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The Role of Livestock in Integrated Peanut/Cotton Cropping System Economics[1]

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The first cattle in the United States were brought to Florida in 1513 by Ponce de León. Over the centuries, the role of cattle in agriculture has changed from subsistence mixed farming, where farmers kept both cattle and crops, to specialization, where for some farmers, cattle production became their sole agriculture business. The current economic situation and environmental and wildlife concerns favor the integration of livestock into peanut/cotton farming systems as well as other row crops. This discussion will be on a long-term rotation of a four-year cropping system that includes two years of bahiagrass followed by peanut and then cotton, with small grain for winter grazing after row crops and overseeding into perennial grasses. An overview of this farming system is given in the EDIS publication SS-AGR-126 *Sod/Livestock-Based Peanut/Cotton Production Systems: The Next Generation Conservation Cropping System* (http://edis.ifas.ufl.edu/ag258) and also on our website at http://nfrec.ifas.ufl.edu/programs/sod_rotation.shtml.

Row-crop growers stand to reap several benefits from including cattle in their farming systems. In the course of grazing, cattle reduce chances of fires, control weeds, and make use of plants that cannot be digested by humans (i.e., changing low-energy grass to high-protein beef or milk). Livestock provides a fallback alternative for using crops when grain quality or quantity is not good enough to be sold or harvested. In the case of the proposed integrated crop/livestock conservation farmingsystem, bahiagrass can be baled and fed to the cattle, or, alternatively, the cattle can graze bahiagrass. Livestock fit well with the cover crop system and can graze throughout the winter in a sod-based system or winter grazing alone after row crops. In winter, small grain are grown on land that would be used for peanuts and cotton in summer. This enables farmers to achieve higher carrying capacity, and more intensive summer and winter grazing increases income from livestock and utilizes land year-round, taking up excess nutrients from previous crops. Livestock manure provides recycled nutrients and other beneficial properties important to soil quality and plant growth. Livestock manure increases soil organic matter, and manure and urine also raise the pH and K level. Soil microbial population is enhanced with cover crops even on a summer grass like bahiagrass and is enhanced even more with livestock grazing. Cattle recycle a considerable amount of N, which reduces N needs while maintaining plant growth and consistently provides higher cotton yields than without grazing. Expansion and intensification of agriculture and associated tillage have robbed wildlife habitat and reduced plant and animal biodiversity and numbers. It is necessary for humans to provide habitat for wildlife preservation for future generations. Many animal species including ground-nesting birds, deer, wild

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turkey, quail, and rabbits all live in close proximity to humans. Diverse cropping systems result in diverse plants likely to attract insects, which in turn will attract birds. Rotating perennial grasses through row-crop land increases plant species composition and wildlife habitat.

Economics of the Crop/Livestock Farming System

Cotton and peanut yields have increased slowly over the past 15–25 years until the past few years, while the cost of production has continued to rise. Our research has shown that incorporating livestock into traditional peanut/cotton or other row-crop rotations greatly increases the profitability for farmers. We have an interactive business model growers can use to evaluate the economic feasibility of a four-year livestock/peanut/cotton/sod rotation for their own farms. The model can be found at http://nfrec.ifas.ufl.edu/programs/sod_rotation.shtml. Farmers can input values for their farm scenarios and find how the system works for them.

Generally, results from the model show low net returns at the beginning of the integrated farming system compared to the traditional peanut/cotton rotation. However, returns quickly increase and can be three- to seven-fold greater compared to the conventional peanut/cotton rotation by the 4th year in the system. The low profits at the beginning of the rotation are a result of conventional crop yields with standard rotations. The greater returns in years 3 and 4 are from the cattle revenue and greater returns from crops with higher yields. Even if the grower does not have cattle but adopts the sod rotation, the sod-based rotation is still more profitable than the conventional peanut/cotton rotation because of the higher crop yields from the rotation. As pointed out earlier, bahiagrass hay or seed can be sold for income. Many small row-crop farmers in Florida have small cattle herds, and they may buy hay from their neighbors. Likewise, farmers who may not want to invest in cattle can still incorporate livestock into their rotations through contract grazing or working with a neighbor who has cattle. Thus, they gain the advantages of integrated farming without actually owning cattle. An intermediate step is using winter grazing after row-crops without bahia keeping all of the land in row crop production. Our data has shown that root mass will be doubled on crops following winter grazing, and that less N and less irrigation water is required because of the extra rooting and increase in microbial population and organic matter.

Conclusion

An integrated sod/livestock peanut/cotton farming system adds value above the traditional peanut/cotton rotation. This system increases yield and profitability and allows for wildlife proliferation. While the integration of crop and livestock systems is challenging because it requires new knowledge and greater management skills, the potential rewarding returns from these systems should make farmers willing to learn to manage cattle. An intermediate step is for winter grazing without bahiagrass in the system with many of the benefits. Complete details on the sod rotation, including the effect on plant and soil health, weeds, diseases, pests, and yield, are available on our website (http://nfrec.ifas.ufl.edu/programs/sod_rotation.shtml) and in other publications on EDIS (http://edis.ifas.ufl.edu/).

Table 1. Cost, returns, and profits for conventional compared to livestock-based peanut/cotton cropping systems.

Enterprise	Yield/Acre	Units	Area	Cost ($)	Returns ($)	Profits ($)
Conventional peanut and cotton rotation						
Peanut	3900	lbs	67	40200	52260	12060
Cotton	650	lbs	67	40200	30485	-9715
Cotton	650	lbs	67	40200	30485	-9715
Total			**200**	**120600**	**113230**	**-7370**
First year in sod rotation						
Peanut	3900	lbs	50	30000	39000	-9000
Cotton	650	lbs	50	30000	22750	-7250
Bahia 1	3	tons	50	12935	15000	2065
Cotton	650	lbs	50	30000	22750	-7250
Total			**200**	**102935**	**9950**	**-3435**
Second year in sod rotation						
Peanut	3900	lbs	50	30000	39000	9000
Cattle	68	head	50	24301	37500	13199
Bahia 1	3	tons	50	12935	15000	2065
Cotton	650	lbs	50	30000	22750	7250
Total			**200**	**97236**	**114250**	**17014**
Third year in sod rotation						
Peanut	5500	lbs	50	30000	55000	25000
Cattle	68	head	50	24301	37500	13199
Bahia 1	3	tons	50	12935	15000	2065
Cotton	650	lbs	50	30000	22750	-7250
Total			**200**	**97236**	**130250**	**33014**
Fourth year in sod rotation						
Peanut	5500	lbs	50	30000	55000	25000
Cattle	68	head	50	24301	37500	13199
Bahia 1	3	tons	50	12935	15000	2065
Cotton	950	lbs	50	30000	33250	3250
Total			**200**	**97236**	**140750**	**43514**