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Economics of Grain Storage

Richard C. Shane
South Dakota State University

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Editor: Donald C. Taylor

Economics Department SDSU, Box 504A Brookings, SD 57007 Tele: (605) 688-4141

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ECONOMICS OF GRAIN STORAGE

by
Richard C. Shane
Grain Marketing Specialist

Low grain prices of recent months have focused attention on the economics of storing grain. Potential seasonal price increases provide the incentive for grain storage. The predominant question in the decision to store is whether expected grain price increases will exceed the costs of storage.

The objective of this Newsletter is to present a method for calculating storage costs. Storage costs for several crops are presented. It is the reader's task to compare these storage costs with expected price changes associated with alternative grain marketing strategies.

Storage Costs

Total costs of storing grain are divided into fixed and variable categories. Fixed costs include depreciation, interest, maintenance, taxes and insurance on facilities and equipment. These costs are incurred whether the grain bin is full or empty. Variable costs differ depending on how much you store, where you store and how long you store. The major component of variable cost is interest. Interest on the inventory value of a stored crop must be taken into account. If a crop is sold (rather than stored), the proceeds from the sale could be used to (1) reduce debt--and hence reduce one's interest payments--or (2) invest to earn interest--for example, in a time certificate. For storage to be profitable, grain prices must increase enough to pay this interest (called opportunity cost interest) plus other storage costs.

Other variable storage costs include insurance on the grain, quality maintenance costs, loss of value due to deterioration, labor, added transportation charges, and shrinkage. In the short-run (one storage period), expected price increases must at least cover variable costs to make storage a viable alternative. However, in the long run (several years), fixed costs must be paid as well. This argument is made because the fixed costs must be paid even if the bin is empty. So, if variable costs plus a little more are paid by grain price increases, you are better off. In the long run, however, if year after year you pay only variable costs the grain bin will deteriorate and there will be no money to replace it.

Commercial Storage

A quoted grain storage charge (per bushel per month) in a commercial facility covers the total costs of storage plus a risk premium. Opportunity interest cost must be added to the quoted rate to calculate a producer's total storage cost. Equation (1) is used for computing storage costs at a commercial facility.

(1) (Rate per month x months stored)
+ (current price x annual interest rate x months stored/12)

A common commercial storage rate is three cents per bushel per month. Combining this rate with $2.00 per bushel of corn stored for six months and a 13 1/2 percent annual interest rate leads to the sample calculation in equation (2).

(2) ($.03 x 6) + ($2.00 x .135 x 6/12)
= $.315

Farm Storage

A producer needs to determine his fixed and variable storage costs. For those who may not know what these costs are, the rule-of-thumb procedure shown in equation (3) can be used. This equation--derived in conjunction with

Dr. Fred Benson at the University of Minnesota--contains no risk premium and assumes no expenditures to maintain grain quality. In using the equations, be sure to make the calculations in the inner-most parentheses first.

(3) $FSC = CP\ [(i \times m/12) + (a + b \times m)]$

where FSC = farm storage cost;
- CP = current price;
- i = interest rate;
- m = months stored;
- a = .01 for corn, soybeans, oats and barley and .005 for wheat; and
- b = .001 for corn and .0005 for soybeans, oats, barley and wheat.

An example calculation for corn with a current price of $2.00 per bushel, an annual interest rate of 13 1/2 percent and six months of storage is presented in equation (4). The result is a total storage cost of 16.7 cents per bushel for six months. In order to justify storing corn under these conditions, an increase in corn price to at least $2.17 per bushel must be expected.

(4)

$$\$2.00\ [(.135 \times 6/12) + (.01 + (.001 \times 6))] = \$.167$$

Illustrative Commercial and Farm Storage Costs

Illustrative storage costs for commercial and farm storage are presented in Table 1. The farm costs tend to be lower than the commercial costs. Farm costs are based on a full twelve months storage and involve no quality maintenance expenditures. Commercial storage costs, on the other hand, include provision for potential unused storage facilities and fumigation, heating and other quality maintenance actions.

Table 1. Grain Storage Costs 1985-86

$/bu	Location	Months Stored 1	3	6	9
		cents per bushel			
		Corn			
1.75	farm	3.9	8.3	14.8	21.3
	commercial	5.0	15.0	30.0	45.0
2.00	farm	4.6	9.4	16.7	24.1
	commercial	5.2	15.8	31.5	47.2
		Soybeans			
4.75	farm	10.3	21.5	38.2	54.9
	commercial	8.3	25.0	50.0	75.0
5.25	farm	11.4	24.6	42.3	60.0
	commercial	8.9	26.7	53.5	80.2
		Wheat			
2.75	farm	4.6	11.1	20.7	30.4
	commercial	6.1	18.3	36.5	54.8
3.00	farm	5.1	12.1	22.7	33.3
	commercial	6.4	19.1	38.3	57.4
		Oats			
.80	farm	1.7	3.6	54.	8.1
	commercial	3.9	11.7	23.4	35.1
1.00	farm	2.1	4.5	8.0	11.6
	commercial	4.1	12.4	24.8	37.1

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