.
- c. Sunlight is the cheapest source of vitamin D.

SWEET CLOVER POISONING (Bleeding disease)

Cause

- a. Sweet clover contains coumarin, a substance of no consequence per se.
- b. Under the right conditions, such as spoilage, "heating", moldiness, etc. -- the coumarin present in either sweet clover hay or silage is converted into **DICOUMAROL**.
- c. Dicoumarol is an anticoagulant, no different than D-con or Warfarin. Dicoumarol disrupts the normal clotting mechanisms of blood in goats ingesting contaminated sweet clover forage.
- d. Dicoumarol has a "cumulative" effect: the longer goats ingest dicoumarol, even very small amounts, the greater the chances for poisoning to occur.

Signs

- a. Some goats are just found dead, victims of extensive internal hemorrhages.
- b. Others may have subcutaneous hematomas (large blood blisters), may bleed through their noses, be anemic, and eventually die from excessive bleeding.
- c. Many animals will appear stiff and/or lame due to bleeding into the muscles and joints.
- d. Kids born to does consuming toxic sweet clover may be born weak and will die from hemorrhages.
- c. Pregnant does may abort.

Treatment

- a. It is essential to **STOP FEEDING** the offending sweet clover forage (hay or silage).
- b. Severe cases respond only to blood transfusions, and/or vitamin K, (vitamin K₃ is of value for treatment).
- c. Mild to moderate cases may be treated with vitamin K.
- d. Affected animals should be handled with care to avoid further bruising and hematomas.

Prevention

- a. The best prevention is not to feed sweet clover hay or silage, although this is not always economical.
- b. If sweet clover hay or silage must be used in a

given operation, proper haying or ensiling practices are essential. **The prevention of sweet clover poisoning starts at harvest time.**

- c. Plant sweet clover varieties which are low in coumarin.
- d. It is a good practice to have sweet clover forage analyzed before offering to goats. The Toxicology Section of the Veterinary Science Department can perform such an analysis.
- e. Sweet clover forage should not be fed to pregnant does, especially during the last 8-10 weeks of gestation.
- f. If one **must** feed sweet clover forage which is known to contain dicoumarol, no guideline is strict enough. At any rate, such sweet clover should not be fed continuously for over 6 days, and if fed, forage other than sweet clover must be fed at least 3 consecutive weeks...*(1 week sweet clover followed by 3 weeks without it).*

URINARY CALCULI (Water Belly)

Cause

- a. Urinary calculi -- primarily a problem of bucks and wethers -- result from mineral salts deposited within the urinary organs: kidneys, bladder, ureters, urethra, around the preputial orifice, etc.
- b. Nutritional and seasonal factors are associated with the incidence of urinary calculi:
 - concentrates, high phosphorus
 - silicates, present in either grasses or grain
 - cold weather which reduces water intake

Signs

- a. Vary from mild to severe when the urinary passages are obstructed.
- b. Arched back, straining, tail twitching.
- c. Subcutaneous edema.
- d. The distended urinary bladder may eventually rupture and the affected animal may actually appear improved for several days...**UNTIL SIGNS OF UREMIA DEVELOP.**
- e. The urethra may also rupture from excessive pressure.

Treatment

- a. Treatment requires the reestablishment of ability to urinate.
- b. Some mild cases may respond to ammonium chloride:
 - either in feed: 1/4 oz/head for 7-10 days
 - or drench: 3/4-1 fluid oz/head for every other day up to 3 times. Use 30% NH₄Cl solution.

- c. Severe cases may be saved only through surgical intervention.
- d. Smooth muscle relaxants may help.
- e. Nutrition, water availability and mineral balance must be adjusted, as needed.

Prevention

- a. Through management practices intended to reduce predisposing factors:
 - plenty of water
 - supplement ration with feed grade limestone: 20-30 lb/ton of feed
 - may add sodium chloride (common salt) to ration: 3-5%
 - balanced mineral intake.
 - may add ammonium chloride to ration: 0.5-1% more effective than sodium chloride

WHITE MUSCLE DISEASE

Cause

- a. Not every stiff or weak kid is affected with WMD...differentiate from other conditions:
 - Vibriosis
 - Polyarthritis
 - Enterotoxemia
 - Rickets
- b. Mortality rate is high in kids born with WMD.
- c. The delayed (or acquired type) may be corrected more easily. This type has nutritional basis (Selenium-vitamin E deficiency) and is often triggered by vigorous exercise.
- d. Kids affected by WMD
 - move slowly...are in pain
 - their backs are arched
 - may be down, as paralyzed
 - may not nurse and starve out
- e. When the heart muscle is severely damaged, death may be sudden.

Treatment

- a. Affected kids should be given injections of sodium selenite - vitamin E. In aqueous solution such as Bo-Se, dosage: newborn kids, 1cc Bo-Se; kids 2 weeks and older, 4cc of Bo-Se. Inject intramuscularly or subcutaneously.
- b. Injection should be repeated every 12-14 days, but not to exceed 4 doses.
- c. Maternal diet should be reevaluated. Recently cut, "good" hay (especially legumes) should provide a vitamin E source. If none is available, use Bo-Se or Mu-Se injections to provide does with Selenium and vitamin E.

- d. The maternal ration may be supplemented with sodium selenite not to exceed 0.3 pp or available selenium.
- e. Do not overdose with selenium, toxicity may occur.

Prevention

- a. Dietary inclusion of recommended NRC levels of selenium and vitamin E.
- b. Areas or flocks with past experience of WMD may consider injecting pregnant does with selenium-vitamin E preparations at least 4-8 weeks prior to kidding. Use Bo-Se at the rate of 1 ½ cc/100 lb.
- c. The incidence of WMD may be reduced by incorporating wheat and linseed oil meal in rations of pregnant does.
- d. May feed pellets containing 5 mg selenium and 350 IU vitamin E before kidding. These pellets are manufactured commercially; follow label instructions.

Information within this guidesheet is taken from research information and is not intended for use as veterinarian advise. Please consult your veterinarian if symptoms resemble those listed.

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