Introduction:

The market for corn and other grains has increased dramatically in the past few months from historical levels. This rise in the market can be seen graphically in Figure 1 which shows the December 2007 (fall crop) corn futures from the Chicago Board of Trade (CBOT®). In recent years the price of corn has averaged around $2.30-2.50 a bushel. At the beginning of 2006, the market price was just above the $2.50 level, and started to increase slowly until leveling off in the summer. The market began to surge upward in mid-September and eventually increased above the $4.00 a bushel mark. Much of this increase can be attributed to additional demand for the production of ethanol as well as expanded markets in southeastern Asia.

The market appears to believe this increased demand for corn will not be short-lived. Futures prices out to 2010 are currently trading near $3.80 a bushel. Futures prices are essentially the market expectations for the balance in supply and demand. They may or may not represent the actual price seen for the commodity. Their accuracy is somewhat like predicting the weather: The prediction for tomorrow’s weather (nearby futures prices) is generally accurate, but the weather a week out (next year’s futures price) is more likely to change from what was originally predicted. However, the futures market is still the most accurate farm planning tool related to the expected market prices that we have.

Futures prices will generally be somewhat higher than what producers can sell at local grain elevators. The difference is referred to as “basis” and can generally be expected to range between -$.20 and -$.50 per bushel. Currently, the basis for fall 2007 delivery is around -$.30.

Figure 1 – December 2007 CBOT® Corn Futures (week ending 4/27/07)
Higher grain prices for the next few years will provide unique opportunities for Kentucky farmers. One of these opportunities is the production of corn on ground that has primarily been used for hay or pasture. Corn production on suitable sod ground may prove to be more profitable than its present use in forage during the next few years. Obviously, producers considering this shift will need to compare the additional revenues and costs against those for their current operation. These additional costs include fertilizer, chemicals, seed, labor, and machinery expenses, as well as the additional management required to transition from forage production to grain crop production.

The purpose of this publication is to help facilitate this comparison and to assist producers in the evaluation of their options. Multiple budget scenarios are used to help producers identify the situations under which this transition may be beneficial. In cases where conversion to corn appears profitable, producers still need to balance the potential increases in profit with market price uncertainty. In practice, each producer should build a “safety factor” into their decision process.

Producers who are new to the grain markets should be aware that there are marketing opportunities that can offset part of the price risk. Potentially the most viable option for small operators is to forward contract for fall delivery with a grain elevator. Using this strategy, producers can “lock in” the price they will receive for their crop. This can be done before the crop is in the ground. However, there is the risk that final yield will be less than expected, and thus producers may want to forward contract only a percentage of the anticipated crop.

Reseeding costs also need to be considered if the land is going to go back into sod. This cost will be lower than reseeding from a sod base as the soil will already be worked up to some degree. Furthermore, lime and nutrient levels should be closer to optimum levels if soil test recommendations are followed for corn. It is worth pointing out that this transition back to sod could provide a potentially valuable opportunity to reseed to something other than traditional KY-31 fescue based forage. On suitable soils, an alfalfa-grass mix could be considered as well as other forages such as orchardgrass, non KY-31 fescues, red clover, etc.

Producers can also use this publication to help determine what conventional grain farmers might be willing to pay for renting out their better sod ground.

**Agronomic Considerations:**

**Weed, Insect, and Rodent Control:**
Weed control is essential to corn following sod, and may require two burndown (herbicide) applications prior to planting. Sod is known for having high insect populations, especially wireworm and white grubs. If present and not controlled, these pests will cause stand loss or decreased seedling vigor. Insecticide options include liquid or granular soil insecticides at planting or the use of an insecticide seed treatment. Typically, the higher end of the dose range on the insecticide label is required for control.
of wireworms. Older planters may need to be retrofitted to handle insecticide applications.

Voles and other small animals can cause problems in corn following sod. Early burndown of the sod will help by removing some of the plant material in which voles can hide. In addition, about two bushels of cracked corn can be spread per acre to help control voles. The voles will eat the cracked corn on the soil surface before digging out planted seeds.

**Nutrient Requirements:**
Corn following sod usually requires 25 to 50 fewer pounds of nitrogen per acre than corn following soybeans or corn. This reduced requirement is largely due to the breakdown of the organic material from the previous sod crop and the subsequent release of nitrogen. Soil testing should be done to determine the recommended supply of phosphorus, potassium, and lime. However, a general idea of the likely recommendation can be taken from recent soil tests that have come off sod ground in Kentucky. The average recommendations from this sod ground on a per year, per acre basis were: 0.5 tons for lime (1.5 tons for the first year good for three years), 48 pounds of phosphate (21 lbs actual phosphorus), and 45 lbs potash (38 lbs actual phosphorus). This translates into roughly $30-35 per year for material and application costs at current prices (March 2007).

**Till vs. No-Till Planting Systems – Advantages and Disadvantages:**
No-till planting conserves soil, organic matter, and soil structure. Timely control of pests with chemicals is an absolute must for successful no-till corn following sod. No-till soils will warm more slowly and may delay planting slightly versus a tilled system. Tillage warms the soil, buries some of the plant residue and exposes some insects to birds. However, tillage destroys soil structure and promotes erosion. Tillage is not generally recommended on sloping soils, which comprise much of the Kentucky landscape.

**Till vs. No-Till Planting Systems – Practices Needed for Corn after Sod:**
No-tillage planting will require an early burndown of the sod and may require two applications for maximum effectiveness. If this sod is primarily fescue, then a high application rate of glyphosate (e.g. 2 qt/A of Roundup Original) is recommended. If sod has both grasses and legumes, then glyphosate plus 2,4-D (1 qt/a) or dicamba (1 pt/a of Banvel) will be needed to control most of the vegetation. In some cases paraquat (e.g. Gramaxone) instead of glyphosate may be used in combination with atrazine as part of a burndown program. A soil-residual herbicide should be applied at time of planting and a post-emergence herbicide will likely be needed later in the season (refer to AGR-6 for specific recommendations and rates).

If tillage is to occur then the fields should be plowed early in the spring before fescue breaks dormancy. If the sod is thick, then a burndown may be needed several weeks before the tillage to prevent plants from wrapping on equipment.

**Yield Potentials:**
Most of Kentucky’s sod ground is not currently in corn or other grains because the historical corn yields were low on those fields. You can use NRCS publications to get
estimates for expected yields from your soils (refer to county soil map, online web-soil survey, or county agent). The NRCS numbers are somewhat dated and should be adjusted to reflect yield trend increases, so add 25% to those numbers to give you an idea of where average corn yields should be in your fields. For example, if the NRCS estimates an average yield potential of 80 bushels per acre, then assume that your fields should be able to produce about 100 bushels per acre on average (80 bushels multiplied by 1.25). Obviously late planting, poor weed or insect control, or other sub-optimal farming practices will result in reduced yields.

Financial Returns:

Table 1 shows the final planning budgets and the estimated returns generated from this analysis. These budgets are for first year corn coming out of sod. The price used in the analysis centers around new crop (fall 2007) corn prices published in the “Kentucky Livestock and Grain Market Report” (KY Dept. of Agriculture 4/26/07 Report) which averaged around $3.50 a bushel. This is the approximate price that farmers could cash forward contract or “lock in” with a grain elevator. A deviation of $.50 a bushel above and below this expected price is also used to show a range of potential returns that could occur depending on market fluctuations. The final price for corn could of course fall outside of this range.

Yields of 100, 125, and 150 bushels were thought to be most representative for sod ground going into corn. Average sod ground is going to have lower potential yield than the average grain crop ground. The average statewide corn yield between 2000 and 2006 was 135 bushels per acre. Hence, the mean yield used in this analysis (125 bushels) is slightly below this average. Average yields can fall below or above the range of yields used in this analysis. As previously mentioned, consult with NRCS county soil maps to estimate yield potential for your soil type.

Most of the inputs and other costs used for sod ground are fairly similar to conventional corn ground, with a few notable differences. The cost of nitrogen fertilizer is set at $.48 per pound of actual nitrogen, with the assumption that urea will be used. A majority of conventional grain farmers in Kentucky probably use anhydrous ammonia for their nitrogen source, which is generally $.10-.15 cheaper per unit. However, specialized equipment is needed and there are also safety concerns and issues associated with its use. So urea is probably the most likely nitrogen source for farmers outside the traditional grain growing belt. On the flip side, less actual nitrogen will be needed for corn coming out of sod for the first year due to the nitrogen credit of the sod. Plant and Soil Sciences generally recommends about 120 pounds of actual nitrogen for tilled planting systems and 145 pounds of actual nitrogen for no-till planting systems on well-drained soils. However, a nitrogen credit of 40 pounds per acre is subtracted off these rates for first year corn.

The average recommendations for P and K on recent sod ground tested in Kentucky are not far off maintenance requirements for corn on continuous grain ground. The average
lime recommendation of 1.5 tons was only slightly higher than the average maintenance requirement when averaged over the three year useful lifespan of the application.

Machinery and labor costs are assumed to be 15% higher than the average custom rate for Kentucky conditions (see appendix for a link to these rates). The higher rate was used based on the assumption that most producers would have less-efficient machinery practices than producers whose main operation was grain production. These custom rates account for all costs related to machinery usage (fuel, lube, repairs, depreciation, overhead, labor) but do not include input costs which are listed separately in the budgets.

The budget compares conventional tillage (plow-disk-plant) to the no-till system. In general, the no-till system had a slightly lower return. Decreases in machinery charges for the no-till system were essentially offset by an increase in herbicide use as well as a slight increase in required nitrogen.

The budgets shown here are for first year corn coming out of sod. Costs and returns will change slightly after this first year. More nitrogen will be needed as the N-credit will be depleted after the first year. However, less herbicide and insecticide will generally be needed in future years. Voles should no longer be a problem with no subsequent need for cracked corn bait. Overall, the producer can expect to net an additional $5-10 per acre after the first year at the same price for corn.

**Budget Results:**
Net returns for the scenarios presented here ranged from a low of $0 for a 100 bushel yield at $3.00 per bushel to a high of $285 for a 150 bushel yield at $4.00 per bushel. Net returns at the current average “lock in” price of $3.50 ranged between $50 and $210 depending on yield and tillage type.

Net returns equals total corn revenue less all costs except land-related charges (land rent, opportunity cost of land, mortgage, property taxes, etc.). These net returns should be compared to the net returns for current operations. However, make sure that you are comparing apples to apples. If you do not include your labor and/or machinery depreciation costs in your current operation, you should try to subtract these out of the corn budgets. Machinery depreciation and overhead costs account for approximately 66% of the total cost in the “Machinery and Labor” cost section, while labor accounts for approximately 10% of the total costs. Thus fuel, lube, and repairs (direct non-labor costs) account for the remaining 24%.

**Conclusions:**
In general, the returns shown in Table 1 are greater than typical land rents for hay and pasture ground, except on the 100 bushel ground and at the lowest evaluated pricing of $3.00 a bushel. Even at the lowest price evaluated, expected net revenues for 125 bushel and 150 bushel ground are $65-70 and $131-135 respectively. These returns are far above pasture and hay rental rates on comparable ground. Only at the lowest yield potential (100 bu) and at the lowest evaluated price ($3.00/bu) did the expected return drop below typical hay or pasture rental rates.
## Table 1 - 2007 Planning Budget for Grain Corn after Sod

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<tr>
<th>Conventional Till Operation</th>
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### Net Revenue:

- **$4.00/bushel**: $104, $195, $285
- **$3.50/bushel**: $54, $132, $210
- **$3.00/bushel**: $4, $70, $135

Notes: Net revenue is derived by taking total revenue from corn and subtracting out all costs except land-related charges such as land rent, opportunity cost, and property taxes. Thus the user should use these budgets to compare against current farming operations. Machinery and labor costs are based on custom machinery rates that include all costs including fuel, lube, depreciation, overhead, and labor. A 15% increase was used over the standard custom rates to account for less-efficient machinery practices from producers whose main operation is not grain production.
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Publications and References (most are available at County Extension Offices):

ID-139: A Comprehensive Guide to Corn Management in Kentucky:  
http://www.ca.uky.edu/agc/pubs/id/id139/id139.htm

AGR-1: Lime and Fertilizer Recommendations:  
http://www.ca.uky.edu/agc/pubs/agr/agr1/agr1.pdf

AGR-6: Weed Control Guide Recommendations for Field Crops:  
http://www.uky.edu/Ag/Agronomy/Weeds/agr-6.htm

ENT-16: Insecticide Recommendations for Corn:  
http://www.uky.edu/Ag/PAT/recs/crop/pdf/Entfact-16.pdf

ID-124: Bringing CRP/Pasture Back into Production:  
http://www.ca.uky.edu/agc/pubs/id/id124/id124.htm

NRCS Online Soil Survey (can also access soil survey data at County Extension Office):  

Custom Machinery Rates Applicable to Kentucky (2007):  
http://www.uky.edu/Ag/AgEcon/pubs/ext_aec/2007-01.pdf