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Managing Cattle on Timberlands: Forage Management[1]

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Livestock grazing in pine forests has been common practice since the first European settlers made their homes in the Southeast. Prior to state-mandated fence laws, cattle were allowed to roam the "open range". Under this type of grazing regime, costs and management were minimized, but it was difficult for owners to monitor and control feeding and breeding. Cattle are now required to be fenced, making integrated cattle and timber production operations much more controlled and productive.

Integrated cattle and timber management programs can generate annual returns for landowners. Periodic returns from livestock sales or grazing leases combined with timber sale revenues make such an operation a desirable investment for owners with land that is large enough and suitably arranged. Grazing also provides other benefits: an economical control of understory plants, maintained firebreaks, and livestock wastes can reduce fertilizer requirements by recycling nutrients.

Successful cattle and timber integration requires managers to understand the requirements of forage, livestock, and timber. This type of operation also requires a fair amount of advanced planning and management. This publication provides some guidelines on managing the forage resource as a part of a cattle and timber production program. Technical assistance can be obtained from your county Cooperative Extension Service office, USDA Natural Resources Conservation Service, Florida Division of Forestry, or consulting foresters. More publications on this topic, some of which are referenced in this document, are available on the IFAS Electronic Data Information Source (EDIS) Web site at http://edis.ifas.ufl.edu/.

Determining Grazing Capacity

The most important information needed for integrating cattle in woodlands is forage production. Without this, the site may not be utilized to its maximum advantage, or worse, it could be overused, damaging grazing resources, wildlife habitat, young trees, and watersheds.

The first step in measuring the forage resource is to identify the areas that are suitable for grazing. Suitable woodland range will typically be upland areas with a good stand of palatable grasses and forbs. Three IFAS publications provide useful information about forage plants and their use in Florida. *Range Sites of Florida* (Circular 951) gives a description of the major range sites in Florida, with a focus on soil, native vegetation and grazing value.

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Florida Range Grasses Impacting Grazing Management (Circular 956) and *Important Range Grasses for Evaluating Grazing Management* (Circular 665) focus on the desirability and use of specific native and introduced grass species on range. *Managing Pine Trees and Bahiagrass for Timber and Cattle Production* (Circular 1154) provides integrated timber and cattle production guidelines specific to bahiagrass.

Areas that are unsuitable for grazing will have some or all of the following characteristics:

- No forage or too little forage;
- Swampy or extremely wet conditions that prevent accessibility to cattle;
- Dry, deep, sandy soils;
- Area reserved for other uses, such as recreation or watershed for domestic water supply.

Once these areas are identified, they should be delineated on a map or aerial photograph. It is also helpful to identify the forest type or dominant vegetation and assess its condition. The next step is to estimate the number of acres that have been identified as suitable range. This can be done using a dot grid or a computer. Your county forester or consultant can estimate acreage easily on a computer using geographic information systems software.

Inventory of Grazing Resources

Field collection of annual forage yields can be done after growth ceases in the fall. Follow these steps to measure forage yields:

1. Select Sample Areas: Use the map to group each area of suitable range into similar types (strata) or vegetation conditions and use an unbiased method to locate plots on each type. One way is to determine yields on ten plots in types containing 200 or more acres, and five plots for types containing 100 or fewer acres.

2. Establish Plots: Plots containing 9.6 square feet are best because of the ease in converting forage weight in grams to pounds per acre. Plots can be square (3 feet, 1 and 3/16 inch x 3 feet, 1 and 3/16 inch) or circular (diameter = 42 inches). A wire circle or a rectangular metal or wooden frame can be easily made to use as a plot marker. Settle the plot marker into the vegetation. Only the vegetation originating from within the plot is used to determine yield. Rake the plot by hand before clipping to remove pine needles and dead plants.

3. Weigh the Forage: With grass clippers, clip all herbaceous vegetation at ground level and place the clipped material into a paper grocery bag. With a spring scale, weigh the herbage in grams (be sure to subtract the weight of the empty bag). If the scale measures in ounces, convert to grams using this conversion: 1 ounce = 28 grams. Have a calculator on hand to assist with necessary calculations. Enter the herbage weight per plot on a permanent record sheet. Empty the bag, gather all equipment and proceed to the next plot.

4. Calculate Yields: After all plots have been clipped and weighed, add the weights of all plots within a stratum and obtain the average weight per plot for that vegetation condition. Convert green weights to a dry weight basis by multiplying green weight by:

- 0.40 if clipped in late spring;
- 0.50 if clipped in summer;
- 0.60 if clipped in fall;
- 0.80 if clipped in winter.

Then multiply the results in grams by 10 (for a 9.6-square-foot plot) to obtain average yield in pounds per acre. Last, multiply dry weight yield per acre by the number of acres in the strata to determine the amount of *available forage* for those strata. Add up the available forage in all strata to obtain *total available forage* that can be grazed.

Carrying Capacity

Carrying capacity, or the number of animals that can graze an area without degradation of the forage resource, will depend on the number of months grazing will take place and forage production. The degree to which forage resources are grazed is critical. A high degree of use (more than 60%

consumption of the available forage) gives maximum returns per acre but can cause deterioration of the forage. A low degree of use (35% or less consumption) maximizes returns per animal but under-utilizes the resource. A medium degree of use (40 to 50% of the available forage) gives a good return while causing no harm to the resource. An accepted rule of thumb for grazing is to *use half and leave half*. This type of grazing management allows the forage to resupply the energy reserves it needs for sustained growth. The following is a simple procedure for determining how many cows can sustainably graze a given area.

Initial Stocking Rate: Calculate a conservative initial stocking rate by taking the *total available forage* and dividing by 2,250 (Byrd et al, 1984). This will give the total months of animal use available for the forage season. An estimate of carrying capacity for specific grazing periods is shown in Table 1.

Adjusting Stocking Rates: The numbers above are conservative estimates that take into account forage growth that is not consumed, trampled, fouled with dung or urine, consumed by other critters, etc. Evaluate forage yields annually to determine if the initial stocking rate is too high or too low. Adjustments will usually be required as trees grow larger, since forage yields decrease as shade increases from canopy closure. Cattle numbers can be maintained by thinning trees more heavily or frequently. Productive forage conditions persist if tree basal area* is maintained between 60 and 100 square feet per acre.

*basal area is the cross-sectional area of the trees at 4.5 feet above the ground, usually expressed as square feet per acre.

Utilization: Keep a few small, ungrazed, enclosed plots to compare with forage remaining in the grazed portion.

Carrying capacity for cattle is often expressed as ***animal unit month* (*AUM*)**. One AUM is equal to the amount of forage required to feed one cow (weighing 1,000 lbs) with one calf for one month. By convention, an AUM is equal to 780 lbs of dry forage. AUMs can be calculated by dividing your ***total available forage*** by 780. This will be important, especially when developing a grazing lease. Note that this estimate does not take into account forage growth that is not consumed, trampled, fouled, and consumed by other animals; as do the estimates in Table 1.

If grazing cattle on bahiagrass, consult specific guidelines outlined in Circular 1154, *Managing Pine Trees and Bahiagrass for Timber and Cattle Production*.

Grazing Systems

A grazing system regulates the length and timing of grazing periods in order to achieve specified outcomes with respect to forage and livestock production. Grazing systems must be tailored to fit the climate, soils, and vegetation of a given area as well as the objectives of the landowner. A good grazing system is simple and flexible, and it provides for adequate utilization of forage, uniform distribution of cattle, and economic practicality.

The objectives of a grazing system are to:

1. Carry out deferment, or rest, over a period of time so that preferred forage plants can replenish energy storage in the roots and restore vigor.

2. Obtain uniform forage use within each land unit. Remember the important guideline, ***use half and leave half***. This allows enough leaves to remain for the grass to maintain healthy roots for the next year's growth.

3. Allow management of both livestock, forage plants, and other components of the grazing system so that production is increased or maintained on a sustained yield basis.

Grazing systems often involve some sort of regular grazing ***rotation***, in which cattle are moved from one grazing unit to another on a scheduled basis. For instance, during one season, a landowner with 4 grazing units will schedule one to be grazed while the other three are deferred or burned. During the next season, the cattle will be moved to another unit while the remaining three are deferred or burned, and so forth. In Florida, 3- to 4-month deferments between grazing have been shown to maximize forage production. Continuous stocking can be as

productive as long as forage is utilized by adjusting animal numbers as needed.

The most commonly stated benefit of grazing systems is improved range condition resulting from increased plant vigor, seed production, and maintenance of preferred forage. These improved conditions increase forage yield and quality, thereby increasing animal production. The benefits gained from a grazing system will depend heavily on the site and forage species.

Timber Considerations

Grazing in pine stands has proven to be very beneficial for stand growth. However, grazing in planted pines should be delayed until trees are at least 18 months old and the grass has become established, and cattle stocking should be applied cautiously during the first 3 years of the stand. The conservative stocking figures in table 1 are good rules of thumb for the various forage quantities.

Influences on Forage

The quantity and quality of forage depends primarily on the species, site and grazing intensity. Most native and introduced range grasses, with a few exceptions, grow on moist to dry upland sites. Cattle favor certain grass species and unfavorable or unpalatable grasses will eventually dominate a range site if it is overgrazed. In addition to these, the following factors will influence forage quantity and quality:

Tree Canopy

Warm season, shade-intolerant forage species (bluestems, carpetgrass, cutthroat grass) predominate under medium to open forest canopies, while cool season, shade-tolerant species (curtiss dropseed, panicums, pineland threeawn) do fairly well under a more dense forest canopy. Other grasses, like bahiagrass do well in both. In general, canopy closure negatively affects the growth of understory forage plants. This can be controlled if tree spacing is strategically planned. Wide spacings, 8 x 12 feet or greater, allow higher production of forage for a longer period of time. However, alternative spacing configurations, involving a third spacing dimension between pairs of rows, can result in a high timber yield while extending a high forage production period. Research has shown that a tree spacing of 4 x 8 x 40 feet (4 feet between trees in rows, 8 feet between rows, and 40 feet between pairs of rows) is an optimal spacing for both wood and forage yield.

If tree density exceeds the optimal level for forage production, periodic thinnings can be used to allow more light and resources to the understory and increase forage yields. Studies have demonstrated that heavy precommercial thinning of young, dense timber stands can increase forage yield by as much as four times. Tree alignment is also an important consideration. An east-west row alignment will maximize grass exposure to sunlight.

Understory Shrub Competition

Forage production is also depressed by shrub competition. If not controlled, gallberry, saw-palmetto and wax myrtle will negatively influence forage yields on wetter sites. Where tree rows are adequately spaced, roller chopping and plowing are mechanical treatments by which shrubs can be controlled. Combinations of prescribed fire, herbicides and mechanical treatments are most effective. See Stewardship publication SS-FOR-10, *Vegetation Management in Florida's Private Non-Industrial Forests*, for more information about these techniques.

Soils

Soil type greatly influences how much forage can be produced per acre. Forage potentials vary from 225 pounds per acre on deep sandy soils (e.g., entisols) to 4,000 pounds per acre on sandy-loam soils (e.g., ultisols).

Fire

Prescribed fire in early spring improves the quantity and quality of range forage by removing ground litter and stimulating vigorous new growth. Burning rotations of 3- to 4-year intervals seem to be best for livestock and several species of wildlife. Regular grazing and mowing have similar effects.

Fire needs to be delayed after planting pines until the trees are about 15-20 feet high. Pasture planted with longleaf pines can be burned sooner, when the trees are 2 to 3 feet high. See Stewardship publication SS-FOR-10, *Vegetation Mangement in Florida's Private Non-Industrtial Forests*, for more information about the use of fire. For more on longleaf pine, see Stewardship Publication SS-FOR13, *Longleaf Pine Regeneration*.

Winter Forage

Despite Florida's warm climate, pastures do not grow year-round, so it is necessary to provide cool season forages. Legumes such as arrowleaf, or crimson or white clovers should be interplanted and fertilized on grazing areas in October for use in late fall, winter and early spring when pasture growth is greatly reduced. It is also necessary to have some conserved forage available. In many areas of Florida, especially north Florida, hay is a dependable source of nutritious winter forage, if harvested, dried and stored without excessive rain damage. For more information on hay production, see publication SS-AGR-70, *Hay Production in Florida*.

Forage Nutrition

The nutritional value of forage, judged by protein and mineral content and digestible energy, is often expressed as a percentage of required total digestible nutrients (TDN). The TDN requirements of heifers increase with weight gain and, depending on species, a diet of pasture grasses alone may not meet the nutritional requirements of a maturing herd. Information about the nutritional value of forage can be used to adjust the amount of protein and energy supplements required to meet the animals' nutritional needs. IFAS has developed an Extension Forage Testing Program to analyze the nutritional content of forage. See publication SS-AGR-63, *Forage Testing -- The University of Florida, IFAS, Extension Forage Testing Program* to learn about the procedure for utilizing this important service.

Supplemental Feeding

To compensate for forage nutrition deficiencies, especially during the winter months, supplemental feeds need to be provided in the grazing vicinity. Supplemental feeds can help to maintain calving percentages at about 80 percent and weaned calf weights at 400 pounds or more. Protein concentrates and mineral feeds are the most common forms of supplemental nutrients.

Fall and winter forages such as residual bahiagrass or mature hay often have a low nutritional quality. Six lb/day of a 75% TDN supplement containing 15% crude protein would be required for heifers to gain 1.0 lb/day. About 10 lb/day of 75% TDN supplement containing 13% crude protein would be needed for heifers to gain 1.5 lb/day. A supplement containing corn, soybean meal and minerals would contain approximately 75% TDN. Your county extension office can help you determine the type and quantity of supplemental feeds necessary to maintain herd health.

Conclusion

Forage management is the most important component of integrating cattle in woodlands. Proper forage management involves an inventory of the forage resource; an assessment of forage nutritional value; a resource-compatible stocking rate; and a grazing system that provides for adequate utilization of forage, uniform distribution of cattle, and economic practicality. Nutritional supplements of protein and minerals are necessary to maintain herd health and acceptable weight gain. Alternative feeding sources, such as hay, are also important considerations where forage production is significantly reduced seasonally

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Table 1. Acres per cow by 3- to 12-month grazing periods (Byrd et al., 1984).

	Months of Grazing				
Grass Production	3	5	7	9	12
(*Dry Weight lbs/acre*)	**Acres per Cow**				
500	14	23	32	41	72
1,000	7	11	16	20	36
2,000	3	6	8	10	18
3,000	2	4	5	7	12