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## Field Pea and Lentil Marketing Strategies for Northern Plains Producers

By George Flaskerud

### Abstract

Marketing strategies are analyzed for field pea and lentil producers in the Northern Plains. Seasonal price patterns were derived for the 1999-2003 marketing years. Correlations indicate that corn futures may provide risk reduction for cross-hedging pea prices. Relationships were too weak to consider a cross-hedge for lentils. Combining a pre-harvest strategy with a marketing loan strategy offered the best total net price for the pea crop in 2004. No one marketing loan strategy performed best during the two crop years examined and no one month stood out as the best time for selling field peas and lentils. Earlier generally was better than later for selling the 2004 crop, whereas the middle of the marketing year worked best for the 2003 crop.

### Introduction

The United States is a small but growing producer of field peas and lentils relative to other countries in the world. In 2004, U.S. field pea production was 4.3 percent of world production and lentil production was 4 percent according to the Food and Agricultural Organization (FAO). In contrast, Canada produced 27.2 percent of the field peas and 24.4 percent of the lentils. Additional information on world production, trade, and marketing is available in the "Pulse Crop Marketing Guide" by Janzen, Fisher, and Bartsch.

North Dakota had the largest field pea and lentil acreage in 2004 in the U.S. according to the National Agricultural Statistics Service (NASS), and has experienced tremendous increases for both crops since 1999. In Idaho, Montana, and Washington, acreages have been steady for field peas but growing for lentils, although the growth has been less than in North Dakota.

The U.S. average yield per harvested acre in 2004 was 2,249 pounds per acre for field peas and 1,271 pounds per acre for lentils (NASS). Above-average yields were achieved in North Dakota and Washington for field peas and in North Dakota and Montana for lentils.



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Field peas and lentils compete well economically with other crops in North Dakota, especially in the northwestern part of the state (Swenson). In the 2005 cost and return estimates for northwestern North Dakota, lentils ranked first out of 17 crops in profitability, with a projected return over direct costs of \$88.16 per acre. Field peas ranked sixth with a return over direct costs of \$49.45.

Producers can sell field peas and lentils at harvest or later by taking the cash price that elevators offer. Producers can sell the crop prior to harvest, when the price is advantageous, by using the cash-forward contract, if available. The contract also assures the producer of a place and market for a portion of the crop. The contract generally states that the producer is to deliver a specific number of pounds of a certain grade to the elevator at a specified time and price. The price is subject to discounts at delivery, depending on quality. The contractor usually has first right of refusal on overrun. The contract generally includes an “act of God” clause to protect growers from production failures beyond their control.

Using the cash-forward contract may be appropriate on a portion of the crop. Producers also may consider using other marketing tools, such as futures or options. Since a futures market does not exist for field peas or lentils, producers need to consider other closely related futures markets. Using the futures market of a different commodity for hedging is cross-hedging.

This article analyzes price risk management strategies for field pea and lentil growers. It analyzes various time series of prices to identify patterns and relationships useful for developing marketing strategies and evaluates pre-harvest and harvest/post-harvest marketing strategies. The focus is on North Dakota, but the results are applicable to other Northern Plains states.

Methods and findings from several related studies in addition to the “Pulse Crop Marketing Guide” by Janzen, Fisher, and Bartsch were reviewed to determine the appropriate design of the marketing analysis for field peas and lentils.

Flaskerud and Shane examined the cash market, cash-forward contract, and cross-hedging, all for sunflowers. The soybean oil futures contract was used for cross-hedging based on the oil content of the sunflowers. O’Brien, Stockton, and Belshe

examined four methods for selling sunflowers: cash sales, forward cash contracts, forward cash grower contracts, and cross-hedges in soybean oil futures. They also presented oil sunflower cash price forecasting models and a sunflower marketing plan.

Flaskerud, Dahl, and Wilson determined that the use of canola futures at the Winnipeg Commodity Exchange (WCE) is preferred to the use of futures for soybeans, soybean oil, or soybean meal to manage price risk for canola. In a study of price risk management for NuSun sunflowers, Flaskerud found that canola cross-hedges have the most risk reduction, whereas soybean oil cross-hedges may be preferred when striving for profitability. Fundamental and technical features in both markets need to be evaluated when considering a cross-hedge.

### Data and Methods

Data were gathered from April 1998 to April 2005. Cash prices were obtained from *Agweek* for feed peas, No. 1 green peas, No. 1 yellow peas, and No. 1 lentils. Futures prices were obtained from *USDA Grain Market News* and the Great Pacific Trading Co. Web site.

Data were compiled as monthly averages. The marketing year used was September through August, as defined by *USDA Dry Edible Bean Market News*.

The data were analyzed using methods to identify patterns and relationships useful for developing marketing strategies (Flaskerud, Dahl and Wilson). Methods included seasonal distributions, correlations and historical simulations.

The analysis of seasonal distributions of prices (Flaskerud and Johnson) was limited to the most recent five marketing years, beginning September 1999 and ending August 2004. The seasonal distributions were reviewed by marketing year and summarized using the average derived after excluding the lowest and highest values.

Hedging of commodities relies largely on the relationship or correlation between futures and cash prices. Higher correlations between cash and futures prices would indicate that prices move similarly, thus hedging with futures can offset risk in cash prices.

Marketing strategies were evaluated on the basis of net returns that could have been received historically. Strategies include pre-harvest and harvest/post-harvest sales. Marketing loans, which are explained in the next section, are incorporated in the strategies. The strategies are described further in the Marketing Strategies section.

### Marketing Loan

A marketing loan is a Commodity Credit Corp. (CCC) commodity loan with a provision that allows producers to repay the loan at less than the original value if market conditions warrant (Aakre). Producers can satisfy a loan either by repaying the loan plus interest, repaying the loan at the posted county price (PCP) and keeping the difference, or forfeiting their collateral and keeping the loan amount.

Producers can exercise a one-time 60-day lock on the PCP, which gives the producers 60 days to repay the loan at the PCP that was in effect on the day they initiated the 60-day lock. If the market price decreases (PCP decreases) during that time, producers can let the lock expire and repay the loan at the lower PCP. Producers also can forgo the loan in return for a loan deficiency payment (LDP). The LDP rate is the amount by which the loan rate exceeds the PCP.

The marketing loan program for field peas and lentils began with the 2002 crop. Lentils have only a national loan rate and PCP. Field peas have an East Region and a West Region, and each has its own loan rate and PCP. Montana and North Dakota are in the East Region. Other state locations are identified at [www.fsa.usda.gov/dafp/psd/LoanRate.htm](http://www.fsa.usda.gov/dafp/psd/LoanRate.htm). The loan rate and PCP applies to both the feed and edible peas. The PCP for field peas is based on the price for feed peas. The 2002 field pea crop had only a national loan rate and PCP. The PCP is updated on Friday of each week. May 31 of the year following harvest is the deadline for receiving a marketing loan or LDP on field peas and lentils.

A history of field pea and lentil loan rates is presented in Table 1. A history of the LDP rates for field peas in the East Region is presented in Table 2 based on data from the North Dakota Farm Service Agency (FSA). An LDP did not exist for the 2002 field pea crop and none ever existed for the lentil crop, except at the very beginning of the program in 2002. The LDP

rate for field peas ranged from \$0.68 per hundredweight (cwt) to \$2.68 per cwt for the 2003 crop and from \$2.41 per cwt to \$2.91 per cwt for the 2004 crop. LDP rate highs occurred during August to December for the 2003 crop and during February for the 2004 crop.

### Prices

Monthly average prices at Ray, N.D. were examined from September 1998 to April 2005 for feed peas, No.1 green peas, No. 1 yellow peas and No.1 lentils. Feed pea prices ranged from \$2.50 to \$5.83, with a mean of \$3.80. Green pea No. 1 prices ranged from \$3.75 to \$9.19, with a mean of \$5.70. Yellow pea No. 1 prices ranged from \$3.08 to \$8.33, with a mean of \$5.43. Lentil No. 1 prices ranged from \$8 to \$18, with a mean of \$12.39.

### Correlations

Correlations were estimated among prices for feed peas, No. 1 green peas, No. 1 yellow peas, No. 1 lentils, corn futures, soybean futures, and soybean meal futures. They were estimated during four time periods.

The best correlation for feed peas generally was with corn futures and it improved over time. The correlation increased from a weak 0.61 during April 1998 to April 2005 to a strong 0.97 during January 2004 to April 2005. Green peas had a stronger correlation with corn futures than did the feed peas during the earlier periods, but a weaker correlation later on. In contrast, the correlation between yellow peas and corn futures, while weaker than between green peas and corn futures during the first period, was stronger by the last period. The best correlation lentils had with any futures contract was a weak 0.66 with corn futures during the last period.

Correlations also were examined for four-month price changes and eight-month price changes. Corn futures continued to provide the strongest relationship with peas (feed, green, and yellow) and lentils and the best correlation with peas that improved over time.

These correlations suggest that corn futures may provide more risk reduction for cross-hedging pea prices, especially feed pea prices, than soybean futures and soybean meal futures. The feasibility of cross-hedging feed, green or yellow peas with corn

futures, however, will depend on whether recent strong relationships can continue. Situations where a cross-hedge may be warranted will be discussed in the Marketing Strategies section.

### Seasonal Price Patterns

Patterns were examined by marketing year during 1999-2003 for the cash prices at Ray, N.D. Cash prices included feed peas, No. 1 green peas, No. 1 yellow peas and No. 1 lentils. The pattern for 2000-04 September corn futures was also examined since corn futures exhibited the best correlation with pea prices and may be useful for pre-harvest marketing strategies.

### Feed Pea Prices

The distribution of feed pea prices shows that the pattern, on average, was for lows to occur at the beginning of the September-to-August marketing year and peak in February (although prices were nearly as high during November and December) before declining into the next marketing year (Figure 1). A wide range of price behavior occurred during individual marketing years. Prices generally were flat during 1999-00. Highs occurred during November 2000-01 and 2001-02, January 2002-03, and May 2003-04. The highest monthly average price was \$5.83 in May 2004.

The range in the monthly average, excluding the low and high, was only \$0.69 per cwt. When the low and high were included, the range was \$1.19. The within-year variations varied considerably, from a low of \$0.25 in 1999-00 to a high of \$1.80 in 2001-02. The within-year variation during the more volatile marketing years of 2001-2003 was \$1.66, on average.

### Green Pea No. 1 Prices

The green pea No. 1 price (Figure 2) was less volatile on average than the feed pea price, but the pattern was similar. However, the green pea price was considerably more volatile during some individual years. Highs occurred early in the marketing year during 1999-00. They occurred during January to June 2000-01, March to April 2001-02, November and December 2002-03, and April and May 2003-04. The highest monthly average price was \$9.17 in April and May 2004.

The range in the monthly average, excluding the low and high, was only \$0.61 per cwt, which was a little lower than for feed

peas. When the low and high were included, the range was \$2.26, which was considerably higher than for feed peas. The within-year variations ranged significantly, from a low of \$1.15 in 2000-01 to a high of \$3.75 in 2003-04. The within-year variation during the more volatile marketing years of 2002-2003 was \$3.71, on average.

### Yellow Pea No. 1 Prices

The yellow pea No. 1 price (Figure 3) peaked during February to April, on average. Highs occurred early in the marketing year during 1999-00, as for No. 1 green peas, and in November to June 2000-01, March and April 2001-02, November to July 2002-03, and May 2003-04. The highest monthly average price was \$8.33 in May 2004.

The range in the monthly average, excluding the low and high, was \$1.17 per cwt, considerably higher than for feed peas and green peas. When the low and high were included, the range was \$2.14, a little lower than for green peas. The within-year variations varied less than for green peas, from a low of \$1.25 in 2002-03 to a high of \$3.25 in 2003-04.

### Lentil No. 1 Prices

The lentil No. 1 price (Figure 4) peaked during March, on average, but was almost as high during January to May. Highs occurred during November to February 1999-00, October to January 2000-01, November to June 2001-02, March to June 2002-03, and April and May 2003-04. The highest monthly average price was \$18 in both April and May 2003 and 2004.

The lentil price was considerably more volatile than the pea prices. The range in the monthly average excluding the low and high was \$2.12 per cwt. When the low and high were included, the range was \$3.22. The within-year variations varied from a low of \$1.00 in 2001-02 to a high of \$6.25 in 2002-03.

### September Corn Futures

September corn futures were much above average during 2004 and peaked in April. On average, futures prices peaked during March and April when the low and high were included, and during January and February without the extremes.

The range in the monthly average, excluding the low and high, was \$0.19 per cwt. When the low and high were included, the

range was \$0.30. The within-year variations ranged considerably, from a low of \$0.30 in 2003 to a high of \$0.94 in 2004.

### Marketing Strategies

Pre-harvest and harvest/post-harvest marketing strategies are evaluated. The specific strategies are identified in each subsection.

#### Pre-harvest

Producers should consider cash-forward contracts when they can realize prices that are above the historical average, and especially when they are in the upper third of the historical range. For pea producers, a cross-hedge in corn futures (best correlation in this study) using put options may be a low-risk alternative to cash-forward contracting when corn futures are well above average prior to harvest, such as during spring 2004. Producers should use a put option because of the uncertainty of future price relationships between corn futures and peas since the risk in using put options is limited to the cost of the option. Producers should use the September futures contract since it is the closest to field pea harvest. A 5,000-bushel put option in corn futures (56 pounds per bushel) might be used for each 5,000 bushels of anticipated field pea production (60 pounds per bushel) until relevant data denotes a more appropriate cross-hedge ratio.

An example put option strategy was initiated on April 30, 2004, by buying a \$3.20 put option in September corn futures when the contract was trading at \$3.18 per bushel. The cost of the option was \$0.29 plus \$0.02 cents for commissions and interest. The option was offset on August 13 when the September corn futures price was \$2.17 for an option net return of \$0.72 cents per bushel ( $\$3.20 - \$2.17 - \$0.29 - \$0.02$  cents).

#### Harvest/Post-harvest

Five harvest/post-harvest strategies were evaluated for 2003-04 and 2004-05 (Table 3). The analysis was limited to those two marketing years since an LDP did not exist for the 2002 pea crop and none existed for the lentil crop during the study period. In four of the strategies, marketing loan alternatives were analyzed for feed peas, No. 1 yellow peas, and No. 1 green peas. The four strategies are compared with a basic strategy of taking the LDP and simultaneously selling the crop

at harvest. In the fifth strategy, government payments were excluded for all crops. In this case, the basic strategy reflects just selling at harvest. The term “net revenue” is used to reflect the LDP or marketing loan gain if any, plus the selling price net of storage costs.

In strategy one, the LDP is taken at harvest and the crop is sold during the month with the highest total revenue received net of storage costs.

In strategy two, the LDP is taken when the crop is sold during the month with the highest total revenue received net of storage costs.

In strategy three, the crop is stored under loan and the loan is repaid at the lower of the PCP or the loan plus interest when the crop is sold during the month with the highest total revenue received net of storage costs.

In strategy four, the 60-day lock is initiated in August, the lower of the August or October PCP is taken, and the crop is sold during the month with the highest total revenue received net of storage costs.

In strategy five, the crop is sold during the month with the highest price net of storage costs, excluding government payments.

For feed peas during 2003-04, strategies one and four were the most profitable. They were not identical because interest was not charged on storage during the 60-day lock (strategy four) on the loan, which was repaid with the PCP, and the accumulation of interest on the marketing loan gain in strategy four started two months later than the interest on the LDP in strategy one. For both strategies, April was the best time to make sales and both strategies were considerably more profitable than selling at harvest. December and February were the best months to make sales in strategies two and three, respectively. Sharply lower prices resulted in strategy five where government payments are excluded.

During 2004-05, selling feed peas as soon as possible was the most profitable in all strategies since the cash price subsequently deteriorated.



For No. 1 green peas during 2003-04, April stood out again as the best time for sales, as for feed peas. Similarly, strategies one and four were the most profitable. Also, all strategies beat the basic strategy of selling at harvest.

During 2004-05, November/December was the best time to make sales for all No. 1 green pea marketing strategies, not at harvest as for feed peas. Strategy three was the most profitable followed by two, four, one, and five.

For No. 1 yellow peas during 2003-04, the profitability ranking of the strategies was identical to the ranking for No. 1 green peas. The profitability of strategies one and four was nearly the same, followed by strategies three and two. May instead of April was the best month to sell. The profitability of strategies one through five far exceeded the basic strategy of selling at harvest.

During 2004-05, the profitability of the No. 1 yellow pea marketing strategies also ranked the same as for No. 1 green peas. Strategy three was best, followed by two, four, one, and five. In addition, November and December were the best months for selling, as for green peas.

For No. 1 lentils, storage always was profitable. The net price received was \$2.64 per cwt greater in 2003-04 and \$1.99 greater in 2004-05 from storage than from harvest sales only. Storage into April was the most profitable in 2003-04 and into September in 2004-05. November through April was a good period, on average.

### Strategies Compared

The pre-harvest strategy, in combination with a marketing loan strategy, would have offered the best return for the pea crop in 2004, when prices generally were the strongest during the first half of the year. The put option strategy would have added an extra \$0.72 per cwt to the net price. The put option was a low-risk strategy since corn futures were much above average during the spring.

No one marketing loan strategy performed best during the two crop years examined. In 2004-05, taking the LDP at harvest was the best strategy for feed peas, whereas storing under loan worked best for No. 1 green and No. 1 yellow peas. In 2003-

04, the LDP at harvest or 60-day lock worked well.

Similarly, no one month stood out as the best time for selling peas and lentils during the two years. Earlier was generally better than later in 2004-05, whereas the middle of the marketing year worked best in 2003-04.

### Summary and Conclusions

The U.S. is a small but growing producer of field peas and lentils relative to other countries in the world. In 2004, U.S. field pea production was 4.3 percent of world production and lentil production was 4 percent.

Field peas and lentils compete well economically with other crops, although their profitability is dependent, in part, on how well producers manage the government program and storage. Time series of prices were analyzed to identify patterns and relationships useful for developing marketing strategies; pre-harvest and harvest/post-harvest marketing strategies were then evaluated. The analysis was based on prices during April 1998 to April 2005 and CCC marketing loan data for the 2003 and 2004 crops.

The LDP for field peas ranged from 68 cents per cwt to \$2.68 per cwt for the 2003 crop and from \$2.41 to \$2.91 for the 2004 crop. The highs occurred during August to December for the 2003 crop and during February for the 2004 crop.

Correlations indicate that corn futures may provide more risk reduction for cross-hedging pea prices, especially feed pea prices, than soybean futures or soybean meal futures. The feasibility of cross-hedging feed, No. 1 green or No. 1 yellow peas with corn futures, however, will depend on whether the recent strong relationships continue. Relationships were too weak to consider cross-hedging lentils.

The distribution of feed pea prices was for lows to occur at the beginning of the marketing year and peak in February. The pattern for No. 1 green pea prices was similar. The No. 1 yellow pea price peaked during February to April, on average. The No. 1 lentil price peaked during March, on average, but was almost as high during January to May.

Combining a pre-harvest strategy with a marketing loan strategy offered the best total net price for the pea crop in 2004, when prices generally were the strongest during the first half of the year. The put option strategy added an extra 72 cents per cwt to the total net price.

No one marketing loan strategy performed best during the two crop years examined. In 2004-05, taking the LDP at harvest was the best strategy for feed peas, whereas storing under loan worked best for No. 1 green and No. 1 yellow peas. In 2003-04, the LDP at harvest or 60-day lock worked well. Marketing loan payments did not materialize for lentils during the study period.

No one month stood out as the best time for selling field peas and lentils during the two years. Earlier generally was better than later in 2004-05, whereas the middle of the marketing year worked best in 2003-04.

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Table 1. Loan Rates for Field Peas and Lentils, Effective August 1 Annually, \$/cwt

	2002	2003	2004	2005
Lentils				
National Avg	11.94	11.94	11.72	11.72
Field Peas				
National Avg	6.33	6.33	6.22	6.22
East Region		5.89	5.84	6.03
West Region		6.68	6.63	6.61

Table 2. Loan Deficiency Rates for Field Peas, East Region, \$/cwt

Month	2003	2004
Aug	2.68	2.41
Sept	2.68	2.42
Oct	2.68	2.53
Nov	2.68	2.73
Dec	2.68	2.86
Jan	1.98	2.90
Feb	2.06	2.91
March	1.56	2.73
April	0.68	2.63
May	0.93	
June	1.62	
July	1.98	

Table 3. Total Revenue Received Net of Storage Costs and Month Crop Sold Under Alternative Marketing Strategies During 2003-04 and 2004-05 at Ray, N.D., \$/cwt

	LDP at Harvest <sup>a</sup>	LDP During Year <sup>b</sup>	Store Under Loan <sup>c</sup>	60-Day Lock <sup>d</sup>	Government Payment Excluded <sup>e</sup>
Strategy	1	2	3	4	5
<b>Feed Peas</b>					
2003-04	6.51 Harv 8.25 Apr	6.51 Harv 7.41 Dec	6.51 Harv 7.51 Dec	6.51 Harv 8.26 Apr	3.83 Harv 5.44 Apr
2004-05	6.57 Harv 6.57 Harv	6.57 Harv 6.57 Harv	6.57 Harv 6.57 Harv	6.57 Harv 6.26 Oct	4.16 Harv 4.16 Harv
<b>Green Peas #1</b>					
2003-04	8.51 Harv 11.47 Apr	8.51 Harv 10.12 Feb	8.51 Harv 10.35 Feb	8.51 Harv 11.51 Apr	5.83 Harv 8.66 Apr
2004-05	7.99 Harv 8.84 Nov	7.99 Harv 9.21 Dec	7.99 Harv 9.35 Dec	7.99 Harv 9.00 Nov	5.58 Harv 6.39 Nov
<b>Yellow Peas #1</b>					
2003-04	8.09 Harv 10.63 May	8.09 Harv 9.07 Nov	8.09 Harv 9.18 Feb	8.09 Harv 10.66 May	5.41 Harv 7.81 May
2004-05	7.49 Harv 8.02 Nov	7.49 Harv 8.40 Dec	7.49 Harv 8.52 Dec	7.49 Harv 8.18 Nov	5.08 Harv 5.57 Nov
<b>Lentils #1</b>					
2003-04					14.38 Harv 17.02 Apr
2004-05					13.70 Harv 15.69 Sep

<sup>a</sup> In strategy one, the LDP is taken at harvest and the crop is sold during the month with the highest total revenue received net of storage costs.

<sup>b</sup> In strategy two, the LDP is taken when the crop is sold during the month with the highest total revenue received net of storage costs.

<sup>c</sup> In strategy three, the crop is stored under loan and the loan is repaid at the lower of the PCP or the loan plus interest when the crop is sold during the month with the highest total revenue received net of storage costs.

<sup>d</sup> In strategy four, the 60-day lock is initiated in August, the lower of the August or October PCP is taken, and the crop is sold during the month with the highest total revenue received net of storage costs.

<sup>e</sup> In strategy five, the crop is sold during the month with the highest price net of storage costs, excluding government payments.

Figure 1. Seasonal Behavior of Feed Pea Prices at Ray, N.D.

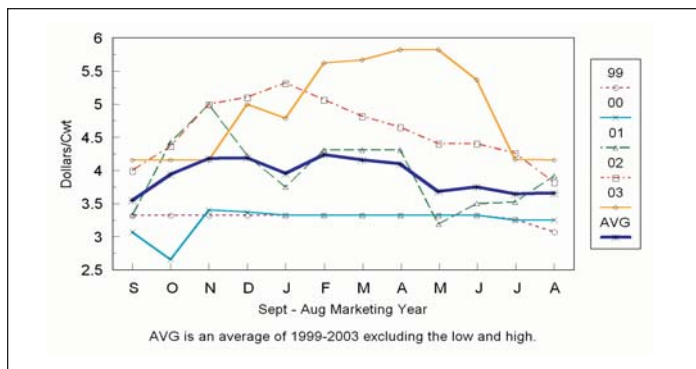


Figure 2. Seasonal Behavior of Green Pea #1 Prices at Ray, N.D.

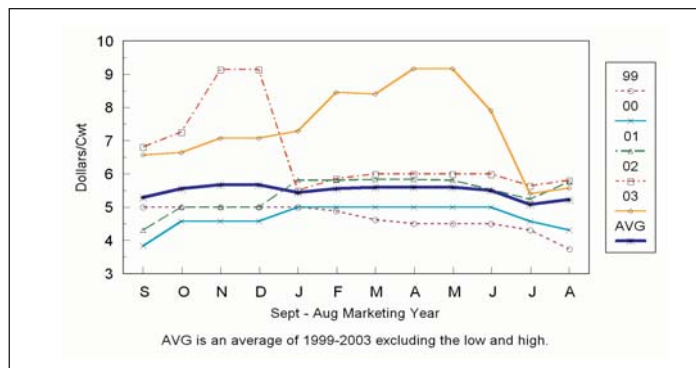


Figure 3. Seasonal Behavior of Yellow Pea #1 Prices at Ray, N.D.

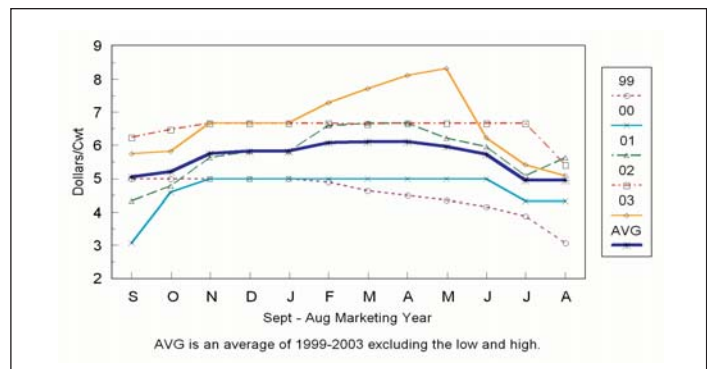


Figure 2. Seasonal Behavior of Lentil #1 Prices at Ray, N.D.

