

Rotational Grazing Benefits and Specific Methods

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Abstract

Rotational grazing is a topic frequently discussed among forage producers. Many testimonials have been made regarding the benefits of rotational grazing. Some claim that simply implementing a rotational grazing system will allow doubling or even tripling stocking rates and total elimination of fertilizer inputs. These claims are far from true; however, rotational grazing does offer substantial benefits to cattle producers located in the humid eastern US, including improved animal productivity, increased plant persistence, conservation of environmental resources, and improved animal temperament. This article gives a general overview of rotational grazing, with examples taken in part from *Southern Forages* (3rd ed) and a large, three-year grazing study conducted by Drs. Hoveland, McCann, and Hill at the University of Georgia.

Résumé

Le pâturage en rotation est un sujet souvent abordé par les producteurs de fourrage. Il y a beaucoup de témoignages en faveur du pâturage en rotation. On avance que le choix d'un système de pâturage en rotation permettrait de doubler voire tripler la densité des animaux et d'éliminer entièrement l'utilisation de fertilisants. Ces déclarations sont loin d'être vraies; toutefois, le pâturage en rotation est quand même avantageux pour les producteurs de bétail dans les états humides de l'est des États-Unis car il permet d'augmenter la productivité animale, d'accroître la persistance des plantes, de conserver les ressources environnementales et d'améliorer le tempérament des animaux. Cet article fournit un exposé général sur le pâturage en rotation avec des exemples provenant en partie du livre *Southern Forages* (3^{ème} édition) et d'autre part d'une grande étude de 3 ans menée par les docteurs Hoveland, McCann et Hill de l'université de Georgia.

What is Rotational Grazing?

Rotational grazing is defined as "a grazing method that utilizes repeating periods of grazing and rest among two or more paddocks or pastures." There are many other terms used by producers and scientists for rotational grazing. A few of these are *intensive grazing*, *controlled grazing*, *MiG* or *management intensive grazing*, and *rotational stocking*.

Controlled or rotational grazing is normally used as a general term. For simplicity, initial discussion in this article will be limited to general rotational stocking, which is probably the method most often considered by cattlemen.

More specialized grazing methods can be combined for further flexibility. Several forms of controlled grazing include *rotational stocking*, *buffer grazing*, *strip grazing*, *creep grazing*, *deferred grazing*, *limit grazing*, *first-last grazing*, *mixed species grazing*, *sequence grazing* and *frontal grazing*. These specific methods are best applied under different situations and will be discussed later in this manuscript. These principles can be applied to various other systems depending upon animal requirements, plant needs and environmental conditions (drought, muddy soils, stream protection).

Why Should I Implement Rotational Stocking?

Forages are typically inefficiently utilized when pastures are continuously stocked. Often cattle will only utilize 40-60% of the forage in a pasture, with the rest refused or wasted. There are many reasons for this waste. Cattle will heavily graze areas close to shade or water and ignore more distant areas. Animals also prefer young, tender, and leafy portions of forages and refuse stemmy mature material when allowed a choice. When there is an excessive amount of forage present, cattle frequently return to grazed areas to utilize fresh regrowth and refuse previously ungrazed forage because hemicellulose, cellulose and lignin content has increased, making the grass "tough" and less palatable.

Effects on Animal Performance

Many times, the benefits of implementing rotational grazing are exaggerated. Claims of doubling or even tripling stocking rate are sometimes made. While some producers have doubled stocking rates when converting to rotational grazing systems, this increase was due to the fact they were severely understocked when they practiced continuous grazing. It is often possible to increase stocking rate and decrease hay and fertilizer inputs using rotational stocking. Stocking rate increases of 35-60% have been reported in the scientific literature (Table 1). However, as a general rule, stocking rates can be increased by 10-25% over several years as pasture and forage management skills improve. In the meantime, excess forage production can be harvested as hay.

Often, rotational stocking is not particularly helpful from an animal performance perspective. Forcing cattle to graze forage to a predetermined height eliminates their ability to select high quality leaves and often reduces individual animal performance (daily gain per head). This is particularly important when animals with high nutrient requirements, like stocker cattle or replacement heifers, are rotationally grazed on bermudagrass or bahiagrass.

Remember that although individual animal performance is reduced, it is possible to increase stocking rate, resulting in higher gain per acre. For producers grazing animals with lower nutrient requirements, like mature cows, this can be a great advantage. In a three-year study conducted in central Georgia, rotational stocking improved cow-calf stocking rate by about 38% and improved calf production per acre by 37%. Individual cow or calf performance was not affected in this study (Table 2).

Effects on Plant Persistence

While increased animal production is often what “sells” rotational stocking to producers, plant performance is also improved. Many plants respond well to short grazing and long rest periods. Rest periods allow plants to produce new leaves which collect energy, transform it into sugars, and store these sugars so that more leaves can be produced following the next grazing cycle.

Table 1. Increase in gain per acre for rotational compared to continuous grazing.

State	% Increase
Arkansas	44
Georgia	38
Oklahoma	35
Virginia	61

Not only is regrowth potential improved, but root depth and stand life are improved as well, which may improve drought tolerance. Practicing controlled grazing also decreases the amount of trampling and pugging of plants and soils (particularly on wet clean-tilled fields). This can improve productivity and persistence of forages.

Under rotational grazing in the study conducted by Hoveland and others, endophyte-free tall fescue productivity and persistence was greatly improved. This resulted in less hay feeding in the rotational stocked system (Table 3). In fact, over the three-year grazing study, cattle in the rotationally stocked system required 31% less hay per head. If this hay were priced at \$100 per ton, an annual average savings of \$37.55 per cow would be realized for each of the three years. Supplement costs and labor for feeding hay would add to the rotational stocking advantage.

Rotational stocking can also improve legume establishment and persistence. Clover can be broadcast-seeded and trampled in by cattle grazing small paddocks in late winter. Rotational stocking also allows flash grazing of paddocks to prevent small legume seedlings from grass shading. After clovers are established, the improved grazing control allows producers to favor clover regrowth.

Intangible Effects

Many benefits of practicing rotational stocking are difficult to quantify and are not directly related to animal or plant performance. Two of the most important benefits rotational grazing offers are (1) improved control and (2) improved flexibility.

Control

Cross-fencing and water developments in large pastures effectively transfer the grazing decisions from the cow to the farm manager. Before a pasture is cross-fenced, the cows determine (1) where they want to eat, (2) what they want to eat (or more importantly what they will refuse to eat), (3) how long they will eat, and

Table 2. Effects of rotational stocking on performance of beef cattle grazing bermuda grass and endophyte-free tall fescue in central Georgia. (From Hoveland, McCann and Hill; 1997).

Item	Continuous	Rotational	Difference*
Cow weight at calving, lb	1037	1017	NS
Cow weight at weaning, lb	1090	1071	NS
Stocking rate cows/acre	0.50	0.69	+38%
Pregnancy rate, %	93	95	NS
Weaning weight, lb	490	486	NS
Calf production lb/ac	243	334	+37%

*NS = not statistically significant

Table 3. Pounds of winter hay fed per cow as affected by grazing method during three-year study. Cows grazed bermudagrass/endophyte-free tall fescue mixture. (From Hoveland, McCann and Hill, 1997.)

	1988-1989	1989-1990	1990-1991	3-year average
Rotational	1310	1480	2240	1680
Continuous	1750	1900	3650	2430
% decrease	-25%	-22%	-39%	-31%

(4) how often they will return to eat. Once cross fences are erected, the farm manager controls how many cattle graze a set amount of acres for a set amount of time. Once available forage has been efficiently utilized, cattle are allowed to move to another paddock and cannot return until forage is ready for another grazing.

Flexibility

Producers soon realize that there is no “set” schedule for rotating pastures and that the length of rest and grazing periods will change with weather and forage growth rate. This added flexibility is an often overlooked advantage to practicing rotational grazing. Paddocks can be removed from the rotation for overseeding or complete stand renovation. Individual paddocks can also be skipped during times of rapid growth and stockpiled for later grazing or hay harvest. Low-lying paddocks with drainage problems can be left ungrazed during wet periods to minimize trampling injury and improve stand productivity and longevity.

Recent fencing and watering equipment developments have made grazing systems easier and cheaper to implement. These advances have enabled many producers to adopt improved grazing management practices. Other reasons for implementing grazing systems include improved nutrient distribution and environmental stewardship. Animal handling is also usually improved with rotational stocking. Frequent movement and exposure to people usually improves cattle temperament. This exposure also allows the farm manager to detect diseases or other problems quicker so that they can be treated in a timely manner.

Specific Grazing Methods

Many people confuse the terms “grazing system” and “grazing method”. In actuality, these are very different terms. **Grazing system** is a broad umbrella term and is defined as “an... integrated combination of animal plant and other environmental components and the grazing method by which the system is managed to meet specific results or goals.” A **grazing method** is “a defined procedure or technique of grazing management designed to achieve a specific objective.” If these definitions are examined closely, a grazing system is defined

broadly—like an automobile. Grazing method is a subtype of a system—like a truck, station wagon or motorcycle—all of which are automobiles, but are most useful in different situations. Grazing methods are extremely variable in their design, and due to this there is no “one size fits all” method for all farms. Below, several controlled grazing methods are outlined along with specific examples of situations where they are useful.

Continuous stocking

This is the simplest grazing method and is almost certainly the most commonly practiced in the southeastern U.S. Animals are stocked on a single pasture unit for the length of the grazing season. Utilization of forage in this system is typically low, unless the pasture is overstocked (when animal performance will suffer). Spot grazing can occur in this system, particularly when pastures are understocked or during periods of rapid forage growth. Normally animals are set-stocked through the entire grazing season, with no animals added or removed from the system. Unfortunately, this makes it practically impossible to achieve optimal forage utilization during the majority of the season. If stocking rate can be altered occasionally during the season, forage utilization can be improved. Continuous stocking can be useful when stocking rate is set properly and maximum individual animal performance is desired (for example, replacement heifers on bermudagrass pastures). In this situation, animals have the ability to select high-quality diets, but forage utilization and gain per acre can suffer.

Rotational stocking

This method is commonly referred to as “rotational grazing,” although animals are actually stocked on the pasture on a rotational basis. Under this system the grazing area is divided into several small “paddocks”. Animals are concentrated on these paddocks for relatively short periods of time, with the ultimate goal being uniform and efficient utilization of forage species. The number of paddocks can vary from two to over 40. Large numbers of paddocks improve control of grazing and animals, but increases input costs and labor. In general, eight to 12 paddocks provide sufficient utilization efficiency and rest periods for most forage and animal systems. Some operations may benefit from more

paddocks, particularly when multiple forage species or herds are grazed.

Grazing period, which varies according to number of paddocks, forage species, and forage growth rate, typically ranges from 14 days to less than one day. Following the grazing period, animals are moved to another paddock for grazing and the previously grazed paddock is allowed to rest and regrow. This system minimizes the amount of individual animal diet selection and can reduce individual animal performance. However, the improved forage utilization normally allows increased stocking rates and increased animal gain per acre. In addition, the rest periods enable less grazing tolerant species, like endophyte-free tall fescue, orchard grass and native species, to persist for longer periods of time. This method also allows a large amount of producer flexibility. During periods of rapid forage growth, some paddocks can be deferred from grazing and used for hay production. This can be an excellent system for beef cow-calf producers, particularly when cool season perennials are grazed.

Deferred grazing or "stockpiling"

This is a largely under-utilized grazing method where forage production is deferred from grazing until later in the season. Stockpiling is typically performed in the fall months to reduce hay needs in late autumn and early winter. This practice is particularly useful in tall fescue-based systems where fall growth rates are good and forage maintains quality well into the winter. This practice can also be utilized in bermudagrass systems, but diet quality rapidly declines after frost and protein supplementation may be necessary.

Creep grazing

Creep grazing is essentially identical to traditional concentrate creep feeding young animals, except that forages are grazed in place of grain feeding. This method allows young animals with high nutrient requirements to access high quality forages like pearl millet, chicory, grazing-tolerant alfalfa or winter annuals. Access to these high quality paddocks is provided either underneath electric fences or through a creep gate opening. Dams are maintained on traditional perennial base forages like tall fescue or bermudagrass, and prevented from grazing high quality forages. Excellent calf gains have been reported with summer creep grazed pearl millet on fescue-based pastures (Table 4). This is a system that offers excellent potential to improve weaning weights and should be utilized more often in beef cattle operations.

Strip grazing

This is a self-descriptive grazing term where animals are held in small areas by a movable electric fence

Table 4. Effect of allowing calves to creep-graze pearl millet from June to September in tall fescue-based pasture systems.

	Control	Creep-grazed calves
Calf gain, lb/hd	144	219
Calf average daily gain, lb	1.38	2.10
Cow weight change, lb	-60	+27

graze and normally graze a one or two-day forage supply. Once this 'strip' is utilized, the front fence is moved forward in the pasture. A back fence may or may not be used depending on forage regrowth potential and/or water availability. Due to lack of forage selectivity, performance of animals with high nutrient requirements will likely be depressed when strip grazing is used. Labor requirements can also be high for strip grazing. This method works particularly well when dry cows are grazing stockpiled forages as it typically forces high forage utilization rates.

Limit grazing

Another self-explanatory term where animals are allowed limited time in certain paddocks. This method is typically practiced when animals are grazing a base paddock containing low quality forages (like dormant bermudagrass or low quality hay) and are allowed periodic access to high quality and high-cost pastures (like winter annuals). This is an extremely effective practice, where animals limit graze a pasture for a few hours per day or on an alternate day basis. Advantages include decreasing intake of high quality forages to more effectively "balance" animal nutrient requirements (particularly with mature animals grazing winter annuals). Decreased pugging or trampling of winter annuals also improves forage utilization. This method can be used with summer annuals to improve cow condition in mid-summer.

Leader-follower grazing, first-last grazing, or forward grazing

In leader-follower systems the herd is sorted into multiple (normally two) nutrient requirement groups. The high nutrient requirement (*leader*) group is rotated through paddocks ahead of the low nutrient requirement (*follower*) group. Paddocks are lightly grazed by the leader group, which allows these animals to select a high quality diet to meet growth or production needs. The follower group then grazes the paddock to utilize lower quality forage and allow high quality regrowth. This method is used in stocker operations where growing calves graze in front of cow-calf pairs. Dairy operations also frequently use this method with either two or three

groups. In a two-group system, lactating cows are the leader group with all other cows in the follower group. In a three-group system, lactating cows graze first, replacement heifers second and dry cows third.

Summary

Rotational grazing systems offer many advantages for most animal producers. Less forage is wasted by animals, which normally allows stocking density to increase. Grazing systems also improve persistence of some forage species and can greatly decrease hay requirements when managed appropriately.

All of the above grazing methods can be useful in particular situations. Carefully think through individual farm operation goals and needs. Match grazing methods with animal, plant and producer needs to implement a successful grazing system. All systems discussed in this paper, including continuous stocking, require management skills and inputs. At a minimum, pasture growth rate should be monitored frequently, with forage and cat-

tle managed in timely manner. Carefully consider farm goals before implementing grazing methods to match systems to desired animal and land productivity.

None of these methods is rigid in nature or “set in stone.” Some producers allow the grazing system to determine farm goals, while the opposite should be true. A farm need not practice rotational stocking during all periods of the year, with all classes of animals, and on all available forages. Many methods can (and probably should) be combined within a grazing system to meet seasonal needs. For example, a producer may continuously stock bermudagrass pastures during summer months, with areas of pearl millet reserved to creep-graze calves. This same producer could then rotationally stock additional paddocks of tall fescue in fall and spring months, and defer grazing on a few tall fescue paddocks to stockpile forage and minimize or eliminate hay needs. Other producers may not have access to tall fescue and could limit-graze winter annuals during winter months while grazing dormant bermudagrass or feeding low-quality hay.