Economic Options to Increase the Value of Your Ranchlands

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I have the unenviable task of discussing a subject that readers understand far better than I do: the economics of their land. Nonetheless, my goal is to suggest some options for land management that I understand and that might supplement your current revenue or even be substituted for some of your current practices. You are already familiar with some of these options, such as the silvopasture operations described by George Owens at this meeting several years ago.

Trees represent a long term commitment to cropping, but can be added to the landscape in diverse configurations to meet a variety of objectives. Some of those objectives may focus on a high level of revenue flow from timber crops. At the other end, your objectives may be only to use trees to provide other benefits such as shade for cattle or habitat for game animals. I will attempt to describe some of the benefits, operational considerations, and constraints for a range of practices in which you add or promote trees on your ranchlands.

Silvopastures

The most common option is actually an array of practices that merge timber management and livestock production. Historically, trees have been associated with cattle when livestock graze on grass or shrub forage in pine plantations or other woodlands. This involved little more than being opportunistic with an available, and underutilized, forage resource. Silvopasture practices involve a more intentional combination and management of cattle, timber, and improved forage crops.

Trees provide important benefits for cattle ranchers. Shade during summer heat influences weight gains; even if trees are only planted or retained in rows along pasture boundaries or as single trees scattered across the range. At higher densities, opportunities for revenue increase although shading can also reduce forage production. Silvopastures are created through two general processes – conversion of existing plantations to widely spaced trees with improved forage crops, or addition of trees to existing pastures. In either case, different tree configurations are possible. Widely spaced rows, or multiple rows, result in fairly uniform forage conditions across the property and offer the highest potential for adding timber-based revenue to cattle operations. Alternatively, trees can be grouped in clumps of ¼ to one acre in size. Forage production in the open pasture should remain unchanged, while the tree clumps still provide timber, shade for cattle, and possible wildlife cover. Timber production may be slightly reduced because of soil effects from the cattle concentrations in the tree "islands".

Costs associated with the two processes for creating silvopastures are substantially different. Generally, planting trees into open pasture or rangeland is the lowest cost option since it does not require operations to establish grasses, control shrubs, or remove logging debris. The following list of practices and approximate costs reflect the common practice of planting trees in double rows (8 feet between rows x 4 feet between trees within rows) with 40-foot spacing

between sets of rows. The 40-foot spacing maintains forage production in full sunlight for most of your pasture, and optimizes timber and forage production as demonstrated by the 13-year-old results of a silvopasture spacing study at Withlacoochie State Forest (Table 1, Lewis et al., 1985). Establishment practices may include some or all of the following:

1. Herbicide (Accord + Arsenal, Arsenal, Oust, Oust + Velpar, Oust + Arsenal) in 3 ft bands along planting rows, applied during site preparation and/or post planting ($30-55/acre);

2. Subsoil (ripper) + scalp (moldboard plow) to shatter compact soil horizons, roll sod away from planting rows, and provide a trench for root growth and water collection ($25-45/acre);

3. Prescribed burning (site preparation and/or post-planting after trees are at least 10 feet high) to reduce competition and increase forage palatability ($3-20/acre);

4. Mechanically plant 450 trees/acre ($50-60/acre);

5. Mowing during the first two to three years after planting to reduce competition and harvest hay ($15-25/acre)

6. Avoid grazing for one to two years, until trees are 4 feet high.

Other important management and planning guidelines are outlined in several extension publications (Tyree and Kunkle, 1995; Nowak et al., 2002; Demers and Clausen 2002).

If, instead, you want to convert existing plantations to silvopasture, the main treatments focus on establishing forage crops rather than tree seedlings. The plantation should first be thinned, with residual densities dependent on tree arrangements. If trees are left at widely spaced intervals across the site, no more than 100-150 trees per acre (tpa) should be left. However, if left in widely spaced double rows, 200-400 tpa are acceptable depending on plantation age at thinning. Revenue from thinning will not be large ($20-300/acre), but should partially compensate for the forage establishment costs. Once harvesting is completed, substantial site preparation is necessary for forage crops, the most expensive step being removal of stumps if not left to decompose in place. A number of other steps (such as 3 and 4 below) may also be optional depending on your particular conditions.

1. Stump removal ($200/acre and up);

2. Rake, pile and burn debris ($150-200/acre);

3. Disk, cultivate, and level soil being careful not to cultivate right beside residual pines ($20-40/acre);

4. Lime and fertilize to improve forage conditions (most pine soils are pH 4-5) and sow forage crops ($175-250/acre);

5. Repeat fertilization with N-P-K ($25/acre);

6. Avoid grazing for 6-18 months for forage establishment.

Table 1. Total wood volume and forage production in 13-year-old slash pine silvopastures at Withlacoochie State Forest (adapted from Lewis et al., 1985).

Spacing	8 x 12 ft	4 x 24 ft	4 x 8 x 40 ft	2 x 8 x 88 ft
Wood volume (cu ft/acre)	903	866	1086	580
Forage production (lbs/acre)	1138	542	1264	2573

The primary justification for planting pines is to reap a future income. Unlike most other crops, or livestock, timber tends to increase in value the longer it grows and it doesn't need to be harvested at a particular time. Actual values will depend on age of harvest, prevailing market prices, and distances to markets. Most southern pines will reach first harvest ages between 10 and 15 years age when 4-8 inch diameter stems can be sold as pulpwood to paper mills across north Florida. Unfortunately, the closest mill for pulpwood from south Florida is in Palatka, which may be too far for many timber sales. As trees grow into the 9-13 inch diameter classes they are usually sold to sawmills at prices for landowners that have tended to be two to four times higher per ton than pulpwood. A variety of sawmills across Florida are potential markets for these logs. As long as trees have ample room to grow (especially as rows or single trees in pastures) they generally reach sawtimber sizes by ages 15-25 years. Harvesting options include complete cutting of all trees, or thinning which removes ⅓-⅔ of the trees, leaving the rest for shade and to grow into larger, more valuable, sizes.

Timber prices for sawlogs have generally been on an upward trend for more than 10 years (Figure 1), with various spikes and downturns due to the economy, weather, and fires. Pulpwood, on the other hand, has remained relatively flat with little potential for short term change. However, if you own land within 30-40 miles of a pulp mill, you may still receive fairly reasonable prices due to short hauling distances. Timber yields will vary depending on site conditions and stocking levels. A recent study in central Florida indicated that a typical widely spaced double row configuration of slash pine in a bahiagrass pasture produced 1.8 cords/acre at age 11 (Ezenwa et al., 2003). The authors projected yields at ages 15 and 20 of 10 and 18 cords/acre, respectively, which translated to timber values of $60/acre and $400/acre. At age 15, timber yields will obviously not cover the costs for establishing trees in the silvopasture but by age 20 timber harvests could represent a sizable profit.

Figure 1. Average quarterly timber stumpage prices in northwest Florida, 1990-2002, from Timber Mart-South.

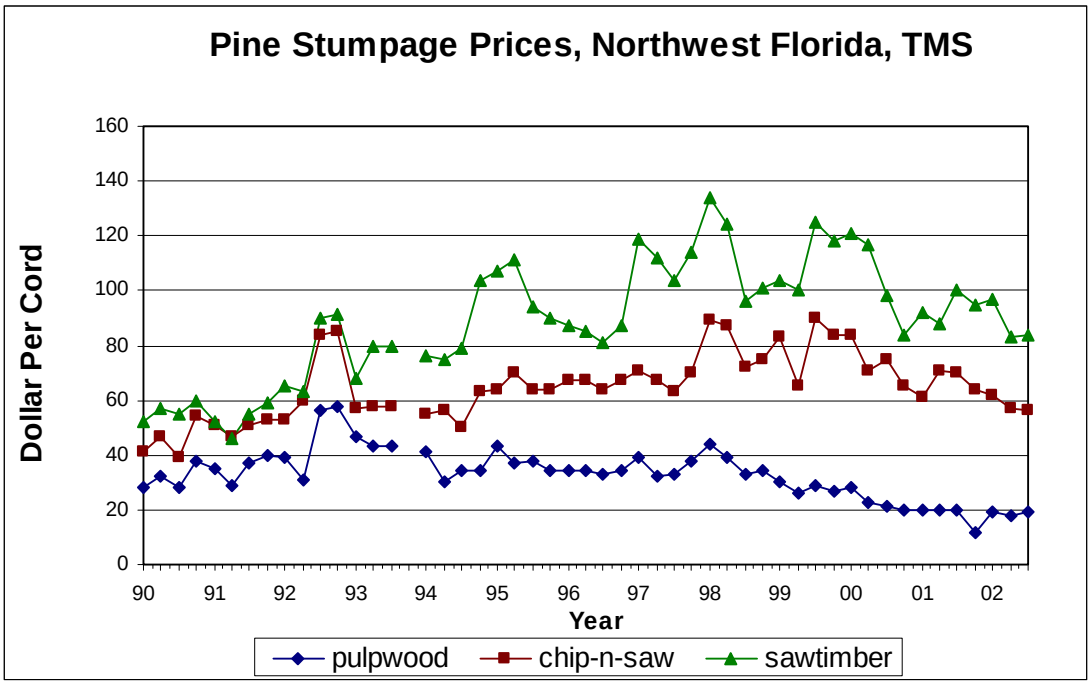

Table 2. Selected economic parameters for open pasture, silvopasture, and pine plantations as described in several recent studies and publications.

Study	Economic parameter	Value		
		Open pasture	Silvopasture	Pine plantation
Husak & Grado, 2002	EAI ($/acre) @ 5%	55	67	69
	EAI ($/acre) @ 9%	54	38	27
Grado et al., 2001	LEV ($/acre)	1,358-2,246	591-1,569	239-963
Clason, 1995	NPV–31 years ($/acre)	613	1491	644
Clason, 1995	Cash flow ($/acre/yr, ages 20-31)	56	135	58

Using the types of price information and silvicultural practices just described, economic analyses have been conducted for both real and simulated scenarios across the South. Brief descriptions of several of those studies follow with key economic parameters summarized in Table 2.

Silvopastures compared very favorably with open pasture cattle grazing and pine plantations in a recent economic model of Southern land management systems (Husak and Grado, 2002). Silvopastures were established at 4 x 8 x 20 foot spacings with loblolly pine and maintained for a 30-year rotation with two thinnings. Open pastures were established with a mix of summer grasses and calves were sold in their second year. Pine plantations were carried for a 35-year rotation with two thinnings. All economic parameters were taken from relevant regional agricultural reports. Results were presented as land expectation values (LEV), equivalent annual incomes (EAI), and rates of return at three different interest rates. The results demonstrated that at low interest rates silvopasture and plantations had slightly higher LEVs and EAIs than open pasture (Table 2). At higher interest rates (e.g. 9%) open grazing was preferred, probably because of the periodic, rather than annual, nature of timber revenues. EAIs increased by $2-10/acre when hunting leases were added to the silvopasture option, making up for some, or all, of the difference between silvopastures and open pastures.

Another comparison of pine silvopastures, open pastures and pine plantations in southern Mississippi indicated that land expectation values for cattle grazing of improved forage in commercially productive loblolly pine stands were lower than for grazing steers in open pasture only, but considerably higher than LEVs for pine plantations (Grado et al., 2001). When fee hunting was added to the silvopasture treatments (at a modest $6/acre lease rate), LEVs improved by almost 9%.

Clason (1995) compared the economics of converting a 20-year-old loblolly-pine plantation to open pastures or a silvopasture (thinned to 245 tpa) with continued timber production in the plantation. He demonstrated that 10 years later the silvopasture had a higher net present value (NPV) and annual cash flow (Table 2) than if the land had been retained in just timber management or converted to open pasture for forage production.

Dangerfield and Harwell (1990) compared a regular 25-year timber management scenario starting with 640 tpa loblolly pine with a silvopasture design of widely spaced double rows. Net present value of the silvopasture was 71% higher than in the regular forestry enterprise, largely because of the annual revenues from cattle production. Their study did not include an open pasture comparison.

Hunting and Recreational Leases

Hunting leases represent a second important source of revenue from silvopastures. Game animals that might utilize the trees for cover and pastures for forage include deer, turkey, quail, and dove. The likely presence of wildlife increases if surrounding properties include hardwoods, older plantations, and/or shrubs where additional cover and food are available. At a landscape scale, ideal habitat includes a mosaic of different vegetation types and ages. Combining several adjacent properties into one lease may optimize this diversity of cover and bring higher lease rates.

Fee hunting (leases or day permits) can begin as early as the second year after seedlings are planted. Typical hunting leases range from $3-10/acre depending on factors such as the size of the lease, diversity of vegetation communities in the lease, and past hunting experiences. Rates may go even higher later in the rotation when habitats mature. Leases provide one other important benefit. Hunt clubs and lease holders will usually provide a security presence, especially during hunting season, to guard against trespass, arson, and dumping. Lease contracts should clearly state lessee and landowner responsibilities, insurance requirements, and payment schedules. Several companies currently provide hunting lease insurance that protects both landowners and hunt clubs from general liability, fire damage liability, and medical expenses.

Other management practices are not necessary for most hunting leases, although establishment of food plots at various locations may increase the value of the lease. Food plots may be strips along roads, property boundaries or power lines, or 1-2-acre blocks in or near timber stands. Plots can be disked or mowed, and seeded or left to revegetate from natural seed. Either the ranch owner or hunt club can assume responsibility for creating and maintaining such plots.

Another much less common lease is one that allows various recreational uses on your land, such as trail riding (horseback, mountain bikes, or ATVs), wildlife viewing, hiking, or even paintball games. As with hunting leases, your best opportunities for developing such leases may be with local organizations who will be interested in protecting your property, or even in helping you develop the trails or other infrastructure. There is little information available to help guide you in developing such leases. Local public agencies who are involved in recreational activities are a possible source of information and assistance, especially if your property is adjacent to theirs.

Pasture Conversions to Other Management Uses

The options described so far are designed to maintain your cattle operation with little, if any, decrease in productivity. Other options represent partial or complete conversion of some of your land, generally with the goal of diversifying income opportunities. The most common option has been planting old pastures with loblolly, slash or longleaf pine, using the silvicultural practices described previously. Planting densities are usually 500-700 tpa with spacing between rows sufficient to allow tractors that might be used for mowing, pine straw baling, or thinning.

Plantations on old pastures provide a variety of benefits and revenue opportunities. Until stands are five to eight years old they can still be used for cattle grazing or hay production. Once tree crowns begin to touch, forage grass production decreases as shade increases (Byrd et al., 1984). Several years later, pine straw raking can begin in slash pine and longleaf pine plantations (Duryea, 2000). Old pastures are preferred for pine straw because there is usually little understory cleanup necessary before raking begins. Raking and baling is usually conducted for a

3- to 5-year period with per acre revenues of $50-125/acre. By age 15, most plantations are ready to thin. This first timber sale should focus on removing small, deformed, and diseased trees and leave the best trees well spaced to grow into higher value logs. Prices for sawtimber logs today are much higher than pulpwood logs, and that difference is not likely to change in the foreseeable future. Although the first thinning may not produce significant revenue it is very important for increasing growing space for final crop trees which might be harvested between ages 20 and 30, either as a final clearcut or with one or two additional thinnings before final harvest.

In central and south Florida, another plantation option is for short rotation woody crops that can be used as mulch or biomass for energy production (Rockwood, 1996; 1998). Both pines and Eucalyptus have been tested so far and there may be other suitable species in the future. Planting densities are generally much higher than regular plantations but harvesting rotations may be as short as 5-7 years. An important factor in a decision to establish energy plantations will be the locations of biomass-to-energy mill sites.

Alley cropping is another agroforestry practice that could be established anywhere in Florida on pasture or other crop land. Although it represents a significant departure from traditional livestock ranching, it may provide income diversification while only requiring a small portion of your total land base. Alley cropping combines trees, planted in single or grouped rows, with agricultural, high-value crops that are cultivated in wide alleys between the tree rows (Workman et al., 2003). Some of the most likely combinations in Florida include nut, hardwood, or timber trees such as pecan, oaks, pines, or cottonwood, and cash crops such as corn, hay, peanuts, cotton, soybeans, blueberries, and Christmas trees. Appropriate combinations will depend on the soils and climate in your area.

In alley cropping, trees are generally planted in widely spaced (20-30 feet) rows to allow sufficient room for mechanized cropping and sunlight for the alley crops. Tree spacing within rows will depend on the species you plant, with wider spacings necessary for nut crops and closer spacings for timber production. Tree species might even be mixed within the tree rows (i.e. redcedar for Christmas trees and slash pine for timber), and alley crops can be mixed both spatially and temporally. For example, corn, soybeans, melons, or other cash crops might be grown for the first 2-4 years while trees are growing above grazing height. At that point, the alley crop could be switched to forage grasses for cattle grazing, creating a silvopasture system.

The decision about which trees and crops to combine in an alley cropping system will depend on your particular objectives and soil characteristics, local markets, and perhaps most importantly, what you will feel comfortable doing. Considering your ‘comfort level’, one option for managing these other cropping systems may be to team up with other landowners in your area who have the equipment and knowledge. Leases, or other agreements, would probably be necessary to spell out responsibilities and payments.

Conclusion

Economic options for ranchlands include a variety of practices that incorporate trees either as a supplement to, or replacement for, grazing pastures. Income may be from various timber products, pine straw, other agricultural crops, or recreational leases. Economic values of each option may or may not exceed the value of cattle ranching under normal conditions. However, these options may provide an important supplement to cattle income; more importantly, they can provide a significant buffer when cattle prices are down. As in most investment literature, diversification is a key to long term economic survival.

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