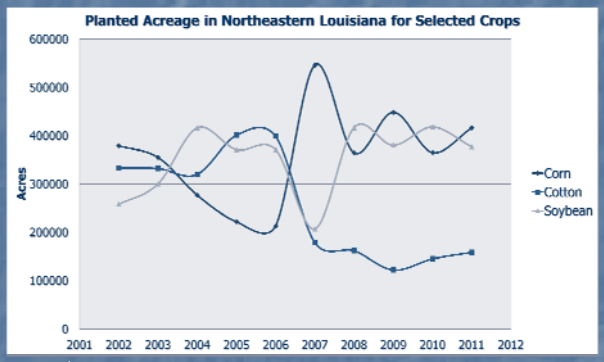
Can Cotton Compete?
Evaluating Cotton Crop Rotations in Northeastern Louisiana

Michael A. Deliberto and Michael E. Salassi

Louisiana State University Agricultural Center, Department of Agricultural Economics & Agribusiness, Baton Rouge, LA

2013 Beltwide Cotton Conferences, January 7-11, 2013, Marriott Riverwalk Hotel, San Antonio, TX.

The Mississippi River delta region of northeastern Louisiana is a diverse agricultural region of the state. Corn, cotton, soybeans, wheat, rice, and grain sorghum are commonly produced in a rotational-based system. The sentiment of Louisiana cotton producers is representative of the nationwide trend of reduced acreage in favor of competing commodities produced in rotation with cotton-namely corn and soybeans. Cotton input prices , depressed market price (versus narrowing profit margins), and high global stocks also contributed to a reduction in plantings. Since 2006, cotton acreage in the region continues to decline as producers elect to plant corn and soybeans. Figure below. Corn and soybean crops that are produced in northeastern Louisiana have lower management intensity when compared to cotton. A noticeable production cost difference exists in fertilizer, seed, insect control programs, as well as with harvesting systems when cotton is compared to corn and soybeans in this region. Reductions in input costs and the potential for yield increases have been associated with rotational crops in this region of Louisiana.



A financial farm simulation model of predetermined crop mixes was constructed for cotton producing parishes in northeastern Louisiana to evaluate the affect that corn, cotton, and soybean crop rotations have on grower profitability. Stochastic prices and yields utilized in this risk analysis were generated using SIMETAR (Richardson et al. 2008). Price, yield, fuel, and fertilizer parameters for each crop was simulated based on the past ten years of data to provide an accurate depiction of the variability within the region. Production cost data was obtained from Projected Cotton Costs and Returns for Northeast Louisiana (Deliberto and Salassi 2012) and held constant within the region for this analysis. Results are presented as Approach 1.

To further evaluate the competitiveness of cotton under alternative market prices and yield levels in northeastern Louisiana, data from Tensas Parish was selected to construct a representative mixed crop farming operation. Approach 2. Given current production costs and expected yields for producers in Tensas Parish, the question of under what price and yield situations can cotton compete economically for crop production acres relative to corn and soybeans was posed. This research question expands on the above mentioned "predetermined" or specified crop selection model. Tensas Parish has recorded an above average cotton yield when compared to surrounding parishes located in the northeastern Louisiana Mississippi River delta region, so it was necessary to account a cotton yield increase in model identification. Corn and soybean yields were consistent with regional averages . As an alternative to the simulation approach that was used for predetermined crop mixes (Approach 1), the previous ten years of data for Tensas Parish was detrended and the residuals were calculated and applied to the mean values of selected input costs, price, and yield for each observation. This approach considers the use of poly-pipe irrigation applied to cotton production. Hence, this production expenditure was weighted and applied to the appropriate acres devoted to cotton in each selected rotational model.

References

Deliberto, M.A. and M.E. Salassi. *2012 Projected Costs and Returns for Cotton, Soybeans, Corn, Grain Sorghum, and Wheat Production in Northeastern Louisiana.* Louisiana State University Agricultural Center. Department of Agricultural Economics and Agribusiness. A.E.A. Information Series No. 283. January 2012.

Richardson, James W., K.D. Schumann, and P.A. Feldman. SIMETAR. Simulation and Econometrics to Analyze Risk. ©2008 Simetar, Inc. College Station, TX.

Approach 1

Results from the farm simulation model (June 2012) for 13 alternative crop mix selections are presented in the table below. These results are evaluated based on the grower's share of net returns above total variable costs per crop mix choice. Simulation of the 2012 simulated yield level for each crop, selected production input parameter, and the near-by harvest month futures prices for each commodity, indicates that a producer would favor a rotation consisting of a corn or a predominant corn mix of farm acres in the Mississippi River delta region of Louisiana. Four out of the top five crop mixes, in terms of grower net returns above variable costs, included a majority (greater than a 50%) of acres devoted to corn. The predetermined crop mix selection modeling approach suggest that predominant crop mixes that favor cotton (rotation numbers 2, 7, 11, and 13) exhibited the lowest net return level per acre while incorporating the highest degree of risk.

Crop Rotation Number	Predetermined Crop Rotation	Net Returns Above Var .Costs	Rotation Rank Return Difference
1	100CR	$255	(1) (--)
2	100CT	$145	(13) ($110)
3	100SY	$165	(9) ($90)
4	33CR-33CT-33SY	$186	(7) ($69)
5	50CR-50CT	$200	(5) ($55)
6	50CR-50SY	$210	(4) ($45)
7	50CT-50SY	$155	(11) ($100)
8	66CR-33SY	$222	(2) ($33)
9	66CR-33CT	$216	(3) ($39)
10	33CR-66SY	$193	(6) ($62)
11	33CR-66CT	$180	(8) ($75)
12	33CT-66SY	$157	(10) ($98)
13	66CT-33SY	$150	(12) ($105)

Simulated mean parameters in this approach: Corn $5.30/bu, cotton $0.6765/lb, soybeans $13.28, diesel $3.50/gal, N fert $0.63, P fert$0.70/lb, and K fert$0.51/lb. Yields were 150bu/ac for corn, 1,000 lbs/ac for cotton, and 40 bu/ac for soybeans.

Approach 2

Modeling Tensas Parish Louisiana (November 2012) aimed at evaluating cotton rotation competitiveness for each of the four pricing scenarios (a through d) appear in the table below. Four price scenarios were used in this approach: (a) $0.72 cotton, $7.00 corn, and $14.00 soybeans, (b) $0.72 cotton, $6.00 corn, and $13.00 soybeans, (c) $0.82 cotton, $7.00 corn, and $14.00 soybeans, and (d) $0.82 cotton, $6.00 corn, and $13.00 soybeans. Yield scenarios were 850, 1,000, and 1,200 lbs/ac for cotton; 130 bu/ac for corn; and 40 bu/ac for soybeans. Weighted irrigation costs are considered. Grower share of net returns above variable costs indicate that cotton can compete economically with corn and soybeans at the $0.82 and even "out-compete" corn and soybeans when yield levels are in excess of 1,000 lbs/ac. However, the risk measure associated with cotton must be considered by the producer as this percentage represents the degree of variability in profit level.

Tensas Parish Crop Rotation	Mean Cotton Yield per Acre		
	850 lbs/ac	1,000 lbs/ac	1,200 lbs/ac
CT/CR/SY = 50/50/0	(a)$121 (b) $69 (c) $155 (d) $103	(a)$164 (b) $112 (c) $204 (d) $152	(a)$222 (b) $170 (c) $270 (d) $218
CT/CR/SY = 33/33/33	(a)$163 (b) $101 (c) $175 (d) $112	(a)$178 (b) $115 (c) $191 (d) $129	(a)$197 (b) $134 (c) $213 (d) $150
CT/CR/SY = 0/50/50	(a)$185 (b) $117 (c) $185 (d) $117	(a)$185 (b) $117 (c) $185 (d) $117	(a)$185 (b) $117 (c) $185 (d) $117

Mean input parameters: $3.50 /gal diesel fuel, $0.63 N, $0.70 P, and $0.51 K fertilizers. Yield levels selected were 120 bu/ac for corn and 36 bu/ac for soybeans.