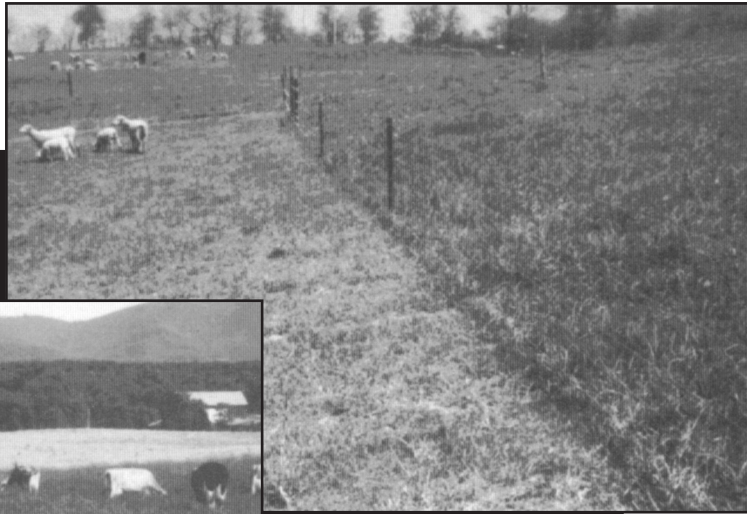


Controlled Grazing

OF VIRGINIA'S PASTURES





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Introduction¹

One of the keys to profitable livestock production is to minimize the costs of producing a marketable animal or animal product. Feed costs are commonly 70-80 percent of the cost of growing or maintaining an animal. Pastures provide feed at a cost of .01-.02 cents/lb of TDN while hay costs .04-.06 cents/lb TDN. Improved pasture management offers the single greatest opportunity to lower production costs, assuming that animal genetics, health, marketing procedures, and other areas of management have been addressed. A primary goal of livestock producers should be to utilize grazed forage for as many months of the year as possible while minimizing the need for stored feed.

In this publication, *controlled grazing* refers to the degree of control or level of management applied to grazing animals through the use of such *grazing systems* as *rotational stocking*, *continuous stocking*, and *strip grazing*. The method or combination of methods used to achieve the appropriate level of control will vary with each livestock farm. Regardless of the *grazing method(s)* utilized, the goal is to provide the amount and quality of the forage required by the particular class of grazing animal, while maintaining or improving the vigor of the plants being grazed.

Except in situations where a high level of grazing management is already being practiced, any increase in the degree of grazing control will improve forage utilization as it is sold off the farm as livestock product. The effective and profitable utilization of grazed forage depends primarily on the degree to which the manager is able and/or willing to exercise control in determining when, where, and for how long animals graze.

Controlled grazing alone will not overcome low soil fertility and low soil pH. Apply fertilizer and lime based on soil test results to meet the needs of the plants being managed. Proper grazing management enhances the growth of well-fertilized, desirable pasture plants, but seeding new stands or overseeding to thicken existing sods accelerates the improvement.

Why Controlled Grazing?

Virginia is blessed with soils and climate that favor the growth of a wide range of productive, high-quality grasses and legumes for grazing, hay, or silage. When grazed these plants need to be fully utilized without abusing their vigor and growth. They should not be grazed too closely or for too long. To achieve a balance between fully utilizing the plants while encouraging vigorous plant growth, the livestock manager must have a planned *grazing system* to control the way animals harvest available forage by grazing.

Without a controlled grazing system, managers cannot control the way their animals graze a pasture during the season. This lack of control can produce an extreme situation such as season-long *continuous stocking* where animals are left on the pasture until there is nothing left to graze or until they are removed at the end of the season. Pounds of livestock or their products per acre are low due to the undergrazing and overgrazing which occurs. Too many Virginia pastures are grazed without adequate control, although this is changing as producers begin to realize the benefits of *controlled grazing*.

Benefits of Controlled Grazing

The “bottom line” benefit of *controlled grazing* is improved profit through more efficient utilization and harvest of forage by grazing animals. Standing forage utilized directly by the grazing animal is always less costly and of higher quality than the same forage harvested with equipment and fed to the animal. There are several factors that contribute to greater profitability. The number of animals in the grazing system (*stocking rate*) can usually be increased by 30 to 50 percent. Gain per acre can also be increased by ensuring that high-quality, fresh, and unsoiled vegetative growth is available throughout the grazing system (Figure 1). Vigor of the pasture sod is improved. Handling and checking grazing animals is easier. More accurate estimates of the amount of forage available, greater uniformity in grazing of pastures, and the flexibility of harvesting and storing forage not needed for grazing are

¹ *Italicized words or terms are defined in the “Definition of Grazing Terms” glossary.*

advantages. Extending the length of the grazing season while providing a more uniform quality and quantity of forage throughout the season are also important benefits. Improved grazing management offers one of the greatest opportunities for making livestock farming more profitable by lowering production costs.

Influence of Controlled Grazing on Pasture Plants

The primary, cool season, perennial pasture grasses used in Virginia are orchardgrass, bluegrass, and tall fescue. When not utilized, each of these passes through successive stages of growth in the spring: 1) leafy vegetative; 2) boot with seed heads enclosed in leaf sheath; 3) heading when the seed heads begin to show and, 4) bloom when pollination has occurred (Figure 2). Since fiber and lignin contents increase steadily beyond the vegetative stage, while percent protein and digestibility decrease, a major goal in grazing management is to maintain these grasses in the leafy, vegetative stage at all times. Once the spring season is past, these grasses do not go through this series of growth stages until the next spring. Therefore, the regrowth after each grazing period is leafy and high in quality.

The bottom leaves of the grasses, especially the tall-growing orchardgrass and tall fescue, die due to shading and diseases as the plants grow tall. Such tall growth also shades clover plants, making it difficult for them to compete or even survive. As leaves mature they decrease in quality and growth rate slows. Removal of these leaves by the grazing animal stimulates new tillers and increases the vigor of the plants if conditions are favorable for regrowth. Legumes, such as red clover, ladino clover, and alfalfa, also go from leafy to stemmy growth stages with the same lowering of quality as the grasses (Figure 3). Except for calcium, the mineral content in these forages decreases from the leafy to the stemmy growth stages.

Nonstructural carbohydrates and other energy reserves are produced when plants are growing. The excess nonstructural carbohydrates are stored in roots, rhizomes, stolons, and tillers. They provide energy and nutrients while plants are being grazed and as they make regrowth. Reserves provide energy for persistence during drought, periods of low or high temperatures, and for growth when conditions improve. Levels of nonstructural carbohydrates are reduced as they are utilized for rapid plant growth, particularly after the plants are grazed so short that little leaf area remains. As leaf area increases, nonstructural carbohydrate reserves also increase due to the positive balance between photosynthesis and respiration.

When leaf area on plants is low, such as after close grazing or hay making, there is not enough energy (sugars) being produced by photosynthesis to provide for both leaf and root development. To “stay alive” the plant uses all available energy for producing new leaves until there is excess for root development. If the leaf area, and

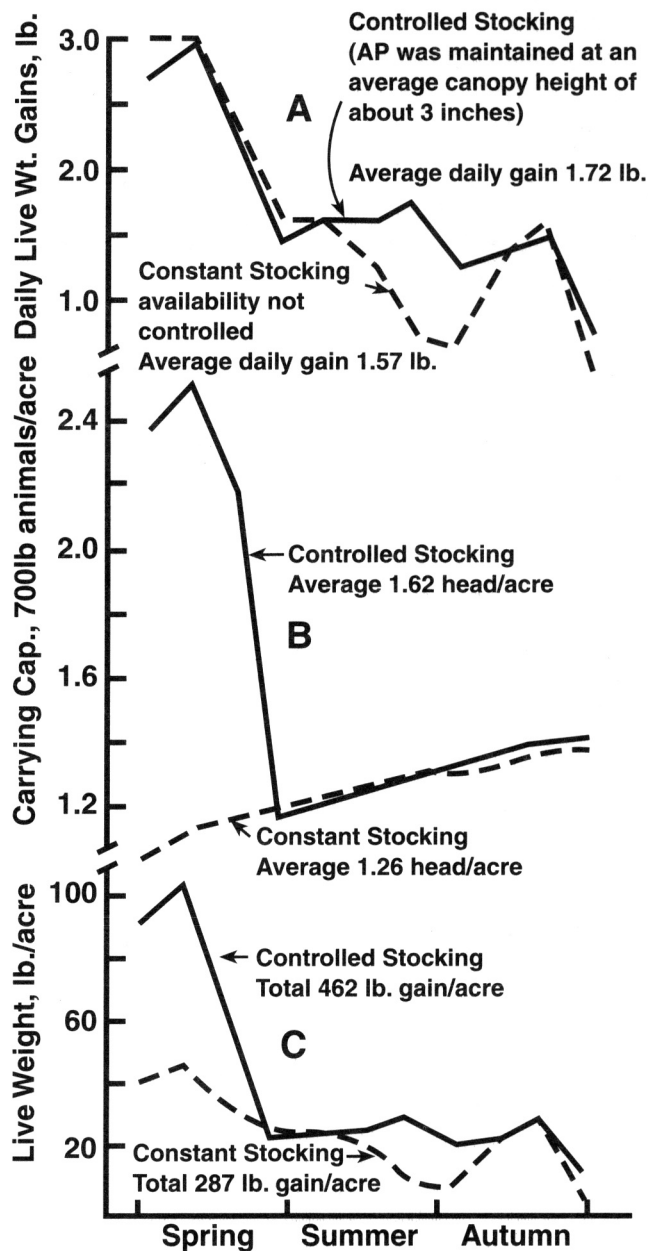


Figure 1. Controlled stocking based on available pasture gave higher liveweight gains per animal and per acre than constant stocking.

indirectly the stored energy, is always low due to continuous overgrazing, the root system is small, weak, and shallow. The deprived root system cannot provide adequate water and nutrients which contributes to a weakening of the entire plant.

Maximum growth of forage plants generally occurs when there are enough leaves present to intercept 90 percent of the sunlight, with less than 10 percent falling on the soil surface below the plants. Additional leaves do not increase production due to shading and loss of efficiency of the older lower leaves. This is the optimum time to begin grazing.

Utilizing these principles, the goal of efficient grazing management, with the plant in mind, is to practice grazing management which results in plant persistence plus high yields and quality while maintaining adequate leaf area and levels of nonstructural carbohydrates for stored energy. This means removing a major portion of the leaves by grazing at a time when plant reserves are adequate, then allowing the plant enough time to produce leaf area sufficient to replace the reserves utilized in the process of making regrowth.

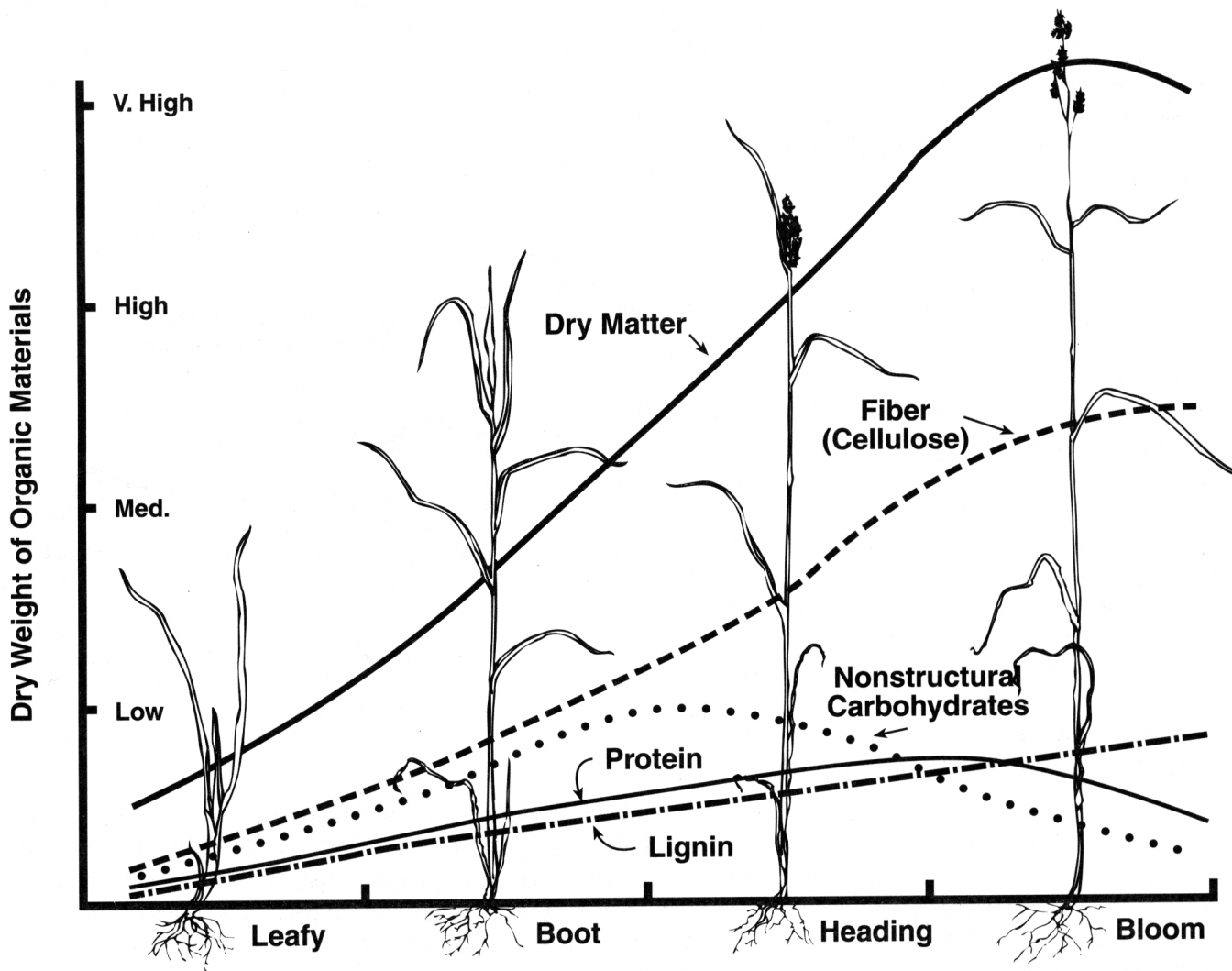


Figure 2. As unutilized cool season grasses such as orchardgrass grow from leafy to stemmy stages, dramatic increases in dry matter yields are accompanied by increases in cell wall materials (fiber and lignin) and decreases in protein and nonstructural carbohydrates.

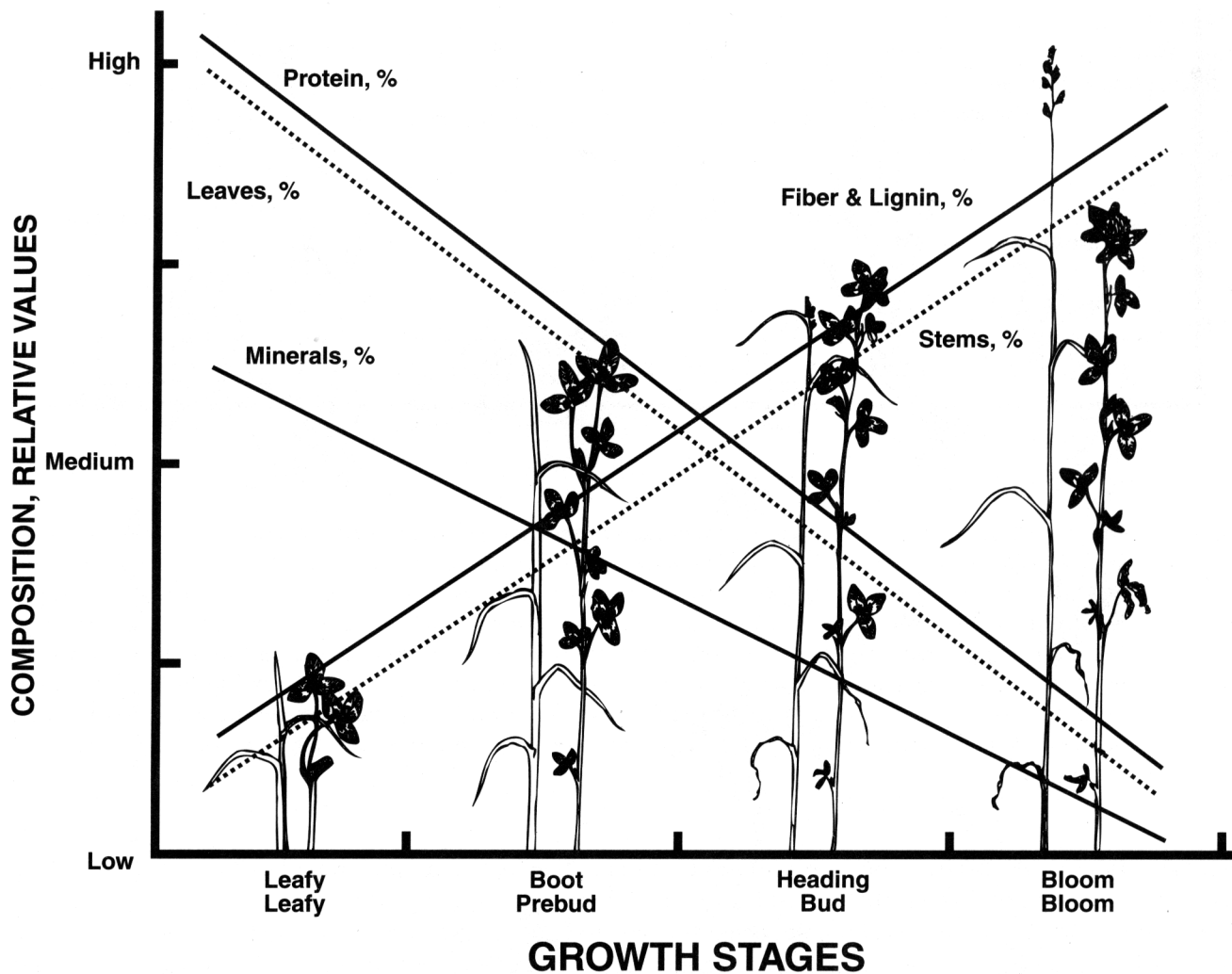


Figure 3. When perennial grasses or legumes grow from leafy to bloom growth stages, protein and mineral contents decline dramatically with leafiness. Concurrently, stemminess and cell wall materials increase rapidly as canopies grow to a stemmy bloom stage.

Perennial Forage Species for Grazing

Orchardgrass and tall fescue are tall growing, perennial, cool season grasses. Bluegrass is also a perennial, cool season grass which is shorter and has finer stems and leaves (Figure 4). Very close continuous grazing suppresses new growth of these grasses, but bluegrass is less affected than the two taller growing grasses. In addition to stored energy at the base of its tillers, bluegrass also has relatively high levels of nonstructural carbohydrates stored in its rhizomes which serve as sources of energy when it is grazed closely. Each of these cool season grasses, especially bluegrass, slows down dramatically in growth during the hot summer months.

The primary storage of nonstructural carbohydrates in orchardgrass is in the base of its tillers. Since it is also a tall grass compared to bluegrass, a large percentage of its tillers and their high levels of stored energy are susceptible to being removed by close grazing. Unlike bluegrass, orchardgrass has no rhizomes and tall fescue has only very short rhizomes for storage of energy.

Tall fescue is better able to withstand close, continuous grazing than orchardgrass. In addition to the non-structural carbohydrate reserves in the base of its tillers, tall fescue has reserve energy stored in its short rhizomes.

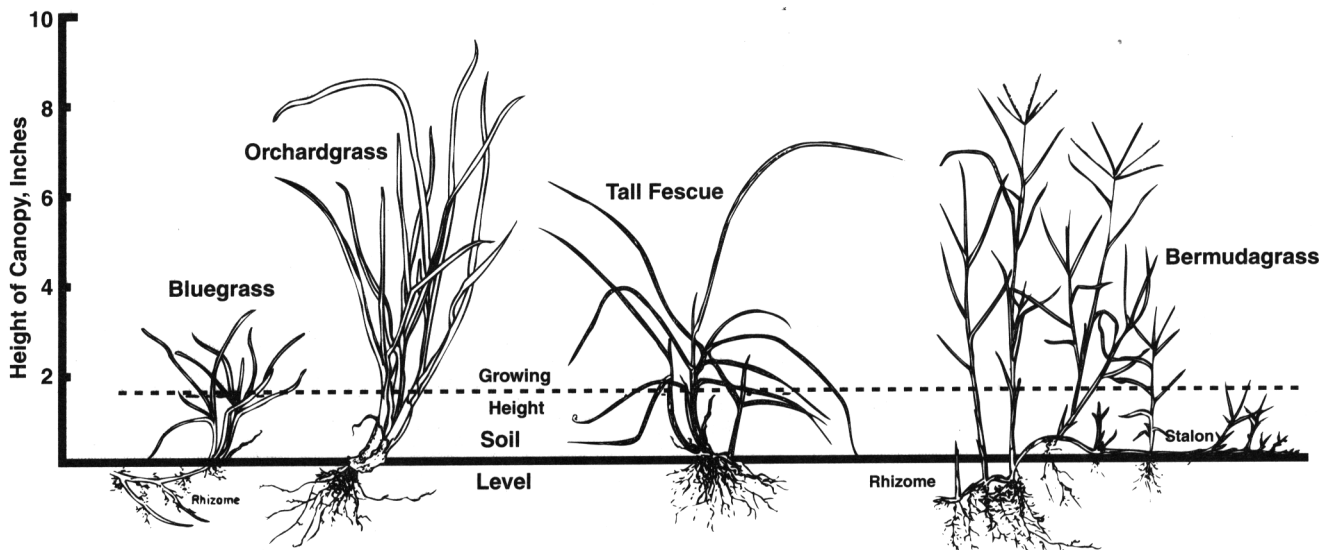


Figure 4. *Grazing and utilization methods are related to the morphological characteristics of grasses. Bluegrass has small leaves and tillers and forms a dense sod because of invading rhizomes (underground stems) that produce roots and tillers. Orchardgrass and tall fescue have large tillers and leaves. Nonstructural carbohydrates are high in basal parts of tillers. With bluegrass and fescue reserve nonstructural carbohydrates appear in tillers and rhizomes. Close grazing depresses orchardgrass more than fescue and fescue more than bluegrass because progressively more of the leafblades and carbohydrates in tillers are removed by close grazing. Bermudagrass, a warm season grass, thrives under close or lax grazing because a high leaf area is maintained and nonstructural carbohydrates in rhizomes and stolons are protected from grazing. New tillers and roots develop from buds in rhizomes and stolons.*

Tall fescue also has more leaves closer (semi-prostrate) to the ground. Based on these characteristics, bluegrass can be grazed down to 1 inch, tall fescue to 2-3 inches, and orchardgrass to 3-4 inches without causing injury to the plants. However, each species benefits from recovery periods following grazing to allow accumulation of leaf area and nonstructural carbohydrate energy reserves. The cool season species benefit from longer rest periods and from not being grazed as closely during periods of stress such as drought or high temperatures.

Light *grazing pressure* results in orchardgrass and tall fescue dominating bluegrass and the clovers due primarily to shading by the two tall growing grasses. In tall fescue-orchardgrass pasture mixtures, tall fescue can be expected to overcome the orchardgrass. This is partly because tall fescue is adapted to a wider range of soil moisture, temperature, and soil fertility than orchardgrass. Another factor is that animals often overgraze the more palatable orchardgrass. Tall fescue also is better able to withstand close grazing due to its semi-prostrate tillers and leaves. In *controlled grazing* systems with adequate, but not extreme, *grazing pressure*, bluegrass can often be maintained with orchardgrass and even tall fescue if soils and climate are favorable for bluegrass.

When properly managed, alfalfa and alfalfa-orchardgrass or alfalfa-tall fescue mixtures provide high-quality, high-yielding forage throughout the grazing season. Its large tap root enables alfalfa to obtain water during dry periods when more shallow rooted plants slow down in growth or dry up. Alfalfa needs a rest period following grazing. Alfalfa varieties developed specifically for grazing are often able to withstand closer grazing and require less recovery period than the traditional hay varieties. To ensure persistence and high yields, alfalfa should be grazed to 3-4 inches within five days, then given approximately 21 days for recovery growth before being grazed again. Regrowth initiates from buds in the crown and from leaf nodes on the stem after the terminal bud (flower) is removed by grazing.

Ladino and white dutch clover are the same (*Trifolium repens*) except for size. Ladino is a giant type while white dutch is much smaller. These perennial legumes have shallow root systems which make them susceptible to drought injury. They spread by stolons which are actually stems laying on the soil surface producing roots and leaves at each node (Figure 5). Since the stem (stolon) is on the soil surface rather than upright, grazing animals remove only leaves. This is a primary reason for the high quality of these plants and their ability to withstand close grazing.

Red clover is a perennial legume that generally persists for only two years in Virginia due to crown and root diseases. It has excellent seedling vigor and develops a strong tap root. Red clover can tolerate close grazing even on a continuous basis. Regrowth is initiated from buds in the crown. It is an excellent companion legume with orchardgrass and tall fescue because it grows tall enough to compete with them. It adds to the quality and productivity of pasture and is also well suited for grazing and for hay or silage.

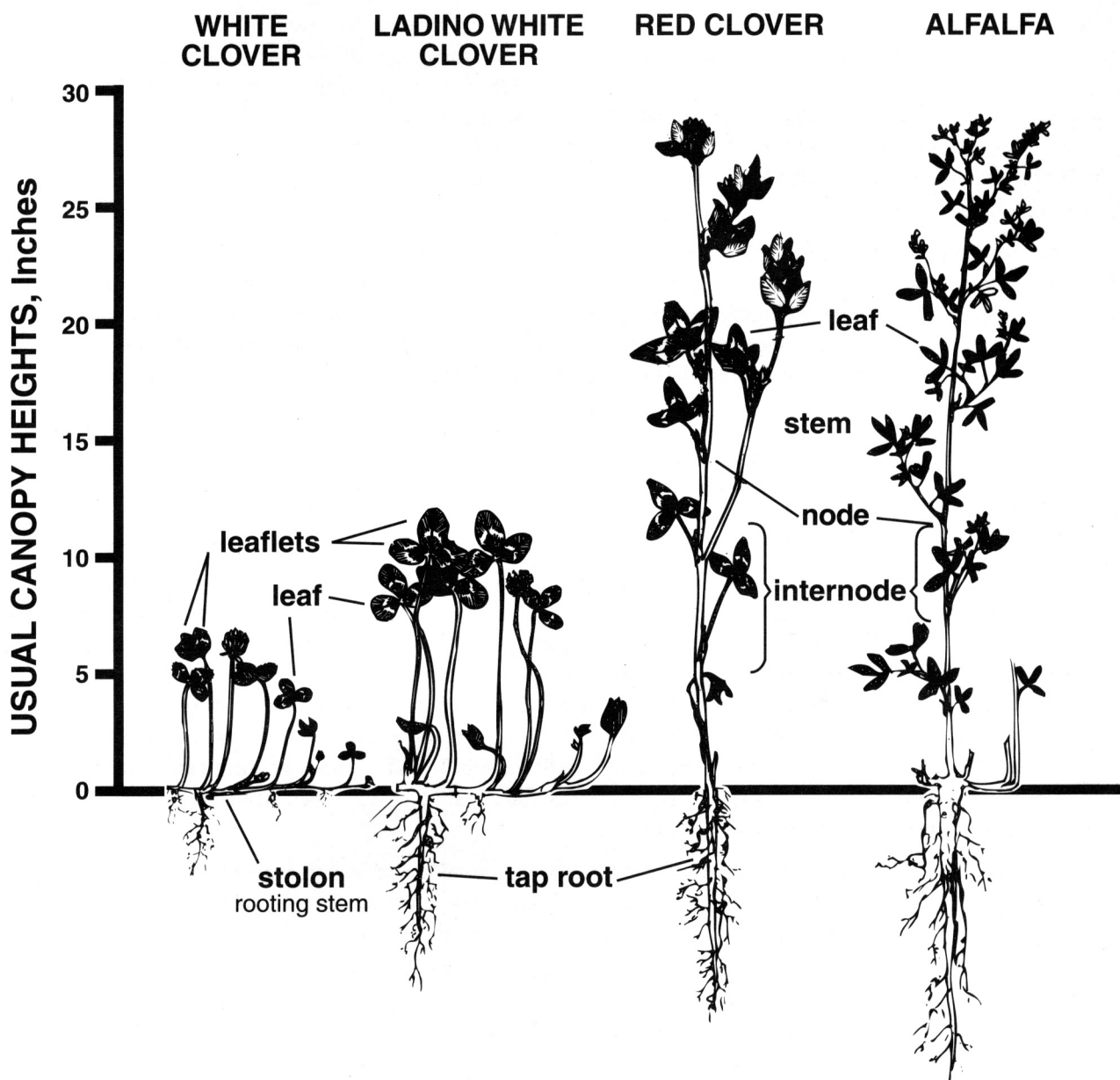


Figure 5. Morphological characteristics of the four main perennial forage legumes in Virginia. Short legumes such as white clover, where leaves grow from stolons at the soil surface, are used primarily for grazing. Tall erect legumes such as alfalfa and red clover may be used for hay, silage, and rotational grazing with special management. Alfalfa, with deep tap roots, produces higher yields than the other legumes. The “growth points” in its crowns, covered with soil to protect them from drought and cold, make alfalfa persistent.

Getting Started with Controlled Grazing

By utilizing an effective grazing system, the manager gains control of the grazing animal and therefore gains control of how the forage plants are treated. Such a system needs to be simple and flexible. Each farm is different, as is each season and each manager, among many other factors. The principles of managing plants for grazing discussed thus far are based on plant science. The daily and seasonal decisions, such as where fences should be placed, when grazing livestock should be moved, which pasture should be grazed first, and size and number of pastures in the grazing systems, are usually based on good judgment and experience. Thus, grazing management is very much an art that is best learned by “doing.”

The degree of control exercised will vary with the situation. Simply dividing a pasture boundary with one fence to provide two areas or paddocks instead of one large pasture increases the degree of control (Figure 6). Additional paddocks and greater control can be established by continuing to subdivide the pasture boundary (Figure 7). Some producers may want to gain very close control, to the extent of moving grazing animals every 12 hours. Generally, when the number of paddocks is more than 4-6, the goal is high-quality forage for high-performance livestock, such as dairy cows or stocker cattle. One practical technique is to use a single strand of temporary wire to limit the grazing animals to the area that can be grazed in the allotted time (Figure 8). Move the wire forward to provide fresh grazing. No back fence is required if the entire paddock is grazed in less than seven days or before significant regrowth occurs.

The first requirement for *controlled grazing* is a boundary fence that will effectively hold grazing animals on the farm or in the pasture area. Temporary or only minimal interior fencing is required to hold the animals in the subdivisions or paddocks. It is very likely that the fencing system will change as the manager gains experience. Do not be afraid to make mistakes because there is no single “perfect” system for any given situation. Lessons learned from the first experience with *controlled grazing* can be easily incorporated into the grazing system.

Guidelines for Establishing Controlled Grazing

Because of the need to start somewhere, general guidelines are useful. Each farm situation is different. Cool season pasture plants generally need about 15 days of rest after being grazed in spring, and 25-30 days of rest during the hotter summer months. Grazing animals should be moved through pastures quickly in the spring, or graze the spring growth continuously without division fences or by giving animals access to all paddocks. Once forage growth begins to exceed livestock demands, limit the area to be grazed to provide forage for no more than 5-7 days grazing, and the excess forage should be harvested as hay or silage. As growth slows during the summer, longer rest periods are necessary and more acreage is required. Additional summer grazing can come from pastures harvested for hay in the spring, from forage species included in the system specifically for summer production, or from hay fields outside the rotational system.

Switchgrass, Caucasian bluestem, and bermudagrass are perennial warm season grasses that make significant growth during the summer months when the cool season perennial grasses slow down in growth. The management of these grasses is discussed in greater detail in the section on extending the grazing season.

Another general rule of thumb is to place enough *grazing pressure* on the forage in each paddock to utilize it within 5-7 days. If grazed longer, plant regrowth begins to be grazed in preference to the existing growth. Generally, the shorter the grazing period, the more uniformly the forage is grazed, with minimal spot grazing.

Any subdivision of pastures provides improved grazing control. However, to meet the guidelines of 15-30 days of rest after grazing for no more than 6 days, at least 6 paddocks are required. The more paddocks, the greater the grazing control and the more flexibility the system has to offer. Livestock distribution is improved, forage waste is reduced, the plants are provided longer periods to make regrowth after being grazed, and the plants are maintained in a leafy, vegetative state for longer periods of time.

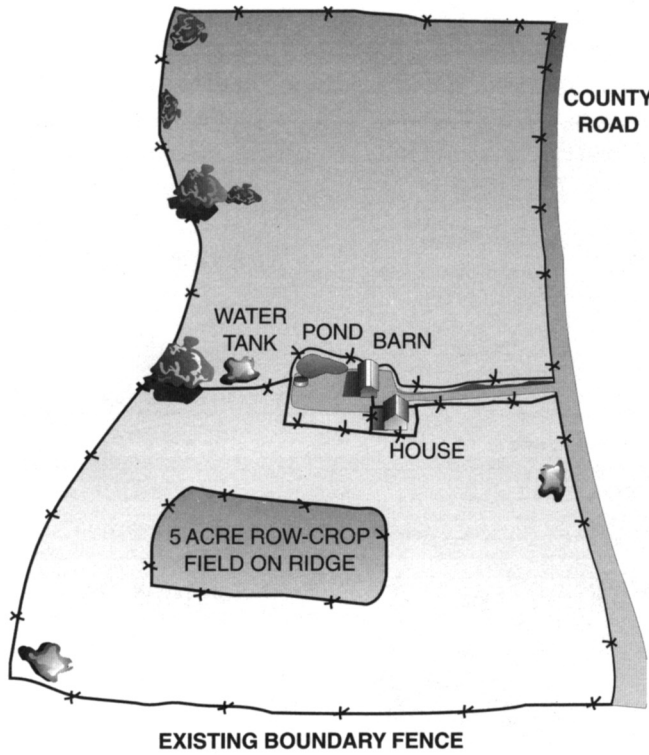


Figure 6. Dividing a large pasture into two paddocks improves control and flexibility.

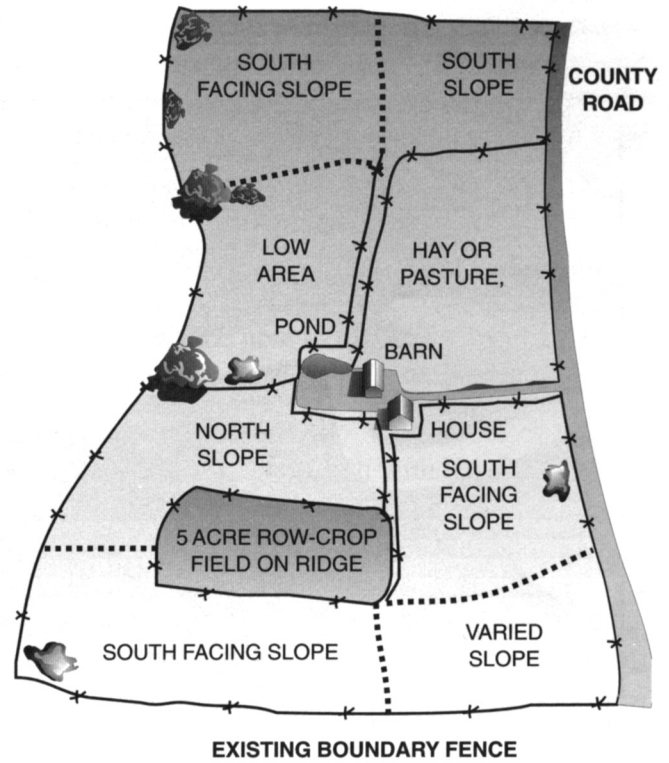


Figure 7. Dividing the large pasture into additional paddocks increases control of the grazing animals.

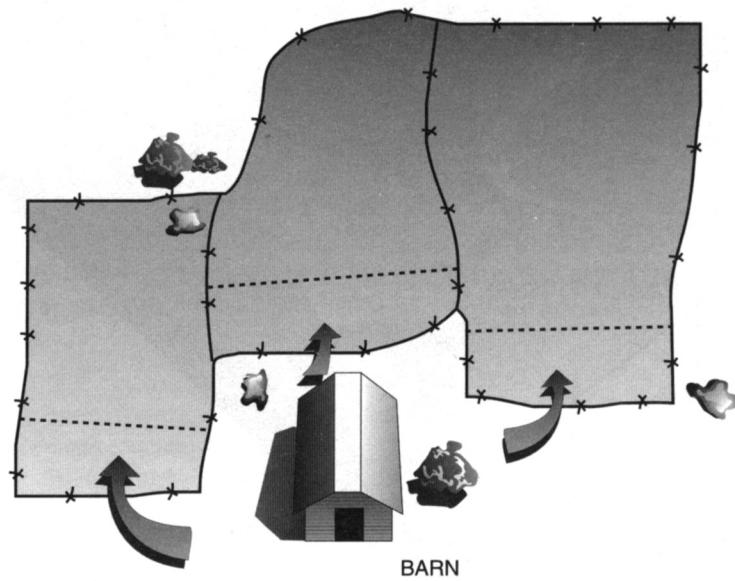


Figure 8. For very intensive grazing a single strand of temporary wire with no "back fence" can be moved every few hours to provide fresh forage.

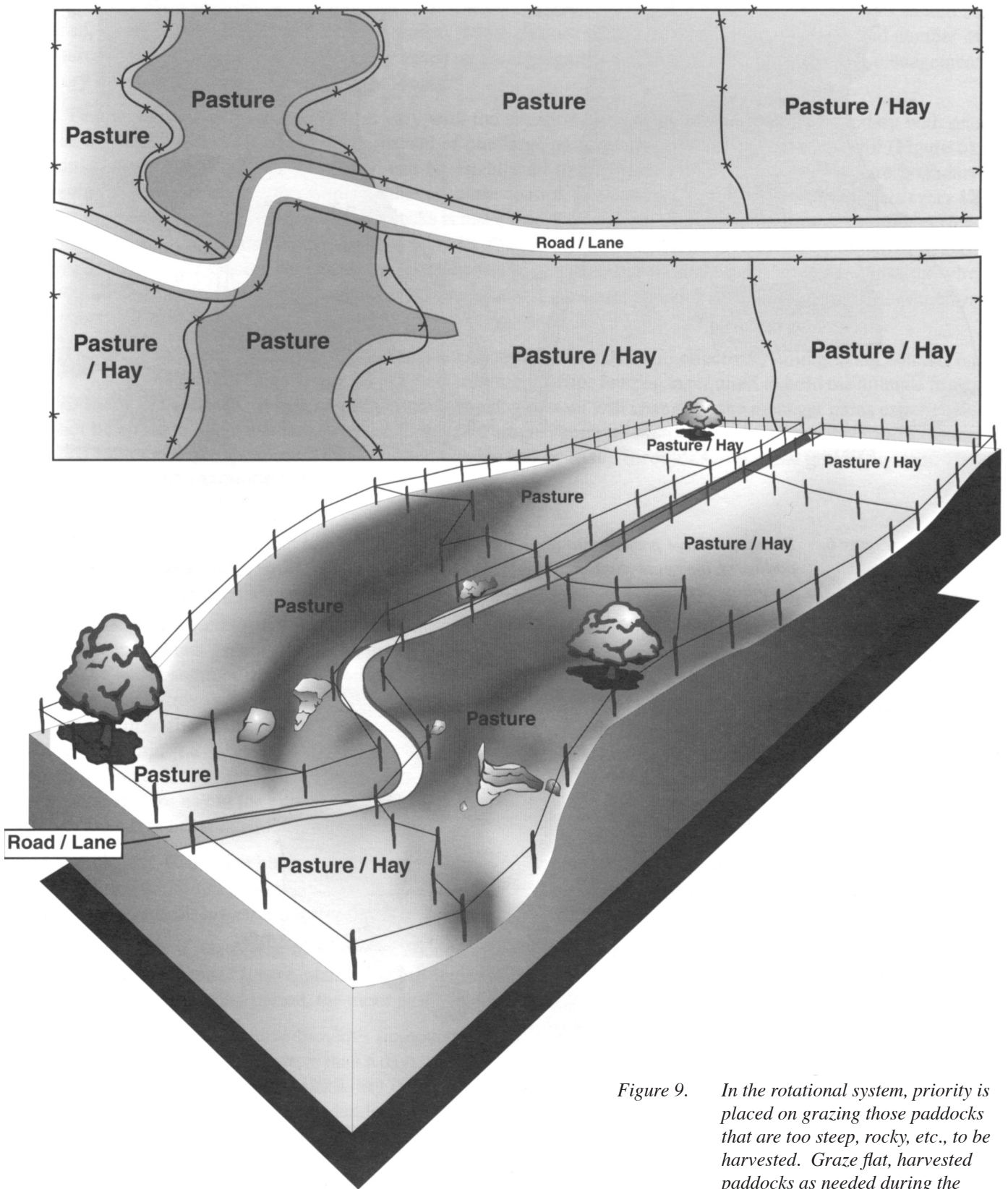


Figure 9. In the rotational system, priority is placed on grazing those paddocks that are too steep, rocky, etc., to be harvested. Graze flat, harvested paddocks as needed during the season.

However, as paddock numbers for a given pasture acreage increase, *grazing pressure* increases, raising the potential very quickly for overgrazing and weakening the plants. To prevent overgrazing, higher levels of management skills are required, along with more frequent monitoring. Always plan to have an alternative source of feed, especially during July and August when drought and/or high temperatures slow plant growth. The alternative feed may include “escape pastures” composed of warm season perennial or annual grasses or cool season forages that were harvested for hay earlier in the season, hay, poultry litter, or silage. *Controlled grazing* offers the opportunity to “inventory” the available forage. The manager can look ahead to the ungrazed paddocks, estimate how long it will take to graze each of them, and plan accordingly.

There are two basic approaches to planning a grazing system that provides forage throughout the grazing season, including the summer months when slower plant growth is combined with the increasing forage requirements of growing livestock:

1. Plan a system of paddocks in which the grazing animals will be able to utilize all the spring growth. As summer approaches, add fenced fields that were harvested for hay or silage to provide the needed additional grazing.
2. Include enough acreage in the system to provide grazing during the month with least production and harvesting of hay from those paddocks not needed for grazing at other times.

While the differences in these approaches are subtle and may not appear to be great, the actual layout of the systems can be quite different and significant. For example, if much of the land available for pasture is too steep or rocky to harvest for hay, spring grazing should be planned so the paddocks in these areas are heavily grazed. Later in the season, paddocks that were harvested for hay can be grazed (Figure 9). If all the pasture land can be harvested, there are advantages to including all that land in the grazing system so that different paddocks can be harvested for hay as necessary.

All paddocks do not need to be the same size or shape. Square paddocks are ideal. Long, narrow paddocks that are 4-5 times longer than their width should be avoided. Livestock often will not graze them uniformly plus long traffic lanes often encourage soil erosion. Place fences to separate areas with different plant species. Use fences to hold grazing animals on areas such as steep hills where they would not naturally prefer to graze. Minimize fencing up and down slopes where travel patterns encourage soil erosion. Place gates in corners nearest the direction of normal livestock travel to and from the paddocks.

The importance of shade for grazing animals is strongly debated in Virginia. Milk cows on very hot summer days need shade if they are going to be out in the paddocks in the middle of the day. However, under such conditions, the cows will go to the barn to find shade. Other livestock are more comfortable in shade on hot summer days, but there is no clear evidence that production is affected. A disadvantage of shade is the concentration of manure and the killing of pasture sod in areas of congregation. Compared to many areas of the country, Virginia has very mild summers.

The formula given below is a useful tool for beginning to plan the acreage per paddock and the number of paddocks needed. It takes into account the amount of forage dry matter required for a given set of circumstances and the amount of forage dry matter available in estimating the acreage needed.

$$\begin{array}{ccccccc}
 \text{Avg. wt. of animals} & & \text{Dry matter consumed per animal} & & \text{number of} & & \text{Days on} \\
 \text{to be grazed} & \times & \text{as \% of body weigh} & \times & \text{animals} & \times & \text{the paddock} \\
 \hline
 & & & & & & = \text{Acres required} \\
 & & & & & & \text{per paddock} \\
 & & \text{Dry matter available/acre} & & \text{\% of the dry matter} & & \\
 & & \text{in the paddock to be grazed} & \times & \text{utilized by grazing} & &
 \end{array}$$

Example for determining paddock size and number of paddocks for a herd of beef stocker cattle:

$$\frac{500 \times .03 \times 20 \times 5}{1500 \times .80} \times \frac{1500}{1200} = 1.3 \text{ Acres required per paddock}$$

In this example, assume twenty, 500 lb steers eating 3 percent of their body weight grazing for 5 days on pasture with 1,500 lb of dry matter present (Table 1) per acre of which they consume 80 percent. Under these conditions, the 20 steers will graze down 1.3 acres in 5 days. Increased weights of the animals and differences in the amount of dry matter available in the paddock during the season can be taken into account by changing the estimates entered into the formula.

To determine the number of paddocks required:

$$\frac{\text{Days of Rest}}{\text{Days of grazing}} + 1 = \text{Number of Paddocks}$$

Assume 15 days of rest in spring.

$$\frac{15}{5} + 1 = 4 \text{ Paddocks needed}$$

Assume 30 days of rest in summer.

$$\frac{30}{5} + 1 = 7 \text{ Paddocks needed}$$

During the spring when plants are growing rapidly and each paddock is grazed in five days then rested for 15 days, four 1.3 acre paddocks or a total of 5.2 acres will be required for the 20 steers. With 30 days of rest during the summer, seven 1.3 acre paddocks or a total of about nine acres will be required. The additional four acres needed for summer grazing could be the acreage harvested for hay in the spring.

Example for determining paddock size and number of paddocks for a dairy herd:

$$\frac{1200 \times .03 \times 100 \times 5}{2000 \times .70} = \frac{1800}{1400} = 1.3 \text{ Acres required per paddock}$$

Assume 100 1200-lb dairy cows eating 3 percent of their body weight grazing for 1/2 day on pasture with 2,000 lb of dry matter present per acre (Table 1) of which they consume 70 percent. Under these conditions, the 100 cows would graze down 1.3 acres in 12 hours or 2.6 acres in one day.

Table 1. Estimates of forage dry matter available per acre at the beginning of each rotational grazing cycle based on annual production¹.

Dry matter yield T/Ac/Yr	5.5	5.0	4.5	4.0	3.5	3.0	2.0
lb Forage dry matter Available/Ac/Rotation	2200	2000	1800	1600	1400	1200	1000

¹ D.L. Emmick and D.G. Fox. *Prescribed Grazing Management to Improve Pasture Productivity in New York*. September, 1993.)

To determine the number of paddocks required:

$$\frac{\text{Days of Rest}}{\text{Days of grazing}} + 1 = \text{Number of Paddocks}$$

Assume that alfalfa is being grazed with 21 days of rest and the cows are moved twice each day.

$$\frac{21}{5} + 1 = 43 \text{ Paddocks needed}$$

The 100 dairy cows requiring 43 paddocks of 1.3 acres each would need about 56 acres. A factor that enters this situation is the amount of grain, silage, etc., that the herd is getting in addition to the grazed forage. If heavy dry lot feeding occurs while the animals are on pasture, less acreage will be required.

This approach is very helpful in the initial planning for *controlled grazing*. Actual experience will nearly always result in fine-tuning and adjusting the system. The use of temporary fencing for paddocks leaves plenty of opportunity to make these adjustments as needed. While these guidelines deal with the number of days of grazing, it must be clearly understood that the actual decision on when to move grazing animals out of or into a paddock is based on the available forage in that paddock.

Managing Controlled Grazing

Managing a *grazing system* offers daily challenges and opportunities to utilize the pasture plants as high-quality feed for grazing animals without weakening the plants. However, there is plenty of flexibility in the degree of intensity. If the manager needs to be away for an extended period, animals can be given access to additional paddocks so they have plenty of forage. Or, it is easy to leave simple directions for moving livestock as necessary.

An experienced manager is able to estimate the number of grazing days a paddock will provide by observing the height and density of its plant growth. When in doubt, it is nearly always better to leave a liberal amount of forage rather than allow it to be grazed too closely.

Techniques such as *creep grazing* of calves in a cow-calf operation can be easily incorporated into the system. Placing structures at gate openings so calves can walk through to graze fresh growth in the next paddock is a common way to creep graze. Raising the fence to allow calves, but not cows, to walk under it is a simple way to creep graze.

Another way to provide the best quality forage to those animals that can most efficiently convert it to a saleable product is “first-last grazing.” For example, stocker cattle are allowed to selectively graze the highest quality plants (first grazers). They are rotated to the next paddock and dry dairy cows or beef cows (last grazers) follow and finish grazing the forage partially removed by the first grazers.

Ideally, by *continuous grazing* or rapid rotation through paddocks in spring and by harvesting those paddocks not needed for grazing for hay or silage, grass seedheads will be kept to a minimum. In practice, there are usually some paddocks in which the timing of grazing is such that the meristematic growing points that move up the stalk to form the seedhead are not removed. In most instances, it is not productive to clip these paddocks simply to remove the relatively sparse seedheads. Livestock will nip most of them off during the next grazing period. If weeds are present and not grazed, clip them to prevent seed production.

In those instances where *grazing pressure* is inadequate and results in mature, low quality forage, clipping will stimulate new, high-quality growth. Overall, clipping is expensive and should be minimized by properly managed *controlled grazing*.

A key to managing *controlled grazing* is to gain the ability to anticipate available forage in other paddocks in the system. In spring or following a drought when all the paddocks are starting growth at the same time, it is

necessary to start grazing before the optimum amount of growth is present. If grazing is postponed until the forage in all paddocks is 6-8 inches tall, the plants in several paddocks in the grazing sequence will decrease in quality before they are grazed. Those paddocks grazed first will provide forage for only a short time before the animals need to be moved.

Water and Controlled Grazing

The availability and accessibility of clean, fresh drinking water for grazing animals is a serious consideration and may limit the design and management of *controlled grazing* systems. A supply of water does not always need to be present in each pasture, but it certainly needs to be available within walking distance of 500-600 feet for milking dairy cows and 1,000-1,200 feet for other livestock. There are many options available, such as solar pumps, ram pumps, cattle operated pumps, spring development, drilled wells, gravity-flow systems, and wind-mills. Do not allow the lack of existing water to be a complete barrier to the development of *controlled grazing* systems until all practical possibilities for supplying water have been explored.

Extend the Grazing Season with Controlled Grazing

One of the benefits of *controlled grazing* is the opportunity to take advantage of the particular contributions various forages can make toward extending the grazing season. (Figure 10). A single, continuously grazed pasture offers little opportunity to do this. For example, with six paddocks, there is the opportunity for several of the paddocks to be seeded to forage species such as switchgrass or alfalfa-orchardgrass.

Utilizing stockpiled tall fescue for winter grazing is a practical way to extend the grazing season and lower winter feed costs. Remove livestock from the tall fescue paddocks August 1-15. Apply 60-80 lb of nitrogen per acre plus lime, P_2O_5 , and K_2O as needed. Allow the fall growth of tall fescue to accumulate. After the forage in other paddocks has been grazed in late fall - early winter, turn the livestock into the stockpiled tall fescue paddocks to graze the accumulated growth; ideally, this will be in late November to early December. Strip grazing to limit the forage offered to the amount that can be grazed in seven days or less will significantly increase the number of grazing days. Since tall fescue is dormant and makes no regrowth at this time of year, it is not necessary to have a back-fence. The increase in grazing days is realized primarily from reduced trampling and soiling of the forage. At the same time, fresh forage is made available as each new strip becomes available. With adequate late summer and fall rainfall, one acre of a strong tall fescue sod managed in this manner will provide sufficient grazing for a beef cow for four months.

The use of warm season perennial grasses, such as switchgrass, Caucasian bluestem, and/or bermudagrass, in grazing systems can provide significant summer forage. Having the grass available for grazing in July and August relieves *grazing pressure* on the cool season grass pastures. This summer growth also provides a greater opportunity for growth of fall forage and to set aside and stockpile tall fescue for winter grazing.

Switchgrass and Caucasian bluestem need to be rested for about four weeks after being grazed. A stubble height of 8-10 inches should be left when grazing switchgrass and 3-4 inches of growth when grazing Caucasian bluestem. Bermudagrass has strong rhizomes and stolons which allow it to be grazed closer and more frequently than most pasture grasses. However, it does respond to *rotational stocking* which results in grazing the plants from 6-10 inches tall down to 1-2 inches followed by a 2-4 week rest period.

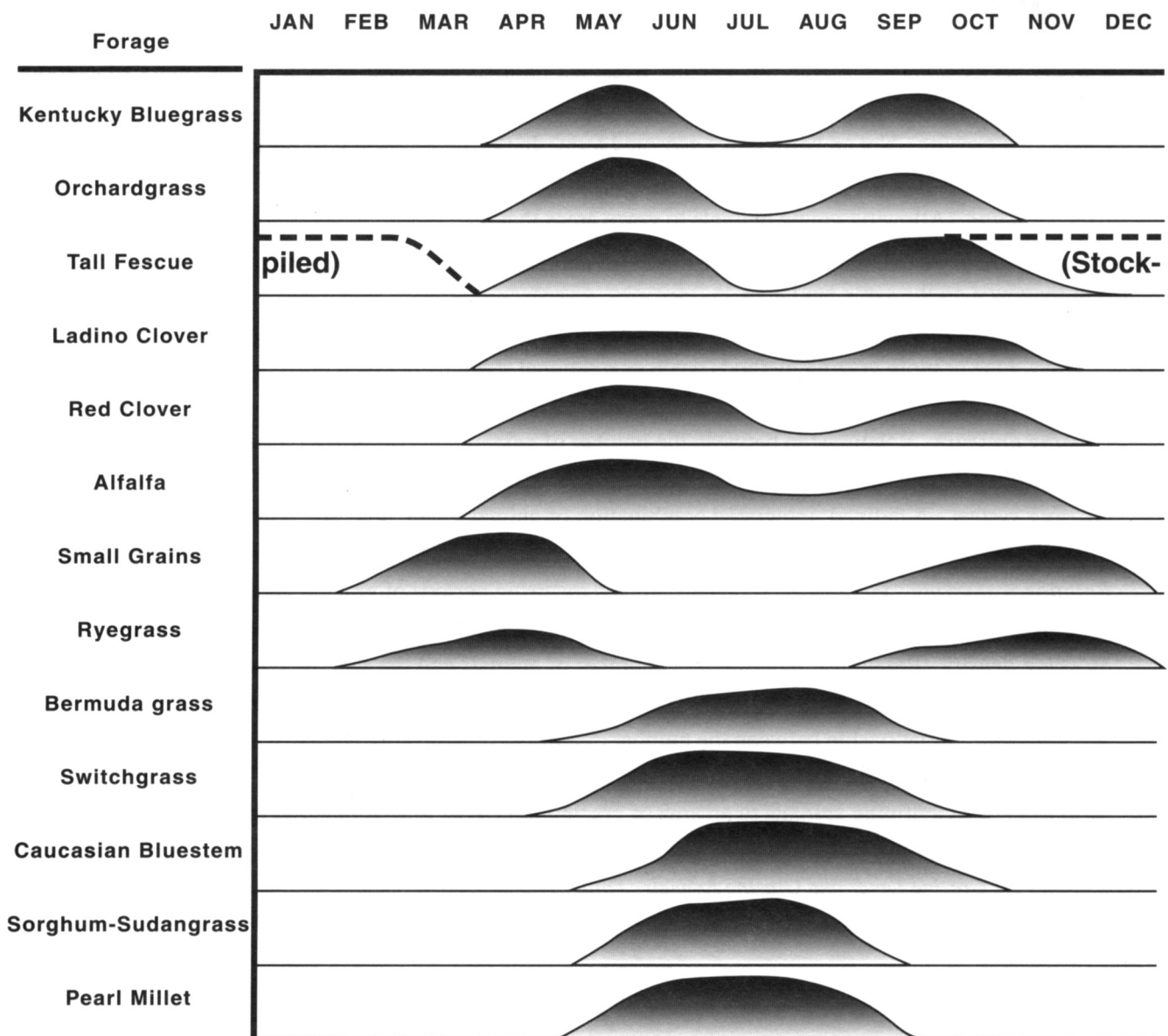
Sudangrass and sorghum-sudangrass are summer annual grasses that provide large amounts of high quality grazing during summer. These plants can contain toxic levels of prussic acid during their early stages of vegetative growth. Once the plants are an average of 30 inches tall they are safe to graze. Each paddock should be grazed down to 3-6 inches within 3-5 days to avoid trampling losses, provide uniform utilization, and minimize grazing of regrowth high in prussic acid. Graze again when plants are an average of 30 inches tall. The leaves of these plants can contain dangerously high levels of prussic acid immediately after being killed by frost. Do not graze such plants until the frosted leaves have dried. Then beware of new leaves that may sprout following the frost.

Dwarf pearl millet is another summer annual grass that provides valuable summer grazing. Prussic acid is not a concern with pearl millet. Grazing can begin whenever forage is needed but preferably not before plants are at least 18 inches tall. Since most of the regrowth from pearl millet occurs from nodes on the stem, leave a stubble height of 6-8 inches. Graze the plants down within 3-5 days to minimize trampling losses and graze again when the plants reach a height of 18 inches or earlier if needed.

Another group of plants valuable for extending the grazing season are the small grains. Any of these winter annuals can be grazed during late fall, winter, and early spring, but rye is most commonly used. Varieties of rye adapted to Virginia conditions make considerable growth in late fall-early winter as well as in late winter – early spring.

Wheat also provides excellent grazing, particularly if growth is needed in late spring. Since wheat matures later than rye, it can be grazed later in spring. Triticale, a cross between wheat and rye, matures later than rye but earlier than wheat. The small grains can be grazed continuously during periods of rapid growth. Once they are grazed down to 1-3 inches, they benefit from a rest period until they reach a height of 6-8 inches. If wheat or triticale is being grown for grain, grazing should stop by March 1 as a general rule, to avoid removal of the growing point or seed head.

Figure 10. Seasonal growth of forages contributing to year-round grazing.



Summary

The development of grazing systems to provide the appropriate degree of control of grazing animals and the plants they graze is a management tool that successful livestock producers will continue to make greater use of in the future. Reducing production costs is a key to profitability in the livestock industry and feed is a major cost. Efficient marketing of forage through livestock which harvest it directly by grazing is a key way to reduce production costs. By controlling the grazing animal, the manager will profit from enhanced livestock performance and continued forage plant productivity.

Definitions of Grazing Terms Used in this Publication²

Continuous stocking - A method of grazing livestock on a specific unit of land where animals have unrestricted and uninterrupted access throughout the time period when grazing is allowed.

Controlled grazing - Not an “officially” accepted term. In this publication it refers to the degree of “control” applied by the manager to grazing animals by developing grazing systems utilizing appropriate grazing methods.

Creep grazing - Allowing young animals to graze areas that their dams cannot access at the same time.

First-last grazing - Utilizing two or more groups of animals, usually with different nutritional requirements, to graze in sequence on the same land area.

Grazing method - A defined procedure or technique of grazing management designed to achieve a specific objective(s). One or more grazing methods (such as rotational stocking or creep grazing) can be utilized within a grazing system).

Grazing pressure - Relationship between the number of animal units or forage intake units and the weight of forage dry matter per unit area at any one point in time; an animal-to-forage relationship.

Grazing system - A defined, integrated combination of animal, plant, soil, and other environmental components and the grazing method(s) by which the system is managed to achieve specific results or goals.

Rotational stocking - Grazing method that utilizes recurring periods of grazing and rest among two or more paddocks in a grazing management unit throughout the period when grazing is allowed.

Stocking density - Relationship between the number of animals and the specific unit of land being grazed at any one point in time (animal units at a specific time/area of land).

Stocking rate - Relationship between the number of animals and the grazing management unit utilized over a specified time period (animal units over a described time period/area of land).

Strip grazing - Confining animals to an area of grazing land to be grazed in a relatively short period of time, where paddock size is varied to allow access to a specific land area

²Terminology for Grazing Lands and Grazing Animals. Forage and Grazing Terminology Committee.

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