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What are the Break-Even Prices and Yields when Comparing Corn and Soybeans 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 corn and soybeans 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 Corn and Soybeans.

	Non-Irrigated Corn	Non-Irrigated Soybeans		Irrigated Corn	Irrigated Soybeans
Harvest Price [1/]	$4.05	$7.50		$4.05	$7.50
Yield	100	35		160	50
Variable Cost [2/]	$278	$161		$403	$193
Return over Variable Costs	$127	$102		$245	$182

[1/] The harvest prices are based on the December Corn and November Soybeans Futures Contract adjusted by harvest-time basis of +0.15 and -$0.20, respectively.
[2/] 2007 Clemson University Crop Enterprise Budgets (http://cherokee.agecon.clemson.edu/budgets.htm).

The estimated Returns over Variable Costs for corn and soybeans are reported in Table 1. The harvest cash prices for corn and soybeans are based on the December 2007 corn futures contract and the November 2007 soybeans futures contract, respectively, and are adjusted by the estimated harvest-time basis. For this comparison, the harvest cash prices for corn and soybeans are $4.05 and $7.50 per bushel, 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 corn is $127/acre while the Return for non-irrigated soybeans is $102/acre (Table 1). Similarly, the estimated Returns over Variable Costs for irrigated corn and irrigated soybeans are $245/acre and $182/acre, respectively (Table 1).

Break-Even Yields and Prices

Based on the assumptions listed in Table 1, corn provides a greater Return over Variable Costs than soybeans. Since prices, yields and costs will vary from these assumptions, managers need to understand the break-even yields and break-even prices when comparing corn and soybean production. Table 2 reports the Break-Even Yields and Break-Even Prices for corn and soybeans 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 corn yielding 94 bu. (Table 2) at a price of $4.05 and Variable Costs of $278 (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 yielding 58 bu. (Table 2) at a price of $7.50 and Variable Costs of $193 (Table 1) will have the same Return as irrigated corn yielding 160 bu. at a price of $4.05 and Variable Costs of $403 (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 soybeans with a price of $8.23 (Table 2) yielding 35 bu. and Variable Costs of $161 (Table 1) will have the same Return as non-irrigated corn yielding 100 bu. at a price of $4.05 and Variable Costs of $278 (Table 1). Similarly, irrigated corn at a price of $3.66 (Table 2) with a yield of 160 bu and Variable Costs of $403 (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).

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

	Non-Irrigated Corn	Non-Irrigated Soybeans		Irrigated Corn	Irrigated Soybeans
Break-Even Yield [1/]	94	38		144	58
Break-Even Price [2/]	$3.80	$8.23		$3.66	$8.76

[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, 94 bu. non-irrigated corn at $4.05 has the same Return as 35 bu. non-irrigated soybeans at $7.50.
[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, 100 bu. non-irrigated corn at $3.80 has the same Return as 35 bu. non-irrigated soybeans at $7.50.

The break-even price and yield information in Table 2 will help managers evaluate when corn is more profitable than soybeans. For example, non-irrigated corn at $4.05 with yields greater than 94 bu. is more profitable than non-irrigated soybeans with a price of $7.50 yielding 35 bu. Similarly, irrigated corn yielding 160 bu. with prices greater than $3.66 is more profitable than irrigated soybeans yielding 50 bu. at a price of $7.50 (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 soybeans for a range of potential corn yields at the prices and costs listed in Table 1. Managers can use Table 3 to understand the yields necessary for soybeans to be competitive with corn. For example, non-irrigated soybeans yielding 30 bu. have the same Return as 85 bu. non-irrigated corn (Table 3). For this example, corn is more profitable when yields are greater than 85 bu. or soybeans yield less than 30 bu.

Similarly, Table 4 lists the break-even prices for soybeans for a range of potential corn prices at the yields and costs listed in Table 1. This table tells managers what price is needed from the market for soybeans to be competitive with corn. For example, at a price of $4.10 for non-irrigated corn, non-irrigated soybeans must have a price of $8.37 to have the same Return (Table 4). For this example, corn is more profitable when soybean prices are less than $8.37 or corn prices are greater than $4.10.

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 corn and soybeans 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 corn and soybeans. 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 Soybeans for Varying Corn Yields for Non-Irrigated and Irrigated Production.

Non-Irrigated Corn Yield	Non-Irrigated Soybeans Yield [1/]		Irrigated Corn Yield	Irrigated Soybeans Yield
50	11		100	26
55	14		105	29
60	17		110	31
65	20		115	34
70	22		120	37
75	25		125	40
80	28		130	42
85	30		135	45
90	33		140	48
95	36		145	50
100	38		150	53
105	41		155	56
110	44		160	58
115	47		165	61
120	49		170	64
125	52		175	67
130	55		180	69
135	57		185	72
140	60		190	75

[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, 33 bu. non-irrigated soybeans have the same Return as 90 bu. non-irrigated corn.

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

Non-Irrigated Corn Price	Non-Irrigated Soybeans Price [1/]		Irrigated Corn Price	Irrigated Soybeans Price
$2.70	$4.37		$2.70	$4.44
$2.80	$4.66		$2.80	$4.76
$2.90	$4.94		$2.90	$5.08
$3.00	$5.23		$3.00	$5.40
$3.10	$5.51		$3.10	$5.72
$3.20	$5.80		$3.20	$6.04
$3.30	$6.09		$3.30	$6.36
$3.40	$6.37		$3.40	$6.68
$3.50	$6.66		$3.50	$7.00
$3.60	$6.94		$3.60	$7.32
$3.70	$7.23		$3.70	$7.64
$3.80	$7.51		$3.80	$7.96
$3.90	$7.80		$3.90	$8.28
$4.00	$8.09		$4.00	$8.60
$4.10	$8.37		$4.10	$8.92
$4.20	$8.66		$4.20	$9.24
$4.30	$8.94		$4.30	$9.56
$4.40	$9.23		$4.40	$9.88
$4.50	$9.51		$4.50	$10.20

[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 soybeans at $8.09/bu. have the same Return as non-irrigated corn at $4.00/bu.