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What are the Break-Even Prices and Yields when Comparing Soybeans and Cotton for 2007?

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The corn and soybean markets have been bidding for acreage due to a bullish final crop report for 2006. With bio-fuels creating new markets for corn and soybeans, this demand-driven market may continue to provide marketing opportunities. Currently, the major decision facing producers is determining the enterprise mix for 2007. This memo compares the Returns over Variable Costs for soybeans and cotton and analyzes the break-even yields and prices for non-irrigated and irrigated production.

Return over Variable Costs

Table 1. 2007 Estimated Return over Variable Costs for Soybeans and Cotton.

	Non-Irrigated Soybeans	Non-Irrigated Cotton		Irrigated Soybeans	Irrigated Cotton
Harvest Price [1/]	$7.50	$0.60		$7.50	$0.60
Yield	35	750		50	1000
Variable Cost [2/]	$161	$476		$193	$599
Return over Variable Costs	$102	-$26		$182	$1

[1/] The harvest prices are based on the November Soybeans and December Cotton Futures Contract adjusted by harvest-time basis of -$0.20 and -$0.03, respectively, with potential harvest-time LDP of $0.00 and $0.03 for soybeans and cotton, respectively.
[2/] 2007 Clemson University Crop Enterprise Budgets (http://cherokee.agecon.clemson.edu/budgets.htm).

The estimated Returns over Variable Costs for soybeans and cotton are reported in Table 1. The harvest cash prices for soybeans and cotton are based on the November 2007 soybeans futures contract and the December 2007 cotton futures contract, respectively, and are adjusted by the estimated harvest-time basis and potential LDP. For this comparison, the harvest cash prices for soybeans and cotton are $7.50/bu. and $0.60/lb., respectively (Table 1). The variable costs are based on Clemson University Extension crop enterprise budgets. Based on the assumptions listed in Table 1, the estimated Return over Variable Costs for non-irrigated soybeans is $102/acre while the Return for non-irrigated cotton is -$26/acre (Table 1). Similarly, the estimated Returns over Variable Costs for irrigated soybeans and irrigated cotton are $182/acre and $1/acre, respectively (Table 1).

Break-Even Yields and Prices

Based on the assumptions listed in Table 1, soybeans provide a greater Return over Variable Costs than cotton. Since prices, yields and costs will vary from these assumptions, managers need to understand the break-even yields and break-even prices when comparing soybeans and cotton production. Table 2 reports the Break-Even Yields and Break-Even Prices for soybeans and cotton produced with and without irrigation.

The Break-Even Yield in Table 2 is the yield that makes the two Returns over Variable Costs equal. For example, non-irrigated soybeans yielding 18 bu. (Table 2) at a price of $7.50 and Variable Costs of $161 (Table 1) will have the same Return as non-irrigated cotton yielding 750 lbs. at a price of $0.60 and Variable Costs of $476 (Table 1). Similarly, irrigated cotton yielding 1,302 lbs. (Table 2) at a price of $0.60 and Variable Costs of $599 (Table 1) will have the same Return as irrigated soybeans yielding 50 bu. at a price of $7.50 and Variable Costs of $193 (Table 1).

Similarly, the Break-Even Price in Table 2 is the price that makes the two Returns over Variable Costs equal. For example, non-irrigated cotton with a price of $0.77 (Table 2) yielding 750 lbs. and Variable Costs of $476 (Table 1) will have the same Return as non-irrigated soybeans yielding 35 bu. at a price of $7.50 and Variable Costs of $161 (Table 1). Similarly, irrigated soybeans at a price of $3.88 (Table 2) with a yield of 50 bu. and Variable Costs of $193 (Table 1) will have the same Return as irrigated cotton yielding 1,000 lbs. at a price of $0.60 and Variable Costs of $599 (Table 1).

Table 2. Break-Even Yields and Prices for Non-Irrigated and Irrigated Soybeans and Cotton.

	Non-Irrigated Soybeans	Non-Irrigated Cotton		Irrigated Soybeans	Irrigated Cotton
Break-Even Yield [1/]	18	963		26	1,302
Break-Even Price [2/]	$3.86	$0.7700		$3.88	$0.7810

[1/] The Break-Even Yield is the yield that equates the Returns over Variable Costs for the two commodities at the prices and costs listed in Table 1. For example, 18 bu. non-irrigated soybeans at $7.50 have the same Return as 750 lb. non-irrigated cotton at $0.60.
[2/] The Break-Even Price is the price that equates the Returns over Variable Costs for the two commodities at the yields and costs listed in Table 1. For example, 35 bu. non-irrigated soybeans at $3.86 have the same Return as 750 lb. non-irrigated cotton at $0.60.

The break-even price and yield information in Table 2 will help managers evaluate when soybeans are more profitable than cotton. For example, non-irrigated soybeans at $7.50 with yields greater than 18 bu. are more profitable than non-irrigated cotton with a price of $0.60 yielding 750 lbs. Similarly, irrigated soybeans yielding 50 bu. with prices greater than $3.88 are more profitable than irrigated cotton yielding 1000 lbs. at a price of $0.60 (Table 2).

Break-Even Yield and Price Sensitivity Analysis

How does yield or price risk affect this analysis? Table 3 lists the break-even yields for cotton for a range of potential soybean yields at the prices and costs listed in Table 1. Managers can use Table 3 to understand the yields necessary for cotton to be competitive with soybeans. For example, non-irrigated cotton yielding 775 lbs. has the same Return as 20 bu. non-irrigated soybeans (Table 3). For this example, soybeans are more profitable when yields are greater than 20 bu. or cotton yields less than 775 lbs.

Similarly, Table 4 lists the break-even prices for cotton for a range of potential soybean prices at the yields and costs listed in Table 1. This table tells managers what price is needed from the market for cotton to be competitive with soybeans. For example, at a price of $7.00 for non-irrigated soybeans, non-irrigated cotton must have a price of $0.7467 to have the same Return (Table 4). For this example, soybeans are more profitable when cotton prices are less than $0.7467 or soybeans prices are greater than $7.00.

Managers can use Table 3 and Table 4 in guiding their enterprise selection for 2007. By using their own price and yield expectations, managers will have a better idea of the relative profitability of soybeans and cotton for both production systems.

Where do I go for Help in Making this Decision?

Clemson University Extension has developed budgets for the major agronomic crops to help you evaluate their profitability for your farm business. There is also a decision spreadsheet available that can be used to compare the Returns over Variable Costs for soybeans and cotton. The budgets and decision spreadsheet are available at http://cherokee.agecon.clemson.edu/budgets.htm. Your local extension office will be able to help you download these budgets and the decision spreadsheet and can help you understand how to use this information in making this comparison.

Table 3. Break-Even Yields for Cotton for Varying Soybeans Yields for Non-Irrigated and Irrigated Production.

Non-Irrigated Soybeans Yield	Non-Irrigated Cotton Yield [1/]		Irrigated Soybeans Yield	Irrigated Cotton Yield
10	650		22	952
12	675		24	977
14	700		26	1,002
16	725		28	1,027
18	750		30	1,052
20	775		32	1,077
22	800		34	1,102
24	825		36	1,127
26	850		38	1,152
28	875		40	1,177
30	900		42	1,202
32	925		44	1,227
34	950		46	1,252
36	975		48	1,277
38	1,000		50	1,302
40	1,025		52	1,327
42	1,050		54	1,352
44	1,075		56	1,377
46	1,100		58	1,402

[1/] The Break-Even Yield is the yield that equates the Returns over Variable Costs for the two commodities at the prices and costs listed in Table 1. For example, 825 lbs. non-irrigated cotton has the same Return as 24 bu. non-irrigated soybeans.

Table 4. Break-Even Prices for Cotton for Varying Soybeans Prices for Non-Irrigated and Irrigated Production.

Non-Irrigated Soybeans Price	Non-Irrigated Cotton Price [1/]		Irrigated Soybeans Price	Irrigated Cotton Price
$5.50	$0.6767		$5.50	$0.6810
$5.75	$0.6883		$5.75	$0.6935
$6.00	$0.7000		$6.00	$0.7060
$6.25	$0.7117		$6.25	$0.7185
$6.50	$0.7233		$6.50	$0.7310
$6.75	$0.7350		$6.75	$0.7435
$7.00	$0.7467		$7.00	$0.7560
$7.25	$0.7583		$7.25	$0.7685
$7.50	$0.7700		$7.50	$0.7810
$7.75	$0.7817		$7.75	$0.7935
$8.00	$0.7933		$8.00	$0.8060
$8.25	$0.8050		$8.25	$0.8185
$8.50	$0.8167		$8.50	$0.8310
$8.75	$0.8283		$8.75	$0.8435
$9.00	$0.8400		$9.00	$0.8560
$9.25	$0.8517		$9.25	$0.8685
$9.50	$0.8633		$9.50	$0.8810
$9.75	$0.8750		$9.75	$0.8935
$10.00	$0.8867		$10.00	$0.9060

[1/] The Break-Even Price is the price that equates the Returns over Variable Costs for the two commodities at the yields and costs listed in Table 1. For example, non-irrigated cotton at $0.77/lb. has the same Return as non-irrigated soybeans at $7.50/bu.