



# Historical Futures Price Distributions for Corn, Soybeans, Wheat, Cotton, Soybean Meal, Feeder Cattle, Live Cattle, and Hogs

David Kenyon\*

Each year producers must make production and marketing decisions that are based on their price expectations. In recent years, cash prices have been extremely variable. Corn prices moved from \$1.99 in November 1994 to over \$5.00 in July 1996 to under \$2.00 in the fall of 1999 and 2000. Feeder cattle prices declined from \$88 in 1995 to \$55 in the summer of 1996 and back to over \$85 in 2000. Hog prices increased from \$28 in November 1994 to \$60 in the summer of 1996 to under \$10 in November 1998. These large price swings make it difficult to plan production and marketing strategies, and increase producer price and financial risk.

The Farm Bill passed by Congress in 1996 may create even more price variability in the future. The programs for feed grains, cotton, and wheat eliminated target prices, acreage set-asides, and storage programs. Producers will have much more freedom in crop selection. For example, since the spring of 1996, soybean acres have increased over 10 million acres and wheat acres have decreased by 15 million acres. These acreage changes may lead to large crop price swings. Since feed costs for broilers, turkeys, hogs, and fed cattle are a major portion of production costs, the feed input price risk associated with feeding livestock and poultry may also increase.

With increased price volatility and lower government price supports, producers will have to become more involved in managing their price risk associated with both input prices and product prices. These price risks can be managed using various forward pricing tools including cash contracts, futures, options, and crop price insurance. These forward pricing tools are directly or indirectly tied to futures prices. To help producers in evaluating their pricing alternatives, the following figures contain the historical distribution of futures prices for several important commodities in Virginia. These distributions can be used to help evaluate from a historical perspective the probability of achieving certain price objectives.

One important step in managing price risk is determining a price objective. The initial price objective should be tied to a careful analysis of production costs. The cost-based price objective should be compared to historical price offerings. Another reasonable objective is to forward price in the top 1/3 of historical prices. These price objectives may need to be modified to reflect current economic conditions.

Each figure is based on daily futures settlement prices for one particular futures contract. For example, the corn figure is based on the December contract. The prices used to develop this chart include daily prices for one year for each contract year. Other futures contract months for corn would have very similar percentage distributions, but the price levels would be slightly different. For the grains and cotton, the first new crop contract was selected since they are most frequently used to price growing crops. For livestock, the contract associated with the month of largest cash sales was selected. Two contract months (April and October) are included for feeder cattle given the importance of feeder cattle to Virginia agriculture and the highly seasonal nature of feeder cattle marketings and prices.

Each figure is based on at least 5,000 daily futures settlement prices. The period 1980 - 2000 covers a wide array of economic conditions, especially periods of low and high prices. On the horizontal axis of each figure is price ranges for that particular commodity. On the vertical axis is the percentage of days since 1980 that prices traded in each price range. For example, December corn futures settled between \$1.50 - \$1.75 per bushel 3.55 percent of the trading days since 1980. The most likely price of December corn futures is between \$2.51 and \$2.75 per bushel. Historically, prices have traded in this range 24.44 percent of the time. December corn futures have only traded above \$3.00 approximately 15 percent of the time. Fifteen percent is the sum of all probabilities above \$3.00 (5.59 + 4.33 + 4.56 + 1.26).

\* Professor, Department of Agricultural & Applied Economics, Virginia Tech

Each of the price distributions can be used to evaluate current prices and producers price goals in a historical perspective. Using corn as an example, if current December futures are \$3.15 per bushel, and the producers' price objective is \$3.00 per bushel, then forward pricing at the current level obviously meets the price goal. The probability that December futures will trade above \$3.15 before contract expiration in December is less than 15 percent in a historical context.

What if current December corn futures are \$2.51 per bushel and the producers' price goal is \$3.00 per bushel? The probability of December corn futures trading lower is about 43 percent (19.82 + 12.90 + 6.37 + 3.55). Based on current and projected prices, the producer will need to assess the probability of prices moving up to \$3.00. The probability of prices being between \$2.51 and \$3.00 a bushel is relatively large (41.63 percent). But this probability must be evaluated in the context of expected supply and demand. If corn acreage is up from last year, the growing season is progressing on schedule, rainfall is adequate, and exports are constant, December futures may not reach \$3.00 before harvest. In such a situation, the producer may need to reevaluate the price goal and pricing strategy to fit current market expectations.

Pricing guides for corn, soybeans, and wheat have been developed to help producers determine likely price ranges given current supply and demand estimates. These publications explain how to develop a pricing strategy based on current supply and demand, the historical distribution of future prices, and pricing opportunities that occurred in years with similar supply and demand conditions.

Each producer should compare the cost-based price goal to the most likely price range for each commodity. If the price goal is consistently above the most likely price range, the probability of success raising this crop or livestock commodity is relatively low. Producers in this situation need to reevaluate their production practices with the goal of lowering costs.

Producers need to study carefully the price distribution of each commodity they produce. For each commodity, producers should know the most likely price range, the probability of prices below their breakeven costs, and the probability of prices in the top one-third of historical prices. Knowledge of these price levels should help substantially in

planning production and marketing strategies. For example, the probability of prices below breakeven costs should help producers design financial or marketing strategies that assure they can manage negative cash flows when they occur. Likewise, producers should take advantage of historically high prices when they occur by forward pricing a substantial portion of expected production.

Several cautions are necessary concerning these distributions. First, they are based on futures prices. To convert them to local market cash prices requires an understanding of basis. Basis estimates for most of these commodities are available in two Virginia Cooperative Extension publications entitled, *Virginia Basis Tables for Corn, Soybeans, Wheat, and Soybean Meal*, Publication 448-016, and *Virginia Basis Estimates for Feeder Cattle*, Publication 448-019.

Second, these distributions are based on historical prices since 1980. In using these distributions, one is assuming that the historical distribution is a fair representation of the future distribution. For these commodities, that appears to be a reasonable assumption at this time. For most of these commodities, the low and high prices in the 1990s occurred at levels comparable to those in the 1980s. Most of these prices do not appear to be trending up or down substantially over time. However, some major economic or political action anywhere in the world could change these distributions. Since these major events are unpredictable, these distributions should be useful to producers in assessing the probability of likely price outcomes.

## Additional Resources

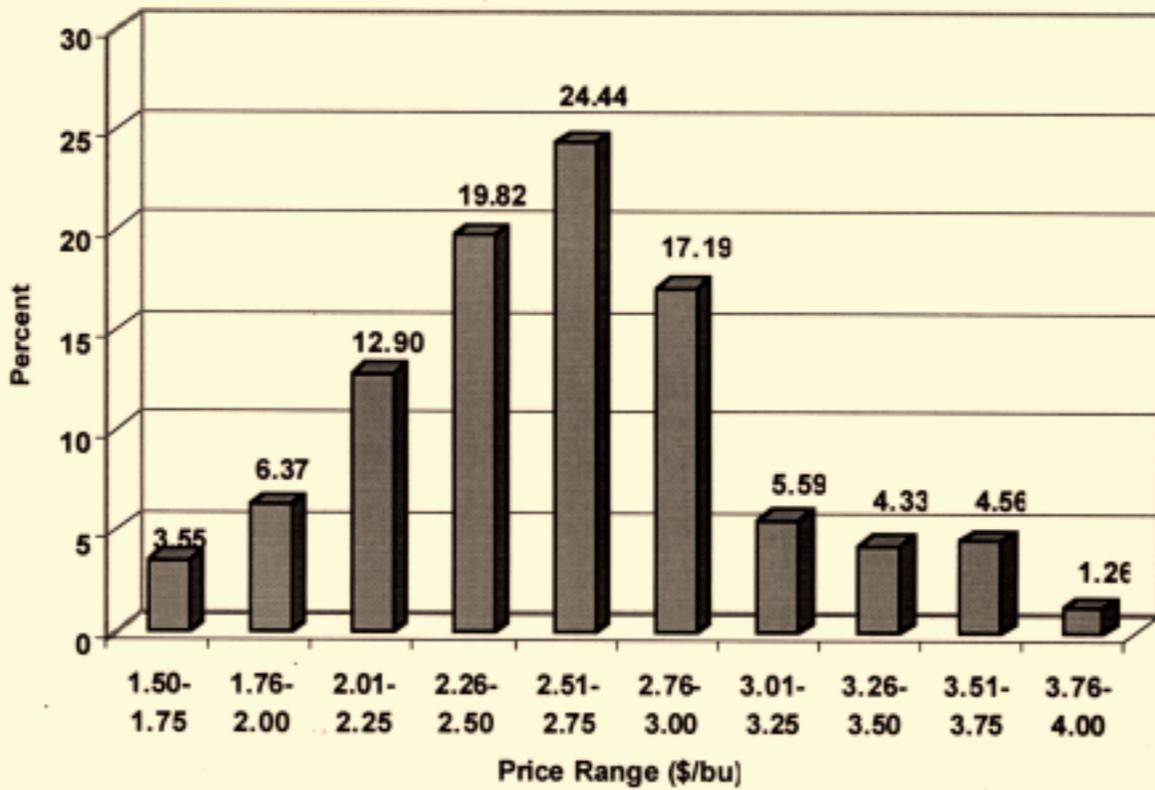
The following publications are designed to help producers develop reasonable price expectations and assess the probability of reaching certain price objectives. These publications are available from The Rural Economic Analysis Program, 0401 Hutcheson Hall, Virginia Tech, Blacksburg, VA 24061, (540) 231-9443, Email reap01@vt.edu.

[Corn Pricing Guide](#) by Kenyon & Lucas, VCE 448-236/REAP R038, 1998.

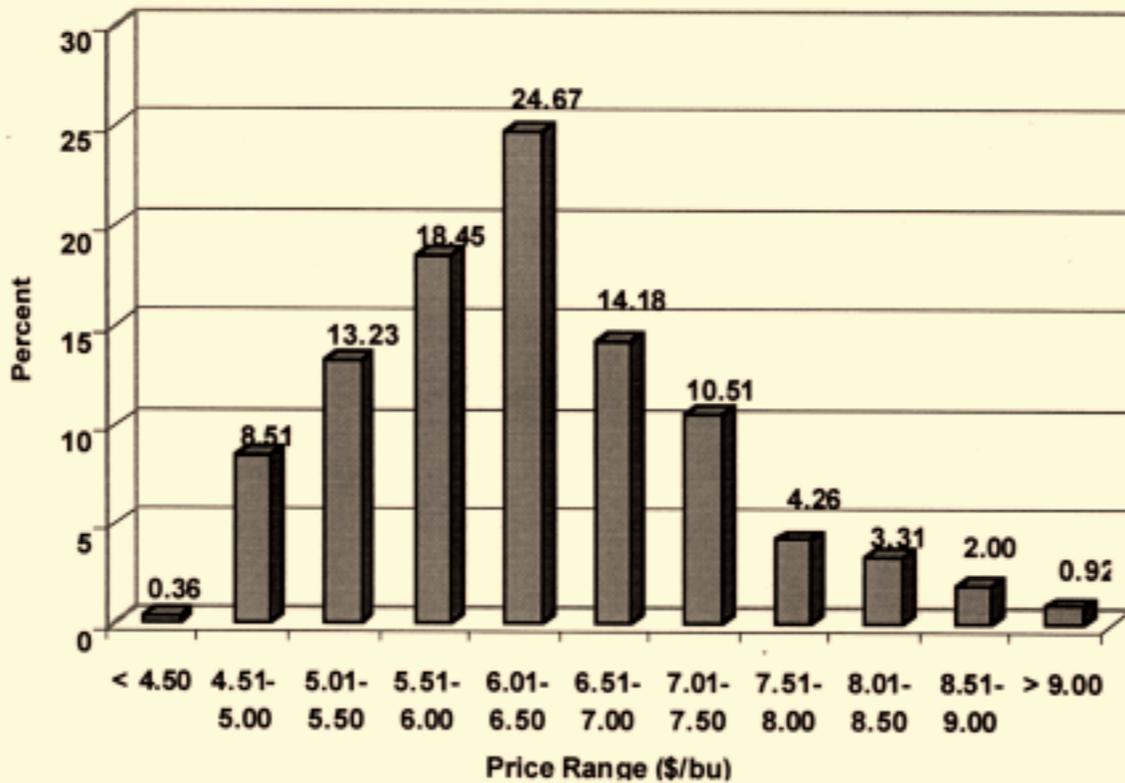
[Soybean Pricing Guide](#) by Kenyon & Lucas, VCE 448-235/REAP R037, 1998.

[Wheat Pricing Guide](#) by Kenyon & Lucas, VCE 448-237/REAP R039, 1998.

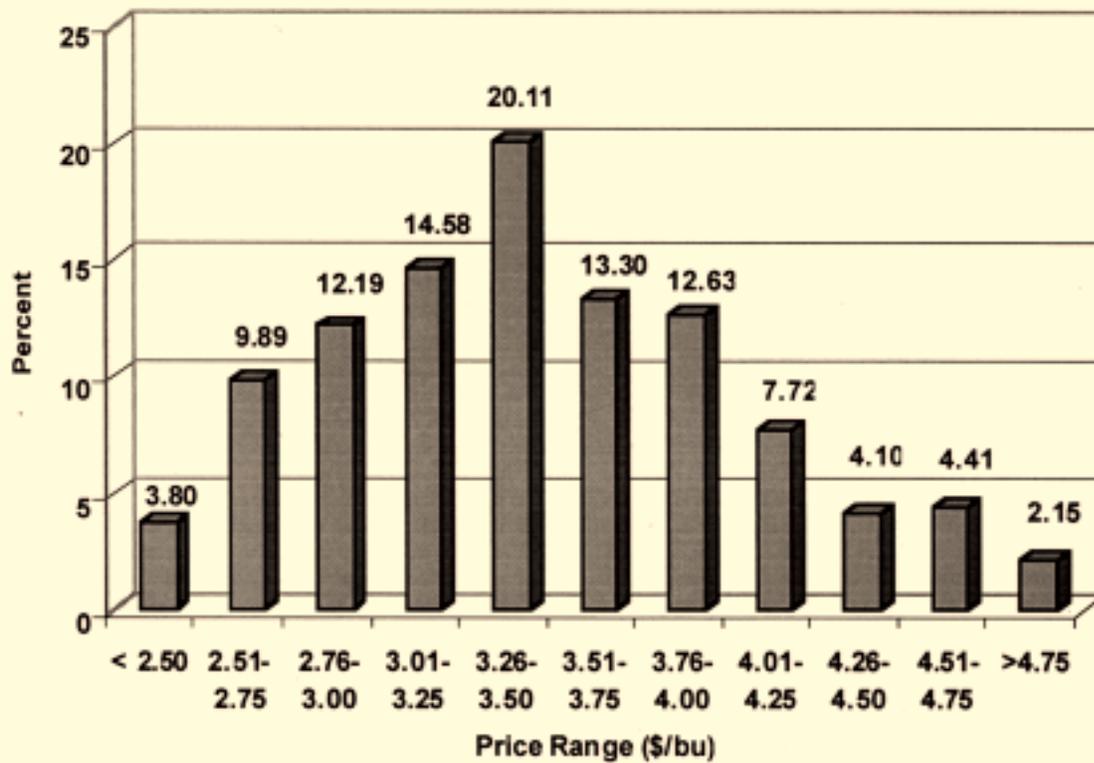
**PRICE DISTRIBUTION DECEMBER CORN FUTURES: 1980-2000**



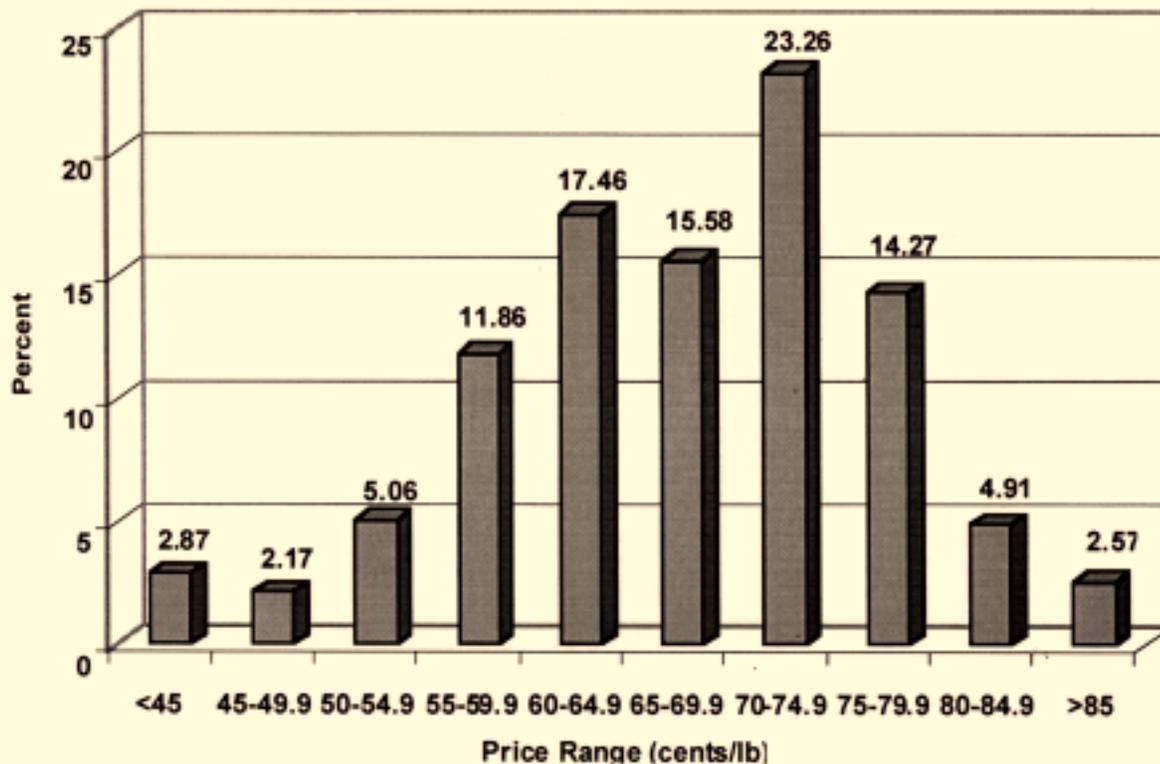
**PRICE DISTRIBUTION NOVEMBER SOYBEAN FUTURES: 1980-2000**



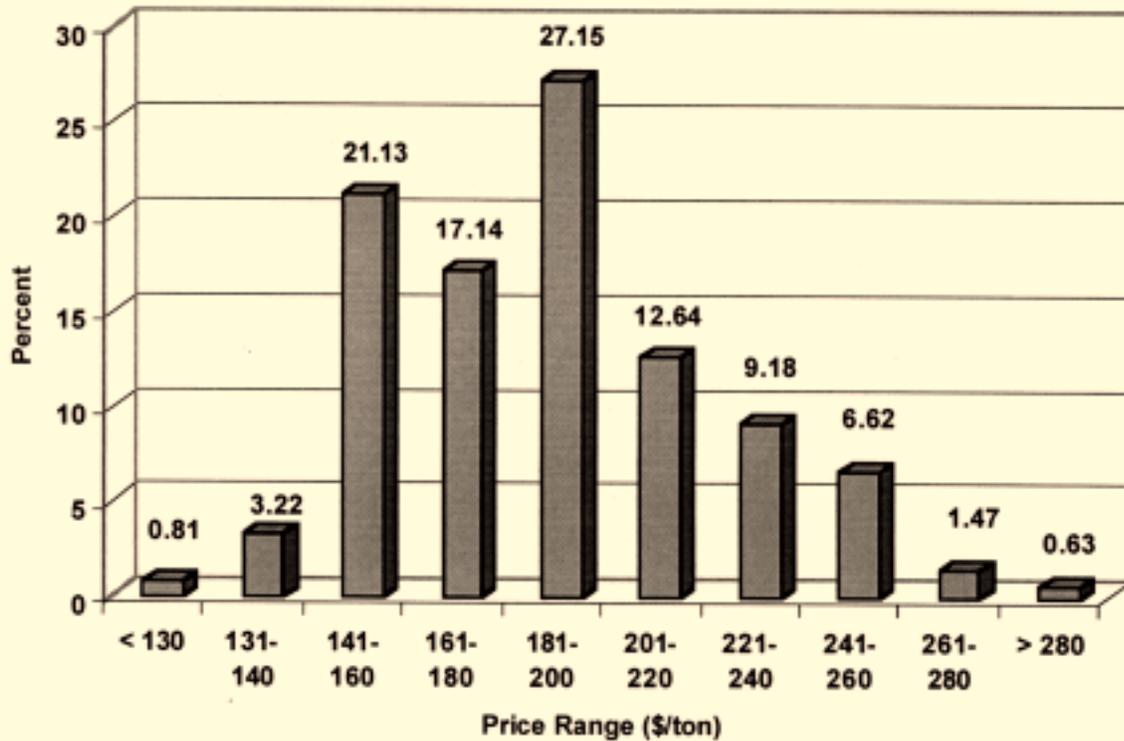
**PRICE DISTRIBUTION JULY CHICAGO WHEAT FUTURES: 1980-2000**



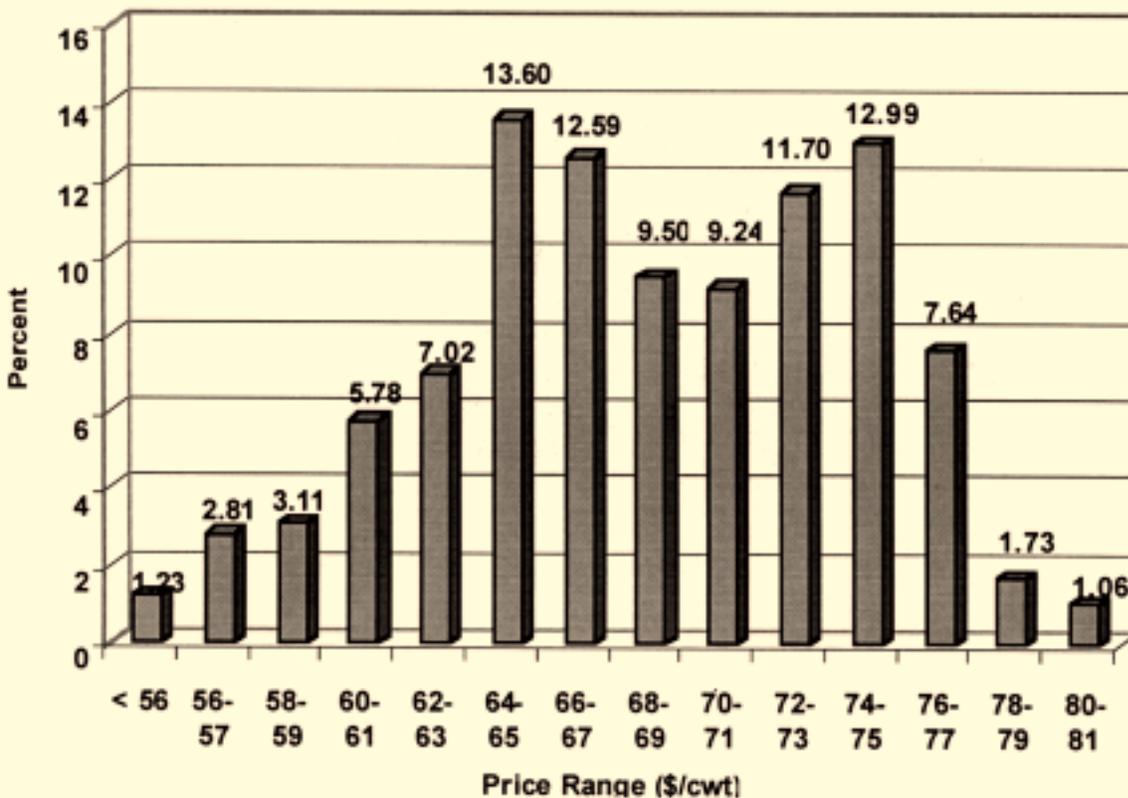
**PRICE DISTRIBUTION DECEMBER COTTON FUTURES: 1980-2000**



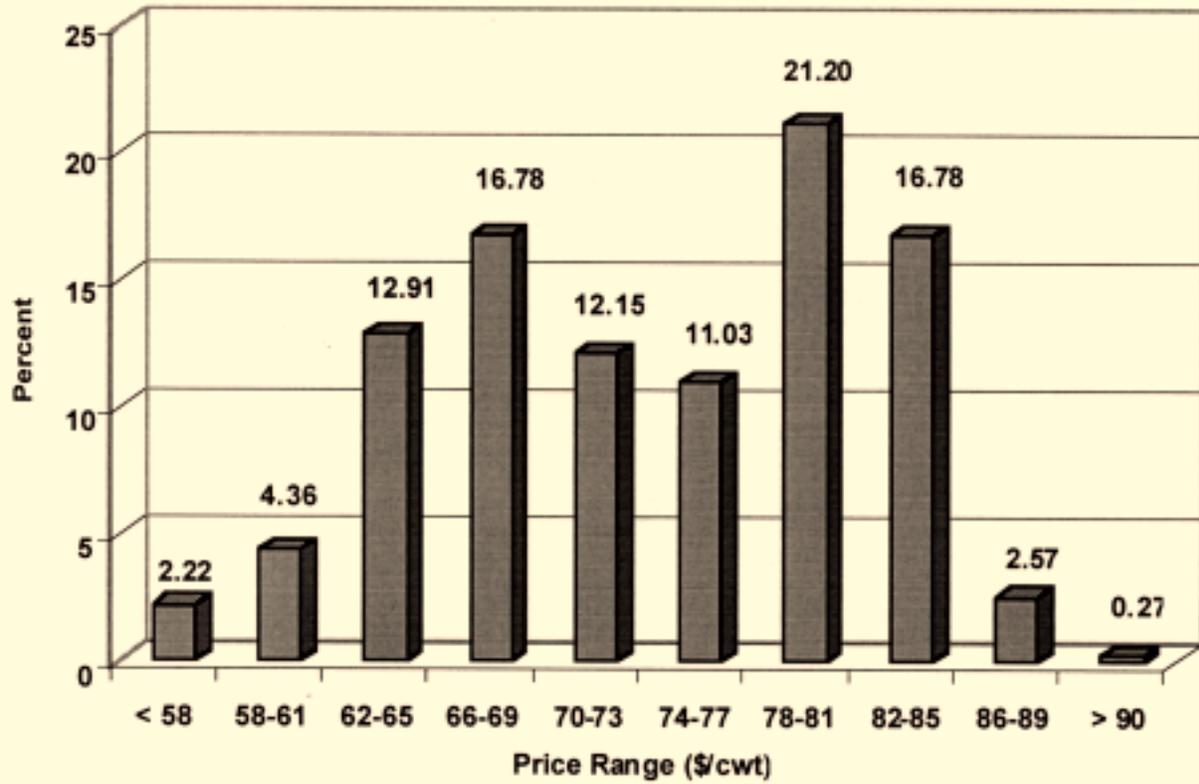
**PRICE DISTRIBUTION MARCH SOYBEAN MEAL FUTURES: 1980-2000**



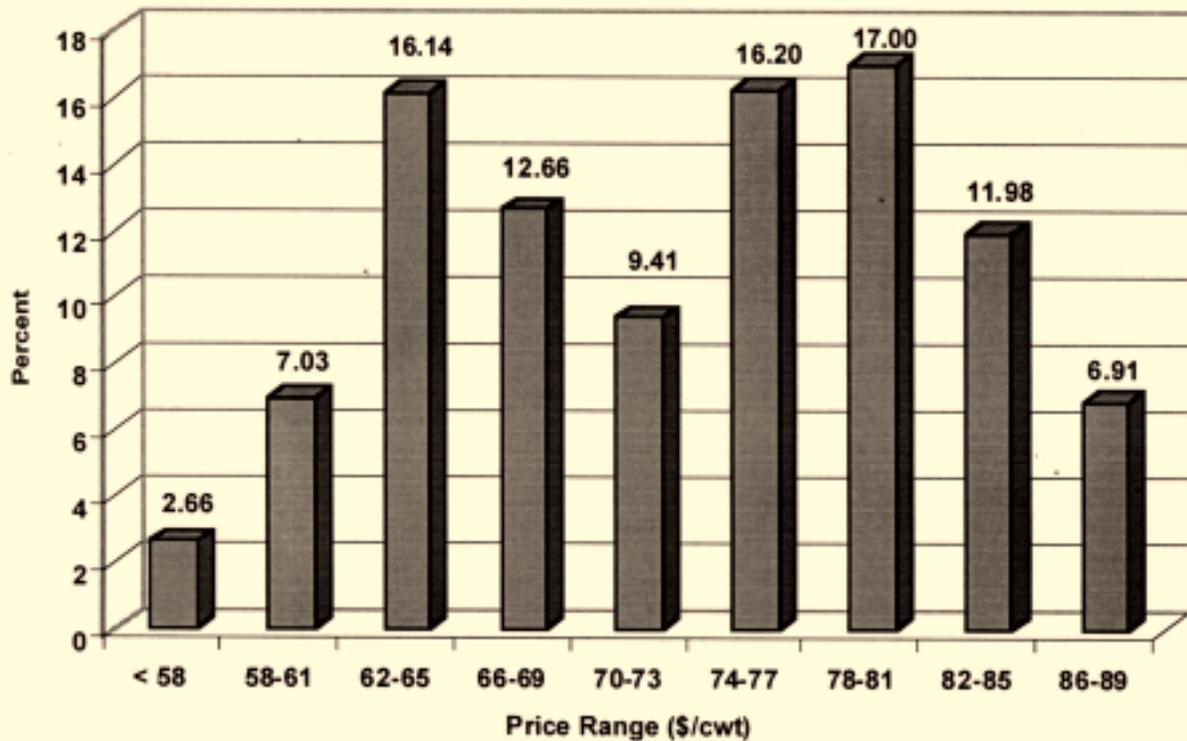
**PRICE DISTRIBUTION APRIL LIVE CATTLE FUTURES: 1980-2000**



### PRICE DISTRIBUTION APRIL FEEDER CATTLE FUTURES, 1980-2000



### PRICE DISTRIBUTION OCTOBER FEEDER CATTLE FUTURES: 1980-2000



### PRICE DISTRIBUTION APRIL HOG FUTURES: 1980-2000

