THE PERFORMANCE OF MARKET ADVISORY SERVICES IN FEEDLOT MARGINS OVER 1995-2004

BY

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THESIS

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ABSTRACT

The purpose of this thesis is to evaluate the pricing performance of market advisory services' live cattle hedging recommendations over 1995-2004. Also, feeder cattle, corn, and soybean meal recommendations were evaluated as input hedges and combined with the live cattle marketing recommendations to approximate the margin that a typical feedlot would face from the third quarter of 1999 through 2004. Other marketing assumptions were also applied to approximate a real world feedlot in Western Kansas. Several key assumptions are i) the feedlot markets on average 1 ctw of live cattle per quarter, inputs are purchased at rates that will yield on average 1 ctw of live cattle per quarter, or 4 ctw total per year, ii) the marketing widow for live cattle marketings begins six months prior to the start of the marketing quarter, making the total marketing window nine months long, iii) brokerage costs are subtracted from futures and options markets gains or losses and iv) the purchases of inputs, live cattle marketed per quarter and benchmarks are weighted by quarter to reflect the cyclical nature of live cattle marketing.

The net price an advisory service receives for a given quarter is compared to a market benchmark to evaluate the performance of the service. The market benchmarks used in this study are weighted average cash prices per quarter for each of the hedged items. Each market benchmark is calculated to assume the same assumptions and cash marketing schedule applied to each advisory service's track record.

Four performance measures are used to evaluate the pricing performance of the advisory services over 1995-2004 for live cattle and 1999 Q3-2004 for margin recommendations. Results show that advisory services as a group do not outperform the benchmark in either live cattle or margin recommendations. Also, no advisory services produced prices that were statistically

different from the benchmark when averaged over all quarters. When risk was taken into account, advisory services again did not outperform the benchmark as a group; however, two advisory services yielded pricing performance superior to the benchmarks in live cattle and one in margin hedging.

Overall, the results show that advisory services do not appear to "beat the market." While there were few services that produced results superior to the benchmark, the services as a group did not provide feedlots the opportunity to improve their margin levels relative to the market and a strategy of marketing a portion of your live cattle per month and achieving the market benchmark was the most profitable strategy.

to Mom and Dad

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1. INTRODUCTION

1.1 Introduction

Feedlots today face many risks. While some of these risks, like weather, are uncontrollable, one risk that may be managed is price risk. The price of the feeder steer is by far the largest cost of each finished steer. Next, the cost of feed also accounts for a substantial portion of total costs. Finally, the sales price of the finished steer is the last factor in determining profitability.

Feedlot managers have several options when managing the price risks of a feedlot. There is the option to participate in the spot cash market only, or a feedlot may follow its own hedging strategy or a recommended strategy of a market advisory service. A market advisory service may have several benefits to the feedlot manager. First, the service provides market news to its subscribers on all relevant markets. It is for this information that many feedlots subscribe. The service also gives marketing advice for live cattle marketings and in some cases, for feed and feeder cattle purchases.

Previous research shows that no one feedlot-run marketing strategy excels over others. Shafer, Griffin, and Johnston (1978) were among the first to study simultaneous hedging of both inputs and outputs. Strategies varying from not feeding if unable to lock in a specified margin to locking in both input and output hedges to technical trading only were compared to a cash marketing strategy. All strategies produced net returns lower than the cash marketing strategy but all, with the exception of technical trading exhibited variances lower than the cash strategy.

Schroeder and Hayenga (1988) used a feedlot model to evaluate the performance of various feedlot marketing strategies which included both input and output hedging. They

concluded that when prices were stable hedging strategies outperformed cash only strategies. Differing market conditions however caused different strategies to be successful and the authors concluded that using a combination of cash, futures and options hedging would lead to better results than using one single strategy.

More recently, Noussinov and Leuthold (1998) analyzed multiproduct optimal hedging to alternative hedging strategies. Here, the producer hedged inputs (feeder cattle, corn and soybean meal) and the output, fed cattle one month prior to placed feeder calves in the feedlot. Hedges were lifted when the underlying commodity was bought or sold. Variations of this basic strategy included hedging each commodity separately or all in the same proportion. The authors concluded that all strategies reduced the variance when compared to not hedging but that no specific strategy dominated.

Overall, no one strategy was found to consistently dominate across various studies. Previous research analyzing the performance of marketing advisory services also shows mixed results in the services' ability to provide an average price greater than the benchmark value (e.g. Gehrt and Good, 1993; Jirik et al., 2001, Weber et al., 2004 and Irwin et al., 2006). These studies suggest market advisory services have a small ability to beat the market in corn and soybeans but no ability in wheat or hogs. The inability to beat the market in hogs may or may not be generalized to all livestock markets. Following both input and output hedges may provide better insight into the ability of services to outperform the market in livestock.

1.2 Thesis Objective and Hypothesis

The purpose of this research is to evaluate the pricing performance of market advisory services in live cattle markets and also in hedging in corn, soybean meal, feeder cattle and live cattle markets. Following Irwin et al. (2006) two key research questions are addressed:

- Do marketing advisory services recommendations in the hedging of live cattle-related markets or in the selective hedging of live cattle markets produce results different the market benchmark? The null hypothesis is that advisory services do not produce results different from the benchmark. The alternative hypothesis is that advisory services do produce results statistically better or worse than the benchmark.
- Is there predictability of performance from quarter-to-quarter within a market advisory service's recommendations? The null hypothesis is that advisory service's do not exhibit and predictability of performance from quarter-to-quarter. The alternative hypothesis is that advisory services do exhibit predictability of returns.

Through the AgMAS program at the University of Illinois at Urbana-Champaign, recommendations were recorded for at least 23 services from 1995 through 2004. Nine advisory services gave consistent recommendations on live cattle during this time period. Forty quarters beginning in the first quarter of 1995 and ending the last quarter of 2004 are evaluated from the standpoint of the selective hedging of live cattle futures only. Of this subset, eight gave consistent recommendations for feeder cattle, and seven gave recommendations for corn and soybean meal as inputs to cattle feeding. Twenty-four quarters are evaluated beginning the first quarter of 1999 and ending the last quarter of 2004. This set of evaluations will determine

the net average price on purchases of feeder cattle, corn and soybean meal and sales of live cattle.

In both cases, the number of quarters to be evaluated is attractive because they should provide a large enough sample size to gain a reasonable understanding of true market advisory performance. This data set is not subject to survivorship bias because the AgMAS project subscribed and collected the recommendations in real-time. The selection of services was not random but was constructed as group to be representative of services offered to feedlot management. The services selected by the AgMAS project were originally selected for their corn and soybean service recommendations, but due to the diversity in the group the sample is also representative of services subscribed to by feedlots.

Performance relative to the benchmark will be measured by the proportion of advisory services exceeding the benchmark cash prices and the magnitude of this difference. A mean-variance framework will be used to compare the average price and risk of advisory returns against the market benchmark. Another performance measure will test predictability of results within a program from quarter to quarter.

Average prices in both the output-only and input-output strategies will be compared to a market benchmark. The benchmark is an average of spot cash prices for the quarter because it is assumed cash transactions are made routinely throughout the quarter. In the selective hedging scenario, this includes only a live cattle spot price while in the optimal hedging scenario the average spot price includes the live cattle price less the spot price from inputs from the appropriate quarters.

1.3 Data Computation

Procedures used to determine the net price received of an advisory service will be similar to those used by Irwin et al. (2006). Advisory service recommendations were collected daily on a real time basis by staff members of the AgMAS project at the University of Illinois at Urbana-Champaign. Specific information recorded for each recommendation included the date the recommended position is entered, futures or options price and percent and time period hedged.

Next, these recommendations are assembled in chronological order and input into models which compute the net price received for each advisory service for the corresponding quarter. It is assumed the feedlot manager will follow the recommendations precisely. Cattle feeding is relatively short run in nature and at any time there will be cattle at various stages of the feedlot. This is dissimilar to grain markets which are longer term and at any one time have at most two crops in different stages.

Because of the short run nature, only futures and options recommendations are followed from advisory services. It is assumed that all feedlots market their livestock on a similar schedule and the net advisory price is computed as the average cash price for the quarter plus or minus gains or losses and any brokerage costs associated with futures or options trades. Cash advice was transformed to futures recommendations in feeder cattle and feed recommendations because a large percent of the recommendations given were only in the cash market. Total net advisory prices were determined by matching average costs from input recommendations with the average price for live cattle of the associated quarters.

Each advisory service has a unique way of giving recommendations and to make them consistent and comparable for interpretation, a few assumptions were made. First, feedlots operate on a consistent production schedule and therefore receive the average cash price for their sales. Second, there is no lumpiness in trading futures contracts. When recommendations are made to lift hedges as cattle are sold, they are lifted on the Wednesday closest to the fifteenth of the month. If no recommendation is made to lift as cattle are sold, the position is held until a recommendation is given to exit or the expiration of the contract. Finally, all hedges in corn, soybean meal and feeder cattle are lifted on the Wednesday closest to the fifteenth of the month, regardless of recommendation.

1.4 Thesis Overview

The remaining chapters of this thesis are organized as follows: In Chapter 2 a general overview of the feedlot industry is given. Then a literature review presents research relevant and prior to this study. Topics covered include performance evaluation theory, mean-variance models, cattle marketing strategies, and market advisory service performance.

Chapter 3 presents the model used to derive an advisory service's net price received. Selection criteria of services and the collection of recommendations are discussed and a brief description of each service is presented. Following an explanation of the geographic location and marketing window assumed, the net price computation is presented. Next, the feedlot model and cash marketing strategy are discussed. Chapter 3 concludes with a summary of each cash price series and assumptions on brokerage fees.

Chapter 4 describes how an advisory service's marketing profile is constructed. The concept of deltas, or the weighting process for calculating net amount sold, is introduced. Other issues related to calculation of net amount sold are discussed and the chapter concludes with a discussion on marketing profiles and their different applications. The average of all marketing profiles for a given quarter depicts net amount sold for a typical service in the given quarter. Marketing profiles for live cattle, feeder cattle and feed are presented in this chapter.

Chapter 5 presents the benchmarks used for live cattle, feeder cattle and feed recommendations. For each set of recommendations, one cash benchmark is used. Also, performance evaluations of the advisory services' results in live cattle, feeder cattle, feed and margin hedging are presented. Programs are examined in a risk/return framework and predictability test results are presented. Next, a summary of the overall study including net pricing results, risk-return performance and predictability results is presented. In this final chapter, implications to the study are identified and a statement on potential further research is given.

2. LITERATURE REVIEW

2.1 Introduction

This review is designed to provide background on the cattle feeding industry and hedging strategies therein, as well as asses both the ability of a marketing advisory service to increase producer returns and their ability to manage risk. Previous research suggests private services may have the ability to marginally beat the cash market in corn and soybeans but not in wheat or hogs when partial hedges are used. Analysis in the area of simultaneous hedging in cattle proposes profits are increased when both inputs and outputs are hedged.

This chapter aims to provide an overview of previous research in the areas of cattle markets, performance evaluation, livestock marketing strategies and review of marketing advisory services in other commodities.

2.2 Cattle Markets

Revenues from the beef industry are a major part of the US economy. In 2006, cash receipts from cattle and calves of $49.1 billion accounted for 20.5% of total farm sector receipts. In 2007 the forecasted cash receipts are expected to rise to $50.3 billion. These values place the cattle markets as the highest source of cash receipts in the US farm economy.

The stages of cattle production include seedstock or genetic farms, cow-calf operations, and feedlots. Prior to entering a feedlot, calves are referred to as feeder calves. During the feedlot stage, calves are fed a high energy ration until they reach market weight. According to the Focus on Feeders data set, between 1995 and 2004 average start weight in a feedlot was 775 pounds.

Steers were on feed approximately 145 days and were marketed at 1250 pounds. At the time steers are ready for market, they are referred to as fed or fat cattle.

To assist in hedging risk on the fed cattle, a futures contract for live cattle was introduced on the Chicago Mercantile Exchange in 1964. It was the first futures contract on a non-storable contract. The feeder cattle futures contract began in 1971. It had the distinction of being the first futures contract which expires to a cash price index as opposed to expiring as deliverable.

Like other markets, the dynamics of the beef industry have changed significantly in the past years. Cattle feedlots are highly concentrated today as opposed to 25 years ago. Also, more small feedlots have exited the industry than large and the feedlots which have stayed in operation have increased in size. In 1972 there were 23.9 million head marketed by 104,340 feedlots in the top thirteen states. By 1995, these same thirteen states marketed 23.4 million head from 41,365 feedlots. Schroeder et al. (2000) state that some of these changes are because the USDA no longer regularly collects data from feedlots with less than 1,000 head one-time capacities.

According to the January 1 Cattle on Feed report published by the National Agricultural Statistics Service, Texas, Kansas and Nebraska led the US in cattle and calves on feed for the 1995-2004 period covered by this study. These areas of the U.S. are suitable for cattle production because of the availability of calves to put on feed, the proximity to feed supplies, and moderate climates.

In addition to consolidation in the feedlots, there has also been consolidation in the meat packing industry. This, in combination with a reduced number of feedlots has led to fewer buyers on both the input and output side of a feedlot. Schroeder et al. (2002) conclude this has had a

potential for both positive and negative effects. The larger firms are more efficient but there is also reduced price competition.

The authors conducted a survey on fed cattle marketing and pricing practices in Texas, Kansas, Nebraska and Iowa to better analyze the changes which have occurred over time in the way cattle are marketed upon exiting the feedlot. The objectives of the survey were to determine the marketing and pricing practices of cattle feeders and to solicit perceptions on various aspects of the marketing environment. 316 surveys were returned and included information on 1996, 2001 and expected 2006 practices. Results included information on cash versus grid pricing. In 1996 97% of fed cattle were sold in the cash market. This was expected to drop to 70% in 2006. This change in marketing method was a result of increased use of grid pricing. 88% of fed cattle were expected to be priced on the grid in 2006.

One reason for the shift to grid based pricing was that with cash or live weight pricing each head received the same price per pound regardless of quality. Grid or formula based, pricing allows for higher-quality cattle to receive a higher price. This reasoning was among the top motivation for feedlot managers to switch to grid pricing. Motivations also include the reverse flow on quality information received from packers. Despite what economists prefer, most grid pricing was based on a cash price series such as the Kansas direct trade. This is unfavorable to economists because there will still be an incentive for packers to keep prices low. Also, as fewer cattle are sold in cash markets, the markets will become thin and may become an unfavorable representation of current market conditions. 69% of feedlot managers realized that the thinning market would be harmful to the industry.

Marketing methods were also surveyed and like the pricing method results, shifts have been made away from traditional practices. In 1996 only 30% of feedlots sold their cattle through a marketing agreement. This percentage was expected to increase to 74% by 2006.

To determine the reasons behind which marketing channels were selected, Hobbs (1997) analyzed transaction costs that may be present in different channels in the United Kingdom. Surveys were sent to 100 cattle producers in Scotland in 1993 and data was collected to try and prove the hypothesis that the choice between live weight and deadweight sales were influenced by transaction costs. Fifty-six percent of all respondents sold all of their cattle directly to packers while ten percent sold all in live auctions. The dependent variable in this study was the proportion of a farmer's cattle sold through live auctions. Independent variables included transaction cost, producer and farm characteristics. Transaction costs variables evaluated were information, negotiation or monitoring costs. A Tobit model was used to ensure an upper and lower limit for the dependent variable. Final results demonstrated that the percent of cattle sold in a live auction was positively influenced by the degree to which the seller was unsure of the grade of the animal and negatively affected by risks such as the cattle not selling or an auction with large numbers sold.

2.3 Theory of Performance Evaluation

While the theory surrounding performance evaluation was first used in the area of financial investment, it can easily be applied to the evaluation of marketing advisory services. Feedlot managers are interested in the marketing advisory services' abilities to create profitable returns and manage risk. Performance evaluations may be thought of as one stage in the risk management process. Assessment of the performance evaluations of a particular service allow

managers to make comparisons between services and assessments of the service's performance relative to benchmarks.

Performance evaluations are not only beneficial to the end user. Services are also interested in assessing their ongoing performance and their performance relative to other marketing advisory services.

A major source of risk to feedlots is the cost of grain. Aside from the purchase of the feeder steer, feed costs are the next largest costs to be incurred. Fluctuations in prices of both inputs obviously have great impact on the profitability of the feedlot, but unlike feeder calve prices, corn prices and fed cattle prices do not always have a strong correlation.

2.3.1 Mean-Variance Model

Mean-variance, or E-V, analysis is the most common theoretical investment framework in modern investment theory. In addition to investment theory and analysis, this framework may also be applied to pricing performance of advisory programs.

Prior to applying E-V analysis to advisory program performance, statistical concepts must be reviewed. The first concept to review is expected return, or in a feedlot manager's case, expected price. P_{it} is defined as the net price received using advisory service *i* in quarter *t*. The expected price for advisory service *i* is the weighted-average price received over all possible *t*. The weight for each t is the probability of a given price occurring, which is equal across all quarters:

$$(1)\ E(P_i) = \beta_i = \sum_{t=1}^{T} f(P_{it}) P_{it}$$

where $E(P_i)$ is the expected price of advisory service i, β_i is an alternative notation that will be used for the remainder of this thesis, and $f(P_{it})$ is the probability of advisory service i's expected price in quarter t occurring.

The second concept in E-V analysis to review is price risk. The level of risk for each service can be determined by comparing an advisory service's price received over a given quarter with the service's expected price. A service is characterized as having little risk if it consistently performs near its expected price. If a service consistently has large deviations from its expected price, it is perceived as having high risk. The variance of the deviations from period to period is used to compute and quantify this risk.

An individual service's variance is the weighted-average of the squared deviations between each price and the expected price of the advisory service:

$$(2)\ \sigma_i^2 = \sum_{t=1}^{T} (P_{it} - \beta_i)^2 f(P_{it})$$

where σ_i^2 is variance for advisory service i, $(P_{it} - \beta_i)^2$ is the squared deviation of advisory service i's price in quarter t from the expected price of advisory service i, and $f(P_{it})$ is the probability of advisory service i's price occurring in quarter t.

Standard deviation may also be used to measure the risk of an advisory service. Standard deviation is the square root of variance and has the advantage of being in the same unit of measurement as expected price. Here, standard deviation is simply:

$$(3)\ \sigma_i = \sqrt{\sigma_i^2}\ .$$

The lower the standard deviation, the less risky an advisory service. The higher the standard deviation, the more risky an advisory service may be perceived to be.

Because the true value of the population parameters for an advisory services' net price is unknown, all parameters presented in the above formulas must be estimated. Given a sample of *T* observations, the conventional estimation formula for the expected price of an advisory service is (Anderson, Sweeney, and Williams, 1996, p. 169):

$$(4)\ b_i = \frac{\sum_{t=1}^{T} P_{it}}{T}$$

where b_i is the average price (estimated expected price) of advisory service i's price in quarter t. The conventional estimation formula for the variance of an advisory service is (Anderson, Sweeney, and Williams, 1996, p. 169):

$$(5)\ \hat{\sigma}_i^2 = \frac{\sum_{t=1}^{T}(P_{it} - b_i)^2}{T-1}$$

Where $\hat{\sigma}_i^2$ is the estimated variance of advisory service i, and $(P_{it} - b_i)^2$ is the squared deviation of advisory service$i$'s price in quarter *t* from the estimated expected price of advisory service i, b_i. Standard deviation is the square root of the estimated variance.

With this statistical review, the E-V framework for decision making may be presented. The basis for E-V analysis is a risk/return graph, as seen in Figure 1. This graph is divided into four quadrants, using the margin's risk and return (price) as horizontal and vertical axes, respectively. When an advisory service's risk and return are plotted against the benchmark, results in the upper left quadrant, or quadrant I are superior to the benchmark. The advisory service has a lower standard deviation and higher expected price than the benchmark. Advisory

services in the lower right hand corner, quadrant IV are inferior to the benchmark because they have a higher standard deviation and lower expected price than the benchmark. Quadrants II (lower left) and III (upper right) are areas where generalizations regarded performance relative to the benchmark cannot be reached. In these quadrants an individual producer must weigh the increased/decreased risk with the higher/lower returns based on their own risk preferences.

For example, suppose the market benchmark is $60.00/cwt. with a standard deviation of $8.00/cwt, as seen in Figure 1. Suppose advisory service 1 has an expected price $62.00/cwt and a standard deviation of $4.00/cwt and advisory service 2 has an expected price of $55.00/cwt and a standard deviation of $15.00/cwt. Advisory service number 1 is preferred over both the benchmark and advisory service 2 because advisory service 1 has a higher expected price and lower standard deviation. Advisory service 2 is inferior to both advisory service 1 and the benchmark because of its lower expected price and higher standard deviation.

One of two assumptions must hold for E-V analysis to be applicable to market advisory service pricing performance (Ladd and Hanson, 1991). The first assumption is that a producer must exhibit a quadratic utility function. This is usually rejected because it implies increasing absolute risk aversion and negative marginal utility above a certain level of income. The second assumption is that advisory service prices are normally distributed. This assumption is also violated because many producers use options in their hedging and marketing strategies. Hanson and Ladd (1991) investigated the ability of the standard linear mean-variance (E-V) model when the income probability distribution function is truncated by the use of options. They used different models to accommodate the use of options. The authors suggested that even though the static results of the E-V model are not always consistent with the Expected Utility (EU) model,

the E-V model produced results close to that of the EU model. They concluded that the E-V model is robust for the particular violations that they studied.

The robustness of the E-V model in the presence of options was also explored by Garcia, Adam, and Hauser (1994), and their results were consistent with those of Ladd and Hanson (1991). The E-V analysis was not very different from the EU analysis in most cases. Limited differences in the shape of the utility functions existed except at very low levels of wealth. Garcia, Adam, and Hauser concluded that the E-V model in a useful evaluation tool. It is reasonable to argue that the E-V framework is applicable when evaluating market advisory service performance.

2.4 Empirical Studies of Cattle Marketing Strategies

This section reviews previous empirical studies conducted on cattle marketing strategies. Research on marketing strategies may be divided into two groups: those using a partial hedge, hedging live cattle only and those using optimal hedging, hedging inputs and outputs simultaneously.

Partial Hedge

To evaluate hedging strategies from the vantage point of a financial position instead of mean and variance, Purcell and Riffe (1980) developed and tested selective hedging strategies based of price prediction models and technical systems. Strategies were judged based on 30 day flows of cash and/or futures and on the ability of the price prediction model as a technical hedging program.

Technical trading signals were given by 5- and 15- day moving averages and point and figure charts. In the case of the moving average signals, hedges were placed which shorted live cattle when the 5-day moving average penetrated the 15-day from above. Hedges were held until a buy signal was generated or until the end of the feeding cycle, whichever came first. The point and figure chart signals were implemented in much the same way. Futures were shorted when double bottoms were violated and lifted on a buy sign or the end of feeding. Using the cash price prediction model, hedges were placed when the forecasted cash price was below the futures market. For comparison purposes, no hedging, routine hedging and combinations of the technical and price prediction models were also analyzed.

Results indicated that when combined with the cash transaction of selling the finished cattle, only the technical trading strategies had positive net results. These strategies also had the lowest variance of cash flows, lowest mean negative flow and small overall ranges. The routine hedging strategy had almost as much variance in cash flow as the no hedging model and also had the most negative mean value. Strategies incorporating the price prediction model were not significantly different from each other and had results between those of the routine and technical hedges. The authors concluded that technical trading strategies best protect cash flow when compared to a routine hedging strategies, especially in periods of fluctuating prices.

In a similar study, Gorman et al. (1982) analyzed hedging strategies for fed cattle through simulation. Unlike previous research, this study used actual feedlot data as opposed to assumptions on number of cattle going in to the feedlot and the costs associated. Data was made available from a commercial feedlot beginning in 1971 and 741 pens were included in the study. This study analyzed one cash-only scenario and five hedging scenarios. The scenarios varied

from a routine hedge strategy to a moving average strategy to a strategy allowing no cattle to be placed on feed.

Over the time period in question, results showed that cattle feeding on average resulted in a market loss of $24.50 per head. Implementing a hedging strategy could have reduced the loss by 50 percent. Due to market factors at the time, some strategies preformed better than others, but no strategy resulted in a profit that was greater than the average cash market loss.

Schroeder and Hayenga (1988) evaluated the performance of various feedlot marketing strategies. A feedlot model was developed to analyze various marketing strategies. Primary focus was placed on alternative hedging and option strategies. The objective of this research was to compare returns generated by selective live cattle put options and standard hedging strategies from 1978 to 1985. The feedlot model used in this study simulated buying feeder cattle each month at an average weight of 650 pounds and marketing the animals six months later at 1150 pounds.

Strategies followed include cash purchase of corn and feeder cattle and cash marketing of fed steers, a routine fed cattle hedge and a routine fed cattle put option. Also analyzed were strategies based on price forecasts for corn and feeder cattle. These strategies varied in the marketing strategy with respect to fed cattle marketing and include selling on a cash basis, hedging fed cattle at placement or purchasing fed cattle puts when net localized futures price is greater than breakeven plus profit margin or greater than the forecasted price (adjusted or unadjusted for standard error).

The strategies were examined *ex ante* for the seven year period. The authors concluded the strategies which included a signal based on profit margin provided the highest average returns. Different market conditions led different strategies to be most successful. For example, during years of rapidly increasing prices, put options strategies led to the best returns. When prices were stable, hedging strategies out-performed. The authors noted that a combination of cash, hedging and options would lead to better results than using one single strategy.

Hedging strategies for Canadian cattle were studied by Carter and Loyns (1985). Because much of the price risk in Canadian cattle feeding is due to US market factors, it was thought that some of the instability could be eliminated by hedging in the US cattle futures markets. The authors used actual feedlot data to evaluate the potential risk management's effects on bottom line.

Four general strategies, routine, naive and selective hedges along with a threshold strategy were analyzed. In addition to hedging the cattle, risk due to changes in the exchange rate were managed by forward pricing the Canadian dollar against the US dollar.

The authors concluded that hedging Canadian feeder cattle in the US futures market would have reduced profit and increased the price risk in most scenarios due to basis and exchange rate risk. Hedges under the routine strategy greatly reduced average profit, (negative with exchange risk) and increased variation of the return. Exchange rate risk was a major risk point and significant source of loss. The authors suggest that for hedging in US markets to be profitable, more complex strategies should be explored.

Input-Output Hedging

Shafer, Griffin and Johnston (1978) were among the first to study simultaneously hedging both inputs and outputs. A cash only marketing strategy was compared to strategies which allowed a producer to place simultaneous hedges or not place any animals on feed or place animals but use cash marketing.

Whether hedges were placed or not depended on if an expected lock-in margin was greater than or equal to a predetermined required lock-in margin two months prior to placing cattle on feed. Two other strategies analyzed included a) being able to lock in short live cattle futures at any time after cattle were placed and b) using 10- and 5-day moving averages as buy and sell signs in feeder and corn and live cattle futures, respectively.

Lock-in margins were set at $10, $15, and $20 per head levels. Due to cost changes in the period of analysis, different strategies excelled at different times. In a period of rising cattle prices, the cash marketing strategy was the most profitable. No hedges were triggered during this time period. When cattle prices were falling, the cash marketing strategy resulted in losses. The strategy bases on technical signals preformed the best, but the other hedging strategies produced positive returns as well. Finally, in the third period, the cash marketing strategy was again the most profitable. All hedging strategies were triggered at some point and produced positive returns. While these average returns were lower than under the cash marketing strategy, all except the technical strategy had variances significantly lower than the cash strategy.

Spahr and Sawaya (1981) investigated prehedging strategies for feeder operations which bought feeder cattle and sold fat cattle. Under the prehedging strategy all major factors of

production and the end-product were prehedged. Markets for feed, feeder cattle and slaughter cattle were analyzed before purchasing feeder cattle. If adequate profit could be assured, simultaneous hedges in the three markets were made. In this study, the first attempt to place a prehedge occurred seventeen weeks prior to purchase of feed and feeder cattle and thirty-nine weeks prior to the sale of fed cattle. If the hedging profit at this time was more than some cut-off level buying hedges were placed on corn and feeder cattle and a selling hedge was placed for slaughter cattle. Hedging profit was checked each week until hedges are placed or feeder cattle are purchased in the cash market.

The 261 weeks through 1974 to 1978 were analyzed with hedging profit levels from -$10 to $60. Results indicated that a feedlot operator would be able to reduce risk while increasing return per head by using the aforementioned prehedging strategy. In periods of depressed prices and high profitability, cattle feeders using prehedging strategies received approximately $10 per head more than if they would not have hedged.

Noussinov and Leuthold (1998) compared multiproduct optimal hedging to alternative hedging strategies. This model simulated the actions of a feedlot operator who, one month prior to placing feeder calves in the feedlot hedged inputs of feeder cattle, corn and soybean meal along with the output, fed cattle. At the time the inputs were purchased or finished cattle were sold, hedges were lifted. Alternatives to this strategy that were also analyzed include hedging each commodity individually or hedging them all in the same proportion. Fully hedged or unhedged positions were considered special cases of hedging with the same proportion. Optimal hedging ratios were determined for multiproduct hedges and compared to hedging proportionate amounts or single commodities.

The mean-variance framework was used to measure the effectiveness of multiproduct hedges over simpler approaches. The reduction in variance of the hedged position compared to an unhedged position was analyzed. It was found that all hedging strategies significantly reduced the variance compared to not hedging and no one strategy consistently dominated.

2.5 Empirical Studies of Market Advisory Service Performance

The abovementioned studies demonstrate the range of options in hedging strategies that are available to a feedlot manager. While there are many strategies a feedlot manager could employ, the research suggests that no one strategy outperforms. An alternative to following a particular hedging strategy every period is to follow the advice of a market advisory service. Little research has been done evaluating the performance of these services in livestock markets and none has been performed in cattle markets. While market advisory performance in pork has been discussed, the research available on market advisory services has primarily been limited to grain markets.

Gehrt and Good (1993) preformed early research in the area of market advisory services. The study examined the performance of five services' recommendations over a five year period in corn and soybean markets. The price which the farmer would have received from following the service was compared to a cash benchmark. To determine the price received by the farmer, weekly newsletters from the services were reviewed. It was assumed that a farmer followed the advice exactly. Three marketing strategies for each crop were available- cash only, cash and futures and options hedging. A set of rules applied to the interpretation of the strategies and allowed for an average annual net price received to be determined. The net price received was

compared to the average of daily prices offered to farmers from February, in pre-harvest, until August after harvest, less computed storage and interest charges.

Results of this study suggested that following recommendations would result in an annual price received for both corn and soybeans that exceeded the benchmark. Year to year, however, no specific service was superior in both commodities and the authors suggest that an optimal strategy may be to follow one service for corn and another for soybeans.

The results of this study have one main drawback—a small sample. The study included only five services over five years, limiting the conclusions which could be made. To address the problem of small sample size, the AgMAS project began at the University of Illinois at Urbana-Champaign in 1994. The intention of the project was to provide unbiased evaluations the pricing performance of marketing advisory services. To date, performance has been evaluated in corn and soybeans, wheat and pork. The results of these studies are discussed below.

Jirik et al.(2001) evaluated the performance of market advisory services' recommendations in wheat from the 1995 to 1998 crop years. There were between 20 and 24 services evaluated during the time frame and cash and hedging recommendations were applied to a simulation representing a soft red winter wheat farmer in southwest Illinois. Net price received for the marketing program was computed for a marketing window which began on June 1st prior to harvest through May 31st.

Once the net price received was calculated for each program, it was compared to three market benchmark values. The benchmarks analyzed were a 24-month, a 20-month and a 16-month average cash price benchmark. In addition to implementing all hedging as recommended

by the program, load deficiency payments were also recorded whenever appropriate. Yield was estimated by using expected yield in the pre-harvest period and actual yield after harvest. In addition, brokerage and carrying charges were included to determine the net price received.

The performance of each program was evaluated on three factors. The first performance measure was whether or not the services „beat' the benchmark. Second, the magnitude and direction of the difference between the average price received and the benchmark was evaluated. Third, the correlation between positive performances year to year provides insight on the ability to predict future performance based on past performances.

Results of this study did not suggest an ability to beat the market by using hedges recommended by marketing advisory services. Positive performance across all programs was denoted as at least half of the programs beating the market benchmark. In 1995, 13 of 24 programs had a net price received statistically greater that the benchmark. In 1996, only four programs beat the benchmark. In 1997 and 1998 the number of programs which beat the market reduced to two and one, respectively. These results suggest a strong inability to beat the market.

When comparing the magnitude and direction of gain/loss above the benchmark, results again suggested little ability to beat the market. Over the entire period from 1995-1998, average return after following program advice was 10.48% less than the benchmark. Comparison of the correlation between results from year to year suggested the correlations were small, at best.

A similar study was conducted in hogs by Webber (2003). Here, pricing recommendations by quarter from 1995 to 2001 were evaluated. The model represented a hog producer near the Iowa/Minnesota cash market who operated on a constant production schedule.

Unlike Jirik, only hedging in the futures market were evaluated and the same cash strategy was assumed over all programs because of the short-run nature of the hog production.

Programs were evaluated on three performance measures. First, the average price of the program was compared to a benchmark. Second, average price and risk were compared to the benchmark. The third measure evaluated the predictability from quarter-to quarter of advisory service performance. The three benchmarks used in evaluating performance were an average cash price, an index benchmark which included routine hedging, and an empirical benchmark based on the average marketing profile given by advisory services.

Comparison to the different benchmarks revealed substantial differences in the proportion of services that beat the benchmark. Like Jirik, the ability to beat the market was defined as having average proportions of greater than 50% of services greater than the benchmark. With regards to the cash benchmark the average proportion was 41%, indicating a lower than average chance that services would exceed the benchmark cash price. The index benchmark had an average proportion of 56% indicating a slight ability to exceed the benchmark. Finally, the empirical benchmark showed a proportion of 46%, which like the cash benchmark, indicated a less than average chance to exceed the benchmark.

Also, the average difference from the benchmark across all quarters was analyzed. A positive value was the result of the advisory services' average price being above the particular benchmark. Across all quarters and all services, the average price received was $-0.41/cwt, $0.00/cwt, and $-0.27/cwt for the cash, index and empirical benchmarks, respectively. This analysis also showed little ability for advisory services to „beat' the market.

When including the risk of the service along with the average price, results also show little evidence of services' ability to outperform a market as a group. Mean-variance framework and mean-standard deviation dominance were used to assess the results of individual programs' risk. If a program had higher average price and lower standard deviation, it exhibited mean-standard deviation dominance over the benchmark. A lower advisory price and higher standard deviation showed the benchmark had dominance over the advisory service. Another option was if price was lower and standard deviation was lower or if price was higher but standard deviation was also higher. Here, neither the advisory service nor the benchmark exhibited dominance over the other.

Comparison to the cash benchmark showed that three of the nine programs dominated the benchmark while the benchmark dominated two programs. In all cases the dominance was statistically significant. No programs dominated the index benchmark, while the benchmark dominated four programs; two of which were statistically significant. Finally, comparison to the empirical benchmark shows three programs having dominated the benchmark (one being statistically significant), while the benchmark dominated two programs. Overall, six programs dominated benchmarks and eight benchmarks dominated programs. These results suggested advisory services as a group did not outperform the benchmarks.

The third performance measure evaluated the predictability of a service from one period to another. Like Jirik, Webber measures predictability through the correlation coefficient of two adjacent periods. A service with little or no predictability will have a correlation coefficient near or at zero. As Jirik predicted in wheat, there is little evidence that suggests a service's performance can be predicted from past performance.

After combining the results of the three performance evaluations the author concluded there was little evidence to suggest ability for marketing advisory services to beat the market when giving recommendations in hogs.

Irwin et. al. (2006) reviewed pricing performance of market advisory services in corn and soybeans over 1995-2004. This study had two performance measures. First, it measured the percent of advisory programs in the top-third of the corn and soybean price ranges and it also reviewed the market advisory price relative to benchmarks.

This study was based on a common belief that farmers typically underperform in managing price risk and market two-thirds of their crop in the bottom third of the price range. This study followed at least 23 market advisory services that farmers often turn to when aiming to improve their price management performance.

Recommendations from advisory services were collected by AgMAS staff in real time and aligned them chronologically within each marketing year from 1995 to 2004. A net price for each advisory service program was calculated for the corn and soybean crops based on assumptions that a) generally speaking, the marketing window runs from the September before harvest to the August following harvest, b) on-farm or commercial physical storage costs and interest costs were charged to post-harvest sales and c) Commodity Credit Corporation (CCC) marketing loan recommendations are followed whenever feasible.

To measure the percent of advisory programs in the top-third of the corn and soybean price ranges, all pre- and post-harvest prices for the 24-month marketing window were aligned from high to low. Then, percentiles of the daily price distribution were computed. Finally, the

percentiles were applied to the prices and the 0, 33rd, 66th, and 100th percentiles of the price range were determined. The frequency of net advisory prices falling in the top-, middle-, and bottom-third of the price range over 1995-2004 was similar for both corn and soybeans. Both had the largest frequency in the middle third of the price range, ranging from 58% to 63% for corn and 67% to 69% for soybeans and relatively equal frequencies in the lower- and upper-third.

In the second performance measure, an advisory service programs' net price received was then compared to a benchmark. In this study, two types of benchmarks were used for each corn and soybeans. First, both a 20- and 24- month market benchmark were defined. Second, two alternative farmer benchmarks were also specified. For corn, average differences from the market benchmarks ranged from 2 cents to 5 cents per bushel. Average difference from farmer benchmarks ranged from 9 cents to 11 cents. For soybeans, the average differences from the market benchmarks ranged from 14 cents to 16 cents per bushel. The average difference from farmer benchmarks was 4 cents per bushel.

Because many farmers farm both corn and soybeans, another price performance measure was created that analyses advisory revenue on a 50/50 corn/soybean model. Average differences for the market benchmarks under the 50/50 revenue scenario ranged from $5 to $7 per acre. These differences increased to $8 to $12 when compared to the farmer benchmark.

Overall, the evidence presented in this study suggests that the pricing performance of market advisory services relative to opportunities provided by the market itself are modest at best. Under the first performance measure, both corn and soybeans pricing, the largest average frequency occurred in the middle third of the market while equal proportions occurred in the lower- and upper- one third of the market.

Under the second performance measure, the average difference from market benchmarks were less than 10 cents a bushels for both corn and soybeans. The average differences to farmer benchmarks were higher, ranging from 14 to 16 cents per bushel for soybeans and 9 to 11 cents per bushels for corn. Average differences for the 50/50 scenario were 5 to $7 per acre higher than the market benchmark and 8 to $12 per acre higher than the farmer benchmark.

2.6 Summary

This chapter summarized literature relating to the feedlot industry, hedging strategies and market advisory service research. The literature surveyed posits that no particular live cattle or input/output hedging strategy outperforms another or out performs a cash-only strategy.

Previous AgMAS studies suggested that subscribing and following recommendations given by market advisory services gives the subscribing parties a marginal advantage in the market when hedging corn and soybeans. No advantage was seen when hedging wheat or hogs.

3. DATA AND SIMULATION METHODOLOGY

3.1 Introduction

This intent of this chapter is to explain the process used to derive an individual advisory service's net price. A service's ability to provide clear and concise recommendations provides the base for developing a services' hedging scenario. Recommendations are applied to a feedlot model designed to be representative of a western Kansas feedlot. The marketing window for this study is nine months long, mirroring the average amount of time a steer is in a feedlot on average.

Cash prices from the western Kansas area are used to simulate the prices a feedlot manager in western Kansas would be a participant in. These markets include the Kansas direct slaughter series, Kansas direct feeder cattle, western Kansas corn and Kansas City soybean meal price series. Marketings and purchases are hedged through the live cattle, feeder cattle, corn and soybean meal futures contracts at the Chicago Board of Trade and Chicago Mercantile Exchange.

3.2 Collection of Recommendations

Collection of marketing advisory service recommendations follows the guidelines set forth in Irwin, Martines-Filho, and Good (2002) for corn and soybeans. It is recognized that the group of services selected is not a random sample and does not comprise the entire population of advisory services available to feedlot managers. There is no clearly defined designation of what constitutes as a marketing advisory service and therefore the AgMAS project developed a set of criteria to determine which services to include in this study. Irwin, Martines-Filho, and Good (2002) offer five criteria to determine which studies to include in AgMAS studies.

The first criterion is that recommendations must be received electronically and in "real-time". This ensures that a feedlot manager would be able to implement them as recommended and that the recommendations are not received after they were to be implemented. Sources for the services tracked include emails, websites and satellite news services. The postal service is not a valid source because of delay of delivery.

The second criterion is that the recommendation must be intended for a feedlot manager who is hedging as opposed to a speculator or trader. Speculative advice is given by some marketing advisory services which are tracked by the AgMAS project, but the hedging and speculative advice must be clearly distinguishable and only production marketing advice may be followed. There is no attempt, however to distinguish between futures and options used for speculation and futures and options used for hedging in a feedlot marketing strategy.

The third criterion specifies services must give recommendations in a manner that easily suits a representative feedlot. The recommendation must include the percent of production for a given marketing period and the futures and/or options price; where applicable, the date of implementation must also be included. An example of this type of recommendation may be to hedge 25% of second quarter live cattle marketings with June futures at 98.75. A recommendation that states to hedge two June live cattle contracts for June cattle marketing may not be included in this study because two contracts may represent different proportions of marketings to feedlots of differing size.

The forth criterion is that a service must give "one size fits all" type recommendations. The recommendations are not to be customizable to individual customers although various programs such as aggressive or basic hedging programs may be given.

The fifth criterion specifies that any services subscribed to must be viable commercial businesses. Someone with little or no expertise may easily start up an advisory service due to advances in Internet and email technology. Therefore, it is necessary to exclude firms which are not viable commercial businesses, but the criterion is not restrictive to new or small firms which have recently begun operations.

Originally, marketing advisory services were selected from a list of Premium Services maintained by two agricultural satellite news services, Data Transmission Network (DTN) and FarmDayta in 1994. The list of services from these two news networks does not attempt to include all marketing advisory services but does include those services which are most in demand from users. It must be noted that the services were originally selected for use in evaluating recommendations in the corn and soybean markets and not in livestock. Therefore, the sample of services may not include all the most relevant advisory services to feedlot manager, but does attempt to provide a representative sample of the majority of services available.

Between 1995 and 2004 at least twenty-three services were tracked by the AgMAS project. Nine of these services provided consistent recommendations in the live cattle futures market. Of this subset, eight provided recommendations on hedging feeder calves and seven provided recommendations for corn and soybean meal as inputs in addition to the live cattle recommendations. The nine services providing live cattle recommendations were included for the entirety of the time period and there were no additions or deletions to the service list during the study. Hedging recommendations on the input side were not available until the first quarter of 1999 when all marketing services' recommendations were recorded electronically, and therefore the time period for evaluation of input-output hedging recommendations runs from

1999 to 2004. Unlike advisory services in grain markets, services only recommended one distinct marketing program. There were no separate programs for basic or aggressive hedging as was the case in the grain and hog analysis (Irwin et al 2006, Webber et al 2004).

Unlike grain markets, livestock markets are non-storable in nature. Few marketing advisory services give recommendations on cash marketing and those who do have recommendations that are very short run in nature. As in Webber et al. (2004), in this analysis, it is assumed that the feedlot manager will employ a cash marketing (or cash buying) strategy that results in obtaining the average cash price over the quarter. Of the nine services followed in this study, these cash recommendations are not followed, and should a service give recommendations on cash marketing exclusively it will not be followed.

Recommendations given on feed and feeder cattle as inputs to the feedlot were given as strictly cash the majority of the time. Eight services gave input recommendations for feeder cattle and seven gave input recommendations for feed. Most services that gave feed recommendations issued both cash and futures recommendations. One service gave specific cash advice for feeders. To increase the sample of available recommendations, cash recommendations for feed and feeders were converted to futures recommendation. Only specific cash advices such as "forward contract January corn needs in the cash market tomorrow" were followed. Vague recommendations such as "stay hand to mouth on corn needs" were not tracked.

There are three potential forms of survivorship bias Irwin et al. (2006) found which may be a problem when collecting the recommendations given by advisory services. Survivorship bias may bias performance upwards since the „survivors' have higher performance than „non-survivors' (e.g. Brown et al. 1992; Carpenter and Lynch 1999). The first form of survivorship

bias occurs when the sample of services is limited to services that are in business at the end of the period. The sample of services in this analysis will not be subject to this form of survivorship bias because all the services which gave consistent recommendations were in business for the entire collection period.

The second form of survivorship bias occurs when a service is excluded from the sample in the quarter when they are discontinued. This is a form of survivorship bias because only survivors of a full quarter are tracked. This form of survivorship bias will not be present in this analysis because no service was discontinued during the range of years in which recommendations were collected.

The final form of survivorship bias which has the opportunity to be present is a result of recommendations being „back-filled' at the point of time when the program was added to the database. This is not relevant here because no advisory programs in the AgMAS project were back-filled. Recommendations were collected only for the quarter after an advisory program had been added to the database.

Also important when assembling a database on advisory program recommendations is the consideration of hindsight bias (e.g., Jaffe and Mahoney, 1999). This is the tendency to record only profitable recommendations and ignore or minimize unprofitable recommendations after the fact. Since the AgMAS project subscribes to all of the services that are followed and records recommendations on a real time basis, the recommendation database should not be subject to hindsight bias.

When recording recommendations of each advisory program, specific attention is paid to which marketing quarter's production or purchases are being hedged, the amount of production

to be sold (or inputs to be purchased), which futures and/or options contract to use, and any price targets that are mentioned. An example of a complete recommendation is as follows: Sell 25% of fourth quarter (2004) marketings at $86.00/cwt or better. The pricing target given in a recommendation like this example would be considered "good-till-canceled" and noted until either the recommendation is filled, canceled, or the contract expires.

Several procedures are used to check the recorded recommendations for accuracy and completeness. Whenever possible, recorded recommendations are cross-checked against later status reports provided by the relevant advisory program. Also, at the completion of the marketing quarter, it is confirmed that all futures positions are offset, all options positions have been offset or expired and that all spot cash sales add up to 100%.

The final set of recommendations attributed to each advisory service represents the best effort of the AgMAS project staff to accurately interpret information made available by each advisory program. In cases where a recommendation is considered vague or unclear, some judgment is used as to whether or not the recommendation should be included or how it should be implemented. Because some recommendations are subject to interpretation, it is acknowledged that the AgMAS track record of recommendations for a given program may differ from that of the advisory program, or from that recorded by another subscriber.

3.3 Services Included

Nine advisory services were included in this study. The services all met the five criterion established above and gave recommendations for live cattle marketing. All services were included for the entirety of the evaluation. A short summary of each service, its physical location, commodities tracked and website follow.

- Ag Line by Doane: Ag Line by Doane has a hedging program for live and feeder cattle using futures only. Ag Line by Doane is located in St. Louis, Missouri, and their website is: http://www.doane.com.
- Ag Resource: Ag Resource uses both futures and option for its live cattle recommendations and uses futures only for feeder cattle, corn and soybean meal. It is based in Chicago, Illinois. Ag Resource's website is http://www.agresource.com.
- Ag Review: Ag Review used both futures and options for live cattle, feeder cattle, and corn recommendations. Futures only are used for soybean meal. Ag Review is an email service based in Morton, Illinois.
- AgriVisor: AgriVisor uses both futures and options for live cattle hedge recommendations. Futures only are used for corn and soybeans. AgriVisor is located in Bloomington, Illinois. Their website is http://www.agrivisor.com.
- Brock: Brock Associates uses both futures and options for live cattle, corn and soybean meal recommendations. Futures only are used for feeder cattle. Brock is based in Milwaukee, Wisconsin, and their website is http://www.agmarketing.com.
- Pro Farmer: Pro Farmer is based in Cedar Falls, Iowa, and uses both futures and options for live cattle hedging recommendations. Futures only recommendations are given for feeder cattle and corn. Their website is http://www.profarmer.com.
- Stewart-Peterson: Stewart-Peterson uses both futures and options for live cattle hedging recommendations. Options only are used for feeder cattle. Stewart-Peterson is located in West Bend, Wisconsin, and their website is http://www.stewart-peterson.com
- Top Farmer Intelligence: Top Farmer Intelligence uses a combination of futures and options for live cattle, corn and soybean meal recommendations. Only futures are used

for feeder cattle hedging. Like Stewart-Peterson, Top Farmer is also based in West Bend, Wisconsin. It is a separate service from Stewart-Peterson but recommendations are compiled by the Stewart Peterson group. Top Farmer's website is: http://www.topfarmer.com.

- Utterback Marketing Services: Utterback Marketing Services uses a combination of futures and options for live cattle, feeder cattle, corn and soybean meal. They are located in West Lafayette, Indiana. Their website is http://www.utterbackmarketing.com.

3.4 Geographic Location

The simulation is designed to characterize conditions facing a feedlot in western Kansas. This area corresponds to the Kansas direct slaughter, the Kansas direct feeder cattle, western Kansas corn and Kansas City soybean meal cash series published by the Agricultural Marketing Service of the USDA. While the volume of slaughter cattle sold in cash markets has decreased substantially, the Kansas direct slaughter series represents an area with a large population of feedlots and is widely followed. According to the January 1 Cattle on Feed report published by the National Agricultural Statistics Service, Kansas ranks second behind Texas for the number of cattle and calves on feed. Over the 1995-2004 period of this study, Kansas had on average 2.3 million head on feed for the January 1st report. With the high number of cattle on feed in Kansas, cash corn and soybean meal markets are followed through the western Kansas corn and Kansas City soybean meal cash series.

3.5 Marketing Window

The time period over which a feedlot manager normally makes pricing decisions is termed the "marketing window." It can also be referred to as the pricing "decision horizon" or

"timeline" of the feedlot. The marketing window does not necessarily equal the time of observed market activity. The reason is that not taking action (e.g., not hedging prior to purchasing input or marketing the live cattle) is one type of decision that can be made during a marketing window.

In the present context, the objective is to define the marketing window of a representative feedlot manager who subscribes to the advisory programs tracked by the AgMAS project. Good, Hieronymus, and Hinton (1980) provide a useful starting point for the conceptual framework. Here, the authors stated that the marketing window for a grain farmer should begin at initial production planning and continue until the end of the storage season. In livestock where there is no storage, the marketing window will end once the input is purchased or the output is sold.

The marketing window concept may be applied to feedlots as well. Production planning begins prior to the feeder calves being purchased. Following Schroder and Hayenga (1988), the marketing window for this study is six months. This six month time frame corresponds with the number of days cattle are typically in the feedlots. This same six months prior marketing window is used for input purchases of feeder cattle and feed. In both cases, the marketing window ends on the last day of the quarter for a total duration of nine months. Hypothetical timelines for live cattle, feeder cattle and feed are found in Table 1.

As stated earlier, the marketing window does not necessarily perfectly encompass the time of market activity; often, recommendations begin before the marketing window. For example, in July, 1997 Ag Resource recommended that 50% of the following March and April live cattle marketing be hedged at $75.00. This was filled July 16, 1997. Typically, the marketing window for Q2 marketings begins in October, but in this example, hedges were recommended, and therefore assumed executed, prior to the start of the marketing window.

Because the marketing window is defined as the average, "normal" window, it is argued that a representative feedlot operator would approach the marketing window with some flexibility, particularly for recommendations that do not extend far outside the limits of the window. A common exception to the marketing window parameters occurs when programs have open positions after the date of the last cash sales for the quarter. This occurs because contracts are often used to hedge more than one quarter. If no specific recommendation is given to exit the position as cash sales are made, the live cattle output hedges are held until there is a recommendation to lift the hedges or the contract expires. Due to the nature of input hedges, all input hedges are liquidated on the Wednesday closest to the 15th of the month in which purchases are made, regardless of whether or not a recommendation is made to do so.

3.6 Net Advisory Price Computation

The methodology used to determine net price received from each advisory service is similar to the procedure used in earlier AgMAS reports (e.g. Irwin et.al., 2006). The stream of collected recommendations is aligned in chronological order and returns to each futures and options hedging recommendation are calculated to arrive at a weighted average net price received by a farmer who precisely follows the marketing advice, as recorded by the AgMAS project. As mentioned earlier, all advisory services are assumed to use the same cash marketing strategy because cash live cattle recommendations are limited and short run in nature.

The net advisory price in the output-only hedging case is computed as the average cash sales price plus or minus gains/losses and brokerage costs associated with the futures and options transactions. In the input-output hedging scenario, the net advisory price is computed as the net advisory price from the output only scenario plus or minus gains/losses and brokerage costs

associated with feeder cattle and grain transactions. A comparison of the net advisory price will be made to a quarterly average cash price benchmark. The following sections discuss specific aspects of computing the net price of each advisory service.

3.6.1 Feedlot Model

The feedlot model used in this study is based on the Focus on Feedlots dataset. This dataset was created by Kansas State University to provide basic feedlot information. Production in the theoretical model feedlot is assumed to be four hundred weights per year. In actual feedlots, the most marketing occurs in the third quarter and the fewest in the fourth quarter due to weather conditions and feedstock sources available during the time the cattle are on feed. The seasonality of feedlot marketings is reflected in this production model and quarters are weighted using data from the Focus on Feedlots dataset. The third quarter receives the heaviest weight and the fourth quarter the lightest weight; together with the first and second quarters, the four quarters have a total per year marketing of four hundred weights. Weights for fed cattle marketings per quarter are found in Table 2. If an advisory service gives a recommendation for a feedlot to hedge 50% of fourth quarter marketings, this translates to 0.39 hundred weights (50% * 4^{th} quarter weight of 0.7833). This allows total gains and losses associated with futures and options to be comparable to estimated cash sales.

Input usage for each quarter is based on the production model of four hundred weights per year. Feeder cattle, corn and soybean meal are weighted to reflect marketing the weighted amount of marketings in a respective quarter. The average gain per head is based on the Focus on Feedlots dataset. The average market weight of a live fed steer between 1995 and 2004 was 1,250 pounds. The average start weight per head over this same time period was near 650

pounds. For simplicity however, this study markets on average one hundred weight per quarter as opposed to one head. To market one head, 0.61 (650/1,250) hundredweight of feeder cattle must be put on feed.

In this hypothetical feedlot, each hundred weight is on feed for five months. If placed on feed January 15, it is marketed on June 15. As discussed previously 1/3 of each quarter's marketings are made on the Wednesday closest to the 15th of the month, each month in the quarter. The placement for fed cattle marketed in Quarter 3 began February 15 and continued March 15 and April 15. Each quarter's weight may be found in Table 2. The low weights for feeder cattle as an input in Quarters 2 and 3 correspond to the low marketing of fed cattle in Q4.

Feed consumption for the hypothetical one hundredweight of marketed animal is calculated in the same manner as feeder calf placement. Average feed consumed per head was deduced partly through the Focus on Feedlots dataset and partly through (interview with ANSC professor). For this model, it was assumed that in the first month a feeder calf was on feed it consumed 7 bushels of corn and for each subsequent month, 11 bushels of corn were consumed, with 200 pounds of soybean meal were consumed equally each month. Quarter weights for both corn and soybean meal are found in Table 2.

3.6.2 Cash Marketing Strategy and Quantity Sold

The representative feedlot in this example is assumed to be large enough that the lumpiness of contracts is not an issue and therefore the manager can hedge the exact amount needed for both input and output hedges. Specifically, if a recommendation is given to hedge 25% of 4th quarter production, a feedlot is expected to hedge exactly 25%, not roughly 25%.

Furthermore, a constant production schedule is assumed, which assures that the representative feedlot will receive the quarterly average spot price for their cash purchases and marketings.

Occasionally, recommendations are given to "lift hedges as cattle are sold." This recommendation is interpreted as lifting hedges on the Wednesday closest to the 15th of the month the hedge targets. It is also assumed the feedlot markets fed cattle continuously throughout the quarter and therefore a recommendation for hedging 25% of fourth quarter marketings lifting hedges as cattle are sold would have one-third of 25% lifted on the Wednesday closest the 15th of October, November and December.

In addition to continuous production, there is also no production risk assumed in the calculations for net price received. It is assumed the feedlot will know the exact number of head that will be marketed in a given quarter and will back out the number of feeder cattle and quantities of corn and soybeans to purchase

3.7 Prices

There is no consistent Kansas live cattle cash series from 1995 through 2004 because of the mandatory price reporting system which caused complications in the collection of prices in 2001. Boxed beef average and select carcass prices were substituted during the period from March 2001 to February 2002, when no live cattle prices were available. A dressing percentage of 62% was used to convert the carcass price to live-weight. The Kansas direct slaughter series represents a flat price agreed upon upfront between feedlot and packer. No slaughter cattle auction prices are included. Input prices for feeder cattle, corn and soybean meal were available in consistent series over the 1995-2004 time period.

Fill prices for futures and options transactions generally are the prices reported by the advisory programs. When a program did not report a specific fill price, the open for the day is used if the recommendation was given before the open and if the recommendation was given during the trading day, the settle price was used. Open and settlement prices from the Chicago Board of Trade and Chicago Mercantile Exchange from www.barchart.com were used. Liquidity costs are incurred when non-floor traders open or close positions on an exchange and are not accounted for in this method. These costs reflect that the non-floor trader must generally buy at the ask and sell at the bid price. This difference, the bid-ask spread, is the return earned by floor traders for "making the market."

3.8 Brokerage Costs

Brokerage cost or commission charges are incurred when a feedlot manager opens or closes positions on an exchange. In this study brokerage costs are assumed as $50 per contract for round turn futures contract and $30 per contract to enter or exit an options contract. Further, it is assumed that live cattle contracts, which have a contract size of 40,000 pounds (400 cwt.) and feeder cattle contracts at 50,000 pounds (500 cwt) are used from the CME. Brokerage costs for one round-turn futures position are $0.125/cwt for live cattle and $0.10/cwt for feeder cattle contracts. Brokerage costs for each options transaction are $0.075 and $0.06, respectively. Corn contracts at 5,000 bushels and soybean meal contracts at 100 short tons are used from the CBOT. Brokerage costs for one round-turn futures position are one cent per bushel for corn and fifty cents per ton for soybean meal. Brokerage costs for each options position were $0.006 per bushel for corn and $0.30 per ton for soybean meal.

3.9 Summary

This chapter defined how an individual advisory program's net price is derived for live cattle in the output only and input-output hedging scenarios. Services are selected based on their ability to give clear and concise recommendations. Five criteria are used to define a market advisory service. The recommendations are collected by AgMAS staff from satellite, internet pages and e-mails.

Net advisory prices are calculated after recommendations were given and collected for a given quarter and issues such as lumpiness of contracts and production risk are addressed. Because of the short term nature of cattle feeding and the small number of services which give cash recommendations, no spot cash sales recommendations are followed in this study.

This feedlot model is designed to be representative of a feedlot in western Kansas that follows the Kansas direct slaughter cattle series. The marketing window for output only live cattle hedges begins one month prior to placing the feeder cattle on feed through the time when the cattle are slaughtered. The window is nine months total, six months prior to marketing and the three months of the window where marketings take place.

The cash prices used in the study are the Kansas direct slaughter series, Kansas direct feeder cattle, western Kansas corn and Kansas City soybean meal price series. Futures contracts used are the live and feeder cattle futures from the Chicago Mercantile Exchange and corn and soybean meal from the Chicago Board of Trade. The net advisory price under the output-only live cattle hedging scenario is the average cash price plus/minus hedging profits. The net advisory price under the optimal hedging scenario is the output-only live cattle average price

minus the sum of the average cash price plus/minus hedging profits from feeder cattle and feed hedges.

In the following chapter, marketing profiles are introduced. First, the construction of marketing profiles is discussed. Finally, the use of marketing profiles is discussed and the quarterly average marketing profiles are presented for each quarter.

4. MARKETING BEHAVIOR OF ADVISORY SERVICES

4.1 Introduction

There are a variety of tools that an advisory service may use in marketing programs and before evaluating a service's performance it is useful to understand what methods were used to produce program results. Differences can exist between advisory service recommendations from various services by the timing of the recommendation, the frequency of recommended transactions and the pricing tool used, whether it be futures, options or a combination of both. While two services may have similar net prices, the marketing behavior which achieves these prices may vary significantly.

In order to compare the marketing behaviors' of different advisory programs, each advisory's behavior is analyzed in two steps. The first step describes the frequency of recommended transactions and which pricing tool is recommended. In the second step, a daily index of the net amount sold by each marketing advisory service is developed and the cash sales for a given program on a given day are weighted by the deltas of individual positions. These "marketing profiles" may be used to summarize point in time positions for individual programs.

4.2 Marketing Tools

The purpose of this section is to describe the frequency of futures and options by advisory programs in live cattle, feeder cattle and corn and soybean meal. There are four possible marketing tools which an advisory service may use. They include futures only, options only, a combination of futures and options, and no future or options. A count of the frequency of each tool is made for each marketing advisory service. In order for a program to be counted in a quarter as using a combination of futures and options, at least one futures and one options

contract must be entered into during the marketing window, although they need not be open during the same time.

The frequency count for each marketing advisory service is shown in Table 3 for live cattle and Tables 4 through 6 for feeder cattle, corn and soybean meal, respectively. "Futures only" was the most common recommendation strategy for live cattle. On average, a futures only strategy was used in 48% of quarters. The second most common strategy was to use no futures or options. Either options only or a combination of futures and options accounted for very few quarters. The most common strategy for both feeder cattle, corn and soybean meal was to use no futures or options. On average, 81% of quarters used no futures or options for feeder cattle. For corn and soybean meal, no futures or options was used on average for 56% and 72% of quarters, respectively.

Frequency counts by quarter are shown in Tables 7 through 9 and percentage counts in Tables 10 through 12 and show similar results to the abovementioned tables. These tables show that a "futures only" marketing regime was used among the majority of live cattle marketing services. Among feed and feeder marketing, using no futures or options was the most frequently recommended action. A few similarities may be seen within the feed and feeder hedges, hedging activity increased during 2002 and 2003 in both commodities. However, no long term patterns are seen across commodities.

4.3 Construction of Marketing Profiles

While the frequency of marketing tools does provide insight into the risk management recommendations of an advisory service, it is pertinent to also examine the magnitude of hedges which are recommended. Daily net amount sold is calculated to provide a measure of the

magnitude of hedges at a point in time. To construct this index, the amount of live cattle sold (or feeder cattle or feed bought) each day in futures or options is calculated and aligned chronologically. The price exposure of a portfolio is a weighted average of the by the price exposures of individual positions where the weights are the "deltas" of the individual positions (e.g., Hull, 1997). Each marketing quarter, an index is computed for each advisory service with the weighted daily deltas. The service's marketing profile is created when the daily values of the index are plotted for the entire marketing quarter.

A weighting process is used when calculating net amount sold for an advisory service. This weight, known as delta, is the dollar amount the value of a position changes when the underlying commodity increases one dollar. Deltas are generally computed assuming positive price changes and the value of delta at any current price is valid only for "small" price changes in the vicinity of the current price.

When a prospective hedger faces downside price risk, as a marketer of fed cattle would, the delta is no longer computed assuming a positive price change. In this case, the delta of a short futures position is typically regarded as being -1. Downside risk is eliminated from one hundred pounds of finished steers by short selling 100 pounds of live cattle futures when basis is ignored. It is appropriate to reverse the sign on the delta to a positive however, which at most times makes more sense to a fed cattle marketer. When signs are reversed long futures will have a delta of negative one because long futures will add downside risk to a feedlot when hedging live cattle marketings.

While futures positions generally have +1 or -1 deltas, the deltas of options positions are more complicated. In the case of an options position, the underlying instrument is the futures

position. Here, delta represents the change in the option premium given a one dollar increase in the futures position. When examined from a fed cattle marketer's position, options represent a future intention to sell the underlying commodity through a long put or sold call. These deltas have positive values. Options that represent the acquisition of the underlying commodity, such as purchasing feeder calves, corn and soybean meal in the form of sold puts or bought calls, have negative delta values. In addition to the change in underlying position, the value of an option's delta also takes into account the relationships between strike price, futures price, time to expiration and whether the option is short or long. Unlike a delta value for a futures contract, deltas for options values change daily as these variables change.

For example, assume a call option is sold with a \$70/cwt. strike price. If the futures were initially at \$75/cwt. and then decreases by \$1.00/cwt. the delta will decrease by less than \$1.00/cwt. as the futures price nears the strike price and the uncertainty that the call will remain in the money grows. While options deltas change frequently unlike futures contracts they are similar in that long puts and short calls have positive deltas and short puts and long calls have negative deltas. Long puts and short calls have deltas in the range of $0 \leq \Delta \leq 1$ while short puts and long calls have deltas ranging from $-1 \leq \Delta \leq 0$.

In this study, options deltas are calculated each day a market advisory service recommends an options strategy or when an option position is open. FINCAD financial software package was used for delta calculations. The first step in computing option deltas is computing theoretical option value (Bertoli, et al. 1999). Black's model,

$$(6)\ C = Ue^{-rt}N(h) - Ee^{-rt}N\left(h - v\sqrt{t}\right)$$

$$(7)\ P = -Ue^{-rt}N(-h) + Ee^{-rt}N(v\sqrt{t} - h)$$

is used to derive theoretical option value because of its use among options traders and in academia (McDonald, Derivative Markets.). In Black's model, *U* represents the value of the current futures contract, *r* is the risk free rate, *t* is the time to expiration expresses as the portion of a year, *N(x)* is the cumulative normal density function, $h = \frac{\ln(\frac{U}{E})}{v\sqrt{t}} + \frac{v\sqrt{t}}{2}$, *E* is the option's exercise price, *e* is the exponential function and *ln()* is the natural logarithmic function. *C* is the theoretical value of a call and *P* is the theoretical value of a put.

Options premiums, exercise prices and time to expiration for each option were collected from barchart.com. The risk free interest rate is the secondary market daily three-month Treasury bill rate, as quoted by the Federal Reserve. Implied volatility of the option is calculated daily, and this estimate should result in an accurate estimation of "true" option delta.

The option delta is calculated by differentiating the call or put formula by the underlying futures price. Therefore, the formula used for deriving put and call deltas is,

(8) $\Delta_C = \frac{\delta C}{\delta U} = N(h)$

(9) $\Delta_P = \frac{\delta P}{\delta U} = -N(-h)$

where Δ_C denotes the delta of a call and Δ_P denotes the delta of a put option. As the underlying futures price, time to expiration, and implied volatility change daily, deltas must be recalculated daily for each underlying option.

4.3.1 Net Amount Sold/Bought

The method for computing net amount of live cattle sold (feed or feeder cattle bought) across all daily positions of each advisory service may be computed

as (e.g., Hull, p.320, 1997),

$$(10)\ \Delta_t = \sum_{i=1}^{m} w_{it}\Delta_{it}$$

where Δ_t is the net amount sold across all (m) marketing positions with open on date t, expressed as percent of actual production. w_{it} is the percentage sold (bought) of marketing service i on date t and Δ_{it} represents the delta position of i on t.

Spot cash marketings (purchases) are made on the Wednesday closest to the 15th of the month for each of the three months in the marketing quarter in each advisory services' marketing profile. Therefore, 33.33% of sales (purchases) are made each month totaling to 100% in the last month of the marketing quarter.

The following example demonstrates how an advisory service's net amount sold is calculated. A marketing advisory service recommends to hedge 25% of 2004 Q1 fed cattle marketings. Using equation (10), the net amount sold is 25%, (.25 *1). Suppose now, the marketing advisory service recommends using a long put to hedge an additional 50% of 2004 Q1 marketings and the option has a delta of -.27. The delta value of this option implies that for a one dollar upward move in the underlying futures contract, the value of the option will increase by 27 cents. The negative value of the delta shows that this option involves buying, and if using equation (10), the net amount sold for the service is 11.5% (.25+ (.50*-.27)).

If the option becomes more out of the money, the delta will become less negative and the net amount sold will approach 25%. This reflects the thought that the option will be worth less or nothing as it nears expiration. If the option becomes more in the money, the delta's value will approach negative one and the net amount sold will approach -25% (25%-50%). This reflects that as an option becomes more in the money the option is more likely to be exercised and may be seen as a long futures hedge. Calculations for this example may also be applied to hedges for input purchases of feed and feeder cattle.

4.4 Marketing Profiles

Marketing profiles for hedging live cattle output marketings begin 6 months prior to the start of the marketing quarter to reflect the time the cattle were put on feed as feeder cattle in the feedlot. Input marketing profiles for feed and feeder cattle purchases also begin 6 months prior to the first purchase of the input. Marketing profiles are used to show feedlot managers the net advisory position of the service as the profile shows the cumulative position of the program at any point in time across all open recommendations. A graph of the net advisory position shows the magnitude of pricing (purchases) at any point in time over the marketing window. For multiple marketing windows an average may be taken across each day to arrive at the average net amount sold (bought) for the marketing advisory service throughout the given marketing window.

To arrive at the average net amount sold for a given program, the days are aligned so the average on a specific date may be calculated. Because of the seasonality in live cattle marketings, each quarter's marketings are weighted and thus the net amount sold of any service may only be compared with other net amounts sold of the same quarter, i.e. 2004Q1 may only

be compared with other Q1 marketing profiles and not a Q2, 3, or 4 marketing profile. Averaging the net amount sold across marketing quarters and graphing this averaged amount sold allows seasonality trends within an advisory service to be seen at a quick glance.

In addition to averaging net amount sold for a given marketing advisory service, an average across all services may also be preformed. Again, only like quarters may be compared due to the seasonality in fed cattle sales. This average across all programs and all years depicts the net amount sold of a „typical' advisory service for a given quarter. In addition to the average, minimum and maximum net amounts sold are also computed to give a perspective of the industry. Similar averages may be computed for input hedges of feed and feeder cattle to gain a perspective on typical industry advisory services.

Figures 2 through 10 show the live cattle quarterly average marketing profiles for each individual marketing advisory service. Figure 11 shows the average live cattle quarterly marketing profile across all services. Figures 12 through 19 show the feed quarterly average marketing profiles. Figure 20 shows the average feed quarterly marketing profile across all services. Figures 21 through 27 show the feeder cattle quarterly average marketing profiles, and Figure 28 shows the average feeder cattle quarterly marketing profile across all services. Most of the graphs of average, minimum and maximum marketing profile stay between zero and 100%, but there are some instances where the marketing profile may be negative. In these instances, such as Top Farmer's third quarter live cattle marketing profile in Figure 9, Panel C, the negative amount represents that a hedger would be holding a net long position. Feed and feeder cattle marketing profiles that are negative are net short. Instances where the marketing profile is over 100%, the hedger is over hedged. All live cattle advisory services and some feed

and feeder advisory services are over hedged at some point within the average marketing window.

Prior to the start of the marketing window, most advisory services had no hedges in place and as the marketing period progressed these advisory services, on average were 100% hedged. There are instances where an advisory service begins making hedging recommendations prior to the start of the average marketing window. An example of this is seen in Figure 5 Panel C, Agrivisor's 3rd quarter average marketing profile. On day one of the marketing window, Agrivisor is approximately 25% hedged. Similarly, an advisory service may be over hedged at the end of the average marketing window, this implies that an advisory service has marketed 100% of cash marketings and still has additional hedges open at the end of the marketing window. All quarterly average live cattle marketing profiles (Figures 2 through 10) have greater than 100% hedged at the end of the marketing window.

In addition to the percent hedged at the beginning and end of the marketing window, it is also important to examine the percent hedged at various points in the marketing window. Tables 13 through 15 show the amount hedge and 6-months, 3-months and the day before the start of the marketing quarter, averaged across all quarters and all years for each advisory service. Six months prior the marketing quarter advisory programs in feeder cattle, live cattle, and feed had hedged small amounts but as the start of the marketing quarter approached most advisory services have a higher percent sold (or bought for feed and feeders). Table 13 shows hedged levels for live cattle. 6-months prior to the start of the marketing quarter advisory services had 0.36% hedged on average. Several companies had no hedges in place and Agrivisor had the highest percent sold at 25% hedged. At 3-months prior to the start of the marketing quarter,

there were still several companies with no hedges in place but on average, marketing advisory services had hedged 5.26%. Top Farmer had the maximum amount hedged at 100% sold.

The day before the marketing quarter began advisory services had 14.6% marketed on average. As with the 6- and 3- month time frames, there were still advisory services with no hedges on place at this time. Stewart Peterson, Top Farmer, and Utterback had 100% or greater hedged. Top Farmer had the most hedged, at 108.63%. Overall, in the months leading up to the marketing quarter there was on average very little hedging and hedged levels were highly variable at all stages of the marketing window, often ranging from 0% to 100% hedged.

Tables 14 and 15 display the net amount bought for feeder cattle and feed respectively. Similarly to live cattle, amounts bought were small 6-months prior to the start of the marketing quarter and increased as the marketing window progresses. On average 0.37% of purchases were hedged 6-months prior and 2.55% of purchases were hedged the day prior to the start of the marketing quarter in feeder cattle. Utterback held the largest hedged position on the day prior to the start of the marketing quarter with 66.67% hedged. Overall, very few hedges for feeder cattle were entered into throughout the time period of this study.

For feed purchases, average coverage 6-months prior to the start of the quarter was -0.39% due to a net long position held by Utterback for several quarters. The day prior to the start of the marketing quarter 19.15% of feed purchases were hedged. Agrivisor had the most hedged prior to the start of the marketing quarter with 149.88% hedged. Hedges the day prior to the start of the marketing quarter were greater in feed than either feeder or live cattle.

4.5 Summary

This chapter examined the marketing tools used by market advisory services throughout the marketing window. The marketing profile construction presented in this chapter provides valuable information about the services' behavior. The most frequently used tool by advisor services for live cattle recommendations was a futures only approach. For feed and feeder recommendations, no futures or options were used the majority of the time and overall, no major trends in either live cattle, feeder cattle or feeder were seen over the time period of this study.

In combination with the frequency of hedging tools, the magnitude of hedging was used to develop a daily index of the net amount sold (or bought) throughout the marketing window for each advisory service. These daily values were weighted by the delta of the individual position and used to create a marketing profile for each advisory service which are able to summarize and individual's position at a given point in time.

These marketing profiles were averaged across quarters and across advisory services to create average marketing profile positions for each live cattle, feeder cattle and feed advisory service. On average, most companies gave hedging recommendations within the marketing quarter and remained between 0 and 100% hedged during this time. There were however advisory services who began recommendation before and ended recommendations after the marketing window began. Also, at various times during the window some services were over (greater than 100%) or under (less than 0%) hedged. Overall, advisory services had small net amounts sold at the beginning of the marketing window and the amount hedged increased as the marketing quarter approached. The day prior to the start of the marketing quarter advisory services had on average 14.66% of live cattle sales, 2.55% of feeder purchases and 19.15% of

feed purchases hedged. The percentage of purchases hedged for feed on the day prior to the start of the marketing quarter is the higher than both feeder and live cattle. This demonstrates the importance of assessing a service's performance for both input and output hedging as opposed to just output hedging.

The following chapter presents the formulation of the cash benchmarks for live cattle, feeder cattle and feed. The four indicators used to evaluate pricing performance are introduced and net advisory prices and results are presented.

5. BENCHMARK FORMULATION AND PERFORMANCE EVALUATION

5.1 Introduction

After an advisory service's net price received is calculated, it can be compared to a benchmark to determine the relative performance of the service's recommendations. In this chapter the properties of a benchmark are developed, and benchmarks are defined and calculated for live cattle sales, feeder cattle purchases, feed purchases and for the three factors on a margin. Then, the benchmark will be used in combination with the results of services' recommendations to compare performance across four indicators.

5.2 Benchmark Specification

While benchmarking originated in the financial literature, it is commonly used across many disciplines. Good, Irwin, and Jackson (1998) referred to the market benchmark price as the standard to which market advisory services were compared for corn and soybeans in the AgMAS Project. Webber (2002) and Irwin, Martines-Filho, and Good (2002) describe the function of a benchmark or market benchmark prices as a comparison of prices generated by an advisory service and prices a representative producer could have received by using an alternative strategy.

The alternative strategy used assumes the representative producer or market participant is rational and that competition eliminates all arbitrage opportunities. Also, it is assumed that the market is efficient (Fama, 1970). In its strongest form, the efficient market hypothesis posits that market prices always reflect all available public and private information. This would imply that no strategy, from an advisory service or otherwise could beat the market. The return on the market becomes the benchmark, and in the context of the AgMAS study, a market benchmark

should measure the average price offered by the live cattle, feeder cattle, or feed markets over the marketing quarter. Average price is computed to reflect returns and purchases of a naïve strategy of marketing equal portions of live cattle sales and feeder cattle and feed purchases each month during the marketing quarter. At the end of the marketing quarter, 100% of sales or purchases will be complete with this strategy.

The efficient market hypothesis suggests the difference between these market benchmarks and other marketing strategies should be equal to zero on average. Additional properties of market benchmarks, from a practical perspective, are that a benchmark should be simple to understand and calculate, represent returns from a strategy that can be implemented by producers and should be directly comparable to net advisory prices (Jackson, Irwin, and Good, 1998).

5.3 Cash Benchmark

The simplest pricing strategy feedlot managers have available is pricing with spot price cash sales. Feedlot managers who purchase inputs and then market live cattle on a constant production schedule would receive, over the period, the quarterly average spot price. In this study, the spot price received for live cattle marketings is the Kansas Daily Direct Slaughter Cattle, Negotiated Purchases price series and thus this price series is the market benchmark for live cattle marketings. The Kansas Daily Direct Slaughter Cattle, Negotiated Purchases price series reflects a weighted average cash price that is agreed to upfront between the feeder and packer. Formula or grid based prices are not included in this series nor are auction prices included. Data is collected twice daily from packers in regards to purchases of finished cattle from feedlots with finished cattle sales of over 125,000 head per year. Approximately 85% of

finished cattle are accounted for in this price survey. This price series dates back to 1993 but prior to 2001 the reporting of price information was on a voluntary basis. Difficulties related to the Livestock Mandatory Reporting Act (1999) after implementation in 2001 resulted in a lack of information from March 31, 2001, to February 25, 2002. After implementation of the act, packers are now audited at least three times per year to insure reliability of data.

Because no slaughter cattle prices are available for 2001-2002, the National Daily Boxed Beef Cutout and Boxed Beef Cuts-Negotiated Sales price has been used as a proxy during this time period. On average, approximately 65% of a carcass can be processed into boxed beef (Phil Rincker, January 20, 2009) and as a result the daily boxed beef value is divided by 0.65 to arrive at a proxy for the value of the entire carcass.

The Kansas Direct Feeder Cattle Summary price series is the simple spot cash price market benchmark for feeder cattle purchases. Unlike the slaughter series, this report is not mandatory. Weekly data is collected from feedlots, order buyers and auction barns that were either purchased from Kansas producers or brought into Kansas feedlots. Because this report is voluntary and has no strict guidelines, there is great variability in what is reported from feedlot to feedlot and only approximately 3% of cattle traded are accounted for in this series. Another caveat related to this price series is that prices are reported as delivered pricing and not free on board from the auction barn or preconditioning lot the feeder calf was purchased from. Transportation costs to the feedlot are included in the overall price.

The soybean meal benchmark is derived from the 48% soybean meal price reported in the Kansas City Daily Feed report. Daily, the two Kansas soybean meal processors report soybean meal basis bids after futures trading has closed. The basis value is then added to the nearby futures contract close to determine a soybean meal cash price. This report is not mandatory but

does accurately represent the Kansas soybean meal market due to the small number of meal processors in Kansas.

The final price series used in this study is the #2 Yellow Corn price from the Western Kansas Grain Market daily price report. Nine Western Kansas grain elevator closing bids are voluntarily reported daily for this report. For use in this study, the simple average of these nine elevators is used to derive a single daily price.

For ease of comparison, a weighted average feed cost was created that combines soybean meal and corn into one price in $/pound. On average, 93% of a feeder calf's diet is corn and 7% is soybean meal. The weighted average cost was constructed by multiplying the monthly average corn price, in $/pound, by 93% and adding this to 7% of the monthly average soybean meal also measured in $/pound. The quarterly average price for the weighted average cost is derived by averaging the monthly feed indexes for each of the three months in the quarter.

For the live cattle and feeder cattle price series, the quarterly average price is derived by averaging each of the weekly average prices in the quarter. Each quarter is then weighted to account for the seasonality present in fed cattle marketings. As described in Chapter 3, the third quarter has the highest number of marketings and fewest fed cattle are marketed in the fourth quarter. These weights flow down to feed and feeder purchases such that sufficient amounts of feed are purchased in the preceding quarters for the increased Q3 marketings.

The difference between the weighted cash spot market benchmark and a market advisory service's net advisory price is easily calculated. As stated above, a feedlot manager who purchases inputs and markets cattle on a consistent schedule receives the average quarterly spot price. Futures gains and losses are added to the average weighted quarterly spot price to

determine the net advisory price for live cattle recommendations. Futures gains and losses are subtracted from the average weighted quarterly spot price of inputs to determine the net advisory price because the futures gains lower net advisory purchase price. As an example suppose the quarterly weighted average cash price for feeder steers is $50.00 per cwt. Futures loss was $0.06 per cwt and brokerage charges were $0.03 per cwt. The futures loss and brokerage charge are added to the quarterly cash price to reflect an increase in the cost. The net price received is $50.09 per cwt (50.00 + 0.06+0.03)

If an advisory program made no recommendations during a quarter their net advisory price is simply the average quarterly spot price. This was most common in feeder cattle recommendations, although there were quarters in both live cattle and feed that a company made no recommendations. Table 16 shows the cash benchmark for each quarter for live cattle, feeder cattle and feed. The large fluctuations from quarter-to-quarter reflect the underlying variability in the price series.

5.4 Benchmark Summary

Similar to other AgMAS studies, in this study benchmarks were used to represent the average prices available to the feedlot manager when purchasing feed and feeder inputs and marketing live cattle over a marketing quarter. As stated earlier, an important concept relating to benchmarks is the efficient market hypothesis. This hypothesis says that rational market participants eliminate arbitrage opportunities and therefore no market advisory service may have proprietary information and „beat' the market.

In this study, one benchmark was used for each class of recommendations. The benchmark used was a spot cash benchmark averaged over a quarter and then weighted to

account for seasonality. The benchmark is compared to the net average price received for the quarter. This comparison is used to evaluate the performance of the marketing advisory program's net price. Net advisory prices are used to calculate average price, risk and return, and predictability.

5.5 Performance Evaluation of Services

There will be four indicators used to evaluate the performance of marketing advisory services in live cattle and margin hedging recommendations. The first indicator is directional performance, the proportion of advisory services that beat the respective market benchmarks. Second, the magnitude of the difference between the marketing advisory service's average price and the benchmark or average price performance will provide another indicator. The third measure of performance will take into account the average price and riskiness of an advisory program in comparison to the market benchmark, known as E-V analysis. The final measure of performance will be the predictability of an advisory service's results across time. Performance evaluations were completed on each live cattle, feeder cattle, feed and margin recommendations.

5.6 Net Advisory Prices and Benchmarks for 1995-2004

The net advisory price for a service giving live cattle marketing recommendations is found by combining the net cash sales price plus futures/options gain (loss) minus brokerage costs. Margin advisory prices are found by taking the live cattle net advisory price for a specific quarter less the weighted net advisory prices for feed and feeder purchases corresponding with cattle marketed in that quarter.

Table 17 summarizes the average net advisory price received per quarter across services for live cattle. The highest net advisory price received for live cattle, $102.71/cwt., over the

entire 40 periods was by Ag Review in Q3 of 2004. The lowest net advisory price over the 40 periods, $47.35/cwt, was in the fourth quarter of 1998 by also by Ag Review. Q3 of 2004 also had the highest average net advisory price at $100.18/cwt and the highest market benchmark price of $101.71/cwt. Both the lowest average net advisory price ($47.65/cwt) and the lowest market benchmark price ($47.79/cwt) occurred in 2001 Q4. Net price received over the 1995 Q1 through 2004 Q4 period averaged $69.79/cwt. Standard deviations of live cattle net price received varied greatly over the entire 10 year period. The standard deviation averaged 1.37 over all quarters from 1995 to 2004 and ranged from a low of 0.07 in 2000 Q2 to 6.75 in 2001 Q3.

Table 18 summarizes average net advisory price paid per quarter across all services for feeder cattle. The lowest price paid was $40.52/cwt in 1999 Q4 by Utterback. The highest price paid across all quarters, $65.39/cwt was by Top Farmer in 2004 Q2. Both the lowest average net price paid ($40.81/cwt) and the lowest market benchmark ($40.86/cwt) occurred in 1999 Q4. The highest average net price paid ($64.93.cwt) and the highest benchmark ($65.19/cwt) were paid in 2004 Q2. Over the entire 22 quarter period, net price paid averaged $52.30/cwt, while the benchmark averaged $52.37. On average, price paid for feeder cattle was favorable to the benchmark. Standard deviation over this time period was very low due to the low number of executed trades and averaged $0.25/cwt and ranged from $0.02/cwt in 1999 Q3 to $0.80/cwt in 2004 Q2.

Table 19 summarizes average net advisory prices paid per quarter across all services for feed. The lowest price paid for feed was $9.77/cwt in 2000 Q1. This price was achieved by executing no trades and thus receiving the benchmark. During this quarter no trades were executed and the benchmark was paid by all services except Ag Review and Brock. The highest

net price paid ($20.41/cwt) was paid in 2004 Q by Top Farmer. Both the lowest average price ($9.85/cwt) and the lowest benchmark price ($9.77/cwt) were paid in 2000 Q1while the highest average price ($19.70/cwt) and the highest benchmark price ($19.91/cwt) were paid in 2004 Q3. Over the entire 22 quarter period, the average price paid was $13.49/cwt and the average market benchmark was $13.37/cwt. Standard deviation ranged from $0.04 in 2000 Q3 to $1.76/cwt in 2002 Q1 and averaged $0.43/cwt over the entire period.

Net advisory prices for margin hedging varied much more than net advisory prices in live cattle due to the interactions of the three markets with the market conditions present at those times. Twenty-two periods are included in this segment of the research due to data availability; results are displayed in Table 20. The highest price received for the margin was $29.56/cwt. in the third quarter of 2003, obtained by Brock. The lowest net price, $-12.94/cwt was obtained in 2001 Q4 by Ag Review. The highest average margin price ($23.68/cwt) occurred in 2003 Q3, and the highest market benchmark price also occurred in 2003 Q3 ($28.54/cwt). The lowest average margin price ($-11.00/cwt) occurred in 2004 Q4 and the lowest market benchmark margin price ($-11.31/cwt) occurred in 2004 Q4. Overall, net price received on margin hedging averaged $8.14/cwt. The standard deviation averaged $1.76/cwt over all quarters, ranging from $0.38/cwt in 2002 Q3 to $7.29 in 2003 Q3.

Table 21 summarizes the average net advisory price received by advisory service across all quarters for live cattle recommendations. On average, Ag Resource had the highest net advisory price ($70.58/cwt) and Top Farmer had the lowest ($68.98/cwt) over the 40 quarter period.

Table 22 summarizes the average net advisory price received per advisory service across all quarters for feeder cattle recommendations. On average, services who executed no trades over the 22 quarter time and as such paid the market benchmark had the highest average price paid ($52.37/cwt). Utterback had the lowest average price paid ($52.19/cwt) over the 22 quarter period. It is important to note that the on average the highest price paid is the benchmark, any service that made recommendations that were executed paid a lower price for its feeder cattle than the benchmark, on average across all quarters.

Table 23 summarizes the average net advisory price received per advisory service across all quarters for feed recommendations. Across the 22 quarter period, Ag Resource paid the lowest price ($13.21/cwt) on average for feed needs. Ag Review paid the highest on average at $14.00/cwt.

Table 24 summarizes the average net advisory price received per advisory service across all quarters for margin hedging. On average, Ag Line had the highest net advisory price ($9.46/cwt) and Ag Review had the lowest ($6.72/cwt) over the 22 quarter period. Ag Review beat the benchmark in feeder cattle hedging but fell short in live cattle and feed.

Two important points should be stressed prior to considering performance results. First, feedlot managers subscribe to market advisory services for a variety of reasons. (Lloyd Miller, June 1, 2006, Irwin et. al., 2006) The most likely reason for service subscription is for market information. While it may stand to reason that an advisory service with high quality information would give marketing recommendations that provided positive gains, this may not always be the case. Second, another cost which is not included in calculations for net advisory price is the cost of subscription for each advisory service. A typical subscription fee for an advisory service's

information costs between $350 and $500 annually. As noted above, feedlots subscribe to advisory services for many reasons, and the fee is not specifically split between cost for market information and cost for hedging recommendations. The annual subscription fee is not included in net price received calculations because it is most often seen as an overhead expense and does not tie specifically to the price a feedlot receives for its live cattle marketings or pays for inputs.

5.7 Directional Performance

The first indicator of performance measures the direction of a service's net price in relation to the benchmark. It measures the proportion of services that beat the benchmark and is not influenced by extremely high or low advisory prices. Positive performance is shown if more than 50% of services beat the market benchmark, what one would expect based on the flips of a fair coin.

Table 25 shows the percentage of services that beat the benchmark with their live cattle and margin recommendations for 1995Q1 through 2004Q4 and 1999Q3 through 2004Q4 periods. Table 26 shows the proportion of quarters that each advisory service beat the benchmark for live cattle, feeder cattle, feed and margin hedging. Average results are also presented but it should be noted that the averages presented in this table does not necessarily equal the average of the individual averages listed. The average from the table equally weights each net advisory price in the sample where the average of the individual quarter's averages equally weights the quarters.

The results in Table 25 reveal similarities in the proportion of services which beat the benchmark when comparing live cattle and margin hedging. For live cattle in Table 25, the maximum proportion of programs for any one given quarter is 78%, and the minimum is 0%.

During the 1995-2004 period, advisory services beat the benchmark 28% of the time with live cattle recommendations. Over the 1999Q3-2004 period, this percentage dropped to 22%. During this same period, performance against the margin was higher at 28%. The increase in performance of margin recommendations may be explained by companies who met, but did not exceed the benchmark in live cattle (thus not attributing to the percent that exceeded the benchmark) and also exceeded the benchmark in either feed or feeder cattle. Per Table 25, advisory services beat the benchmark 19% and 14% of the time for feeder and feed, respectively. While this percentage is small, there were cases where the amount that an advisor was below the benchmark in live cattle was offset by gains in either feed or feeder.

In Table 26, Ag Resource has the highest proportion of quarters where it beat the benchmark (45%) across all quarters for live cattle. Pro Farmer beat the benchmark the fewest percent of the time at 13% in the 1995-2004 time period. The average proportion of programs above the benchmark for the 1995-2004 period for live cattle was 27%. This percentage dropped to 22% during the 1999Q3-2004 period. During 1999Q3-2004, Ag Resource's performance dropped to 14%, the second lowest among all services. Ag Line had the best performance (41%) and Pro Farmer beat the benchmark the least percent of quarters (5%).

Ag Line beat the margin in 45% of quarters during 1999Q3 and 2004Q4. Pro Farmer beat the margin benchmark the fewest percent of the quarters (9%). The average proportion of programs above the benchmark during this period was 28%. On average, both live cattle and margin recommendations fell short of exhibiting positive (greater than 50%) performance.

The directional performance analysis discussed in this section showed an underperformance for both live cattle and margin hedging. The average proportions of live

cattle (27%) and margin (28%) is below the performance of other crops or livestock studied by AgMAS. Like wheat (Batts et. al., 2009) which had an average proportion of 40%, results indicate underperformance, on average.

5.8 Average Price Performance

The second pricing performance indicator takes into account both direction and magnitude. Here, the average net price received from an advisory service is compared to the market benchmark. Performance is measured by net price received minus the benchmark for each service. A positive difference indicates that an advisory service received a price above the benchmark. Next, these differences are averaged across each quarter for a program and then within each quarter across all advisory programs.

Unlike grains that may only have tests conducted yearly, the average differences for live cattle and margin hedging may be computed on a quarterly basis in conjunction with the quarterly marketing windows. In comparison to grains, this results in a larger sample size with 40 marketing quarters available for observation in live cattle and 22 marketing quarters in margin hedging.

A matched sample *t*-test of zero difference is used to assess statistical significance. The *t*-statistic is,

$$(11)\ t = \mu_{diff}/(\hat{\sigma}/\sqrt{n})$$

where μ_{diff} is the average difference across *n* marketing quarters. $\hat{\sigma}$ is the estimated standard deviation of the differences across *n* marketing quarters in the sample. This *t*-statistic follows a *t*-distribution with *n*-1 degrees of freedom. The two-tail *p*-value represents the probability of

observing the absolute value of the *t*-statistic or higher across many random samples. With a *p*-value of 0.05 or smaller one may conclude that the average differences are not equal to zero.

Table 27 presents results on the average price performance for each quarter averaged across all programs for live cattle, feeder cattle, feed and margin hedging. For live cattle, average price performance ranged from $3.52/cwt below the benchmark (2003 Q4) to $1.91/cwt above the benchmark in 2004 Q1. Over 1995-2004, the average price performance was $0.29/cwt below the benchmark. During this same time frame, standard deviation was $0.91/cwt, resulting in a *p*-value of 0.05, signifying that this pricing performance is statistically different from than the market benchmark.

The price performance decreased to $0.58/cwt below the benchmark over 1999 Q3-2004, and the standard deviation increased to $1.21/cwt, resulting in a *p*-value of 0.04. Similarly to 1995-2004, these results are significantly different from the market benchmark.

For feeder cattle, pricing performance ranged from $0.26 below the benchmark (2004 Q2) to $0.04 above the benchmark (2000 Q4), and the average price paid was $0.06/cwt below the market benchmark. The *p*-value for feeder cattle prices was 0.00, signifying feeder cattle prices paid were significantly better than the benchmark.

Converse to the positive performance of feeder cattle recommendations, the net price received for feed was significantly worse than the benchmark. Prices ranged from $0.60/cwt above the benchmark (2002 Q1) to $0.21/cwt below the benchmark (2004 Q3), or $0.12/cwt above the benchmark. The standard deviation of this data was $0.17/cwt which resulted in a *p*-value of 0.00.

Pricing performance for margin recommendations was also significantly worse than the benchmark. Prices received for the margin ranged from $4.87/cwt below the benchmark (2003 Q3) to $1.49/cwt above the benchmark and averaged $0.76/cwt below the benchmark, across all services and all quarters. The standard deviation of these prices was $1.32/cwt which resulted in a *p*-value of 0.01.

Because results are statistically significant, it is useful to more closely examine the financial impact to a feedlot. Suppose a large Kansas feedlot markets 12,000 head per quarter at 1,250 pounds or 150,000 cwt marketed per quarter. If this feedlot was under the market by $0.76/cwt on average over the quarter, the feedlot has lost $114,000 for one quarter. Over the course of a year, the feedlot would lose $456,000. This difference is both statistically significant and may play an important role in the financial viability of the feedlot.

Table 28 presents the average price performance for individual programs for live cattle, feeder cattle, feed and margin hedging by advisory service. Two advisory services, AgLine and AgResource produced average net advisory prices that outperformed the market benchmark in live cattle recommendations from 1995-2004. AgResource was the only advisory service that produced an average net price received that was statistically significant above the benchmark at the 90% confidence level. Seven advisory services produced an average price that underperformed than the market benchmark. Three advisory services, Ag Review, Stewart-Peterson and Top Farmer had average prices that were statistically lower than the benchmark at the 90% confidence level.

In feeder cattle, six advisory services outperformed the benchmark but only one service, Utterback, produced results that were statistically significant. No advisory services underperformed when compared to the benchmark.

Two advisory services had average net advisory prices that outperformed the benchmark in feed hedging recommendations. However, neither AgResource's nor Agrivisor's results were statistically different from the benchmark. Five advisory services produced a net price paid that was higher than the benchmark, and four of these services, Ag Review, Brock, Pro Farmer, and Top Farmer, had a net price paid that exhibited statistically significant underperformance compared to the benchmark at the 90% confidence level.

Similar to live cattle hedging AgLine and AgResource both produced a net price received that was better than the benchmark for margin hedging. However, neither of these differences were statistically significant. The remaining seven advisory services produced results that were inferior to the benchmark. Four services, Brock, Pro Farmer, Stewart-Peterson and Top Farmer had net priced received on the margin that was statistically worse than the benchmark at the 90% confidence level.

Overall in margin hedging, two services produced results better than the benchmark, three services produced results that were not statistically different from the benchmark and four services produced results worse than the benchmark.

5.9 Risk/Return Analysis

While the direction and magnitude of net prices received in relation to the market benchmark is an important indicator of performance, it may not give the complete picture. Another important indicator to examine in this analysis is the riskiness of a program. Two

programs may end up having the same net advisory price for a quarter but one may have much higher risk than the other. These differences in risk may come from the type of hedging participation, the timing of actions and variations in implementing complex strategies. E-V, or mean variance, analysis is the most common method used to analyze decision making risk. Often, standard deviation is substituted for variance because of its ease of interpretation.

In this analysis risk may be described as the chance that participants fail to achieve the market benchmark price because the participant followed an advisory service's recommendations. Based on this definition, risk is not just limited to losses but also refers to the likelihood that what is expected to happen actually fails. An actualized price that varies often from its expected price carries greater risk than price that does not vary often although the two may, in the end, have the same net price.

Tables 21 through 24 also illustrate the data required for E-V analysis for live cattle and margin hedging. Mean and standard deviation per quarter for each advisory service are presented in the tables. Among quarters both the average price and standard deviation vary. Standard deviation for live cattle recommendations during 1995-2004 ranges from a low of $12.55/cwt to a high of $13.34/cwt among advisory services. The cash benchmark standard deviation over the 1995-2004 time period was $13.12/cwt. The benchmark's standard deviation from 1999Q3-2004 increased to $13.82/cwt and ranged from $13.03/cwt to $14.24.

Standard deviation for margin hedging ranges from a low of $9.07/cwt to a high of $10.14/cwt among all quarters. The standard deviation of the cash benchmark averaged $9.79/cwt.

This range in standard deviations illustrates the wide range of riskiness present among various advisory programs' recommendations. Although more variables are taken into account in the margin, the standard deviation of the margin is lower than live cattle's average's standard deviation. This can be attributed to the low number of trades executed in feeder and feed. The lack of activity in these inputs lowered the overall movement and helped to decrease standard deviation.

E-V analysis is demonstrated through a graph of the average net price received versus the standard deviation of that price. The benchmark's price and standard deviation is used as an anchor to divide the graph into four quadrants. The top left quadrant of the graph is the most desirable as it depicts higher return and lower risk in comparison to the benchmark. The bottom right is least desirable because of the higher risk and lower return when compared to the benchmark.

Figures 29 and 30 show E-V analysis results. In Figure 29, two programs demonstrated superior results in relation to the benchmark with higher prices and a lower standard deviation than the benchmark in for live cattle advisory programs. Two programs fall into the inferior category of higher risk and lower price in the bottom right, while the other five programs fall in categories of moderate risk and return.

Figure 30 presents the E-V analysis results for margin hedging. One program dominated the cash benchmark while two were inferior and fell in the bottom right quadrant. When comparing performance in relation to price only, 27% of the advisory programs outperformed the cash benchmark in their live cattle recommendations. Once risk was taken into account, this

percent was reduced to 22%. In comparison, 28% of margin hedging programs beat the margin cash market benchmark based on price alone and 11% when risk was considered.

In summary, the performance of advisory programs drops once risk is considered. This is consistent with results from other AgMAS studies (e.g., Weber, 2004, Jirik, et. al, 2001, Irwin, Martines-Filho, and Good, 2002). In each of the previous AgMAS studies, performance also dropped once risk was accounted for.

5.10 Predictability Tests

Even as one program may perform positively in a given quarter, there may also be a wide range of performances among other quarters. This raises a question of whether or not an advisory service exhibits predictability from quarter to quarter. Within a single quarter the net advisory price received from program to program may vary by as much as $19 per cwt. Financial investment research has used a study of the correlations of program rank across quarters to measure the degree of predictability present within a set of marketing periods (Irwin, Zulauf and Ward, 1994; Malkiel, 1995).

To test predictability, all active programs are first aligned by quarter. Predictability is then tested between two adjacent quarters (e.g., 1995 Q1 versus 1995 Q2). For the first quarter of the pair (t=1995 Q1), advisory services are ranked in descending order based on net advisory price received. Advisory programs in the second quarter of the pair are also ranked (t + 1= 1995 Q2). Finally, the correlation coefficient between the ranks of the two adjacent quarters is computed. Unpredictable performance is demonstrated through a correlation coefficient near zero. The standard error of the correlation coefficient is approximately equal to $1/\sqrt{T}$ and as thus the Z-test is appropriate.

Results of the predictability test for live cattle are found in Table 29. Correlation coefficients for live cattle recommendations ranged from 0.85 to -0.55 while average rank correlation over 1995-2004 was 0.25. Five of the thirty-nine comparison periods showed statistical significance at the 95% confidence level or higher.

In summary, rank correlations in live cattle found little evidence of predictable performance from year to year. The rank correlation coefficient of live cattle was lower than previous AgMAS studies in pork, soybeans and corn but higher that wheat (Weber; 2004, Irwin, et. Al., 2006, and Jirik, et. Al, 2001).

5.11 Advisory Service Performance Behavior

The performance of each advisory service in live cattle and margins may be compared to the other advisory services, and may also be compared to the performance of the advisory service's performance in corn, soybeans, wheat and pork. This section examines the behavior of advisory services within the scope of this study and also across all AgMAS studies.

Table 29 ranks each service's performance within the group of advisory services for each inputs, output and margin. A rank of 1 is given to the advisory service with the most desirable performance. For live cattle and margin, a rank of 1 is given to the advisory service with the highest net price received and for feed and feeder cattle, a rank of 1 is given to the advisory service with the lowest net price received. It is interesting to note the change in rank in live cattle from the 1995-2004 period to the 1999Q3-2004 period. Ag Resource was the top performing program from 1995-2004 and the fifth performing from 1999Q3-2004. Utterback was the fifth performing service from 1995-2004 and the top performing service from 1999Q3-2004. Utterback was also the top performing service in feeder cattle. Ag Resource was the top

performing service in feed and Ag Line was the top performing service in the overall margin. Ag Line ranked second in both live cattle time frames, second in feeder cattle and tied for third in feed.

Ag Line, the top ranked company in margins gave no recommendations for feed and tied for third in feed along with the other services who gave no feed recommendations. Ag Line gave a total of four recommendations over the 1999-2004 time period. Recommendations were given in the fourth quarter of 2003 and the first quarter of 2004. Ag Line gave more frequent recommendation for live cattle. Recommendations were given in 65% of quarters. Ag Line gave as many as nine recommendations per quarter and averaged 2.3 recommendations per quarter, during quarters where recommendations were given.

Similarly, Ag Resource, the #2 ranked service in margins also gave recommendations in 65% of quarters, and gave a max of nine recommendations in a single quarter. Among quarters that gave recommendations, Ag Resource gave on average 3.5 recommendations per quarter.

An advisory service's performance in hog marketing may be the most similar to live cattle because both are non storable, livestock commodities. Results from Weber et al. (2004) are shown in Tables 30 and 31. Table 30 presents the ranking of each advisory service's net price received over a give time frame. Top Farmer had the highest net price received for hogs. However, for all live cattle related classes, Top Farmer placed near or at the bottom. Ag Line, who ranked 1st for the margin in this study ranked 7th in hogs. Ag Resource performed similarly across live cattle (1st, 1995-2004), margin (2nd) and hogs (2nd). Other than Ag Resource, advisory services did not perform similarly across hogs and live cattle.

E-V Analysis results are for hogs are presented in Table 31. Three companies had an average net price received above the cash benchmark and standard deviations below the average standard deviation of the cash benchmark. This compares to two companies outperforming in live cattle and one company outperforming in the margin. Ag Resource outperformed the benchmark in both live cattle and hogs but not in margin.

It is useful to compare the results of this study to the results of prior AgMAS studies to determine if a service outperforms across commodities or perhaps has a strength or weakness in a specific area. Looking to Tables 30 and 31, performance results for wheat, corn and soybeans are presented. Table 30 displays the rank of each advisory service. More advisory services gave recommendations for corn and soybeans than those listed; however, results are only presented for services who also gave recommendation for live cattle. Rankings for Utterback are not available. Similar to live cattle, Ag Resource was the top ranked advisory service for corn and soybeans. Ag Resource came in near the middle in wheat. Ag Line, who was the top ranked advisory service for the margin came in near the middle to low end for corn, beans and soft red winter wheat. Ag Review and Top Farmer placed near or at the bottom for live cattle and margin results and similarly these two companies placed in the bottom half for most of grains. The one exception is Ag Review who placed third in corn. Overall, Ag Resource exhibited positive performance across most commodities.

The E-V Analysis reported for corn, beans and wheat in Table 31 reveals substantial differences to live cattle. For both corn and soybeans six of the eight advisory services listed exhibited positive performance with respect to the benchmark and the benchmark's standard deviation. Overall, when using E-V analysis as a performance indicator, as a group advisory services' corn and soybean recommendations far out performed their live cattle or margin

recommendations. For wheat however, the opposite is true. Only one advisory service beat the benchmark with respect to net price and risk in soft red winter wheat and no advisory services beat the benchmark in hard red winter wheat. While underperformance was seen both in wheat and live cattle, live cattle did perform marginally better than wheat.

Another aspect of advisory service behavior that may be examined is the probability that an advisory service locks in profit through hedging across multiple commodities. As advisory services give recommendations for each commodity in the margin calculation, it stands to reason that the advisory service would give recommendations such that hedges are in place in multiple commodities at once to further reduce risk. During the 1999 Q3-2004 time frame, advisory services had hedges on in more than 1 commodity 18% of the time. Ag Resource used simultaneous positions the least, only 4% of the time while Stewart Peterson used simultaneous positions the most, at 44% of the time.

5.12 Summary

This chapter examines differences between the net advisory prices of live cattle and margin hedging in comparison to the respective benchmarks. Three benchmarks are used in this study: a live cattle benchmark, feeder cattle benchmark and a feed index benchmark created through derived from corn and soybean meal prices. These benchmarks are based on cash markets that a Western Kansas feedlot manager would be subject to or look to on a daily basis for pricing direction.

Directional, average price, risk/return and predictability performance analyses were performed on the recommendations as they were analyzed by group, across quarters and as a

whole. With each performance measure, margin hedging had a much lower proportion of positive performance than live cattle.

Under the first performance measure, directional performance, the average proportion of programs above the benchmark in live cattle was 27% and 28% for margin hedging. This measure looked at the percent of advisory services that were above or below the benchmark and magnitude was not taken into account. Exhibiting performance of less than 50%, both live cattle and margin hedging indicated underperformance, on average.

The second performance measure looked at both direction and magnitude. Here, over the 40 quarter period of live cattle recommendations, the average net price received was $0.37/cwt lower than the benchmark. Similarly, the net price received on margin hedging was $0.76/cwt below the benchmark. When each advisory service's net price received was averaged across the group, the advisory services produced results that significantly underperformed the benchmark in live cattle, feed and margin hedging. Advisory services as a group outperformed the benchmark in feeder recommendations. This performance measure indicates that following an advisory service's recommendations will produce a negative benefit for live cattle and margin hedging. Also, the fewest number of hedges were placed for feeder cattle and this service had a net priced received that outperformed the benchmark.

The third performance measure, risk/return analysis, took into account direction, magnitude and the riskiness of the hedging portfolio. E-V analysis was used to analyze the decision making risk. Two advisory programs exhibited positive performance results compared to the benchmark for live cattle hedging. This was indicated by placement in the upper-right hand quadrant of the E-V graph in Figure 1. One advisory program exhibited positive

performance results for margin hedging. Overall, less than half of the services performed better than the market benchmark in both live cattle and margin hedging. This suggests advisory services have an inability to beat the market benchmark. Consistent with the results from the average price performance measure, using E-V analysis also posits that a feedlot manager is not better off on average after using an advisory service's hedging recommendations.

The final performance measure used was predictability. Rank correlations for live cattle had little support for predictable performance from year to year. Performance predictability increased for margin hedging but this may have been due to the small number of hedges that took place in feed and feeder. Overall, on average, the net price received for live cattle and margin hedging underperformed with respect to the benchmarks.

Finally, comparisons were made between this research and previous AgMAS research. Similarities were seen across some advisory services but in the performance measures examined here, advisory services performed better in corn and soybeans than in live cattle and margin hedging.

6. CONCLUSION

6.1 Summary

Among the largest risks a feedlot may face are price risks associated with the sales price of fed cattle and the cost of feeder calves and feed. The feedlot may follow the advice of a market advisory service to manage these risks. Advisory services provide feedlots with market information and also provide hedging recommendations.

Previous research on feedlot marketing strategies has shown that no one marketing or risk management strategy excels above another. Shafer, Griffin, and Johnston (1978) studied hedging both inputs and outputs. All strategies reviewed in this report produced net returns lower than the cash marketing strategy but all, with the exception of the technical trading strategy, exhibited variances lower than the cash strategy.

Noussinov and Leuthold (1998) also analyzed input and output hedging strategies. The producer hedged live cattle, feeder cattle, corn and soybean meal. This simulation included hedging the inputs one month prior to placement and lifting when the underlying commodity was bought or sold. It was concluded that no specific strategy dominated but variance was reduced when compared to not hedging.

While it is common for feedlot managers to subscribe to advisory services, there was no research analyzing the effectiveness of the service's hedging recommendations. Prior to the founding of the AgMAS project, research on advisory services had been limited and in corn and soybeans only (Gehrt and Good, 1993, Martines-Filho, 1996).

In 1994 the AgMAS Project was started at the University of Illinois. The purpose of the AgMAS project was to provide objective, nonbiased evaluations of advisory services. Under the AgMAS project, the recommendations given by advisory services have been studied for corn, soybeans, wheat and pork. Under each of these commodities, only the output hedge was studied. In contrast, many advisory services studied for these prior research studies gave both input and output recommendations for live cattle. Many services gave recommendations on feeder cattle, corn and soybean meal recommendations as input hedges and live cattle recommendations as output hedges, as to simulate a feedlot.

Following Irwin et. al. (2006) two key research questions were addressed in this study:

- Do marketing advisory services recommendations in the hedging of live cattle-related markets or in the selective hedging of live cattle markets produce results different the market benchmark? The null hypothesis is that advisory services do not produce results different from the benchmark. The alternative hypothesis is that advisory services do produce results statistically better or worse than the benchmark.
- Is there predictability of performance from quarter-to-quarter within a market advisory service's recommendations? The null hypothesis is that advisory service's do not exhibit and predictability of performance from quarter-to-quarter. The alternative hypothesis is that advisory services do exhibit predictability of returns.

Through the AgMAS project, recommendations were recorded for at least 23 services from 1995 through 2004. Nine advisory services gave recommendations deemed clear and concise for live cattle hedging and of this subset, eight gave recommendations for feeder cattle and seven gave recommendations for feed.

Using these recommendations, a feedlot model was developed to be representative to an actual feedlot. It was assumed the feedlot in this study is located in Western Kansas due to the high volume of feedlots in Kansas and because of the availability of cash price series in the geographic region. These markets included the Kansas direct slaughter series, Kansas direct feeder cattle, western Kansas corn and Kansas City soybean meal price series. Because the Kansas direct slaughter series was not available for the entire time period, prices were derived from boxed beef carcass prices to complete the series.

The marketing window for live cattle hedges began one month prior to placing the cattle on feed and extends through the time when cattle are slaughtered, totaling nine months. Marketing windows for feeder cattle and feed were also nine months to mirror the live cattle marketing window. To analyze an advisory service's margin recommendations, net price received from live cattle, and net price paid for feeder cattle and feed for preceding quarters was combined.

Prior to reviewing the net price received for the group of services, it is useful to understand the behavior of the advisory services. Two advisory services may have the same net price received, but they may arrive at the prices in entirely different ways. Differences existed between the timing and frequency of recommendations and the pricing tools that were used.

To compare the marketing behavior, each service was analyzed in two steps. First, the frequency of recommendations and the tool used is described. The most frequently used tool by advisor services for live cattle recommendations was a futures only approach. For feed and feeder recommendations, no futures or options were used the majority of the time and overall, no

major trends in either live cattle, feeder cattle or feeder were seen over the time period of this study.

Second, the daily index of net amount sold by each service is developed and the cash sales for a given program on a given day are weighted by the deltas of individual positions. These "marketing profiles" were used to summarize point in time positions for individual programs. On average, most services gave recommendations within the marketing quarter and hedged between 0 and 100% during the marketing quarter. The day prior to the start of the marketing quarter advisory services had on average 14.66% of live cattle sales, 2.55% of feeder purchases and 19.15% of feed purchases hedged. However, at various times some services were over or under hedged or had hedges on prior to the start or after the completion of the marketing window.

The net price received from an advisory service for each commodity was compared to the market benchmark. Benchmarks were an important concept to this study because the efficient market hypothesis says that rational market participants will eliminate arbitrage opportunities. No market advisory service may have proprietary information to „beat' the market. The benchmark used for each commodity in this study was a spot cash benchmark averaged over a quarter and then weighted to account for seasonality.

Four performance indicators were applied to the net price received for the live cattle, output only recommendations and for the input/output margin recommendations. The first performance indicator was directional performance, which measured whether or not a service beat its benchmark. 27% of services beat the benchmark for live cattle hedges and 28% beat the

benchmark for margin hedging. Because less than 50% of services beat the benchmark, this performance measure indicates that on average advisory services do not outperform the market.

The second performance measure captured both the direction and magnitude of the net price received in comparison to the benchmark. On average for the 40 quarter period across all services, net price received was $0.37/cwt lower than the benchmark for live cattle hedges. No services' average price received, when averaged across all quarters, was statistically different from the benchmark. Over the 22 quarter period for margin hedging, the net price received was $0.76/cwt below the benchmark. When averaged across all benchmarks, the difference from benchmark was statistically significant in all commodity classes. Feeder recommendations were the only class that exhibited positive price performance. Because of the statistical significance, a feedlot would be worse off if they had followed the advice of an average advisory service for live cattle or margin hedging. An advisory service would have been better off only if they would have ignored live cattle and feed recommendations and followed feeder recommendations only.

The third performance measure, risk/return analysis, took into account direction, magnitude and the riskiness of the portfolio. Mean variance, also known as E-V analysis, was used in this study to analyze the risk in decisions making. Net price received in combination with standard deviation is compared to the benchmark. A four-quadrant graph was used to display the relationships between the riskiness of advisory services and the benchmark across all quarters. Two advisory programs exhibited positive performance results compared to the benchmark for live cattle hedging. One advisory program exhibited positive performance results

for margin hedging. For both live cattle and margin hedging less than 50% of services beat the benchmark and as such the advisory services on average did not outperform the benchmark.

Predictability was the final performance measure used. Live cattle rank correlations showed little support for the ability to predict performance from period to period. While predictability increased slightly for margin hedging, this may have been because overall a small number of input hedges were used.

Across the four performance measures, live cattle and margin recommendations from advisory services underperformed with respect to the benchmark. Not only did the services underperform compared to the benchmark when risk, direction and magnitude were taken into account, the services did not outperform the benchmark even with respect to direction only. Also, the low predictability suggests that although an advisory service may beat the market in one quarter, the probability of them outperforming in the following quarter is very low.

Overall, these results are consistent with results found in corn, soybeans, wheat and hogs, although advisory service performed better as a group in corn and soybeans than in this study. After all performance measures were analyzed, the null and alternative hypothesis presented earlier may be revisited. The null hypothesis is that the market advisory services do not produce results different from the market benchmark. The alternative hypothesis is that the market advisory services perform significantly better or worse than the market benchmark. The null hypothesis is rejected. As a group advisory services perform statistically worse than the benchmark for live cattle, feed and margin hedging. Advisory services perform statistically better than the benchmark for feeder cattle purchases. Across the margin, a feedlot manager would be worse off following an advisory service that practicing a routine marketing strategy.

There are interesting points that may be made in regard to performance results. First while the net price received for live cattle was not worse than the benchmark, two advisory services had mean-variance risk profiles that outperformed the benchmark. Similarly, in margin hedging these two services also outperformed the benchmark with respect to mean variance.

6.2 Implications

There are two key implications to this study. First, from a cost/benefit standpoint, the findings of this research suggest that the feedlot is worse off from having followed the advisory service recommendations. These findings provide feedlot managers with information to help manage price risk and do not support the use of advisory services in live cattle and the related hedges. With an average market underperformance of $0.76.cwt, a large feedlot could stand to lose close to $500,000 annually. From a statistical perspective, the prices received from following and advisory services' recommendations were, on average, significantly worse than the benchmark, and as demonstrated, may also have a significant negative effect on the profitability of a feedlot.

6.3 Limitations and Further Research

There are a few main limitations to this research. First, although the AgMAS research project collected recommendations from 1995 through 2004, feed and feeder recommendations were only available from 1999 through 2004. Implications related to timing of input hedges made margin profiles available from 1999Q3 through 2004, or 22 marketing quarters. For the results to be comparable to actual pricing performance realized by market advisory service programs and program participants.

Also, the number of advisory services selected by the AgMAS program was not random. The selection was aimed to represent a wide variety of services that gave recommendations for corn and soybeans. Not all services tracked by AgMAS gave live cattle recommendations and some may argue that not all services that give live cattle recommendations were included.

Overall however, enough service gave recommendations over a long enough period of time that sample size is reasonable to draw conclusions and produce a practical analysis of performance recommendations.

TABLES

Table 1. Schedule of Marketing Windows Based on Placement Quarter and Corresponding Marketing Quarter, Live Cattle

	Marketing Quarter		
Start of Placement Quarter	**First Month in Marketing Quarter**	**Second Month in Marketing Quarter**	**Third Month in Marketing Quarter**
January	July	August	September
April	October	November	December
July	January	February	March
October	April	May	June

Note: Feeder Cattle and Feed input hedging follows the same placement quarter/marketing quarter schedule

Table 2. Variable Weight to Achieve Fed Cattle Marketing of 4 cwt per Year, by Quarter, by Input or Output

	Input			Output
Quarter	**Feeder Cattle**	**Corn**	**Soybean Meal**	**Fed Cattle**
1	0.7184	4.1621	0.0256	0.9141
2	0.5680	4.6507	0.0266	1.0910
3	0.5339	3.9737	0.0219	1.2116
4	0.6330	3.5320	0.0219	0.7833

Table 3. Percentage and Number of Times that Marketing Tools were Used by Individual Market Advisory Programs, All Services Combined, Live Cattle 1995 - 2004

Market Advisory Program	Marketing Tool: Futures Only	Options Only	Combination of Futures and Options	No Futures or Options Positions	Total
			-Number of Quarters-		
Ag Review	30	1	1	8	40
Ag Line	26	0	0	14	40
AgResource	7	13	6	14	40
AgriVisor	19	0	2	19	40
Brock	26	1	1	12	40
Pro Farmer	19	1	1	19	40
Stewart-Peterson	18	6	12	4	40
Top Farmer Intelligence	12	0	15	13	40
Utterback Marketing Services	14	5	5	16	40
Average	19	3	5	13	40
			-Percentage of Quarters-		
Ag Review	75	2.5	2.5	20	100
Ag Line	65	0	0	35	100
AgResource	17.5	32.5	15	35	100
AgriVisor	47.5	0	5	47.5	100
Brock	65	2.5	2.5	30	100
Pro Farmer	47.5	2.5	2.5	47.5	100
Stewart-Peterson	45	15	30	10	100
Top Farmer Intelligence	30	0	37.5	32.5	100
Utterback Marketing Services	35	12.5	12.5	40	100
Average	48	8	12	33	100

Note: Advisory programs that are include for only one year are not listed in this table due to lack of observations.

Table 4. Percentage and Number of Times that Marketing Tools were Used by Individual Market Advisory Programs, All Services Combined, Feeder Cattle 1999- 2004

Market Advisory Program	Marketing Tool: Futures Only	Options Only	Combination of Futures and Options	No Futures or Options Positions	Total
			-Number of Quarters-		
Ag Review	15	1	0	8	24
Ag Line	2	0	0	22	24
Ag Resource	2	0	0	22	24
AgriVisor	0	0	0	24	24
Brock	4	0	0	20	24
Pro Farmer	2	0	0	22	24
Stewart-Peterson	0	2	0	22	24
Top Farmer Intelligence	4	0	0	20	24
Utterback Marketing Services	8	0	2	14	24
Average	4	0	0	19	24
			-Percentage of Quarters-		
Ag Review	63	4	0	33	100
Ag Line	8	0	0	92	100
AgResource	8	0	0	92	100
AgriVisor	0	0	0	100	100
Brock	17	0	0	83	100
Pro Farmer	8	0	0	92	100
Stewart-Peterson	0	8	0	92	100
Top Farmer Intelligence	17	0	0	83	100
Utterback Marketing Services	33	0	8	58	100
Average	17	1	1	81	100

Note: Advisory programs that are include for only one year are not listed in this table due to lack of observations.

Table 5. Percentage and Number of Times that Marketing Tools were Used by Individual Market Advisory Programs, All Services Combined, Corn 1999- 2004

Market Advisory Program	Marketing Tool: Futures Only	Options Only	Combination of Futures and Options	No Futures or Options Positions	Total
			-Number of Quarters-		
Ag Review	19	1	2	2	24
Ag Line	0	0	0	24	24
Ag Resource	5	0	0	19	24
AgriVisor	14	0	0	10	24
Brock	11	0	1	12	24
Pro Farmer	16	0	0	8	24
Stewart-Peterson	0	0	0	24	24
Top Farmer Intelligence	6	8	4	6	24
Utterback Marketing Services	1	3	5	15	24
Average	8	1	1	13	24
			-Percentage of Quarters-		
Ag Review	79	4	8	8	100
Ag Line	0	0	0	100	100
AgResource	21	0	0	79	100
AgriVisor	58	0	0	42	100
Brock	46	0	4	50	100
Pro Farmer	67	0	0	33	100
Stewart-Peterson	0	0	0	100	100
Top Farmer Intelligence	25	33	17	25	100
Utterback Marketing Services	4	13	21	63	100
Average	33	6	6	56	100

Note: Advisory programs that are include for only one year are not listed in this table due to lack of observations.

Table 6. Percentage and Number of Times that Marketing Tools were Used by Individual Market Advisory Programs, All Services Combined, Soybean Meal 1999- 2004

Market Advisory Program	Marketing Tool: Futures Only	Options Only	Combination of Futures and Options	No Futures or Options Positions	Total
			-Number of Quarters-		
Ag Review	22	0	0	2	24
Ag Line	0	0	0	24	24
Ag Resource	5	0	0	19	24
AgriVisor	14	0	0	10	24
Brock	9	1	0	14	24
Pro Farmer	0	0	0	24	24
Stewart-Peterson	0	0	0	24	24
Top Farmer Intelligence	0	0	6	18	24
Utterback Marketing Services	0	4	0	20	24
Average	6	1	1	17	24
			-Percentage of Quarters-		
Ag Review	92	0	0	8	100
Ag Line	0	0	0	100	100
AgResource	21	0	0	79	100
AgriVisor	58	0	0	42	100
Brock	38	4	0	58	100
Pro Farmer	0	0	0	100	100
Stewart-Peterson	0	0	0	100	100
Top Farmer Intelligence	0	0	25	75	100
Utterback Marketing Services	0	17	0	83	100
Average	23	2	3	72	100

Note: Advisory programs that are include for only one year are not listed in this table due to lack of observations.

Table 7. Number of Advisory Programs that Used Futures and Options in Live Cattle by Marketing Quarter, 1995 Q1 - 2004 Q4

	Marketing Tool				
Marketing Quarter	Futures Only	Options Only	Combination of Futures and Options	No Futures or Options Positions	Total
1995 Q1	6	0	1	2	9
1995 Q2	6	1	1	1	9
1995 Q3	7	1	1	0	9
1995 Q4	6	0	1	2	9
1996 Q1	4	2	0	3	9
1996 Q2	5	1	0	3	9
1996 Q3	7	0	0	2	9
1996 Q4	5	1	0	3	9
1997 Q1	5	1	1	2	9
1997 Q2	4	1	0	4	9
1997 Q3	4	0	2	3	9
1997 Q4	3	0	1	5	9
1998 Q1	3	0	1	5	9
1998 Q2	3	0	2	4	9
1998 Q3	2	1	1	5	9
1998 Q4	3	1	2	3	9
1999 Q1	3	1	1	4	9
1999 Q2	2	1	1	5	9
1999 Q3	3	0	0	6	9
1999 Q4	6	0	0	3	9
2000 Q1	5	0	0	4	9
2000 Q2	5	0	1	3	9
2000 Q3	3	0	2	4	9
2000 Q4	4	0	4	1	9
2001 Q1	6	1	1	1	9
2001 Q2	4	2	1	2	9
2001 Q3	4	2	1	2	9
2001 Q4	0	1	1	7	9
2002 Q1	2	2	2	3	9
2002 Q2	0	2	1	6	9
2002 Q3	2	2	1	4	9
2002 Q4	3	0	3	3	9
2003 Q1	6	1	1	1	9
2003 Q2	6	0	2	1	9
2003 Q3	5	0	1	3	9
2003 Q4	5	1	1	2	9
2004 Q1	6	0	1	2	9
2004 Q2	7	0	0	2	9
2004 Q3	7	0	1	1	9
2004 Q4	4	1	2	2	9

Table 8. Number of Advisory Programs that Used Futures and Options in Feeder Cattle by Marketing Quarter, 1999 Q1 - 2004 Q4

	Marketing Tool				
Marketing Quarter	Futures Only	Options Only	Combination of Futures and Options	No Futures or Options Positions	Total
1999 Q1	1	0	0	8	9
1999 Q2	1	0	0	8	9
1999 Q3	1	0	0	8	9
1999 Q4	1	0	0	8	9
2000 Q1	1	0	0	8	9
2000 Q2	1	0	0	8	9
2000 Q3	1	0	0	8	9
2000 Q4	1	0	0	8	9
2001 Q1	0	0	0	9	9
2001 Q2	1	0	0	8	9
2001 Q3	1	0	0	8	9
2001 Q4	0	0	0	9	9
2002 Q1	1	1	0	7	9
2002 Q2	2	1	0	6	9
2002 Q3	2	0	0	7	9
2002 Q4	2	0	0	7	9
2003 Q1	4	0	0	5	9
2003 Q2	3	0	0	6	9
2003 Q3	0	0	0	9	9
2003 Q4	1	0	0	8	9
2004 Q1	2	1	0	6	9
2004 Q2	0	0	0	9	9
2004 Q3	1	0	0	8	9
2004 Q4	1	0	0	8	9

Table 9. Number of Advisory Programs that Used Futures and Options in Feed by Marketing Quarter, 1999 Q1 - 2004 Q4

	Marketing Tool				
Marketing Quarter	Futures Only	Options Only	Combination of Futures and Options	No Futures or Options Positions	Total
1999 Q1	1	0	0	7	8
1999 Q2	1	0	0	7	8
1999 Q3	1	0	0	7	8
1999 Q4	1	0	0	7	8
2000 Q1	4	0	0	4	8
2000 Q2	4	0	0	4	8
2000 Q3	3	0	0	5	8
2000 Q4	4	0	0	4	8
2001 Q1	3	0	1	4	8
2001 Q2	4	1	0	3	8
2001 Q3	3	1	1	3	8
2001 Q4	3	0	1	4	8
2002 Q1	4	0	1	3	8
2002 Q2	3	0	2	3	8
2002 Q3	4	1	0	3	8
2002 Q4	5	1	0	2	8
2003 Q1	3	1	0	4	8
2003 Q2	2	1	0	5	8
2003 Q3	3	1	0	4	8
2003 Q4	4	1	0	3	8
2004 Q1	3	0	1	4	8
2004 Q2	3	0	1	4	8
2004 Q3	4	1	0	3	8
2004 Q4	3	0	0	5	8

Table 10. Percentage of Advisory Programs that Used Futures and Options in Live Cattle, by Marketing Quarter, 1995 Q1 - 2004 Q4

	Marketing Tool				
Marketing Quarter	Futures Only	Options Only	Combination of Futures and Options	No Futures or Options Positions	Total
1995 Q1	67	0	11	22	100
1995 Q2	67	11	11	11	100
1995 Q3	78	11	11	0	100
1995 Q4	67	0	11	22	100
1996 Q1	44	22	0	33	100
1996 Q2	56	11	0	33	100
1996 Q3	78	0	0	22	100
1996 Q4	56	11	0	33	100
1997 Q1	56	11	11	22	100
1997 Q2	44	11	0	44	100
1997 Q3	44	0	22	33	100
1997 Q4	33	0	11	56	100
1998 Q1	33	0	11	56	100
1998 Q2	33	0	22	44	100
1998 Q3	22	11	11	56	100
1998 Q4	33	11	22	33	100
1999 Q1	33	11	11	44	100
1999 Q2	22	11	11	56	100
1999 Q3	33	0	0	67	100
1999 Q4	67	0	0	33	100
2000 Q1	56	0	0	44	100
2000 Q2	56	0	11	33	100
2000 Q3	33	0	22	44	100
2000 Q4	44	0	44	11	100
2001 Q1	67	11	11	11	100
2001 Q2	44	22	11	22	100
2001 Q3	44	22	11	22	100
2001 Q4	0	11	11	78	100
2002 Q1	22	22	22	33	100
2002 Q2	0	22	11	67	100
2002 Q3	22	22	11	44	100
2002 Q4	33	0	33	33	100
2003 Q1	67	11	11	11	100
2003 Q2	67	0	22	11	100
2003 Q3	56	0	11	33	100
2003 Q4	56	11	11	22	100
2004 Q1	67	0	11	22	100
2004 Q2	78	0	0	22	100
2004 Q3	78	0	11	11	100
2004 Q4	44	11	22	22	100

Table 11. Percentage of Advisory Programs that Used Futures and Options in Feed, by Marketing Quarter, 1999 Q1 - 2004 Q4

	Marketing Tool				
Marketing Quarter	Futures Only	Options Only	Combination of Futures and Options	No Futures or Options Positions	Total
1999 Q1	13	0	0	88	100
1999 Q2	13	0	0	88	100
1999 Q3	13	0	0	88	100
1999 Q4	13	0	0	88	100
2000 Q1	50	0	0	50	100
2000 Q2	50	0	0	50	100
2000 Q3	38	0	0	63	100
2000 Q4	50	0	0	50	100
2001 Q1	38	0	13	50	100
2001 Q2	50	13	0	38	100
2001 Q3	38	13	13	38	100
2001 Q4	38	0	13	50	100
2002 Q1	50	0	13	38	100
2002 Q2	38	0	25	38	100
2002 Q3	50	13	0	38	100
2002 Q4	63	13	0	25	100
2003 Q1	38	13	0	50	100
2003 Q2	25	13	0	63	100
2003 Q3	38	13	0	50	100
2003 Q4	50	13	0	38	100
2004 Q1	38	0	13	50	100
2004 Q2	38	0	13	50	100
2004 Q3	50	13	0	38	100
2004 Q4	38	0	0	63	100

Table 12. Percentage of Advisory Programs that Used Futures and Options in Feeder Cattle, by Marketing Quarter, 1995 Q1 - 2004 Q4

	Marketing Tool				
Marketing Quarter	Futures Only	Options Only	Combination of Futures and Options	No Futures or Options Positions	Total
1999 Q1	11	0	0	89	100
1999 Q2	11	0	0	89	100
1999 Q3	11	0	0	89	100
1999 Q4	11	0	0	89	100
2000 Q1	11	0	0	89	100
2000 Q2	11	0	0	89	100
2000 Q3	11	0	0	89	100
2000 Q4	11	0	0	89	100
2001 Q1	0	0	0	100	100
2001 Q2	11	0	0	89	100
2001 Q3	11	0	0	89	100
2001 Q4	0	0	0	100	100
2002 Q1	11	11	0	78	100
2002 Q2	22	11	0	67	100
2002 Q3	22	0	0	78	100
2002 Q4	22	0	0	78	100
2003 Q1	44	0	0	56	100
2003 Q2	33	0	0	67	100
2003 Q3	0	0	0	100	100
2003 Q4	11	0	0	89	100
2004 Q1	22	11	0	67	100
2004 Q2	0	0	0	100	100
2004 Q3	11	0	0	89	100
2004 Q4	11	0	0	89	100

Table 13. Magnitude of Net Amount Sold by Market Advisory Programs, Live Cattle, Selected Dates 1995-2004

Market Advisory Program	Months Prior to Start of Marketing Quarter		
	6-months	3-months	0-months
		--percent--	
Average Net Amount Sold			
Ag Review	0.00	6.54	14.09
AgLine by Doane	0.63	6.11	19.80
AgResource	0.10	1.25	9.24
AgriVisor	2.40	7.00	16.86
Brock	0.00	5.25	14.81
Pro Farmer	0.00	6.35	12.55
Stewart-Peterson	(0.06)	1.02	10.77
Top Farmer Intelligence	0.20	11.36	23.07
Utterback Marketing Services	0.00	2.57	12.44
All Programs	0.36	5.27	14.85
Minimum Net Amount Sold			
Ag Review	0.00	(16.32)	(51.56)
AgLine by Doane	0.00	0.00	0.00
AgResource	(13.78)	(42.81)	(61.85)
AgriVisor	0.00	0.00	0.00
Brock	0.00	0.00	0.00
Pro Farmer	0.00	0.00	0.00
Stewart-Peterson	(2.48)	(10.76)	(32.64)
Top Farmer Intelligence	0.00	0.00	(2.90)
Utterback Marketing Services	0.00	(32.64)	0.00
All Programs	(1.81)	(11.39)	(16.55)
Maximum Net Amount Sold			
Ag Review	0.00	51.56	88.12
AgLine by Doane	16.32	52.55	52.55
AgResource	16.32	85.94	54.15
AgriVisor	26.27	52.55	59.67
Brock	0.00	26.27	52.55
Pro Farmer	0.00	52.55	78.82
Stewart-Peterson	0.00	40.29	105.10
Top Farmer Intelligence	8.16	96.22	106.37
Utterback Marketing Services	0.00	66.67	105.10
All Programs	7.45	58.29	78.05

Table 14. Magnitude of Net Amount Bought by Market Advisory Programs, Feeder Cattle, Selected Dates 1999-2004

Market Advisory Program	Months Prior to Start of Marketing Quarter		
	6-months	3-months	0-months
		--percent--	
Average Net Amount Sold			
Ag Review	0.72	0.96	0.89
AgLine by Doane	0.00	0.00	2.63
AgResource	0.93	3.70	3.70
AgriVisor	0.00	0.00	0.00
Brock	0.00	2.63	7.89
Pro Farmer	0.00	0.00	0.00
Stewart-Peterson	0.00	0.75	0.43
Top Farmer Intelligence	0.00	1.67	0.00
Utterback Marketing Services	1.67	7.16	7.44
All Programs	0.37	1.87	2.55
Minimum Net Amount Sold			
Ag Review	0.00	0.00	0.00
AgLine by Doane	0.00	0.00	0.00
AgResource	0.00	0.00	0.00
AgriVisor	0.00	0.00	0.00
Brock	0.00	0.00	0.00
Pro Farmer	0.00	0.00	0.00
Stewart-Peterson	0.00	0.00	0.00
Top Farmer Intelligence	0.00	0.00	0.00
Utterback Marketing Services	0.00	0.00	0.00
All Programs	0.00	0.00	0.00
Maximum Net Amount Sold			
Ag Review	16.67	16.67	16.67
AgLine by Doane	0.00	0.00	50.00
AgResource	16.67	50.00	50.00
AgriVisor	0.00	0.00	0.00
Brock	0.00	50.00	50.00
Pro Farmer	0.00	0.00	0.00
Stewart-Peterson	0.00	14.32	8.09
Top Farmer Intelligence	0.00	33.33	0.00
Utterback Marketing Services	33.33	66.67	66.67
All Programs	7.41	25.67	26.83

Table 15. Magnitude of Net Amount Bought by Market Advisory Programs, Feed, Selected Dates 1999-2004

Market Advisory Program	Months Prior to Start of Marketing Quarter		
	6-months	3-months	0-months
		--percent--	
Average Net Amount Sold			
Ag Review	0.00	5.79	29.00
AgLine by Doane	0.00	0.00	0.00
AgResource	3.85	15.76	23.71
AgriVisor	0.00	0.00	30.95
Brock	0.01	17.85	57.09
Pro Farmer	0.00	3.12	15.59
Stewart-Peterson	0.00	0.00	0.00
Top Farmer Intelligence	0.00	2.49	12.11
Utterback Marketing Services	(7.33)	(9.33)	3.93
All Programs	(0.39)	3.96	19.15
Minimum Net Amount Sold			
Ag Review	0.00	0.00	0.00
AgLine by Doane	0.00	0.00	0.00
AgResource	0.00	(16.67)	0.00
AgriVisor	0.00	0.00	0.00
Brock	0.00	0.00	0.00
Pro Farmer	0.00	0.00	0.00
Stewart-Peterson	0.00	0.00	0.00
Top Farmer Intelligence	0.00	(45.09)	(53.37)
Utterback Marketing Services	(33.15)	(33.41)	(60.76)
All Programs	(3.68)	(10.58)	(12.68)
Maximum Net Amount Sold			
Ag Review	0.00	99.77	100.00
AgLine by Doane	0.00	0.00	0.00
AgResource	50.00	63.33	74.83
AgriVisor	0.00	0.00	100.00
Brock	0.11	99.89	149.88
Pro Farmer	0.00	49.88	49.89
Stewart-Peterson	0.00	0.00	0.00
Top Farmer Intelligence	0.00	49.89	133.04
Utterback Marketing Services	(7.33)	(9.33)	3.93
All Programs	4.75	39.27	67.95

Table 16. Cash Benchmarks, Live Cattle, 1995 - 2004 Feeder Cattle, Feed, 1999 Q3 - 2004

Quarter	Quarterly Average Benchmark Price		
	Live Cattle	Feeder Cattle	Feed
		---$/cwt.---	
1995 Q1	66.85		
1995 Q2	71.35		
1995 Q3	75.85		
1995 Q4	51.95		
1996 Q1	57.73		
1996 Q2	65.75		
1996 Q3	81.46		
1996 Q4	54.19		
1997 Q1	60.15		
1997 Q2	72.13		
1997 Q3	78.62		
1997 Q4	52.29		
1998 Q1	57.02		
1998 Q2	70.25		
1998 Q3	71.83		
1998 Q4	47.79		
1999 Q1	57.66		
1999 Q2	71.61		
1999 Q3	78.89	48.10	11.66
1999 Q4	54.40	40.86	11.51
2000 Q1	63.73	44.72	9.77
2000 Q2	77.74	54.93	10.07
2000 Q3	79.74	56.60	12.56
2000 Q4	56.49	47.37	12.72
2001 Q1	72.23	49.35	10.63
2001 Q2	83.14	58.16	11.63
2001 Q3	87.27	58.74	13.00
2001 Q4	52.52	49.95	13.02
2002 Q1	64.54	50.23	11.83
2002 Q2	71.86	55.15	11.44
2002 Q3	77.39	53.32	12.94
2002 Q4	54.20	42.39	13.98
2003 Q1	71.74	45.30	13.89
2003 Q2	85.36	53.88	13.57
2003 Q3	97.28	53.22	15.52
2003 Q4	76.00	47.66	15.74
2004 Q1	73.35	55.17	13.68
2004 Q2	94.97	65.19	15.41
2004 Q3	101.71	62.65	19.91
2004 Q4	67.39	59.09	19.61

Table 17. Descriptive Statistics for Market Advisory Program Pricing Results by Quarter, Live Cattle, 1995 - 2004

	Net Advisory Price				
Quarter	Average	Standard Deviation	Minimum	Maximum	Market Benchmark Price
			---$/cwt.---		
1995 Q1	66.51	1.73	63.87	69.82	66.85
1995 Q2	72.09	2.68	67.42	76.32	71.35
1995 Q3	76.42	2.56	71.06	79.17	75.85
1995 Q4	51.76	1.06	49.74	53.47	51.95
1996 Q1	57.48	1.54	54.55	59.54	57.73
1996 Q2	66.38	2.18	62.72	70.41	65.75
1996 Q3	80.68	0.80	79.18	81.46	81.46
1996 Q4	54.27	0.51	53.61	55.33	54.19
1997 Q1	59.58	0.78	58.19	60.51	60.15
1997 Q2	71.65	0.88	69.81	72.61	72.13
1997 Q3	78.95	1.13	77.05	80.71	78.62
1997 Q4	52.52	1.03	51.58	54.42	52.29
1998 Q1	57.60	1.08	56.87	59.97	57.02
1998 Q2	70.72	1.05	69.74	73.19	70.25
1998 Q3	71.56	0.70	70.37	72.61	71.83
1998 Q4	47.65	0.25	47.35	48.04	47.79
1999 Q1	57.63	0.82	55.99	59.24	57.66
1999 Q2	71.50	0.55	70.12	72.16	71.61
1999 Q3	78.16	1.27	75.25	78.92	78.89
1999 Q4	53.70	0.72	52.72	54.82	54.40
2000 Q1	63.58	0.34	62.91	63.80	63.73
2000 Q2	77.74	0.07	77.61	77.85	77.74
2000 Q3	79.91	0.57	79.29	81.16	79.74
2000 Q4	55.07	1.20	53.14	56.49	56.49
2001 Q1	70.81	1.70	66.67	72.49	72.23
2001 Q2	82.92	0.94	81.27	84.58	83.14
2001 Q3	87.63	0.80	86.70	89.31	87.27
2001 Q4	52.54	0.15	52.33	52.91	52.52
2002 Q1	65.05	2.62	62.44	71.44	64.54
2002 Q2	71.74	0.36	71.01	72.23	71.86
2002 Q3	77.44	0.46	76.63	78.23	77.39
2002 Q4	53.61	0.69	52.35	54.24	54.20
2003 Q1	70.21	1.55	67.43	71.86	71.74
2003 Q2	85.43	0.76	83.99	86.60	85.36
2003 Q3	92.46	6.75	77.20	97.44	97.28
2003 Q4	72.86	3.84	64.30	76.00	76.00
2004 Q1	74.83	3.39	71.41	80.57	73.35
2004 Q2	93.20	1.84	90.48	94.97	94.97
2004 Q3	100.18	2.81	93.20	102.71	101.71
2004 Q4	67.69	0.78	66.70	69.35	67.39
1995-2004					
Average	69.79	1.37			70.16
Minimum	47.65	0.07			47.79
Maximum	100.18	6.75			101.71
1999 Q3 - 2004 Q4					
Average	73.94	1.53			74.63
Minimum	52.54	0.07			52.52
Maximum	100.18	6.75			101.71

Note: Nine programs included for entire 1995-2004 time period

Table 18. Descriptive Statistics for Market Advisory Program Pricing Results by Quarter, Feeder Cattle, 1999 - 2004

Quarter	Net Advisory Price				Market Benchmark Price
	Average	Standard Deviation	Minimum	Maximum	
			---$/cwt.---		
1999 Q3	48.11	0.02	48.10	48.17	48.10
1999 Q4	40.81	0.12	40.52	40.86	40.86
2000 Q1	44.52	0.42	43.51	44.72	44.72
2000 Q2	54.75	0.39	53.82	54.93	54.93
2000 Q3	56.63	0.13	56.49	56.96	56.60
2000 Q4	47.41	0.12	47.37	47.74	47.37
2001 Q1	49.37	0.08	49.27	49.57	49.35
2001 Q2	58.19	0.08	58.16	58.39	58.16
2001 Q3	58.73	0.03	58.65	58.74	58.74
2001 Q4	49.90	0.11	49.60	49.95	49.95
2002 Q1	50.18	0.12	49.90	50.23	50.23
2002 Q2	55.09	0.18	54.64	55.23	55.15
2002 Q3	53.22	0.31	52.52	53.52	53.32
2002 Q4	42.32	0.27	41.87	42.80	42.39
2003 Q1	45.17	0.45	44.16	45.77	45.30
2003 Q2	53.74	0.29	52.98	53.88	53.88
2003 Q3	53.16	0.63	52.21	54.56	53.22
2003 Q4	47.66	0.23	47.34	48.19	47.66
2004 Q1	55.03	0.39	53.98	55.17	55.17
2004 Q2	64.93	0.80	62.81	65.39	65.19
2004 Q3	62.65	0.18	62.35	63.04	62.65
2004 Q4	59.06	0.09	58.81	59.09	59.09
Average	52.30	0.25			52.37
Minimum	40.81	0.02			40.86
Maximum	64.93	0.80			65.19

Note: Nine programs included for entire 1999-2004 time period

Table 19. Descriptive Statistics for Market Advisory Program Pricing Results by Quarter, Feed, 1999 - 2004

Quarter	Net Advisory Price				Market Benchmark Price
	Average	Standard Deviation	Minimum	Maximum	
			---$/cwt.---		
1999 Q3	11.75	0.32	11.66	12.61	11.66
1999 Q4	11.63	0.40	11.51	12.70	11.51
2000 Q1	9.85	0.21	9.77	10.42	9.77
2000 Q2	10.22	0.43	10.05	11.35	10.07
2000 Q3	12.57	0.04	12.52	12.67	12.56
2000 Q4	12.88	0.39	12.72	13.91	12.72
2001 Q1	10.85	0.59	10.57	12.40	10.63
2001 Q2	11.72	0.45	11.19	12.85	11.63
2001 Q3	13.37	0.93	12.77	15.80	13.00
2001 Q4	13.45	1.01	12.36	15.85	13.02
2002 Q1	12.43	1.76	11.51	17.16	11.83
2002 Q2	11.56	0.17	11.42	11.92	11.44
2002 Q3	13.07	0.18	12.93	13.40	12.94
2002 Q4	14.03	0.14	13.86	14.32	13.98
2003 Q1	13.80	0.23	13.46	14.03	13.89
2003 Q2	13.71	0.24	13.39	14.15	13.57
2003 Q3	15.61	0.25	15.38	16.06	15.52
2003 Q4	15.78	0.19	15.64	16.28	15.74
2004 Q1	13.79	0.17	13.64	14.14	13.68
2004 Q2	15.34	0.18	14.86	15.43	15.41
2004 Q3	19.70	0.56	18.26	20.04	19.91
2004 Q4	19.63	0.69	17.96	20.41	19.61
Average	13.49	0.43			13.37
Minimum	9.85	0.04			9.77
Maximum	19.70	1.76			19.91

Note: Nine programs included for entire 1999-2004 time period

Table 20. Descriptive Statistics for Market Advisory Program Pricing Results by Quarter, Margin, 1999 Q3 - 2004 Q4

Quarter	Net Advisory Price				Market Benchmark Price
	Average	Standard Deviation	Minimum	Maximum	
			---$/cwt.---		
1999 Q3	18.28	1.57	14.47	19.15	19.12
1999 Q4	1.24	0.71	0.37	2.45	2.03
2000 Q1	9.19	0.73	7.77	10.45	9.24
2000 Q2	12.76	0.65	11.33	13.85	12.74
2000 Q3	10.70	0.68	9.66	12.11	10.58
2000 Q4	-5.24	1.22	-6.95	-3.59	-3.59
2001 Q1	10.57	1.74	6.77	12.51	12.25
2001 Q2	13.01	1.30	10.26	15.00	13.35
2001 Q3	15.49	0.58	14.77	16.74	15.53
2001 Q4	-10.86	0.94	-12.94	-9.79	-10.45
2002 Q1	2.38	3.58	-4.61	9.38	2.48
2002 Q2	5.09	0.53	4.09	6.11	5.27
2002 Q3	11.14	0.39	10.73	11.85	11.13
2002 Q4	-2.74	0.65	-3.92	-2.14	-2.17
2003 Q1	11.25	1.23	9.31	12.67	12.56
2003 Q2	17.97	1.06	16.56	20.23	17.91
2003 Q3	23.68	7.29	7.26	29.56	28.54
2003 Q4	9.41	4.03	0.35	12.64	12.60
2004 Q1	5.99	3.74	2.11	12.90	4.50
2004 Q2	12.94	2.16	10.04	16.01	14.37
2004 Q3	17.86	2.99	10.64	20.80	19.15
2004 Q4	-11.00	0.99	-12.14	-9.35	-11.31
Average	8.14	1.76			8.90
Minimum	-11.00	0.39			-11.31
Maximum	23.68	7.29			28.54

Note: Nine programs included for entire 1999-2004 time period

Table 21. Descriptive Statistics for Market Advisory Program Pricing Results by Program, Live Cattle, 1995 - 2004

	Net Advisory Price			
Program	Average	Standard Deviation	Minimum	Maximum
		---$ per cwt.---		
Ag Review	69.17	12.55	47.35	102.71
Ag Line	70.40	12.92	47.79	101.64
Ag Resource	70.58	13.02	47.87	101.71
AgriVisor	69.99	12.92	48.04	99.71
Brock	70.03	13.13	47.79	99.86
Pro Farmer	69.66	12.63	47.41	101.92
Stewart Peterson	69.44	12.62	47.47	97.28
Top Farmer	68.98	12.66	47.79	100.64
Utterback	69.88	13.34	47.37	100.26
Average	69.79	12.86		
Minimum	68.98	12.55		
Maximum	70.58	13.34		
Market Benchmark	70.16	13.12	47.79	101.71

Note: Each program was included for forty quarters during 1995-2004

Table 22. Descriptive Statistics for Market Advisory Program Pricing Results by Program, Feeder Cattle, 1999 - 2004

Program	Net Advisory Price			
	Average	Standard Deviation	Minimum	Maximum
		---$ per cwt.---		
Ag Review	52.30	6.52	40.74	65.04
Ag Line	52.20	6.16	40.86	62.81
Ag Resource	52.32	6.40	40.86	65.19
AgriVisor	52.37	6.39	40.86	65.19
Brock	52.27	6.40	40.86	65.19
Pro Farmer	52.37	6.38	40.86	65.19
Stewart Peterson	52.32	6.42	40.86	65.19
Top Farmer	52.37	6.43	40.86	65.39
Utterback	52.19	6.44	40.52	65.19
Average	52.30	6.39		
Minimum	52.19	6.16		
Maximum	52.37	6.52		
Market Benchmark	52.37	6.39	40.86	65.19

Note: Each program was included for twenty-four quarters during 1999-2004

Table 23. Descriptive Statistics for Market Advisory Program Pricing Results by Program, Feed, 1999 - 2004

	Net Advisory Price			
Program	Average	Standard Deviation	Minimum	Maximum
		---$ per cwt.---		
Ag Review	14.00	2.60	9.88	19.94
Ag Line	13.37	2.63	9.77	19.91
Ag Resource	13.21	2.25	9.77	18.26
AgriVisor	13.35	2.70	9.77	20.11
Brock	13.55	2.48	10.42	19.66
Pro Farmer	13.57	2.67	9.77	20.07
Stewart Peterson	13.37	2.63	9.77	19.91
Top Farmer	13.70	2.71	9.77	20.41
Utterback	13.38	2.63	9.77	19.91
Average	13.50	2.59		
Minimum	13.21	2.25		
Maximum	14.00	2.71		
Market Benchmark	13.37	2.63	9.77	19.91

Note: Each program was included for twenty-four quarters during 1999-2004

Table 24. Descriptive Statistics for Market Advisory Program Pricing Results by Program, Margin, 1999 - 2004

	Net Advisory Price			
Program	Average	Standard Deviation	Minimum	Maximum
		---$ per cwt.---		
Ag Review	6.72	9.34	-12.94	20.43
Ag Line	9.46	9.28	-10.45	26.00
Ag Resource	9.04	9.86	-10.45	29.08
AgriVisor	8.77	9.23	-11.15	25.01
Brock	8.30	10.03	-11.64	29.56
Pro Farmer	7.85	9.22	-12.14	19.92
Stewart Peterson	7.75	9.52	-11.25	28.54
Top Farmer	6.96	9.07	-11.65	19.15
Utterback	8.42	10.14	-12.00	28.70
Average	8.14	9.52		
Minimum	6.72	9.07		
Maximum	9.46	10.14		
Market Benchmark	8.90	9.79	-11.31	28.54

* Each program was included for twenty-two quarters during 1999 Q3-2004 Q4

Table 25. Proportion of Advisory Programs Outperforming Cash Benchmark by Quarter, Live Cattle and Margin 1995 - 2004

		Proportion of Programs		
Marketing Quarter	**Live Cattle**	**Feeder Cattle**	**Feed**	**Margin**
1995 Q1	33%			
1995 Q2	67%			
1995 Q3	67%			
1995 Q4	33%			
1996 Q1	33%			
1996 Q2	44%			
1996 Q3	0%			
1996 Q4	44%			
1997 Q1	22%			
1997 Q2	22%			
1997 Q3	33%			
1997 Q4	22%			
1998 Q1	33%			
1998 Q2	78%			
1998 Q3	11%			
1998 Q4	22%			
1999 Q1	22%			
1999 Q2	22%			
1999 Q3	11%	0%	0%	11%
1999 Q4	11%	22%	0%	11%
2000 Q1	22%	22%	0%	44%
2000 Q2	22%	22%	22%	56%
2000 Q3	33%	11%	11%	33%
2000 Q4	0%	0%	0%	0%
2001 Q1	11%	11%	11%	11%
2001 Q2	44%	0%	22%	44%
2001 Q3	56%	11%	11%	33%
2001 Q4	11%	22%	11%	22%
2002 Q1	33%	22%	11%	44%
2002 Q2	11%	22%	11%	22%
2002 Q3	33%	22%	11%	56%
2002 Q4	11%	33%	22%	11%
2003 Q1	11%	22%	33%	11%
2003 Q2	44%	44%	11%	33%
2003 Q3	11%	44%	22%	33%
2003 Q4	0%	22%	22%	11%
2004 Q1	33%	11%	33%	33%
2004 Q2	0%	22%	22%	11%
2004 Q3	22%	22%	11%	33%
2004 Q4	56%	11%	0%	56%
1995-2004 Average	27%			
1999 Q3-2004 Average	22%	19%	14%	28%

Note: Nine programs were included for each quarter from 1995-2004

Table 26. Proportion of Advisory Programs Outperforming Cash Benchmark by Program, Live Cattle and Margin 1995 - 2004

	Proportion of Quarters				
Advisory Service	**Live Cattle 1995-2004**	**Live Cattle 1999 Q3-2004**	**Feeder Cattle 1999 Q3-2004**	**Feed 1999 Q3-2004**	**Margin 1999 Q3-2004**
Ag Review	20%	18%	50%	18%	32%
Ag Line	40%	41%	14%	0%	45%
Ag Resource	45%	14%	14%	27%	36%
AgriVisor	20%	23%	0%	36%	27%
Brock	33%	18%	18%	27%	18%
Pro Farmer	13%	5%	9%	5%	9%
Stewart Peterson	25%	27%	14%	0%	27%
Top Farmer	25%	32%	14%	18%	23%
Utterback	20%	23%	41%	0%	36%
Average	27%	22%	19%	15%	28%

Note: Each program was included for forty quarters during 1995- 2004 and twenty-two quarters during 1999 Q3-2004 Q4

Table 27. Significance Tests of the Difference Between an Average Advisory Program and Market Benchmarks, Live Cattle and Margin, 1995 - 2004

Production Quarter	Live Cattle	Feeder Cattle	Feed	Margin
		---$/cwt---		
1995 Q1	-0.34			
1995 Q2	0.74			
1995 Q3	0.57			
1995 Q4	-0.19			
1996 Q1	-0.26			
1996 Q2	0.62			
1996 Q3	-0.78			
1996 Q4	0.09			
1997 Q1	-0.57			
1997 Q2	-0.48			
1997 Q3	0.33			
1997 Q4	0.23			
1998 Q1	0.59			
1998 Q2	0.46			
1998 Q3	-0.26			
1998 Q4	-0.14			
1999 Q1	-0.03	0.00		
1999 Q2	-0.12	0.00		
1999 Q3	-0.73	0.01	0.10	-0.84
1999 Q4	-0.70	-0.05	0.12	-0.78
2000 Q1	-0.15	-0.20	0.08	-0.04
2000 Q2	0.00	-0.18	0.15	0.01
2000 Q3	0.17	0.03	0.01	0.12
2000 Q4	-1.42	0.04	0.16	-1.64
2001 Q1	-1.42	0.01	0.22	-1.68
2001 Q2	-0.22	0.03	0.09	-0.34
2001 Q3	0.36	-0.01	0.37	-0.04
2001 Q4	0.02	-0.04	0.43	-0.41
2002 Q1	0.51	-0.05	0.60	-0.10
2002 Q2	-0.11	-0.06	0.12	-0.18
2002 Q3	0.05	-0.11	0.13	0.01
2002 Q4	-0.59	-0.07	0.04	-0.57
2003 Q1	-1.54	-0.13	-0.09	-1.31
2003 Q2	0.07	-0.14	0.14	0.06
2003 Q3	-4.83	-0.06	0.09	-4.87
2003 Q4	-3.13	0.00	0.05	-3.18
2004 Q1	1.48	-0.13	0.11	1.49
2004 Q2	-1.77	-0.26	-0.07	-1.43
2004 Q3	-1.53	0.01	-0.21	-1.30
2004 Q4	0.30	-0.03	0.02	0.31
1995-2004				
Average	-0.37			
Standard Deviation	1.07			
t-statistic	-2.17			
Two-tail p-value	0.04			
1999Q3-2004				
Average	-0.69	-0.06	0.12	-0.76
Standard Deviation	1.36	0.08	0.17	1.32
t-statistic	-2.39	-3.68	3.26	-2.71
Two-tail p-value	0.03	0.00	0.00	0.01

Table 28. Pricing Performance Results for Individual Market Advisory Programs versus the Cash Market Benchmark Price, Live Cattle, Feeder Cattle, Feed and Margin 1995 - 2004

Market Advisory Program	Average Net Advisory Price	Difference Between Program and Cash Benchmark	Standard Deviation	*t* -statistic	Two-tail *p* -value
	---$ per cwt.---	---$ per cwt.---			
1995 - 2004 Live Cattle					
Ag Review	69.17	-0.99	3.45	-1.82	0.08
AgLine by Doane	70.40	0.24	1.78	0.86	0.40
AgResource	70.58	0.42	1.41	1.89	0.07
AgriVisor	69.99	-0.17	1.27	-0.86	0.40
Brock	70.03	-0.13	1.09	-0.75	0.46
Pro Farmer	69.66	-0.50	1.92	-1.65	0.11
Stewart-Peterson	69.44	-0.72	1.86	-2.45	0.02
Top Farmer Intelligence	68.98	-1.18	2.62	-2.84	0.01
Utterback Marketing Services	69.88	-0.29	1.64	-1.10	0.28
Benchmark	70.16				
1999 Q3 - 2004 Live Cattle					
Ag Review	73.02	-1.61	4.44	-1.70	0.10
AgLine by Doane	75.03	0.40	2.33	0.80	0.43
AgResource	74.57	-0.06	1.42	-0.21	0.83
AgriVisor	74.48	-0.15	1.50	-0.47	0.65
Brock	74.13	-0.51	0.99	-2.40	0.03
Pro Farmer	73.80	-0.84	1.83	-2.15	0.04
Stewart-Peterson	73.44	-1.20	2.34	-2.40	0.03
Top Farmer Intelligence	73.03	-1.61	3.22	-2.34	0.03
Utterback Marketing Services	74.00	-0.64	1.45	-2.05	0.05
Benchmark	74.63				
1999 Q3 - 2004 Feeder Cattle					
Ag Review	52.30	0.07	0.47	0.65	0.52
AgLine by Doane	52.20	0.16	0.56	1.38	0.18
AgResource	52.32	0.04	0.13	1.62	0.12
AgriVisor	52.37	0.00	-	-	-
Brock	52.27	0.09	0.32	1.34	0.19
Pro Farmer	52.37	-0.01	0.13	-0.20	0.84
Stewart-Peterson	52.32	0.04	0.12	1.64	0.12
Top Farmer Intelligence	52.37	0.00	0.12	-0.14	0.89
Utterback Marketing Services	52.19	0.18	0.40	2.08	0.05
Benchmark	52.37				
1999 Q3 - 2004 Feed					
Ag Review	14.00	-0.64	1.29	-2.31	0.03
AgLine by Doane	13.37	0.00	-	-	-
AgResource	13.21	0.16	0.50	1.45	0.16
AgriVisor	13.35	0.01	0.25	0.26	0.80
Brock	13.55	-0.18	0.42	-2.02	0.06
Pro Farmer	13.57	-0.20	0.20	-4.82	0.00
Stewart-Peterson	13.37	0.00	-	-	-
Top Farmer Intelligence	13.70	-0.33	0.67	-2.31	0.03
Utterback Marketing Services	13.38	-0.02	0.05	-1.67	0.11
Benchmark	13.37				
1999 Q3 - 2004 Margin					
Ag Review	6.72	-2.18	4.81	-2.13	0.05
AgLine by Doane	9.46	0.56	2.50	1.05	0.31
AgResource	9.04	0.13	1.48	0.43	0.67
AgriVisor	8.77	-0.14	1.46	-0.44	0.67
Brock	8.30	-0.60	1.19	-2.36	0.03
Pro Farmer	7.85	-1.05	1.85	-2.66	0.01
Stewart-Peterson	7.75	-1.15	2.34	-2.31	0.03
Top Farmer Intelligence	6.96	-1.94	3.20	-2.84	0.01
Utterback Marketing Services	8.42	-0.48	1.55	-1.45	0.16
Benchmark	8.90				

Note: Each program was included for forty quarters during 1995- 2004 and twenty-two quarters during 1999 Q3-2004.

Table 29. Predictability of Market Advisory Program Performance by Rank Between Adjacent Pairs of Marketing Quarters, Live Cattle 1995 - 2004

Quarter *t*	Quarter *t+1*	Correlation Coefficient	z - statistic	Two-tail p-value	
1995Q1	1995Q2	0.20	0.60	0.55	
1995Q2	1995Q3	0.37	1.10	0.27	
1995Q3	1995Q4	0.42	1.25	0.21	
1995Q4	1996Q1	(0.33)	(1.00)	0.32	
1996Q1	1996Q2	0.85	2.55	0.01	**
1996Q2	1996Q3	0.65	1.95	0.05	*
1996Q3	1996Q4	0.65	1.95	0.05	*
1996Q4	1997Q1	0.08	0.25	0.80	
1997Q1	1997Q2	0.47	1.40	0.16	
1997Q2	1997Q3	0.35	1.05	0.29	
1997Q3	1997Q4	0.08	0.25	0.80	
1997Q4	1998Q1	0.50	1.50	0.13	
1998Q1	1998Q2	0.43	1.30	0.19	
1998Q2	1998Q3	(0.11)	(0.32)	0.75	
1998Q3	1998Q4	0.45	1.35	0.18	
1998Q4	1999Q1	0.52	1.55	0.12	
1999Q1	1999Q2	0.63	1.90	0.06	
1999Q2	1999Q3	0.70	2.10	0.04	*
1999Q3	1999Q4	0.72	2.15	0.03	*
1999Q4	2000Q1	0.22	0.65	0.52	
2000Q1	2000Q2	0.18	0.55	0.58	
2000Q2	2000Q3	0.60	1.80	0.07	
2000Q3	2000Q4	(0.55)	(1.65)	0.10	
2000Q4	2001Q1	0.55	1.65	0.10	
2001Q1	2001Q2	0.62	1.85	0.06	
2001Q2	2001Q3	(0.03)	(0.10)	0.92	
2001Q3	2001Q4	(0.50)	(1.50)	0.13	
2001Q4	2002Q1	(0.12)	(0.35)	0.73	
2002Q1	2002Q2	(0.12)	(0.35)	0.73	
2002Q2	2002Q3	0.08	0.25	0.80	
2002Q3	2002Q4	0.27	0.80	0.42	
2002Q4	2003Q1	(0.18)	(0.55)	0.58	
2003Q1	2003Q2	0.43	1.30	0.19	
2003Q2	2003Q3	0.55	1.65	0.10	
2003Q3	2003Q4	0.27	0.80	0.42	
2003Q4	2004Q1	0.07	0.20	0.84	
2004Q1	2004Q2	0.40	1.20	0.23	
2004Q2	2004Q3	(0.15)	(0.45)	0.65	
2004Q3	2004Q4	(0.38)	(1.15)	0.25	
Average					
1995 Q1-2004 Q4		0.25			
1999 Q3-2004 Q4		0.14			

** Significant at 99% confidence level
* Significant at 95% confidence level

Table 30. Rank of Performance Among Market Advisory Services by Commodity, 1995 - 2004

	Rank									
	Live Cattle 1995-2004	**Live Cattle 1999 Q3-2004**	**Feeder Cattle 1999 Q3-2004**	**Feed 1999 Q3-2004**	**Margin 1999 Q3-2004**	**Hogs 1995-2001**	**Corn 1995-2004**	**Soybeans 1995-2004**	**SRW Wheat 1995-2004**	**HRW Wheat 1995-2004**
Ag Review	8	4	4	9	9	6	3	15	8	9
AgLine by Doane	2	2	2	3 (T)	1	7	5	8	5	11
AgResource	1	5	5	1	2	2	1	1	5	6 (T)
AgriVisor	4	7	7 (T)	2	3	4, 5	2, 4, 6, 7	2, 3, 5, 10	9, 12, 14	2, 4, 6 (T)
Brock	3	3	3	6	5	8	9, 9	12, 4	1, 4	2, 9
Pro Farmer	6	9	7 (T)	7	6	3	14, 15	6, 8	7, 9	13, 14
Stewart-Peterson	7	6	6	3 (T)	7	9	13	6	11	12
Top Farmer Intelligence	9	8	7 (T)	8	8	1	7	11	15	14
Utterback Marketing Services	5	1	1	5	4	-	-	-	-	-

Note: (T) denotes a tie between advisory services.
More than one ranking denotes an advisory service gave multiple recommendation tracks

Table 31. Pricing Performance Results Across Market Advisory Services by Commodity, 1995 - 2004

	Hogs 1995-2001		Corn 1995-2004		Soybeans 1995-2004		SRW Wheat 1995-2004		HRW Wheat 1995-2004	
Market Advisory Program	Net Price Received	Standard Deviation	Net Price Received	Standard Deviation	Net Price Received	Standard Deviation	Net Price Received	Standard Deviation	Net Price Received	Standard Deviation
Ag Review	42.37	9.61	2.37	0.23	5.56	1.05	3.00	0.89	2.80	0.51
AgLine by Doane	42.35	7.24	2.33	0.35	6.00	0.68	3.05	0.75	2.79	0.46
AgResource	43.43	8.57	2.58	0.63	6.56	0.71	3.05	1.03	2.82	0.60
AgriVisor	43.12	8.37	2.30	0.29	6.06	0.76	2.93	0.69	2.82	0.65
Brock	41.96	8.20	2.28	0.22	6.05	0.66	3.09	0.39	2.88	0.43
Pro Farmer	43.24	7.38	2.17	0.41	6.01	0.79	3.01	0.64	2.69	0.33
Stewart-Peterson	41.73	9.44	2.20	0.33	6.01	0.65	2.95	0.49	2.76	0.46
Top Farmer Intelligence	43.77	7.99	2.30	0.33	5.96	0.53	2.80	0.41	2.69	0.37
Benchmark	43.23	9.38	2.18	0.44	5.97	0.91	3.07	0.64	2.83	0.34

Note: When more than one recommendation track was given, basic hedge was used for comparison

FIGURES

Figure 1. E-V Decision Making Model for Hedging Decisions

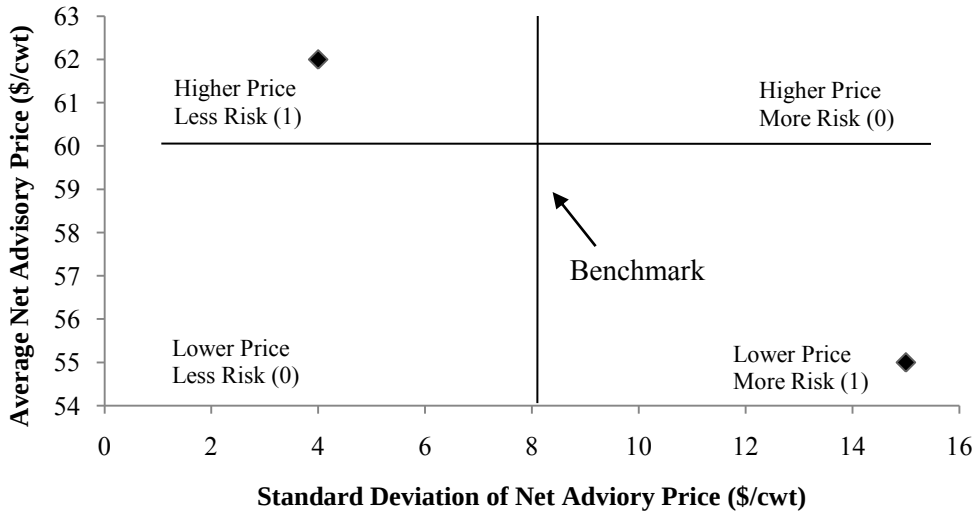


Figure 2. Quarterly Average Live Cattle Marketing Profiles, Ag Line

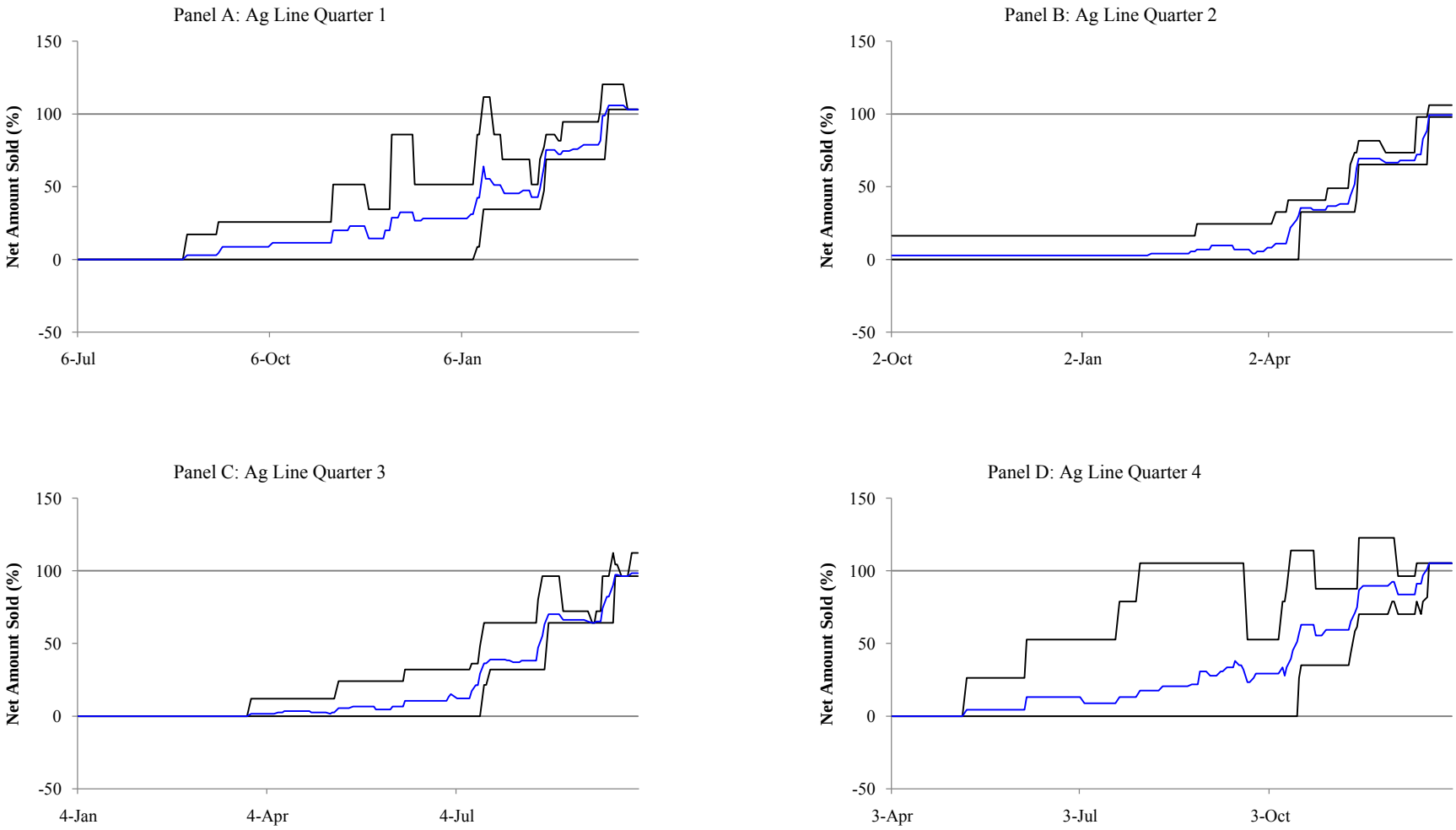


Figure 3. Quarterly Average Live Cattle Marketing Profiles, AgResource

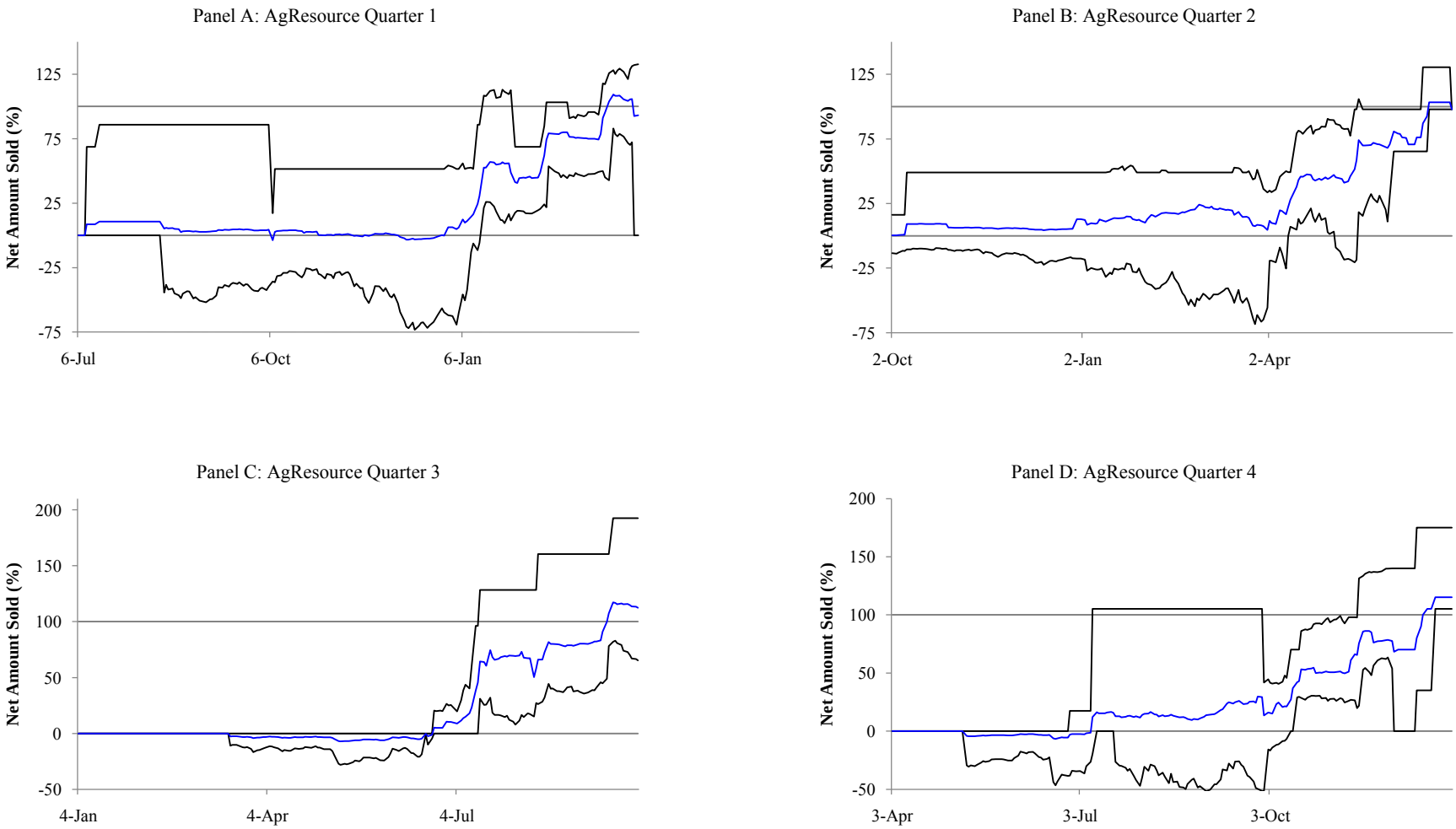


Figure 4. Quarterly Average Live Cattle Marketing Profiles, Ag Review

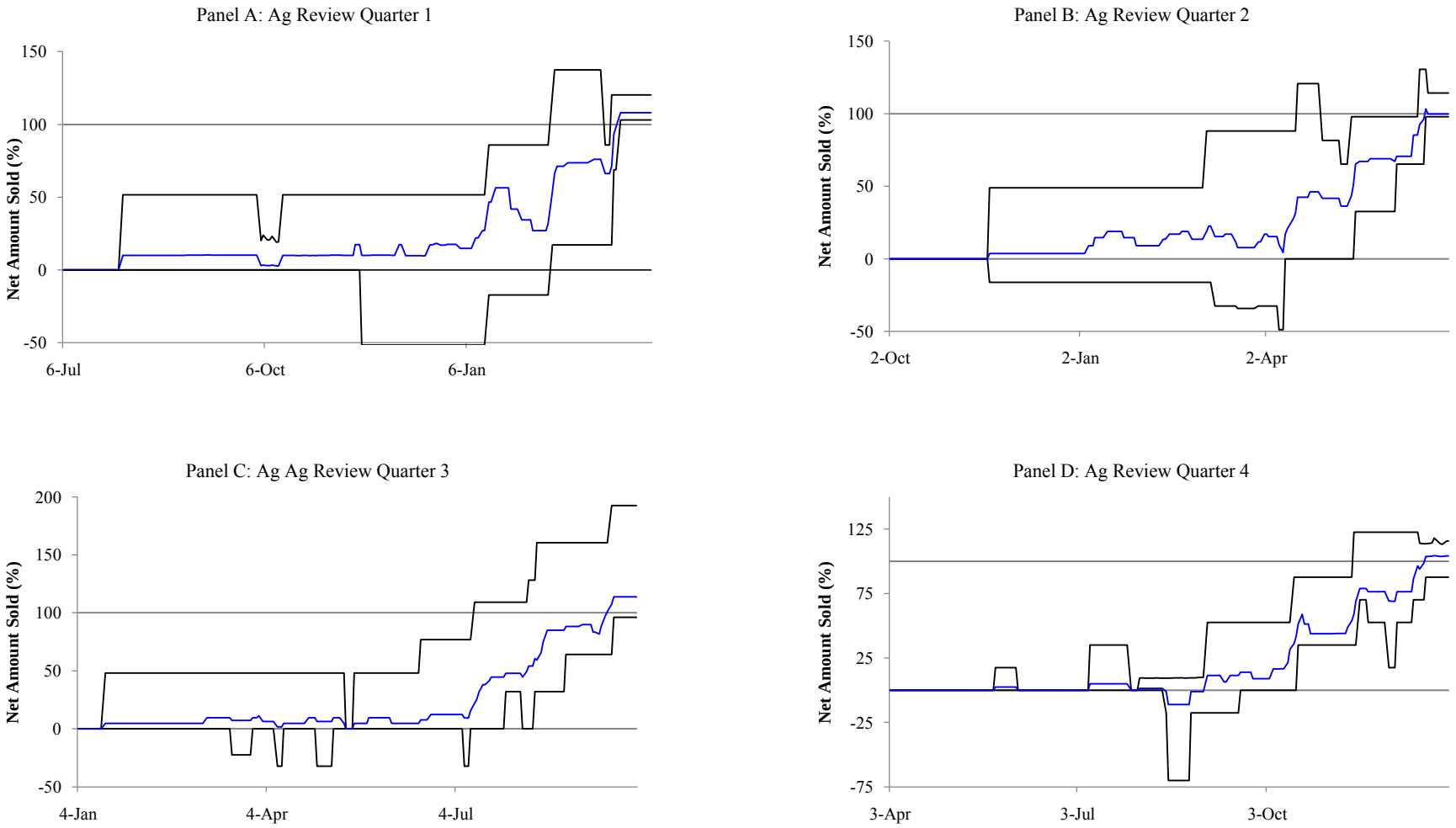


Figure 5. Quarterly Average Live Cattle Marketing Profiles, Agrivisor

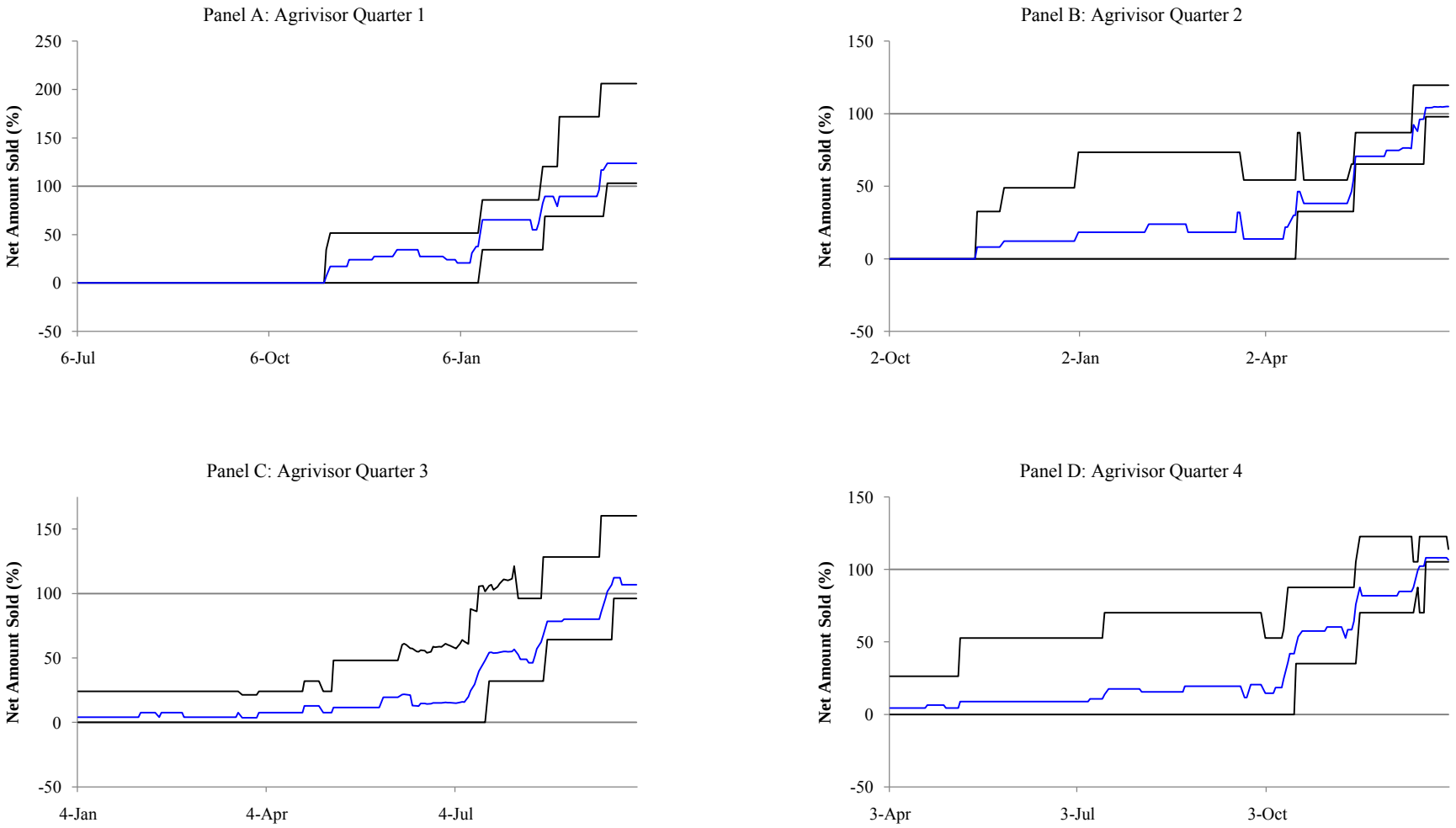


Figure 6. Quarterly Average Live Cattle Marketing Profiles, Brock

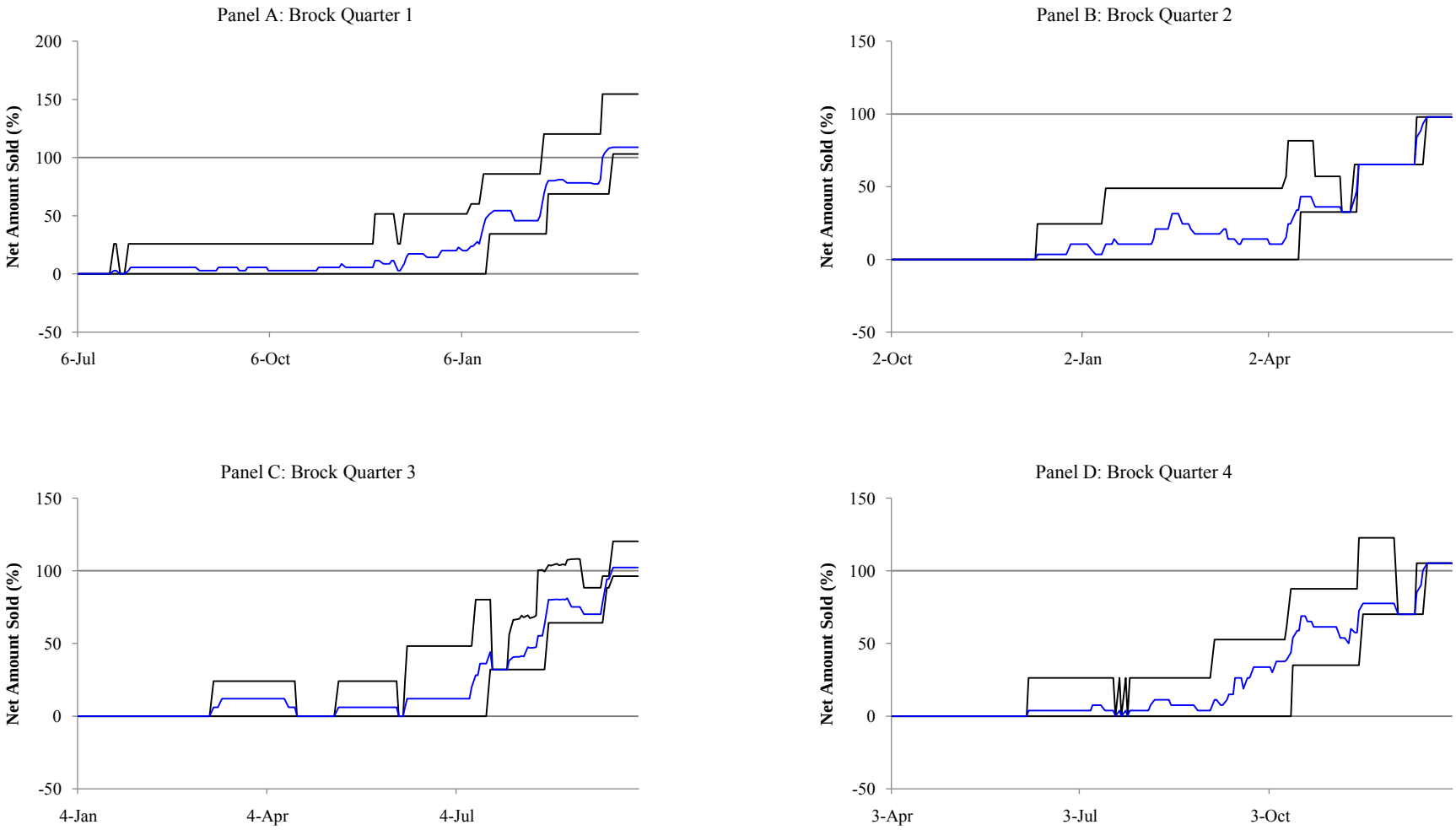


Figure 7. Quarterly Average Live Cattle Marketing Profiles, Pro Farmer

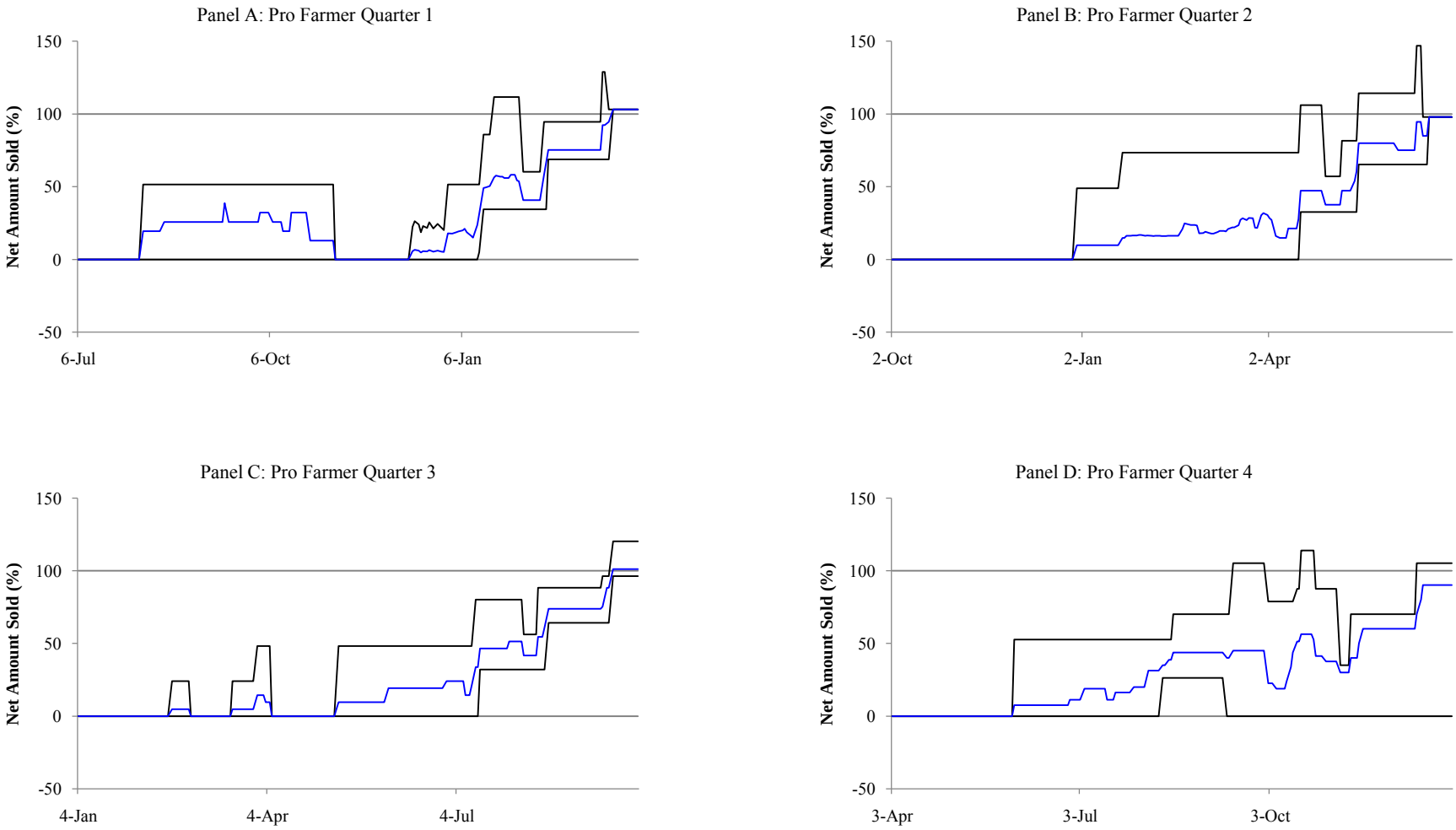


Figure 8. Quarterly Average Live Cattle Marketing Profiles, Stewart Peterson

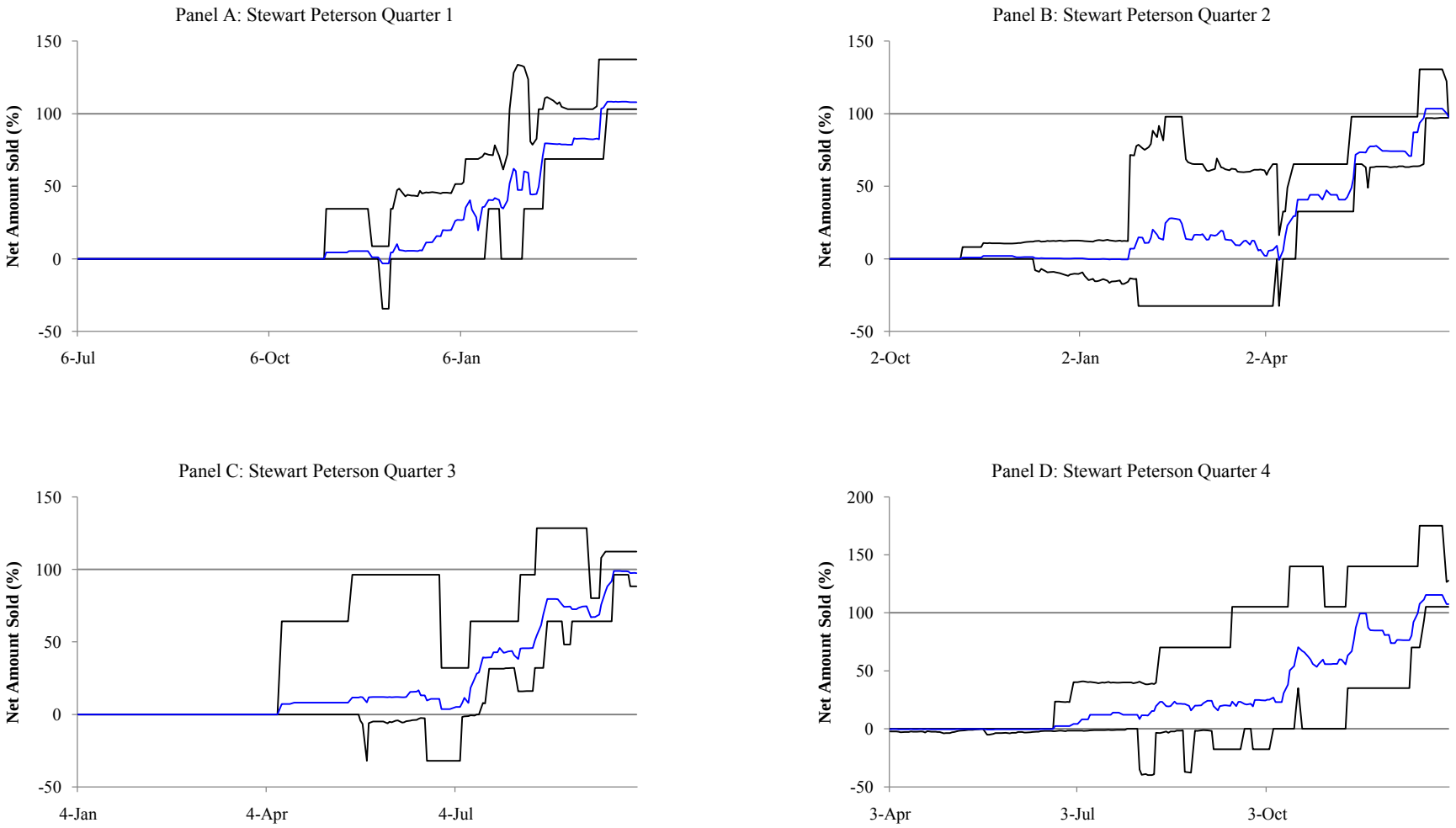


Figure 9. Quarterly Average Live Cattle Marketing Profiles, Top Farmer

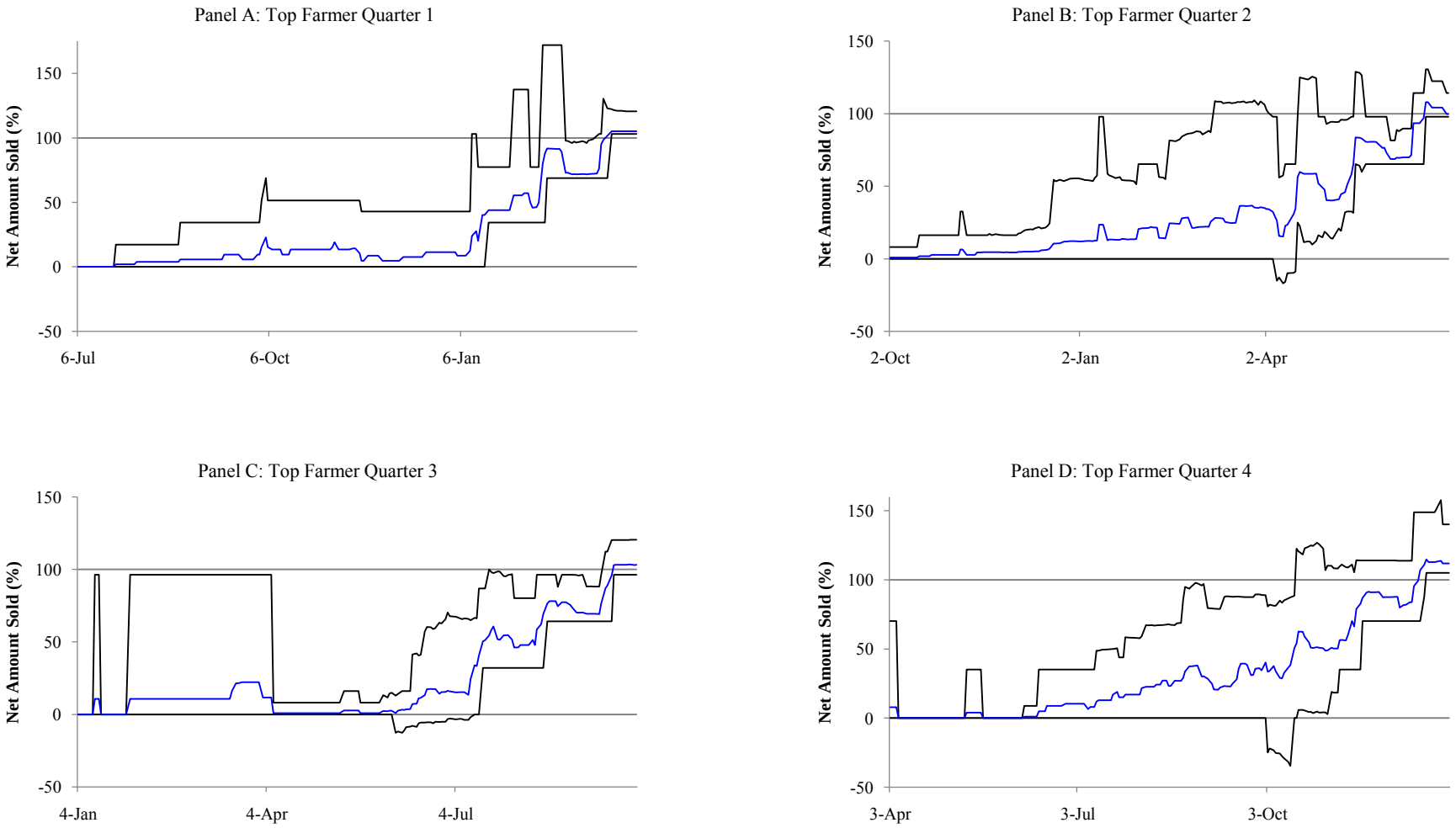


Figure 10. Quarterly Average Live Cattle Marketing Profiles, Utterback

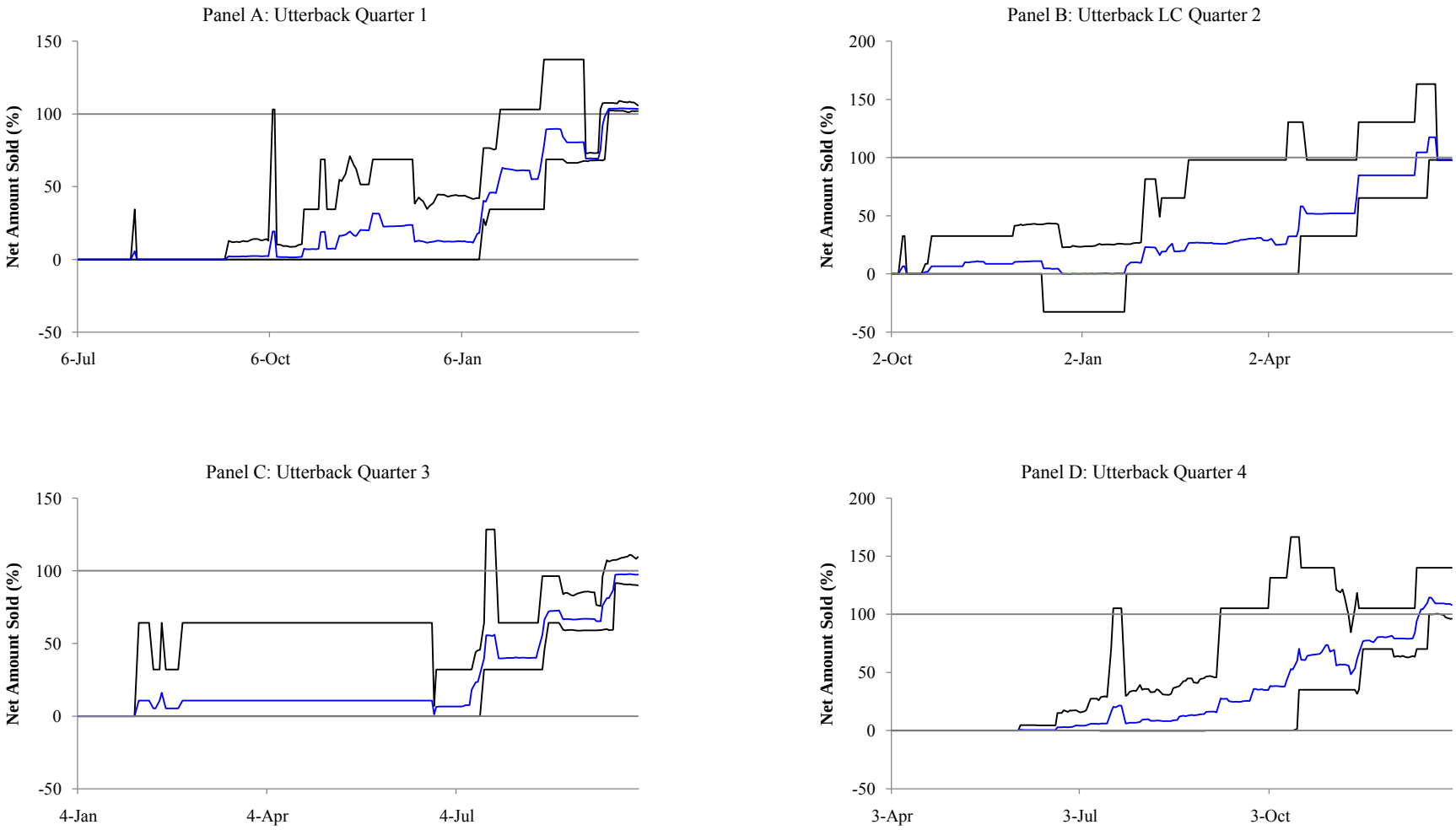


Figure 11. Quarterly Average Live Cattle Marketing Profiles, All Programs 1995-2004

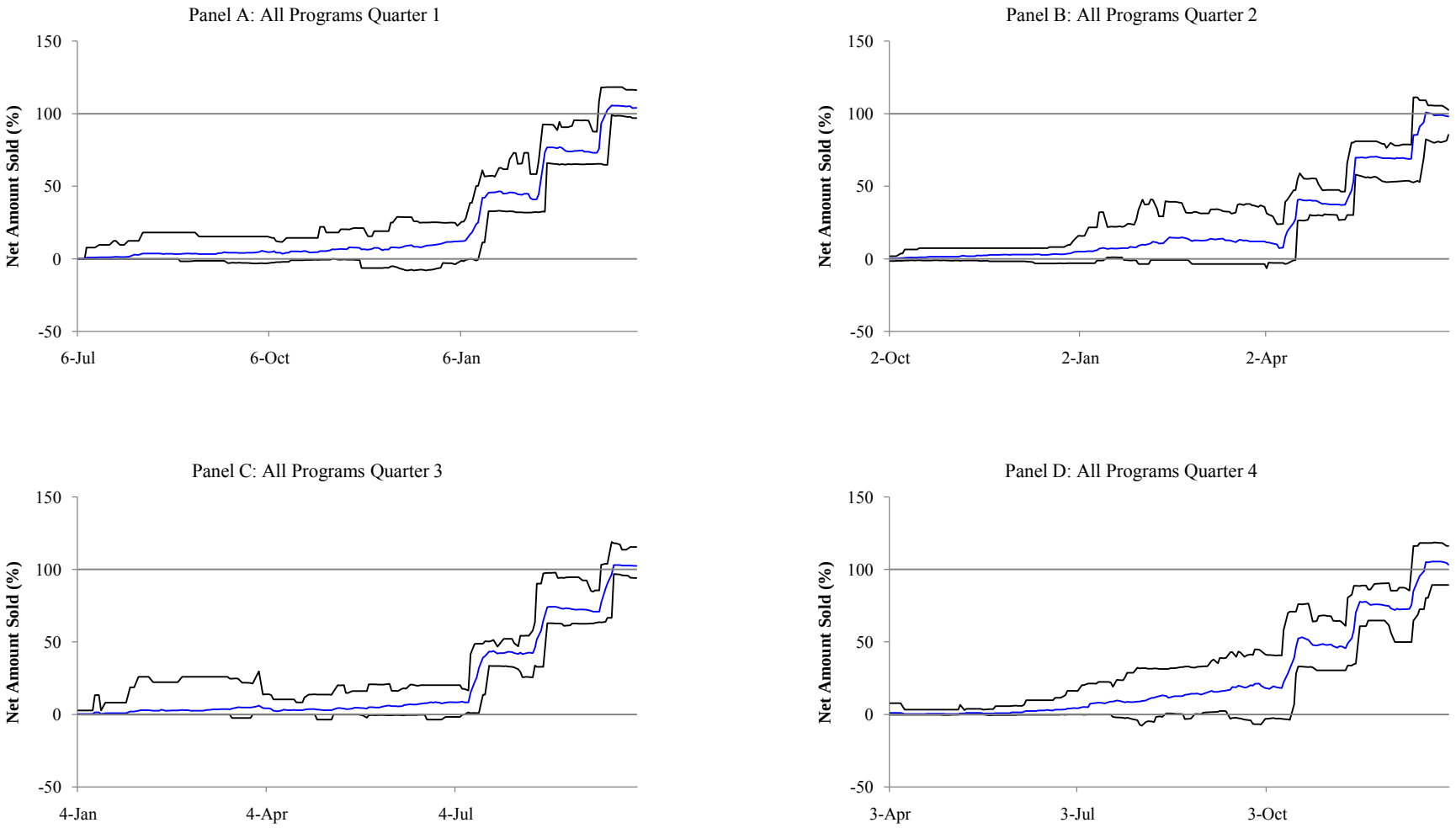


Figure 12. Quarterly Average Feeder Cattle Marketing Profiles, AgLine by Doane

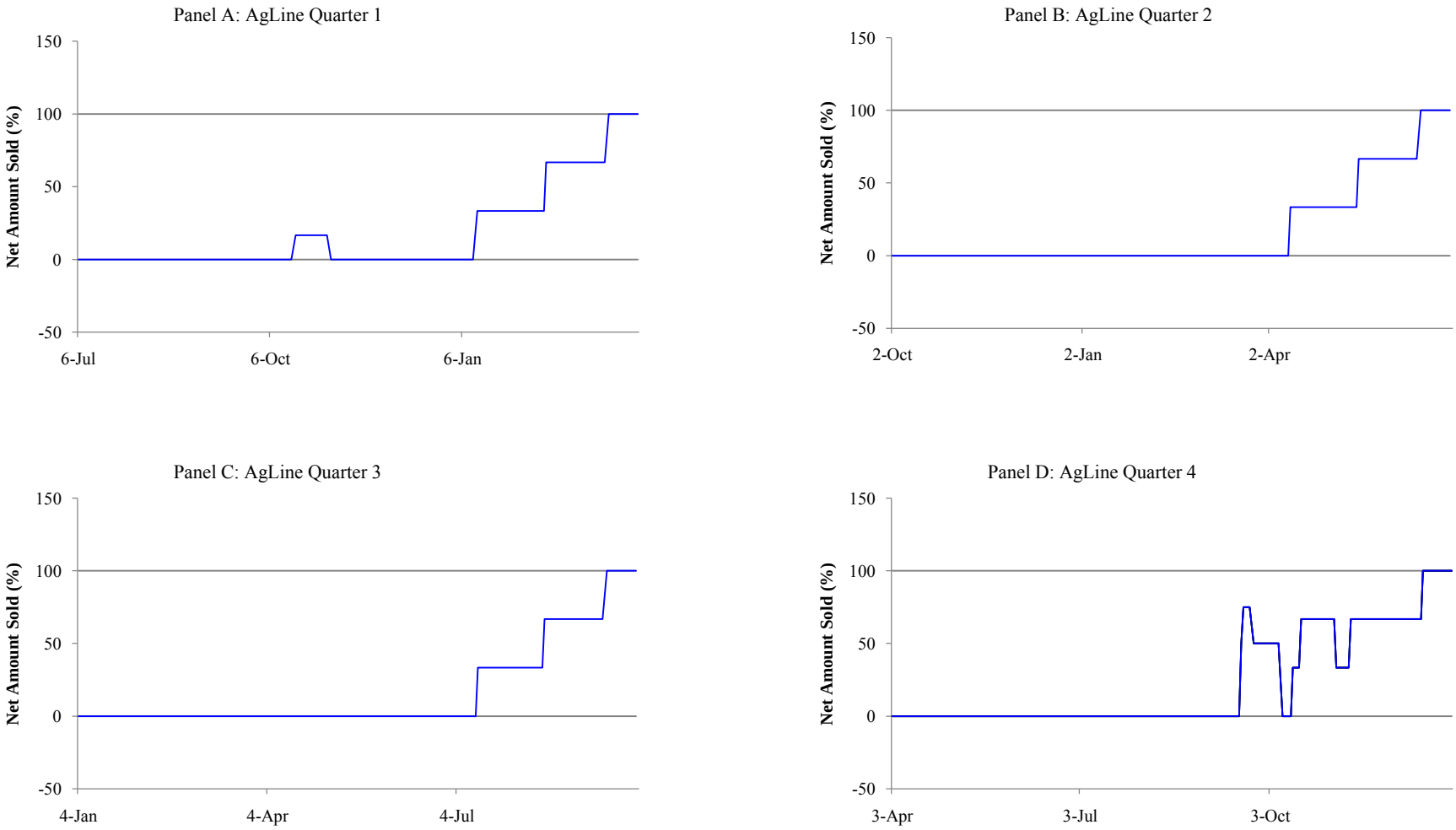


Figure 13. Quarterly Average Feeder Cattle Marketing Profiles, AgResource

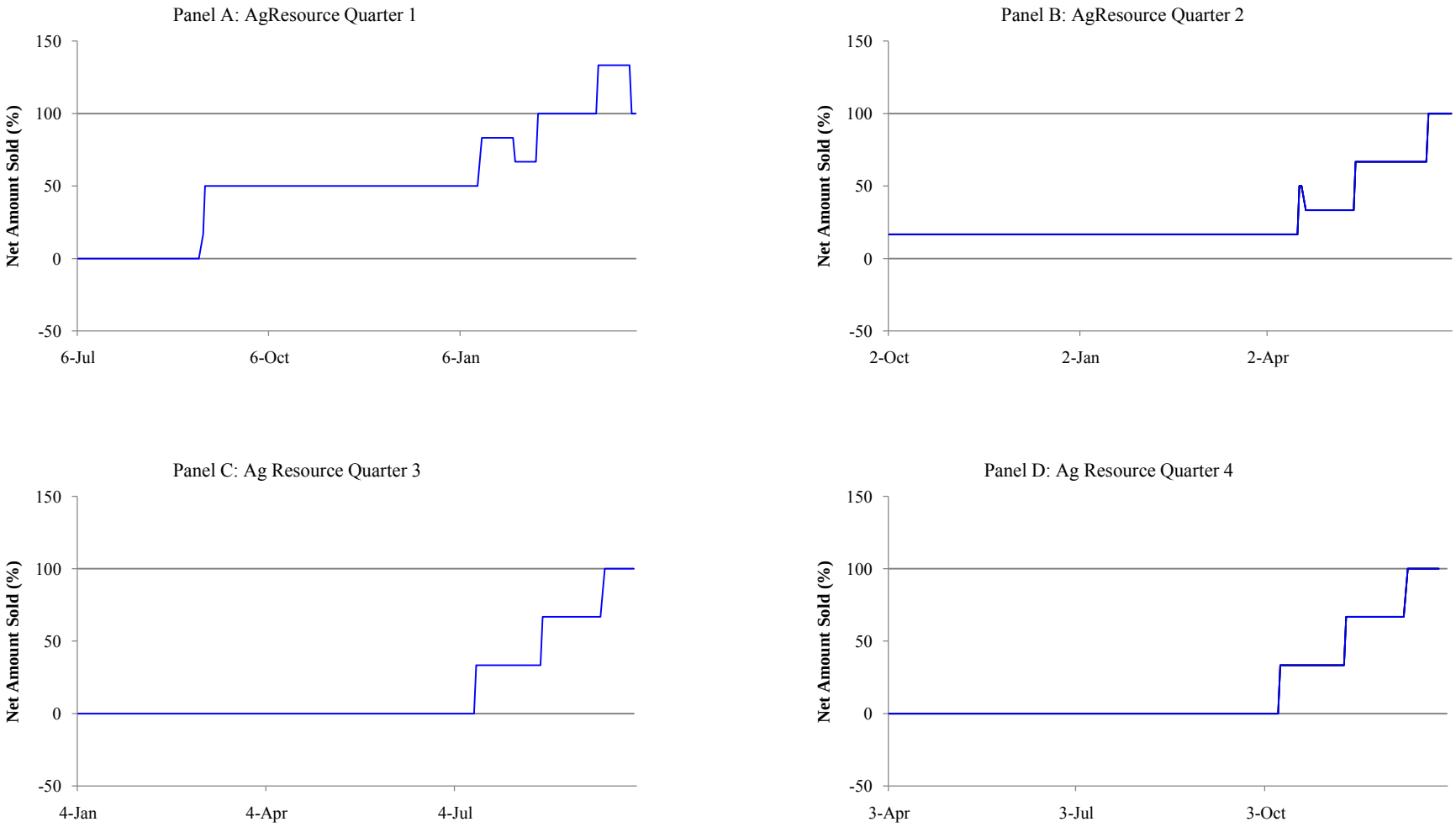


Figure 14. Quarterly Average Feeder Cattle Marketing Profiles, Ag Review

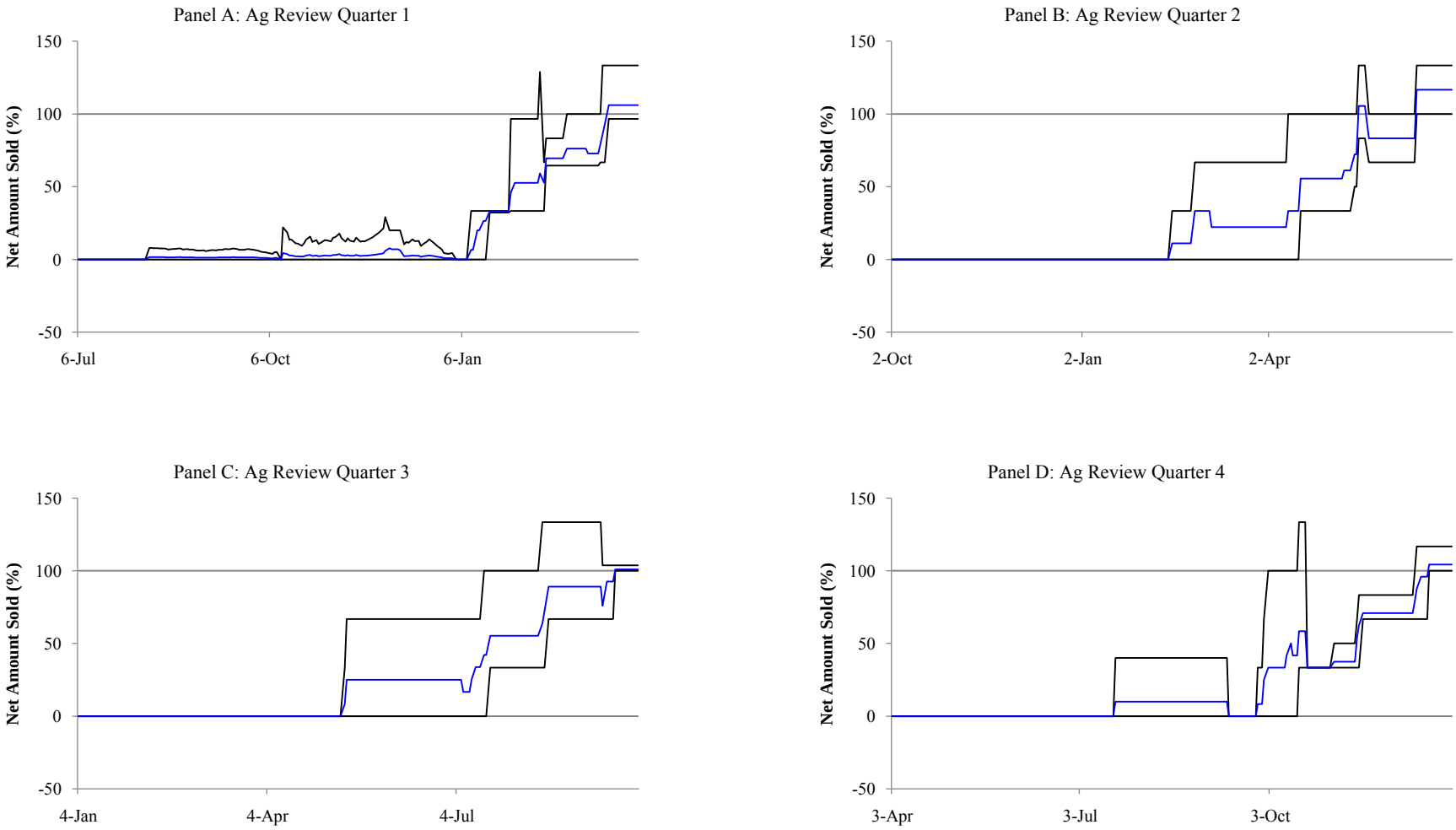


Figure 15. Quarterly Average Feeder Cattle Marketing Profiles, Brock

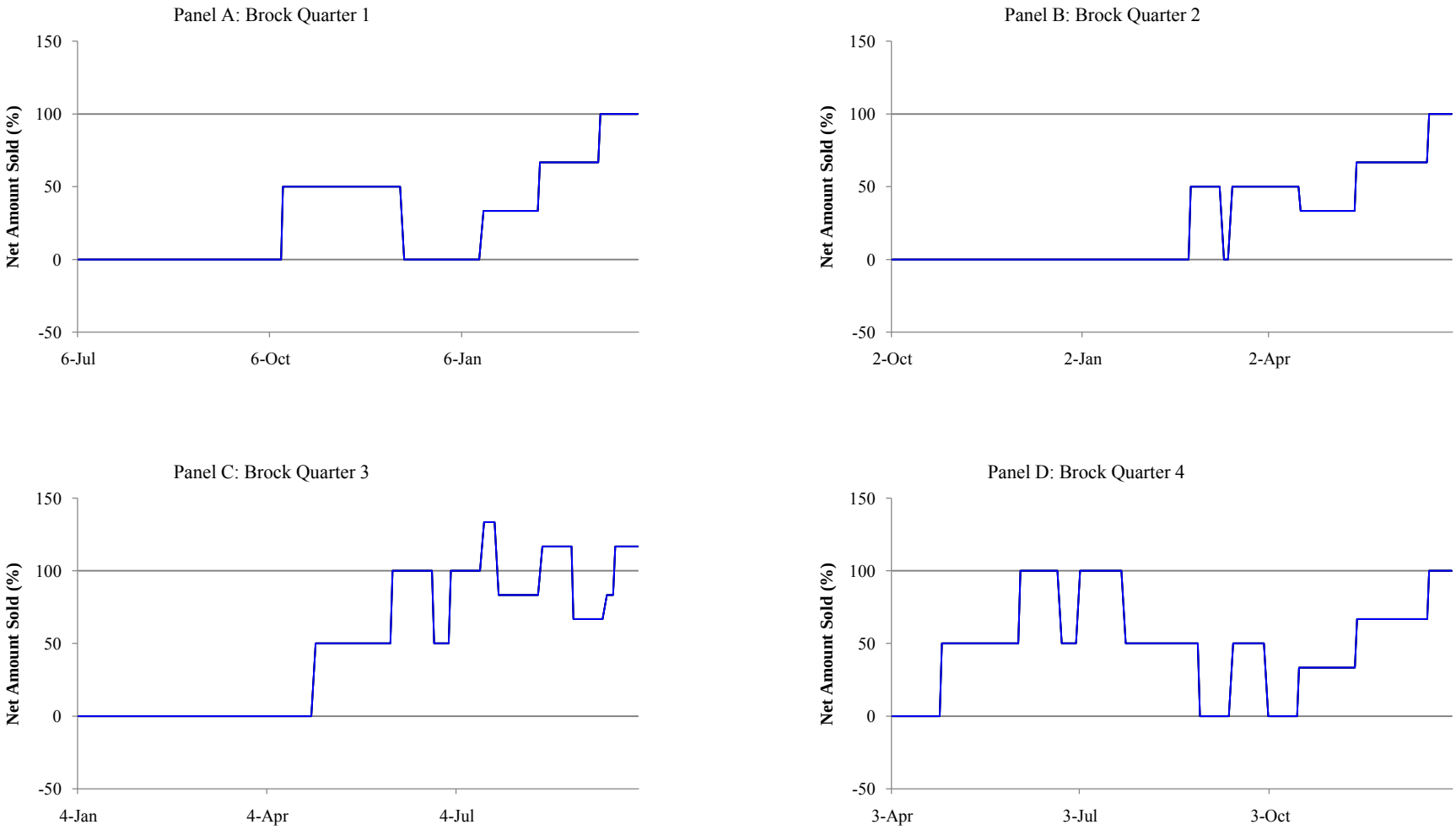


Figure 16. Quarterly Average Feeder Cattle Marketing Profiles, Pro Farmer

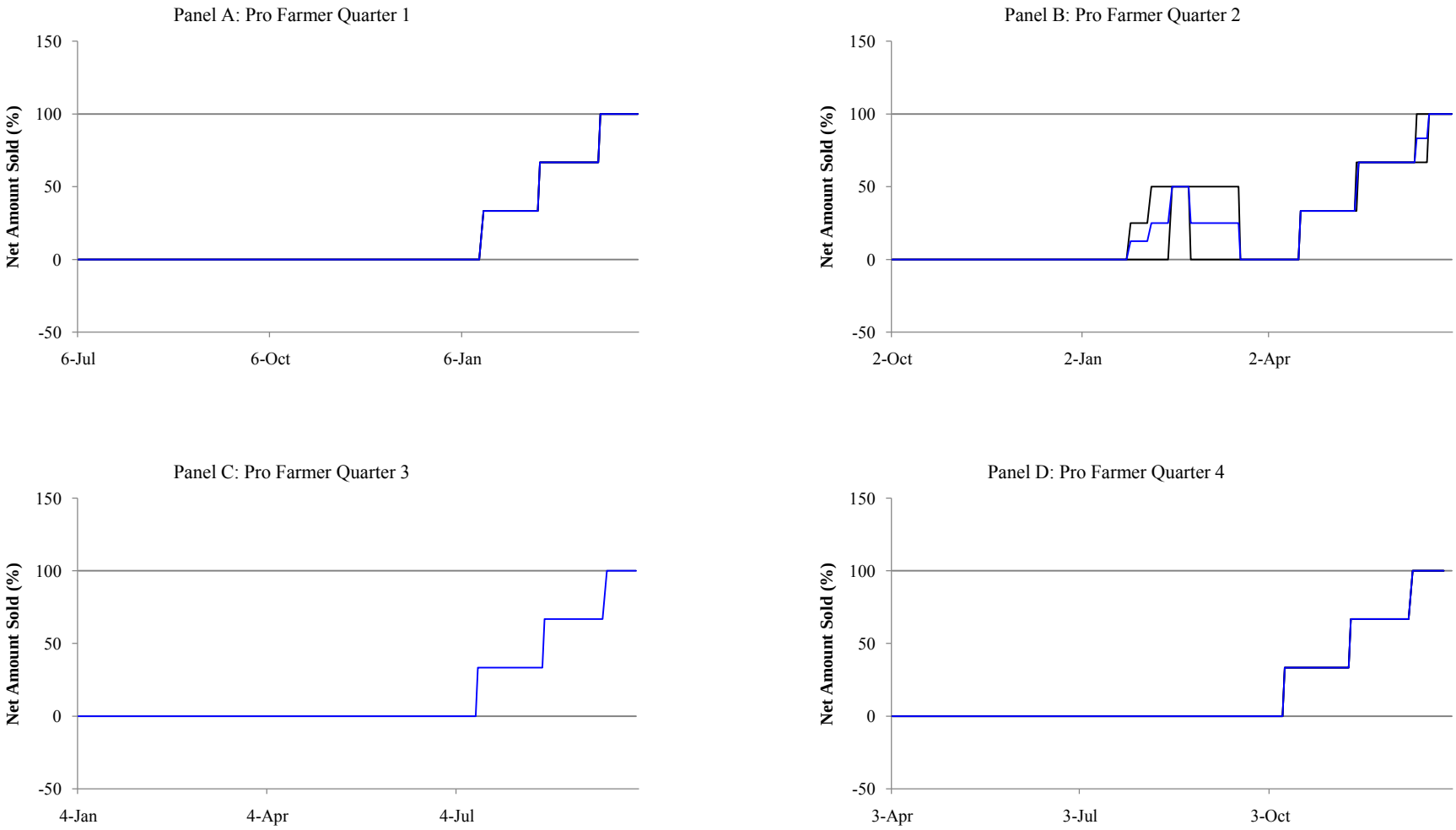


Figure 17. Quarterly Average Feeder Cattle Marketing Profiles, Stewart Peterson

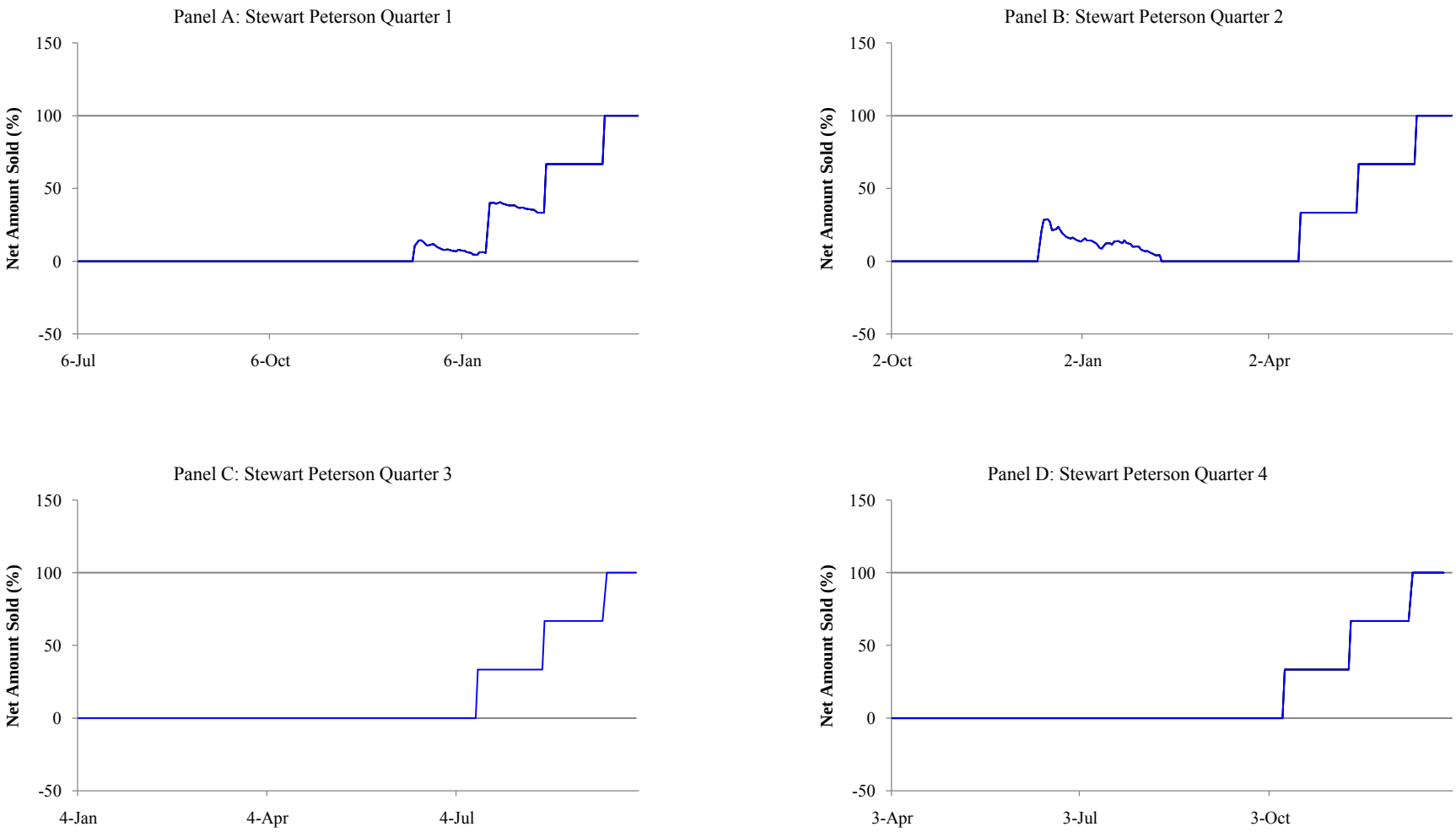


Figure 18. Quarterly Average Feeder Cattle Marketing Profiles, Top Farmer

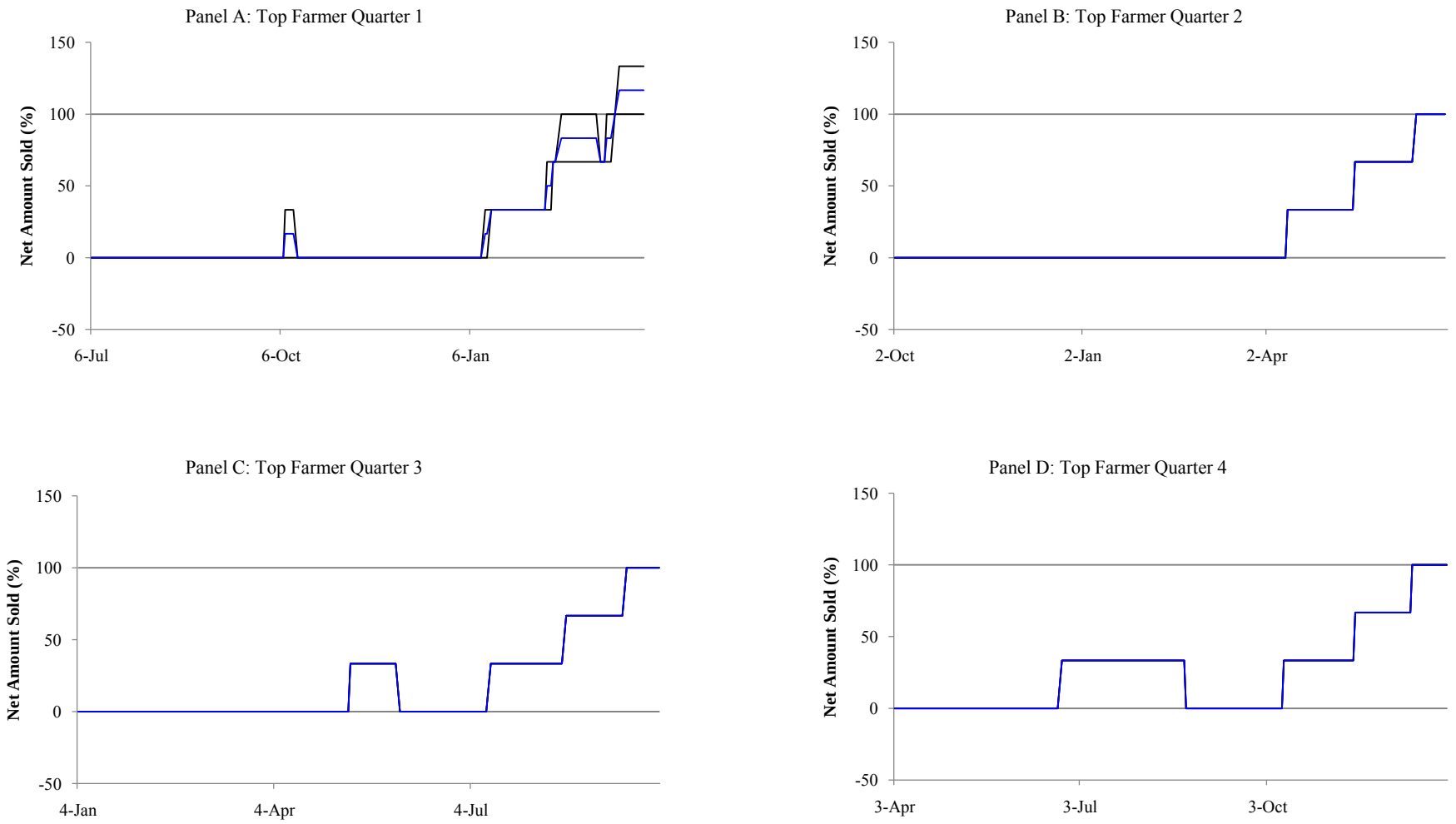


Figure 19. Quarterly Average Feeder Cattle Marketing Profiles, Utterback

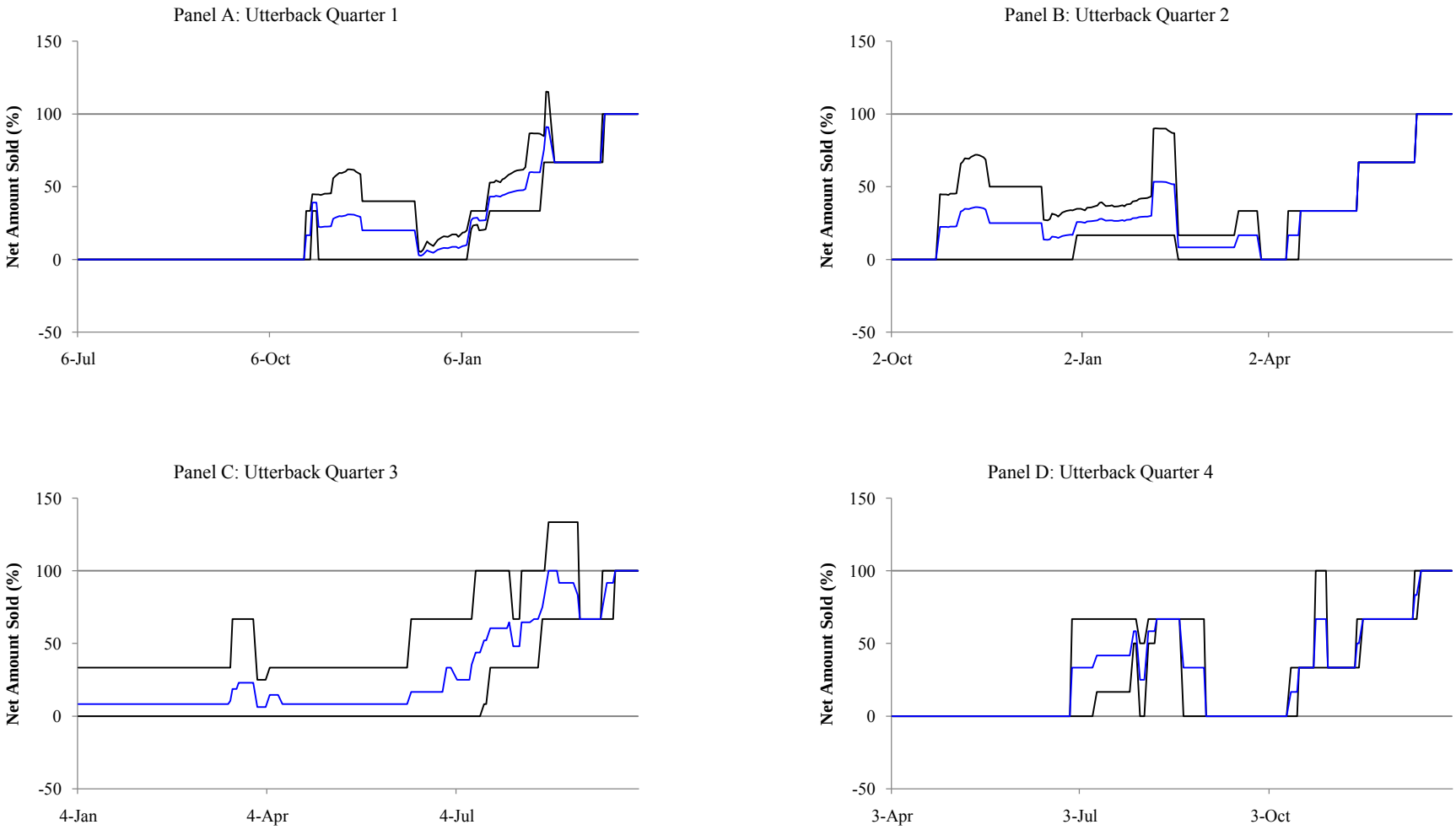
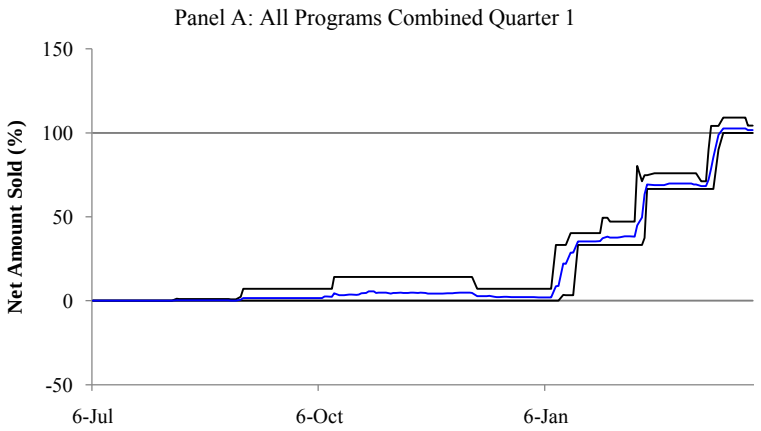
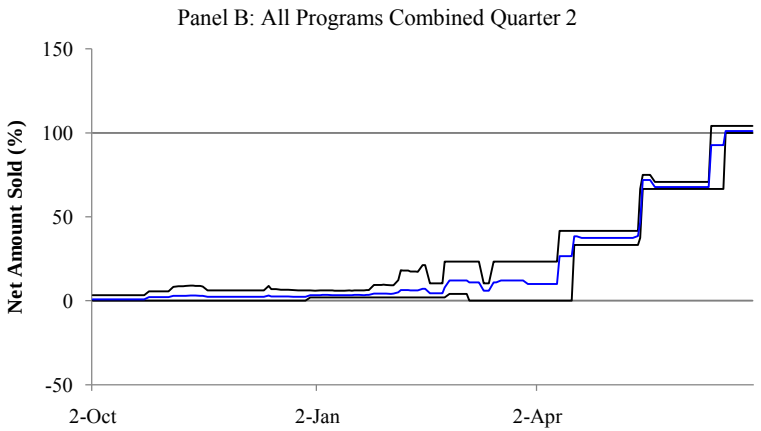
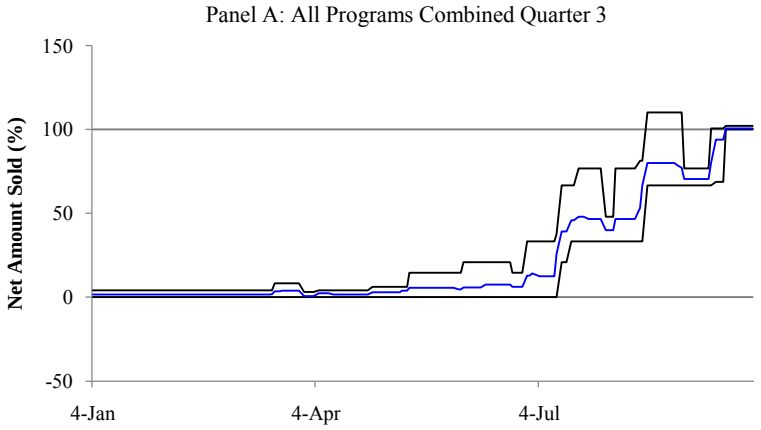


Figure 20. Quarterly Average Feeder Cattle Marketing Profiles, All Programs Combined, 1999-2004







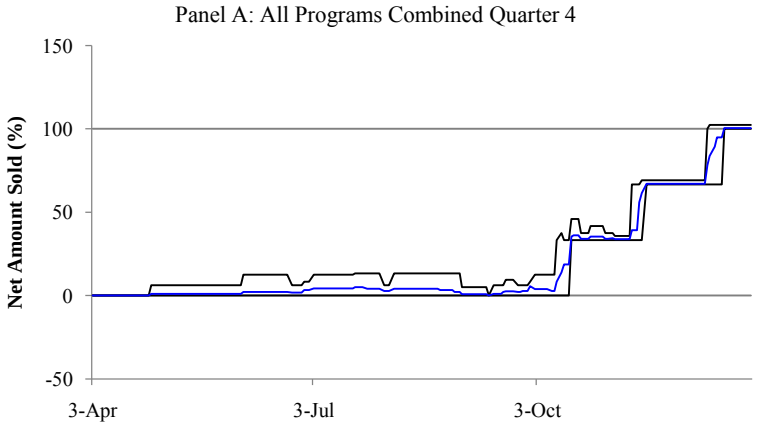


Figure 21. Quarterly Average Feed Marketing Profiles, Agrivisor

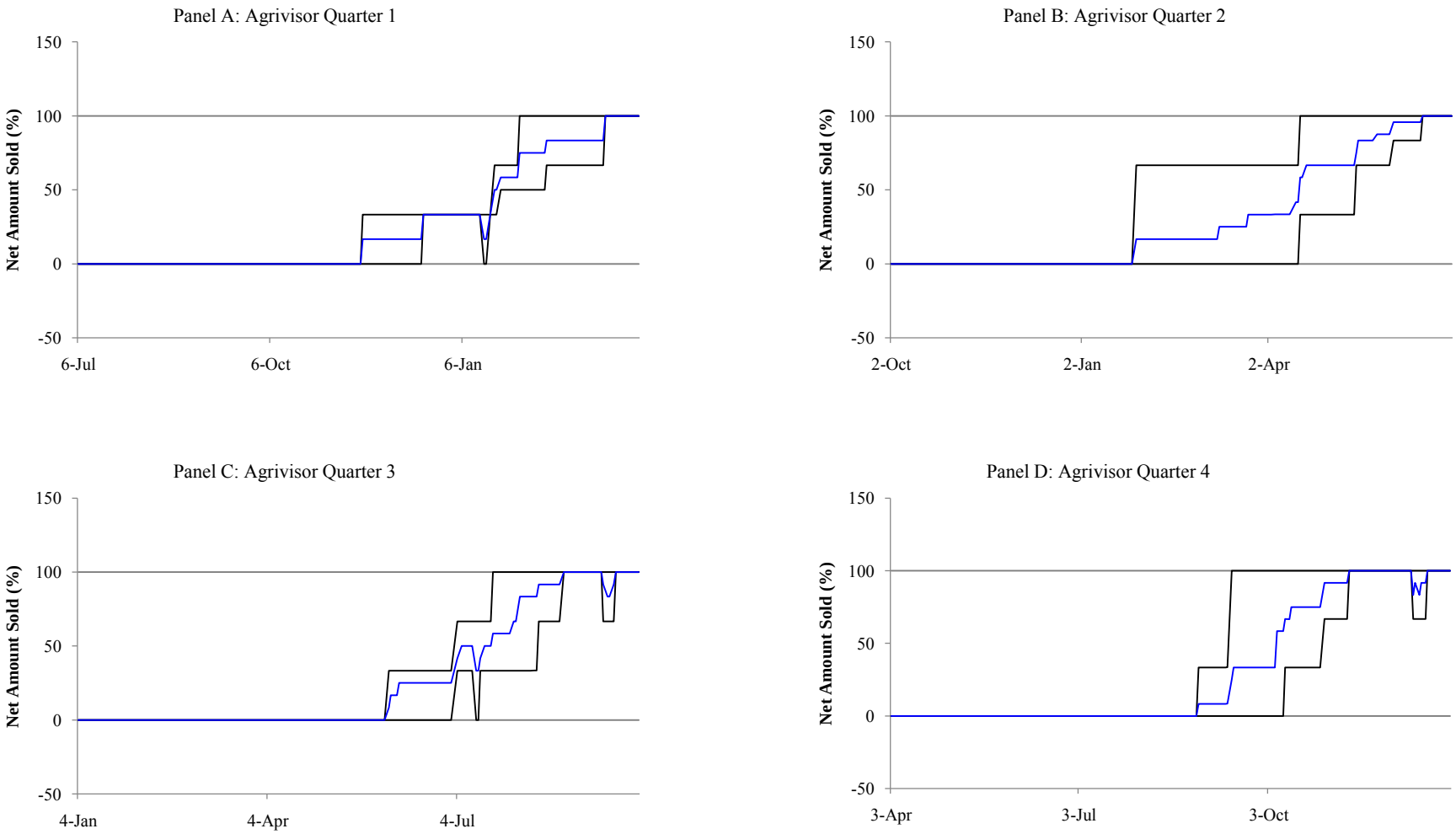
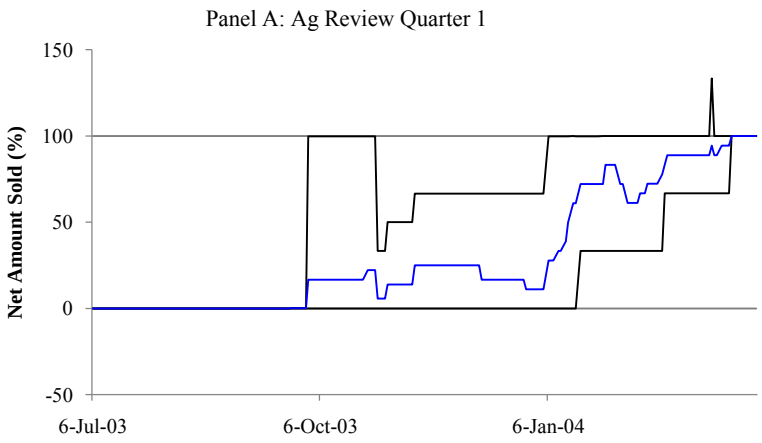
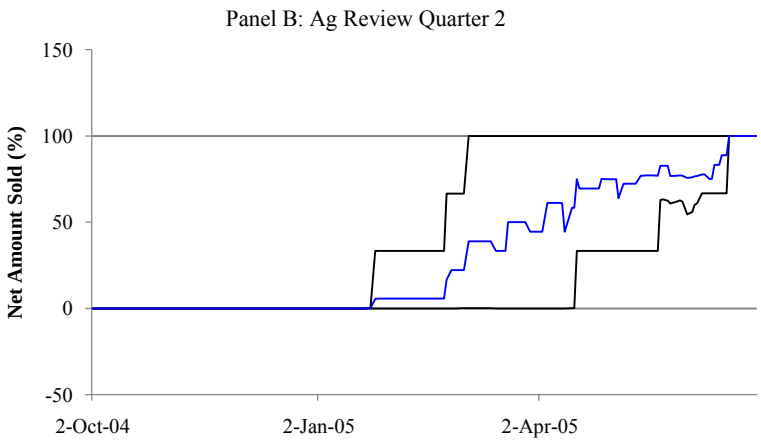
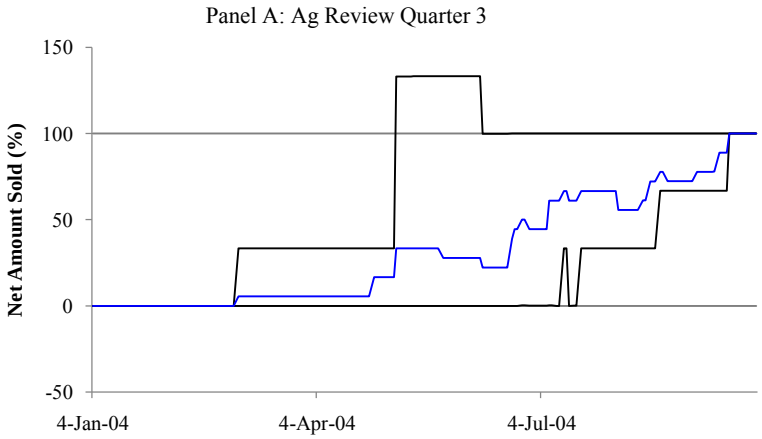


Figure 22. Quarterly Average Feed Marketing Profiles, Ag Review







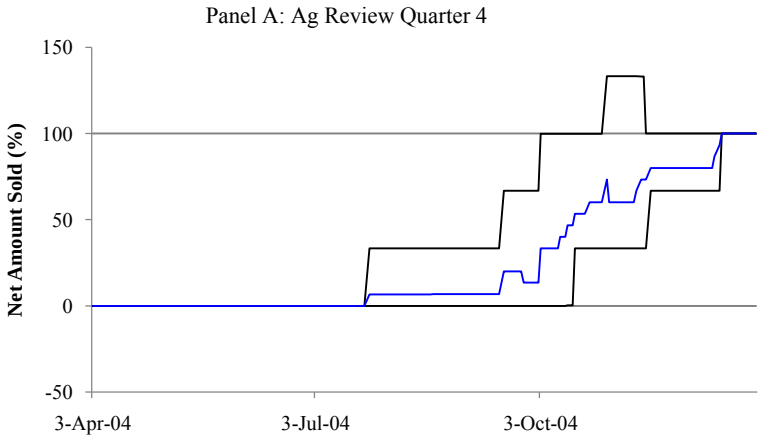
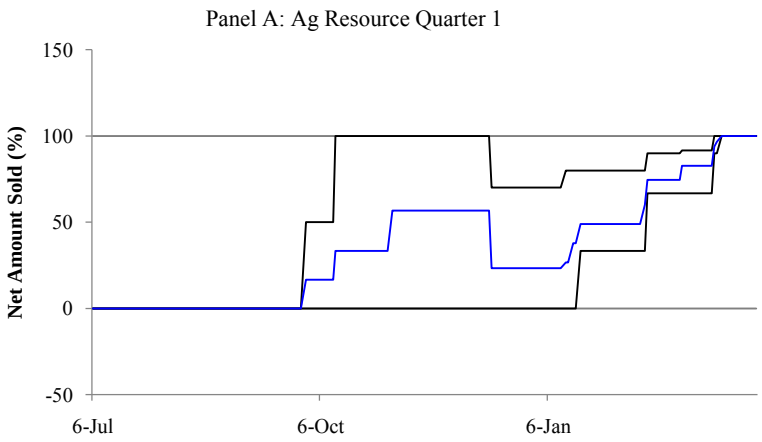
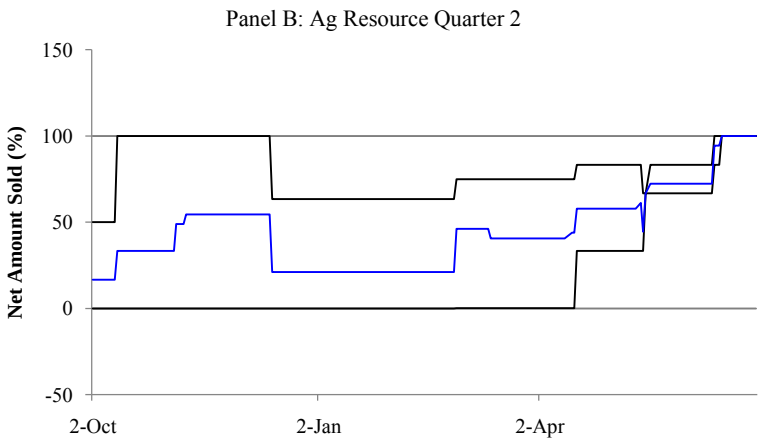
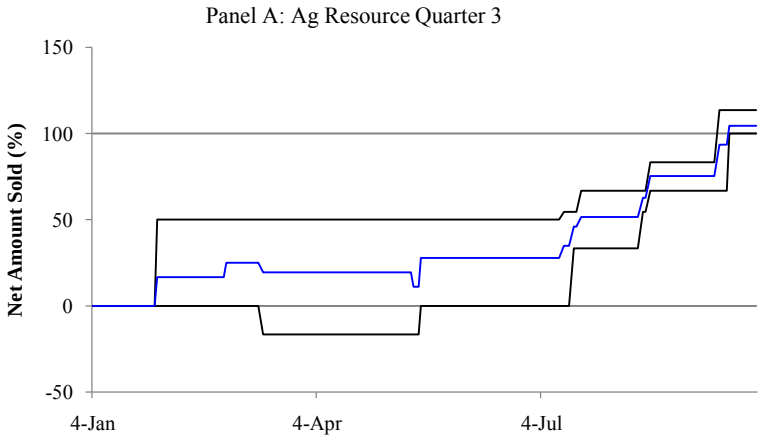


Figure 23. Quarterly Average Feed Marketing Profiles, Ag Resource







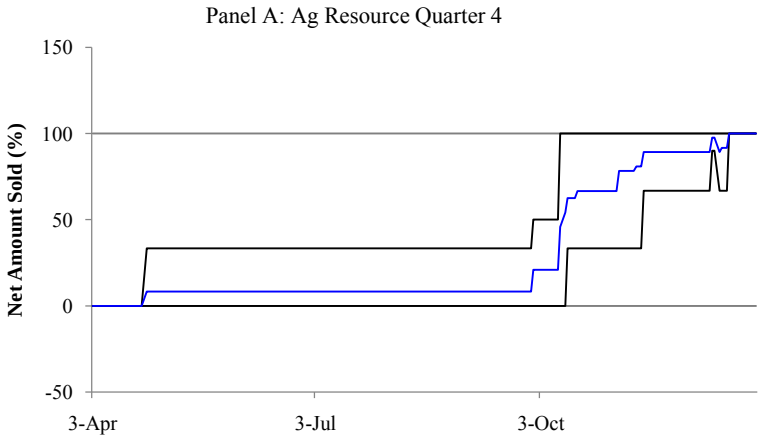


Figure 24. Quarterly Average Feed Marketing Profiles, Brock

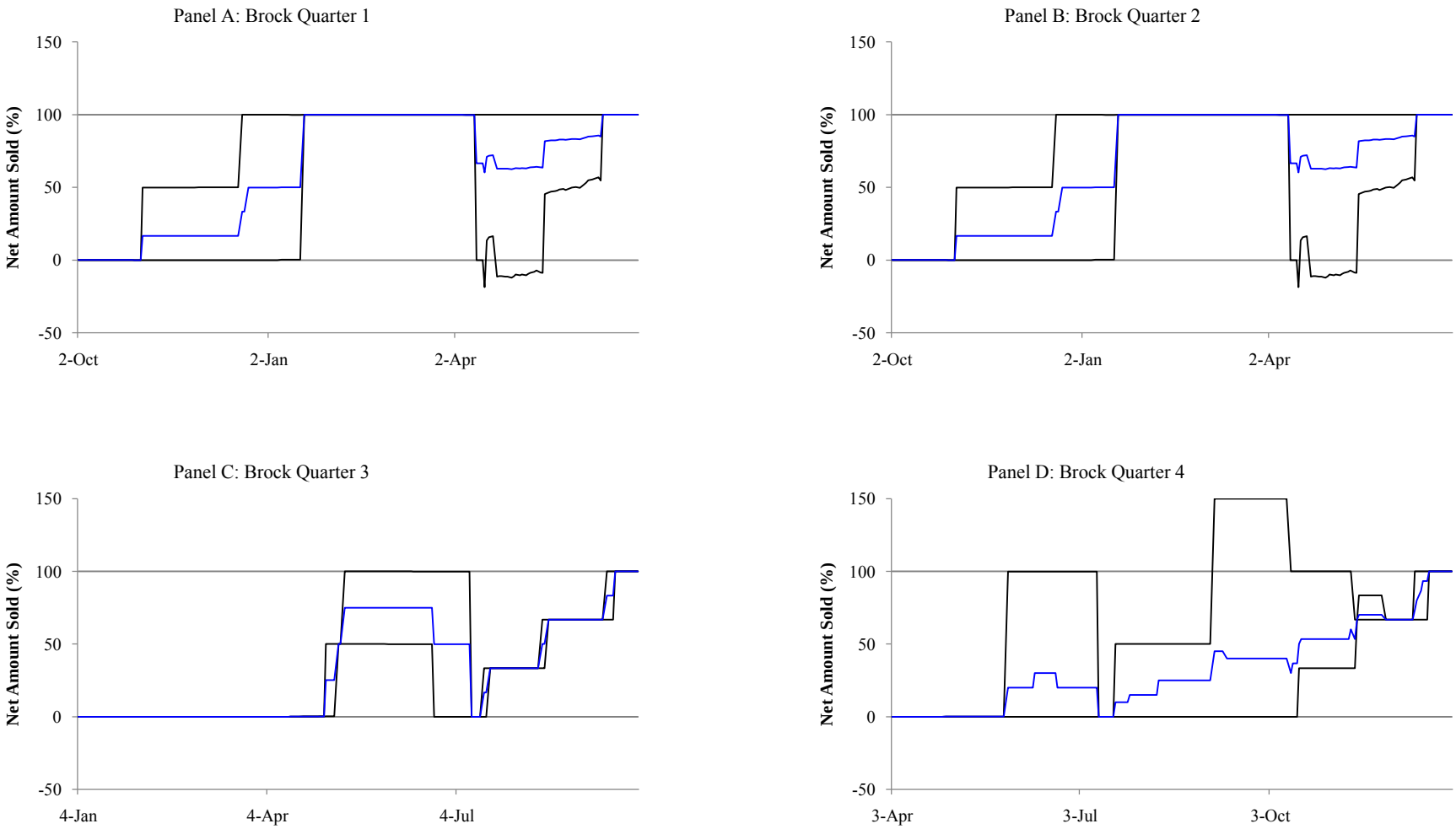


Figure 25. Quarterly Average Feed Marketing Profiles, Pro Farmer

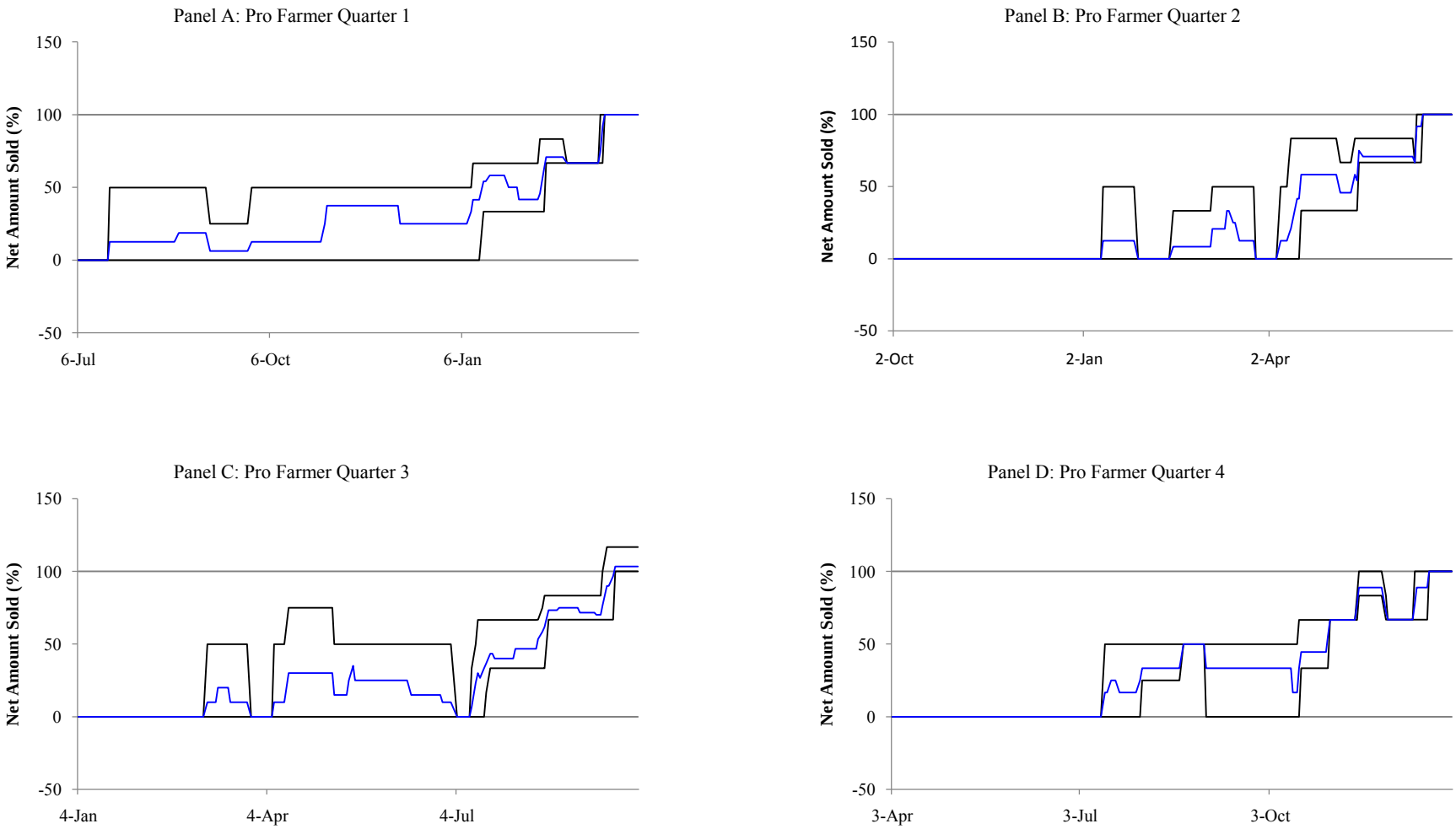


Figure 26. Quarterly Average Feed Marketing Profiles, Top Farmer

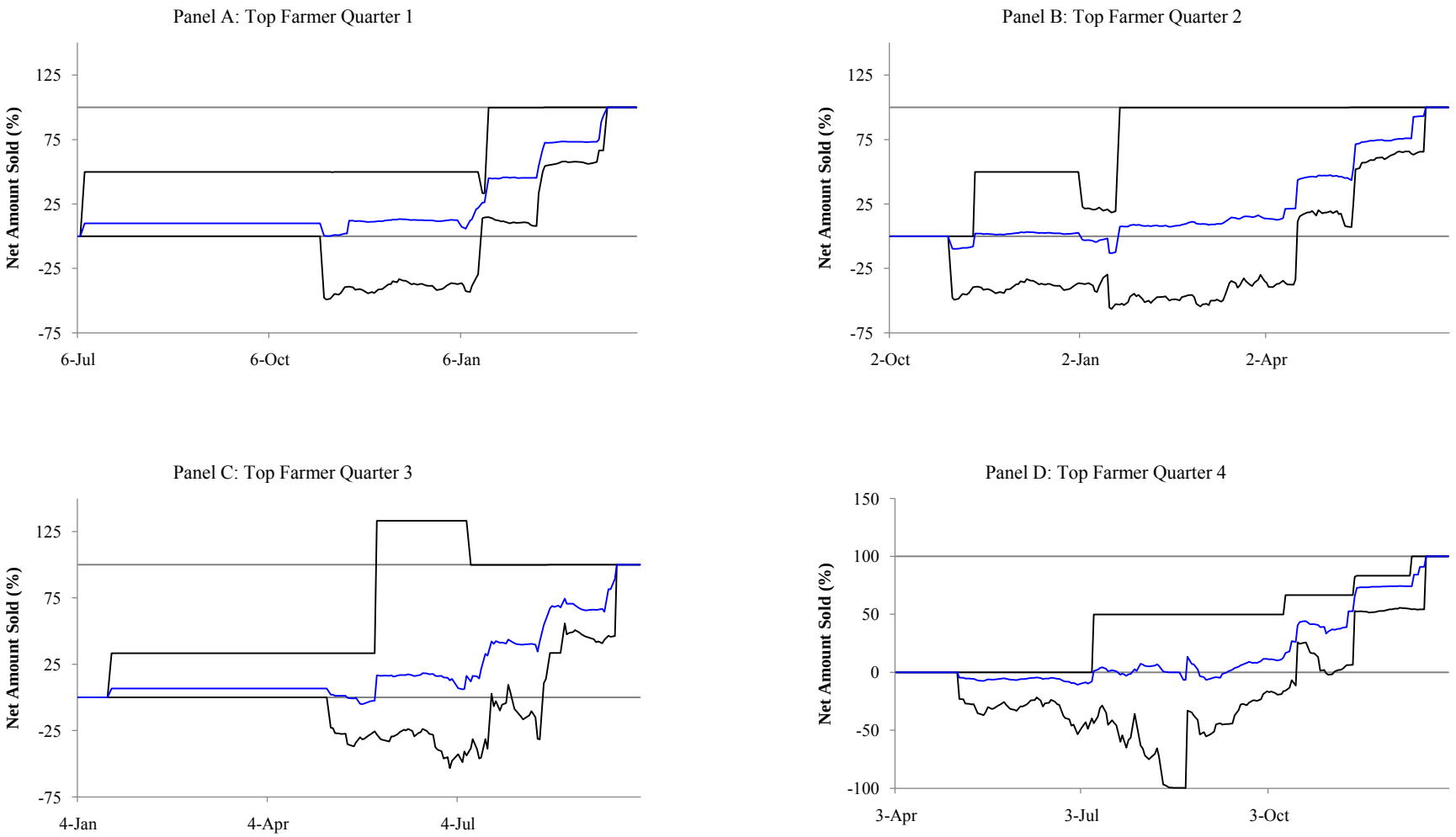


Figure 27. Quarterly Average Feed Marketing Profiles, Utterback

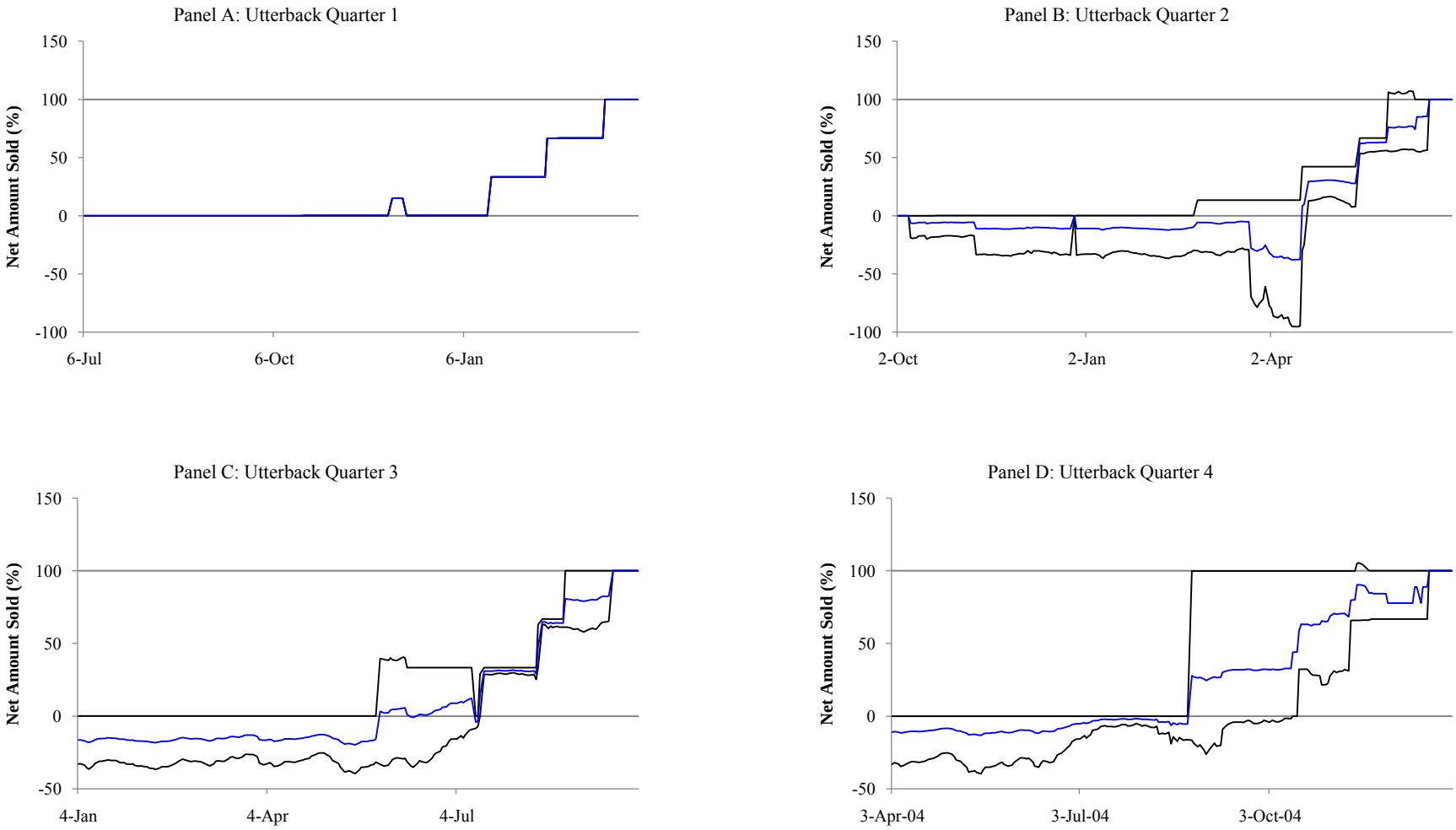


Figure 28. Quarterly Average Feed Marketing Profiles, All Programs 1999-2004

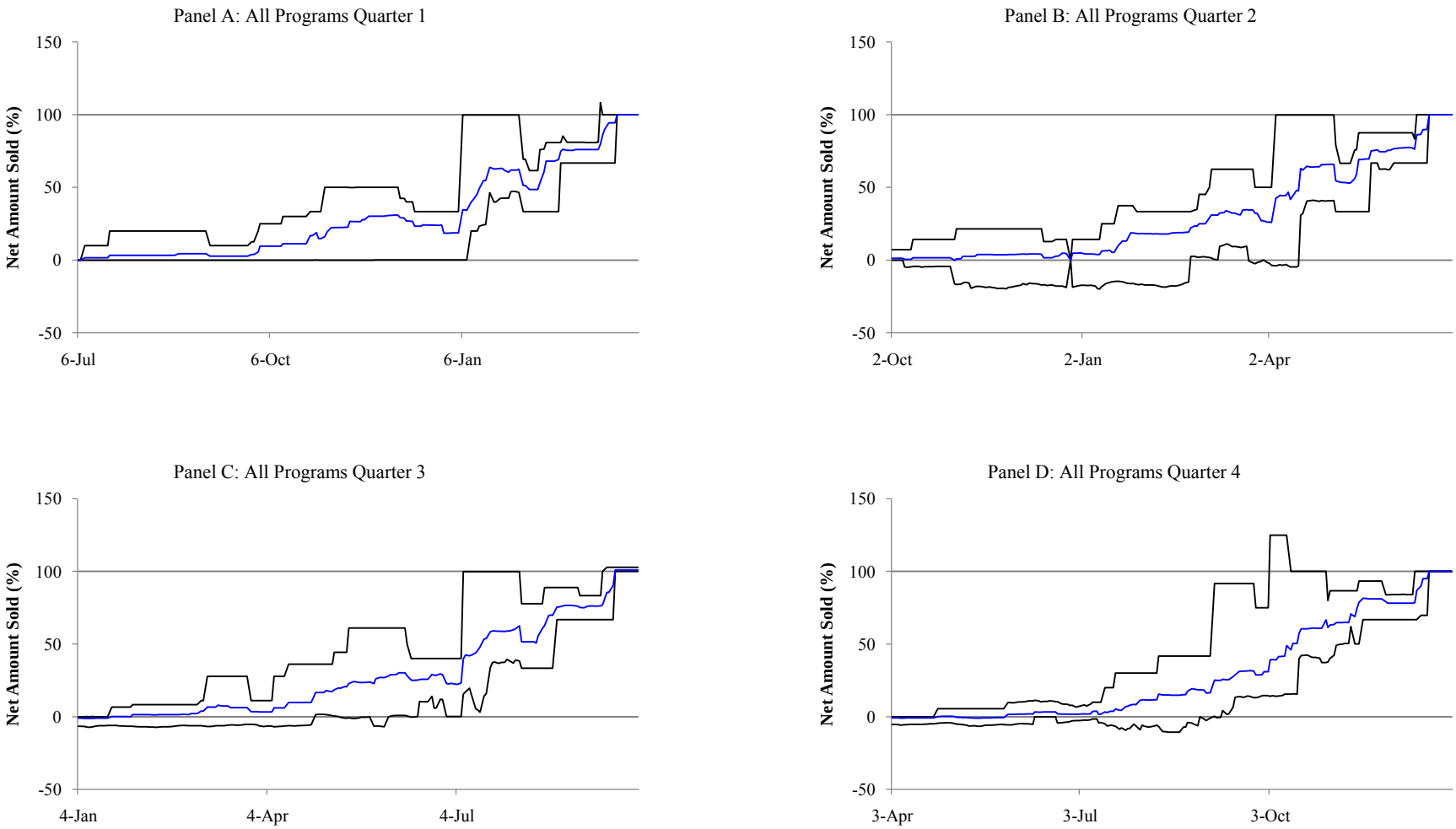


Figure 29. Average Net Advisory Price and Standard Deviation for 9 Advisory Proframs versus Cash Market Benchmark, Live Cattle, 1995-2004

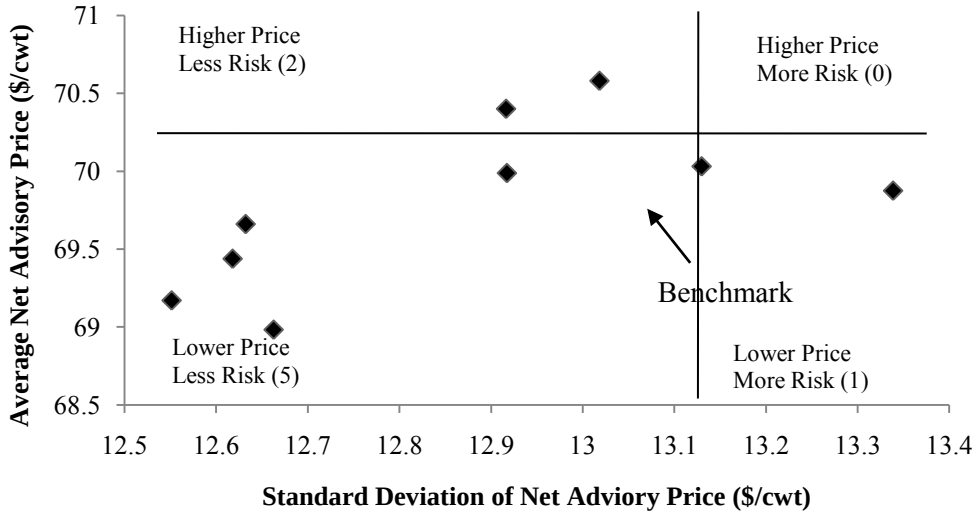
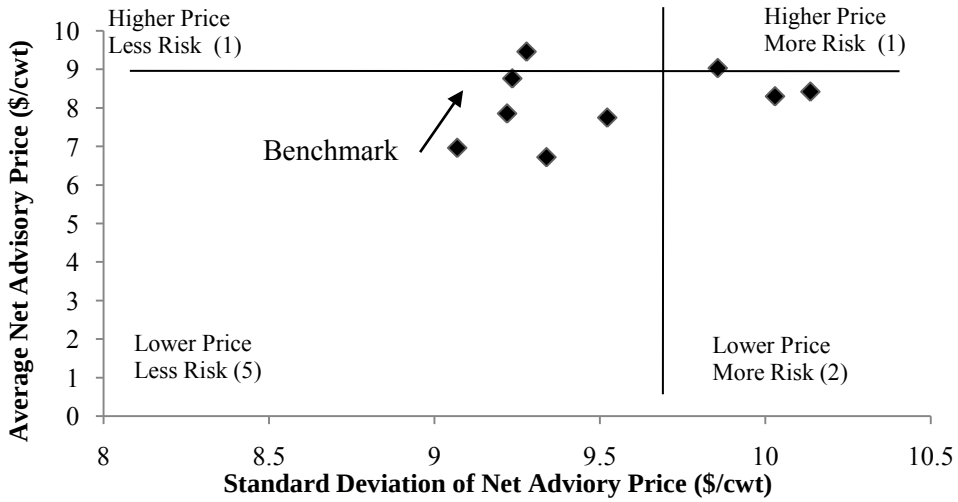


Figure 30. Average Net Advisory Price and Standard Deviation for 9 Advisory Programs versus Cash Market Benchmark, Margin, 1999 Q3-2004



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