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Seasonality In Corn and Soybean Prices Received By South Dakota Farmers; Grain: Sell or Store

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SEASONALITY IN CORN AND SOYBEAN PRICES RECEIVED BY SOUTH DAKOTA FARMERS

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Grain markets are characterized by seasonal production and year-around utilization. When a region is self sufficient, demand year round for a grain can be met by storing the grain in the region. If the region has excess demand, the off season demand can be met by importing grain from other regions. If the region has excess supply, the grain can be exported to other regions.

Seasonal grain price patterns depend on storage costs, distances from other regions with seasonal excesses of demand and supply, and transportation costs to and from these regions. Seasonal price patterns also can change in response to changes in the relative strengths of seasonal supply and demand.

This article's main objectives are: a) to investigate seasonal patterns in cash prices received by South Dakota farmers (S.D. Prices) for corn and soybeans and b) to make monthly projections for S.D. corn and soybeans prices for the marketing year September 1993 through August 1994, hereafter abbreviated as simply "1993" or "93".

Seasonality in Commodity Prices

Seasonality in commodity prices is commonly studied by computing monthly seasonal indices. Under this approach, the average price for each year is assigned an index of 100. The prices for different months in a year are then converted into appropriate indices. If, for example, the average October price in a year is 5.2% lower than the average price for the year, the index for October will be 94.8. If the average price for May is 12.2% higher than the average price for the year, the index for May will be 112.2.

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GRAIN: SELL OR STORE

by
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Grain storage cost changes as price changes because a major cost of storage is interest. Compared to one year ago when storage decisions were made, prices for wheat are lower, feed grains similar to slightly higher and oilseeds higher. So, with slightly lower to constant interest rates, wheat storage cost will be lower, feed grain storage cost the same to slightly higher, and oilseed storage cost higher than last year.

When considering storage, producers will want to compare on farm storage and commercial storage. With commercial storage three costs are of concern -- (1) the rate charged by the storage facility, (2) interest on the sales value of the stored grain, and (3) costs associated with waiting in long lines at harvest time. With on farm storage, costs are broken down as fixed and variable. The fixed costs are normally not a part of the annual storage decision because these costs must be paid whether you store or not. These costs include depreciation, interest, and insurance on the farm storage facility. Variable costs include bin preparation-cleaning, insect control and repair; in and out costs; utilities; and labor. Transportation is not included when comparing selling and storage because the grain must be hauled to market some time.

Shrink can also be a consideration when storing grain on the farm. With commercial storage your warehouse receipt insures a constant amount of grain to sell at a later date. But loss of moisture, handling loss, insect or rodent damage, and quality deterioration all result in fewer bushels to sell after farm storage. These costs vary widely with storage facility, climate, and farmer. Stored grain must be monitored regularly for heating or insect infestation

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(Seasonality ... Continued from p.1)

Given monthly data for a number of years, average indices for different months can be computed which depict an average seasonal pattern during the sample period. In addition, standard deviations and yearly trends in the indices also can be computed. Standard deviations for monthly indices indicate the magnitude of variability in relevant monthly indices. The yearly trend in a monthly index indicates that the index for that month is changing over time. These trends are helpful in forecasting monthly indices beyond the sample period.

Seasonal Patterns in Corn Prices

In a recently completed study at SDSU the seasonal price patterns for corn, wheat and oats were analyzed for the period from September 1949 through August 1991. Seasonal indices based on historical data for 6 years, 11 years, 16 years, 21 years, 26 years, and 31 years were computed, and the price forecasts up to 12 months beyond the sample period based on these indices were evaluated. This research report can be obtained by writing to the author c/o Economics Department.

A brief summary of major findings of this study relating to corn price seasonality follows.

1) Seasonal corn price forecasts improved with an increase in the sample size up to 21 years. However, increasing the sample size beyond 21 years resulted in increased errors in S.D. price forecast and a negligible decrease in U.S. price forecast errors.

2) Both S.D. and U.S. corn prices show a decline following harvest to a seasonal low in October and reach a seasonal high in June. Between October and June, on average, S.D. corn prices increased 15% whereas U.S. corn prices increased 8%. In other words, S.D. corn prices exhibit relatively more pronounced seasonality than U.S. corn prices. This implies that monthly S.D. corn price forecasts based on S.D. seasonal patterns will be superior. However, a number of tests also showed that differences in S.D. and U.S. corn price seasonality are becoming less significant over time.

3) For both S.D. and the U.S., variance for monthly seasonal indices was higher during August, September, and October; and was lower during December, January, February, and March. Compared to the U.S., monthly S.D. seasonal indices showed less variance.

Monthly Price Forecasts for Corn

For this article, the analysis was updated using the S.D. corn price data from September 1972 to August 1993 (the most recent 21 years of data). Monthly seasonal indices, standard deviations, yearly trends, and average projected seasonal indices for crop year 1993 (September 1993 to August 1994) were computed. These average projected seasonal index values are shown in Fig 1 as APSI(93). The computation of APSI(93) is based exclusively on 21 years of prior price data, i.e., it does not take into account new information about 1993 supply conditions. Later, in this article, 1993 corn supply information will be incorporated in the analysis.

Seasonal price patterns are influenced by supply (Beginning stocks + Production + Imports) and use (domestic use + exports). Since data on grain use are not available at the beginning of the crop year and the annual grain use is generally more stable, a ratio of current year supply and preceding year's use, hereafter referred to as a supply/use ratio, is used to measure the relative strength of supply and demand forces in different crop years. In this analysis, a crop year is considered to be in short (long) supply when the supply/use ratio for the current crop year is below (above) the six year moving average for the ratio.

As shown in Table 1, crop years 1990 and 1991 were short supply years for corn. To demonstrate the impact of short supply, seasonal price indices for these years are plotted in Fig 1 as PSI(90) and PSI(91). Fig 1 clearly shows that for years with relatively short supply, price seasonality is less pronounced and the seasonal high tends to occur earlier than in the case of the average supply year, as indicated by APSI(93). In a short supply year, prices at harvest tend to be higher and the potential for a post harvest price increase is much smaller.

Corn price levels in the last three months of the marketing year (June, July, and August) are heavily influenced by

expectations of the following year's crop. As can be seen by these two short years, the price pattern for short crop years can deviate greatly from the average supply year. If the following year's crop is expected to be short, prices stay high or even rise (as in 1990). If the following year's crop is expected to be normal, prices decline (as in 1991).

Based on the current information on supply conditions, my best guess is that the price pattern for 1993 will be similar to the pattern for 1991. Monthly S.D. corn prices for 1993 are projected based on assumptions that S.D. corn price for September 1993 averages at $2.00 per bushel and the seasonal pattern for 1993 is similar to that for 1991. Monthly projections for 1993, hereafter referred as Modified Projected Prices or "MPP", are plotted in Fig 2. Accordingly to these projections, S.D. corn prices are expected to drop by 5¢ in October 93, and then increase by 17¢ by February 94. The average S.D. corn price in February 94 is expected to be 12¢ per bushel higher than the September 93 level.

The corn price pattern beyond February 94 will be influenced strongly by the outlook for the 1994 crop. If 1994 is expected to be a normal crop year, projections reflected in MPP will hold. Accordingly, by March 94, the S.D. corn price will increase by about 16¢ over the September 93 price, remain near that level until May 94, and then drop sharply. If 1994 is expected to produce a short crop, S.D. corn prices may show some increase during the last three months of the year (recall PSI(90) in Fig 1).

For comparison, average projected monthly S.D. corn prices (APP) for 1993 based on index values for APSI(93) were computed and plotted in Fig 2. Along with these monthly price projections, one standard deviation interval is plotted in Fig 2. One standard deviation around the projected

Fig 1: S.D. Corn Price Seasonality
(Average v/s Short Supply Years)

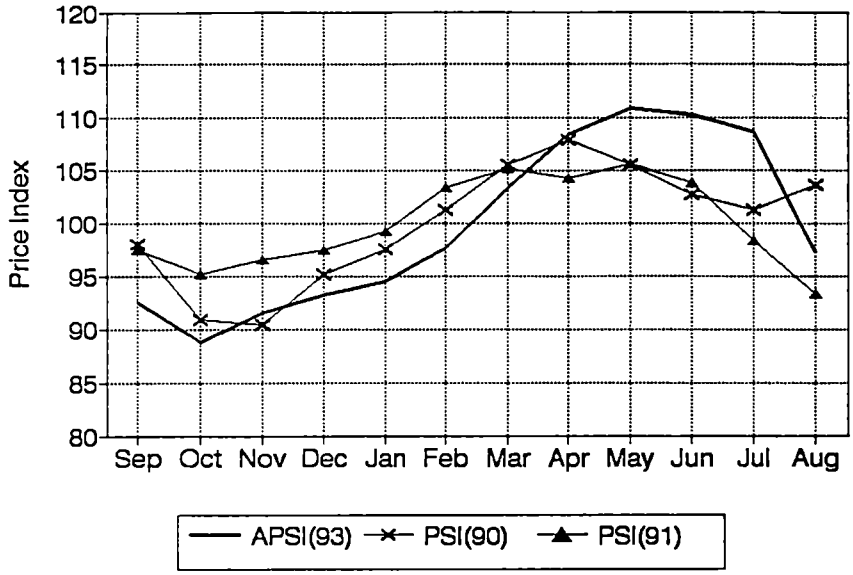

Fig 2: S.D. Corn Price Projections
(Crop Year 1993)

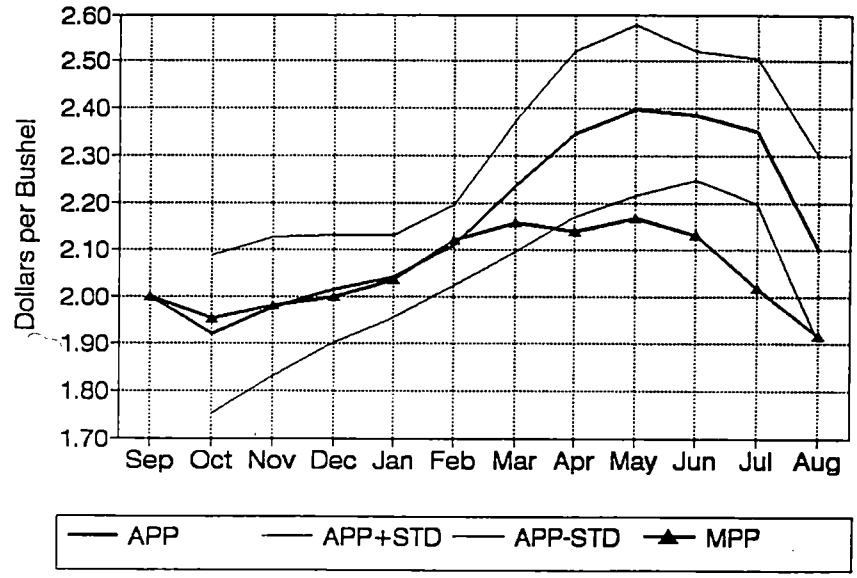

Table 1. Corn Supply/Use Ratio in U.S.

Crop Year	Supply/Use Ratio a/ (6 Yr Moving Av)	Supply/Use Ratio (for Current Year)	Comment
1990	144.1%	114.4%	Short Supply
1991	138.5%	116.2%	Short Supply
1992	129.3%	133.7%	Long Supply
1993 b/	120.7%	111.3%	Short Supply

a/ A ratio of Beginning Stocks, Current Year's Production and Imports divided by the preceding year's Domestic Use and Exports.
b/ Based on USDA's crop estimate released on September 9, 1993.

values gives the range of prices which can be expected to occur about 2/3rd of the time. The projections contained in APP and MPP are similar for the period October 1993 to February 1994.

Monthly Price Forecasts for Soybeans

Average monthly soybeans prices received by S.D. farmers are available only for the last 12 years (September 1981 to August 1993). Based on these data, monthly S.D. soybean price indices projected for 1993 are shown in Fig 3 as APSI(93). These seasonal patterns for S.D. soybean prices are based on the assumption that 1993 will be a normal crop year.

From to the most recent estimates for the soybean crop, however, 1993 is expected to be a short supply year (Table 2). Other recent years with a short supply include 1990 and 1988 (Table 2). Seasonal patterns in S.D. soybean prices for short crop years 1988 and 1990 are plotted as PSI(88) and PSI(90).

S.D. soybean prices are seasonally low in October and seasonally high in June and July. However, post harvest increase in S.D. soybean prices is much smaller than for corn. Between September and February, S.D. soybean prices, on average, show a slight decrease. During crop year 1988, a year with extremely short supply, September soybean prices were about 10% higher than the year's average, and stayed at about 3% to 5% higher than the average for the year until March. During 1990, a year with a slightly short supply, soybean prices decreased by about 3% between September and December and by about 4% between September and February.

Based on the most recent crop estimates, my best guess is that the S.D. soybean price pattern for 1993 will be between the patterns APSI(93) and PSI(88). Monthly S.D. soybeans prices are projected based on the assumption that a) the S.D. soybean price for September 1993 averages $5.80 per bushel and b) the

Fig 3: S.D. Soybean Price Seasonality
(Average v/s Short Supply Year)

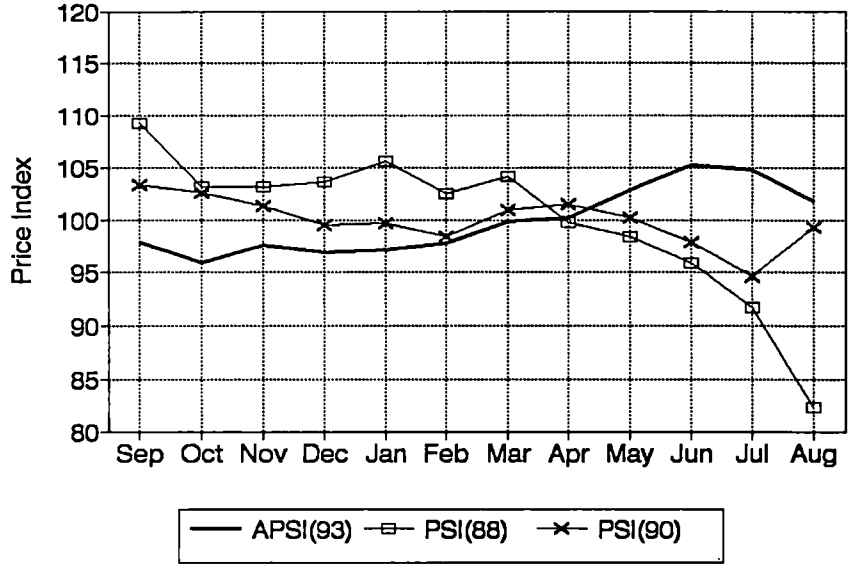

Fig 4: S.D. Soybean Price Projections
(Crop Year 1993)

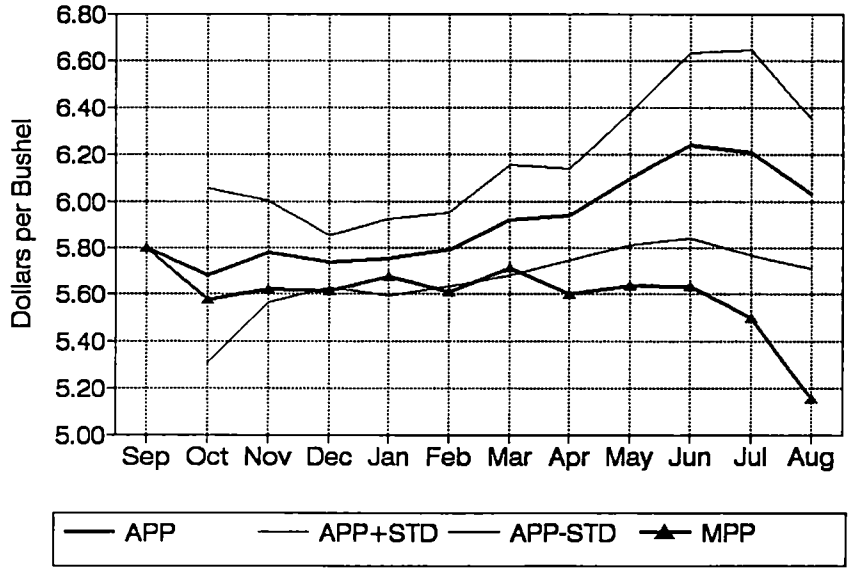

Table 2. Soybeans Supply/Use Ratio in U.S.

Crop Year	Supply/Use Ratio a/ (6 Yr Moving Av)	Supply/Use Ratio (for Current Year)	Comment
1988	114.2%	89.5%	Short Supply
1989	119.5%	126.1%	Long Supply
1990	120.0%	115.9%	Short Supply
1991	117.6%	126.1%	Long Supply
1992	115.9%	121.4%	Long Supply
1993 b/	113.3%	100.8%	Short Supply

a/ A ratio of Beginning Stocks, Current Year's Production and Imports divided by the preceding year's Domestic Use and Exports.
b/ Based on USDA's crop estimate released on September 9, 1993.

seasonal pattern for year 1993 will be between the patterns for a normal year and 1988 year. It is projected that soybeans prices will be about 23¢ per bushel lower in October 93 compared to September 93 (see MPP in Fig 4). By February 94, soybean prices are expected to increase by 4¢ higher than the October 93 level, but will be about 19¢ per bushel lower that the September 93 level. After February 94, the price will be heavily influenced by the Brazilian crop estimates and the U.S. crop outlook for the following year, which cannot be accurately estimated at this time.

Primarily for comparison, a second set of S.D. soybeans price projections based on the assumption that 1993 SD soybean price pattern will be like APSI(93) was also computed and plotted as APP in Fig 4. Along with these monthly mean price projections, one standard deviation interval is also plotted. If 1993 were a normal crop year, average S.D. soybeans prices would be about 1¢ per bushel lower in February 1994 as compared to September 1993. This shows that even under a normal crop year, on average, the storage of soybeans does not pay.

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(Grains: ... Continued from p.1)
problems. After detection of a problem, steps must be taken immediately to reduce potential shrinkage loss. Low quality grain requires very close attention when stored. Many farmers consider drying and storage costs simultaneously when making the sell or store decision.

Storage cost examples could include interest using 3.5 to 9.0 percent per year depending on whether the CCC loan rate or a private loan rate is being paid. An average rate of 6 percent leads to an interest cost of 3.0¢ per bushel per month for $6.00 soybeans, 1¢ per bushel per month for $2.00 corn, and 1.5¢ per bushel per month for $3.00 wheat.

For commercial storage, you would usually pay to the elevator 3¢ per bushel per month. In some cases, a three to four month minimum is charged. The total cost of commercial storage to the farmer without any cost of waiting lines becomes 6¢ per bushel per month for soybeans (3.0¢ interest), 4¢ per bushel per month for corn, and 4½¢ per bushel per month for wheat (Table 1).

On farm storage involves an in and out charge of around 8¢ per bushel for corn or wheat and 13¢ per bushel for soybeans. After the grain is in the bin, other costs usually don't exceed ½¢ per bushel per month unless quality or insect problems arise. So, with interest the cost of storing grain after it is in the bin runs 1½¢ per bushel per month for $2.00 corn, 2¢ per bushel per month for wheat, and 3½¢ per bushel per month for soybeans. Waiting line costs at the elevator often offset the in and out charges of storage.

Shrink from storage is minimal for well constructed and monitored facilities but you can count on ½ of one percent shrink even with the best facilities. If the elevator accepts 15% moisture grain at harvest and you later deliver 13% moisture grain, this is also a cost of storage. Shrink of 2½ percent on $2.00 corn costs around 5.0¢ per bushel.

As an example, the variable cost of six months on farm storage of corn is 8.0¢ in and out charge plus 3.0¢ "other costs" plus 6.0¢ interest plus 5.0¢ shrink (assuming 15 to 13 percent moisture change) for a total variable cost of 22¢ per bushel (Table 1).

Table 1. Illustrative On Farm and Commercial Storage Costs to the Farmer for Corn, Soybeans and Wheat: 1993-1994*

Grain	3-Months	6-Months	9-Months
		(cents/bushel)	
		ON-FARM	
Corn	17.5	22.0	26.5
Soybeans	23.5	34.0	44.5
Wheat	15.5	21.5	27.5
		COMMERCIAL	
Corn	12.0	24.0	36.0
Soybeans	18.0	36.0	54.0
Wheat	13.5	27.0	40.5

*Assume six percent interest and prices of $2 for corn, $3 for wheat and $6 for soybeans. Shrink is calculated at two percent for corn moisture with on-farm storage, zero for soybeans and wheat.

Carry (change in futures price from new crop December futures to May futures) in the futures market indicates whether grain storage may be profitable or not. As of this writing, the carry for six months of corn storage is 18¢ per bushel. Since

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this amount is less than the cost of storage, basis improvement would have to occur in order for corn storage to be profitable this year. Often corn basis improves after harvest by more than the 4¢ that variable cost of storage exceeds current carry. Use this method to evaluate your personal storage opportunities for 1993 harvested grain. The costs in the table represent the amount the price of your grain must increse before a profit to storage is realized.

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