

ONA REPORTS

published in

THE FLORIDA CATTLEMAN AND LIVESTOCK JOURNAL

December 2004

Forage and Livestock Production in Silvopasture

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Economic gains from silvopasture are usually achieved through diversified products (timber, beef, forage, hunting leases) and services (wildlife habitat, environmental sustainability) which improve ranch profitability and cash flow. Although the potential to maintain multiple products remains high, forage and beef production, and management practices necessary to achieve the potential from silvopasture have not been determined. We began a long-term study to determine how much forage and beef could be produced from a south Florida slash pine-bahiagrass silvopasture.

The Study Area and Methods

Our study was conducted on a 40-acre pine-bahiagrass silvopasture at Ona. Trees were established in December 1991 in a 'Pensacola' bahiagrass pasture at 450 trees/acre where trees were planted in double-rows spaced 8 ft apart, 4 ft between pines within the row, and 40 ft between double-rows. The silvopasture was sown to 'Florida' carpon desmodium in 1994 and 'Shaw' creeping vigna in 2001. By 2002, tree density was reduced to 200 trees/acre (44% of original planting density). During the first 11 years of grazing, an average of 1 cow-calf pair/1.2 acres was maintained from March to October, with 76% weaning rate and calves averaging 450 lb at 230 days of age.

During the summer of 2003 and 2004, when the trees were 12- and 13-years old, respectively, we grazed the silvopasture and compared forage and livestock production to a 20-acre open pasture (no pines). The open pasture was also Pensacola bahiagrass with Florida carpon desmodium and Shaw creeping vigna.

In 2003, we used mature Braford cows and calves (112-day-old at start) in the silvopasture and open pasture stocked at 1 cow-calf pair/acre for 107 days from 1 June to 15 September 2003 when the calves were weaned. In 2004, we reduced stocking rates (based on 2003 results) to 1 cow-calf pair/1.2 acres in open pasture and 1 cow-calf pair/1.6 acres in silvopasture (Fig. 1).



Fig. 1. Cattle grazing 12-year old pine-bahiagrass silvopasture at Ona.

Forage and Cattle Data

In 2003, available forage averaged 2190 lb/acre in all pastures at the start in June, but forage availability declined steadily over the grazing period in silvopasture because pasture growth could not keep up with animal demand. In the open pasture, available forage increased from June to July, and then declined through September. Cows lost an average 193 lb on the silvopasture compared with a loss of 46 lb for open pasture over the 107-day period (Table 1). Body condition scores of the cows in September were 4.9 and 3.8 in open pasture and silvopasture, respectively. Calf weights at weaning (236 days of age) were 466 lb on open pasture compared with 394 lb on silvopasture.

Table 1. Initial and final cow and calf weights and body condition score (BCS) after 107 and 143 days of grazing in 2003 and 2004. Range Cattle REC, Ona.				
	2003†		2004‡	
	Open	Silvopasture	Open	Silvopasture
Cow weight at start (lb)	1120	1123	1097	1091
Cow weight at end (lb)	1074	930	1204	1083
Cow BCS at start	5.2	5.1	4.6	5.1
Cow BCS at end	4.9	3.8	5.7	4.3
Calf weight at start (lb)§	326	316	287	287
Calf weight at end, weaning (lb)§	466	394	587	472
Calf avg. daily gain (lb/day)	1.9	0.7	2.0	1.2
† For the period 27 May to 29 Sept. 2003.				
‡ For the period 10 May to 30 Sept. 2004.				
§ Calf weight adjusted for sex and age.				

Calf weaning weight on the 12-year old silvopasture was 15% lower, and cow weight loss was 4 times more than that on open pasture. These represented drastic reductions in livestock production compared with production when the trees were younger.

Available forage during the 2004 grazing period averaged 1560 lb/acre in silvopasture and 1990 lb/acre in open pasture. In both open pasture and silvopasture, available forage increased from May to July, and then declined through September. Cows lost an average 8 lb on the silvopasture compared with a gain of 107 lb on open pasture over the 143-day period (Table 1). Body condition scores of the cows in September were 5.7 and 4.3 in open pasture and silvopasture, respectively. Calf weight at weaning (255 days of age) was 587 lb on open pasture compared with 472 lb on silvopasture. In other words, calves on open pasture gained an average of 300 vs. 185 lb on silvopasture. This is equivalent to 288 lb of gain/acre on open pasture vs. 110 lb/acre on silvopasture.

Application of the Results

Pines definitely reduced beef output. Cattle (and forage) production may be reduced by about 25% when pines are 12 years of age, and beef production should continue to decline as pines increase in size. If silvopasture is to be an economically viable management option for landowners, then increasing value of timber and income from other sources, such as sale of hunting leases, must offset declining returns from cattle. Perhaps, a better strategy to avoid the negative impact of the trees is to adopt shorter rotations that will entail harvesting trees before they are 12-years old. In central and south Florida, it may be best to produce fence posts or pulpwood, which would mean shorter rotations of ~10 years. In this way, trees are harvested before they can reduce livestock production. The trees are then replanted to begin a new rotation.

Silvopasture can fit into existing operations of many ranchers, especially those interested in diversifying their income and those interested in investing in environmental sustainability and improvement of wildlife habitat. In addition to beef, forage, and timber, revenues from hunting leases, and other recreational services that silvopasture provide make the outlook for the practice bright.