



Designing a Flexible and Efficient Rotational Grazing System

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Introduction



(Photo credit: Matt Booher.)

Labor requirements are sometimes cited as an obstacle to implementing managed rotational grazing. This publication, one of four in a series on rotational grazing, explores how to determine the intensity of management that would be required and provides information to help build an efficient and flexible grazing system.

Principles of rotational stocking

Rotational stocking involves carefully managing the timing and intensity of grazing to improve the growth and diversity of desirable forage species. On perennial cool-season pastures, this is accomplished by implementing the following fundamental principles:

1. Match the stocking rate to the farm's carrying capacity. Doing so optimizes the length of the grazing season and minimizes hay feeding. A good starting point on moderately productive soils in much of Virginia would be a stocking rate of no more than 400 lbs. liveweight per acre. In other words, no less

than 2 ½ pasture acres per 1,000 lbs. of animal. Good grazing management often allows increased stocking rates over time.

2. Use the highest stocking density that is practical. Increased stock density paired with more frequent rotation of livestock improves forage utilization and provides a more uniform manure/urine distribution. Stock densities over 10,000 lbs. liveweight per acre generally maximize these benefits.

What is the difference between stocking rate and stocking density?

| | | |
|--|--|--|
| | | |
| Stocking Rate | | |
| <i>total liveweight of animals on farm</i> | | |
| ÷ | | |
| <i>total pasture acres on farm</i> | | |

| | | |
|---|--|--|
| | | |
| Stocking Density | | |
| <i>total liveweight of animals in current paddock</i> | | |
| ÷ | | |
| <i>acres in current paddock</i> | | |

3. Rotate livestock to new pasture before grasses have been grazed shorter than an average height of 4 inches. This rule of thumb for cool-season grasses will optimize leaf area to prevent root dieback and support rapid regrowth of forage.

4. Ensure pastures receive adequate rest and recovery. To prevent the grazing of new leaves that are important for plant recovery, livestock should always be moved before grazed plants begin to regrow. Grazed pastures should be rested long enough to allow full recovery: thirty days rest and at least 8-inch-tall grass is the average recommended goal; however, recovery will be faster in spring and fall and slower in summer.

Grazing management levels

Consistently following the principles of managed grazing requires fencing and watering infrastructure to create multiple paddocks, along with labor to move livestock. For the purposes of this publication, rotational grazing systems will be broken into three general levels of grazing management commonly found in Virginia, assuming a stocking rate of about 2 ½ pasture acres per 1,000 lbs. of animal.

Low-level management

- Six to eight permanent paddocks *per animal group*.
- Livestock are typically rotated every five to seven days.
- Each paddock is limited to less than 30 days' rest.
- Stock density of up to 3,000 lbs. liveweight per acre.

Medium-level management

- Nine to 15 permanent paddocks *per animal group*.
- Livestock typically rotated every three to five days.
- Each paddock is rested for 30 days or more.
- Stock density of up to 6,000 lbs. liveweight per acre.

High-level management

- More than 15 paddocks *per animal group*.
- Livestock typically rotated every one to three days.
- Each paddock is rested for 30 days or more.
- Stock density of over 6,000 lbs. liveweight per acre.

Determining the proper management level

In determining what level of management is best for an individual farm, both the available resources and the needs of the livestock should be considered.

Low-level management (six to eight paddocks per animal group, rotating every five to seven days)

A low level of grazing management will generally support adequate performance in cow-calf and stock-sheep operations. However, livestock with high nutrient requirements (such as on stocker, grass-finishing, or grass-based dairy operations) typically require supplemental energy and/or protein while on pasture. Because it cannot provide adequate rest to the pasture, a low level of grazing management results in lower overall pasture productivity and forage quality than is possible with more intensive management, thereby limiting the number of animals that can be stocked or reducing the length of the grazing season. Stocking rates under low-level management are relatively low (less than 3,000 lbs. per acre), so uniformity of grazing and nutrient distribution is limited. However, even a low level of management will be a significant improvement over continuous stocking, so it is a good idea to start simple and gradually increase management intensity over time.

Medium-level management (nine-15 paddocks per animal group, rotating every three to five days)

Increasing the number of paddocks supports more adaptive grazing management. This allows managers to better align the timing and intensity of grazing and the length of the rest period with the needs of the pasture. This level of management will support adequate performance in cow-calf and stock-sheep operations and also creates opportunities to extend the grazing season. Livestock with high nutrient requirements will likely still require supplemental energy and/or protein; however, using a medium level of grazing management in combination with a relatively low stocking rate can provide animals with a greater diet selection and reduce the need for supplemental nutrition while on pasture. A medium level of grazing management will generally improve pasture productivity, forage species diversity, and forage quality. Higher stocking densities enabled by more paddocks can begin to show improvements in

uniformity of grazing and nutrient distribution, as well as better utilization of the forage by livestock.

High-level management (15 or more paddocks per animal group, rotating every one to three days)

Increasing management by combining more frequent moves with greater stocking density, in general, supports a higher whole-farm stocking rate without overgrazing. It is critical, however, that managers pay close attention to grazing height and pasture recovery. Under high-level grazing management, cow-calf and stock-sheep operations will likely be able to significantly improve overall farm carrying capacity while still supporting good animal performance. At moderate stocking densities — 10,000 to 30,000 lbs. per acre — frequent moves to new pasture can give livestock the ability to select the most nutritive plant parts while also ensuring adequate overall intake of forage. As a result, farms raising livestock with high nutrient requirements may be able to support moderate animal numbers with minimal to no supplemental nutrition, provided there is a good diversity of forage species, including legumes.

High-level management can be achieved by creating multiple permanent paddocks or by subdividing permanent paddocks with temporary electric fencing. This enables considerable improvements in uniformity of grazing and nutrient distribution, as well as better forage utilization by livestock. The use of temporary electric fencing to obtain stocking densities exceeding 50,000 lbs. per acre is commonly used to graze stockpiled pasture and extend the forage supply.

It is worth noting that selective grazing is usually not possible with “mob grazing” (generally considered to be over 50,000 lbs. per acre), and this ultra-high density can reduce animal performance (Tracy and Bauer, 2019). Mob grazing can be a useful tool for soil and vegetation management, but it must be timed appropriately, as severe soil disturbance can cause soil compaction and/or increased annual weed pressure. Mob grazing should also be followed by long rest periods to retain the health of desirable perennial forages in the pasture.

A flexible approach

Unless a producer’s goal is to significantly extend the grazing season or support livestock with high nutrient requirements, using a high level of management

intensity on a continual basis is usually unnecessary and would not yield many benefits. A flexible approach that has worked well for many producers is to design a system with enough permanent infrastructure to enable a medium level of grazing management year-round, while retaining the option to add temporary electric fencing to increase management intensity periodically (such as when grazing annual forages or stockpiled pasture).

Designing a flexible system involves dividing grazable acres into roughly six to eight permanent paddocks with water access to each paddock. Providing electricity to each paddock by way of permanent electric fencing or an electric trunk line will give the option to add temporary electric fencing anywhere on the farm. Incorporating water hydrants, valves, or other means to expand access to water will greatly improve the options for subdividing fields to obtain greater grazing efficiency, even if only on a seasonal basis. Further design considerations include lanes, central water corrals, or other features to allow for livestock to be easily moved between fields or to working facilities. These grazing system components are discussed in more detail in related Virginia Tech publications: “Designing a Permanent Grazing Infrastructure” (SPES-708P), “Reducing Labor When Using Temporary Electric Fencing” (SPES-709P), and “Using Temporary Watering and Electric Fencing in a Grazing System” (SPES-710P).

Summary

Increasing the level of grazing management can measurably improve pasture productivity and utilization, as well as increasing the livestock carrying capacity of a farm. Additionally, it can also improve the flexibility of the farm’s grazing system to enable cost-saving practices such as pasture stockpiling. When making decisions about what level of grazing management intensity is right for an individual farm, it is important to consider many factors, including the farm’s carrying capacity, the number and type of livestock, livestock nutritional requirements, capital available to build infrastructure, and time or labor limitations.

In general, a medium level of grazing management facilitated by six or more permanent paddocks per livestock group is an obtainable goal for most livestock farms in Virginia. Periodic, short-term use of high-level grazing management practices, such as strip-grazing stockpiled pasture, can further extend the grazing season and help manage pasture rest and rotation.

References

Tracy, B., and R. Bauer. 2019. "Evaluating mob stocking for beef cattle in a temperate grassland." PLoS ONE 14(12): e0226360. <https://doi.org/10.1371/journal.pone.0226360>.

Technical resources and cost-share information

Soil and Water Conservation Districts (SWCD)

Soil and Water Conservation Districts throughout Virginia offer technical support for grazing management and state-funded cost-sharing to install grazing management infrastructure, including interior fencing, waterers, stream exclusion fencing, and other agronomic practices. Find a list of local offices from the Virginia Department of Conservation and Recreation at "Virginia's SWCDs by Locality," <https://www.dcr.virginia.gov/soil-and-water/swcdlist>.

Natural Resources Conservation Service (NRCS)

Offices throughout Virginia offer technical support for grazing management and federally funded cost-sharing to install grazing management infrastructure, including interior fencing, waterers, stream exclusion fencing, and other agronomic practices. Find a list of U.S. Department of Agriculture Service Centers and associated NRCS offices at "Find Your Local Service Center," <https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/virginia#contact>.

Virginia Cooperative Extension (VCE)

The Virginia Cooperative Extension's Graze 300 website (<https://ext.vt.edu/agriculture/graze-300.html>) offers information on grazing livestock for 300 days by using better pasture management and environmental stewardship. Extension offices in each county in Virginia offer education and resources from Virginia Tech and Virginia State University, as well as the entire Extension system. Find a list of Virginia's local offices and regional centers at "Local Offices," <https://ext.vt.edu/offices.html>.

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