

MATCHING FORAGES TO THE NUTRIENT NEEDS OF MEAT GOATS

J. Paul Mueller, Matthew H. Poore, Jean-Marie Luginbuhl, and James T. Green, Jr.

FORAGE FOR GOATS

Goats offer an alternative to utilizing forage and vegetation which is otherwise “wasted”, while producing a healthful food product (meat) currently marketable and in demand by a growing segment of the US population. In addition, because of their preference for “browse” goats offer the potential for using idle land that is currently unproductive, and for biological control of unwanted vegetation in pastures and forests without use of pesticides.

Goats consume only the best 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 that exhibit a high degree of selectivity. They are 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 small leaves tucked among woody stems and an upright growth habit, is a unique characteristic of the goat compared to heavier, less agile ruminants. Goats frequently will stand on their hind legs and stretch up to browse tree leaves or pull down 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 is 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.

TABLE 1. ESTIMATED NUTRIENT COMPOSITION OF VARIOUS FEEDS¹

PLANT TYPE	TDN, CRUDE PROTEIN,	
	%	%
Whole cottonseed	88	22
Corn	86	9
Soybean meal (48%)	82	44
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

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

- Grazing goats have been observed to:
- select grass over clover.
- prefer browse over grazing.
- prefer foraging on rough and steep land over flat, smooth land.
- graze along fence lines before grazing the enter of a pasture.
- graze the top of the pasture canopy fairly uniformly before grazing close to the soil level.

In a pasture situation goats are “top down” grazers. This behavior results in uniform grazing and favors a first grazer-last grazer system using a goat flock 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, and do not like to get wet. They seem to be less tolerant of wet cold conditions than sheep and cattle because of a thinner fat layer. A wet goat can easily become sick. Therefore, it is usually necessary to provide natural or artificial shelters, such as open sheds.

NUTRIENT REQUIREMENTS

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 rates are 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.

TABLE 2. NUTRIENT REQUIREMENTS FOR MEAT AND FIBER PRODUCING GOATS¹

NUTRIENT	YOUNG GOATS ²		DOES (80 lb)	
	Weanling (30 lb)	Yearling (60 lb)	Dry (Early)	Pregnant (Late)
Daily Feed, lb	2.0	3.0	4.5	4.5
TDN, %	68	65	55	60
Protein, %	14	12	10	11
Calcium, %	.6	.4	.4	.4
Phosphorus, %	.3	.2	.2	.2

NUTRIENT	DOES (80 lb)		BUCK (80-120 lb)
	Lactating Avg Milk	Lactating High Milk	
Daily Feed, lb	4.5	5.0	5.0
TDN, %	60	65	60
Protein, %	11	14	11
Calcium, %	4	.6	.4
Phosphorus, %	.2	.3	.2

¹ Derived from: Nutrient Requirements of Goats. 1981. National Research Council and Pinkerton, F. 1989. Feeding Programs for Angora Goats. Bulletin 605. Langston University, OK

² Expected weight gain >.44 lb / day

High quality forage and/or browse should be available to does during the last month of gestation, 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).

A complete goat mineral or a 50:50 mix of trace mineralized salt and dicalcium phosphate should be offered free choice during the first 90 days of lactation in herds with a controlled breeding season (or year round for those without controlled breeding) and for young goats. Selenium is marginal to deficient in all areas of North Carolina. Therefore, trace mineralized salt or complete minerals 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.

BODY CONDITION SCORING

Body condition scoring is a procedure that has been used successfully with cattle as a management aid to indicate nutritional status of the animal during various physiological stages. This system has not been widely adapted by meat goat producers, but it offers potential to aid producers in assessing the nutritional management of the flock.

Because the greatest potential for goats is when run in combination with beef cows, we have adapted the same system for goats. A 1-9 system where one is extremely thin and nine is extremely fat is used for beef cattle in North Carolina. A 1-3 system (thin, moderate and fat) has been proposed for goats. In our system, this is simply expanded to where thin is 1-3, moderate is 4-6 and fat is 7-9.

Figure 1 shows areas on the goat that are used to determine condition. Visual evaluation is not adequate for goats so scoring should be done in a chute where the animal can be felt. Table 3 lists different body condition scores and describes them. In most situations goats should be in the range of four to seven. Scores of 1 to 3 indicate a problem, and scores of 8 to 9 are almost never seen in goats.

USING BODY CONDITION SCORES

Body condition scores are the best way to monitor your nutritional program. With underfeeding, goats will become thin, and with overfeeding, goats will become fat. Using body condition to help fine tune feeding or to “head off” a developing parasite problem is relatively simple and should prove useful.

Does should be in good condition in late pregnancy (5 or 6) and body condition should not drop off too rapidly after kidding. In no case should a goat be in thin (1-3) condition. This is most critical in late pregnancy as weak kids may result. Pregnancy toxemia could occur in late pregnancy if does are too fat (7-9). It is critical to have animals in good condition (5 or 6) during the breeding season to maximize the number of kids born.

CS 1 Extremely thin and weak, near death.

TABLE 3. BODY CONDITION SCORING CHART

BCS2	Extremely thin but not weak.	BCS6	Good. Smooth look with ribs not very visible. Spinous processes smooth and round. Individual processes very smooth, felt with considerable pressure. Significant fat cover felt over eye muscle.
BCS3	Very thin. All ribs visible. Spinous processes prominent and very sharp. No fat cover felt with some muscle wasting.	BCS7	Fat. Ribs not visible, spinous process felt under firm pressure. Considerable fat felt over eye muscle.
BCS4	Slightly thin. Most ribs visible. Spinous processes sharp. Individual processes can be easily felt. Slight fat cover can be felt over the eye muscle.	BCS8	Obese. Animal is very fat with spinous processes difficult to feel. Ribs can not be felt. Animal has blocky obese appearance.
BCS5	Moderate. Spinous processes felt but are smooth. Some fat cover felt over eye muscle.	BCS9	Extremely obese. Similar to an eight but more exaggerated. Animal has deep patchy fat over entire body.

FIGURE 1. AREAS TO BE MONITORED FOR FAT COVER:

