Pasture Management Clinic

May 14, 1994

The Kerr Center

Poteau, Oklahoma

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Table of Contents

Managing Soil Fertility in Forage-Livestock Production Systems

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We are dependent on soils and to a certain extent, good soils are dependent on us and the use we make of them. Soils are the natural bodies on which plants grow. We enjoy and use these plants because of their beauty and also their ability to supply food and fiber for ourselves and our animals. Our standard of living is often determined by the health and quality of soils and the kinds and quality of plants grown on them (Brady, 1974).

Healthy soils are those supporting a diverse plant community that protects the soil surface from erosion, provides organic matter inputs in the form of root growth and surface litter, and forms symbiotic relationships with soil microorganisms. Healthy soils also support an array of soil micro and macroorganisms capable of rapidly cycling organic matter inputs which supply the essential elements necessary for vigorous plant growth.

Essential elements are only one of the environmental factors influencing the growth of plants. In addition to the absence of disease and freedom from insect pests, six other external factors are generally recognized: (a) light, (b) mechanical support, (c) heat, (d) air, (e) water, and (f) nutrients. The soil is an agent in supplying, either wholly or in part, all of these external factors except for light.

Plant growth depends on a favorable balance of these factors and any one of them, if out of balance with the others, can reduce or prevent plant growth. Furthermore, the factor which is least optimum will determine the level of pasture production. This principle of limiting factors may be stated as follows: The level of pasture production can be not greater than that allowed by the most limiting of the essential plant growth factors (Silverton, 1987).

These considerations explain why the majority of soils research has been directed towards the surface six to eighteen inches of topsoil. Firstly, this layer is the major zone of root development and supplies most of the nutrients and water needed by plants. Secondly, as the layer directly affected by our management decisions and practices, it can be manipulated to our benefit or detriment. Through proper management and maintenance of organic matter inputs, its physical condition can be modified. It can be treated with fertilizers and limestone and it can be drained or irrigated. In short, its fertility, the inherent capacity to supply nutrients to plants in adequate amounts and suitable proportions, may be raised, lowered, or stabilized at levels consistent with economic pasture production. Therefore, one of the major goals of any forage-livestock production system should involve developing and evaluating different management tools that maintain or enhance soil-based fertility.

One particularly effective tool for managing soil-based fertility in forage-livestock production systems is rotational grazing. Rotational grazing prevents selective grazing by livestock, thereby assuring uniform utilization of pasture species and maintenance of palatable and desirable grass/legume mixtures. Where no nitrogen fertilizer is applied, greater total forage yields may be obtained by growing a grass and legume in association, rather than in individual swards (Haynes, 1980). The legume component in these rotationally grazed pasture systems is also capable of fixing more than 100 pounds of nitrogen per acre, thereby improving soil fertility (Ta and Faris, 1987). Some of this fixed nitrogen is transferred from the legume to associated grass plants, greatly improving palatability and nutritional quality without the use of fertilizer nitrogen (Brophy et al., 1987: Gebhart et al., 1993).

Trampling, soil compaction, and livestock trailing, all of which increase erosion and subsequent losses if soil nutrients, are significantly reduced under rotational grazing systems when compared to continuously grazed pastures. Improved livestock distribution resulting from rotational grazing also improves manure distribution, pasture-scale nutrient cycling, and soil fertility (West et al., 1989).

Periodic pasture rest cycles associated with rotational grazing systems improve plant competitive and reproductive abilities and maintain or enhance species diversity. Vigorous, diverse assemblages of plant species are capable of extracting soil nutrients from deeper depths than pure stands, greatly improving nutrient availability and cycling efficiency in the livestock-forage-soil system.

Hay production, transportation, and storage are relatively expensive items in any forage-livestock production system. Hay produced in one pasture is frequently transported long distances and fed somewhere else. Under these circumstances, significant amounts of nutrients are removed from hay producing pastures, resulting in an overall decline in soil fertility. An alternative to this would be to feed hay in the pasture where it was produced. This maintains nutrient cycling and allows manure distribution/soil fertility to be manipulated within a pasture. If one area of a hay producing pasture appeared to have nutrient limitations, for example, hay could be fed in this area to improve soil fertility through manure deposition.

Another tool for managing soil-based fertility in forage-livestock production systems is prescribed burning. All types of vegetation in Oklahoma evolved with fire and many native plants are adapted to, and actually require fire in order to complete their life cycles (Bidwell and Masters, 1993). Prescribed burning, through its effects on species composition and animal behavior, can be used to improve animal distribution, forage utilization, manure deposition, and plant community diversity. Burning of litter, debris, and live plant material releases the minerals available in the surface soil (Vallentine, 1980). All these effects have a positive influence on pasture-scale nutrient cycling and productivity. It should be noted, however, that burning as late in the dormant season as possible provides less potential for erosion, since it minimizes the time the soil is without vegetation cover.

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Ecotype Selection of Eastern Gamagrass (*Tripsacum dactyloides* (L.)L.) and Big Bluestem (*Andropogon gerardii* Vit.)

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Introduction

As part of its overall program of resource conservation, the Soil Conservation Service (SCS) carries out specialized activities in plant materials including assembly, evaluation, release, and distribution of new or improved plants for solving a wide range of conservation problems.

The Booneville Plant Materials Center (PMC) is part of a national system of plant materials centers. These centers are located to serve major land resource areas (usually occurring in two or more states) having common major characteristics. The PMC is operated according to SCS procedures provided in the National Plant Materials Manual and in cooperation with other federal and state agencies and other interested parties, as determined through memorandums of understanding and cooperative agreements.

The Booneville PMC is located in Logan County, Arkansas, in cooperation with the Agricultural Research Service, South Central Family Farm Research Center. Approximately 1,600 acres of state-owned land is available at this facility. It is located in the Arkansas Valley and Ridges major land resource area. Soils at the Center are Leadville, Taft, Enders, Linker and Mountainburg. The climate is temperate and continental and extremes may vary from year to year. The Center has approximately 200 frost-free days, and drought is severe in some summers.

Service Area

The primary service area of the Booneville PMC includes 54 million acres in Arkansas, Oklahoma, and Missouri. Much of the area is rugged and forested. Elevations range from 300 to 3,000 feet. Average annual rainfall varies from 36 inches in the west to 53 inches in the higher mountain areas in the east. Average annual temperature varies from 48 to 61 degrees F. The frost-free period is usually 180 to 200 days, and summer drought is sometimes severe. Small family farms are characteristic of much of the area. Soils are frequently shallow and stony. The economy of the area is supported largely by agriculture, coal mining, and tourism.

Potential Uses for Improved Plant Materials

Plants are used many ways to conserve our natural resources and enhance our environment. Improved plant materials released through the Booneville PMC will increase the effectiveness of conservation efforts in the service area. Although conservation problems are many and are interrelated, the potential use of improved plant materials may be grouped into five major categories as follows:

1. Improvement of Grassland
2. Protection of Water Quality
3. Reclamation of Critical Areas
4. Reduction of Woodland Erosion
5. Enhancement of Wildlife Resources

Needs for Improved Plant Materials

The plant materials problems and needs in the Booneville service area were summarized from the Long Range Programs for the three states involved. The problems and needs for improved plant materials are listed, by priority, according to the five major categories:

Improvement of Grassland

Approximately 14.1 million acres of the service area are in some kind of grassland. Most are native grazing lands or introduced pasture species. Plants to increase productivity are needed.

The PMC is conducting two studies that address Improvement of Grassland:

Eastern gamagrass (*Tripsacum dactyloides* (L.)L.) is an erect, 6 to 9 ft (2 to 3m) tall, perennial, warm season native bunch grass. Leaves are flat 3/8 to _ inch (1 to 2 cm) wide, 12 to 24 inches (30 to 60 cm) long, and have a pronounced midrib. The inflorescence is a panicle of 2 or 3 and occasionally 1 terminal raceme 6 to 10 inches (12 to 25 com) long with unisexual spikelets. Staminate spikelets are in the upper part of the racemes with pistillate spikelets below.

Problem: Approximately 6.6 million acres of the service area are vegetated by low order grasses and weeds. Cattle production could be improved by the use of more productive and nutritious selections of forage grasses. Warm season grasses are needed for the summer grazing period; they should be drought resistant.

Objective: The objective is to assemble, evaluate, develop, and release cooperatively and adapted variety and/or varieties of

Eastern gamagrass for conservation use in Arkansas and Oklahoma.

Action: Eastern gamagrass collections were made in March 1990 from all Arkansas and 20 Oklahoma counties. These 252 accessions were assembled at the Plant Materials Center in Booneville where they were placed in a replicated space plant nursery. The individuals were evaluated visually during two growing seasons. Thirty accessions were chosen to enter initial evaluation in a replicated space plant initial evaluation block along with two commercially available cultivars serving as standard of comparison. They are 'Pete' and 'Iuka'.

During the 1993 growing season, along with visual evaluation of height, blade width, insect disease, etc., forage was taken for quality analysis. 'Pete' and 'Iuka' yielded 10-11% crude protein and 58-60% digestibility.

Five accessions have been selected to enter advanced evaluation in 1995, based on visual evaluation and forage quality. If one of the five accessions demonstrates clear-cut superiority, it will be released for commercial production. If not, we will release the five as a composite release.

The second study that addresses Improvement of Grassland is the evaluation of Big Bluestem, *Andropogon gerardii* (Vit.). Big bluestem is a tall, warm-season perennial, native grass with stiff, erect culms; flattened and keeled sheaths; membranous ligules, and flat or folded leaf blades. Big bluestem has developed a very efficient spreading root system, which may reach depths of 5-8 ft (150-200 cm). Big bluestem reaches a mature height of 3-4 ft (90-120 com) or more in the southern part of its natural range. Although short rhizomes may be present, it usually makes a bunch-type growth. Big bluestem is composed of many ecotypes with a wide range of adaptation to soil and climate. Big bluestem is one of the most widespread and important forage grasses of the North American tallgrass prairie region. It is usually associated with one or more of the other three dominant species, Indiangrass (*Sorghastrum nutans* (L.) Nash.), switchgrass (*Panicum virgatum* (L.), and little bluestem (*Schizachyrium scoparium* (Michz.) Nash.). Big bluestem occurs on subirrigated lowlands, nearly level to gently undulating glacial till plains, overflow sites, level swales and depressions, residual and glacial uplands, and stream terraces and bottomlands along rivers and tributaries. The abundant, leafy forage is palatable to all classes of livestock.

<u>Problem:</u> There is a need for an adapted variety of big bluestem for pasture and range seedings, surface mine reclamation, critical area planting, recreational area development, and other conservation use in Arkansas, Oklahoma, and Missouri.

<u>Objective:</u> The objective is to assemble, evaluate, develop, and release cooperatively an adapted variety and/or varieties of big bluestem for conservation use in Arkansas, Oklahoma, and Missouri.

This collection was made in western Arkansas, eastern Oklahoma, and southwestern Missouri. The vegetative collection was assembled at the Elsberry, Missouri Plant Materials Center in November 1987. Plants were cloned and grown in a greenhouse until April 1988. Half of the plants were transported to Booneville and established in a replicated space plant screening nursery. Visual evaluations were conducted for four years. Sixty-five accessions were chosen to enter initial evaluation in 1992. The release variety ‘Kaw’ is used as the standard of comparison.

Plants are being evaluated on production, quality, insect disease, drought, seed production, and seed quality. Six to ten accessions will be selected in the 1994 growing season to be placed in advanced evaluation in 1995.

A breeding program was initiated in 1992 as an alternative method of selecting a superior plant. Known as Recurrent Selection, the best (visually) plants in the screening nursery were harvested (seed) in the fall of 1992. The seed was threshed down to the caryopsis, which was classed by weight, using a South Dakota seed blower. Heavy, medium, and light seed lots were planted in flats and placed in a greenhouse. Seedlings were rated on vigor and root development. Superior seedlings were placed in a 1m x 1m space plant nursery, after being given new accession numbers. Some of these plants, in theory, should be superior to either parent. The plants are being evaluated using the same criteria as the original assembly. This procedure will be repeated a total of three times. If a plant emerges that is superior to the best plant in the vegetative assembly, it will be released for commercial production.

How Cost Share Programs Can Assist You in Improving Your Pastures

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As District Conservationist for the Soil Conservation Service, I work with a variety of people and programs every day. I can honestly say that working with livestock producers to improve their pastures is the most enjoyable part of my work. A major reason for the enjoyment is I am a livestock producer myself. I believe to do a good job advising others, I need to know from practical experience what works and what doesn't; what is cost effective and what isn't; and what is true and what is advertisement.

Before we get into programs and money, I think we need to look at what we as livestock producers are really growing. In actuality, we are forage producers. We use livestock to harvest the forage; the same as a wheat farmer uses a combine to harvest his wheat crop. We convert forage into pounds of gain or bales of hay.

It is hard to visualize a "per acre" yield for forage. For example, "I grew a 600 pound calf last year." This is a great accomplishment, but we need to ask a few questions first.

1. How many acres did it take?
2. Was supplemental feeding required?
3. How much did the gain cost?

4. Was this an average or just the best one?

As you can see, there are more questions than answers.

The best way to improve gains and performance is through good forage. The big problem is "How do I get good forage and how much will it cost?"

The United States Department of Agriculture (USDA) has several agencies and programs to assist in improving forage for your farm. The Agricultural Stabilization and Conservation Service (ASCS) administers a cost share program to help defray the cost of many conservation practices. The Soil Conservation Service (SCS) provides technical assistance to help implement these practices. In Oklahoma, local Conservation Districts can provide equipment and manpower to put these practices on the ground. Also, cost share may be available through the local Conservation District if it is located in a high priority water quality area.

I will begin with different programs with cost share assistance. The Agriculture Conservation Program (ACP) is available nationwide. The Forest Incentive Program (FIP) and Stewardship Incentive Program (SIP) are available in timber producing areas of the nation. The Water Quality Incentive Program (WQIP) and Hydrologic Units Program are available in selected watersheds. Each program offers producers different options that will assist them to improve their property.

The **ACP** program is available to assist in controlling erosion. It will depend on the local ASCS County Committee on how they determine the extent of erosion on your property. If you qualify, these are the main practices that will help you to improve your forage production.

SL-1 Permanent Vegetative Cover Establishment

Cost share is available for planting most perennial grasses. The cost share rate will vary by county, but should be in the 50 to 65 percent range. A few of the species available are: bermudagrass (sprigged or seeded), weeping lovegrass, fescue, and bahia. Establishment fertilizer and lime are cost shared according to a soil test recommendation. An example of how cost share can help is:

Bermudagrass sprigging will cost $26 per acre plus $21 per acre for establishment fertilizer. The total cost will be $47 per acre. Cost share will pay $24.70 per acre for sprigging and $14 per acre on fertilizer. The total payment will be $38.70 per acre. This will leave you paying $8.30 per acre. The example shown is you providing the labor.

WC-1 Water Impoundment Reservoir

Cost share is available for building livestock water supplies if it controls erosion. The cost share will be about 50 percent. An example of how cost share can help is:

An average pond will be 1,500 cubic yards. The cost will be $1,230. The cost share payment will be $615. This will leave you paying $615. Other components that can be cost shared under this practice are livestock pipelines, storage tanks, and freeze proof tanks.

The **WQIP** program is available in selected areas. The selected area must show water quality problems. All practices must improve water quality to qualify.

If you qualify these are the main practices that will help you to improve your forage production.

W-16 Pasture and Hayland Planting

An incentive payment is available for establishing or reestablishing stands of perennial, biennial, or reseeding annual forage plants. The incentive payment will be $15 per acre for three years or a total of $45 per acre.

W-15 Pasture and Hayland Management

An incentive payment is available for proper treatment and use of pasture and hayland to prolong the life of desirable forage species. The incentive payment will be $10 per acre for three years or a total of $30 per acre.

W-18 Proper Grazing Use

An incentive payment is available for grazing at a rate that will maintain or improve the quantity and quality of native species.

W-26 Waste Utilization

An incentive payment is available for using animal waste in an environmentally acceptable manner.

The **FIP** and **SIP** programs are available in timber producing counties. Although these programs do not cost share on forage plantings, they are available to improve timber stands. Since most producers have some land that is not suitable for forage production, these programs can be used to improve timber land by planting fast growing trees or thinning to improve growth of existing stands.

Your local Conservation District may be able to assist you with custom work or rental equipment. The Leflore County Conservation District assists cooperators by providing custom work for seedbed preparation; bermudagrass sprigging or seeding; drilling fescue, bahia, ryegrass, clovers, and lespedeza; no-till small grains, vetch, and sudan; cultipacking; and fertilizing. Rental equipment is available, such as bermudagrass spriggers, grain drills, cultipacker, gopher getter, and tailgate seeders. In addition, the district digs and sells bermudagrass roots. These services are provided at nominal charges to district cooperators.

Your local SCS office can assist you by providing technical assistance and advice on planting dates and rates, what species is best adapted to your soils, and how to do the work. Job sheets are available for most locally grown forage crops. A conservation plan can be developed to assist you in improving your pastures.

There may be additional cost share practices and services that will help. You will need to contact your local ASCS, Conservation District, or SCS office to find out what is available for your particular county.

Why Rotational Stocking Through a Grazing Cell Is a Way to Improve Income and Ecological Soundness of a Ranch

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As we approach the 21st century it becomes apparent that for agriculture producers to stay in business there are two necessities that are going to have to be met. These are: 1) how to generate new forms of wealth from land resources and 2) ways to create environmental soundness as it pertains to land resource management.

There has been a silent trend taking place on farms and ranches since the early nineteen hundreds that has shifted wealth away from the producer. We know about the population decline that has taken place in agriculture. In 1900 of 90% of the population was engaged in agriculture production. Today the population of people engaged in agriculture is approximately 2% and declining. We have been told that those agriculture producers are more efficient and therefore society doesn't need as many producers. According to Smith, S., *"Farming" Its Declining in the US*, this is not the case. What has really happened is that wealth has transferred from the production side of the equation to the input side. Agriculture producers are spending as much money to produce a unit of commodity as they are receiving in like value. Agriculture producers over time have traded value added production practices for production enhancing technologies, assuming that if you increase production you automatically increase profits. Agriculture producers can lo longer associate maximum production with maximum profit.

The second consideration that agriculture producers are faced with is being able to produce agriculture commodities without any risk to the environment. Our federal government has mandated that we will have clean water and air, and every producer will have to comply with regulations that have been established by the Environmental Protection Agency.

How will rotational stocking through a multiple paddock grazing cell address these two subjects of creating wealth and at the same time produce a sound environment? I want you to allow me to review two ranches that changed from a conventional method of grazing and production enhancing technologies to rotational stocking through a grazing cell.

Managing for Profit

Ranch A - This ranch is located in south central Oklahoma and contains 11,500 acres of native grasses in excellent condition. Its history of management consisted of continuous grazing, a very limited 2, or 3-paddock rotation of livestock using stocking rate and herbicides as the basic means of controlling range condition and protecting the grass resources. Ranch A was divided into 15 main paddocks and 3 smaller trap pastures. These management practices ere used at different levels over time since the ranch has been managed under several owners. The composition of the grass has remained predominantly high seral species.

Ranch A came under the present ownership in 1989. After one year of operation, the ranch owner asked for guidance “for a more ecological sound grazing management.” His first year of operation under conventional methods of grazing convinced him that there had to be a better way for the ranch to be more economically sound. In his first year of operation, he spent $52,000 in weed control in addition to other operational expenses. He assumed restocking pastures was needed so that weed problems and the cost of herbicide usage would not recur. Ranch A in 1989 ran 2,500 steers in a conventional continuous summer grazing program. The stocking rate for conventional methods of grazing was 5 acres per steer. In 1990, the grazing method was changed to rotational stocking through an 11-paddock grazing cell for steers and a 5 paddock-grazing cell for the mature cowherd. Approximately 250 black baldly cows were stocked on the ranch in fall of 1989. The livestock goals in the purchase of the ranch was to stock the ranch to its capacity with cows.

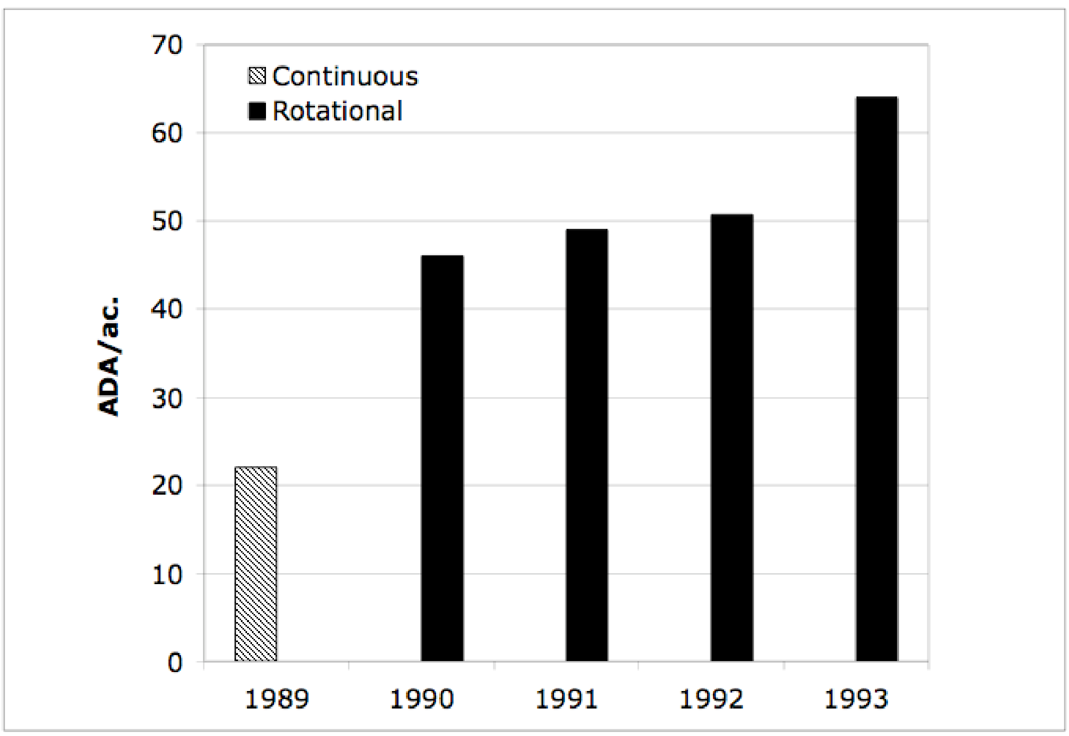

Figure 1. Animal days per acre for Ranch A for 1989 – 1993.

Shifting grazing management to rotational stocking has allowed an increase in the stocking rate. Figure 1 shows production of Animal Day per Acre (ADA). An ADA is equivalent to one mature cow weighing 1,000 pounds grazing one acre for one day. Steer days have been converted to ADAs. The ADAs have increased from 22 days in 1989 to 46 days in 1990. This increase could be contributed to the change in grazing method. Also, there has been a gradual increase in forage production over time by the increase from 46 ADAs in 1990 to 64 ADAs in 1994.

The increase in stocking rate has allowed an increase in gross dollars per acre as shown in Figure 2. The $15.40 gross income per acre in 1989 was 246% less than the $38 gross income in 1994. These figures represent total ranch sales from beef gains on yearling steers and calf sales from the cowherd. These figures do not include the 350 head cow increase in total cow inventory over the four years.

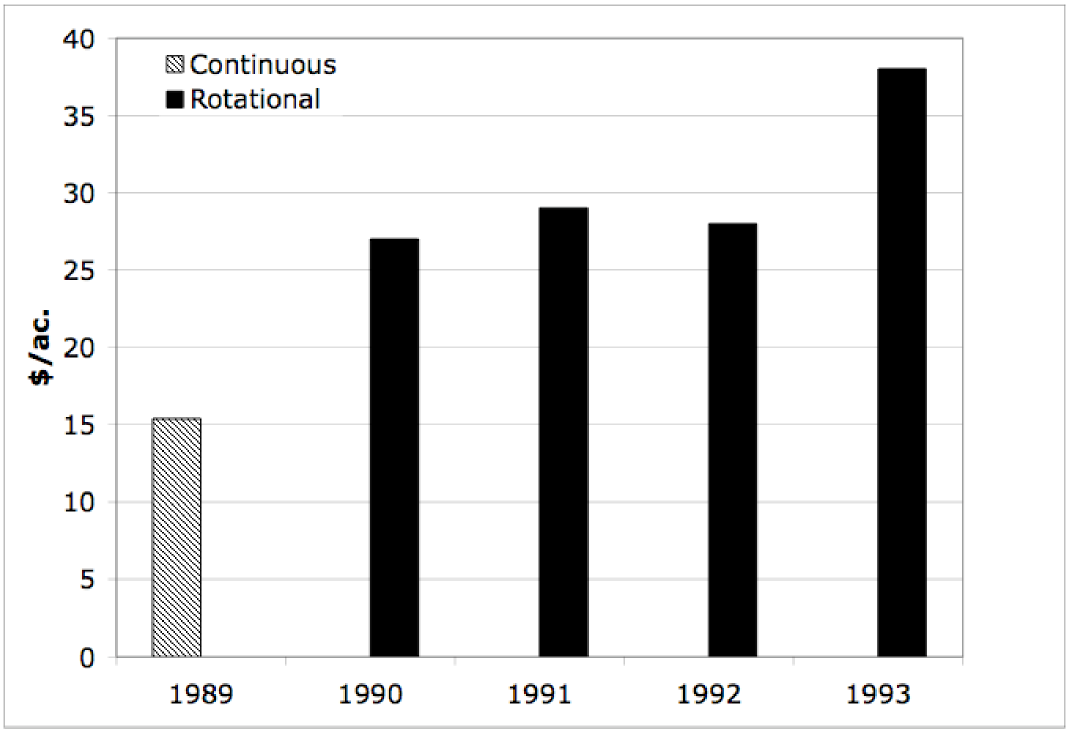

Figure 2. Gross dollar income per acre for Ranch A for 1989 – 1993

Figure 3 shows an average of gross income for two years for two ranches together under conventional grazing methods in comparison to the above ranch under rotational stocking for years 1990 and 1991. These ranches were adjacent to Ranch A and were comparable in kinds of soils and plant composition. The gross income from conventional continuous grazing was 314% less than rotational stocking.

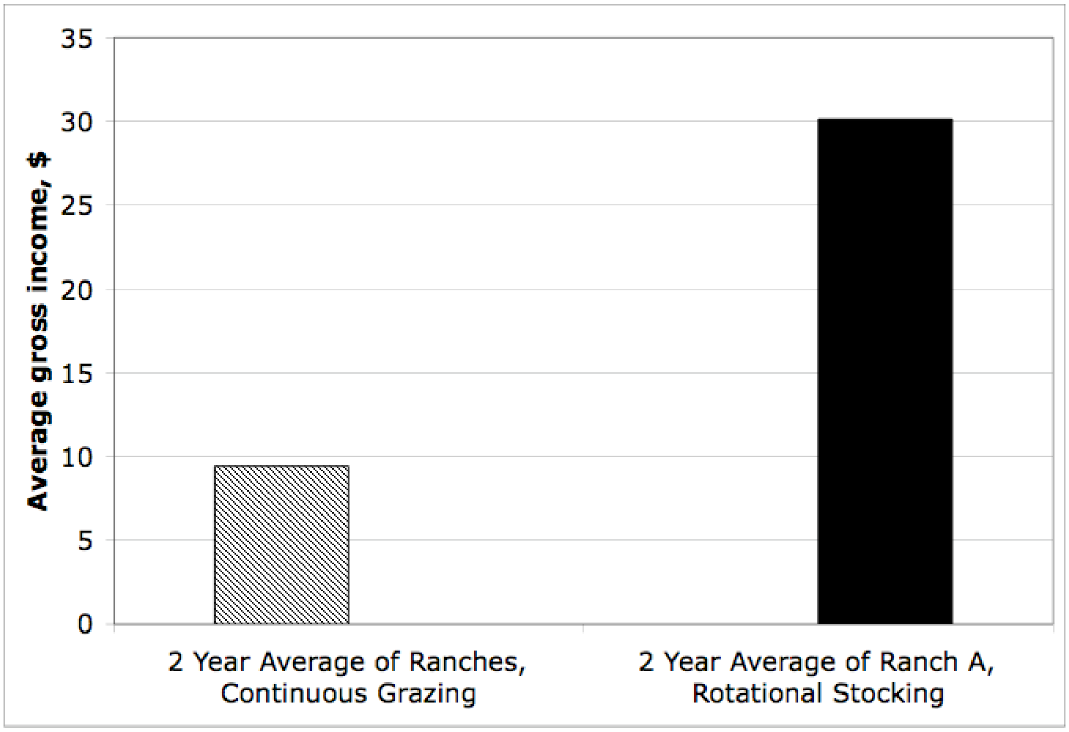

Figure 3. Comparison of average gross income for two ranches under continuous grazing and Ranch A using rotational stocking for two years.

These figures are very convincing of the additional income that can be made by using a rotational stocking of multiple paddocks in a grazing cell. Rotational stocking grazing methods will help to decrease production cost. This can be in the form of labor, equipment, and production inputs. When there are fewer herds of animals to care for this reduces the requirement of labor and equipment. When land resource is being managed with ecological soundness then there are fewer problems with outbreaks of insects, animal parasites, weeds, and other unwanted pest problems that will lessen the necessity for control measures.

Managing for Environmental Soundness

Ranch B – Ranch B contains 2,600 acres of half timber, half-open timber, and half-open grasslands located along the Red River in southern Oklahoma. Ranch B had been operated under one ownership for over 30 years until 1987 when management changed. It had been operated as a two-pasture, two-herd continuous grazing system. The landscape in 1987 could be described as overgrazed native range in the open grassland area. Plant composition consisted of 60% low seral plant species with varying degrees of encroachment of oaks, cedar, and miscellaneous hardwood trees.

Erosion had taken place in many forms over the years. Some of the open grassland areas were farmed for many years after early settlement. There was evidence of both sheet and gully erosion. Water quality in many of the ponds was poor.

The timber areas contained a thick impenetrable mass of low growing shrub species. It was neither suitable for wildlife nor livestock production.

The above description typically describes many ranches in the western United States. In a conventional approach to improving this ranch, we would recommend reseeding, controlling unwanted species by chemical and mechanical means, and decreasing stocking rate to remove the grazing pressure from desirable plants. This approach will increase production cost and at the same time reduce production potential. It does not deal with the real issue of why the ranch got like it is and what is the real cause of the problem.

Rotational stocking was initiated in 1987 in order to solve management problems by a sound ecological approach. Rotational stocking would allow short graze periods and long rest periods in order to stop overgrazing and to allow a designated rest period for plants to recover. Also, the concept of high stock density, the number of animals grazing an area at a given point in time, was used as a management tool to increase the grazing intensity and to remove grazing selectivity.

The landscape goal for Ranch B was to reverse the success ional trend back to a mixture of low, medium, and high seral species with high seral species occupying as much as 50% of the plant composition. Also, a part of the goal was to stop all forms of soil erosion. This would help the ranch reach a production goal of high profitability from livestock and lease hunting.

Figure 4 shows the frequency data for low, mid, and high seral species for years 1987 through 1991. Significant changes did occur in plant composition. Low seral species have declined from 60% to a 32% frequency rate as a result of grazing management. This grazing method provided the flexibility to use timing and stock density as a tool to decrease the abundance of these less desirable low seral species. Mid seral species have been increasing as fast as low seral species have decreased. In 1987, mid seral species accounted for only 12% of the plant composition. Mid seral species have responded to the decreased competition of low seral species. The high seral species have not changed, but we anticipate our grazing management will restore vigor and a competitive edge to the high seral species.

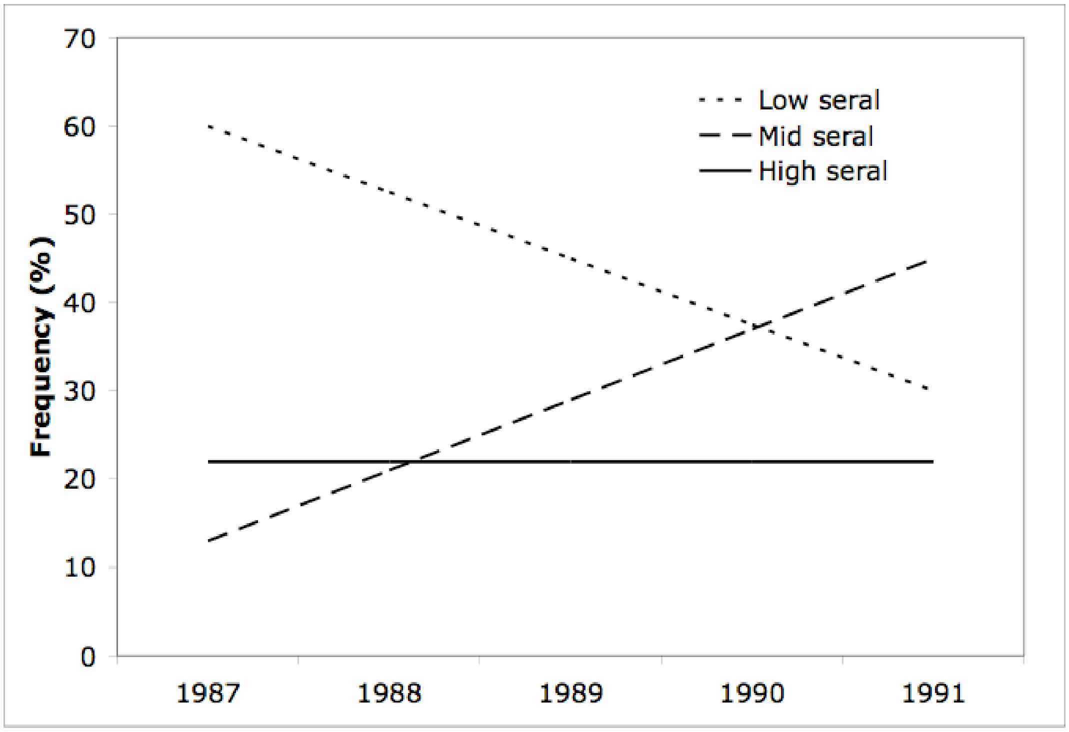

Figure 4. Frequency data for low, mid and high seral species.

Exposed soil containing sheet, rill, and gully erosion is now completely covered with healthy and vigorous plants. As a result of stopping water erosion, water quality in streams and ponds has dramatically improved.

The annual stocking rate has increased 30% while the deer population has increased 100%. Turkey and quail populations have fluctuated depending more on weather condition than on management of Ranch B.

Summary

Rotational stocking allows opportunity to manage a land resource by sound financial and ecological management. The results are dependent on the knowledge, skill, and dedication of the land resource manager. His commitment to monitoring plants, animals, and all biological processes toward a given goal is essential for a healthy ecosystem. In most situations, training in resource management is paramount for continued success.

It is ranches such as Ranch A and Ranch B that can escape the onslaught of government regulations to meet the standards set forth for clean water and air as we approach the year 2000.

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The Kerr Center Ranch Pasture Tour
Of Henson Bottom

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The Henson Bottom consists of 207 acres of bottomland along the Poteau River. The area is divided into a cell grazing system consisting of 15 pastures radiating from working pens and livestock water in the center of the cell. Thirteen pastures range from 10 to 16 acres each and make up the main rotational grazing system. Two other pastures (29 and 21 acres) are mainly used as hay pastures. The dominant cool season forages are tall fescue and ladino clover. Bermudagrass and Johnsongrass are the dominant warm season forages. In October of each year, steer calves (six to seven months of age) are placed on the rotation until July of the following year (approximately 295 days). The calves are from the Kerr Center cow-calf operation and out of Angus, Senepol, and Gelbvieh sires. The calves are weighed and weaning (initial weight), 12 months of age (yearling weight), and at 18 months of age (final weight). From this information, average daily gain and gain per acre are calculated.

The cattle are moved from one pasture to another every two and three days. Stock density is set so that 60 to 70 percent of the forage is removed during that grazing period. With thirteen pastures available, a pasture generally receives 24 to 36 days rest before it is grazed again.

When forage production exceeds animal consumption, certain pastures are deferred from grazing and cut for hay. The hay is put in round bales with grass twine and left in the pastures. The steers are allowed to graze those pastures on the next rotation. During the winter months, the steers continue through the rotation and utilize the baled hay if fresh forage is not available.

The steers are fed 48% protein cubes at a rate of 1 lb/head/day when consuming hay. Generally, the steers will be on hay for about 60 days (January and February). A 12% protein supplement is used during the first 30 days, after the steers are placed on the rotation to train them to move from pasture to pasture.

All variable expenses are recorded. The value of the steers when they are placed on the grazing system is based on their current market value. A cost of $15 per round bale is charged for the amount of hay baled that year. Interest on variable expenses is calculated using an annual interest rate of 8% for a 10-month production period. Income is from actual sales receipts.

The 1993 production information is presented in Table 1. There were 114 head of steers on the grazing system for 292 days. Stocking rate was 1.8 acres/steer. The average initial weight at weaning was 534 lbs/head and the final weight 809 lbs/head. The average daily gain was 0.9 lbs/head/day. The grazing system produced 151 pounds weight gain per acre.

Table 1. Production Summary for the Henson Bottom from 1992 to 1993.

Number (head)	114
Stocking Rate (ac/steer)	1.8
Grazing Period (days)	292
Initial Weight (lbs./head)	534
Yearling Weight (lbs./head)	589
Final Weight (lbs./head)	809
Weight Gain (lbs./head)	275
Daily Gain (lbs./head/day)	0.9
Total Weight Gain (lbs.)	31,339
Gain/Acre (lbs.)	151

The economic summary is presented in Table 2. Income was $75,647.23 or $663.57 per head. Total variable expenses were $64,874.54 or $569.07 per head. The price paid for the steers in the fall of 1992 was $91 cwt. A total of 174 round bales were fed in 1993. The cost/lb. gain was 18 cents. Net return to land, labor, and management was $10,772.69 or $94.50 per head. Net return per acre was $52.04.

Table 2. Economic Summary for the Henson Bottom from 1992 to 1993.

Total Income			**$ 75,647.23**
Income/Head	663.57		
Variable Costs			
Livestock	$ 55,435.38		
Hay	2,610.00		
12% Supplement	270.90		
48% Supplement	1,248.00		
Mineral	666.00		
Vaccine	299.82		
Dewormer	478.50		
Interest (8% annual)	3,865.94		
Total Variable Costs			**$ 64,874.54**
Variable Costs/Head		569.07	
Breakeven ($/cwt)	70.00		
Variable Cost/lb. Gain	0.18		
Net Return/Head	94.50		
Net Return/Acre	52.04		
Net Return to Land, Labor and Mgmt.			**$ 10,772.69**