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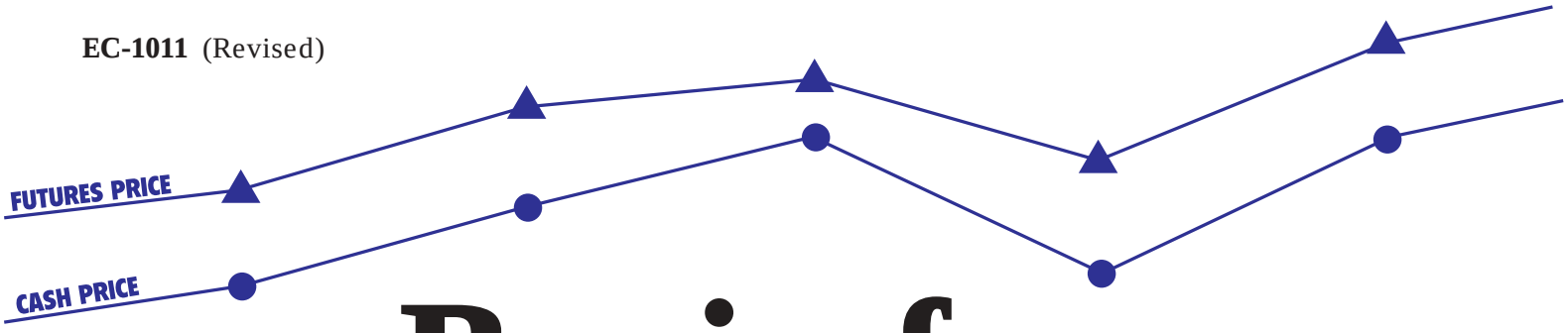

Basis for Selected North Dakota Crops

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A knowledge of the basis is important to good marketing.

It can enable a farmer to make more profitable cash sales and to make better use of other marketing tools.

The basis can also be used along with the futures market to make farm level price projections.

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Definitions

Basis is the relationship between the local cash price and a futures contract price for a commodity. It is calculated as the cash price minus the futures price. In North Dakota, the basis is usually negative for most commodities, so it is described as being a number of cents under a particular futures contract price. If it is positive, it is described as being over the futures contract price.

The nearby basis is presented in this publication. It is derived by subtracting the nearby futures contract price from corresponding local cash prices. Prices from the nearby futures contract month are used until the last Thursday in the month before the futures contract month. After that Thursday, prices from the following futures contract month are used. Futures prices during the futures contract delivery month are not used since distortions between the futures and cash markets during that month can occur and work to the disadvantage of the hedger.

Suppose that the nearby basis is being calculated for wheat beginning in July. The September futures price is subtracted from the local cash price until the last Thursday in August. After that, the December futures price is subtracted from the local cash price until the last Thursday in November, and so on.

The calculated basis is summarized in this publication as monthly averages of the weekly basis values and the averages of the 1993-02 monthly averages excluding the lows and highs. The averages are presented in graphs.

Basis components

Observation of the basis graphs in this publication indicates that the basis varies throughout the year as well as from one year to the next. However, the variations within a year tend to follow a fairly predictable pattern, and annual deviations from the pattern are generally small relative to annual changes in cash grain prices. The pattern is reasonably predictable because of the carrying charge, arbitrage and transportation costs (Baldwin).

The carrying charge consists of storage costs (interest, shrink and insurance), handling costs and management costs. The charge exists because inventories must be stored from harvest until used. As time passes, storage costs should decrease and cash prices should increase relative to futures prices; in effect, the basis should strengthen.

Arbitragers make sure the cash price at delivery points and the futures price converge at the time the futures contract terminates by buying grain in the low priced market (cash or futures) to sell in the higher priced market. However, the cash price at delivery points will usually exceed the futures price when the futures contract terminates because of delivery charges and adjustments for quality.

The price relationships among delivery points and other locations such as terminal elevators, milling elevators, country elevators, feedlots and so on is important because most grain is not shipped to delivery points. Transportation costs determine these relationships among prices at various locations.

Transportation and other costs generally increase over time. So, it may be necessary to use a slightly weaker basis than presented in the basis graphs in this publication.

The basis may fluctuate from one day to the next or deviate from the pattern from one year to the next for reasons in addition to changes in costs. For example, the basis may be weak if demand is lacking and/or supply excessive. The amount of storage available in an area can have an impact on the basis, too. In general, anything impacting the flow of grain through the market system can have an effect on the basis.

■ Using the Basis in Farmer Marketing Decisions

The relationship between cash grain prices and futures prices is useful in many ways. Generally, the basis can be used as a guide in timing sales and in selecting appropriate marketing tools (O'Connor and Anderson).

Deriving an expected cash price

The basis can be used along with the futures market to derive an expected cash price. This is accomplished by subtracting a minus basis (adding a positive basis) for a particular time period from the nearby futures price. Several steps are involved.

First, select basis graphs representing the closest elevator. Then review the 10-year average basis and the individual year basis.

Next, select the month for which the estimate is being made. An estimate of the basis for that time period can be deduced by comparing the recent basis level and pattern to historic basis levels and patterns. The 10-year average may not be the most appropriate estimate of the basis. Subtract the estimated basis number from the nearby futures contract price. The result is an estimate of the cash price.

For example, determine the expected hard red spring wheat harvest price for Gladstone, N.D., when the Minneapolis September futures price is currently $3.52. An estimate of the basis for August might be a minus $0.52, which would yield an estimate of the cash price of $3.00 ($3.52 minus $0.52).

Evaluating a cash forward contract

The cash forward contract is the most frequently used marketing tool for locking in a price prior to harvest. One way of evaluating the contract price is to compare it to the expected cash price.

Suppose the wheat cash forward contract price is $2.95 for harvest delivery at Gladstone when the Minneapolis September futures price is $3.52. The contract price is $0.05 below the expected cash price ($3.00) in the above example.

The difference in these prices is most likely due to the uncertainty of the basis. A farmer may choose to speculate that the basis will be better than the contract price reflects. But, that requires the use of a different marketing tool such as the cash sales, futures hedge or put option.

Establishing a hedge price

Hedging in the futures market locks in the futures price but not the basis. Compared to cash forward contracting, hedging would be more profitable if the basis is stronger at the time the hedge is completed than reflected in the forward contract price or less profitable if the basis is weaker.

The expected hedge price is equal to the expected cash price (futures price minus the expected basis when the basis is negative) less brokerage fees and interest cost on the margin money that must be paid to the brokerage firm on the futures hedge. The total fees and interest cost are usually about $0.02 per bushel for wheat. Thus, the expected hedge price in the example being used would be $2.98 ($3.52 less $0.52 and $0.02).

Suppose the basis improves so that in August it is minus $0.42 instead of minus $0.52. Subtracting the 42 cents basis and 2 cents hedge cost from the $3.52 futures price yields a hedge price of $3.08. This price would be $0.13 better than the cash forward contract price of $2.95 and $0.10 better than the expected hedge price of $2.98 because of the better-than-expected basis.

Basis contracts

There may be times when it is advantageous to fix a favorable basis but not the price (Good). This can be done at elevators offering a basis fixed contract.

In this contract, the basis is fixed relative to a specific futures month. The farmer then just watches the futures price. When a price objective is reached, the farmer can fix the futures price too through the elevator manager. At this point, the basis contract is equivalent to a cash forward contract.

Establishing minimum or maximum prices

Farmers have expressed a lot of interest in options because they are flexible and margin money is not required when buying an option (Campbell). An option is purchased for a premium. There are two general types of options. One is the “put” and the other is a “call.”

With a put option, a farmer has the right, but not the obligation, to sell a futures contract at a specific strike price and there is no delivery obligation. Conversely, a call option is the right to buy a futures contract at a specific strike price.

When a put option is purchased, the minimum selling price is the strike price less the expected minus basis, the premium, the brokerage fee and interest on the premium. When a call option is purchased, the maximum buying price is established by adding the premium and the cost of fees and interest to the strike price and then subtracting the expected minus basis.

Minimum price contracts are available through many elevators (McDonald). They are based on the options market and they offer about the same price flexibility as options. They differ from options in that a farmer has a delivery obligation and the basis is fixed.

Determining the profitability of storage

A knowledge of the basis is crucial when deciding whether to sell grain for delivery off the combine or to store until a later time. Furthermore, it is just as important for the cash marketer as for the hedger to have this knowledge of the basis.

Once the basis is known, the expected price can be derived from the futures price. There are only two additional steps needed to determine the profitability of storage once an expected price has been established. The first step is to determine the cumulative variable cost of storage per month.

If the grain is stored in the elevator, the variable cost of storage per month is the rate specified by the elevator plus an interest cost. The monthly interest cost is the current cash grain price times the interest rate per month.

If the grain is stored in existing on-farm bins, variable storage costs also need to be considered. The variable costs of existing on-farm storage can be divided into two categories.

The first category is comprised of costs primarily associated with the grain going into and out of storage. Many farmers feel they need at least $.05-$.10 per bushel to justify using existing on-farm storage for wheat to cover handling, handling shrink, repairs and utilities. The $.05-$0.10 charge would be specified as a cost during the first month of storage only. Once the grain is in the bin, this cost is not important to the storage decision since part of it has already occurred and the remainder will occur regardless of whether the grain is hauled out immediately or later.

The second category of variable costs includes a cost per month for interest on investment in the grain in storage and storage shrink, both are based on the current cash price. The cost for shrink is very small for properly designed storage facilities, approximately .05 percent per month for wheat, .1 percent per month for corn and .05 percent per month for soybeans.

Interest on investment, in this publication, was based on a bank loan annual interest rate of 7 percent. An alternative rate of interest would be applicable for those producers with no debt. It would be the potential rate of return from an investment of the proceeds of a grain sale.

The final step in determining the profitability of storage is to determine the month with the highest net expected price by subtracting the variable storage costs from the expected prices. The month with the highest net expected price is the month during which sales should be planned.

It must be emphasized that this procedure is only a tool for planning sales. If the differences (spreads) between futures prices change and/or expectations of the basis change, then the plan may also need to be changed.

An example of using basis to time sales is provided in **Table 1**. The example is for Hunter, N.D.

The graph of the Hunter wheat basis relative to the nearby Minneapolis futures was used to determine the basis in this example. For planning purposes, the 1991-00 average, excluding the low and high, was used.

In this example, the market is indicating that storage until March should be profitable. The highest net price occurred in March when it was 21 cents per bushel higher than at harvest.

In order to be sure of capturing the expected futures price for March delivery, however, it would be

Table 1. Using basis to time sales, August 2001.

Calendar Month	Nearby Futures Month	Nearby Mpls. Price	Hunter Nearby Basis	Hunter Expected Price	Storage Costs	Expected Net Price
		cents				
Aug	Sep	311	-26	285	0	285
Sep	Dec	325	-35	290	10.8	279
Oct	Dec	325	-30	295	12.6	283
Nov	Dec	325	-21	304	14.5	289
Dec	Mar	338	-19	319	16.4	303
Jan	Mar	338	-18	320	18.5	301
Feb	Mar	338	-22	316	20.5	295
Mar	May	346	-17	329	22.5	306
Apr	May	346	-18	328	24.6	304

necessary to establish a storage hedge by selling the May futures. The risk in a storage hedge is limited to the basis.

Current and potential protein premiums also need to be considered when making the decision to sell or store. There is not a way to secure protein premiums while the grain is being stored.

Storage is not always profitable, as the example in **Table 2** illustrates. In this example, the market is indicating that grain should not be stored but sold at harvest.

Table 2. Using basis to time sales, August 2002.

Calendar Month	Nearby Futures Month	Nearby Mpls Price	Hunter Nearby Basis	Hunter Expected Price	Storage Costs	Expected Net Price
		cents				
Aug	Sep	438	-26	412	0	412
Sep	Dec	433	-35	398	11.6	386
Oct	Dec	433	-30	403	14.1	389
Nov	Dec	433	-21	412	16.7	395
Dec	Mar	429	-19	410	19.3	391
Jan	Mar	429	-18	411	21.9	389
Feb	Mar	429	-22	407	24.5	382
Mar	May	416	-17	399	27.1	372
Apr	May	416	-18	398	29.6	369

■ Behavior of Basis in Selected North Dakota Locations

Bases were derived for hard red spring wheat in six North Dakota locations, corn and soybeans in one location, and oats in two locations **(Appendix A)**. Minneapolis and Portland terminal market bases were also calculated to help in the analysis of basis levels and patterns in North Dakota.

Derivation of the basis

The basis estimates in this publication were computed using weekly (Thursday or nearest day) cash and futures closing prices during the January 1993 through December 2002 period, except for the Williston wheat basis which was provided by Dale Naze, McKenzie County Extension Agent, using Friday prices.

Futures prices were taken from the Wall Street Journal. Cash prices were obtained for several commodities from various sources.

Cash prices were obtained for Number 1 Dark Northern Spring Wheat with 14 percent protein, Number 2 Corn, Number 1 Soybeans and Number 2 Heavy Oats.

Minneapolis (MPLS) to arrive cash prices were taken from the USDA Grain Market News. Portland (PRTLND) spot cash prices were taken from the USDA Grain and Feed Market News.

Elevators in various North Dakota communities provided the local cash prices. Elevators were selected that could provide historical prices typical for an area. The location of these elevators was specified since transportation costs are an important element of the basis.[1] They included:

Fessenden (FESNDN)	Fessenden Cooperative Association
Gladstone (GLDSTN)	Southwest Grain
Hunter (HUNTER)	Hunter Grain Company
Minot (MINOT)	Sun Prairie Grain
Valley City (VALCTY)	AGP Grain Ltd.
Williston (WILSTN)	Northwest Grain Co-op Terminal

Wheat basis

The basis at elevators in the western part of North Dakota generally followed the basis at the Portland terminal market. The basis at elevators in the eastern part of the state generally followed the basis at the Minneapolis terminal market.

The lower quality wheat crops produced in the U.S. during 1992 and 1993 resulted in very high basis levels during 1993-1994 for number 1 quality wheat until the 1994 harvest began. The basis levels then dropped sharply but remained generally higher because of quality problems in some areas and tight stocks at both the U.S. and world levels.

The basis strengthened during the spring of 1996 because of tight stocks and poor crop prospects. As conditions improved, the basis weakened. The basis generally weakened into the fall of 1999 as stocks accumulated. Since then the basis has generally strengthened as stocks have decreased. The basis was exceptionally strong during 2001 for Portland and western North Dakota when the Montana crop was significantly reduced.

[1] The cooperation of those elevators willing to share their time and price information was greatly appreciated.

The monthly average wheat bases generally reflected a similar pattern at the various locations. Relative to the nearby Minneapolis futures, the basis was generally the weakest in September, a fall peak developed in November-December and a seasonal high was usually reached in May-June.

The basis at Minot during November averaged a minus $0.40 during 1998-02. The strongest basis occurred during May when it averaged a minus $0.36.

Corn basis

The corn basis pattern at Hunter generally followed the Minneapolis pattern. The Portland market was likely a reason for differences between the Hunter and Minneapolis basis. Local supply and demand conditions for corn as well as competing feed grains would have also had an impact on the basis.

The basis at Hunter during October averaged a minus $0.61 during 1998-02. The strongest basis occurred during June when it averaged a minus $0.42.

Oats basis

The basis for oats was generally the stronger at Minot compared to the basis at Gladstone. At Minot, the average varied between a minus $.15 and a minus $.30 during 1998-02.

Soybean basis

The soybean basis pattern at Hunter generally followed the Minneapolis pattern. As in corn, the Portland market was a soybean outlet at times, which probably accounted for most of the differences between the Hunter basis and the Minneapolis basis.

The weakest basis during 1998-02, on average, was during November for Hunter and September for Minneapolis. The strongest basis was during July for Hunter and August for Minneapolis.

At Hunter, the weakest basis during November averaged a minus $0.73, on average during 1998-02. The strongest basis during July averaged a minus $0.55, on average.

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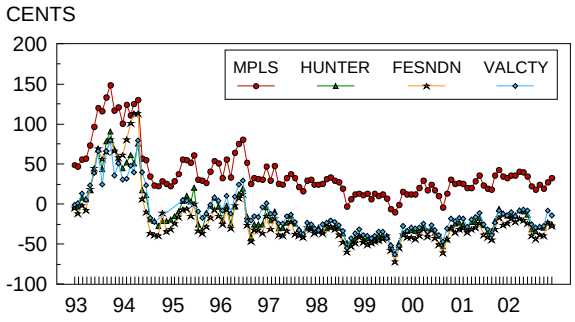
Appendix A Graphs

#1, 14 PRO WHEAT BASIS RELATIVE TO NEARBY MPLS FUTURES



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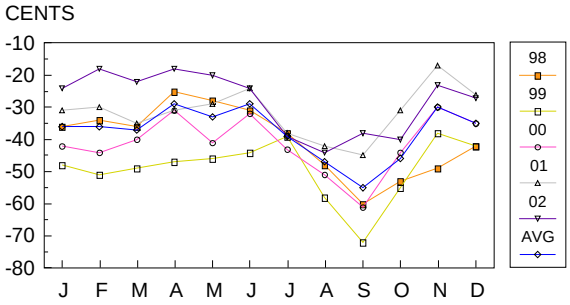

AVG is an average of 1998-02 basis excluding the low and high.

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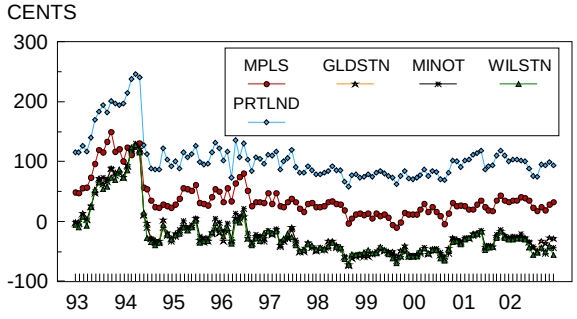

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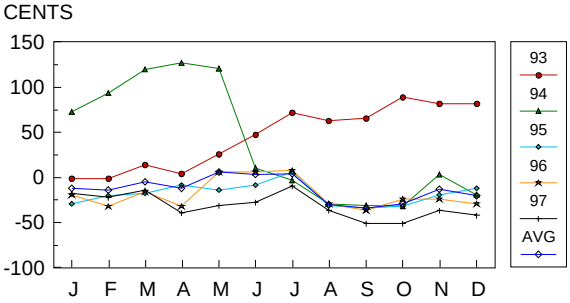

AVG is an average of 1993-97 basis excluding the low and high.

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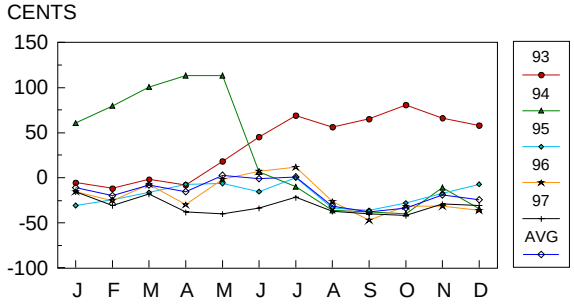

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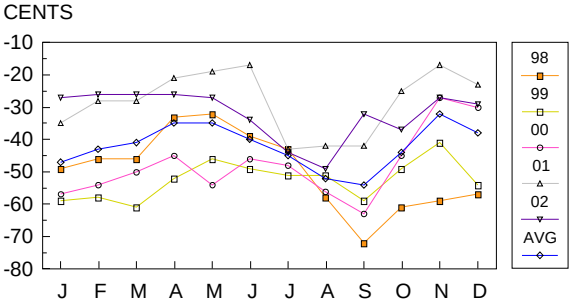

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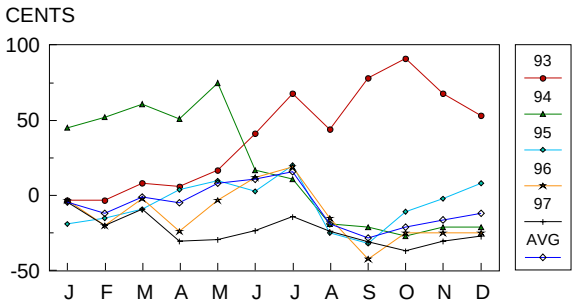

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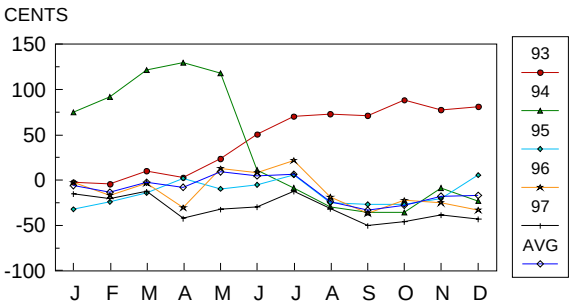

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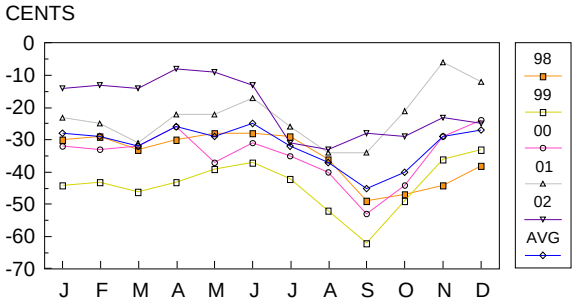

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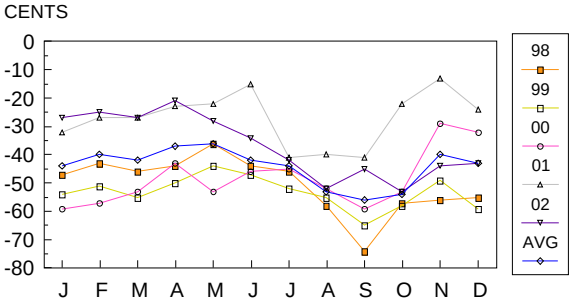

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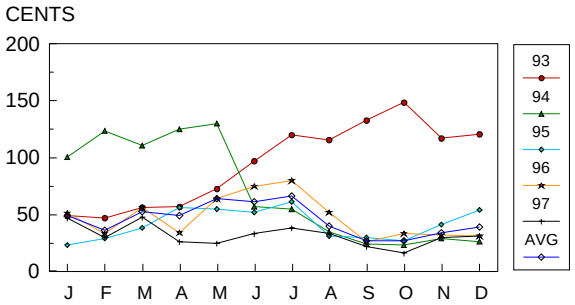

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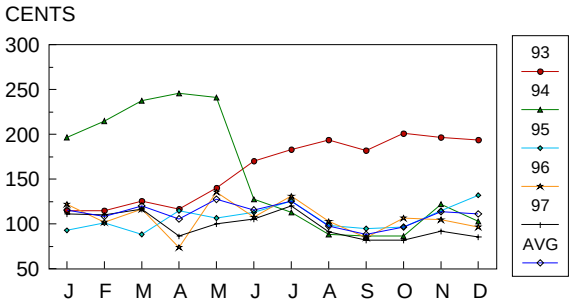

AVG is an average of 1993-97 basis excluding the low and high.

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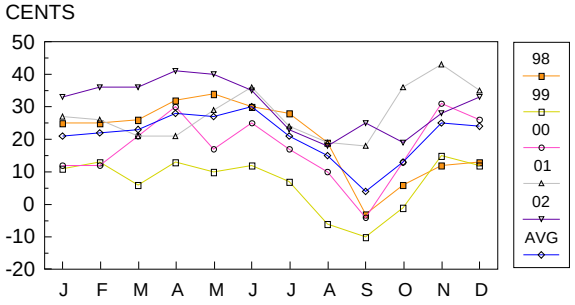

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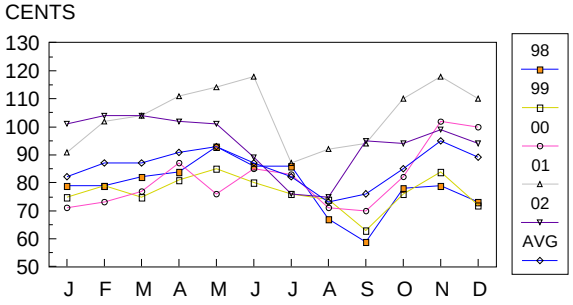

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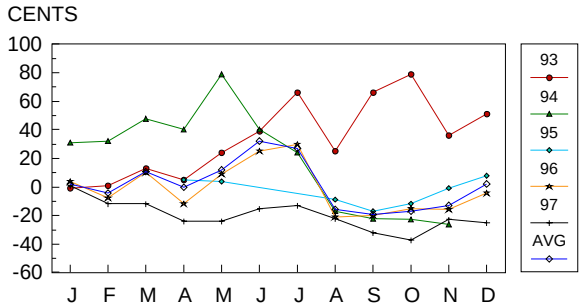
VALLEY CITY #1, 14 PRO WHEAT BASIS RELATIVE TO NEARBY MPLS FUTURES



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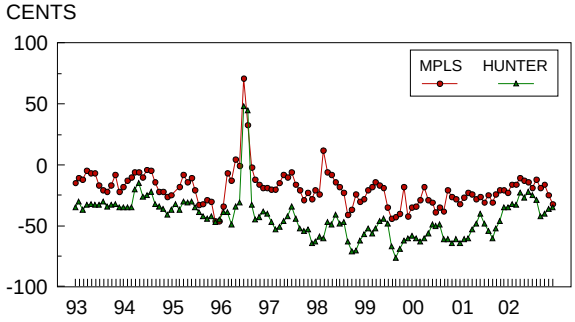
#2 CORN BASIS RELATIVE TO NEARBY CBOT FUTURES



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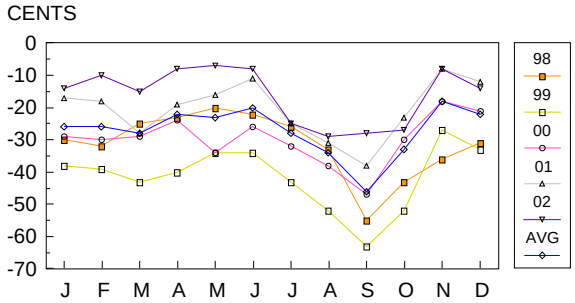

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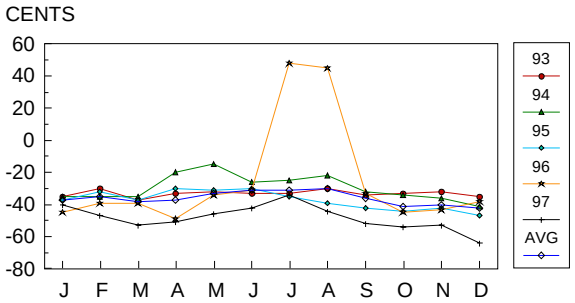

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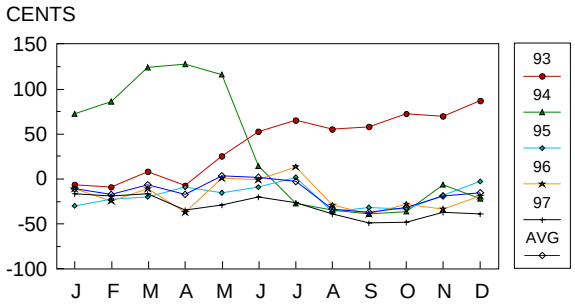

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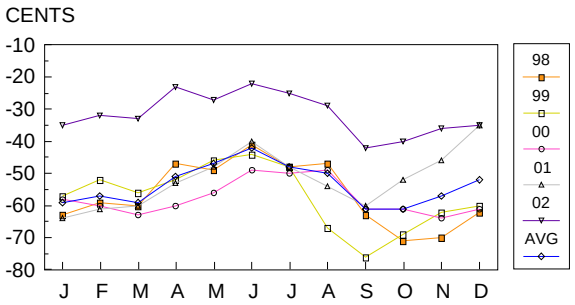
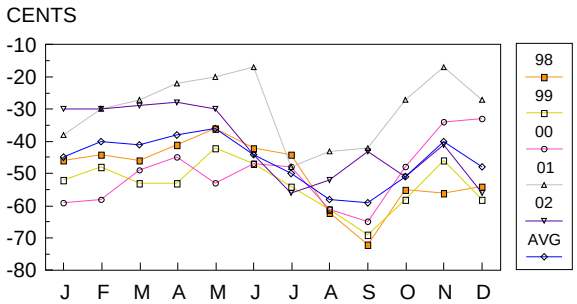


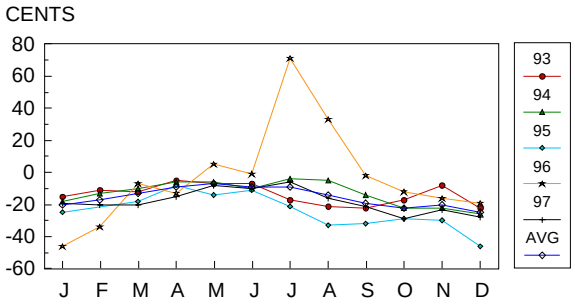
AVG is an average of 1998-02 basis excluding the low and high.

WILLISTON #1, 14 PRO WHEAT BASIS RELATIVE TO NEARBY MPLS FUTURES



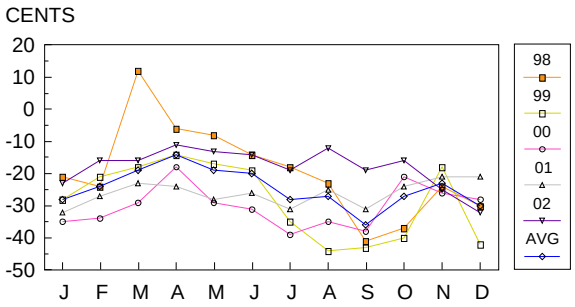
AVG is an average of 1998-02 basis excluding the low and high.

MPLS #2, TO-ARV CORN BASIS RELATIVE TO NEARBY CBOT FUTURES



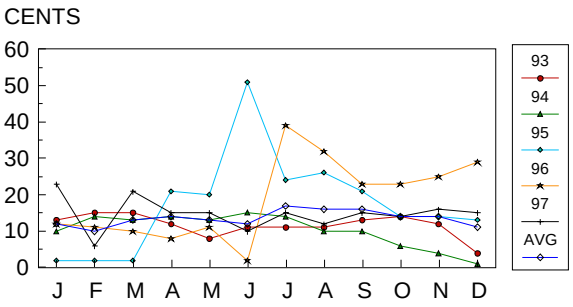
AVG is an average of 1993-97 basis excluding the low and high.

MPLS #2, TO-ARV CORN BASIS RELATIVE TO NEARBY CBOT FUTURES



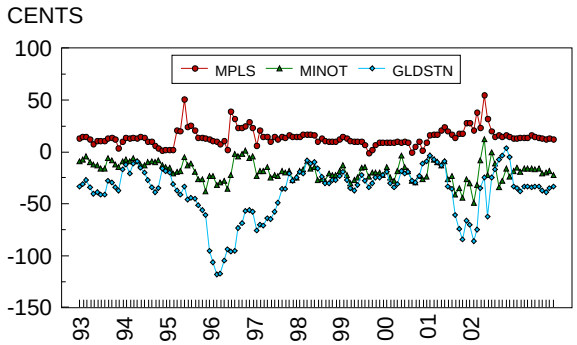
AVG is an average of 1998-02 basis excluding the low and high.

MPLS #2, TO-ARV HEAVY OATS BASIS RELATIVE TO NEARBY CBOT FUTURES

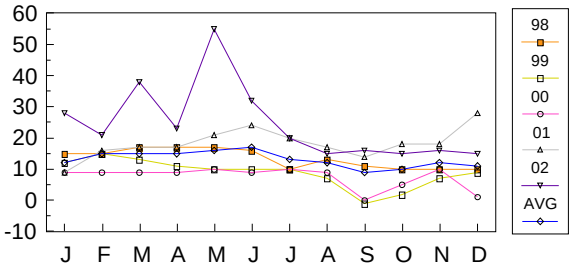


AVG is an average of 1993-97 basis excluding the low and high.

#2 HEAVY OATS BASIS RELATIVE TO NEARBY CBOT FUTURES

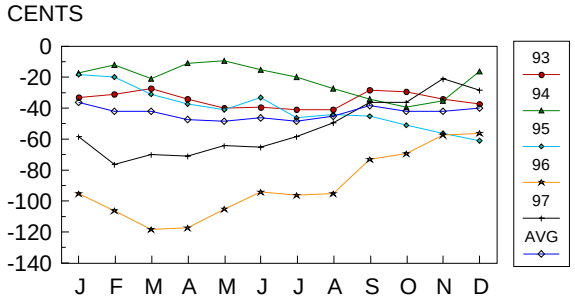


MPLS #2, TO-ARV HEAVY OATS BASIS RELATIVE TO NEARBY CBOT FUTURES



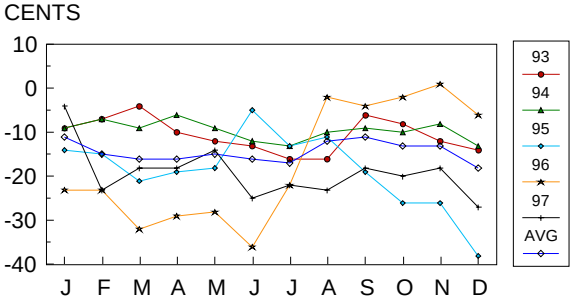
AVG is an average of 1998-02 basis excluding the low and high.

GLADSTONE #2 HEAVY OATS BASIS RELATIVE TO NEARBY CBOT FUTURES



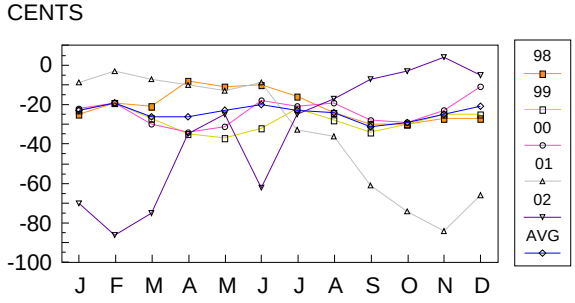
AVG is an average of 1993-97 basis excluding the low and high.

MINOT #2 HEAVY OATS BASIS RELATIVE TO NEARBY CBOT FUTURES



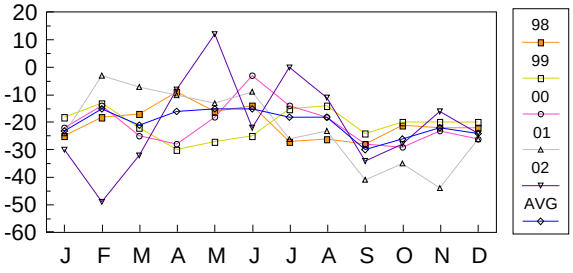
AVG is an average of 1993-97 basis excluding the low and high.

GLADSTONE #2 HEAVY OATS BASIS RELATIVE TO NEARBY CBOT FUTURES



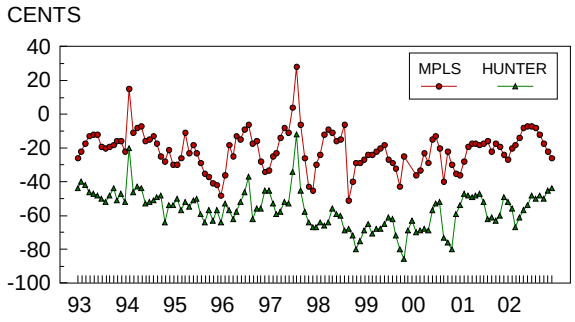
AVG is an average of 1998-02 basis excluding the low and high.

MINOT #2 HEAVY OATS BASIS RELATIVE TO NEARBY CBOT FUTURES

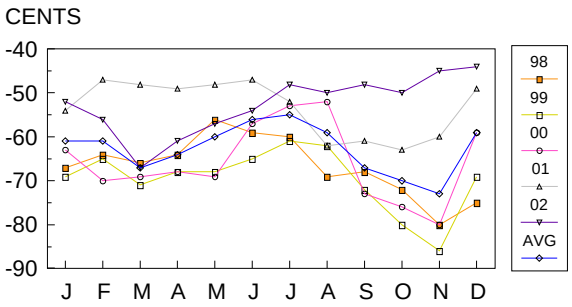


AVG is an average of 1998-02 basis excluding the low and high.

#1 SOYBEAN BASIS RELATIVE TO NEARBY CBOT FUTURES

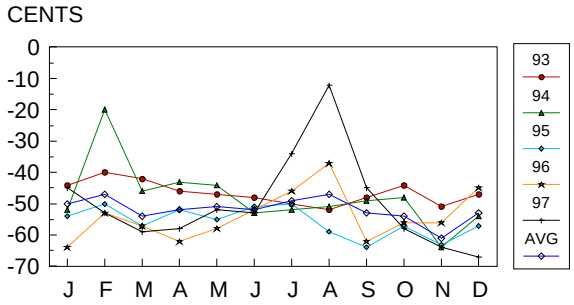


HUNTER #1 SOYBEAN BASIS RELATIVE TO NEARBY CBOT FUTURES



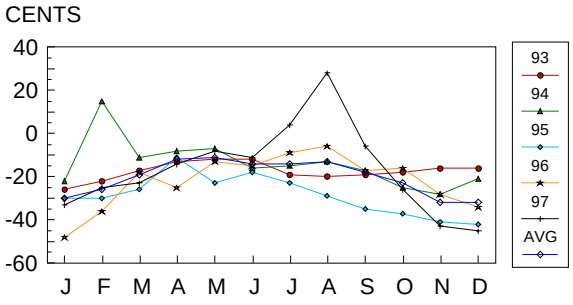
AVG is an average of 1998-02 basis excluding the low and high.

HUNTER #1 SOYBEAN BASIS RELATIVE TO NEARBY CBOT FUTURES



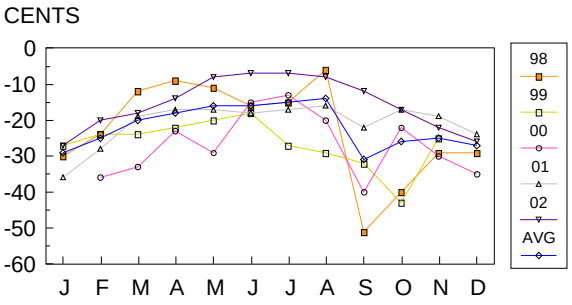
AVG is an average of 1993-97 basis excluding the low and high.

MPLS #1, TO-ARV SOYBEAN BASIS RELATIVE TO NEARBY CBOT FUTURES



AVG is an average of 1993-97 basis excluding the low and high.

MPLS #1, TO-ARV SOYBEAN BASIS RELATIVE TO NEARBY CBOT FUTURES



AVG is an average of 1998-02 basis excluding the low and high.

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For more information on this and other topics, see: www.ag.ndsu.nodak.edu

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