



Corn vs Soybeans The Cropping Decision: 2002 and Beyond?

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Introductory Note

This article is designed to assist grain farmers in making a crop planting decision using estimated market conditions, production costs, and yield estimates. It is designed to be used in conjunction with a computerized decision aid available off the University of Kentucky Agricultural Economics web site at :

<http://www.uky.edu/Ag/AgEcon/pubs/software/cornvsoybean.html>

The text of the article defines the base scenario. Users are encouraged to change the default values to match their own situation. Variables that may be changed are indicated in blue font in the spreadsheet.

The Macro Situation

Congress is in the middle of deciding a new farm bill that should cover the next 5-10 years. Both the House and Senate proposals call for reducing soybean marketing assistance loan rates (LR) from the current national average rate of \$5.26 per bushel. Both proposals also include making soybeans a program crop with an established base and yield history. In each proposal, fixed payments will be made regardless of market conditions and additional payments may be made if prices decline below a specified trigger level. However, these two classes of payments will be made on a predetermined basis without regard to current planted, or attempted planted, acres. However, a third class of payments, marketing loan deficiency payments (LDP's) will be paid on actual production if market prices are below specified trigger levels. These payments, as is the case with the first two classes of payments, will be subject to set payment limits.

If global and U.S. weather during the growing seasons remains reasonably favorable over the next 5-10 years a case can be made that soybean prices will spend much of their time below the LR levels mentioned in either the U.S. House or Senate farm bill proposals (\$4.92 and \$5.20 respectively). If this is the situation that unfolds the new farm bill may well be the primary driver behind corn prices and therefore acres devoted to corn production in the U.S. over the life of the bill.

Indeed, it can be argued that the anticipated new bill is already a prime driver behind the current "new-crop" futures contracts for corn. Many market analysts as well as grain farmers have been surprised by how unresponsive the futures market has been during the winter of the 2001-02 corn marketing year. Each month since the beginning of the current corn marketing year in September USDA has issued supply/demand projections that indicate the first year-to-year drop in projected corn carryover stocks since the 1999-00 crop season and the first meaningful year over year drop in stocks since the 1995-96 season. Yet, corn prices made only a modest recovery from harvest season lows by early December and declined to set a new low in the nearby futures contract by late February. The disappointing weekly export shipments of corn from the U.S. and the competition for the world market from other countries has clearly been an important factor. However, U.S. exports are only slightly behind last years pace and recently have shown signs of improving significantly. Is it possible that futures market participants believe that corn futures prices for "new-crop" contracts are already sufficient compared to the government LR for soybeans that farmers will plant more than enough acres to corn, at roughly trend yield – 139-140 bu/acre, to meet or exceed the record setting levels of disappearance expected for the coming marketing season?

The Micro Situation

The Farm Bill and world markets set the macroeconomic situation. However, for individual grain farmers the annual crop mix planting decision depends on the relative profitability of competing crops on their farm. Because relative profitability of crops can vary considerably from field to field, the crop mix decision should be made independently on each management unit and not for the entire grain operation as a whole. Using average yield and cost data for the entire land base to make crop mix decisions can be misleading and result in less than optimal economic decisions.

The crop mix planting decision is really a partial budgeting process that compares the change in revenues and costs as one crop is increased and another decreased. The crop with the greatest return over variable costs (gross returns minus the relevant cash costs) will be preferred in the crop mix decision. However, return over variable costs (ROVC) will differ across crops and fields. The optimal crop decision for highly productive fields may not hold for less productive fields. Therefore, it is very important to use the best yield data available for each separate field to accurately compare ROVC.

Hopefully, this residual ROVC (gross returns minus cash production costs) will be large enough to pay all the remaining cash costs, e.g. taxes and insurance, provide for family living expenses and acquire or replace capital assets. Without other sources of income all of these items have to be paid for in the long run for the farm to survive. However, for any single cropping season the objective should be to plant the crops on the land to maximize the ROVC on each acre planted.

The accompanying computer spreadsheet is designed to assist growers in making the crop mix decision. Users may input a base soybean yield, a soybean price, a base corn yield, relevant cash costs for each crop, an estimate of corn basis in October for December futures and in January for March futures, and storage costs from December to March. Based on the current global price outlook for soybeans and the anticipated U.S. farm program for grains and oilseeds it may now be prudent to use the loan rate for soybeans as the soybean price.

Table 1. Default values for Corn/Soybean Planting Decision Aid

Soybean Yield (bu/ac)	50 bu/ac
Corn Yield (bu/ac)	175 bu/ac
Soybean Price	5.06 \$/bu
Soybean Variable Production Costs (\$/ac)	100 \$/ac
Corn Variable Production Costs (\$/ac)	162 \$/ac
Corn basis in Oct for Dec futures	-25 ¢/bu
Corn basis in Jan for Mar futures	-5 ¢/bu
Corn storage costs for three months	-9 ¢/bu

The spreadsheet uses the crop yields, the soybean price (or loan rate), the production costs, the basis, and storage costs to calculate a breakeven futures price for corn. The default values (See Table 1) in the spreadsheet are starting points for breakeven analysis. The soybean price is the average of the House and Senate proposals for soybean loan rates. If market conditions change and users anticipate a soybean price above the loan rate, they can use that value as the soybean price. The loan rate should provide an effective minimum net price for soybeans for most producers, under most conditions, and thus net prices below that level should be avoided. Using this base scenario, \$2.05 is the December futures price that will make corn and soybeans equivalent in ROVC. At this corn price the net returns from corn and soybeans are exactly the same. At any corn price above this level corn production will be more profitable than soybeans, thus favoring corn production. At corn prices below this level, soybean production is favored.

IMPORTANT NOTE: This breakeven corn futures price applies **ONLY** to this specified combination of soybean/corn yields, soybean/corn production costs, soybean price, basis, and storage costs. This breakeven price will change when any of the variables are changed. The Sensitivity Analysis tables in the spreadsheet are constructed using changes in two of the variables: corn yield and soybean yield.

The Sensitivity Analysis tables illustrate how the breakeven corn prices will change as relative corn and soybean yields change. Note that for any given

soybean yield, as corn yields increase, the breakeven price for corn drops. In other words, as corn yield potential improves, a grower could tolerate a lower corn price to induce a switch from beans to corn. It should be apparent that the corn/bean planting decision is not a farm level, but rather a field level decision.

Under the base scenario and costs in Table 1, growers will switch to corn on better yielding ground and to beans in lower yielding fields.

Summary

In the past, farmers have been advised to use cash forward contract prices, futures contract prices, some “expert” opinion price, or their own price projections for the new crop year for the crops being considered in the planting decision. These prices are used to generate estimates of gross revenues per acre for each crop to be considered and compared to the cash costs to get a residual Return over Variable Costs, as discussed in the preceding section. The spreadsheet decision aid accompanying this article is designed to facilitate this process.

It appears that current “new-crop” futures prices for corn for harvest delivery may be slightly below the

level needed to attract more acres to corn production while futures contracts for corn delivered from storage tend to favor corn production over soybeans. However, this conclusion is somewhat dependent on the quantity of highly productive land relative to the quantity of on-farm storage controlled by each farmer and summed over the entire corn/soybean acres in the U.S. This conclusion also implicitly assumes soybean prices will remain equal to or below the government soybean loan rate.

If farmers believe soybean prices might exceed the LR they should substitute their estimate of the market price into the computer spreadsheet in the box labeled soybean loan rate, instead of entering their county marketing assistance LR for soybeans. The program will still calculate the futures market price needed for corn to be equal to soybean production from a ROVC perspective. This is what farm management advisors have always advocated ... compare the relative profitability of competing crops. Instead of using futures market prices, cash forward contract prices, or some “expert” opinion price for soybeans, this spreadsheet starts with the soybean LR as the price and allows users to substitute a soybean market price if they expect the market price to exceed the loan rate.

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