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Economic Considerations in Marketing Corn

by J. William Uhrig, Extension Economist

Marketing field-shelled corn as cash grain presents you with several alternatives. You can choose between: (1) Marketing wet corn out of the field and accepting a moisture discount; or (2) Drying the corn for sale at harvest or at a later date.

If corn is not sold out from the field, then you must make other choices. Should you have your corn dried commercially: Or, should you invest in a dryer of your own? And if you dry the corn, should you store before selling? If you store, when should you sell?

Marketing Strategy

The decision to market corn directly from the field or to condition and store for sale later in the season is affected by (1) the availability of storage and drying facilities already on your farm; (2) cost of new storage and drying equipment; (3) availability and cost of commercial storage and conditioning facilities; (4) market discounts for excess moisture corn; and (5) price of corn at harvest and the anticipated price during the marketing season.

The most profitable choice depends upon many things. The purpose of this publication is to give you information on moisture discounts, shrink, storage costs, and price increases needed to cover drying and storage costs.

Purposes of Moisture Discounts

Market discounts for high-moisture grain are designed to (1) Equalize the value of the dry matter in a bushel of wet grain with that in a bushel of dry grain on which the market price is based; (2) Obtain payment for the extra costs of conditioning and handling wet grain -- the costs of drying, the value of the shrinkage, and the risk of high-moisture grain going out of condition; and (3) Discourage the marketing of more high-moisture grain than can be safely handled by the grain trade.

What Does a Bushel of Corn Weigh?

Because of the extra weight in the form of water that it contains, corn with high moisture is worth less per pound and per bushel than No. 2 corn. A bushel of No. 2 corn contains 15.5 percent moisture and weighs 56 pounds. It contains 47.32 pounds of dry matter and 8.68 pounds of water. Shelled corn is sold at 56 pounds per bushel regardless of the moisture content. You sell more water and less dry matter when corn is sold at moisture contents above the 15.5 percent standard for No. 2 corn.

When corn is purchased by an elevator, the usual practice is to buy corn at the standard weight of 56 pounds per bushel and discount the basic bid for No. 2 corn to compensate for the excess moisture. A common discount scale used in Indiana during the past year was 1 percent of the No. 2 price for each 1/2 percent for No. 2 corn. However, there are other variations in the discount scale used in the state. If grain is dried and stored, a common practice has been to shrink the grain 1.3% to 1.4% for each 1% excess moisture and assess a drying charge.

Shrinkage

Shrinkage is the main cost incurred in drying corn. When high-moisture corn is artificially dried or dries later in the season, there is a moisture loss and a dry matter loss. The amount of shrinkage caused by the removal of excess moisture can be determined mathematically.

The dry matter loss consists of the removal of chaff, bee's wings, tips of corn, fine parts of cracked kernels, dust, and the respiration that occurs in the grain. This is often referred to as an invisible shrink or a handling shrink. The amount of the dry matter shrink varies between 1/4 and 1 percent with different lots of grain and different storage and climatic conditions. Usually, 1/2 of 1 percent is allowed for the dry matter shrink.

The percentage weight loss, or shrinkage, caused by drying is proportional to the percentage change in moisture content but always exceeds it. The percentage change in weight because of shrinkage is calculated on -- the wet weight of a lot of grain before drying and the dry weight of the lot after drying. The percentage change in moisture is calculated by subtracting the moisture content after drying from the moisture content before drying. For example, when corn is dried from 20 to 15 1/2 percent moisture, you have 4.50 percent reduction in moisture content. But, you must reduce the original wet weight by 5.33 percent to end up with corn at 15.5 percent moisture. An additional allowance of .5 percent should be made for the dry matter loss, i.e.,

$$5.33 + .5 = 5.83\%$$

Determining Value of Shrinkage and Implied Drying Charges

To evaluate moisture discounts, and relate them to conditioning charges, first divide the moisture discounts into two parts: (1) the value of the shrinkage; and (2) the imputed or implied conditioning charge and/or the penalty for selling wet corn if you are selling.

The shrinkage can be determined from Table 1. The discount may be divided into its two component parts by multiplying the appropriate shrinkage figure in Table 1 by price for No. 2 corn and subtracting the product from the total discount. The No. 2 corn price multiplied by the percentage shrinkage, determines the value of the shrinkage. The imputed conditioning cost is the amount that is left after subtracting the value of the shrinkage from the moisture discount. When selling, this becomes a penalty for selling wet corn. When drying corn, the imputed conditioning charge less the actual drying charges becomes the profit from drying.

When to Sell?

The answer to this question depends upon the availability of storage, the cost of storage, the current price, and the anticipated seasonal price rise. When ear corn was stored, part of the income from storage was actually derived

from avoiding moisture discounts. You sold a higher-quality product after the corn dried during the winter and spring months. When high-moisture shelled corn is dried to where little or no discounts are involved, the income from storage must come from a price increase.

The price increase necessary to cover drying, shrinkage, and storage costs can serve as a guide to decide which marketing alternative to choose. Costs of six alternative methods of marketing corn are shown in Table 2. The following assumptions are used in the table:

1. A farmer harvests 1,000 bushels of corn at 22.5 percent moisture.
2. No. 2 corn price is \$2.80 per bushel on October 1.
3. The discount for delivering "wet" corn is 1 percent of the No. 2 price for each 1/2 percent excess moisture above No. 2 grade.
4. If the corn is stored in an elevator, it must be dried to 14.5 percent moisture. The elevator uses a shrink factor of 1.3 percent for each 1 percent excess moisture, plus a drying charge of .8 cent for each 1/2 percent moisture removed with a minimum charge of 10 cents per bushel.
5. Harvest date is October 1.
6. Interest rate is 12 percent.
7. If corn is stored past March 1, taxes of 2.5 cents per bushel must be paid.
8. Corn stored on the farm is dried to 15 percent moisture for April and 14 percent moisture for July sales.
9. Commercial storage charges are 12 cents minimum to January 1, plus 1 1/2 cents per month after January 1.
10. Total cost for farm storage is 15 cents per bushel.
11. Drying costs on farm are 11.0 cents for corn dried to 15-15 1/2 per-

Table 1. Grain shrinkage: When grain is dried to levels of 13 to 19 percent moisture*

Initial moisture percent	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0
	percentage of shrinkage												
15.5	3.37	2.81	2.24	1.67	1.09	----	----	----	----	----	----	----	----
16.0	3.95	3.39	2.83	2.25	1.68	1.09	----	----	----	----	----	----	----
16.5	4.52	3.97	3.41	2.84	2.26	1.68	1.10	----	----	----	----	----	----
17.0	5.10	4.55	3.99	3.42	2.85	2.28	1.70	1.10	----	----	----	----	----
17.5	5.67	5.12	4.57	4.01	3.44	2.87	2.29	1.70	1.11	----	----	----	----
18.0	6.25	5.70	5.15	4.59	4.03	3.46	2.88	2.30	1.71	1.11	----	----	----
18.5	6.82	6.28	5.73	5.18	4.62	4.05	3.48	2.90	2.31	1.72	1.11	----	----
19.0	7.40	6.86	6.31	5.76	5.21	4.64	4.08	3.50	2.91	2.32	1.72	1.12	----
19.5	7.97	7.44	6.90	6.35	5.79	5.23	4.67	4.10	3.52	2.93	2.33	1.73	1.12
20.0	8.55	8.01	7.48	6.93	6.38	5.83	5.27	4.70	4.12	3.54	2.94	2.35	1.74
20.5	9.12	8.59	8.06	7.52	6.97	6.42	5.86	5.30	4.72	4.14	3.55	2.96	2.36
21.0	9.70	9.17	8.64	8.10	7.56	7.01	6.46	5.89	5.32	4.75	4.16	3.57	2.97
21.5	10.27	9.75	9.22	8.69	8.15	7.60	7.05	6.49	5.93	5.35	4.77	4.19	3.59
22.0	10.84	10.33	9.80	9.27	8.74	8.19	7.65	7.09	6.53	5.96	5.38	4.80	4.21
22.5	11.42	10.90	10.38	9.86	9.32	8.78	8.24	7.69	7.13	6.57	5.99	5.40	4.83
23.0	11.99	11.48	10.97	10.44	9.91	9.38	8.84	8.29	7.73	7.17	6.60	6.03	5.44
23.5	12.57	12.06	11.55	11.03	10.50	9.97	9.43	8.89	8.34	7.78	7.21	6.64	6.06
24.0	13.14	12.64	12.13	11.61	11.09	10.56	10.03	9.49	8.94	8.38	7.82	7.25	6.68
24.5	13.72	13.22	12.71	12.20	11.68	11.15	10.62	10.09	9.54	8.99	8.43	7.87	7.30
25.0	14.29	13.79	13.29	12.78	12.26	11.74	11.22	10.68	10.14	9.60	9.04	8.48	7.91
25.5	14.87	14.37	13.87	13.37	12.85	12.33	11.81	11.28	10.75	10.20	9.65	9.09	8.53
26.0	15.44	14.95	14.45	13.95	13.44	12.93	12.41	11.88	11.35	10.81	10.26	9.71	9.15
26.5	16.02	15.53	15.03	14.54	14.03	13.52	13.00	12.48	11.95	11.41	10.87	10.32	9.76
27.0	16.60	16.11	15.62	15.12	14.62	14.11	13.60	13.08	12.55	12.02	11.48	10.93	10.38
27.5	17.17	16.69	16.20	15.71	15.21	14.71	14.20	13.68	13.16	12.63	12.09	11.55	11.00
28.0	17.74	17.26	16.78	16.29	15.79	15.29	14.79	14.27	13.75	13.23	12.70	12.16	11.61
28.5	18.32	17.84	17.36	16.87	16.38	15.88	15.38	14.87	14.36	13.83	13.30	12.77	12.23
29.0	18.89	18.42	17.94	17.46	16.97	16.48	15.98	15.47	14.96	14.44	13.92	13.38	12.85
29.5	19.47	19.00	18.52	18.04	17.56	17.07	16.57	16.07	15.56	15.05	14.52	14.00	13.46
30.0	20.04	19.58	19.10	18.63	18.15	17.66	17.17	16.67	16.16	15.65	15.13	14.61	14.08

*This table applies to all grains. It includes the moisture shrink and one-half of one percent for the dry matter shrink.

- Formulas: (1) Shrinkage $100.0\% - \frac{(\% \text{ dry matter in wet grain} \times 100)}{(\% \text{ dry matter in dry grain})} + 0.5\%$ handling shrink.
 (2) Value of shrink = price basis grade X shrinkage.
 (3) Returns to drying = discount - value of shrinkage.

Table 2. Alternative methods of marketing 1,000 bushels of corn harvest October; -- No. 2 price \$2.80 per bushel

Item	Marketing Direct		Commercial Drying & storage ^{1/}		Farm drying & storage	
	Sold "wet" at harvest	Dried on farm sold at harvest	April 1	July 1	April 1	July 1
Percent moisture content	22 1/2	15 1/2	14 1/2	14 1/2	15	14
Bushels of corn sold	1000	912.16	896.0	896.0	906.76	896.16
Value of corn (if sold wet)	\$2,408.00	\$2,408.00	\$2,408.00	\$2,408.00	\$2,408.00	\$2408.00
Interest at 1/2 percent	XXX	XXX	144.48	216.72	144.48	216.72
Storage Costs ²	XXX	XXX	147.84	188.16	136.01	134.42
Drying Costs ³	XXX	110.00	128.00	128.00	110.00	125.00
Taxes	XXX	XXX	22.40	22.40	22.67	22.40
Extra handling ²	XXX	XXX	XXX	XXX	13.60	13.44
Total value	\$2,408.00	\$2,518.00	\$2,850.72	\$2,963.28	\$2,834.76	\$2,919.98
Value per bu. (rounded)	\$2.41	\$2.76	\$3.18	\$3.31	\$3.13	\$3.26

¹ Note: Calculate shrink using a 1.3% reduction in weight for each 1% excess moisture.

² Storage costs, taxes, and extra handling charges are calculated on the actual bushels sold.

³ Drying costs are calculated on wet weight. Farm drying charges include allowance for fixed costs.

cent moisture or 12.5 cents for corn dried to 14 percent moisture on wet weight.

12. On farm-stored corn, there is an extra handling charge of 1.5 cents per bushel.

13. On farm-dried corn, there is an "invisible" loss of .5 percent.

In these examples, the price increases needed to justify drying and storage are compared with the alternative of marketing directly from the field. Price increases of about 37 and 50 cents per bushel are needed to offset the total costs of storing corn on the farm from October to April and July, respectively, as compared to selling at harvest when the price of No. 2 corn is 2.80 per bushel.

When marketing corn directly from the field (in the above example), the profits from drying before selling rather than taking the moisture discount at harvest time are small. However, the drying returns covered the cost of the drying, and in many cases elevators can take dry corn and may not be able to accept wet corn at certain times during harvest.

Selling before personal property taxes are assessed on March 1 would reduce the storage costs about 2 1/2 cents a bushel.

Farmers who are experienced at maintaining corn quality may be able to store corn at a higher moisture content than used in the example, especially if the corn is sold before the warm spring weather. This results in more bushels sold and reduces the amount of price increase needed to justify storage. However, additional costs may be incurred in on-farm storage if the grain quality is allowed to deteriorate.

Costs of storing grain at the elevator increase monthly by the monthly storage fee and interest charges on the grain. Most of the costs of on-farm storage are fixed costs. Once the ini-

tial investment is made, the cost of additional storage time is largely the interest expense incurred. There are also other advantages of on-farm storage such as (1) being able to control the harvest operation; (2) investment credit on storage and drying equipment; and (3) depreciation on the storage and drying equipment.

Summary

Many factors are involved in assessing the alternatives of drying, conditioning, and marketing grain. Outlook information on prospective grain prices should be utilized in making marketing decisions.

Use of storage, either on-farm or in commercial elevators, helps avoid selling when the basis is depressed. If corn is stored, evaluation of separating the pricing decision from the exchange of title should be considered. Corn may be forward-priced through contracting with an elevator or by hedging in the futures market. The decision of whether (or when) to forward-price corn depends upon your price outlook.

A gross storage return of up to 40 cents per bushel for storage from harvest until July, can usually be locked in through hedging. If you are eligible for the Government loan (\$2.25 national average) your interest costs may be reduced slightly.

If corn is stored at harvest time and not forward-priced, the gain can be larger -- or smaller -- than that which can be locked in through forward-pricing or hedging.

The examples illustrated are for one price, one moisture content, and two selling dates. There are many other combinations of prices, moisture contents, and selling dates which would yield slightly different results from those selected. Your county Extension office in Indiana has a grain marketing information program operational on the FACTS computer terminal to help evaluate other alternative methods of selling corn.

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