THE REACTION OF LIVESTOCK FUTURES PRICES

TO NEW INFORMATION

by

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ABSTRACT

Effects of USDA <u>Hogs and Pigs</u> reports on live hog, pork belly, live cattle and feeder cattle futures prices are examined. Evidence suggests that some of those prices underreact or overreact initially to unanticipated information contained in the <u>Hogs and Pigs</u> reports. However, price-trend following and contrarian trading strategies generate profits only for some of the pork belly, live cattle and feeder cattle contracts. These results, which hold for both in- and out-of-sample analysis, suggest that with respect to the <u>Hogs and Pigs</u> report, the live hog futures market is economically efficient but some inefficiencies exist in the pork belly, live cattle, and feeder cattle futures markets.

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A commonly expressed concern by U.S. producers is that markets, especially futures markets, do not respond appropriately to the release of production and stocks reports from the U.S. Department of Agriculture (USDA) (Lambert et al; Trevis; McKee). This issue has been examined by Gorham, Fackler, Milanos, Sumner and Mueller, and French, et al examined the effects of USDA's Crop Production reports on cash and futures prices for grains. Hoffman investigated the effect of the Cattle on Feed report on cash and futures prices for cattle, while Carter and Galopin, Colling and Irwin, Hudson et al, Miller, and USDA (1977) analyzed the effects of USDA's Hogs and Pigs report on hog prices. Schroeder, et al investigated the effects of USDA's Cattle on Feed and Hogs and Pigs reports on live-cattle, feeder-cattle, and live-hog futures prices. Barnhart (1988, 1989) examined the effects of several financial and macroeconomic variables on many commodity futures prices.

With the exception of Colling and Irwin, French, et al, and Barnhart (1988, 1989) these studies do not separate the information contained in USDA reports into anticipated and unanticipated information. This distinction is important because the efficient market hypothesis (EMH) (Fama) states that efficient prices should reflect all known information. Because information expected to be contained in these reports is already incorporated into prices, markets should respond only to information that was not expected to be contained in the reports. In other words, markets should respond to new information only to the extent that the new information is unanticipated.

Consistent with the EMH, Colling and Irwin, French, et al, and Barnhart (1988, 1989) find that the markets they investigated did not respond to anticipated information, but did respond to unanticipated information. Furthermore, price changes were in a direction consistent with economic theory. However, Colling and Irwin and French, et al, suggest, but do not formally test for, the potential existence of underreaction or overreaction to the USDA reports.

This study will examine the effects of the release of USDA's Hogs and Pigs report (HPR) on live-hog, pork-belly, live-cattle and feeder-cattle futures contracts traded at the Chicago Mercantile Exchange. Prices of these commodities are directly impacted by the HPR (live-hogs and pork-bellies) or indirectly impacted through significant cross-price elasticities (live-cattle and feeder-cattle). The methodology of Colling and Irwin, French, et al, and Barnhart (1988, 1989) will be used to partition information into anticipated and unanticipated components. Over or under reaction of prices will be tested for via (1) maximum likelihood ratio tests, (2) observation of price patterns following the HPR, and (3) significance of trading profits. The effects of price limits and executions costs will be incorporated into the analysis.

DATA

Futures prices were collected for all contracts on the days the HPR was released as well as opening and closing futures prices for the five trading days following the HPR release. Ideally, the number of months from the HPR release date to the expiration of the futures contracts should be equal for each HPR. But, futures contracts do not expire for each month. For example, no pork-belly contracts expire from September of any year through February of the following year. Therefore, the futures contracts were grouped into

various "time-horizons" based on the approximate number of months from the time the HPR is released until the futures contracts expire. Five time-horizons are defined for live hogs, three for pork bellies, six for live cattle and four for feeder cattle (Table 1).

An average of market analysts' expectations is used as a proxy for market expectations of actual changes in breeding and market hog inventories reported in the HPRs.[2] The expectations data are collected by Futures World News and released over electronic news services after the close of trading two trading days prior to the release of the HPR. The survey data have been shown to conform almost entirely to Muth's rational expectations hypothesis suggesting that they are a reasonable proxy of market expectations (Colling, Irwin, and Zulauf). The sample runs from the September 1981 through the June 1990 HPR providing thirty-six observations. Four additional observations, from the September 1990 to June 1991 HPRs, are used to test for significant out-of-sample trading profits.

PROCEDURES AND RESULTS

Efficiency of Price Reactions Following the HPR - Anticipated Information

Under the EMH, a price should reflect all available information relevant to the formation of that price. Therefore, price changes following release of HPRs should not be a function of anticipated information. To test this hypothesis, the following model is estimated for each time-horizon and for all commodity contracts:

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[2] USDA also reports farrowing intentions for the next six months. Unfortunately, expectations data do not exist for farrowing intentions. However, over the sample period, the correlation coefficient for breeding hogs and farrowing intentions exceeds +0.90. Therefore, most of the information in farrowing intentions should be captured by breeding hog inventories.

$$(1) \quad Ln(FP_t^i(O^1)) - Ln(FP_t^i(C^0)) = \beta_0 + \beta_1(BRD_t^e) + \beta_2(MKT_t^e) + \mu_t$$

where Ln denotes the natural logarithm, FP_t^i denotes the futures price for commodity i, C denotes close of trade, O denotes open of trade, a superscript O denotes the day of an HPR release (day 0) and a superscript 1 denotes the day following an HPR (day 1), and t is the date of the HPR release. BRD and MKT refer to breeding and market hogs, respectively, and a superscript e denotes expectations as proxied by the mean of the survey data. Because the price change is from the close of trade on the day of the HPR to the open of trade the following day, it is an "immediate" price change. The dependent variable is specified as differences in natural logs because futures prices are generally believed to follow a geometric random walk.

Livestock futures prices change no more than \$1.50/cwt. (\$2.00/cwt. for pork-bellies) from the previous day's closing price. Limit price moves are quite common among the livestock futures prices following the HPR (see Table 2). Because of the limit on price changes, the two-limit tobit model is used to estimate unbiased parameters (Rosett and Nelson; Maddala).

None of the coefficient estimates for any contracts are significantly different from zero. These results are consistent with the EMH indicating that prices do not respond to expected information.[3]

Efficiency of Price Reactions Following the HPR - Unanticipated Information

According to the EMH, prices should adjust to unanticipated information instantaneously. Thus, price patterns once the immediate price reaction has

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[3]These results are not presented but are available from the authors upon request.

occurred to the HPR should not be predictable. Such an occurrence might indicate that profitable trading strategies are possible.

Ideally, predictable price movements could be tested for by regressing changes in prices for selected times following the HPR on unanticipated breeding and market hog information. However, given the institutional price limits of the Chicago Mercantile Exchange, this would not be appropriate because prices, by their limited nature, tend to move away from their closing level on the day of the HPR. To test for the reaction of futures prices to unanticipated information, and for predictable price patterns, the following <u>cumulative</u> price-change models are estimated:

$$(2; O1) \quad Ln(FP_t^i(O^1)) - Ln(FP_t^i(C^0)) = \beta_0 + \beta_1(BRD_t - BRD_t^e) + \beta_2(MKT_t - MKT_t^e) + \mu_t.$$

$$(3; C1) \quad Ln(FP_t^i(C^1)) - Ln(FP_t^i(C^0)) = \beta_0 + \beta_1(BRD_t - BRD_t^e) + \beta_2(MKT_t - MKT_t^e) + \mu_t,$$

$$(4; O2) \quad Ln(FP_t^i(O^2)) - Ln(FP_t^i(C^0)) = \beta_0 + \beta_1(BRD_t - BRD_t^e) + \beta_2(MKT_t - MKT_t^e) + \mu_t,$$

$$(5; C2) \quad Ln(FP_t^i(C^2)) - Ln(FP_t^i(C^0)) = \beta_0 + \beta_1(BRD_t - BRD_t^e) + \beta_2(MKT_t - MKT_t^e) + \mu_t,$$

$$(6; O3) \quad Ln(FP_t^i(O^3)) - Ln(FP_t^i(C^0)) = \beta_0 + \beta_1(BRD_t - BRD_t^e) + \beta_2(MKT_t - MKT_t^e) + \mu_t,$$

$$(7; C3) \quad Ln(FP_t^i(C^3)) - Ln(FP_t^i(C^0)) = \beta_0 + \beta_1(BRD_t - BRD_t^e) + \beta_2(MKT_t - MKT_t^e) + \mu_t,$$

$$(8; O4) \quad Ln(FP_t^i(O^4)) - Ln(FP_t^i(C^0)) = \beta_0 + \beta_1(BRD_t - BRD_t^e) + \beta_2(MKT_t - MKT_t^e) + \mu_t,$$

$$(9; C4) \quad Ln(FP_t^i(C^4)) - Ln(FP_t^i(C^0)) = \beta_0 + \beta_1(BRD_t - BRD_t^e) + \beta_2(MKT_t - MKT_t^e) + \mu_t,$$

$$(10; O5) \quad Ln(FP_t^i(O^5)) - Ln(FP_t^i(C^0)) = \beta_0 + \beta_1(BRD_t - BRD_t^e) + \beta_2(MKT_t - MKT_t^e) + \mu_t,$$

$$(11; C5) \quad Ln(FP_t^i(C^5)) - Ln(FP_t^i(C^0)) = \beta_0 + \beta_1(BRD_t - BRD_t^e) + \beta_2(MKT_t - MKT_t^e) + \mu_t$$

where the superscripted number refers to the number of days following the HPR and all other terms are as defined earlier. Model 2 is identical to model 1 except that unexpected information is substituted for expected information as the explanatory variables. Models 3 through 11 increment the length of time for the price change from the open of trade on day 1, to the close of trade on

day 1, then to the open of trade on day 2, and so on. As a shorthand, these models are referred to by open (O) or close (C) and the number of days after the HPR is released. For example, O4 denotes the open of trade four days following the HPR. The parameter estimates for unexpected breeding and market hog inventories are compared to determine if they are different across the models. Again, the two-limit tobit model is used to account for the effects of price limits.

As expected, all of the slope parameter estimates for the immediate price change model (2) are negative (Table 3). This result is expected because if an HPR indicates that hog supplies are higher than expected, prices should drop to reflect the larger supply. Conversely, if an HPR shows hog supplies to be smaller than expected, prices should rise to reflect the smaller supply.

The slope parameters are interpreted as the percent change in price given a one percent forecast error. All slope parameter estimates for live hog and pork belly futures are significantly different from zero at the five-percent level. As expected, parameter estimates for the more nearby time-horizon contracts (time-horizons 1-2 and 2-3 months for live hogs, 2-5 months for pork bellies) are greater for unanticipated market hog inventories while parameter estimates for breeding hog inventories are greater for the more distant time-horizon contracts (time-horizons 7-8 and 10-11 months for live hogs, 8-11 months for pork bellies). This relationship is expected because market hogs will be ready for market in the near term while the potential pig crop from breeding hogs will not be on the market for at least one hog-production period. These results are in accord with those of Colling and Irwin.

All live cattle and feeder cattle contracts respond significantly to unanticipated breeding hog information. In contrast, only about one-half of those contracts responded significantly to unanticipated information regarding market hogs. Furthermore, the absolute value of the coefficients is not nearly as large as for live hog and pork belly contracts. For example, none of the coefficient estimates for live-cattle and feeder cattle are greater than 0.35 (in absolute terms). However, live-hog and pork belly coefficient estimates have an absolute value greater than 0.4 and most are greater than 0.8.

To test the null hypothesis that prices do not change following their immediate response, the slope coefficient estimates for models 3 - 11 are jointly restricted to those from models 2 - 10, respectively. These results are presented in Table 4. Many of the likelihood ratio statistics reject the null hypothesis, suggesting that price patterns following the HPR do exist. However, they do not indicate the direction of the price patterns.

To examine for price patterns, the slope coefficient estimates from all of the price-change model (2-11) are graphed for each time-horizon and commodity. The time since release of the HPR is indicated on the horizontal axis, again where the first letter indicates open or close and where the number indicates the number of days following the HPR. A closed circle indicates that the parameter estimate is significantly different from zero at the five-percent level while an open circle indicates that the coefficient estimate is not different from zero at the five percent level. The vertical axis is interpreted as the percent change in price given a one-percent bearish forecast error.

For live-hog futures, the slope coefficient estimates for breeding hog inventories at time-horizons 1-2 and 2-3 months change little over the five

days following the HPR (Figure 1). However, contract at the three longer time-horizons appear to overreact initially to the unanticipated breeding hog information. For example, the parameter estimate for the open of trade on day 1 (O1) for time-horizon 4-5 months is approximately -1.4. The parameter estimate is -0.8 with all of the reaction back toward zero having occurred by the close of trade on the third day following the HPR. In addition, all market hog coefficient estimates appear to overreact to some degree. This is especially true for time-horizons 4-5, 7-8 and 10-11 months.

Pork-belly futures contact prices follow a different pattern than live hog futures in responding to unanticipated information in the HPR (Figure 2). Futures prices react significantly to unanticipated information on the open of trading the day following the HPR, but then continue to further react to the information by the close of trading on the first day. Then the futures prices revert back to roughly the same price level on the open of the first day following the HPR.

Reaction of pork-belly prices to unanticipated market hog information is more variable. Initial overreaction is suggested for time-horizon 2-5 months, while no further under- or overreaction is suggested at the 8-11 month time-horizon. On the other hand, the price pattern at the 5-8 months time-horizon resembles that for the unanticipated breeding hog information.

For both live-cattle and feeder-cattle, initial overreaction to unanticipated breeding hog information is suggested by the graphs (Figures 3 and 4). Similarly, after the initial reaction to unanticipated market hog information, most live-cattle and feeder-cattle futures prices move back toward a zero price reaction. However, by the close of trading five days after the HPR, prices changes have returned to roughly their initial response level.

The results indicate that prices react to unanticipated breeding and market hog inventories which is what is expected under the EMH. However, there appears to be a general tendency for prices to overreact to the new information. This observations suggests that a profitable trading rule might exist. Therefore, a simple trading rule based on the notion of price overreactions is evaluated. These evaluations takes account of price limits and transactions costs.

Trading Strategies

An overreaction to unanticipated information suggests the potential for a contrarian trading strategy. For example, if an HPR is bearish, the trader buys a contract at the first opportunity when no price limit is reached. The trader offsets that position in the near future.

Before a trader can take a contrarian position in the market, the HPR must be classified as bullish or bearish. This classification is derived by summing the forecast errors for the unexpected breeding and market hog inventories[4]. If the sum of the forecast errors is greater than zero, the HPR is classified as bearish because hog numbers are higher than expected. Conversely, if the sum of the forecast errors is less than zero, the HPR is classified as bullish. Among the thirty-six HPRs examined, seventeen were bearish reports and nineteen were bullish reports.

If an HPR is bearish (bullish), the trader buys (sells) a futures contract at the first open or close following the HPR in which the price is not at the limit. Under one strategy, which is called the "quick" trading

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[4]The breeding hog inventories tend to have a greater effect on futures prices than market hog inventories which suggests that the bullishness or bearishness of the breeding hog numbers alone might be used to classify the HPRs. However, the classification of the HPR changed only three times out of the thirty-six HPRs and results of the trading strategies were changed only slightly.

strategy, the trader offsets the position at the next close or open. Under another strategy, which is called the "hold" trading strategy, the trader offsets the position at the close of trade five days following the HPR.

Two types of traders, each facing different transactions costs, are assumed. The first, public traders, are any traders outside of the Chicago Mercantile Exchange who must deal through a broker to make a transaction. The second, floor traders, are those who own a seat on the Chicago Mercantile Exchange and therefore, can trade on the floor. The assumed commission for public traders is $75.00 for a round-trip transaction, approximately what a full-service brokerage house will charge. The commission for floor traders is much less and is assumed to be $4.00.

All traders face liquidity costs, which is the movement in price necessary for a transaction to take place. Liquidity costs are normally referred to in terms of the number of "ticks," which is the minimum price movement that a contract is allowed to move under the trading rules of the Chicago Mercantile Exchange. Liquidity costs are assumed to be the same for public and floor traders. The liquidity cost is assumed to be two ticks for a round-trip transaction for nearby contracts and four ticks for a round-trip transaction for distant contracts, which normally experience lower trading volume and therefore require a larger price movement for a transaction to take place. Since live hog, pork belly and live cattle contracts are for forty thousand pounds, one tick is worth $10.00. Feeder cattle contracts are for forty-four thousand pounds making the value of a tick $11.00. For live hogs, the nearby contracts are assumed to be time-horizons 1-2, 2-3 and 4-5 months and the distant contracts are time-horizons 7-8 and 10-11 months. For pork belly futures, the nearby contracts are time-horizons 2-5 and 5-8 months and the distant contracts are time-horizons 8-11 months. The nearby contracts for

live cattle are time-horizons 1-2, 2-3, 4-5 and 6-7 months while the distant contracts are time-horizons 8-9 and 10-11 months. For feeder cattle, the nearby contracts are time-horizons 1-2, 2-3 and 4-5 months while the distant contracts are time-horizons 7-8 contracts.

In-Sample Results

There appear to be no profitable trading opportunities with live-hogs and pork-bellies (see Table 5). Mean trading strategies are greater than zero for none of the time-horizons for public traders. While positive profits were generated for four time-horizons by floor traders, none were significantly greater than zero at the five percent level.

In-sample profits do exist with live-cattle and feeder-cattle futures contracts. For live-cattle, mean profits are significantly greater than zero at the five-percent level to floor traders under the quick strategy at time-horizons 1-2 and 6-7 months. Under the hold strategy, floor traders generated significant profits exist for time-horizons 4-5, 6-7 and 8-9 months contracts. With feeder-cattle, mean profits are significantly greater than zero to floor traders under the quick strategy at time-horizons 2-3 and 4-5 months. These results suggest that in-sample profits were generated by overreactions in live-cattle and feeder-cattle futures prices.

Out-of-Sample Results

The in-sample period ended with the June 1990 HPR. Profits are examined out-of-sample for the September 1990, December 1990, March 1991 and June 1991 HPRs. Of those HPRs, the September and December 1990 were bullish and the March and June 1991 HPRs were bearish.

Mean out-of-sample returns are presented in Table 6. With live-hogs, profits were generated and were significantly greater than zero at the five percent level with time-horizon 1-2 months. Significant profits were generated under both trading strategies and to both public and floor traders. Profits were highest under the quick strategy for floor traders, in which profits averaged $216.00 per contract. With the other time-horizons, profits were mainly negative, and none were significantly greater than zero. Returns to pork-bellies were negative for all time-horizons and trading strategies.

The greatest returns are generated by live-cattle and feeder-cattle. Generally, the hold strategy performed better than the quick strategy. Average returns were as high as $385.25 for feeder-cattle, time-horizon 2-3 months, to floor traders using the hold strategy.

Individual returns to public traders are presented in Table 7. With live-hogs and pork-bellies, some profitable trades existed. The highest profit with those contracts is $265.00 with the quick strategy for live-hogs, time-horizon 1-2 months, following the September 1990 HPR. However, there are several losses associated with live-hogs and pork-bellies. Losses are as high as $1095.00 for pork-bellies, time-horizon 5-8 months, following the March 1991 HPR. These results suggest that some profitable trades do exist, but unprofitable trades are even more likely.

There are several profitable trades to public traders with live-cattle and feeder-cattle. The greatest profits for live-cattle follow the December 1990 and June 1991 HPRs. The highest profits occur with live-cattle time-horizons 1-2 and 2-3 months contracts under the hold strategy following the December 1990 HPR with a profit of $565.00.[5] In General, for live-cattle,

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[5]The futures contract was the March 1991 contract for both time-horizons. This explains the reason for the profits being the same.

the nearby contracts are more profitable. This result is partially explained
by the higher liquidity costs to the distant contracts. However, the nearby
contracts are generally more profitable than the distant contracts by a margin
greater than that explainable by liquidity costs.

Profits are also greatest for feeder-cattle following the December 1990
and June 1991 HPRs. In addition, although negative returns exist under the
quick strategy following the March 1991 HPR, returns are positive under the
hold strategy following the same HPR. The highest return is $607.00 for time-
horizon 7-8 months under the hold strategy following the March 1991 HPR.
However, losses occur for both trading strategies and for all time-horizons
following the September 1990 HPR.

Out-of-sample returns for floor traders are presented in Table 7. The
returns are always greater than those of the public traders by a factor of
$71.00 because of the reduced commission costs. Therefore, the results are
essentially the same as those from the floor traders except for the constant
increase in profits due to the reduced commission cost.

SUMMARY AND CONCLUSIONS

An efficient market should reflect all known or expected information.
Therefore, prices should respond only to new or unanticipated information.
Colling and Irwin confirm these expectations for live-hog futures prices
concerning information contained in USDA's Hogs and Pigs report. This study
also supported the efficient market hypothesis for pork-belly, live-cattle,
and feeder-cattle futures.

The efficient market hypothesis also implies that prices react
instantaneously and fully to new information. This implies no under- or
overreaction to unanticipated information. Likelihood ratio tests and graphs

of price paths suggest the existence of initial overreaction to unanticipated information in all four livestock contracts. However, both in-sample and out-of-sample returns to a trading strategy based on overreaction of prices failed to generate significant trading profits for live hogs and pork bellies. In contrast, significant profits net of transaction costs were generated for live-cattle and feeder cattle contracts, but most of the profits were limited to floor traders.

In conclusion, hog producers appear to have little reason to be concerned with the efficiency of the live-hog and pork-belly futures market relative to USDA's Hogs and Pigs report. On the other hand, there is some evidence of inefficiency in the live-cattle and feeder-cattle market with respect to USDA's Hogs and Pigs report.

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Table 1. Futures Contracts Used for Each Time Horizon for the Live-Hog, Pork Belly, Live Cattle and Feeder Cattle Futures Contract

Time-Horizon (Months)	Quarterly Hogs and Pigs Report			
	March	June	Sept.	Dec.
--Live Hogs--				
1-2	Apr. (1)	July (1)	Oct. (1)	Feb.+ (2)
2-3	June (3)	Aug. (2)	Dec. (3)	Feb.+ (2)
4-5	July (4)	Oct. (4)	Feb.+ (5)	Apr.+ (4)
7-8	Oct. (7)	Feb.+ (8)	Apr.+ (7)	July+ (7)
10-11	Feb.+ (11)	Apr.+ (10)	July+ (10)	Oct.+ (10)
--Pork Bellies--				
2-5	May (2)	Aug. (2)	Feb.+ (5)	Feb.+ (2)
5-8	Aug. (5)	Feb.+ (8)	Feb.+ (5)	May+ (5)
8-11	Feb.+ (11)	Mar.+ (9)	July+ (10)	Aug.+ (8)
--Live Cattle--				
1-2	Apr. (1)	Aug. (2)	Oct. (1)	Feb.+ (2)
2-3	June (3)	Aug. (2)	Dec. (3)	Feb.+ (2)
4-5	Aug. (5)	Oct. (4)	Feb.+ (5)	Aug.+ (4)
6-7	Oct. (7)	Dec. (6)	Apr.+ (7)	June+ (6)
8-9	Dec. (9)	Feb.+ (8)	June+ (9)	Aug.+ (8)
10-11	Feb.+ (11)	Apr.+ (10)	Aug.+ (11)	Oct.+ (10)
--Feeder Cattle--				
1-2	Apr. (1)	Aug. (2)	Oct. (1)	Jan.+ (1)
2-3	May (2)	Aug. (2)	Nov. (2)	Mar.+ (3)
4-5	Aug. (5)	Oct. (4)	Jan.+ (4)	May+ (5)
7-8	Nov. (8)	Jan.+ (7)	Apr.+ (7)	Aug.+ (8)

Note: A (+) indicates that the corresponding contract is used for the year following the Hogs and Pigs report. Numbers in parentheses are the approximate number of months from the time the Hogs and Pigs report is released until the expiration of the futures contract.

Table 2. Number and Percent of Limit Price Moves on the Open and Close of Trade One Through Five Days Following the Hogs and Pigs Report

Time-Horizon (Months)	Day 1 Open	Day 1 Close	Day 2 Open	Day 2 Close	Day 3 Open	Day 3 Close	Day 4 Open	Day 4 Close	Day 5 Open	Day 5 Close
--Live Hogs--										
1-2	14	13	3	2	2	1	0	0	0	0
	39	36	8	6	6	3	0	0	0	0
2-3	16	13	4	5	2	1	0	0	0	0
	44	36	11	14	6	3	0	0	0	0
4-5	22	16	5	7	2	1	0	0	0	0
	61	44	14	20	6	3	0	0	0	0
7-8	20	16	6	5	2	2	0	0	0	0
	56	44	17	14	6	6	0	0	0	0
10-11	16	12	3	3	2	1	0	0	0	0
	44	33	8	8	6	3	0	0	0	0
--Pork Bellies										
2-5	22	21	12	12	4	3	1	1	0	0
	61	58	33	33	11	8	3	3	0	0
5-8	21	25	13	9	4	5	0	0	0	0
	58	69	36	25	11	14	0	0	0	0
8-11	19	24	11	9	4	3	1	0	0	0
	53	67	31	25	11	8	3	0	0	0
--Live Cattle--										
1-2	3	2	1	1	0	0	0	0	0	0
	8	6	3	3	0	0	0	0	0	0
2-3	6	3	1	1	0	0	0	0	0	0
	17	8	3	3	0	0	0	0	0	0
4-5	4	3	2	0	0	0	0	0	0	0
	11	8	6	0	0	0	0	0	0	0
6-7	4	4	2	1	0	0	0	0	0	0
	11	11	6	3	0	0	0	0	0	0
8-9	3	2	1	0	0	0	0	0	0	0
	8	6	3	0	0	0	0	0	0	0
10-11	5	3	2	1	0	0	0	0	0	0
	14	8	6	3	0	0	0	0	0	0
--Feeder Cattle--										
1-2	5	4	2	0	0	0	0	0	0	0
	14	11	6	0	0	0	0	0	0	0
2-3	6	3	2	0	0	0	0	0	0	0
	17	8	6	0	0	0	0	0	0	0
4-5	4	4	2	0	0	0	0	0	0	0
	11	11	6	0	0	0	0	0	0	0
7-8	2	2	1	0	0	0	0	0	0	0
	6	6	3	0	0	0	0	0	0	0

Note: The percent of limit price moves appears underlined below each respective number of limit price moves.

Table 3. Response of Livestock Futures Contract Prices to Unanticipated Information in the <u>Hogs and Pigs</u> Report from the Close of Trade on the Day of the <u>Hogs and Pigs</u> Report to the Open of Trade One Day Following the <u>Hogs and Pigs</u> Report

| Time-Horizon (Months) | Coefficient Estimates[a] | | | H_0: β_1, β_2 = 0 |
	Intercept	Breeding Hogs	Market	Chi-Square(2)[b]
--Live Hogs--				
1-2	0.765 (0.459)	-0.457* (0.201)	-0.901** (0.297)	25.66**
2-3	0.787 (0.515)	-0.649** (0.232)	-0.985** (0.335)	26.37**
4-5	0.779 (0.902)	-1.371** (0.519)	-1.387* (0.620)	16.51**
7-8	0.630 (0.630)	-1.368** (0.362)	-1.114** (0.430)	22.21**
10-11	0.544 (0.532)	-1.121** (0.298)	-0.835* (0.344)	26.11**
--Pork Bellies--				
2-5	-0.147 (0.830)	-1.223** (0.461)	-1.653** (0.606)	17.12**
5-8	0.109 (0.735)	-1.369** (0.431)	-1.350** (0.522)	18.52**
8-11	0.097 (0.638)	-1.268** (0.371)	-1.124** (0.426)	21.92**
--Live Cattle--				
1-2	0.255 (0.158)	-0.199* (0.068)	-0.256** (0.099)	44.13**
2-3	0.263 (0.201)	-0.246** (0.088)	-0.261* (0.126)	33.21**
4-5	0.187 (0.179)	-0.276** (0.080)	-0.183 (0.111)	41.52**
6-7	0.215 (0.171)	-0.272** (0.076)	-0.179* (0.107)	43.70**
8-9	0.317 (0.174)	-0.254** (0.076)	-0.234* (0.109)	42.30**
10-11	0.241 (0.166)	-0.246** (0.072)	-0.177 (0.104)	38.69**
--Feeder Cattle--				
1-2	-0.000 (0.160)	-0.283** (0.072)	-0.206* (0.100)	53.34**
2-3	0.092 (0.182)	-0.304** (0.081)	-0.277* (0.113)	49.38**
4-5	0.130 (0.148)	-0.291** (0.065)	-0.194* (0.094)	59.06**
7-8	-0.025 (0.139)	-0.262** (0.060)	-0.035 (0.086)	46.49**

Note: Standard errors of the estimated coefficients appear in parentheses. One and two asterisks represent significance at the 5% and 1% levels, respectively. One sided t-tests are performed for coefficient estimates β_1 and β_2.

[a]The coefficient estimates are interpreted as the percent change in price (dependent variable) for each percent of the forecast error.

[b]Chi-Square(2) = Chi-Square test with two degrees of freedom.

Table 4. Likelihood-Ratio Statistics of the Joint Tests of Changes in Coefficient Estimates in the Livestock Futures Price-Change Models Given Unanticipated Information in the Hogs and Pigs Report[a]

Time-Horizon (Months)	Price Change Model[b]								
	C1	O2	C2	O3	C3	O4	C4	O5	C5
--Live Hogs--									
1-2	7.44*	5.73	1.10	0.67	0.40	5.48	2.32	2.73	0.24
2-3	4.52	1.38	1.18	0.20	1.07	0.60	0.03	0.49	1.82
4-5	7.27*	0.57	0.06	2.26	1.59	2.58	0.46	2.24	0.19
7-8	3.60	10.75**	17.15**	15.04**	29.67**	15.60**	25.92**	14.42*	14.77**
10-11	3.60	19.44**	19.46**	19.84**	20.89**	4.58	8.20*	5.95	10.92**
--Pork Bellies--									
2-5	0.17	0.43	0.80	10.80*	0.23	3.58	0.06	0.13	0.21
5-8	1.65	38.76**	4.39	1.83	0.86	8.20*	0.30	2.35	0.40
8-11	2.19	0.16	0.09	0.69	0.86	1.13	0.96	1.17	0.09
--Live Cattle--									
1-2	6.81*	3.71	1.82	7.52*	0.85	7.27*	7.58*	8.00*	3.77
2-3	4.78	0.38	1.61	7.13**	0.81	5.25	5.99*	10.87**	8.36*
4-5	0.50	7.37*	1.83	0.77	6.06*	0.48	0.07	1.11	2.10
6-7	1.25	17.82**	9.30**	16.55**	4.17	7.79*	9.85**	0.24	1.40
8-9	2.64	6.82*	11.01**	21.24**	22.53**	10.11**	6.58*	1.64	1.45
10-11	3.07	11.76**	6.93*	40.69**	25.27**	19.73**	18.68**	1.96	18.67**
--Feeder Cattle--									
1-2	1.62	23.42**	5.74	9.45**	11.77**	1.78	0.24	8.01*	0.81
2-3	3.33	26.98**	7.85*	16.12**	15.88**	0.93	0.42	1.56	2.48
4-5	3.99	72.53**	10.63**	20.53**	46.03**	7.12*	3.43	1.48	4.57
7-8	12.58**	18.46**	9.64*	26.54**	47.03**	13.72**	5.00	0.99	2.09

Note: One and two asterisks represent significance at the five and one percent levels, respectively.

[a]These are chi-square statistics of the joint hypotheses that the slope parameter estimates are equal to those of the previous model's parameter estimates.

[b]The first character, or letter (O or C), refers to the open (O) or close (C) of trade. The second character, or number (1,...,5), refers to the number of days following the Hogs and Pigs report.
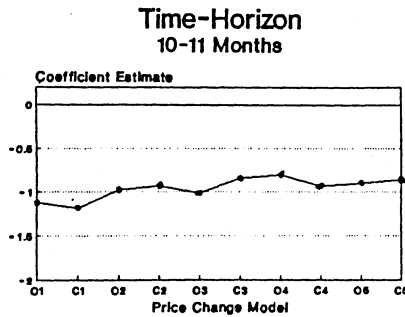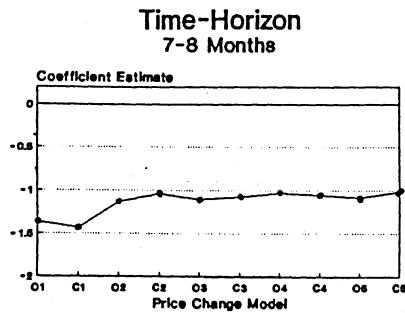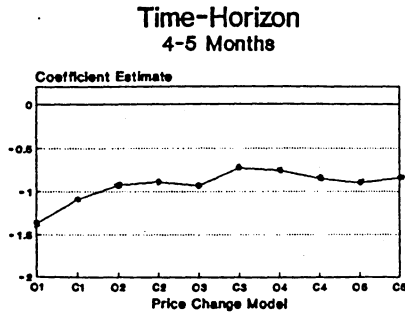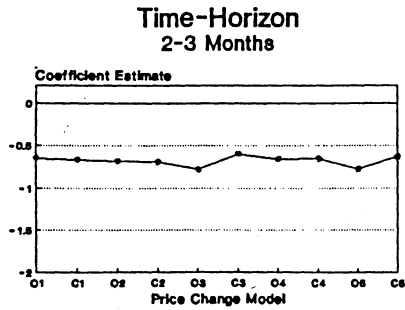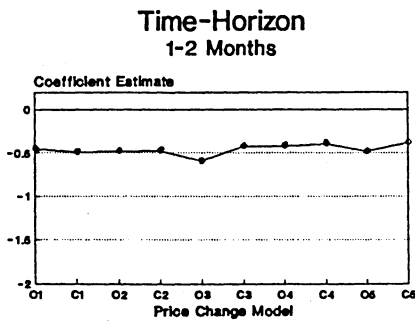
Figure 1. Cumulative Response of Live-Hog Futures Prices to Unanticipated Changes in Breeding and Market Hog Information as Time from the <u>Hogs and Pigs</u> Report Release Date Passes

Breeding Hog
Coefficient Estimates

Time-Horizon
2-5 Months

Coefficient Estimate

Time-Horizon
5-8 Months

Coefficient Estimate

Time-Horizon
8-11 Months

Coefficient Estimate

Market Hog
Coefficient Estimates

Time-Horizon
2-5 Months
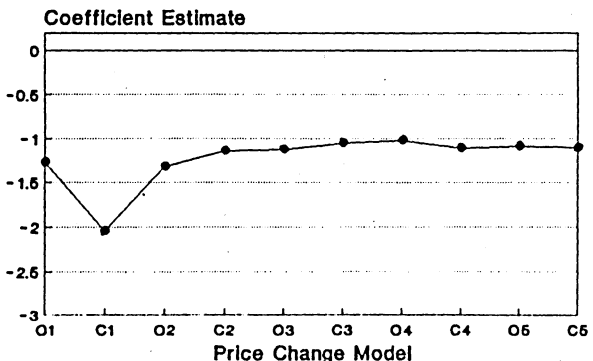
Coefficient Estimate

Time-Horizon
5-8 Months

Coefficient Estimate

Time-Horizon
8-11 Months
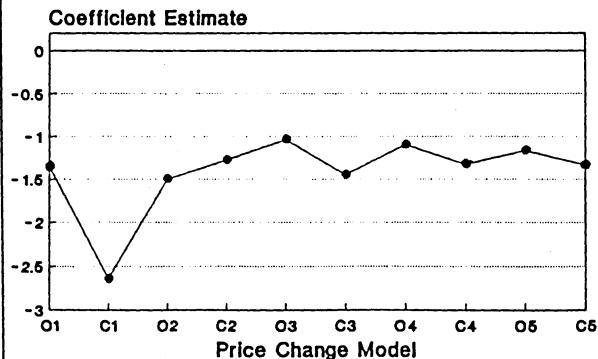
Coefficient Estimate
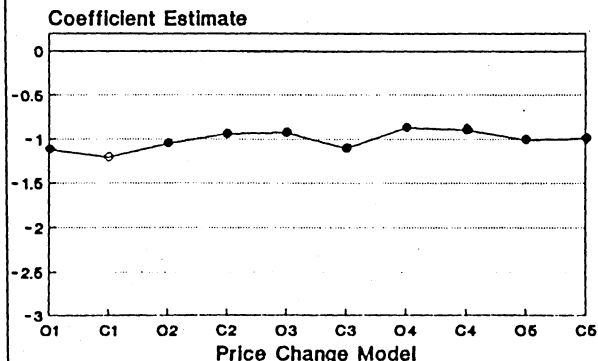
Figure 2. Cumulative Response of Pork-Belly Futures Prices to Unanticipated Changes in Breeding and Market Hog Information as Time from the Hogs and Pigs Report Release Date Passes

Breeding Hog
Coefficient Estimates
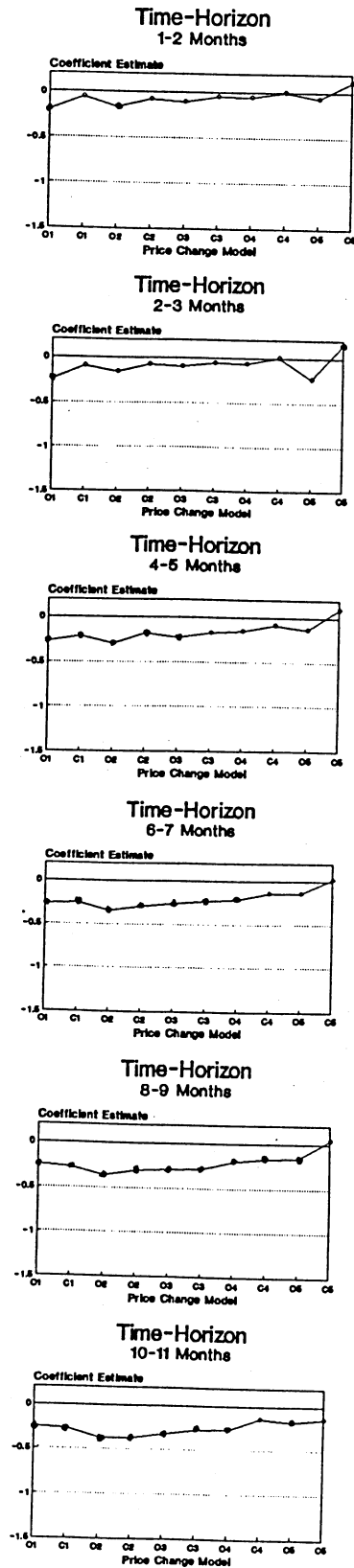
Market Hog
Coefficient Estimates
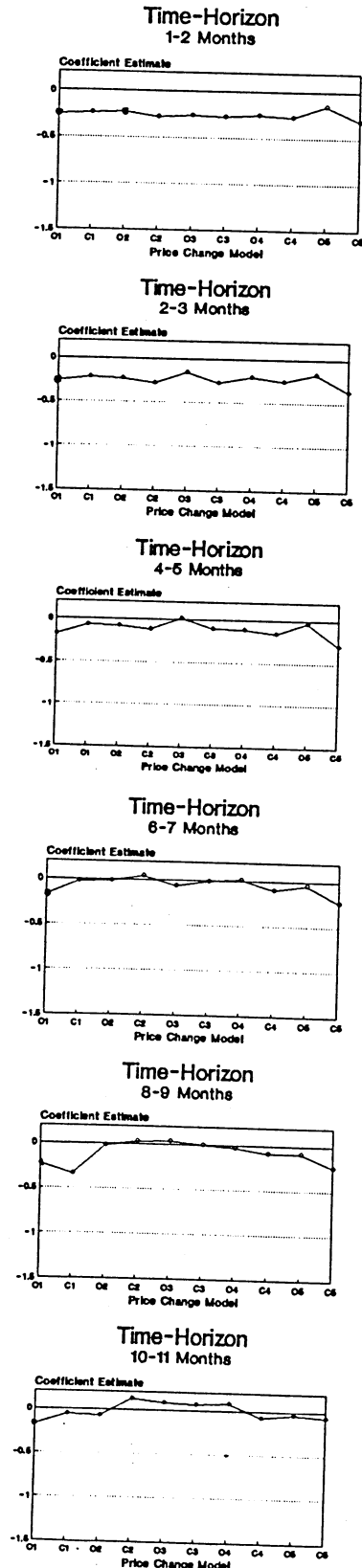
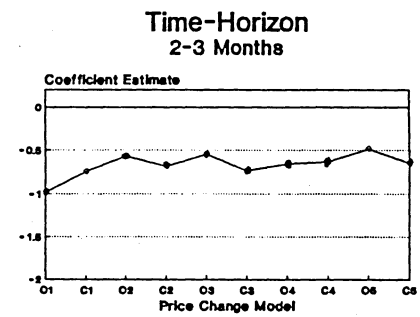**Figure 3.** Cumulative Response of Live-Cattle Futures Prices to Unanticipated Changes in Breeding and Market Hog Information as Time from the <u>Hogs and Pigs</u> Report Release Date Passes
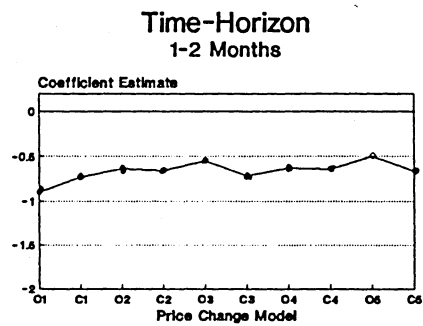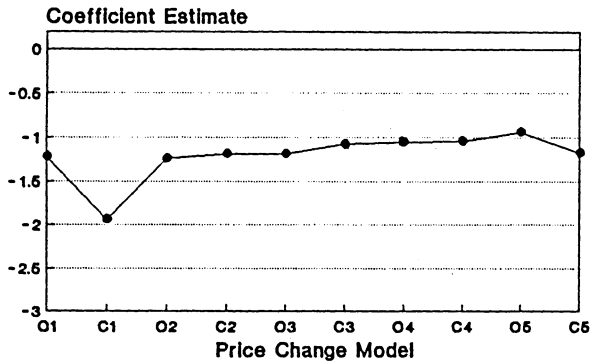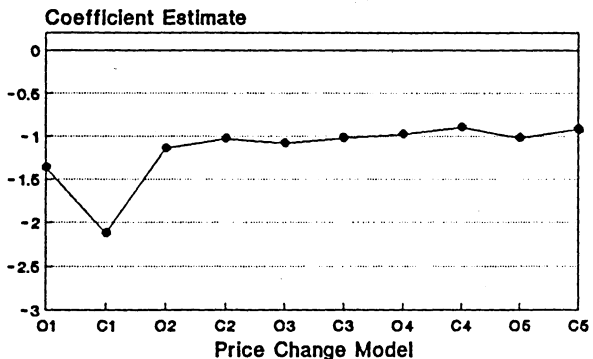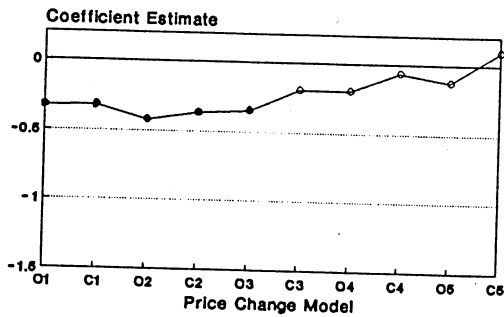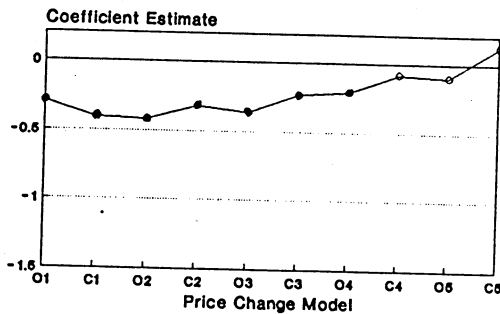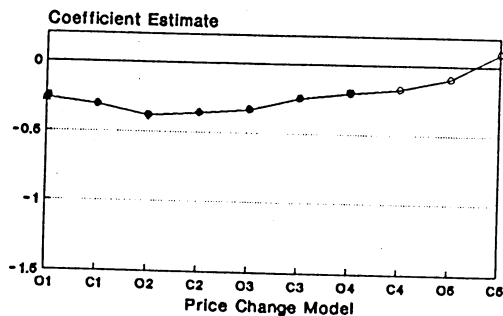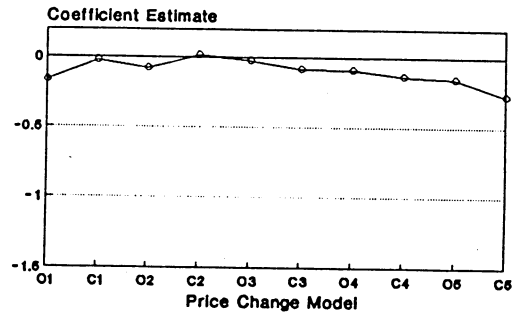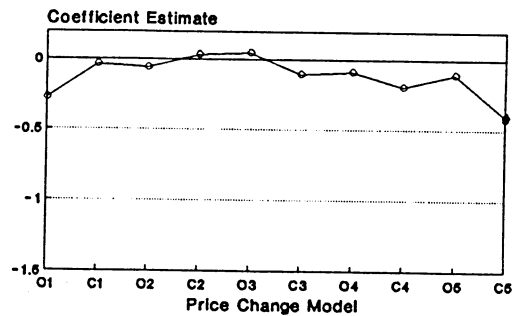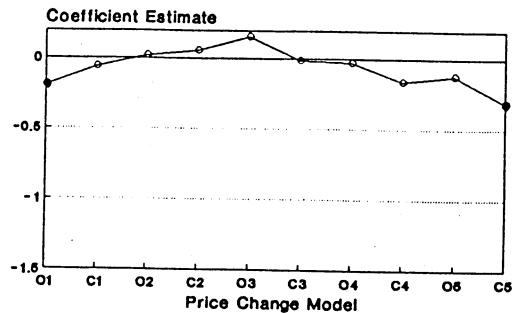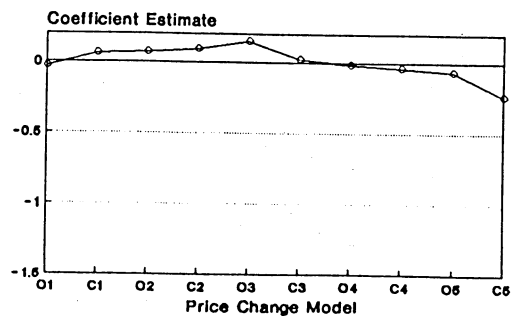
Figure 4. Cumulative Response of Feeder-Cattle Futures Prices to Unanticipated Changes in Breeding and Market Hog Information as Time from the Hogs and Pigs Report Release Date Passes

Table 5. Net In-Sample Trading Returns to A Contrarian Position Taken at the First Non-Limit Open or Close After the Hogs and Pigs Report is Released

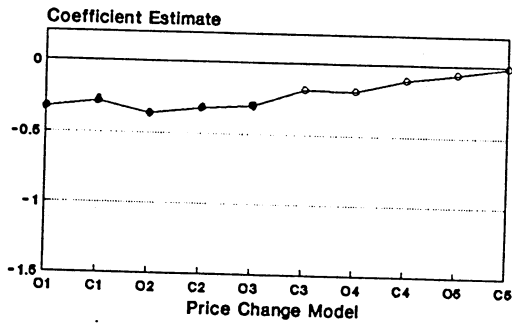| Time-Horizon (Months)	Trade Offset at the Next Open or Close		Trade Offset at the Close Five Days after HPR Release	
	Net Returns to Public Traders ($/contract)	Net Returns to Floor ($/contract)	Net Returns to Public ($/contract)	Net Returns to Floor ($/contract)
--Live Hogs--				
1-2	-74.44	-3.44	-95.32	-24.32
	(28.56)	(28.56)	(84.24)	(84.24)
2-3	-75.56	-4.56	-61.32	9.68
	(33.04)	(33.04)	(81.20)	(81.20)
4-5	-123.44	-52.44	-15.68	55.32
	(38.88)	(38.88)	(61.68)	(61.68)
7-8	-123.88	-52.88	-154.32	-83.32
	(41.84)	(41.84)	(67.08)	(67.08)
10-11	-52.56	18.44	-161.32	-90.32
	(35.84)	(35.84)	(50.44)	(50.44)
--Pork Bellies--				
2-5	-132.32	-61.32	-48.24	22.76
	(84.96)	(84.96)	(164.24)	(164.24)
5-8	-204.56	-133.56	-142.00	-71.00
	(68.48)	(68.48)	(144.16)	(144.16)
8-11	-251.56	-180.56	-212.04	-141.04
	(67.12)	(67.12)	(126.08)	(126.08)
--Live Cattle--				
1-2	8.00	90.00[**]	-2.32	68.68
	(36.04)	(36.04)	(92.16)	(92.16)
2-3	-36.56	34.44	14.44	85.44
	(50.88)	(50.88)	(79.68)	(79.68)
4-5	-15.22	55.88	125.76	196.76[**]
	(39.84)	(39.84)	(79.60)	(79.60)
6-7	7.32	78.32[*]	102.68	173.68[**]
	(40.24)	(40.24)	(68.44)	(68.44)
8-9	-54.32	16.68	59.88	130.88[*]
	(37.68)	(37.68)	(69.28)	(69.28)
10-11	-35.88	35.12	48.12	119.12
	(33.84)	(33.84)	(71.64)	(71.64)
--Feeder Cattle--				
1-2	-5.98	62.02	8.54	81.54
	(39.43)	(39.43)	(118.89)	(118.89)
2-3	25.04	98.04[*]	42.90	115.90
	(45.01)	(45.01)	(113.74)	(113.74)
4-5	1.45	74.45[*]	67.23	140.23
	(31.15)	(31.15)	(98.43)	(98.43)
7-8	-56.85	16.15	2.07	75.07
	(38.72)	(38.72)	(90.07)	(90.07)

Note: Standard errors of the means of returns appear in parentheses. One and two asterisks represent significance at the five and one percent levels, respectively. The null hypothesis is that the mean is equal to zero and the alternative hypothesis is that the mean is greater than zero, making the test a one-sided t-test.

Table 6. Net Out-of-Sample Trading Returns to A Contrarian Position Taken at the First Non-Limit Open or Close After the Hogs and Pigs Report is Released

Time-Horizon (Months)	Trade Offset at the Next Open or Close		Trade Offset at the Close Five Days after HPR Release	
	Net Returns to Public Traders ($/contract)	Net Returns to Floor Traders ($/contract)	Net Returns to Public Traders ($/contract)	Net Returns to Floor Traders ($/contract)
--Live Hogs--				
1-2	145.00**	216.00**	138.00*	209.00*
	(15.29)	(15.29)	(50.96)	(50.96)
2-3	-32.00	39.00	-125.00	-54.00
	(36.89)	(36.89)	(58.02)	(58.02)
4-5	-12.00	59.00	-66.00	5.00
	(23.49)	(23.49)	(14.57)	(14.57)
7-8	-185.00	-114.00	-132.00	-61.00
	(10.97)	(10.97)	(32.78)	(32.78)
10-11				
--Pork Bellies--				
2-5	-128.00	-57.00	-454.50	-383.50
	(54.77)	(54.77)	(39.54)	(39.54)
5-8	-153.25	-82.25	-585.00	-514.00
	(60.67)	(60.67)	(87.37)	(87.37)
8-11				
--Live Cattle--				
1-2	38.00	109.00*	272.00*	343.00*
	(35.02)	(35.02)	(48.13)	(48.13)
2-3	102.00*	173.00**	299.00**	370.00**
	(24.21)	(24.21)	(41.18)	(41.18)
4-5	70.00	141.00*	282.00**	353.00**
	(32.29)	(32.29)	(35.25)	(35.25)
6-7	82.00*	153.00**	197.00**	268.00**
	(19.39)	(19.39)	(30.85)	(30.85)
8-9	22.00	93.00**	55.50*	126.50**
	(17.45)	(17.45)	(22.14)	(22.14)
10-11	-25.00	46.00	23.00	94.00**
	(26.74)	(26.74)	(15.40)	(15.40)
--Feeder Cattle--				
1-2	-115.70	-44.70	187.80*	258.80**
	(49.46)	(49.46)	(55.62)	(55.62)
2-3	22.00	93.00*	314.25**	385.25**
	(37.15)	(37.15)	(57.89)	(57.89)
4-5	-78.30	-7.30	184.30*	255.30*
	(50.69)	(50.69)	(69.50)	(69.50)
7-8	7.50	78.50	300.10**	371.10**
	(31.74)	(31.74)	(51.62)	(51.62)

Note: Standard errors of the means of returns appear in parentheses. One and two asterisks represent significance at the five and one percent levels, respectively. The null hypothesis is that the mean is equal to zero and the alternative hypothesis is that the mean is greater than zero, making the test a one-sided t-test.

Table 7. Net Out-of-Sample Trading Returns for Public Traders in which A Contrarian Position is Taken at the First Non-Limit Open or Close and offset at the Following Close or Open for the Quick Trading Strategy or Offset at the Close of Trade Five Days Following the Hogs and Pigs Report for the Hold Trading Strategy

Time-Horizon (Months)	Hogs and Pigs Report							
	Sept. 1990		Dec. 1990		March 1991		June 1991	
	Quick	Hold	Quick	Hold	Quick	Hold	Quick	Hold
--Live Hogs--								
1-2	265.00	-123.00	57.00	145.00	93.00	-35.00	165.00	565.00
2-3	237.00	-35.00	57.00	145.00	-247.00	-635.00	-175.00	25.00
4-5	157.00	-67.00	-23.00	-95.00	-187.00	-155.00	5.00	53.00
7-8	-143.00	-103.00	-235.00	-415.00	-115.00	33.00	-247.00	-43.00
10-11	-555.00	-735.00	-175.00	-55.00	.	.	-295.00	-55.00
--Pork Bellies--								
2-5	45.00	-755.00	-455.00	-175.00	245.00	-443.00	-347.00	-455.00
5-8	45.00	-755.00	-695.00	-635.00	72.00	-1095.00	-35.00	145.00
8-11	.	.	-151.00	-235.00	.	.	.	.
--Live Cattle--								
1-2	-223.00	-63.00	165.00	565.00	-35.00	133.00	245.00	453.00
2-3	-95.00	105.00	165.00	565.00	93.00	73.00	245.00	453.00
4-5	-175.00	105.00	117.00	457.00	45.00	93.00	293.00	473.00
6-7	-55.00	77.00	225.00	473.00	53.00	113.00	105.00	125.00
8-9	-95.00	37.00	157.00	145.00	33.00	165.00	-7.00	-125.00
10-11	-135.00	-75.00	205.00	137.00	-35.00	53.00	-135.00	-23.00
--Feeder Cattle--								
1-2	-369.80	-233.80	48.20	79.00	-361.00	409.00	219.80	497.00
2-3	-273.00	-203.00	167.00	532.20	-25.00	431.00	219.80	497.00
4-5	-505.00	-409.80	135.00	409.00	-88.20	211.00	145.00	527.80
7-8	-251.00	-127.80	101.00	400.20	-9.00	607.00	189.00	321.00

Note: Returns are in dollars per contract.

Table 8. Out-of-Sample Trading Returns for Floor Traders in which A
Contrarian Position is Taken at the First Non-Limit Open or Close and Offset
at the Following Close or Open for the Quick Trading Strategy or Offset at the
Close of Trade Five Days Following the Hogs and Pigs Report for the Hold
Trading Strategy

| Time-Horizon (Months) | Hogs and Pigs Report | | | | | | | |
| | Sept. 1990 | | Dec. 1990 | | March 1991 | | June 1991 | |
	Quick	Hold	Quick	Hold	Quick	Hold	Quick	Hold
--Live Hogs--								
1-2	336.00	-52.00	128.00	216.00	164.00	36.00	236.00	636.00
2-3	308.00	36.00	128.00	216.00	-176.00	-564.00	-104.00	96.00
4-5	228.00	4.00	48.00	-24.00	-116.00	-384.00	76.00	124.00
7-8	-72.00	-32.00	-164.00	-344.00	-44.00	104.00	-176.00	28.00
10-11	-484.00	-664.00	-104.00	16.00	.	.	-224.00	16.00
--Pork Bellies--								
2-5	116.00	-684.00	-384.00	-104.00	316.00	-372.00	-276.00	-384.00
5-8	116.00	-684.00	-624.00	-564.00	144.00	-1024.00	36.00	216.00
8-11	.	.	-444.00	-164.00	.	.	.	.
--Live Cattle--								
1-2	-152.00	8.00	236.00	636.00	36.00	204.00	316.00	524.00
2-3	-24.00	176.00	236.00	636.00	164.00	144.00	316.00	524.00
4-5	-104.00	176.00	178.00	528.00	116.00	164.00	364.00	544.00
6-7	16.00	148.00	296.00	544.00	124.00	184.00	276.00	196.00
8-9	-24.00	108.00	228.00	216.00	104.00	236.00	64.00	-24.00
10-11	-64.00	-4.00	276.00	208.00	36.00	124.00	-64.00	48.00
--Feeder Cattle--								
1-2	-298.80	-162.80	119.20	150.00	-290.00	480.00	290.80	568.00
2-3	-202.00	-132.00	238.00	603.20	46.00	502.00	290.80	568.00
4-5	-434.00	-338.80	206.00	480.00	-17.20	282.00	216.00	598.80
7-8	-180.00	-56.80	172.00	471.20	62.00	678.00	260.00	392.00

Note: Returns are in dollars per contract.

*P.S. *How do you make prereported estimates. Use Historical USDA data. timeseries. proprietary*

Choice — magazine
issue before article
around time of article

February 7, 1990

Scott Irwin
Department of Agricultural Economics
    and Rural Sociology
Ohio State University
Agricultural Administration Building
2120 Fyffe Rd. Rm. 103
Columbus, Ohio 43210

Scott:

Enclosed are the copies of my dissertation for your reading
enjoyment. Also enclosed, for your interest and records, is a
copy of the COF paper by the people at K-State (I can never
remember their names).

Finally, the raw expectations data for the HPR along the actual
values are included. All observations are in terms of percent
changes from year-ago levels. The data are in the form of a
matrix with the observations labelled on the left and the
variables labelled on the top. The observation labels correspond
to the year and quarter (i.e. 1986:3 corresponds to the September
1986 HPR). Be careful to note that starting in January 1988, the
HPR which was traditionally issued in December was issued in
early January. Therefore, 1987:4, 1988:4, and 1989:4 correspond
to the HPRs issued in January 1988, January 1989 and January
1990, respectively. The definitions of the variables are:

        ALLPRE = Expectations of all hogs
        ALLPC = Actuals of all hogs
        BRDPRE = Expectations of breeding hogs
        BRDPC = Actuals of breeding hogs
        MKTPRE = Expectations of market hogs
        MKTPC = Actuals of market hogs

I will be faxing a copy of the new market reaction paper to you
very shortly. However, you may have received it by the time you
read this letter.

Sincerely,

Phil L. Colling
Economist
USDA:ARS:BA:NRI:SRL
Systems Research Laboratory
Bldg. 011A, Rm. 165-B, BARC-WEST
10300 Baltimore Ave.
Beltsville, MD 20705-2350

	ALLPRE	ALLPC	BRDPRE	BRDPC	MKTPRE	MKTPC
1981:3	92.50	94.56	89.00	95.07	91.50	94.48
1981:4	94.00	90.96	95.00	85.74	94.00	91.83
1982:1	91.00	89.69	89.00	86.13	91.00	90.29
1982:2	86.00	87.03	88.00	88.41	85.00	86.80
1982:3	88.50	88.23	91.00	87.23	89.50	88.39
1982:4	89.00	90.70	93.00	93.19	88.00	90.31
1983:1	97.00	102.54	106.00	106.01	101.00	101.98
1983:2	107.00	110.50	107.00	109.27	108.00	110.71
1983:3	109.00	110.10	103.00	104.97	111.00	110.89
1983:4	104.80	103.49	97.90	99.15	105.80	104.19
1984:1	95.50	94.50	93.30	90.30	94.90	95.20
1984:2	89.00	90.57	90.00	90.85	89.00	90.52
1984:3	91.00	93.24	94.50	94.61	91.00	93.04
1984:4	95.00	96.82	95.00	94.26	98.00	97.21
1985:1	98.30	98.65	97.40	95.76	98.40	99.11
1985:2	97.30	98.55	96.80	94.54	97.70	99.21
1985:3	97.00	96.85	95.10	96.88	97.40	96.85
1985:4	98.50	96.77	100.00	97.84	98.00	96.61
1986:1	97.60	97.28	98.30	95.56	97.50	97.54
1986:2	97.70	93.48	98.20	91.32	97.70	93.82
1986:3	92.10	94.66	91.40	90.01	92.20	95.34
1986:4	96.20	97.44	96.60	97.52	95.90	97.43
1987:1	99.80	102.68	104.30	105.70	99.20	102.23
1987:2	107.10	107.47	110.80	110.02	106.40	107.09
1987:3	107.90	108.87	109.80	109.40	107.70	108.80
1987:4	110.00	105.15	110.60	104.53	109.90	105.24

94.5?

106.1 ?

<table>
<thead>
<tr><th></th><th colspan="2">All</th><th colspan="2">Breeding</th><th colspan="2">Market</th></tr>
</thead>
<tbody>
<tr><td>1988:1</td><td>(105.00)</td><td>105.54</td><td>105.00</td><td>103.93</td><td>106.00</td><td>105.79</td></tr>
<tr><td>1988:2</td><td>104.00</td><td>107.99</td><td>103.00</td><td>107.12</td><td>104.00</td><td>108.12</td></tr>
<tr><td>1988:3</td><td>105.00</td><td>104.63</td><td>102.00</td><td>103.21</td><td>105.00</td><td>104.83</td></tr>
<tr><td>1988:4</td><td>103.00</td><td>101.72</td><td>100.00</td><td>99.35</td><td>103.00</td><td>102.07</td></tr>
<tr><td>1989:1</td><td>99.00</td><td>100.94</td><td>97.00</td><td>99.03</td><td>99.00</td><td>101.24</td></tr>
<tr><td>1989:2</td><td>97.00</td><td>98.65</td><td>95.00</td><td>97.28</td><td>97.00</td><td>98.86</td></tr>
<tr><td>1989:3</td><td>100.00</td><td>100.42</td><td>99.00</td><td>96.72</td><td>100.00</td><td>100.95</td></tr>
<tr><td>1989:4</td><td>100.00</td><td>97.03</td><td>100.00</td><td>97.32</td><td>100.00</td><td>96.99</td></tr>
<tr><td>1990:1</td><td>97.00</td><td>97.59</td><td>98.00</td><td>96.23</td><td>97.00</td><td>97.80</td></tr>
<tr><td>1990:2</td><td>98.00</td><td>97.28</td><td>98.00</td><td>97.95</td><td>98.00</td><td>97.18</td></tr>
</tbody>
</table>

1990:3 ?

90

Livestock market Information Center
→ Colorado

Jim Robb   weep Late-Next week
(303) 236-2881

Hog & Pig Reports

David

1990:1   All
           97.11

Knight-Ridder -Chicago
          Approx. → 12/20

Breeding
Market

	ALLPRE	BRDPRE	MKTPRE
1981:3	92.50	89.00	91.50
1981:4	94.00	95.00	94.00
1982:1	91.00	89.00	91.00
1982:2	86.00	88.00	85.00
1982:3	88.50	91.00	89.50
1982:4	89.00	93.00	88.00
1983:1	97.00	106.00	101.00
1983:2	107.00	107.00	108.00
1983:3	109.00	103.00	111.00
1983:4	104.80	97.90	105.80
1984:1	95.50	93.30	94.90
1984:2	89.00	90.00	89.00
1984:3	91.00	94.50	91.00
1984:4	95.00	95.00	98.00
1985:1	98.30	97.40	98.40
1985:2	97.30	96.80	97.70
1985:3	97.00	95.10	97.40
1985:4	98.50	100.00	98.00
1986:1	97.60	98.30	97.50
1986:2	97.70	98.20	97.70
1986:3	92.10	91.40	92.20
1986:4	96.20	96.60	95.90
1987:1	99.80	104.30	99.20
1987:2	107.10	110.80	106.40
1987:3	107.90	109.80	107.70
1987:4	110.00	110.60	109.90
1988:1	105.00	105.00	106.00
1988:2	104.00	103.00	104.00
1988:3	105.00	102.00	105.00
1988:4	103.00	100.00	103.00
1989:1	99.00	97.00	99.00
1989:2	97.00	95.00	97.00
1989:3	100.00	99.00	100.00
1989:4	100.00	100.00	100.00
1990:1	97.00	98.00	97.00
1990:2	98.00	98.00	98.00
1990:3	999.00	102.00	100.50
1990:4	999.00	101.50	101.00
1991:1	999.00	101.70	102.30
1991:2	999.00	103.50	102.60
1991:3	999.00	106.50	106.00

all numbers are *
percent of year-ago
levels

* Δ of last years Actuals?

I don't have these.

	ALLPC	BRDPC	MKTPC
1990:3	97.75	99.85	97.47
1990:4	101.38	100.15	101.56
1991:1	102.36	101.12	102.56
1991:2	104.53	105.58	104.37
1991:3	106.00	106.67	105.91
1991:4	104.58	105.15	104.5
1992:1	106.34	102.54	106.93
1992:2	105.69	101.37	105.67
1992:3	103.86	102.06	104.12
1992:4	103.69	102.12	103.92
1993:1	103.83	103.84	103.82
1993:2	100.67	97.86	101.07
1993:3	95.74	95.41	95.79
1993:4	97.73	98.60	97.61
1994:1	98.49	99.65	98.32
1994:2	102.91	102.84	102.92
1994:3	104.45	103.65	104.56
1994:4	102.95	97.08	103.78
1995:1	101.86	96.92	102.57
1995:2	99.09	95.77	99.56
1995:3	97.98	95.32	98.34