

Using a Rainfall Simulator on Pasture to Demonstrate How Grazing Management Impacts Pasture Condition and Rainfall Infiltration by J.B. Daniel, NRCS Grassland Agronomist

Many factors contribute to the yield and productivity of pasture during the growing season but one of the most important is water, and more specifically available soil moisture. Available soil moisture is arguably the greatest limiting factor to forage growth during the growing season. Other management factors do contribute to overall growth and productivity of the pasture, but when it gets dry plant growth stops. Many livestock producers don't realize there is a practical way to truly increase a pasture's ability to capture and store rainwater and it begins with improved grazing management.

In Virginia depending on where a farm is located, it likely receives anywhere from 35 to 49 inches of precipitation annually. Most people think available soil moisture is just related to the amount of rainfall you receive, but that is incorrect. Of course the amount and timing of rainfall throughout the growing season is important, however; the condition of the pasture surface is of equal importance because that is what largely determines how much rainfall is captured for forage use versus what runs off as a lost resource.

Pasture condition is estimated by several indicators of the forages and soils in a pasture. Certain site characteristics such as slope, aspect, soil type, and depth to rock cannot be changed, however; other characteristics that also affect runoff of rainwater can be managed. Some manageable pasture characteristics include living plant cover, dead plant residue on the surface, livestock concentration areas, soil compaction and soil erosion. These 5 indicators of pasture condition are usually related to the stocking rate and management of the grazing livestock within a pasture system.

Many livestock producers in VA, like most of the eastern United States, have higher livestock numbers than their pastureland acres can sustainably support and they don't actively manage the grazing of their livestock on the pasture. These two factors combined often result in overgrazed pastures with less plant cover, greater compaction near the soil surface, suppressed forage yield, concentrated feeding areas and increased erosion and runoff. In contrast, livestock producers who adjust stocking rate to closely match annual pasture production and implement rotational stocking, can greatly improve pasture condition. By committing to managing the grazing animals on the pasture based on forage height and sufficient rest periods, forages are allowed to regrow and recover. These management strategies ultimately result in thick, dense pasture sod with greater surface cover throughout the year and fewer livestock concentration areas. Thick plant canopy helps protect the soil from direct raindrop impact. Plant residue on the soil surface slows rainfall runoff to allow more time for infiltration into the soil. Research shows that grazing management practices which leave 4 inches of forage residue on the surface after grazing cool season grass pastures, and allow sufficient time for regrowth, decreases rainfall runoff and erosion (Hann et al. 2006). Although managing grazing animals to maintain surface cover is important research indicates that other forage and soil characteristics including forage mass, forage height and soil organic matter are also important for controlling runoff and decreasing the loss of sediment and valuable nutrients from pastures.

NRCS uses a rainfall simulator demonstration to help people visualize the potential for greater rainfall infiltration on pastures with a high level of grazing management. Actual samples of pasture sod are carefully collected from representative pastures of long term, continuous stocking versus long term, rotational stocking systems. The sod is placed firmly in trays and secured on a demonstration table at a 20% slope. A high intensity, short duration rainfall simulation begins and all rainfall runoff is funneled into collection jars on the front of each respective pasture sample. At the end of demonstration it is amazing to see the amount of runoff and suspended sediment collected from an overgrazed pasture sod in a continuous stocking system versus a well rested pasture sod from a rotational stocking system

(Figure 1). Furthermore the rainfall that actually infiltrates the pasture surface and moves downward through the soil from these same samples is captured and funneled into collection jars beneath the demonstration table. This comparison emphasizes the improved potential for capturing rainfall and storing it in a well conditioned pasture soil for future forage growth in a rotationally stocked grazing system.

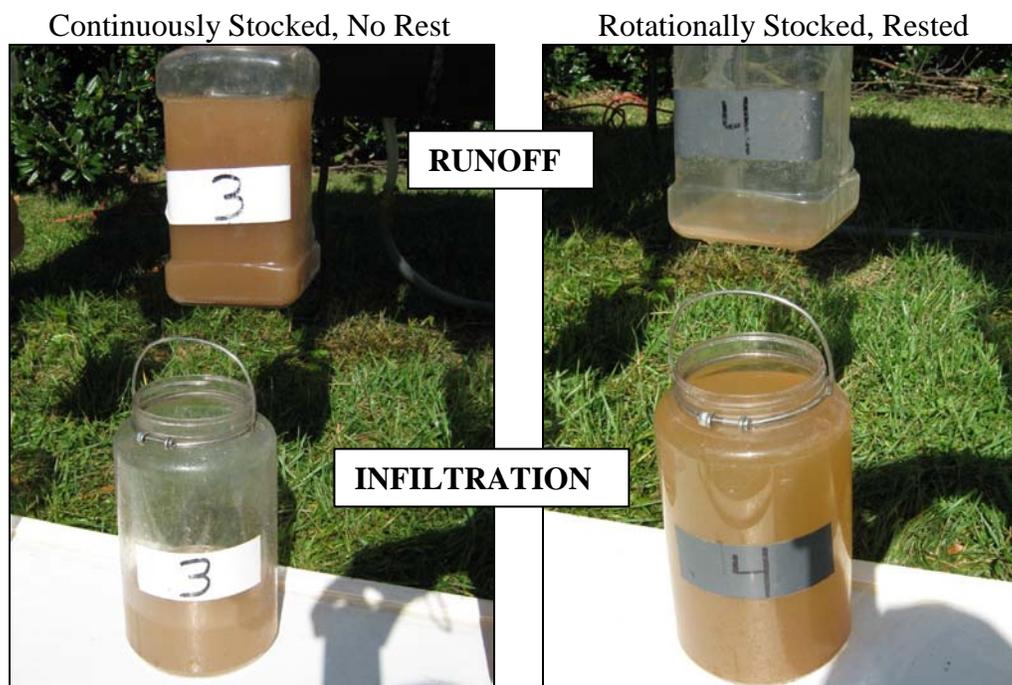


Figure 1. Rainfall runoff versus infiltration from a rainfall simulator demonstration comparing a continuously stocked, overgrazed pasture to a rotationally stocked, well rested pasture.

Although the results shown in Figure 1 are from a demonstration, field studies support that improved grazing management has positive impacts on pasture condition, which often reduces rainfall and sediment runoff and has the potential to increase forage yield. Once a person understands these relationships, they begin to realize the need to better manage the grazing animal for improving soil and water resource management and increased forage yield across the entire pasture landscape.

For more information about improved grazing management, get to know the successful graziers in your area of the state. Visit www.vaforages.org to see what forage educational events are planned near you. Tap into the knowledge and resources available within your community to help you begin planning a grazing system that will meet the goals of your operation. Start by contacting your local USDA Natural Resources Conservation Service office, the Soil and Water Conservation District and your local Extension Agent to see what resources they can offer to help you along the way.

Hann, MM, et al., "Grazing Management Effects on Sediment and Phosphorus in Surface Runoff." *Rangeland Ecological Management*, November 2006: 59:607-615.

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