Module 10

Title: **Pasture Production and Utilization**

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Objective(s) of Lesson:

- To familiarize and educate small ruminant producers with the fundamentals of pasture production and management.
- To enable producers to understand terminology, requisite practices and applications.
- To better equip producers to make sound pasture management decisions and to be sensitive to the need for maximizing the use of forages in a more profitable small ruminant enterprise.

INTRODUCTION

In the rearing of meat goats, approximately 65 to 75% of costs can be attributed to feed. Pastures/forages are still the cheapest feed sources and can meet most of the animal's needs for maintenance and growth. Incorporating grazing as an integral part of a ruminant program saves money and creates less trouble as animals are allowed to harvest forage whenever possible.

Grass is a crop and good management is essential for profitable livestock production. Mere movement of animals from paddock to paddock is not enough. Many other factors such as season, soil type, topography, type of livestock operation, and the objective of the producer must be considered for a productive forage program.

Dry matter digestibility can be defined as dry matter in food minus dry matter in feces as a percentage of dry matter in food. Forages and feedstuff consist of water and dry matter. While water is essential to life and metabolic processes, all of the nutrients (protein, energy, vitamins, and minerals) are found in dry matter. If a forage sample is oven or air dried, the water fraction evaporates and dry matter remains. For example, if a given sample has 85% moisture (young grass) then the dry matter content is 15% (100-85). If a second sample has a lower moisture content (10%), for example, hay, then its dry matter is 90% (100-10).

An overall definition of forage quality must combine Dry Matter Intake and Total Digestible Nutrients (DMI). Leaf to stem ratio, protein content, fiber and lignin levels of the forage are all important parameters to consider. Cell contents of forages are more readily digested than cell wall fraction. Age, height and stage of maturity at grazing are all very important factors. Digestibility, forage intake, and animal performance are all highly correlated. However, animal performance is the best indicator of forage quality.

Some important definitions are:

Stocking rate: Stocking rate is the number of animals stocked per acre (hectare) of grazing land for a defined period of time.

Grazing pressure (grazing intensity): This is defined as animals per unit of forage available on grazing area.

Carrying capacity (grazing capacity): This is defined as the number of animals a given pasture will support for a given period of time without harming it. It depends on soil productivity and rainfall and refers to the forage-producing capacity of pasture.

Animal unit (AU): This is generally defined as one mature non-lactating cow weighing 1,000 pounds and fed at a maintenance level. Animal unit is used to describe the stocking rates for various classes of livestock.

LIVESTOCK PRODUCTION SYSTEMS

Extensive:

This production system is generally characterized by grazing only and in paddocks sufficiently large to allow for forage or browse selection. Open range lands in the U.S. and savannahs in the tropics, with their indigenous plants, lend themselves to extensive meat goat production.

In instances where soil fertility and rainfall are adequate, improved forage species can be planted to enhance the growth rate of animals. As a general rule of thumb, the extensive system seeks to minimize management input, utilizes relatively large areas of land, and is further defined by low economic investment and operating expenses. Both productive and reproductive efficiencies can be compromised but economic efficiency is the overriding factor.

Intensive:

This production system is characterized by many farm management interventions in an effort to maximize animal performance and overall production. Land preparation, fertilization of planted improved forage, feed supplementation, fencing to obtain smaller paddock sizes and controlled grazing, increased use of state-of–the art technologies and equipment are all facets of intensive meat goat production.

In this system of production, selective grazing can still occur to achieve the desired animal response. However, there is a need for greater animal health monitoring, particularly with intestinal parasites.

Semi-intensive:

Producers utilizing this production system attempt to combine grazing with some strategic levels of concentrate supplementation. Animals are generally corralled and are dewormed in a timely fashion. The ultimate objective, as in other production systems, is economic efficiency.

GRAZING MANAGEMENT

Rotational:

Rotational grazing is characterized by the grazing of two or more paddocks sequentially, followed by a rest period for recovery and regrowth of the grazed herbage. Pastures are generally divided into several smaller paddocks using permanent and/or electric fences.

Paddock numbers are dependent on the number of animals, stocking rate, and estimated time of grazing per paddock. Time of grazing can vary (usually 7 to

10 days) as well as paddock sizes. Rest period between grazing can also vary based on grazing pressure, height of the grazing fertilizer levels, and rainfall.

Producers must know that a greater number of paddocks will increase the investment cost and can only be justified if there is a corresponding increase in livestock performance. Ease of movement of animals is also an important consideration when contemplating a rotational grazing system.

Continuous:
This generally occurs on range and large acreages but is also applicable in an intensified production system where pastures are much smaller. Animals are generally grazing the same paddock or land area for an entire season at a fixed or variable stocking rate. In the absence of a put-and-take management strategy, where animal numbers are adjusted to match the available forage supply, continuous grazing can lead to overgrazing and under-grazing (both undesirable conditions) of forage species. At adequate stocking rates, this form of grazing can lend itself to selective harvesting of the various forage species and acceptable levels of animal performance. Continuous grazing is sometimes synonymous with continuous stocking.

Strip grazing:

This is sometimes referred to as “ration grazing.” Animals are confined to small areas or strips of land to be consumed in a short period of time, usually a day. Moveable electric fences can be employed to ensure daily rationing of forage. Strip grazing results in high forage utilization, a desired feature when forage quality is excellent.

Creep grazing:

This method is designed mainly for young animals and allows access to high quality forage. Specially constructed openings in fences can facilitate easy movement of small animals while preventing larger animals from passing through. The general objective is to improve live weight gains and overall performance of the young growing animals.

STOCKING RATES

While recommended stocking rates have existed over many years for grazing cattle, very little information exists in the literature for goats. As a general rule of thumb, stocking rates of 6 to 8 goats per acre have been cited in the literature, but unfortunately no definite live weights of these animals have been indicated. Florida A&M University has recently completed research to identify adequate stocking rates of adult goats grazing under pine trees. Relevant information will soon be published.

FORAGE SPECIES

Forage production must be viewed as a complex interaction between grass/legume species, the animals that utilize it, or graze, and the soil that supports and provides nutrients. Species planted are influenced by climate, topography, rainfall pattern, and soil fertility status. In the Tallahassee area, meat goat producers rely mainly on tested and proven warm/cool season annuals and perennials for both grazing and hay, and have reported acceptable annual performance levels. While grasses predominate as the major forage sources, legumes must be recognized as major potential contributors to future livestock production systems.

Warm Season Grasses:

1. Bahia grass (Paspalum notatum) – Perennial.
2. Bermuda grass (Cynodon dactylon) – Perennial.
3. Pearl millet (Pennisetum glaucum) – Annual.

Bahia grass

Varieties: Pensacola, Tifton-9, Argentine. For Tifton-9 Bahia grass,

- Plant from February through July.
- Plant 15 to 20 pounds of seed per acre.
- Apply fertilizer when seedlings have emerged from the soil.
- Apply 30 to 40 pounds per acre along with P and K according to soil test recommendation.

When Bahia grass plants are high enough to start spreading, apply an additional 40 to 50 pounds of Nitrogen.

Example:

100 pounds of ammonium nitrate contains 33.5 pounds 0f nitrogen
100 pounds of 10:10:10 fertilizer contains 10pounds of nitrogen

Bahia grass must be closely grazed or clipped to keep it tender, succulent and of good quality. Protein level of bahia grass range from 7%-11% depending on the stage of growth and level of Nitrogen fertilization.

Bermuda grass

Varieties: Coastal, Suwanee, Coast-grass, Tifton-85

- Plant from March to April.

- Plant seed at 5 to 10 pounds per acre in spring or broadcast at 25 to 40 bushels/acre, then cover.
- Soil pH should be around 5.5.
- Apply approximately 80 pounds of nitrogen per acre and/or as indicated by a soil test recommendation.
  Hay yields of 5 to 7 tons per acre can be obtained depending on the stage of grazing or cutting.

Pearl millet

- Plant from April-June, using seeding rates of 12-15 pounds per acre depending on method of planting, i.e., drilling or broadcasting of seed.
- Pearl millet is productive over a short season (June to September).
- Requires a high stocking rate and sometimes mowing to maintain pasture quality.

Cool Season Grasses:

Ryegrass

Ryegrass is an annual forage that grows well in Tallahassee during the fall and winter months. Maximum yields are generally obtained in February and March, but grazing is available between the months of January to April. This forage is of high nutritive value and seeding rates of 20 to 30 pounds per acre are recommended. September and early October are the optimum months of planting.

Oats

Oats is an annual cool season forage that produces well in February and March and tends to be more cold sensitive than other winter small grains. Recommended seeding rates are 90 to 120 pounds per acre and the best time of planting is September or October. Oats is highly responsive to nitrogen fertilization and adequate levels can be obtained from your extension agent.

Legumes:

Legumes generally produce higher quality forage than grasses and their overall digestibility falls less rapidly with maturity than warm season perennial grasses. Crude protein levels tend to be higher in legumes. However, the basic reason for using forage legumes for livestock production is to exploit their potential for fixing atmospheric nitrogen in association with rhizobia. Legumes can be grown in pure stands and carefully grazed or cut as green fodder or baled for hay. They can also be grown with grasses but management can be difficult to maintain and sustain viable grass-legume mixtures.

Animal performance is often higher on legumes and grass-legume mixtures mainly due to higher dry matter intake, a more rapid rate of digestion, and better efficiency of nutrient utilization. Crude protein levels are normally greater than the requirements for the normal functioning of many animal species. Alfalfa is probably the best known and most widely grown perennial legume used for livestock production throughout the world. It is the highest in feeding value of all commonly grown hay crops, and can provide excellent pasture. However, it does not do well in warmer and more southern region of the USA. In North Florida, goat producers rely on the cool season clovers for grazing in the winter and early spring seasons. Perennial peanut is widely used in parts of central Florida for hay during the summer months while cowpea (annual), alyceclover (annual), and sericea lespedeza (perennial) are potential warm season forages for the region.

Cool season legumes

1. **Crimson clover:** This is a winter annual with its characteristic flower head. It produces well in North Florida and tends to achieve maximum forage availability in March and April when the cool season grasses are declining in yield and quantity. At establishment, seeds can be broadcasted at 20 to 30 pounds per acre in late August to October. When planted in pure stands, nitrogen fertilization is not generally necessary particularly if seeds are inoculated at planting with appropriate rhizobia.

2. **Red clover:** This is a cool season legume that grows as a winter annual in North Florida and tends to be more tolerant of soil acidity. Seeding rates of 6 to 8 pounds per acre when drilled or 12 to 15 pounds per acre when broadcasted are recommended for the fall months September to October. Optimum grazing is achieved in February-March, but this species does not tolerate close, continuous grazing.

Warm season legumes:

4. **Cowpea:** This is a viney plant that does well on well drained soils. It is drought tolerant and provides excellent quality in June to August. It can be grazed or harvested for hay and can be planted in relatively low pH and infertile soils. The recommended seeding rates are 30 to 40 pounds per acre if drilled or 100 to 120 pounds per acre if broadcasted. Care must be taken not to overgraze or employ heavy grazing pressure.

5. **Perennial peanut:** This summer perennial does well in Central to South Florida and is primarily used for hay production on well drained soils. While it is high in nutritive value, it will not do well under waterlogged condition. It is not grown from seeds, but from rhizomes at the rate of 60 to 80 bushels per acre during the months of December to March. Correcting soil calcium is necessary as well as adequate rainfall/irrigation at time of planting. For meat goat producers, rotational grazing can be employed successfully but at all

times one must be mindful of the need to replace the food reserves of the rhizomes to maintain a healthy legume stand.

PASTURE MANAGEMENT

What are fertilizers?

Fertilizers are compounds administered to crops (remember that grass is a crop) to promote or enhance growth and production. They can supply major plant nutrients, nitrogen, phosphorus, potassium (N:P:K), minor ones (calcium, magnesium, etc.), and micronutrients (copper, zinc, etc.) in varying amounts. Generally, they are in solid or liquid form and can be applied to the soil or to the leaves. In forage production and management, fertilizers are mostly of the granular, inorganic type, e.g. ammonium nitrate and 10: 10: 10, but increasingly organic fertilizers are applied to pastures in the form of fresh cow manure, dried poultry waste or mushroom compost.

Application rates:

Fertilizer application rates are generally based on soil test reports. Standard recommendations already exist for organic crops in the state of Florida and these can easily be obtained from your local extension service. However, if necessary, as in a new land area, soil tests can be requested and relevant information obtained. The University of Florida extension bulletin (SL129) indicates that a successful crop fertilization management usually requires a representative soil sample for your intended pasture site. Legitimate laboratory methods are used to predict fertility and, finally, the generated recommendations are based on measured crop responses.

Blanket application rate for the major nutrients (nitrogen, phosphorus, and potassium) and other micronutrients will vary based on the nature of the crop/forage, whether the producer is establishing new seed or vegetative cuttings, whether, he/she is fertilizing for maintenance of already established pasture, or whether the farmer is in the hay production business.

What does 10: 10: 10 Fertilizer mean?

Firstly, this is a complete fertilizer, containing all three primary nutrients (N, P, K). These numbers on the fertilizer bag indicate the exact percentage of Nitrogen (N), Phosphorus (P), and Potassium (K in the form of K2O) by weight. For example, 100 pounds of 10: 10: 10 fertilizer contains 10 pounds. of N, 10 pounds. of Phosphate (P2O5), and 10 pounds of potash (K205).

What is Single Nutrient Fertilizer?

These fertilizers contain only one major/primary nutrient, but in relatively high quantities. For example, ammonium nitrate (NH_4NO_3) is considered a sole source of Nitrogen with the following bag numbers (34:0: 0). Hence 100 pounds of ammonium nitrate contains 34 pounds of nitrogen.

How to calculate fertilizer rates:

Example:
Given a pasture area with the dimensions of 140 x 140 yards, how much 5-10-10 fertilizer is required to achieve a nitrogen application rate of 50 pounds/ acre?

Solution:

1. Calculate the acreage of pasture:
   i.e. 140x140 (sq.yds) = 140x140 sq.yds.x 1 acre/4840 sq. yds.
   = Approx. 4 acres.

2. Given an application rate of 50 pounds of N per acre,
   Total N. requirement is (50x4) pounds. of N = 200 pounds of Nitrogen.

3. A 5: 10: 10 fertilizer indicates there are 5 pounds of Nitrogen in 100 pounds of fertilizer.

4. Since 5 pounds of nitrogen are in 100 pounds of 5-10-10 fertilizer,
   Then 200 pounds of nitrogen will require (100/5 x 200pounds) of 5-10-10 fertilizer.
   = 4000 pounds of fertilizer or 80 bags of fertilizer at 50 pounds per bag.

Question: Was this a good selection of fertilizer?

Lime:

Most forage crops perform best between the pH range of 5.8-6.5 because most nutrients are generally available then. Lime may serve as a soil amendment and as a fertilizer. As an amendment, it corrects soil pH and as a fertilizer, it supplies calcium and magnesium. Soils in the Southern U.S. tend to be too acidic (low pH) for optimum crop growth and as a result, lime is applied to raise the pH to the desired levels (recall that a pH of 7.0 is neutral, and values below 7.0 reflect acidity while values above 7.0 reflect alkalinity). Dolomitic lime, for example, contains calcium carbonate and magnesium carbonate and is recommended for soils low in magnesium. Hugh, Heath, and Metcalf (1951) indicated that lime is often the first essential addition for forage production on

acid soils of humid regions and affects the efficiency of utilization of any other fertilizers used.

SOIL TESTING AND FERTILITY

Points to note:

1. Proper fertilization and liming normally result in more dramatic increases in forage production than any other single practice. Good record-keeping, including routine sampling and analyses, is vital to maintain pastures in an acceptable productive state.
2. Perform all the activities in a timely fashion.
3. Whenever practically and economically feasible, follow the recommendations from the county extension agents.
4. Remember that certain minimum levels of fertilization and liming are necessary to maintain a forage stand.
5. Also, heavy fertilization rates can be justified if stocking rates are increased.

FORAGE COMPOSITION AND QUALITY

Forage Composition

The nutrient composition of forages, and indeed feedstuff in general, is based on the separation of the constituent dry matter into the following major fractions:

1. Forage carbohydrates
2. Forage protein
3. Ether extract

The carbohydrates are divided into two main classes, crude fiber (CF) and Nitrogen- free extract (NFE).

Crude Fiber

This fraction contains relatively insoluble carbohydrates such as cellulose, hemicellulose and lignin which may vary indigestibility from 35-75%.

Nitrogen-Free Extract

This fraction includes the soluble fractions of the carbohydrates (Starches, sugars, organic acids, vitamins, etc.) and is highly digestible

Crude Protein

This is calculated from the nitrogen content of the forage. Because the analytical method used determines the nitrogen from sources other than protein, the term crude protein is used.

Ether Extract:

This fraction essentially contains waxes, alcohols, organic acids, oils and fat in the case of other feeds.

In 1987, Van Soest developed a more rapid system to fractionate and separate the forage dry matter by using a series of different detergents. This system was designed to replace the crude fiber-NFE separation mentioned before. and identifies the categories listed below:

1. Cell contents (soluble in neutral detergent), consisting of sugars, starches, soluble protein, non-protein nitrogen, organic acids, and lipids. This class is non-lignified and almost completely digestible.
2. Cell wall constituents or neutral-detergent fiber (NDF). Some are partially digestible hemicellulose, for example, according to the degree of lignifications. Generally, the higher the forage NDF value, the lower is the forage intake.
3. Acid-detergent fiber. This is a measure of only the lignified or undigested cell wall fractions. Generally, the higher the ADF value, the lower the forage digestibility.

In summary, NDF represents all cell wall material while ADF is an estimate of only the lignified or undigested components.

Forage Quality:

General quality of forage declines in nutritive value with age due to increased lignifications and a reduction in the leaf to stem ratio. As a result, forages are harvested or grazed before maturity so as to obtain the best quality. It is normally felt that leaves have higher quality than stems and upper canopy stems are generally of better quality than the lower ones. Young, actively growing forages (immature) may decline in soluble cell content by as much as 25% as they reach maturity with a compounding increase in cell wall of 25%. Crude protein levels can also decline with increasing maturity from approximately 20% to 5 to 7%. Forage digestibility also declines with increasing maturity. However, the ultimate measure of forage quality is animal performance.

Hay Production

Producing hay for meat goat production can be an integral part of any grazing system or can be part of a specialized hay-making operation. Given the seasonal variations in production of most pastures in the U.S., it generally becomes necessary to incorporate the feeding of hay in late fall, winter, and early spring, particularly in the absence of planted winter forage.

The aim in hay making is the reduction of moisture content of green forage to a level that is low enough to inhibit the action of plant and microbial enzymes. Generally the aim is a reduction of moisture from 65 to 85% to approximately 15 to 20% or lower. The more mature the crop is at the time of harvesting, the lower is the moisture content (hence more rapid drying), but at this particular stage, nutritive value is lower. It is always important to remember that you are buying plant nutrients in hay, and for the livestock owner, there is a need to maximize the available nutrients per ton of hay purchased in order to meet animal requirements for growth and reproduction.

HAY STORAGE

Hay bales, small and rectangular or large and round are best stored inside where there is adequate protection from the weather. In such a case, there is usually an investment cost for a shed or building, a factor which must be considered in the overall economics of the meat goat enterprise. Inside storage prevents or minimizes spoilage and losses. Estimates of 30% or more dry matter losses have been reported in the Southern U.S. due to outside weathering. Not only is there a direct storage effect, but also animal refusal of hay increases.
Method of placement of bales is also important, with both losses and animal refusal decreasing generally with placement on the ground or gravel, on tires, on wooden racks, and on wooden racks with plastic covers. Protected hay will not deteriorate nutritionally when adequately stored, but it will undergo color change over time.

In storing hay outside, some form of protection must be done. Plastic wraps can be applied at time of baling or large tarps can be used to cover the hay. Area used for outside storage should be well drained and be continually exposed to sunlight. Proper handling of hay is required to avoid or minimize leaf losses. Generally, major changes during hay-making occur in the carbohydrate fraction. Soluble carbohydrate losses occur as a result of respiration, when sugars are oxidized to carbon dioxide and water. As a result, cellulose constituents increase, crude fiber percentage increases, and nutritive value decreases. To a lesser extent, proteins can be altered by action of plant enzymes, but major losses in this fraction is mainly evident if there is leaching of soluble nitrogenous compounds.

BALANCING RATIONS

Forages and other feedstuffs vary in their moisture percentages, so for the purpose of comparison and feed formulation, they must be converted to a common nutritional basis, hence the reference to feed dry matter (DM) when mixing different feeds. Balancing a ration to meet the nutrient requirements of meat goats and other livestock species for maintenance, growth, lactation, and reproduction (gestation) necessitates knowledge of the nutrient concentration of feed ingredients and their dry matter levels. Animal requirements based on size, species and production levels are obtained from NRC (National Research Council) tables and matched with nutritional contents of available feed sources. Whenever possible, the most economical mixes that will sustain acceptable performance levels are preferred.

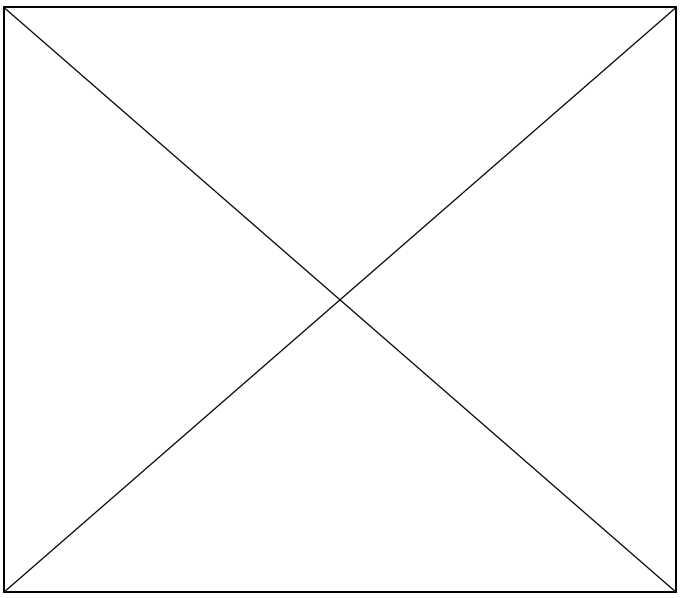
THE PEARSON SQUARE

This is a relatively simple technique for balancing rations using two ingredients at a time and aimed at providing the desired nutrient feed concentrations for any class of livestock. The method can also be used for feed ingredients which are mixtures themselves. Generally, the Pearson Square technique is used to balance rations for both energy and protein.

Procedure: Balancing for Protein

The protein levels of the two ingredients used must be on either side of the required level. For example, if a 20% protein content is required in the feed, then one of the ingredients must possess a higher protein level (44%, for example) and the second must have a lower protein level (10%, for example).

1. Draw a square and insert the 10% crude protein desired of the final mixture in the middle of the square.



1. Place corn with its crude protein (10%) on the upper left corner and 44% soybean meal (SBM) with its percent crude protein (44%) in the lower left corner.
2. Subtract the % crude protein in corn (10) from the % crude protein desired in the mix (15) and place the difference (5) on the corner of the square diagonally opposite from the corn. This amount is the SBM.
3. Subtract the % crude protein desired in the mix (15) from the % crude protein in the SBM (44) and place the difference (29) on the corner of the square diagonally opposite from the SBM. This amount is corn.
4. The above remainders represent the protein levels of the two feeds that will provide a mix containing the desired % crude protein.
5. Supposing a farmer wants to mix a ton of feed (2000pounds), then the relative amounts of corn and SBM in mix are:

   Corn: 29/34 x 2,000 pounds = Approx. 1,706 pounds
   SBM: 5/34 x 2,000 pounds = Approx. 294 pounds.

6. Finally, it must be remembered that the protein values for corn and SBM are given on dry matter basis. Hence the farmer must convert the ration ingredient amounts from pounds dry matter to pounds as fed.
7. Recall the mix contains 1,706 pounds of corn and 294 pounds SBM on a dry matter (DM) basis. Given the dry matter content of corn is 88% and SBM 91%, then the as-fed requirements in mix are:

   Corn: 1706 x 100/88 = Approx. 1,939 pounds as-fed.

   SBM: 294 x 100/91 = Approx. 323 pounds as-fed.

Review Questions

Multiple Choice Questions 1 to 6

1. Selecting a forage species for your pasture depends on the following:
   a. Rainfall
   b. Soil drainage
   c. Soil acidity
   d. Climate
   e. All of the above
   f. None of the above

2. Most producers plant grasses rather than legumes because grasses
   a. Yield less per acre
   b. Are easier to maintain
   c. Have higher protein levels
   d. Increase soil fertility
   e. All of the above
   f. None of the above

3. When is the best time to plant clover for grazing?
   a. December
   b. March
   c. August
   d. October

4. The two most important forage management and utilization considerations are:
   a. Rainfall.
   b. Proper frequency of grazing or cutting.
   c. Soil nitrogen fertility improvement.
   d. Farm location.
   e. All of the above.
   f. None of the above.

5. In order to produce better quality forage the livestock producer needs to
   a. Increase stocking density.
   b. Focus more on age of forage at grazing.
   c. Focus more on timeliness of nitrogen application.
   d. Graze pastures when their yield/acre is maximized.
   e. All of the above.
   f. None of the above

6. Continuous close grazing of pastures at frequent intervals can

a. Maintain nutritive value at a relatively high level.
b. Create the introduction of weeds.
c. Reduce forage yield and vigor.
d. Reduce forage palatability/acceptability.
e. All of the above.
f. None of the above

Write Short Answers for Questions 7 to 12

7. Why should you emphasize proper establishment and management of pastures for your herd or flock? Explain.

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8. What do you understand by the term “liming” and how is it important to your pasture program? Explain.

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9. Why is continuous grazing considered to be a bad management practice on your farm? Explain.

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10. When purchasing hay for your animals what are some important factors to consider? Explain.

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11. From a forage standpoint, when is it most appropriate to commence grazing of your summer pastures? Explain.

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12. In any grazing situation is it a good practice to have your young, growing animals graze new pastures before the adults? Why?

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Fill in the Blanks for Questions 13 to17

13. The number of animals grazing a given area can be defined as _____.

14. Ammonium nitrate provides _____ as the major nutrient to pastures.

15. Animals increase their forage intake when forage digestibility _____.

16. When broadcasting seeds for pasture establishment use a _____ seeding rate as A general rule of thumb.

17. A commonly suggested stocking rate for adult meat goats is _____animals per acre. What is it for sheep?_____

True or False Questions 18 to 21

16. Annual pastures require replanting with the change of the season. T or F

17. Grasses are generally more nutritious than legumes. T or F

18. Forage quality reduces with age and maturity. T or F

19. Ryegrass is an excellent summer forage in Florida. T or F

20. Forages are the cheapest source of feed for small ruminants. T or F

21. Pasture rotation helps in the prevention of parasite buildup. T or F

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