

Conservation Practice Fact Sheet



Introduction

Nutrient management planning for pastures in Arkansas has become an important component of management of livestock farms. The rapid increase in the cost of fertilizer necessitates a comprehensive approach to nutrient management for farms with grazing lands. This approach should include nutrient recycling through grazing management, addition of clovers to pastures, increasing the organic matter in soils, and consideration of where and how to feed hay. The focus of this fact sheet is to discuss how to maintain a fertility level of soils and adequate nutritional quality of pastures without having to add maintenance fertilizer.

Nutrient recycling

Grazing animals impact the fertility of pasture since only a small portion of what they ingest is not returned to the pasture system. Estimates are that 60-90% of the nutrients eaten by the animal are excreted in the form of urine and manure. Under a well-managed rotational grazing system, the excretion covers 30-40% of the pasture surface annually. Consider that a urine patch may contain as much as 1000 lbs of N/acre. Therefore, the more efficiently nutrients are cycled in the system, the lower the nutrient losses and the lower the maintenance fertilizer needed.

Cows will defecate around 10 times a day with each manure pile covering a square foot and contributing 200-700 lbs N/acre. They will also urinate 8-12 times a day with each urination spot receiving an equivalent to 500 to 1000 lbs of N/acre. However, cattle do not deposit urine and feces evenly across pastures. Losses occur by transfer of nutrients from grazing areas to animal concentration areas (shaded areas, alleyways, streams or stream banks). Returning the nutrients to the pasture rather than the loafing areas is very important.

An intensive rotation of moving cattle every two days has been shown to cover every square yard with manure in two years. A continuous grazing program would require 27 years and more nutrients are deposited in shade areas, near or in streams or other loafing areas. Animals in smaller pastures tend to minimize congregation where they deposit manure near the water source, salt block or shade.

Water distribution

When the water source is near their grazing, even herd animals tend to drink individually. If they have to walk a distance to water (over 800 feet), they tend to travel as a group. The more watering points and the closer they are, the better the nutrient distribution. Conversely, the fewer watering points increases the animal concentration and decreases the nutrient distribution. Therefore, water distribution is not only important to maintain water quality but to also maintain pasture fertility.

Organic matter and biological activity

The overall biological activity of soil generally increases in properly grazed pastures. Building the soil organic matter and dense masses of pasture roots increases microbial biomass as well as increasing the water holding capacity of the soil. Additionally, the manure and proper manure distribution contributes to increasing soil organic matter. The release of nutrients is dependent on factors contributing to the breakdown of the manure. Fungi, bacteria, soil microbes, beetles and earthworms help in that process. Each one per cent of organic matter can provide up to 20 pounds of nitrogen. Under moist conditions and with lush vegetative growth, the more liquid manure breaks down more rapidly than the drier manure consisting of more indigestible dry matter from mature forage or hay.

At times manure is slow to break down and may kill the forage beneath it; however, the area adjacent to the manure has increased growth. It has been estimated that cattle dung patches affect the growth of forage 5-6 times greater than the actual manure area. Tillers from the adjoining area tend to cover the affected area and white clover invades readily. Rejection of forage around manure, up to 5-10 times greater than the area covered by manure, is initially because of the odor and then the forage becomes mature and unpalatable. A rotational program with a high stock density decreases the wastage. By the fourth rotation, there should be no evidence of a difference in cover around manure piles.

Legumes

An important source of fertility for pasture maintenance is legumes. Some legumes can provide as much as 200 lbs of N fertilizer per acre of pasture. Alfalfa and white clover are optimum nitrogen fixers with hairy vetch, red clover and annual lespedeza important contributors also. A pasture with 20-40% legumes can sustain the nitrogen needs of the other plants in the pasture. Recycled nutrients in a grass-legume system are sustained at a much higher level than in an extensively managed system with only grasses. Legumes can be difficult to maintain in a pasture system as they require a well-managed grazing program to provide rest for regrowth and defoliation of grasses to keep competition down. Periods of dry weather and some herbicides interfere with legume growth. Spring nitrogen fertilization encourages grass growth and decreases the input from legumes since they will also consume the fertilizer instead of fixing their own. Legumes and the soil livestock are more vigorous with more neutral pH. Pastures are botanically unstable over time so small changes in environmental conditions, grazing management or stocking rate can change the plant species in the pastures. Rest periods, and not overgrazing pastures, are very important in maintaining a legume presence in pastures

Hay feeding

Feeding hay is a nutrient management practice. If hay is fed in pastures and the feeding areas are rotated, the net effect is one of fertilizing those areas through the deposition of manure and urine as well as the residue from feeding the hay. This is especially true if the hay was purchased from off the farm. Placement of hay bales in areas that need extra fertility, away from drainage into water sources, and not feeding bales in the same place all the time contribute to the fertility of the pastures. If hay is cut on the farm and the bales are not fed back on those same pastures, they can become nutrient deficient and less productive.

Summary

Nutrient management of pastures can be enhanced by

- 1) Building organic matter—strive for an estimate of 4%.
- 2) Feeding hay—when hay is purchased, how much does it contribute to soil fertility?
- 3) Rotate livestock frequently to distribute manure and urine more effectively—strive to cover each acre every two years.
- 4) Add legumes—a 30% stand of legumes can add over 100 lbs of nitrogen/acre.
- 5) Soil “livestock”—earthworms, dung beetles and soil microbes assist in breaking down manure and making the nutrients available to the plants.

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