EB-61

Seasonal Price Patterns

FOR CROPS

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NDSU EXTENSION SERVICE

DECEMBER 2000

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Agricultural commodities have historically exhibited seasonal price movements that are tied to the annual nature of the crop cycle. Crop prices in the cash and futures markets are usually the lowest near harvest due to supply pressure. Conversely, they are usually the highest near the end of the marketing year when supplies are less abundant.

Seasonal price movements will vary, however, depending on supply and demand fundamentals. In particular, deviations of actual from expected supplies can have a pronounced impact on seasonal price patterns.

During a “small” crop year, the new crop supply falls significantly below what the market expected at the time of planting. During a “large” crop year, the new crop exceeds earlier market expectations. Different seasonal indexes are relevant in these different situations.

The purpose of this publication is to present seasonal price patterns for calendar years with different levels of new crop supplies. New crop refers to the new marketing year, which begins June 1 for wheat, barley and oats and September 1 for corn, soybeans and sunflowers.

Motive for Seasonal Analysis

Seasonal price patterns can be used as a guide for developing a marketing plan when they are examined along with supply and demand information and other marketing concepts. Plans can be made about selling a portion of the crop in the cash market or the futures market.

Development of a marketing plan begins early. It is one of the first considerations in developing a production plan. Some beliefs about potential market prices are needed to determine the profitability of alternative enterprises.

Marketing plans are generally constructed before a producer has any notion about whether new crop supplies will be “small” or “large.” Within this framework of uncertainty, price objectives must be established. Time deadlines for selling must also be established in the event that the price objectives are not reached.

Several steps may be followed to formulate price objectives. Supply and demand fundamentals can be used to determine an expected seasonal average price. With the help of a seasonal price index representing average price movements over all years, a distribution of prices during the marketing year can be forecast. Price objectives can then be determined, keeping storage costs in mind. In effect, seasonal changes in price must be at least as great as storage costs to justify storage. Additional information about the storage decision can be found in NDSU Extension Service publication EC-1011, *Basis For Selected North Dakota Crops*.

The seasonal price pattern can also be used to establish the time deadline for selling a portion of the crop. Those times of the year when prices are usually the highest can be used as a time deadline for selling a percentage of the crop. Again, storage costs must be considered when selecting the time deadlines for selling.

The marketing plan needs to be updated as the growing season unfolds. Price objectives and time deadlines for selling may need to be modified when more is known about new crop supplies. A different seasonal price pattern may be relevant for making a decision at this time, depending on whether forecasts of new crop supplies are being revised downward or upward.

The marketing tool used for selling a portion of production will depend on the anticipated seasonal price pattern. The pattern will depend considerably on the potential size of new crop supplies.

If forecasts of new crop supplies are pushed lower (due to bad weather conditions), prices are likely to peak during the growing season. In this case, a hedge using a cash forward contract, futures hedge or option may be justified on a portion of anticipated production. Storage is not usually economically feasible.

If forecasts of new crop supplies remain stable through the growing season (or are revised upward), prices are likely to reach bottom near harvest when supply pressures are the greatest. In this case too, a hedge using a cash forward contract, futures hedge or option may be justified on a portion of anticipated production.

Storage may be economically justifiable in this situation. However, additional information on futures prices, the relationship between futures and cash prices (basis) and storage costs are needed to analyze the storage decision. Basis information and methods for analyzing storage can be found in EC-1011.

Analytical Techniques

Seasonal price patterns are usually described by means of an index. Alternative analytical techniques are available for calculating seasonal price indexes. The moving average and the annual average are alternatives. In addition, a technique is needed for classifying years, since seasonal patterns are likely to vary depending on supply conditions. To reflect seasonal patterns in a "small" or "large" crop year, the price index should be based on years with similar fundamentals.

Moving Average

The moving average is the most commonly used technique for calculating a seasonal price index (Purcell). It isolates the seasonal pattern by removing the influence of cyclical price movements and long-term trends.

A moving average over 12 months is usually used for calculating an index for crops. That is the length of a marketing year, and the length of time required to complete a seasonal pattern.

The index is derived by expressing the average price for each month in a series as a percentage of the moving average. An average of the monthly percentages provides monthly numbers for the seasonal index.

An example in Table 1 illustrates the procedure for calculating monthly percentages using the 12-month moving average. The example uses to-arrive cash prices on the Minneapolis Grain Exchange (MGE) for hard red spring (HRS) wheat with 14 percent protein.

Table 1. Procedure for calculating monthly prices as a percentage of the 12-month moving average.

Year	Month	Price	12-Month Moving Total	12-Month Moving Average	Price Divided by Avg.
		(cts)	(cts)	(cts)	(pct)
1978	Jan	293			
	Feb	288			
	Mar	301			
	Apr	313			
	May	321			
	Jun	314			
	Jul	304	3777	314	96.6
	Aug	318	3808	317	100.2
	Sep	325	3847	320	101.4
	Oct	338	3871	322	104.8
	Nov	338			
	Dec	324			
1979	Jan	324			
	Feb	327			
	Mar	325			

The 12-month moving total for July is the sum of January-December prices, the 12-month moving total for August is the sum of February-January prices, and so on. Dividing the totals by 12 gives the averages. Dividing the prices by the averages gives the monthly percentages.

Monthly numbers for the seasonal index are derived by averaging the monthly percentages. The January number is derived by averaging all the January percentages, and so on. The result is a seasonal price index for wheat, as presented in Table 2.

The seasonal price index in Table 2 shows the average seasonal price for 14 percent protein HRS wheat over the period 1978-1999. The lowest seasonal price occurred during August and the highest during May.

The May price index in Table 2 is 103.1. This means that the price in May is expected to be 103.1 percent of the seasonal average price. For a seasonal average price of $3.00, the price in May is expected to be about $3.09.

The reliability of the price index is determined by the index of variability, which is also presented in Table 2. It indicates the range where the index could be expected to fall with 95 percent probability.[1] Lower limit defines the low end of the range, and upper limit defines the high end.

The larger the variability index, the less reliable the monthly price index. In Table 2, the month of highest variability is May and the lowest is December.

The variability index in Table 2 is 15.4 for May. For a $3.00 seasonal average price, the index indicates that there is a 95 percent chance that the price will fall within the range of 87.6 percent to 118.5 percent of the $3.00 price, which is $2.63 to $3.55.

Table 2. Seasonal price and variability indexes for 14 percent protein Hard Red Spring Wheat on the Minneapolis Grain Exchange, based on the moving average, 1978-1999 to-arrive prices

Month	Price Index	Variability Index
Jan	99.5	8.5
Feb	99.3	10.7
Mar	99.7	11.4
Apr	102.1	13.7
May	103.1	15.4
Jun	102.3	14.6
Jul	99.7	13.6
Aug	96.5	11.5
Sep	97.4	11.5
Oct	99.7	10.2
Nov	100.6	10.4
Dec	100.1	8.4

Annual Average

A seasonal pattern for select years (corresponding to “small” or “large” new crop supplies) can be calculated using the annual average. Insufficient data would be available for calculating the moving average; further, cyclical moves and trend are of lesser concern for short, select time periods.

This seasonal price index is derived by calculating the annual average price, and then by expressing the price for each month during the year as a percent of the annual average. The monthly indexes over the years are averaged to derive a price index that represents those years.

An example of the technique is presented in Table 3 for 14 percent protein HRS wheat to-arrive cash prices on the MGE. The index is calculated for those years with smaller-than-expected new crop supplies.

The seasonal price index presented in Table 3 suggests that the highest monthly price may occur during June. It could be 104.2 percent of the calendar year average price. May and December were the next closest high months.

Classification

The perception of new crop supply as “small” or “large” depends on the frame of reference. Prices continuously adjust to new information about supply and demand conditions, and it can be argued that the only relevant “news” is that which conflicts with expectations. During the growing season, what matters most to the market is how the developing new crop compares to earlier supply expectations.

In this study, calendar years were classified according to whether new crop supplies were smaller or larger than expected at the time of planting. One standard deviation of the differences between actual and expected supplies was the guideline used in classifying the years.

Supply consists of carryover stocks plus production plus imports. Expected production was based on actual planted acres, the historical relationship between planted and harvested acres, and the trend yield per harvested acre. Actual carryover stocks were used as the expected. Large carryover stocks would tend to reduce the effect of small yields and accentuate the effect of large yields.

[1] The range presented is a prediction interval, which is different than a confidence interval around the mean. During a given year, the prediction interval is the range within which the price is expected to fall with specified probability. The confidence interval around the mean is smaller, but does not reflect the inherent variance of an individual observation.

Table 3. Seasonal price index for 14 percent protein Hard Red Spring Wheat on the Minneapolis Grain Exchange, based on the annual average for those years with smaller than expected new crop supplies.

	Prices						Prices Divided by Average						
Mth	**1980**	**1988**	**1989**	**1991**	**1996**	**1997**	**1980**	**1988**	**1989**	**1991**	**1996**	**1997**	**Price Index**
	(cts)						(pct)						
Jan	402	316	439	274	537	434	92	83	103	87	100	102	94.5
Feb	403	320	430	279	551	423	93	84	101	89	103	99	94.6
Mar	396	308	446	296	554	446	91	81	104	94	103	105	96.3
Apr	394	327	442	303	626	454	90	86	103	96	117	106	99.8
May	426	335	451	305	686	438	98	88	106	97	128	103	103.2
Jun	428	422	435	300	642	423	98	111	102	95	120	99	104.2
Jul	464	417	433	286	572	410	107	110	101	91	106	96	101.8
Aug	427	424	414	304	516	437	98	111	97	97	96	103	100.3
Sep	451	423	406	321	450	422	104	111	95	102	84	99	99.1
Oct	472	430	412	352	440	410	109	113	97	112	82	96	101.4
Nov	485	421	405	366	436	411	111	111	95	116	81	96	101.8
Dec	479	422	412	393	437	405	110	111	97	125	81	95	103.1
Avg	436	380	427	315	537	426							

Data and Computations

The prices used to derive the seasonal price patterns were obtained from several sources. To-arrive cash prices at Minneapolis/Duluth were taken from *USDA Grain Market News*. Cash prices for sunflowers were obtained from National Sun Industries, Inc., Enderlin, North Dakota. Cash prices for Minot were obtained from SunPrairie Grain at Minot, North Dakota. Futures prices were obtained from the Wall Street Journal and various internet sites.

Cash prices were obtained for Number 1 HRS wheat with 14 percent protein, terminal quality hard amber durum (HAD), number 2 corn, number 3 or better feed barley, mellow malting barley, number 2 heavy oats, number 1 soybeans and sunflowers with 40 percent oil.

The moving average was used to calculate seasonal indexes for cash prices over all the years considered in this study. They were calculated over the 1986-1999 period for sunflowers, over the 1989 - October 1999 for Minot, over the 1978 - May 1996 period for MGE durum and over the 1978-1999 period for the other commodities and locations.

The annual average was used to calculate seasonal indexes for cash prices during those years with smaller and larger-than-expected supply deviations. This technique was also used for select futures prices. The classification of calendar years according to the size of new crop supplies is presented in Table 4.

Table 4. Classification of calendar years by crop according to the size of new crop supplies[a].

	New Crop Supplies	
Crop	**Smaller than Expected**	**Larger than Expected**
Hard Red Spring Wheat	80,88,**89**,**91**,**96**,97	82,**90**,92,**98**
Hard Amber Durum	80,88	82,85,90,92
Corn	83,88,93	79,82,85,92,94
Barley	**83**,88,**93**	**79**,81,82,**85**,92,**94**
Oats	**83**,88,91,**93**	**79**,**82**,85,92,**94**
Soybeans	80,83,84,88,93	79,85,92,94
Sunflowers, Oil Type	88,89,93	86,87,98

[a] The years were classified according to deviations of actual from expected new crop supplies with adjustments to reflect situations in closely related markets. A shaded or bold appearance of a year identifies a supply situation in a closely related market. A plain appearance of the year indicates the supply situation existed for only the specified crop. For HRS and HAD, a shaded appearance indicates the supply situation existed for both the specified crop and all wheat. A bold appearance indicates the supply situation existed only for all wheat. For malting barley, feed barley and oats, a shaded appearance indicates the supply situation existed for both the specified crop and corn. A bold appearance indicates the supply situation existed only for corn. For sunflowers, a shaded appearance indicates the supply situation existed for both sunflowers and soybeans.

Behavior of Indexes

The behavior of the indexes is described in this section by commodity. The baseline is MGE to-arrive cash prices during 1978-99 unless otherwise specified. The commodities include: hard red spring wheat, hard amber durum, corn, feed barley, malting barley, oats, soybeans and oil sunflowers. The indexes are presented in Appendix A, Tables 1-4, and Figures 1-50.

Hard Red Spring Wheat

Prices bottomed during August and peaked during May, on average (Figure 1). From harvest lows, the price increased 4.1 percent by November and 6.6 percent by May, on average. Prices were the least variable in December and the most variable in May.

During the 1990s, the price pattern remained the same but the prices were more variable (Figure 2). Also, the least amount of variability occurred in January instead of December, although December was the second lowest.

When new crop supplies were smaller than expected, prices peaked during June, on average (Figure 3). A pronounced increase occurred in the growing season during 1988 when both the all wheat and HRS wheat new crop supplies were smaller than expected. The increase was less pronounced in 1980 and decreased from the peak in 1997, when only HRS wheat new crop supplies were smaller than expected.

All wheat, but not HRS, new crop supplies were smaller than expected in 1989, 1991 and 1996. Prices peaked early in 1989. Prices strengthened during the last half of 1991 in anticipation of substantial exports to the former Soviet Union. Prices fell sharply from the peak in 1996 as the HRS crop turned-out better than expected.

When new crop supplies were larger than expected, prices peaked by April and generally bottomed during harvest (Figure 4). Prices continued falling into November-December in 1990 when large new crop supplies existed for HRS, all wheat and world wheat.

At Minot, similar price patterns were exhibited (Figures 5-7) for comparable years. In contrast, the behavior of the futures contract (Figures 8-11) was markedly different.

For the September futures contract, a modest seasonal pattern was revealed, on average, although the pattern peaked during the same month of May. In addition, price variability was about the opposite for the futures, being low in March and high in August. Similar price patterns prevailed for the smaller and larger crops.

Hard Amber Durum

The seasonal pattern for terminal quality HAD prices (Figure 12) resembles the pattern for HRS, on average, but with less variation among months. The greatest price variability occurred in July.

When new crop supplies were smaller than expected, prices peaked in July, on average (Figure 13). They generally remained strong into November.

When new crop supplies were larger than expected, the seasonal price pattern for HAD (Figure 14) was similar to HRS. Both reflected a small post harvest recovery in prices, on average.

At Minot, the average price patterns for milling and terminal (Figures 15 and 16) were similar to one for the MGE. The variability was greater at Minot but that could be due in part to the difference in price periods.

Corn

The seasonal price patterns for corn were the most pronounced of the commodities. Prices peaked in June and bottomed in October, on average (Figure 17). The smallest price variability occurred in February, the greatest in July. The price pattern and variability were similar during the 1990s (Figure 18).

When new crop supplies were smaller than expected, price peaks were established during July in 1988, August in 1983 and December in 1993 (Figure 19). On average, prices strengthened into July and remained strong until the end of the year.

When new crop supplies were larger than expected, prices peaked, on average, by June (Figure 20). Prices fell by 21.9 percent, on average, between June and October.

For the December futures contract (Figure 21), the average price pattern varied little throughout the year. Price variability was at a low in May and at a high in November. The situation was similar during the 1990s (Figure 22). For smaller-than-expected supply years (Figure 23), the price, on average, increased into July and remained strong during the balance of the year. For larger-than-expected supply years (Figure 24), the price remained strong into June before collapsing.

Feed Barley

Prices bottomed in August and peaked in November and May, on average (Figure 25). The pattern was similar during the 1990s (Figure 26).

When new crop supplies were smaller than expected, prices were also the highest in November, on average (Figure 27). Prices bottomed in August and remained low, on average, when new crop supplies were larger than expected (Figure 28).

Prices in 1979 appear contraseasonal (Figure 28). However, new crop supplies were larger than expected for corn, not for feed barley.

The seasonal price pattern at Minot (Figure 29) was similar to the MGE pattern for comparable years. The Minot pattern did have a more pronounced August low.

Malting Barley

The seasonal price patterns for malting barley (Figures 30-34) were similar to those for feed barley, on average.

When new crop supplies were smaller than expected for barley only, prices rose sharply between May and August in 1988, according to Figure 32. They almost doubled.

In contrast, prices generally fell sharply between May and August, according to Figure 33, when new crop supplies were larger than expected. They fell 16.8 percent, on average.

Oats

The highest price for oats occurred in December, on average, over the 1978-1999 period (Figure 35) and during May (Figure 36) during the 1990s. The anticipation of a very small crop led to a price peak in June during 1988 (Figure 37). Prices decreased into August when supplies were larger than expected (Figure 38). The price pattern at Minot was similar to the one at the MGE for comparable periods (Figure 39).

Soybeans

Prices were the lowest in October and the highest in May, on average, for soybeans (Figure 40). The price pattern was similar during the 1990s (Figure 41).

During smaller-than-expected new crop supply years (Figure 42), prices peaked in various months of the year. On average, they peaked in August and remained high through November.

During years with larger-than-expected new crop supplies, prices fell by 18.2 percent, on average, between June and October (Figure 43). On average, the price in March was almost as high as in June.

As for the other futures prices, the price pattern was modest for November soybean futures, on average (Figures 44). The situation was the same for the 1990s (Figure 45). Cash and futures prices had similar patterns for smaller and larger-than-expected new crop supply years (Figures 46-47).

Oil Sunflowers

Oil sunflower prices reached a peak in May, on average, during 1986-1999 (Figure 48) and during July, on average, when new crop supplies were smaller than expected (Figure 49). Prices weakened during most of 1989 when the smaller-than-expected new crop supplies prevailed only for sunflowers. During years with larger-than-expected new crop supplies (Figure 50), prices also reached a peak in May, on average, but then fell sharply into August, on average.

Implications for Marketing Plans

Seasonal price indexes have implications for marketing plans. In this section, examples illustrate how to make practical use of seasonal price indexes.

Price Forecasting

Seasonal indexes can be used to calculate a price forecast. The forecast can be based on a projected seasonal average price or on the current monthly price.

Prices can be forecast for each month of the marketing year by multiplying the projected seasonal average price by the appropriate index for each month. Given a projected seasonal average HRS wheat price of $3.10 and normal supply and demand conditions, price projections would be based on the indexes presented in Figure 1. Price projections would be $2.99 in August, $3.02 in September, $3.09 in October and so on. Combining this information with storage costs permits the producer to make an informed decision about the best time to plan sales.

Suppose that a forecast is desired based on the current monthly price. The forecast price is the current monthly price times the ratio of the forecast month's index to current month's index. For example, suppose the HRS wheat price in August is \$3.00 and a forecast for November is desired. The equation is:

$$\text{This month's price} \times \frac{\text{Index in forecast month}}{\text{Current month's index}} = \text{Forecast price}$$

$$\$3.00 \times \frac{100.6}{96.5} = \$3.13$$

The November index was taken from Figure 1 to derive the forecast price of \$3.13, under the assumption that normal supply and demand conditions will materialize. If large wheat crops are being produced around the world, then the larger-than-expected new crop supply price index might be used.

Using the Moving Average Index

The moving average index for HRS wheat in Figure 1 indicates that the price recovers rapidly from harvest and reaches a fall high, on average, during November. The producer could make plans early in the calendar year to have two-thirds of actual production sold by that time, keeping in mind that the seasonal change in price between harvest and November must be at least as great as storage costs to justify storage.

The moving average seasonal price pattern was selected for this decision because growing conditions were unknown. During the growing season the producer may decide that a different seasonal price pattern is more appropriate for the decision.

Using the Annual Average Index

Suppose that as of mid-June it appears that dry growing conditions will reduce U.S. wheat production, carryover supplies are relatively low, and current prices are relatively high. The producer needs to update the marketing plan.

The price indexes for HRS wheat in Figure 3 (smaller-than-expected new crop supplies) indicates that the price is the highest, on average, during June. The producer may make plans to sell one-half of anticipated production during June and to sell the balance off the combine. Such a decision would be supported by the price index in Figure 10, which depicts the movement of the September futures price when new crop supplies are smaller than expected.

Consider a situation where carryover supplies are plentiful, and in mid-June it becomes apparent that a very large wheat crop is being produced. The producer should consider selling a substantial amount of anticipated production immediately according to Figure 4 (larger-than-expected new crop supplies). Should the producer sell the balance of the crop off the combine or wait for the price improvement in the fall that the moving average seasonal price index suggests is likely, on average? Figure 4 needs to be studied along with the information and methods in EC-1011.

If large wheat crops are being produced worldwide as in 1990, the producer should probably consider selling the balance off the combine. If government programs are being used aggressively to export wheat as in 1992, storage should be considered if futures prices, basis and storage costs support the decision.

References

Campbell, Gerald, *Primer on Agricultural Options*, Fact Sheet No. 1, NCR Publication No. 217.

Ferris, John, *Developing Marketing Strategies and Keeping Records on Corn, Soybeans and Wheat*, Fact Sheet No. 4, NCR Publication No. 217, December 1985.

Ferris, John, *Using Seasonal Cash Price Patterns for Selling Decisions on Corn, Soybeans and Wheat*, Fact Sheet No. 3, NCR Publication No. 217.

Flaskerud, George, *Basis For Selected North Dakota Crops*, North Dakota State University Extension Service Publication EC-1011, March 1991.

Good, Darrel, *Deferred Pricing Alternatives for Grain*, Fact Sheet No. 2, NCR Publication No. 217.

King, Robert P., Paul L. Fackler and Patti A. Held, *Options*, Microcomputer Program, University of Minnesota Extension Publication AG-CS-3003-S, 1991.

McDonald, Hugh, *The Minimum Price Contract - A New Marketing Alternative*, Fact Sheet No. 9, NCR Publication No. 217.

O'Connor, Carl and Kim Anderson, "Understanding Basis," *Business Management in Agriculture: Volume III*, Joint Project of the Cooperative Extension Service, Farm Credit Services and Chicago Mercantile Exchange, 1989.

Purcell, Wayne D. *Agricultural Marketing: Systems, Coordination, Cash and Futures Prices*, Reston Publishing Company, Reston, Virginia, 1979.

Reff, Tom, *Determining Grain Storage Costs*, North Dakota State University Extension Service Publication EC-801, July 1983.

Satrom, John P., Alfred K. Chan, and William W. Wilson, *Commercial and Producer Applications Using Options on Grain Futures*, Agricultural Economics Report No. 200, Department of Agricultural Economics, North Dakota State University, Fargo, N.D., May 1985.

Shane, Richard, *Feed Grain Buying Alternatives*, Fact Sheet No. 15, NCR Publication No. 217, February 1992.

Appendix A

Table A.1. Seasonal price and variability indexes based on the moving average, 1978-1999 to-arrive prices.

Commodity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hard Red Spring Wheat												
Price index	99.5	99.3	99.7	102.1	103.1	102.3	99.7	96.5	97.4	99.7	100.6	100.1
Variability index	8.5	10.7	11.4	13.7	15.4	14.6	13.6	11.5	11.5	10.2	10.4	8.4
Hard Amber Durum												
Price index	101.5	101.9	100.5	99.5	101.3	99.1	97.0	96.5	99.2	101.4	101.4	100.6
Variability index	14.5	17.1	15.7	16.7	16.9	15.4	20.1	19.5	16.3	14.2	11.9	10.8
Corn												
Price index	95.7	97.8	103.1	106.5	108.2	108.6	104.1	98.5	94.4	93.1	95.4	94.6
Variability index	11.9	9.7	12.0	12.1	17.6	17.0	18.4	16.7	15.5	14.2	13.7	11.7
Feed Barley												
Price index	99.4	100.2	101.1	103.1	104.2	102.3	98.1	96.1	97.2	99.7	101.3	97.3
Variability index	11.6	11.8	9.1	12.2	16.3	20.4	15.3	12.0	13.4	14.7	18.6	13.6
Malting Barley												
Price index	99.4	99.5	99.6	102.5	103.2	102.1	97.4	95.3	98.0	100.9	102.6	99.7
Variability index	8.3	11.4	17.1	19.7	18.0	16.8	16.2	17.3	16.8	14.4	9.0	8.6
Oats												
Price index	101.5	99.9	100.1	99.9	101.9	101.3	99.0	95.5	97.7	99.0	101.6	102.7
Variability index	12.4	13.9	15.7	16.7	16.0	18.2	18.6	15.9	11.9	10.7	14.4	13.5
Soybeans												
Price index	97.8	97.8	100.6	102.4	104.4	104.0	102.5	99.3	98.5	96.2	98.8	97.8
Variability index	6.6	6.1	9.8	10.9	14.0	16.0	11.3	15.4	16.3	11.7	12.4	7.3
Sunflower Oil Type												
Price index	99.4	98.3	100.5	103.9	107.5	106.8	103.4	99.3	96.8	93.3	94.2	96.6
Variability index	14.0	12.3	13.9	14.2	15.6	15.7	18.9	16.9	13.2	8.8	8.6	

Table A.2. Seasonal price indexes for hard red spring wheat September futures on the MGE, select years, based on the annual average.

		Smaller-than-Expected Supply							Larger-than-Expected Supply				
Month	1978-99 Avg.	1980	1988	1989	1991	1996	1997	Avg.	1982	1990	1992	1998	Avg.
Jan	99.4	101.1	87.3	99.6	97.2	89.3	91.3	94.3	103.4	108.9	103.4	105.9	105.4
Feb	99.6	102.9	88.9	100.6	99.1	92.4	93.4	96.2	104.7	107.3	111.0	107.3	107.6
Mar	99.1	98.5	86.9	102.4	104.1	93.9	100.2	97.7	101.8	105.3	105.2	107.1	104.9
Apr	100.2	93.6	90.4	100.8	105.3	111.0	111.0	102.0	102.5	104.7	98.8	101.8	102.0
May	101.2	97.6	93.5	102.9	102.2	121.6	106.1	104.0	98.8	104.0	101.2	100.2	101.1
Jun	101.1	97.6	120.0	98.7	99.1	109.0	98.1	103.8	96.1	98.9	101.0	96.6	98.2
Jul	100.3	105.6	117.4	98.5	94.2	98.7	96.2	101.8	97.2	89.5	93.0	92.7	93.1
Aug	99.2	103.0	115.6	96.5	98.7	94.7	103.7	102.0	95.4	81.4	86.2	88.3	87.8

Table A.3. Seasonal price indexes for corn December futures on the CBOT, select years, based on the annual average.

		Smaller-than-Expected Supply				Larger-than-Expected Supply					
Month	1978-99 Avg.	1983	1988	1993	Avg.	1979	1982	1985	1992	1994	Avg.
Jan	101.1	89.8	80.1	99.1	89.7	91.6	111.0	108.2	108.5	111.2	106.1
Feb	101.8	91.9	82.7	97.8	90.8	94.3	113.3	107.6	111.2	110.8	107.4
Mar	102.2	94.3	83.5	99.1	92.3	94.3	109.0	106.3	110.0	108.6	105.6
Apr	102.4	96.5	85.9	99.6	94.0	96.8	112.1	107.6	104.3	105.3	105.2
May	101.8	92.9	88.2	97.4	92.8	99.1	107.3	105.1	107.1	104.2	104.6
Jun	102.4	88.8	117.3	94.5	100.2	108.4	103.8	102.8	108.3	106.1	105.9
Jul	100.3	96.4	123.3	101.7	107.1	112.9	98.4	97.1	97.1	92.6	99.6
Aug	97.7	113.3	113.9	99.4	108.9	102.5	89.6	90.1	90.8	91.8	93.0
Sep	96.5	114.1	111.9	98.1	108.0	101.3	84.6	88.8	89.7	91.0	91.1
Oct	96.7	110.7	110.2	101.5	107.5	101.2	83.0	90.2	85.9	89.2	89.9
Nov	97.2	111.3	102.9	111.8	108.7	97.7	87.9	96.2	87.1	89.1	91.6

Table A.4. Seasonal price indexes for soybean November futures on the CBOT, select years, based on the annual average.

		Smaller-than-Expected Supply						Larger-than-Expected Supply				
Month	1978-99 Avg.	1980	1983	1984	1988	1993	Avg.	1979	1985	1992	1994	Avg.
Jan	100.9	104.4	99.9	94.1	96.1	101.2	99.1	97.3	101.3	100.2	101.6	100.1
Feb	100.6	103.7	100.0	95.0	92.7	97.9	97.9	99.1	102.1	101.9	102.7	101.5
Mar	101.0	97.0	96.3	101.5	89.8	98.1	96.5	99.7	103.2	104.6	104.5	103.0
Apr	101.4	89.7	97.0	104.0	91.9	97.6	96.0	98.4	106.7	101.6	100.7	101.9
May	101.6	88.9	91.4	107.1	98.2	97.0	96.5	100.7	102.9	105.4	104.4	103.4
Jun	101.2	90.1	87.1	106.2	120.6	96.9	100.2	109.0	100.1	106.7	107.2	105.8
Jul	99.2	103.9	95.7	94.1	113.2	113.2	104.0	105.5	98.4	97.8	94.6	99.1
Aug	98.1	104.0	119.0	95.1	110.0	106.5	106.9	99.2	93.1	93.0	94.2	94.9
Sep	98.8	109.9	122.3	93.0	108.1	100.3	106.7	98.9	93.9	93.9	94.6	95.3
Oct	97.2	110.1	113.4	95.3	99.3	96.1	102.8	93.6	94.1	92.4	91.5	92.9

HARD RED SPRING WHEAT, 14% PROTEIN
MPLS TO-ARRIVE CASH, 1978-1999

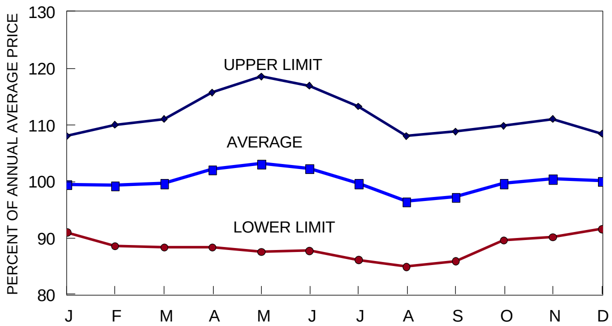


Figure 1.

HARD RED SPRING WHEAT, 14% PROTEIN
MPLS TO-ARRIVE CASH, 1990-1999

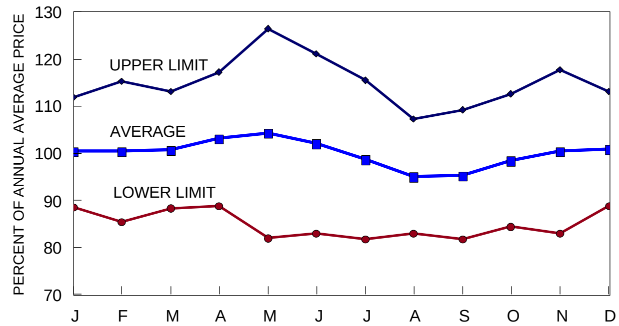


Figure 2.

HARD RED SPRING WHEAT, 14% PROTEIN
MPLS TO-ARRIVE CASH, 1978-1999
SMALLER THAN EXPECTED NEW CROP SUPPLY

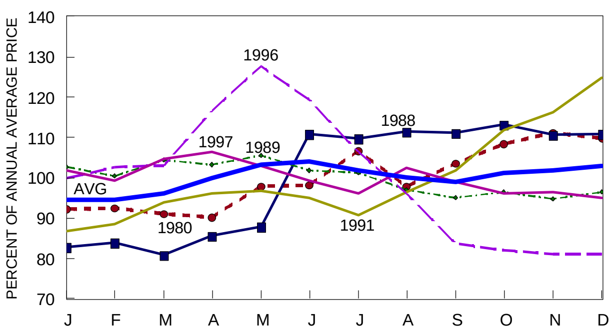


Figure 3.

HARD RED SPRING WHEAT, 14% PROTEIN
MPLS TO-ARRIVE CASH, 1978-1999
LARGER THAN EXPECTED NEW CROP SUPPLY

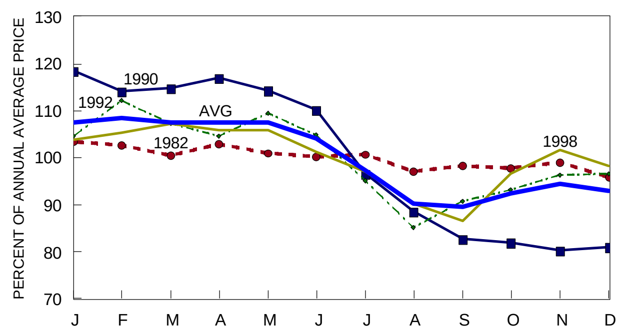


Figure 4.

HARD RED SPRING WHEAT, 14% PROTEIN
MINOT, 1989-1999

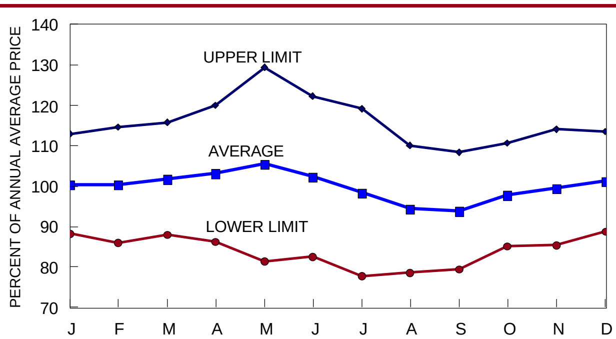


Figure 5.

HARD RED SPRING WHEAT, 14% PROTEIN
MINOT, 1989-1999
SMALLER THAN EXPECTED NEW CROP SUPPLY

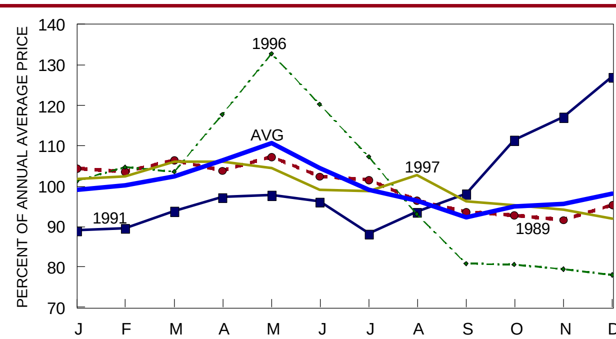


Figure 6.

HARD RED SPRING WHEAT, 14% PROTEIN
MINOT, 1989-1999
LARGER THAN EXPECTED NEW CROP SUPPLY

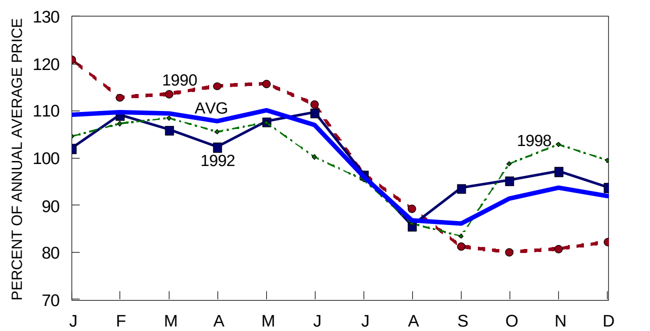


Figure 7.

HARD RED SPRING WHEAT
SEPTEMBER FUTURES MGE, 1978-1999

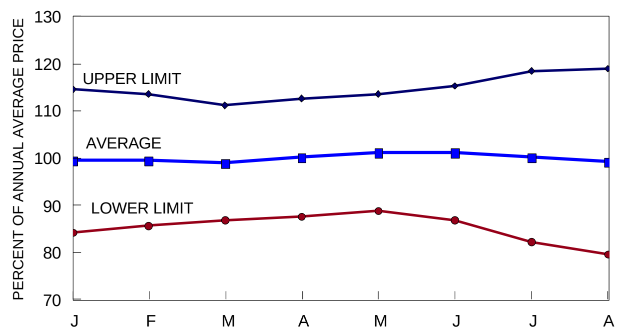


Figure 8.

HARD RED SPRING WHEAT
SEPTEMBER FUTURES MGE, 1990-1999

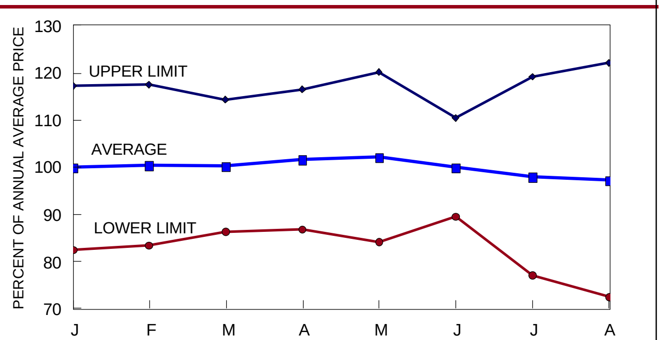


Figure 9.

HARD RED SPRING WHEAT
SEPTEMBER FUTURES MGE, 1978-1999
SMALLER THAN EXPECTED NEW CROP SUPPLY

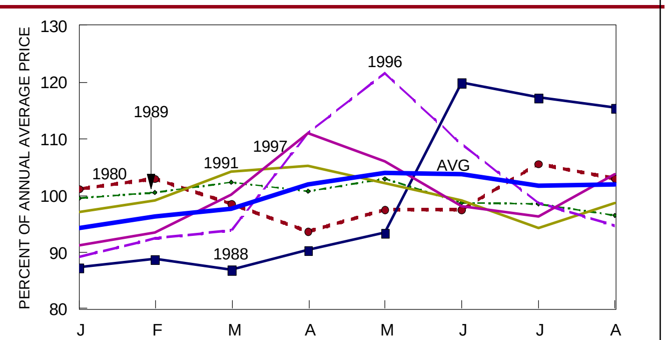


Figure 10.

HARD RED SPRING WHEAT
SEPTEMBER FUTURES MGE, 1978-1999
LARGER THAN EXPECTED NEW CROP SUPPLY

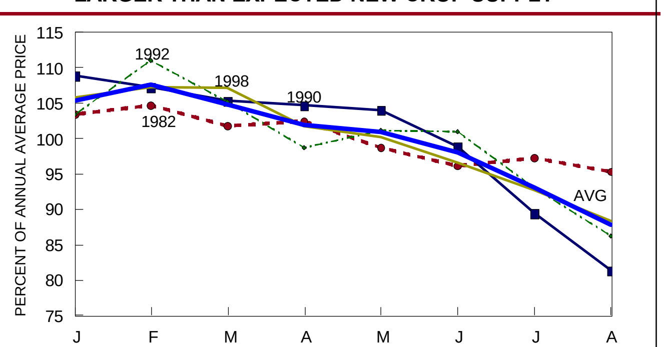


Figure 11.

HARD AMBER DURUM
MPLS TO-ARRIVE CASH, 1978-MAY 1996

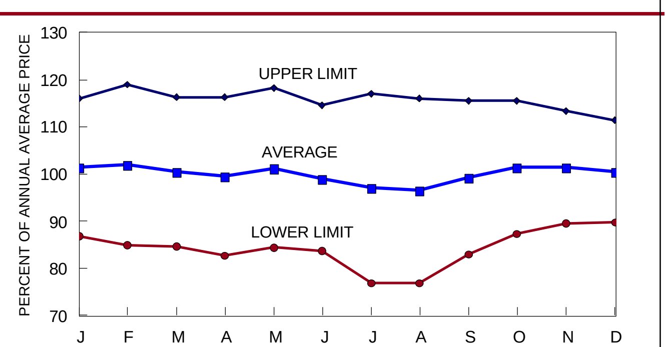


Figure 12.

HARD AMBER DURUM
MPLS TO-ARRIVE CASH, 1978-MAY 1996
SMALLER THAN EXPECTED NEW CROP SUPPLY

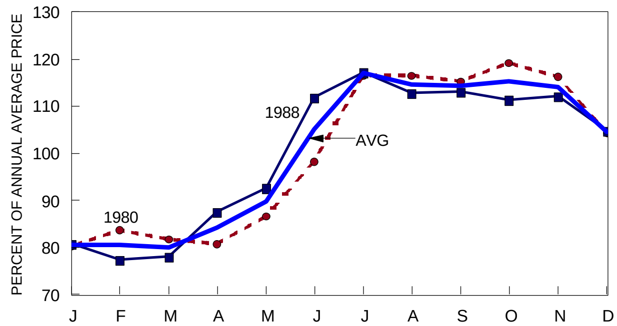


Figure 13.

HARD AMBER DURUM
MPLS TO-ARRIVE CASH, 1978-MAY 1996
LARGER THAN EXPECTED NEW CROP SUPPLY

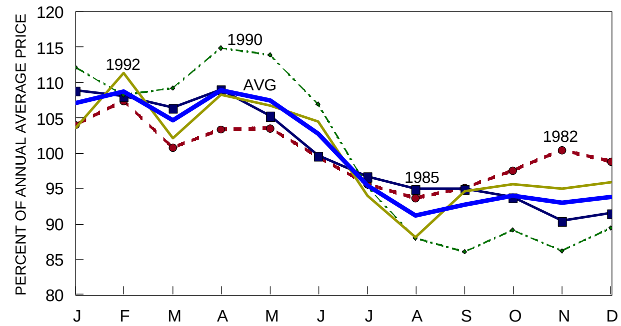


Figure 14.

HARD AMBER DURUM
MINOT MILLING, 1989-1999

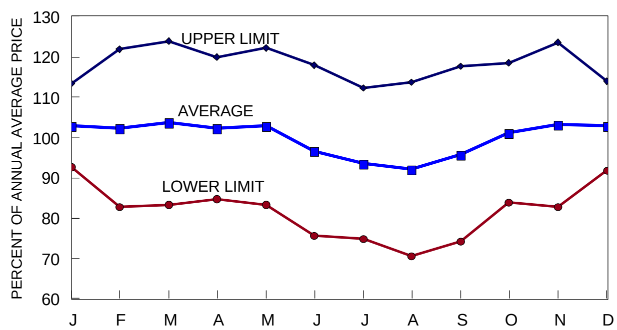


Figure 15.

HARD AMBER DURUM
MINOT TERMINAL, 1989-1999

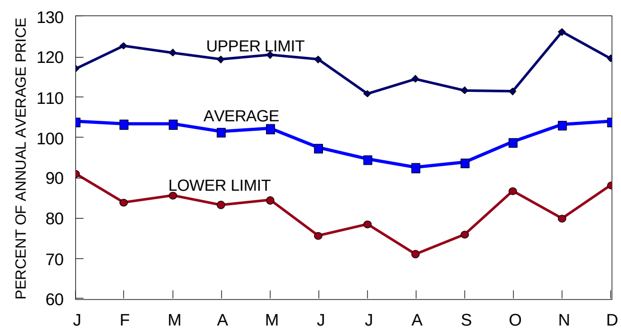


Figure 16.

CORN
MPLS TO-ARRIVE CASH, 1978-1999

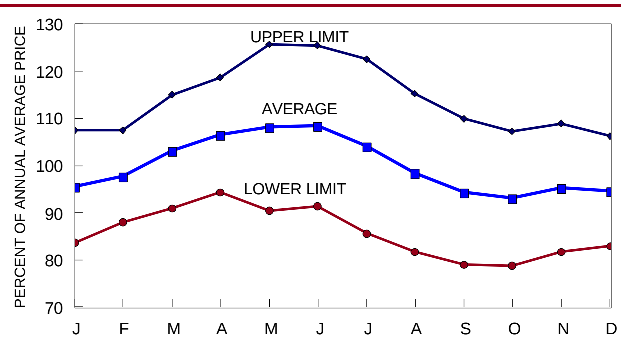


Figure 17.

CORN
MPLS TO-ARRIVE CASH, 1990-1999

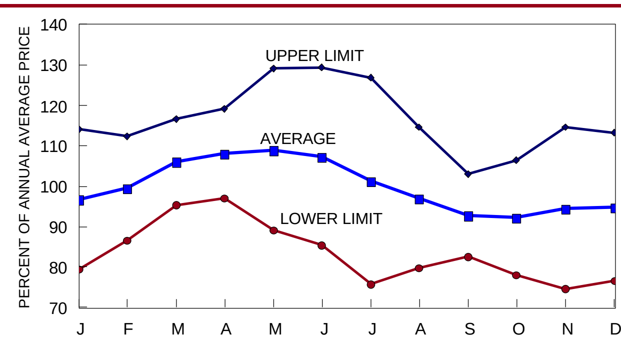


Figure 18.

CORN
MPLS TO-ARRIVE CASH, 1978-1999
SMALLER THAN EXPECTED NEW CROP SUPPLY

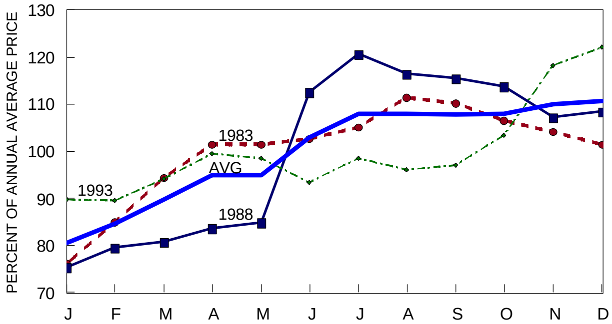


Figure 19.

CORN
MPLS TO-ARRIVE CASH, 1978-1999
LARGER THAN EXPECTED NEW CROP SUPPLY

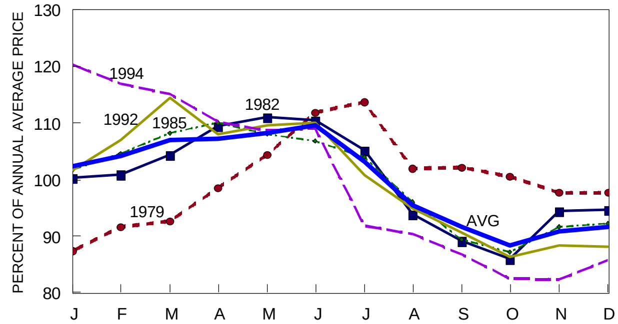


Figure 20.

CORN
DECEMBER FUTURES CBOT, 1978-1999

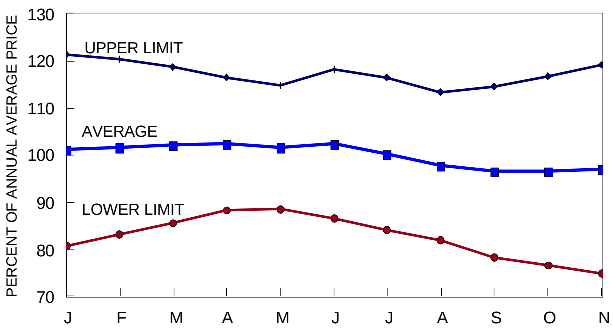


Figure 21.

CORN
DECEMBER FUTURES CBOT, 1990-1999

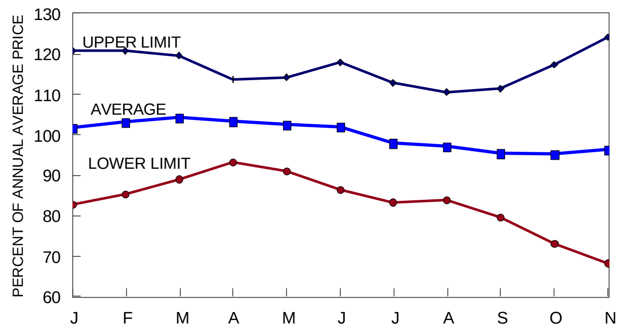


Figure 22.

CORN
DECEMBER FUTURES CBOT, 1978-1999
SMALLER THAN EXPECTED NEW CROP SUPPLY

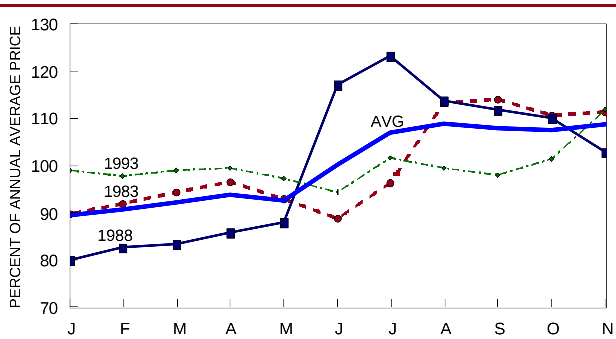


Figure 23.

CORN
DECEMBER FUTURES CBOT, 1978-1999
LARGER THAN EXPECTED NEW CROP SUPPLY

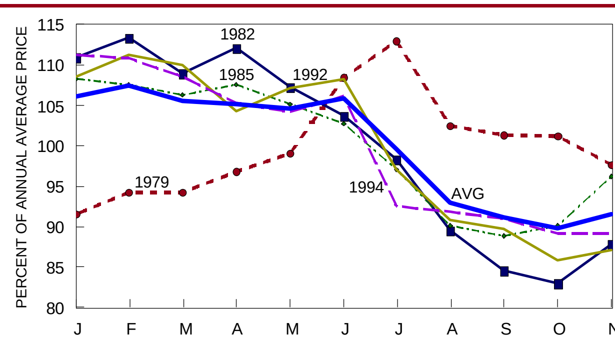


Figure 24.

FEED BARLEY
MPLS TO-ARRIVE CASH, 1978-1999

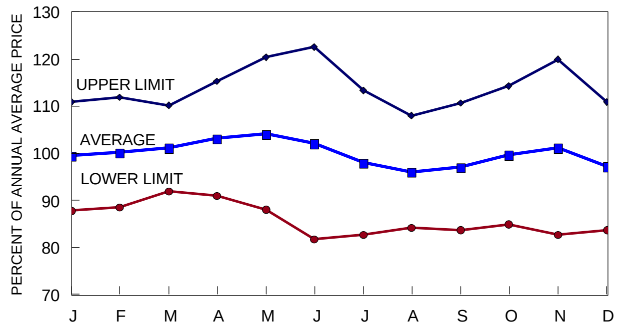


Figure 25.

FEED BARLEY
MPLS TO-ARRIVE CASH, 1990-1999

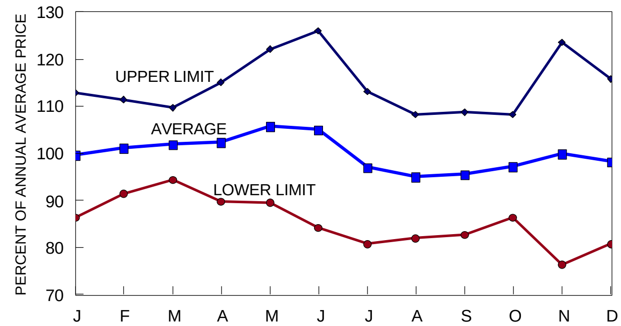


Figure 26.

FEED BARLEY
MPLS TO-ARRIVE CASH, 1978-1999
SMALLER THAN EXPECTED NEW CROP SUPPLY

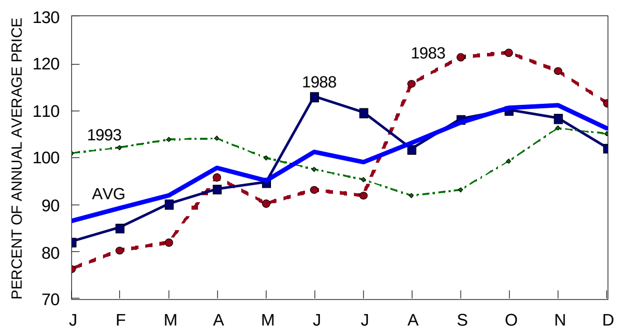


Figure 27.

FEED BARLEY
MPLS TO-ARRIVE CASH, 1978-1999
LARGER THAN EXPECTED NEW CROP SUPPLY

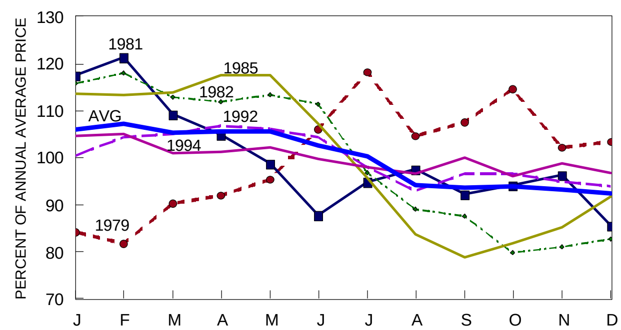


Figure 28.

FEED BARLEY
MINOT, 1989-1999

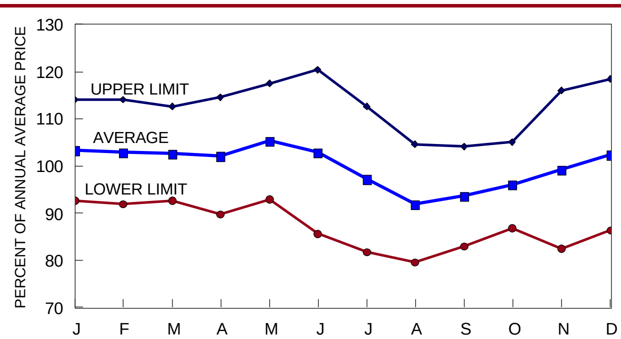


Figure 29.

MALTING BARLEY
MPLS TO-ARRIVE CASH, 1978-1999

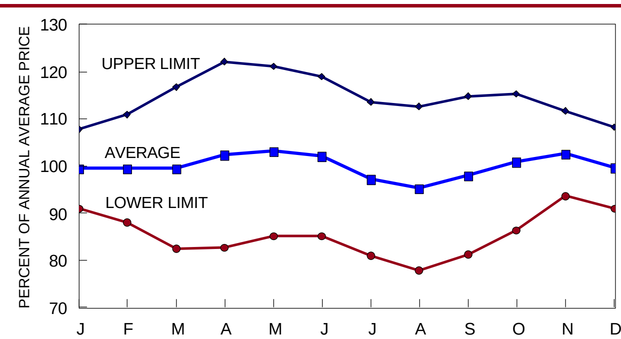


Figure 30.

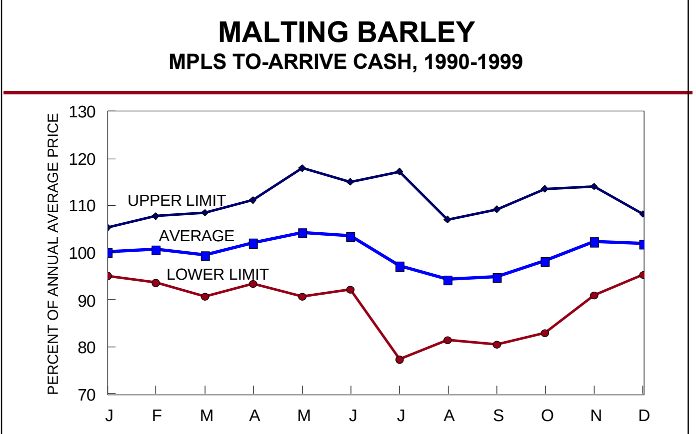


Figure 31.

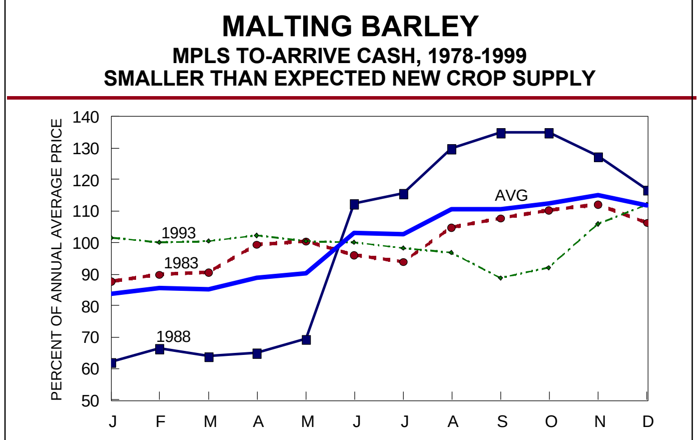


Figure 32.

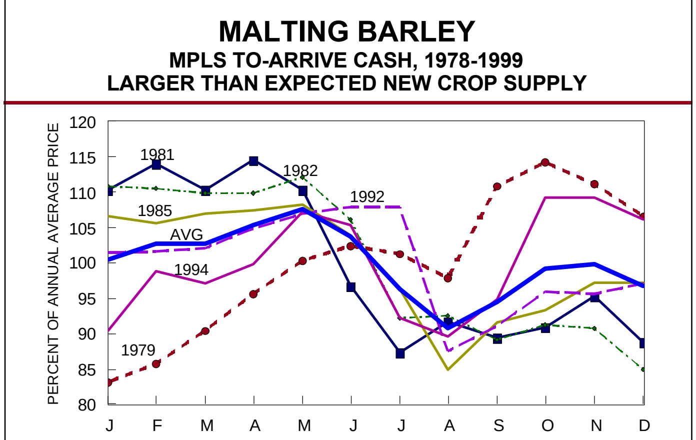


Figure 33.

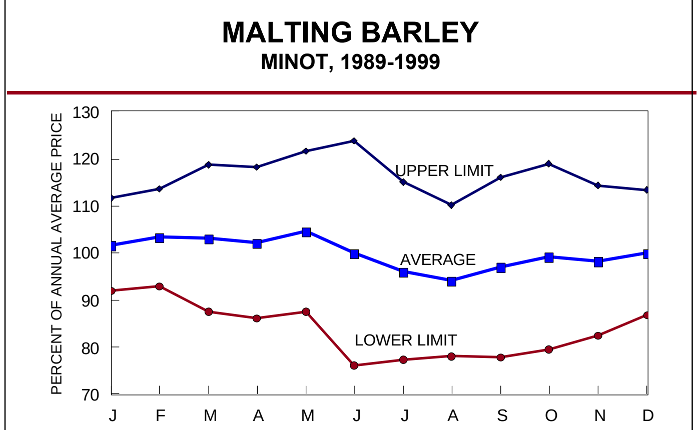


Figure 34.

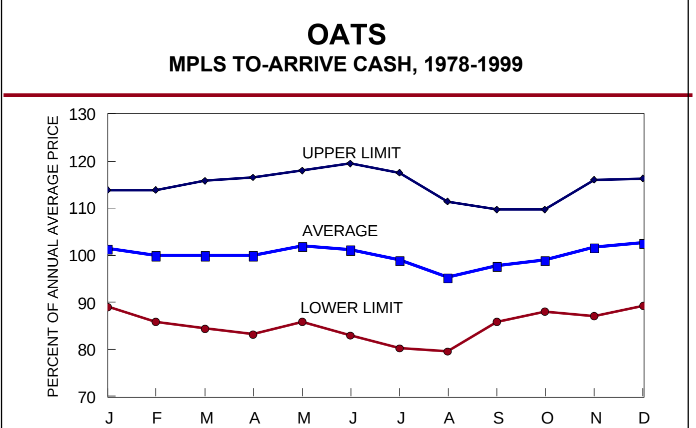
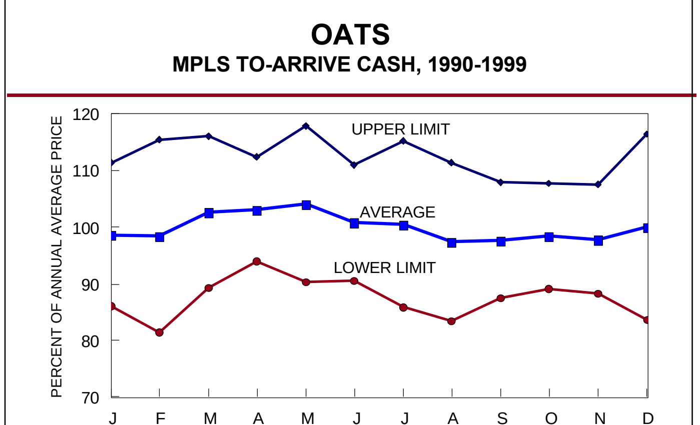


Figure 35.



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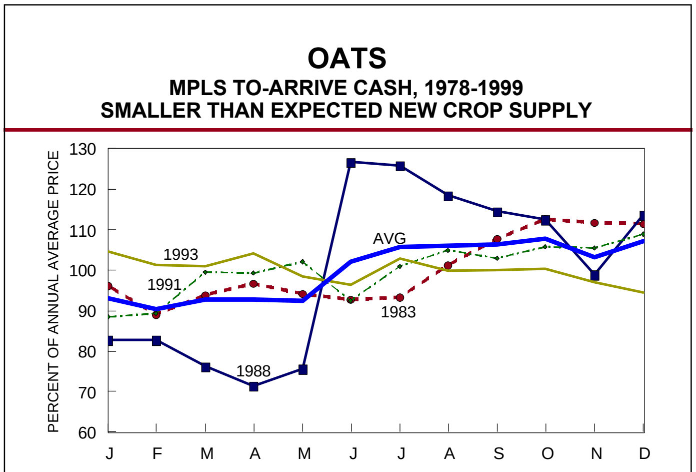

Figure 37.

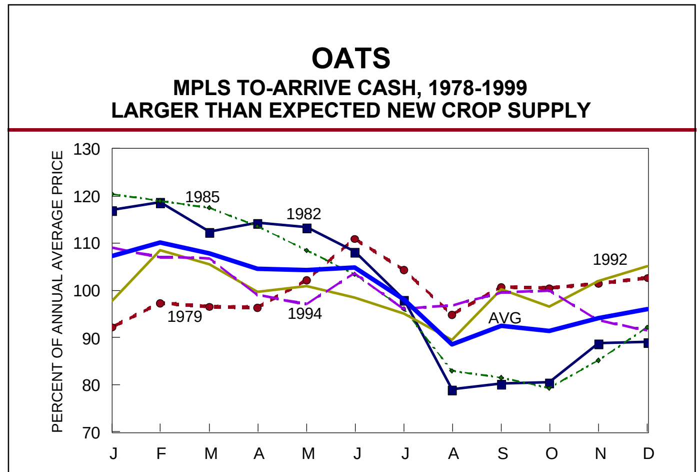

Figure 38.

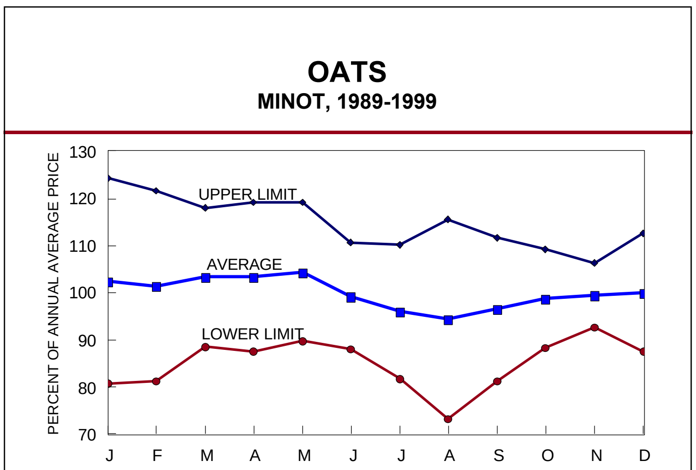

Figure 39.

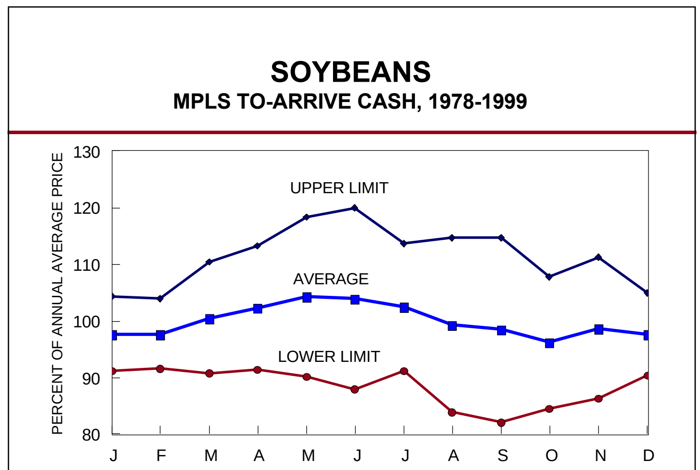

Figure 40.

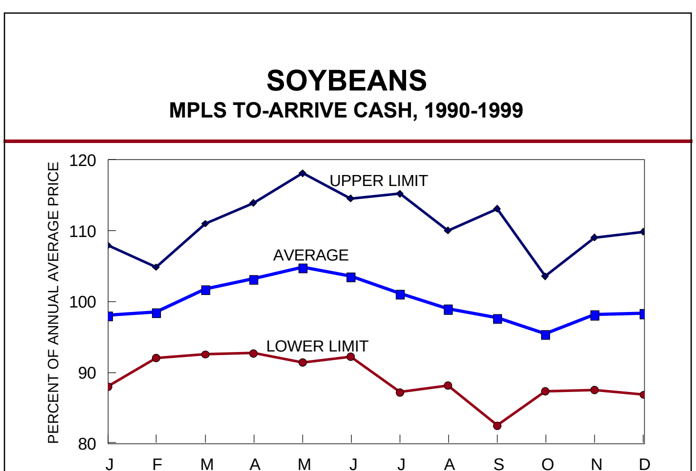

Figure 41.

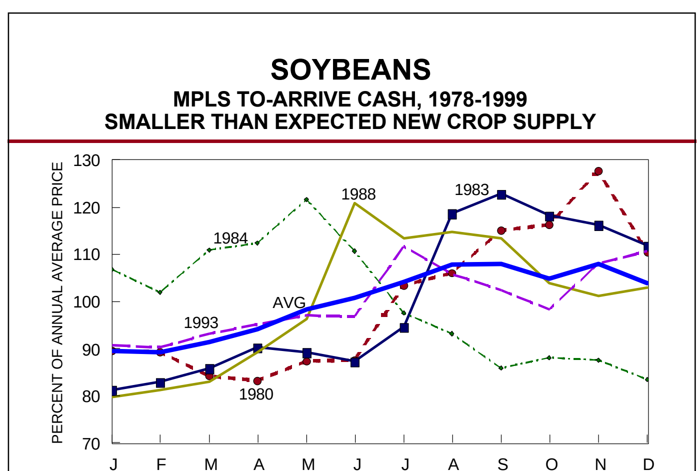

Figure 42.

SOYBEANS
MPLS TO-ARRIVE CASH, 1978-1999
LARGER THAN EXPECTED NEW CROP SUPPLY

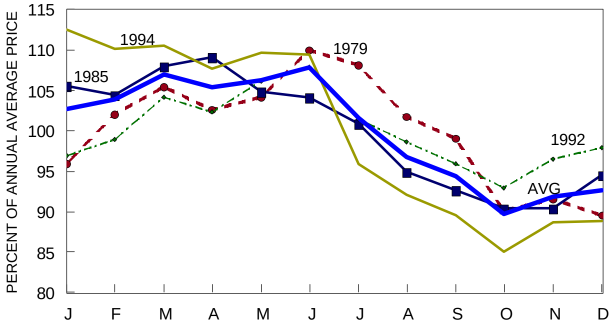

Figure 43.

SOYBEANS
NOVEMBER FUTURES CBOT, 1978-1999

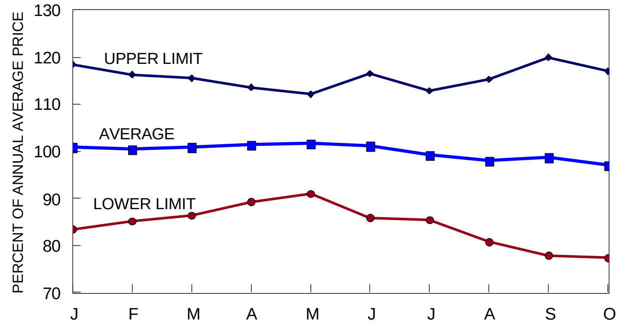

Figure 44.

SOYBEANS
NOVEMBER FUTURES CBOT, 1990-1999

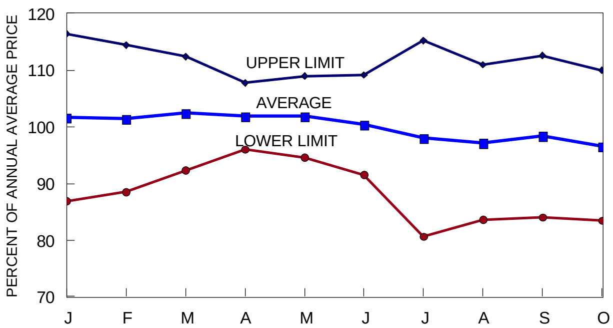

Figure 45.

SOYBEANS
NOVEMBER FUTURES CBOT, 1978-1999
SMALLER THAN EXPECTED NEW CROP SUPPLY

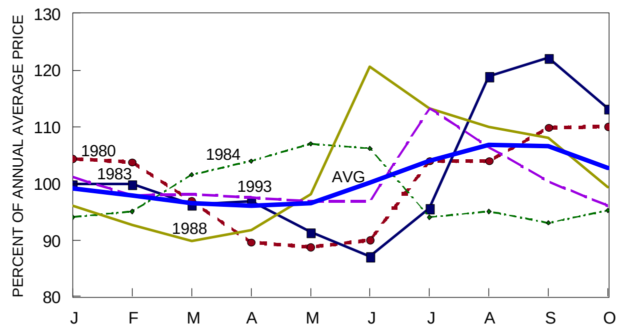

Figure 46.

SOYBEANS
NOVEMBER FUTURES CBOT, 1978-1999
LARGER THAN EXPECTED NEW CROP SUPPLY

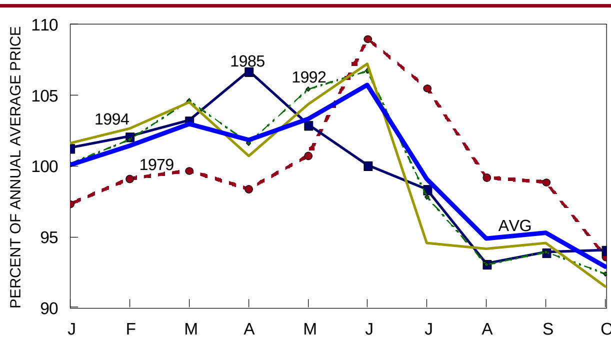

Figure 47.

SUNFLOWERS, 40% OIL
ENDERLIN, 1986-1999

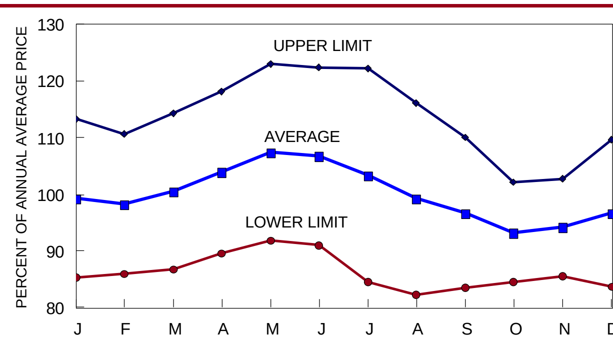

Figure 48.

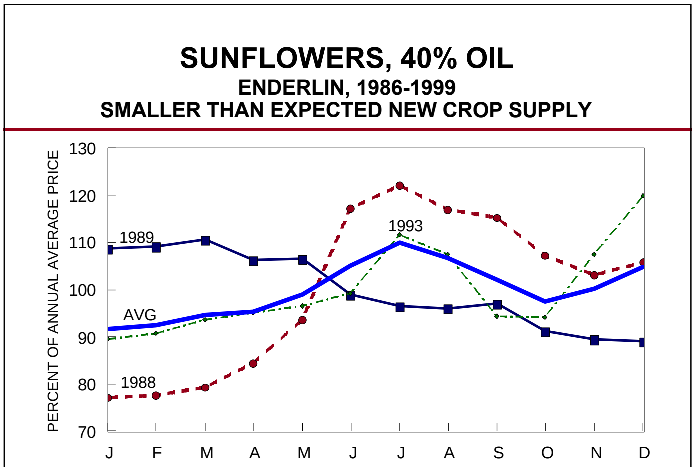

Figure 49.

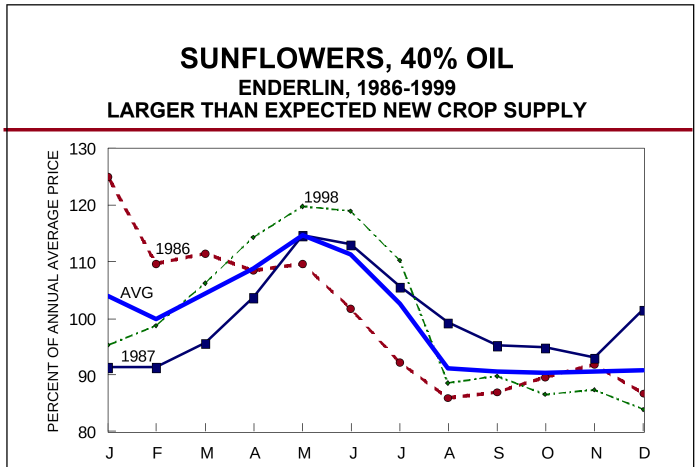

Figure 50.

This publication was partially produced with support from

the North Dakota Grain Growers Association and

the Farm Credit Services Associations in North Dakota

headquartered in Fargo, Mandan, Minot and Grand Forks.

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