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Drying Considerations for the 1996 Corn Crop

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DRYING CONSIDERATIONS FOR THE 1996 CORN CROP[1]

SITUATION:

The corn harvest season has already started on some farms and is rapidly approaching for many others. Current market opportunities and previous contractual arrangements have some farmers thinking about starting their harvest earlier than usual. Other factors also suggest that a substantial portion of this year's crop could be harvested at moisture contents between 24 and 32%. To understand what is pushing the high moisture harvest, consider the following factors:

- A tight supply of corn throughout the past year has created a strong market for early September delivery of corn. In many places, premiums of 25 to 50 cents per bushel are being offered for new crop corn delivered by mid September.

- Some corn that was contracted for early September delivery may be late maturing because of delayed spring planting.

- With relatively high corn prices and low fuel prices, small reductions in field losses are more than enough to offset the added cost of drying wetter grain. In general, current grain and fuel prices will push the optimum harvest moisture content two to four points higher than it has been in recent years. For many situations, that optimum moisture content is between 25 and 30% this year.

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[1] Prepared by Dr. Douglas G. Overhults and Samuel G. McNeill, Biosystems and Agricultural Engineering Department, with contributions by Dr. Steve Riggins, Mr. Craig Gibson, and Dr. Richard Trimble, Agricultural Economics Department, University of Kentucky Cooperative Extension Service.

- Finally, unusually wet conditions delayed spring planting on a substantial acreage in some parts of the state. In those situations, late maturing crops may be harvested at high moisture because of poor field drying conditions, danger of frost, or deteriorating field conditions. Fall weather will be the major factor that determines just how wet the late harvested grain may be.

Thus, there are some good reasons why farmers in different situations may choose not to let grain dry in the field this year. Many farms routinely harvest some grain at relatively high moisture contents. However, not everyone is accustomed to that practice, and it may be useful to review some options for handling high moisture grain before beginning the harvest.

CHOOSE YOUR STRATEGY:

One general principle applies to all of the available options: the grain should be dried or delivered quickly, preferably within 24 to 48 hours of harvest. Equipment and operations that have worked well when corn was harvested at 22% moisture content may not work so well when the corn is wetter. Combines often have much greater capacity than driers when the corn is very wet. The options available for handling high moisture grain fall into three general categories:

1) Dry on the farm. -- Where adequate drying equipment is available, this option may be chosen. Drying capacity, economics, and convenience and are major factors in this decision. Higher moisture contents can substantially reduce drying capacities so that factor should be carefully considered when evaluating the choices.

2) Deliver to Elevator or other Buyer. -- Buyers can usually handle wet grain early in the season but they all have limits on their capacity and may not accept high moisture grain later in the season. The major factor in choosing this option is usually one of economics although delivery may also be important. Various combinations of price discounts, weight shrinkage and drying charges are used to compensate the buyers for their drying cost and for the weight lost during drying. These discounts and charges will vary from one buyer to another and may change with time. Good decisions cannot be made if current and accurate information about wet grain discounts is not available.

3) Custom Drying. -- In some places, there may be limited access to a custom drying arrangement. This would most likely involve a neighbor who may not have started or has already finished his harvest. Costs for such a service would be a drying charge and handling fee. Custom services could be used to boost drying capacity or as a supplement for systems that were not designed to handle high moisture corn.

MAKING A DECISION:

From an operational point of view, examining your ability to harvest and handle high moisture corn is an important step. Evaluate factors such as combine performance, harvest losses, drying capacity (if on-farm drying), and delivery schedules. At least four key pieces of information are needed to evaluate the economics of your decision: a) how much the elevator will discount your wet grain, b) how much weight loss or shrinkage occurs during drying, c) your cost for on-farm drying, handling, and transporting the grain, and d) the price premium received for early delivery. Let's take a more detailed look at some of these items.

BUYER DISCOUNTS. -- This is a key element in evaluating your options. Discounts are usually one of 3 types as described below. For each example, the base price of corn is assumed to be $3.50 per bushel:

1) Fixed rate per point of moisture -- e.g., 6 cents per bushel for each point of moisture above 15%. The discount for corn at 30% moisture would be $0.90 per bushel. Discounts and payments are based on the wet weight and the farmer would receive $2.60 per wet bushel for his grain.

2) Percentage of the selling price per point of moisture -- e.g., 2% of the selling price for each point of moisture above 15%. Under this system, the discount for 30% moisture content corn selling for $3.50 per bushel would be $1.05 per bushel. Discounts and payments are based on the wet weight and the farmer would receive $2.45 per wet bushel for his grain.

3) Shrinkage plus drying charge -- e.g., Calculated moisture shrinkage at 1.4% of wet weight plus a drying charge of 2.5 cents per bushel for each point of moisture above 15%. With this system, the quoted market price for dry grain is not discounted. However the wet weight of the corn is reduced according to the buyer's own "shrinkage" chart and a drying charge is deducted. Final payment is based on the shrunk weight with a deduction from the base price for the drying charge. For this example, grain at 30% moisture content would be shrunk 21% in weight and the drying charge would be assessed on the "dry bushels." The farmer would receive an amount equivalent to $2.40 per wet bushel.

Discounts will vary between elevators. They do not all use the same system for discounts and even those who use the same general method may use different discount rates. Thus, comparing different elevators' discounts for your corn moisture contents is important. Remember that the discounts include three things from the elevators' point of view:

1) Moisture shrinkage -- Buyers pay (if based on wet weight) for moisture that is lost in the drying process but is not a salable product. The true moisture loss during drying is the same for everyone. However shrinkage tables often vary because they include other factors besides moisture loss.

2) Drying costs -- Costs for fuel, labor, and equipment must be paid from the discounts or drying charges. It should not be surprising that different elevators would have different costs that they must cover. Thus, they will factor different amounts into their price discounts or drying charges to make sure they can pay their bills.

3) Profit -- Any profit that the buyer expects to make from drying wet grain is also included in the discount system. Sometimes, the drying operation may be viewed as a service or as part of the overall operating cost and not as a profit generator. In other cases, the buyer may expect his drying operation to return some profit to the overall operation. Thus, a profit variable will also enter the setting of discount rates.

SHRINKAGE -- The actual weight of water lost during drying can be accurately calculated and is the same for everyone no matter where the corn is dried. The actual water loss can be estimated as 1.18% of the wet weight for each percentage point of moisture removed. Thus, the water loss in drying corn from 30% to 15% moisture content will equal 17.7% of the original wet weight of the grain (15 points x 1.18% per point = 17.7%). Besides the water loss, another 1/4 to 3/4 % of the total weight is usually lost during drying and handling operations. An additional loss of about 0.5% is normally added to account for minor product losses during drying and handling making the total expected shrinkage 18.2% of the initial weight. The total shrinkage, including 0.5% for dry matter losses, is given in Table 1 for some example initial moisture contents.

Table 1. Fraction of weight remaining after drying corn at various moisture levels to 15.0%.

Moisture Content	20	22	24	26	28	30	32
Shrink	0.936	0.913	0.889	0.866	0.842	0.819	0.795

DRYING COST -- The operating cost for drying on the farm is another item needed for an analysis of the on-farm drying option. Using actual cost data for the farm is always best if it is available. Lacking known cost data, some estimates can be made. Although dryers vary in efficiency, 0.02 gal of LP gas or 1.84 cubic feet of natural gas per point of moisture removed is a reasonable estimate for calculation purposes. In the above examples, about 0.3 gal of LP gas or 28 cubic feet of natural gas is needed to dry a bushel of corn from 30% to 15% moisture content. A $0.04 per bushel charge for electricity and $0.05 per bushel for hauling is also reasonable to include in an operating cost estimate.

Figure 1 and Table 2 show a comparison of the above examples at different moisture contents. The graph predicts how much money one could expect to receive per wet bushel of grain from three different buyer discount schedules and from drying the grain on the farm. Note that considerable differences exist between the various options and that the differences are not the same at all moisture contents.

Table 2. WET GRAIN DISCOUNTS & DRYING COSTS

ON - FARM DRYING COSTS

MARKET PRICE $3.50

BASE MOISTURE LEVEL
(Dry Bushels) 15.0%

CROP: Corn

PROPANE GAS COST
($ per gallon) $0.50
($ per bu/pt) $0.01

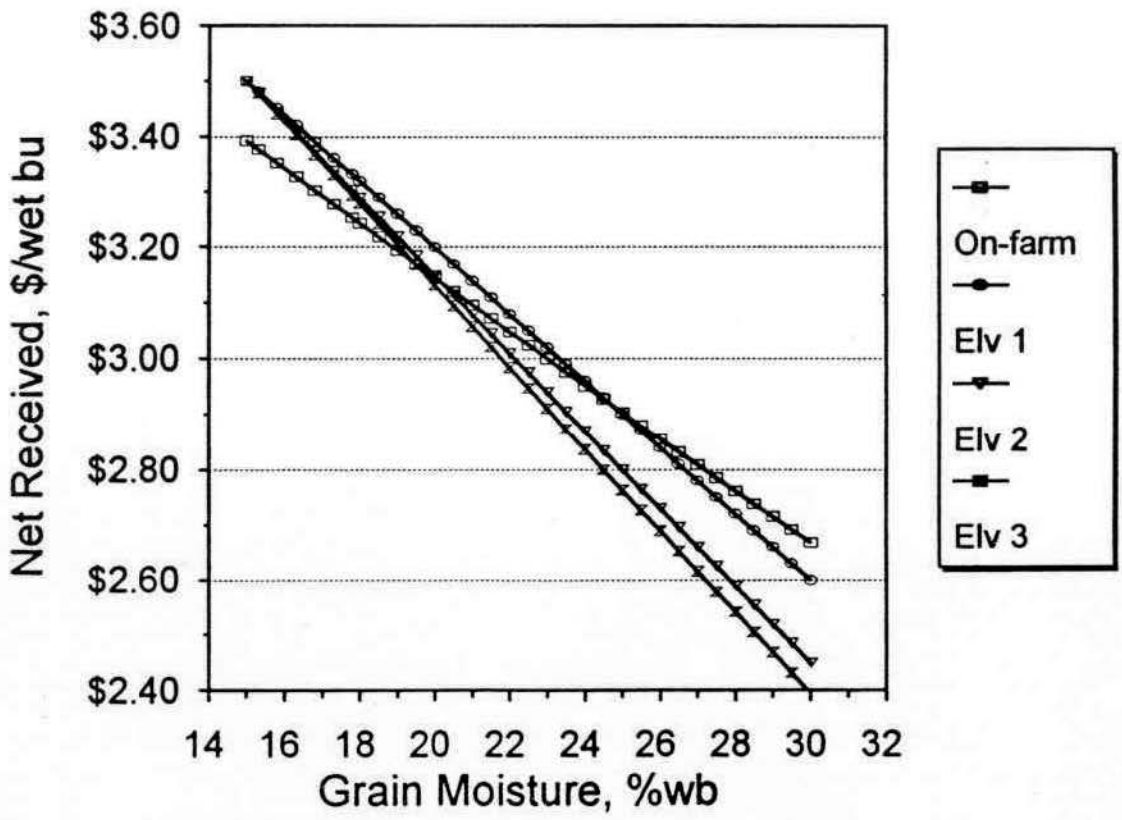
ELECTRICITY COST
($ per kw-hr) $0.06
($ per bushel) $0.04

HAULING CHARGE (optional)
($ per bushel) $0.05

ELEVATOR DISCOUNT CHARGES:
(per bu. per point of moisture)

EXAMPLES	
Elv 1 - cents per bushel	6.00
Elv 2 - % of price or weight	2.00%
Elv 3 - wt. shrink plus drying shrink (% of wet wt.)	1.40%
drying (cents per bu.)	2.50

Figure 1. ***Returns from on-farm drying and example wet sale options***



Our discussion thus far has not included any evaluation of the fixed equipment costs for on-farm drying. These costs are often not considered in short term strategies but they may be a factor to consider at times. It is not the purpose of this report to present an analysis of fixed costs. However, being between $0.05 and $0.10 per bushel is usual for these costs.

MARKET PREMIUMS -- Finally, factor in any premium that the market may be offering for early delivery. That premium is available to offset the added cost of drying wetter grain instead of leaving it to dry in the field. Consider, for example, what could happen if the price declined from $3.50 to $3.20 per bushel while corn was left in the field to dry for two additional weeks. In that time, the corn could dry from about 30% to 25% moisture content. For this illustration, let us also assume that the grain is delivered wet and that the discount per bushel is 2% of the selling price per point of excess moisture above 15%. An acre of corn that yielded 100 wet bushels at 30% moisture content would be discounted $1.05 per bushel (2% x 3.50 x 15 points) at the elevator and would return $245 ($2.45 x 100 bushels) to the grower. That same acre two weeks later at 25% moisture content would be discounted only $0.64 per bushel (2% x $3.20 x 10 points) but would also yield only 93.3 wet bushels. The gross return to the grower for that same acre of corn would be $239 or $6 less than he would have received 2 weeks earlier. Thus, a substantial drop in the market or the loss of a significant premium may exceed the savings that might be gained from field drying.

Some moisture discounts may also be affected by changing market prices. Those consisting of shrinkage plus a drying charge change very little as grain prices fluctuate. Indeed, if the buyer's shrinkage table is close to true moisture shrinkage (1.18% per point of moisture), then grain price does not affect the return to on-farm drying. Fixed cents per bushel discounts provide an increasing return to on-farm drying as grain price declines. If grain prices increase, on-farm drying becomes less profitable. Discounts based on a percentage of the selling price are obviously a direct function of grain price. Since the discount increases as grain prices rise, this discount schedule provides an increasing return to on-farm drying as corn prices increase. Lower grain prices reduce the economic incentive for on-farm drying when moisture discounts are computed as a percent of the selling price.