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Seasonal Price Patterns for Arkansas Soybeans

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Seasonality is frequently mentioned as a major aspect of price variation for many agricultural commodities. Market analysts refer to seasonal price patterns as they present market outlooks and advice for producer marketing strategies. Tomek (1990) has defined seasonality as "a regularly repeating price pattern that is completed once every 12 months. Such a regular pattern might arise from seasonality in demand, seasonality in supply and marketing, or a combination of the two." These tendencies occur because most major U.S. agricultural grain commodities are harvested during rather narrow time periods and then stored for use throughout the year. The seasonal production patterns generate seasonal price variations which further impact the commodity storage decisions.

Recent years in Arkansas have seen considerable construction of on-farm grain storage facilities. Since 2010, on-farm storage capacity in Arkansas has increased by 18 percent to a present-day total of 230 million bushels (NASS). Increased on-farm storage provides opportunities for producers to delay marketing activity and at least partially avoid low price periods of the seasonal cycle. The purpose of this fact sheet is to present the most recent seasonal price pattern for Arkansas soybeans.

Economic Theory and Background

Traditional market theory has long held that grain prices should follow a seasonal pattern related to the interaction of production season and market supply level. Prices would be lowest during harvest months, increase in strength through subsequent months as excess supply declines, decrease immediately following the planting period in response to supply indications, and have another upward spike prior to new crop harvest beginning as market supply reaches its lowest annual level. Stark and Bryant (2011) examined five and ten-year indices for soybeans in Arkansas using data from the 1999 to 2008 crops. In their findings, both the five and ten-year indices reached a high in June and a low in October.

Data and Methods

Recent five-year and ten-year seasonal price indices for soybeans in Arkansas are calculated for the 2014 to 2023 marketing years (Table 1A). The indices were developed from monthly cash market prices received by farmers as collected by the Arkansas field office of the National Agricultural Statistics Service (Table 1B). These indices are compared to price indices calculated for Arkansas for the period 1999 to 2008 (Stark and Bryant). Individual year indices for the 2014/15 through 2023/24 crops are then examined and compared to the five-year average. Seasonal price index differences through time are identified and discussed.

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TABLE 1A. Soybean Price Indices for Arkansas Farmers, Crop Years 2014/15-2023/24

YEAR	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
2014-15	1.04	1.03	1.05	1.04	1.04	1.02	1.00	0.98	0.96	0.96	0.97	0.95
2015-16	1.00	0.98	0.95	0.96	0.93	0.92	0.95	0.98	1.05	1.17	1.06	1.07
2016-17	0.99	1.00	1.01	1.02	1.04	1.03	1.05	0.95	0.96	0.97	1.01	0.97
2017-18	1.03	1.02	1.01	1.02	1.04	1.06	1.06	1.06	1.03	0.91	0.88	0.88
2018-19	1.09	1.00	1.02	1.04	1.04	1.01	0.97	0.94	0.92	1.00	0.99	0.98
2019-20	1.00	1.02	1.03	1.02	1.02	1.00	0.97	0.95	0.96	0.95	0.99	1.08
2020-21	0.79	0.81	0.83	0.87	0.91	1.05	0.99	1.19	1.10	1.23	1.17	1.07
2021-22	0.88	0.86	0.85	0.87	0.95	1.12	1.10	1.05	1.15	1.11	0.97	1.08
2022-23	0.97	0.96	0.98	1.03	1.03	1.03	1.05	1.03	0.95	0.99	1.02	0.96
2023-24	1.11	1.08	1.06	1.09	1.06	1.00	0.99	0.95	0.97	0.94	0.92	0.83
10 Yr Av	98.91	97.46	97.82	99.49	100.53	102.48	101.33	100.85	100.47	102.23	99.74	98.71
Std Dev	9.36	8.24	7.82	7.38	5.36	5.16	4.94	7.84	7.36	10.76	7.73	8.78
Coef Var	9%	8%	8%	7%	5%	5%	5%	8%	7%	11%	8%	9%
5 Yr Av	95.01	94.56	95.05	97.52	99.34	104.10	101.97	103.55	102.61	104.47	101.33	100.49
Std Dev	12.01	11.32	10.26	10.05	6.25	5.03	5.42	9.80	9.17	12.33	9.36	10.98

Daily price information is collected by the Livestock, Poultry, and Grain Market News Division of USDA. The individual market prices are reported in the Arkansas Daily Grain Bids report published by the USDA Agricultural Marketing Service. These daily prices for multiple locations in the state were used to calculate an average monthly price if NASS survey findings were not available for a specific month in the 2014 to 2023 marketing years.

Seasonal price indices measure monthly price movement about the average annual price. Average annual prices were assigned an index of 100 and the monthly indices were percentages of the annual averages. The USDA soybean crop marketing year runs from September 1 to August 31 and data from 2014 to 2023 were included. By using the crop marketing year as a base, annual price variations due to crop size (total production) were removed. Monthly index values were calculated for each year, then averaged over the ten-year period as previously done by Jordan et al. (1986).

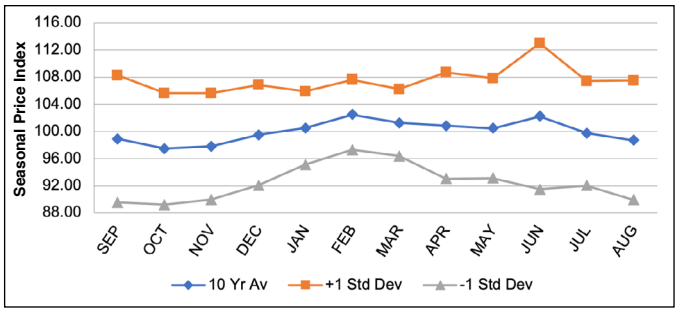
The standard deviation (Std Dev) measures the divergence of the monthly index from the average index, an indication of seasonal pattern consistency. The ten-year soybean seasonal index is presented in Figure 1. The outer lines indicate one standard devia-

TABLE 1B. Soybean Prices Received by Arkansas Farmers, Crop Years 2014/15-2023/24

YEAR	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	YR AVG
	DOLLARS PER BUSHEL												
2014-15	10.70	10.60	10.80	10.70	10.70	10.50	10.30	10.10	9.88	9.90	10.00	9.80	10.60
2015-16	9.76	9.54	9.23	9.32	9.10	8.98	9.25	9.55	10.20	11.36	10.30	10.40	9.46
2016-17	9.69	9.76	9.88	9.97	10.20	10.10	10.30	9.30	9.42	9.45	9.89	9.50	9.83
2017-18	9.75	9.68	9.58	9.69	9.85	10.10	10.10	10.10	9.76	8.64	8.40	8.36	9.77
2018-19	9.39	8.61	8.80	9.00	8.96	8.72	8.40	8.09	7.98	8.64	8.53	8.46	8.81
2019-20	8.73	8.92	9.00	8.90	8.95	8.75	8.50	8.31	8.43	8.35	8.68	9.43	8.87
2020-21	9.78	9.98	10.30	10.70	11.20	12.90	12.20	14.70	13.60	15.16	14.40	13.20	10.50
2021-22	12.51	12.20	12.10	12.40	13.50	15.97	15.60	14.90	16.30	15.80	13.80	15.40	12.90
2022-23	13.90	13.70	14.00	14.70	14.70	14.80	15.10	14.82	13.58	14.21	14.60	13.80	14.20
2023-24	13.50	13.20	12.90	13.30	12.90	12.20	12.00	11.60	11.80	11.40	11.16	10.10	12.80

tion above and below seasonal index values, the range within which prices are expected to be in two out of three years.

Figure 1. Seasonal Price Index Variability, Soybeans, 2014-2023.



Another price variability measure is the coefficient of variation. The coefficient of variation is the standard deviation divided by the sample mean. Dividing by the sample mean normalizes the variability to a percentage of the mean to compare relative variability across the year for a given commodity and across commodities for a given month.

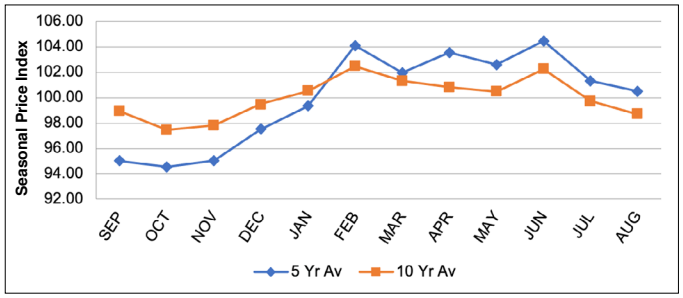
Both five-year and ten-year seasonal indices were calculated to show the base year dependence. Comparing the two indices (five-year and ten-year) can provide a check for changes occurring in the seasonal price patterns. If the timing of seasonal highs or lows has changed, then the pattern may be shifting.

Results

Monthly average soybean prices for Arkansas from September 2014 to August 2023 are displayed in Table 1B. Prices ranged from $7.98/bu. in May 2019 to $16.30/bu. in May 2022. The highest average annual price for the ten-year period occurred in 2022, with an average producer price of $14.20 per bushel.

The ten-year and five-year price indices for the most recent periods are displayed in Figure 2. Over the past ten years, Arkansas soybean prices have followed a pattern of seasonal lows occurring in October (during peak harvest) and seasonal highs in either February or June; most often in February. Similarly, the five- year average price index

Figure 2. Average Seasonal Price Indices, Soybeans, 2014-2023.



displays seasonal price lows occurring in October and a seasonal high in June. However, notable price strength has also occurred in February over the past five years. Figure 2 illustrates over the past five years and ten years an increasing price trend in the November to February time period. These months are now considered the "export window" for U.S. soybeans as South American production is largely out of the world export market.

The ten-year average price index ranges from 97.46% to 102.48% while the five-year price index ranges from 94.56% to 104.47% (Table 1 and Figure 2). This differs from what Stark and Bryant (2011) found in the 1999 to 2008 marketing years. Their ten-year indices ranged from 89.49% to 108.82% and their five-year indices ranged from 86.02% to 114.04%. In fact, the current findings more closely resemble what Jordan et al. (1986) found thirty-eight years ago. Their ten-year indices ranged from 96.78% to 104.36% and their five-year indices ranged from 96.74% to 102.20%. Arkansas soybean prices from 2014 to 2023 exhibited less price volatility during each 12-month period than in the years 1999 to 2008.

The coefficients of variation for the ten-year average price indices are displayed in Table 1. The greatest uncertainty in price levels relative to the recent ten-year average occurs in the U.S. growing season months of June and August. Stark and Bryant found their highest ten-year coefficients of variation in July, August, September, and December. The current findings suggest that ten-year price variability may be occurring somewhat earlier in the summer perhaps as production practices evolve and U.S. soybean planting begins earlier in the calendar year.

Conclusions

Knowledge of price patterns and the volatility levels of specific months can be useful to soybean producers and end users as they develop their annual marketing plans. Arkansas soybean prices appear to have followed a consistent and logical pattern around their annual average over the past ten years. The findings of this study identified a consistent seasonal price pattern with lows occurring in October. However, the five-year and ten-year average price index displayed some differences in seasonal price highs. In the most recent five-year period, the highest seasonal price strength occurred in June. Over the past ten years however, prices received were marginally higher in February than in June. While the U.S. harvest window is typically characterized by lower prices in October, the increasing price trend from November through February is likely driven by relatively strong demand for U.S. soybeans during the South American growing season.

The authors do acknowledge the use of seasonal price tendency for forecasting does carry its own risk. In a dynamic economy, the factors influencing seasonal price patterns are likely to change and one must also consider short-run shifts in supply or demand that may result from trade policy adjustments or production shocks around the globe. A knowledge and awareness of factors that may influence price behavior is useful in making marketing and price risk management decisions.

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