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FORAGE NEEDS AND GRAZING MANAGEMENT FOR MEAT GOATS IN THE HUMID SOUTHEAST

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Forages For Goats

Goats offer an opportunity to more effectively convert pasture nutrients to animal products as milk, meat and fiber which are currently marketable and in demand by a growing segment of the US population. In addition, goats selectively graze unwanted vegetation in pastures and forests, thus providing biological control which will reduce dependence on certain pesticides.

Goats consume only the most nutritious parts of a wide range of grasses, legumes, and browse plants. Browse plants include brambles, shrubs, trees, and vines with woody stems. The quality of feed on offer will depend on many things, but it is usually most directly related to the age or stage of growth at the time of grazing. The nutrient composition for several common feed types found on many farms is shown in Table 1.

Grazing Behavior

Goats are very active foragers, able to cover a wide area in search of scarce plant materials. Their small mouths and split upper lips enable them to pick small leaves, flowers, fruits and other plant parts, thus choosing only the most nutritious available feed.

The ability to utilize browse species, which often have thorns and an upright growth habit with small leaves tucked among woody stems, is a unique characteristic of the goat compared to heavier, less agile ruminants. Goats have been observed to stand on their hind legs and stretch up to browse tree leaves or throw their bodies against saplings to bring the tops within reach.

The feeding strategy of goats appears to be to select grasses when the protein content and digestibility are high, but to switch to browse when the latter overall nutritive value may be higher. This ability is best utilized under conditions where there is a broad range in the digestibility of the available feeds, giving an advantage to an animal which is able to select highly digestible parts and reject those materials which are low in quality.

Grazing goats have been observed to:

- select grass over clover.
- prefer browsing over grazing pastures

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- prefer foraging on rough and steep land over flat, smooth land.
- graze along fence lines before grazing the center of a pasture.
- graze the top of pasture canopy fairly uniformly before grazing close to the soil level.

Because of their inquisitive nature and tolerance of "bitter" or high tannin material, goats may eat unpalatable weeds and wild shrubs that may be poisonous, such as cherry or milkweed. The absence or the severity of poisoning is related to the quantity of material consumed, the portion and age of the plant eaten, the season of the year, the age and size of the animal, and other factors. In addition, several ornamental plants that are grown outdoors or indoors are highly toxic. For example, goats should not have access to, or be fed clippings of yew, azaleas, delphinium, lily-of-the-valley and larkspur.

In a pasture situation goats are "top down" grazers. This behavior results in uniform grazing and favors a first grazer-last grazer system. This might consist of using a goat herd as the first group and cattle as the last group. This management is most appropriate with lactating does or growing kids.

Goats naturally seek shelter when it is available. Goats seem to be less tolerant of wet cold conditions than sheep and cattle because of a thinner subcutaneous fat layer. A wet goat can easily become sick. Therefore, it is advisable to provide artificial shelters, such as open sheds.

Nutrient Requirements

The goat is not able to digest the cell walls of plants as well as the cow because feed stays in their gastrointestinal tract for a shorter time period. A distinction as to what is meant by "poor quality roughage" is necessary in order to make decisions concerning which animal can best utilize a particular forage. Trees and shrubs, which represent poor quality roughage sources for cattle, because of their highly lignified stems and bitter taste, may be adequate in quality for goats. Goats will avoid eating the stems, but don't mind the taste and will benefit from the relatively high levels of protein and cell solubles in the leaves of these plants. On the other hand, straw, which is of poor quality due to high cell wall and low protein, can be used by cattle but will not provide maintenance needs for goats because goats utilize the cell wall even less than cattle.

Goats must consume a more concentrated diet than cattle because their digestive tract size is smaller relative to their maintenance energy needs. When the density of high quality forage is low and the stocking rate is low, goats will still perform well because of their grazing behavior, even though their nutrient requirements exceed those of most domesticated ruminant species. Total digestible nutrients (TDN) and protein requirements are given in Table 2. Comparing the nutrient requirements to the chemical composition of feeds shown in Table 1 should give producers an idea of how to match needs with appropriate forages. For comparison, low quality forages have 40 to 55% TDN, good quality forages have from 55 to 70% TDN, and concentrates have from 70 to 90% TDN.

High quality forage and/or browse should be available to does during the last month of gestation and to lactating does, to developing/breeding bucks, and to weanlings and yearlings. Female kids needed for reproduction should be grazed with their mothers during as much of the milk feeding period as possible and not weaned early. When the quantity of available forage and/or browse is limited or is of low quality, a concentrate supplement may be considered to maintain desired body condition, depending on cost:benefit. Whole cottonseed makes an excellent supplement for goats when fed at no more than 0.5 lb/head/day. Dry does and non-breeding mature bucks will meet their nutritional requirements on low to medium quality forage (10-12% protein and 50-60% TDN).

Providing free choice a complete goat mineral or a 50:50 mix of trace mineralized salt and dicalcium phosphate is advisable under most situations. Selenium is marginal to deficient in all areas of North Carolina. Therefore, trace mineralized salt or a complete mineral mix containing selenium should always be provided to the goat herd year around. It is sometimes advisable to provide a mineral mix that contains 20-25% magnesium oxide to reduce the risk of grass tetany when heavy milking goats are grazing lush small grain or grass/legume pastures in early lactation. Copper requirements for goats have not

been definitively established. Growing and adult goats are less susceptible to copper toxicity than sheep, however, but their tolerance level is not well known. Young, nursing kids are generally more sensitive to copper toxicity than mature goats, and cattle milk replacers should not be fed to nursing kids. Mineral mixes and sweet feed should contain copper carbonate or copper sulfate because these forms of copper are better utilized by the goat than copper oxide.

Suggested Supplemental Feeding Program For Goats

When goats are raised on browse, abundant forage should be made available to allow goats to be very selective and to ingest a high quality diet that will meet their nutritional requirements. When forage or browse is limited or low in protein(< 10%), lactating does (and does in the last 30 days of gestation) and developing/breeding bucks should be fed 1.0 lb/day of a 16% protein mixture (77:20:2.5:0.5 ground corn : soybean meal :goat mineral : limestone). Alternatively, ground corn and soybean meal can be substituted by whole cottonseed for lactating does. Low to medium concentration of protein (> 10%) will meet requirements of dry does and non-breeding bucks. When forage or browse is limited or low in protein (< 10%), weanlings and yearlings should be fed ½ to 1.0 lb/day of the 16% protein mixture. Goats can be forced to eat very low quality feed including twigs, tree bark, etc., but producers should be aware that this practice will hurt the productivity of superior meat and fiber goats.

Grazing Management for Goats

Grazing of forage generally provides the least expensive way of supplying nutrients to animals. Therefore, it is advantageous to develop a year round forage program which allows for as much grazing as possible every month of the year. However, good pasture management involves much more than simply turning the animals to pasture. The principles of controlled grazing of goats or sheep are similar to those used for cattle. The primary goal is to have control of the animal's grazing pattern so that one can dictate the degree of defoliation and the frequency of defoliation. To obtain efficient animal production over a number of years, the needs of the plants as well as the needs of the animals must be taken into consideration. The development of a successful forage systems/grazing management entails:

1. Adjusting the number of animals grazing a certain area (stocking density) of pasture because some forage must be left at the end of the grazing period to maintain adequate plant production. Otherwise, overuse will weaken the plants and regrowth will be slower. Adjusting the stocking rate requires experience because forage growth is not uniform throughout the year or from year to year.

2. Harvesting ungrazed forages as hay or silage at an immature stage of growth when forage growth is more rapid than it can be grazed. This will provide high quality feed when grazing is not available. Cross fencing will keep animals concentrated on small areas while excess growth accumulate on other paddocks. Under those circumstances, short duration rotational grazing through a series of paddocks, or strip grazing a rapidly growing pasture by allowing animals access to only enough forage to carry them for one day using a movable fence, are alternatives to consider.

3. Overseeding bermuda pastures with legumes, ryegrass, small grains, or brassicas to extend the grazing season and to provide some high quality feed during the winter and spring.

4. Restricting the use of high quality forage, when in short supply, for the supplementation of other low quality pastures, hay or silage. This can be achieved by letting goats graze high quality forage a few hours at the end of each day, or by grazing the limited high quality supply every other day.

When the aim is to kill or reduce the amount of unwanted vegetation, then greater severity and frequency of grazing is necessary. Goats will actively select major weeds at particular stages of growth. As a rule, effective control of unwanted vegetation can be achieved in two years. Therefore, the advantages of the goat in feeding strategy must be weighed against its disadvantages. Being a browsing animal, the goat stunts tree growth and prevents the regeneration of forests and thus should be managed carefully in areas desired for forests. Goats could be very useful, however, in areas where regrowth of brush and trees is not desirable.

Grazing Time

Some livestock producers confine their animals at night for protection from straying or predation. However, confinement means that grazing time is reduced and that the animals spend more time in unsanitary lots or pens. Reduced grazing time due to confinement at night is even more critical during the hot and humid summer months, because animals may not forage efficiently during the hottest periods of the day. If animals must be confined at night, allowing the animals to graze during the cooler parts of the day would increase production as a consequence of improved feed intake resulting from increased grazing time.

Fencing For Goats

Goats can be controlled with 4-5 strands of smooth electrified wire. The wire spacings can vary from 6 to 8 inches near the ground to 8 to 12 inches for the top strands. Perimeter fence height should be at least 42 inches tall. A high wire, or an offset wire set one foot inside the fence near the top, may be needed if goat jumping is a problem. As a rule, goats will crawl rather than jump a fence, so the bottom wire should be kept close to the ground. A grounded barb wire laid along the ground will help with predator control, especially in mountainous areas. Training animals to respect electric wire fences can be done effectively by forcing animals to stay in a small paddock which encourages them to "test" the wire.

Woven wire (6" x 6" opening) is effective, but costs at least twice that of a 5 strands electric fence. Further, horned goats frequently become caught in the wire. To address this problem with existing fences, an electric wire offset about 9 inches from the woven wire fence and about 12 to 15 inches from the ground will reduce the number of animals caught in the woven wire fence. However, this practice also reduces control of forage growth on the fence line. Woven wire with a 6" x 12" opening is a new and cheaper alternative than the woven wire with a 6" x 6" opening, that does not require an electric offset wire. Horned goats usually do not get caught or, if caught, they are able to free themselves because of the larger opening.

Boundary fences should control all stock at all times. However, interior fences may be made of 3 to 4 wires, assuming animals are well trained. Because goats like
to climb, the corners of fences should not have the diagonal bracing for posts or the animals will climb out of the pasture. Corner posts should be driven with a deadman of H-braces.

Mixed Grazing and Stocking Rates

The differences in feeding behavior among cattle, sheep and goats uniquely fit each species to the utilization of different feeds available on a farm. These differences should be considered in determining the best animal specie to utilize a particular feed resource. Feeding behavior is also important in determining whether single or multi-species will best utilize available plant materials. Most studies indicate greater production and better pasture utilization are achieved when sheep and cattle or sheep, cattle and goats are grazed together as opposed to grazing only sheep or goats or cattle alone. This is especially true where a diverse plant population exists.

Under mixed grazing conditions (more than one ruminant species grazing in the same paddock) on fescue/orchardgrass-clover where the forage supply is low and the nutritive value is high, goats and sheep may be at a disadvantage. Under those conditions, the animal with the largest mouth (cattle, horse) has an advantage because it can grasp more material per unit of time. In addition, food intake by goats is rapidly reduced and may stop if the pasture is soiled or trampled, even with an ample amount of pasture remaining.

Generally one cow eats about the same amount of feed as 6 to 8 goats (Table 3). Because of the complimentary grazing habits, the differential preferences and the wide variation in vegetation within most pastures, one to two goats could be grazed with every beef cow in NC without adversely affecting the feed supply of the beef herd. The selective grazing habits of goats in combination with cattle would eventually produce pastures which would be more productive, of higher quality, and with little weed problems as a result of the mixed grazing.

TABLE 1. ESTIMATED NUTRIENT COMPOSITION OF VARIOUS FEEDS[1]

PLANT TYPE	TDN, %	CRUDE PROTEIN, %
Whole cottonseed	88	22
Corn	86	9
Soybean meal (48%)	82	44
Soybean hulls, ground	75	14
Wheat middlings	80	19
Pasture, vegetative	60-76	12-24
Pasture, mature	50-60	8-10
Pasture, dead leaves	35-45	5-7
Fescue hay, 6 weeks growth	58-62	8-11
Fescue hay, 9 weeks growth	48-53	7-9
Bermuda hay, 7 weeks growth	54-58	9-11
Bermuda hay, 12 weeks growth	47-50	7-9
Alfalfa hay	50-63	13-20
Honeysuckle, leaves+buds	70+	16+
Honeysuckle, mature	68+	10+
Sumac, early vegetative	77	14
Oak, buds and young leaves	64	18
Persimmon leaves	54	12
Hackberry, mature	40	14
Kudzu, early hay	55	14
Juniper leaves	64	6
Acorns, fresh	47	5
Curled dock	74	13
Chicory	65	15
Mimosa leaves	72	21
Mulberry leaves	72	17

[1]Nutrient requirements of Goats in Temperate and Tropical Countries. 1981 National Research Council.

TABLE 2. DAILY NUTRIENT REQUIREMENTS FOR MEAT PRODUCING GOATS[1,2]

NUTRIENT	YOUNG GOATS[3]		DOES (80 lb)			BUCK (80-120 lb)
	Weanling (30 lb)	Yearling (60 lb)	Dry (Pregnant)	Lactating Avg Milk	Lactating High Milk	
Dry matter, lb	2.0	3.0	4.5	4.5	5.0	5.0
TDN, %	68	65	60	60	65	60
Protein, %	14	12	10	11	14	11
Calcium, %	.6	.4	.4	.4	.6	.4
Phosphorus, %	.3	.2	.2	.2	.3	.2

[1] Nutrient Requirements of Goats in Temperate and Tropical Countries. 1981. National Research Council.
[2] Pinkerton, F. 1989. Feeding Programs for Angora Goats. Bulletin 605. Langston University
[3] Expected weight gain >.44 lb / day.

TABLE 3. ESTIMATED STOCKING RATES OR FEED NEEDS FOR GOATS, SHEEP AND CATTLE ON PASTURE[1]

PASTURE TYPE	GOATS	SHEEP	COW
		Head[1]	
Good quality pasture system	6-8	5-6	1
Good brush-browse system	9-11	6-7	1
		Head/acre	
Wheat/alfalfa system	10-12	8-9	1.5
Alfalfa pasture, Oklahoma	12-15	10-11	1.9

[1] Number of animals to consume similar amount of feed.