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Ted Schroeder, Joanne Blair,

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THE IMPACTS OF USDA LIVESTOCK INVENTORY REPORTS ON LIVESTOCK CASH AND FUTURES PRICES

Ted Schroeder, Joanne Blair, James Mintert, and Allen Featherstone*

INTRODUCTION

Market efficiency has long been a major concern of commodity market participants. The extent to which livestock futures markets respond to and reflect available information is of particular concern to futures market traders including meat producers, processors, and merchandisers. Recently, questions have been raised regarding the responsiveness of live cattle and live hog futures markets to U.S. Department of Agriculture (USDA) livestock inventory reports. In particular, the short-term efficiency of the futures market following the release of the USDA reports and the ensuing impact of the reports on cash market prices has emerged as an important policy issue. Concerns have long been present that the inventory reports lead to perverse futures price behavior which subsequently affect cash market prices in an adverse manner. There is also a concern of whether or not the USDA livestock inventory reports actually provide the market with any new information not already incorporated by trader expectations.

One of the reasons producers are concerned with the relationship of inventory reports and future and cash prices is the significant increase in large price changes that occur immediately following the report releases. Figures 1 and 2 show the distributions of nearby contract futures price changes around the quarterly inventory release dates for live hogs and live cattle markets, respectively. The percentage of price changes of $1.50/cwt or more increases dramatically the day after the report releases compared to the day before or the day of the report releases. The nearby live hog futures price dramatically reacts to the Hogs and Pigs report with $1/cwt or larger absolute price changes occurring roughly 48% of the trading days the day after the Hogs and Pigs report release compared to 6% the day of the release. Live cattle nearby contracts respond a little less dramatically with $1/cwt or greater absolute price changes occurring 26% of the trading days one day after the Cattle on Feed report releases, respectively, compared with 2% the day of the report releases (feeder cattle futures exhibited a very similar pattern). The sharp price changes associated with the report releases have led some observers to question the inventory reports' effectiveness. However, these shifting price change distributions actually provide an indication of the level of new information the reports are providing the respective markets, perhaps thereby contributing to market efficiency.

Several studies have examined the impacts of new information on agricultural commodity markets. Event studies involving the reaction of feed grains (and other commodities) to information shocks have been investigated

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*The authors are assistant professor, research assistant, and assistant professors, respectively, Department of Agricultural Economics, Kansas State University.

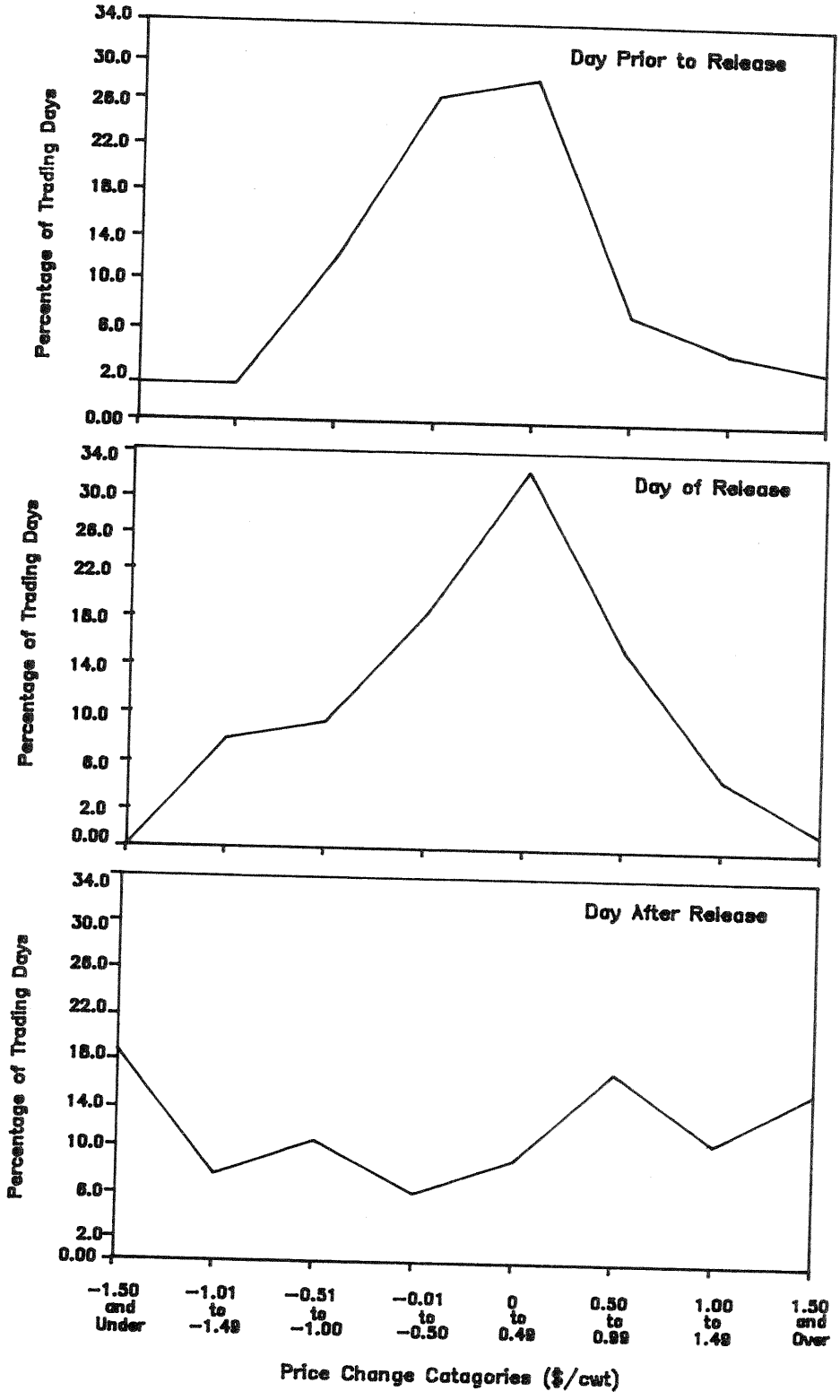

Figure 1. Percentage Distribution of Nearby Live Hog Futures Price Changes on the Day Prior, Day of, and Day After the Release of the Quarterly Hogs and Pigs Reports, 1972–1987.

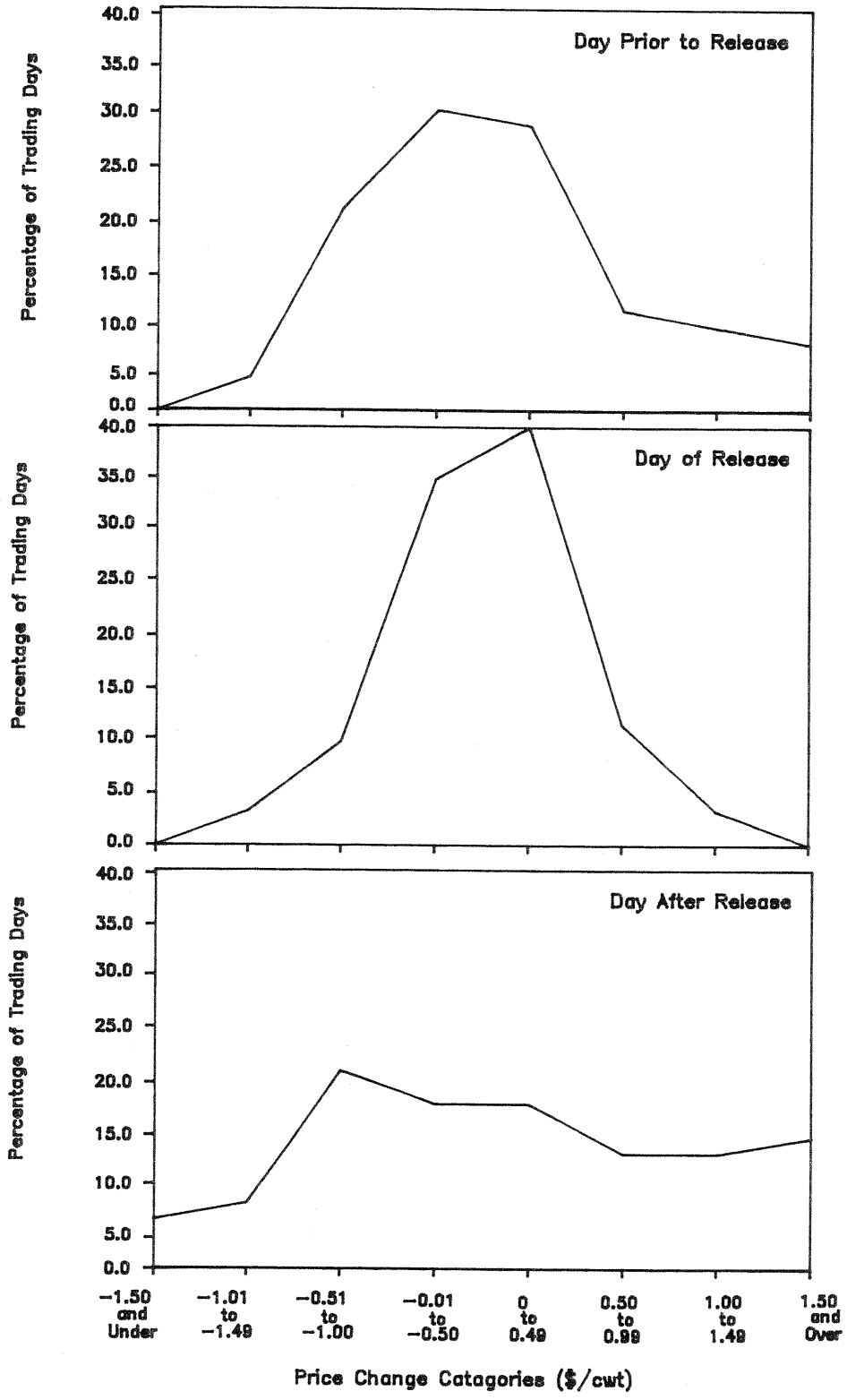

Figure 2. Percentage Distribution of Nearby Live Cattle Futures Price Changes on the Day Prior, Day of, and Day After the Release of the Quarterly Cattle on Feed Reports, 1972–1987.

(Pruitt et al.; Kitchen; Fackler; Milonas). Hoffman concluded that cattle and hog inventory reports did not on average exert downward influences on cattle and hog futures prices. He also concluded that while the cash hog and cattle markets reacted to specific information contained in the reports, the futures prices did not react significantly to the information in the reports - suggesting, perhaps, that the futures prices had already anticipated the information. Koontz, Hudson, and Purcell examined the impact of hog and pig reports on live hog futures prices. They concluded that the live hog futures market reacted dramatically to bullish and bearish Hogs and Pigs reports and they suggested that the market may be starved for information. Miller concluded that the live hog futures market reacted to changes in sow farrowings as reported in the Hogs and Pigs reports. In particular, he concluded that contracts maturing in 3 to 4 months completed half of their total average response to the report within one day whereas, contracts maturing in 6 to 7 months completed half of their total response within one week.

This research examines the responsiveness of live hog, live cattle, and feeder cattle futures market prices to emerging economic information. More specifically, we examine the speed of information dissemination with respect to the USDA livestock inventory reports on the Chicago Mercantile Exchange livestock futures markets. The impacts of USDA inventory reports on livestock futures markets are investigated using event study methodology focusing on an examination of abnormal market returns and time series analysis. Specifically, we examine whether standardized mean-adjusted abnormal market returns and cumulative abnormal returns are present on the days following the inventory report release. The presence of abnormal returns would suggest that market participants could adopt a routine trading strategy prior to the report's release and, on average, earn a positive return. Additionally, the dynamic nature of the relationship between selected cash and futures market prices is also examined. The hypothesis that the relationship between the cash and futures markets changes near the release dates is examined by testing for differences in the lead-lag relationships between the cash and futures markets near the release dates, relative to all other times.

METHODS

Abnormal Returns

In order to determine the price behavior before and after a specific event (inventory report releases), we use common event study methodology to examine the presence of excess market returns or biases in the market's reaction to new information (Brown and Warner, 1980, 1985; Fama, Jensen, and Roll). In this methodology, residual price behavior is statistically examined after "normal" variations are subtracted from the price behavior during days around the release of the information. There are several measures one may use as a proxy for normal price variation. Brown and Warner (1980, 1985) provide a summarized discussion of the most commonly used event study approaches. In this study the mean-adjusted returns model is used to examine the presence of unusual price activity following the report releases. Brown and Warner (1980) concluded that despite its simplicity, the mean-adjusted model can robustly identify the presence of abnormal returns in event studies; they found no evidence that using more complex models conveyed any benefits.

In this study we define the daily rate of return on commodities (R_t) as the logarithm of price changes as follows:

$$R_t = \ln(F_t / F_{t-1}) \times 100 \qquad (1)$$

where t denotes the day and F is the daily settlement futures price. The standardized mean-adjusted return for an event (n) is calculated by:

$$AR_{n,t} = (R_{n,t} - \bar{R}_n)/\sigma_n \qquad (2)$$

where $\bar{R}_n$ is the normal return and σ_n is the standard deviation of the normal return. In this study R_n and σ_n for each release day are defined as:

$$\bar{R}_n = \sum_{t=-14}^{-7} R_{n,t} / 8 \qquad (3)$$

$$\sigma_n = \left(\sum_{t=-14}^{-7} (R_{n,t} - \bar{R}_n)^2 / 7\right)^{1/2} \qquad (4)$$

We arbitrarily chose to use the 14th day prior through the 7th day prior to the release day as the period in which to measure normal returns. This period was selected to be long enough so as not to be biased easily by very short-term price moves, but was limited in length so as not to be influenced by the reports from the previous month.

The standardized mean adjusted returns are then averaged to determine the mean excess return for each day surrounding the release of the reports as follows:

$$\overline{AR}_t = \sum_{n=1}^{N} AR_{n,t} / N_t \qquad (5)$$

where N is the number of events studied. Statistically significant mean excess returns suggest inefficient responses of the market to the information releases. For example, significant negative excess returns following the information release would suggest that a trader could routinely take a short position in the market prior to the inventory report and expect, on average, to make a profit by offsetting the short position following the report release.

The average mean-adjusted returns are also summed across days around the inventory report release date. The cumulative abnormal returns provide evidence of the total price adjustment, whereas individual abnormal returns suggest excess returns for particular days around the report. The cumulative abnormal returns provide evidence of the long-term trend within a series of individual days' returns and indicates the total abnormal returns across time. The cumulative returns are defined as:

$$CAR = \sum_{t=t_1}^{t_2} \overline{AR}_t \qquad (6)$$

where t_1 and t_2 can be selected to cover any time period of interest.

Dynamic Cash - Futures Price Relationships

The procedure used to examine the dynamic nature of daily cash and futures prices utilizes bivariate vector autoregression (VAR) models. VAR models allow us to investigate the lead-lag structure and causality present between cash and futures prices. Previous studies have used similar methodologies to determine typical lead-lag relationships in live cattle cash and futures markets (Koontz et al.; Oellerman and Farris). This section describes the process we use to test whether differences in this price relationship are present following the release of USDA reports.

The general bivariate VAR model was utilized to determine the leads and lags of daily cash and futures prices and to test the Granger causality between these markets. The general model can be specified as follows:

$$F_t = a_{10} + \sum_{k=1}^{K} a_{1k} F_{t-k} + \sum_{k=1}^{K} b_{1k} C_{t-k} + e_{1t} \qquad (7)$$

$$C_t = a_{20} + \sum_{k=1}^{K} a_{2k} F_{t-k} + \sum_{k=1}^{K} b_{2k} C_{t-k} + e_{2t} \qquad (8)$$

where t refers to day, F is the nearby contract futures price, C is the cash market price, the e terms are random errors, and a and b are parameters to be estimated. The lag length, K, is estimated using Sim's modified log likelihood ratio test. Equations (7) and (8) can be efficiently estimated using OLS assuming no autocorrelation among the residuals. Autocorrelation among the OLS residuals is tested using the Box-Pierce Q-statistic.

In this model, standard Granger causality tests can be used to determine the lead and lag relationship amongst the cash and futures prices. To test if the cash market leads or Granger-causes the futures market one tests the hypothesis of H_o: $b_{11}=b_{12}=\ldots=b_{1k}=0$ using the standard F-test. Rejection of this test implies that price discovery in the cash market leads the futures market. To test whether the futures market leads the cash market an F-test is performed for H_o: $a_{21}=a_{22}=\ldots=a_{2k}=0$. Rejection of this test implies that the futures market price discovery leads the cash market.

Instantaneous price relationships may also be present. That is, the prices in the two markets may respond on the same day to information and instantaneous feedback could be present. To test for instantaneous price relationships either of the models in equations (7) and (8) can simply be modified to include the current price in the right hand side. That is, equation (7) can be modified to include the cash price on day t in the regressor set and likewise equation (8) can be modified to include the futures price on day t as a regressor. A significant coefficient on the non-lagged independent variable in either model indicates the presence of instantaneous price adjustments. This test is identical on both models thereby, making one model redundant. Both models are estimated to test the stability of the remaining coefficients after allowing for instantaneous relationships.

Finally, the above models are modified in order to test for differences in the cash-futures price relationships shortly after the release of the USDA inventory reports. Of particular interest is whether the slope coefficients on the independent variables of the VAR system differ following the release of

inventory reports. To test this the following models are estimated:

$$F_t = a_{50} + \sum_{k=1}^{K} a_{5k} F_{t-k} + \sum_{k=1}^{K} b_{5k} C_{t-k} + \sum_{j=2}^{J} \sum_{i=1}^{j-1} c_{5ji} D_{ji} F_{j,t-i} + \sum_{j=1}^{J} \sum_{i=1}^{j-1} d_{5ji} D_{ji} C_{j,t-i} + e_{5t} \quad (9)$$

$$C_t = a_{40} + \sum_{k=1}^{K} a_{4k} F_{t-k} + \sum_{k=1}^{K} b_{4k} C_{t-k} + \sum_{j=2}^{J} \sum_{i=1}^{j-1} c_{6ji} D_{ji} F_{j,t-i} + \sum_{j=2}^{J} \sum_{i=1}^{j-1} d_{6ji} D_{ji} C_{j,t-i} + e_{6t} \quad (10)$$

where j refers to number of days after the inventory report is released (day 0 refers to the release day, the report actually is not available to the market until the opening of trade on the day following the release, day 1), i refers to the number of futures and cash price lags in the post-release day slope shifters. The D_{ji} are binary variables equal to one for each day after the report, for each lag, in which the price relationship significantly differs from "normal" and are equal to zero otherwise. In equations (9) and (10) the lag order (K) is assumed to be the same as in equations (7) and (8). Thus, the factors which have to be determined to estimate (9) and (10) are the number of days (J), if any, after the release of the report in which the cash-futures price relationship differs from normal, and the length of the lag (I) over which this difference occurs. These two unknowns were estimated by first determining the number of days after the release of the report (J) that had significant coefficients with a lag length (I) fixed at one. Then fixing the number of days after the release of the report (J) at the highest level for which the next adjacent day's coefficient was no longer significant, the lag length (I) was estimated using the modified log likelihood ratio test. In this regard, the lag length (I) by design was constrained to be less than or equal to J-1. In this process, given that the prices were all first differenced, the first price change that adjusts to lagged price changes following the report release is the price change between one and two days after the report. Thus, the first day in which the report is able to influence the dynamics of the cash-futures market price relationship is two days after the release of the information (one day after its ability to be reflected in the market).

DATA

The data used in this study includes Chicago Mercantile daily closing futures prices for feeder cattle, fed cattle, and live hogs covering the 1972 through 1987 period. All quarterly USDA Hog and Pig report releases and quarterly Cattle on Feed inventory reports during this 16-year period are examined as event dates. Daily cash hog prices (mid-range of daily range) for U.S. #1-2 210-240 pound barrows and gilts were collected from the Omaha Stockyards over the 1972 through 1987 period. Daily cash 900-1100 pound choice slaughter steer prices were collected for the Texas Panhandle direct trade over the 1980 through 1986 period (the shorter period of data were used on cattle because of data availability - efforts to increase this sample size are underway).

EMPIRICAL RESULTS

For the specific analysis in this paper, only the impacts of quarterly reports of Hogs and Pigs on hog markets and quarterly reports of cattle inventories on cattle and feeder cattle markets are reported. These represent the most significant sources of information to these markets and thus represent the major price influencing events.

Abnormal Returns

The average abnormal returns, their standard errors, and the cumulative abnormal returns around the quarterly inventory report release dates are given in tables 1, 2, and 3 for live hog futures, live cattle futures, and feeder cattle futures, respectively. The abnormal returns are reported for the nearby futures contract prices, those maturing in four to five months, and those maturing in seven to eight months. These contract maturities correspond to the horizons of futures contracts for which most of the information in the inventory reports would be relevant.

For live hogs, none of the average abnormal returns are significantly different from zero. This suggests that on average during 1972-1987 there were no systematic hog futures price moves following the Hogs and Pigs reports. Thus, the report did not induce a downward price movement as some have suggested. This is consistent with the findings of Hoffman. In fact, there is a consistent tendency across contract maturities for the abnormal returns to be positive the day after the report releases although they are not statistically significant. The standard errors of the average abnormal returns suggest that for at least two days after the report release price variability increases relative to the variability in the remaining days surrounding the report. For each of the contracts reported, the price variability the first day the information is available to the market (the day after the release) is at least twice as large as variability on most of the days just prior to the report release. Cumulative abnormal returns show no trend and none were significantly different from zero. The cumulative abnormal returns provide additional evidence that systematic price direction movements were not present following the report releases.

The live cattle and feeder cattle futures markets responded in a similar manner to the quarterly Cattle on Feed report releases (tables 2 and 3). In general, the average abnormal returns were not statistically significant. However, an interesting exception occurs on the day before the report releases in that significant negative abnormal returns are present in two of the three feeder cattle contract periods and in all three of the live cattle contract periods. This suggests that on average, the price declined one day prior to the quarterly Cattle on Feed inventory reports. The average abnormal returns for live cattle were negative through the fourth day following the report release, though none were statistically significant. Thus, the cumulative abnormal returns exhibited a downward trend, though again, none were significantly different from zero. For both live cattle and feeder cattle, the standard errors of the mean abnormal returns one day after the report releases were nearly double the standard errors for the remaining days. Thus, as compared to hogs, in which price variability remained high for two days after the reports, the price variability for cattle increased for only one day. This may reflect the fact that the cattle market receives more information on a regular basis since less detailed monthly Cattle on Feed reports are released between the quarterly reports, whereas, quarterly hog reports have no monthly counterparts.

Dynamic Cash - Futures Price Relationships

VAR models were estimated using daily futures and cash prices for live hogs and live cattle. Because of the lack of any single large- volume daily-traded feeder cattle market, and thus unavailability of any consistent daily price series, the VAR analysis was not performed for feeder cattle. All prices were first differenced to remove trends present during the period. In the VAR models, the nearby futures contract (up to the 15th day of the expiration month)

Table 1. Means and Standard Errors of Means of Abnormal Returns in Live Hog Futures Prices During Days Around the Quarterly Hogs and Pigs Reports, Selected Contract Maturities, 1972-1987

Days Around Report Release	Contracts Maturing in One to Two Months In the Future			Contracts Maturing in Four to Five Months In the Future			Contracts Maturing in Seven to Eight Months In the Future		
	Mean Abnormal Return (%)	S.E. of Mean (%)	Cumulative Abnormal Return (%)	Mean Abnormal Return (%)	S.E. of Mean (%)	Cumulative Abnormal Return (%)	Mean Abnormal Return (%)	S.E. of Mean (%)	Cumulative Abnormal Return (%)
Four Days Prior	-0.183	0.153	-0.183	-0.179	0.157	-0.179	-0.103	0.145	-0.103
Three Days Prior	0.070	0.171	-0.113	-0.194	0.191	-0.373	-0.185	0.184	-0.288
Two Days Prior	-0.134	0.151	-0.247	0.077	0.178	-0.296	-0.084	0.190	-0.372
One Day Prior	-0.053	0.151	-0.300	-0.210	0.160	-0.506	-0.109	0.183	-0.481
Release Day	0.024	0.142	-0.276	0.024	0.147	-0.482	0.062	0.126	-0.419
One Day After	0.119	0.272	-0.157	0.023	0.309	-0.459	0.136	0.380	-0.283
Two Days After	-0.084	0.210	-0.241	0.138	0.243	-0.321	0.163	0.255	-0.120
Three Days After	-0.055	0.160	-0.296	-0.003	0.168	-0.324	0.106	0.187	-0.014
Four Days After	-0.336*	0.179	-0.632	-0.132	0.192	-0.456	-0.204	0.170	-0.218
Five Days After	-0.280	0.180	-0.912	-0.319	0.195	-0.775	-0.279	0.190	-0.497

*Indicates significantly different from zero at the .10 level.
**Indicates significantly different from zero at the .05 level.

Table 2. Means and Standard Errors of Means of Abnormal Returns in Live Cattle Futures Prices During Days Around the Quarterly Cattle on Feed Reports, Selected Contract Maturities, 1972-1987

Days Around Report Release	Contracts Maturing in One to Two Months In the Future			Contracts Maturing in Four to Five Months In the Future			Contracts Maturing in Seven to Eight Months In the Future		
	Mean Abnormal Return (%)	S.E. of Mean (%)	Cumulative Abnormal Return (%)	Mean Abnormal Return (%)	S.E. of Mean (%)	Cumulative Abnormal Return (%)	Mean Abnormal Return (%)	S.E. of Mean (%)	Cumulative Abnormal Return (%)
Four Days Prior	-0.241	0.154	-0.241	-0.158	0.142	-0.158	-0.244*	0.143	-0.244
Three Days Prior	-0.235	0.157	-0.476	-0.307*	0.162	-0.465	-0.192	0.166	-0.436
Two Days Prior	0.032	0.160	-0.444	0.049	0.145	-0.416	0.031	0.177	-0.405
One Day Prior	-0.363**	0.159	-0.807	-0.448**	0.163	-0.864	-0.574**	0.192	-0.979
Release Day	-0.007	0.133	-0.814	-0.062	0.127	-0.926	0.044	0.132	-0.935
One Day After	-0.351	0.244	-1.165	-0.100	0.239	-1.026	-0.079	0.243	-1.014
Two Days After	-0.082	0.161	-1.247	0.014	0.155	-1.012	0.011	0.175	-1.003
Three Days After	-0.119	0.198	-1.366	-0.304*	0.181	-1.316	-0.184	0.215	-1.187
Four Days After	-0.250	0.171	-1.616	-0.139	0.152	-1.455	-0.204	0.165	-1.391
Five Days After	0.004	0.150	-1.612	0.168	0.163	-1.287	0.072	0.180	-1.319

*Indicates significantly different from zero at the .10 level.
**Indicates significantly different from zero at the .05 level.

Table 3. Means and Standard Errors of Means of Abnormal Returns in Feeder Cattle Prices During Days Around the Quarterly Cattle on Feed Reports, Selected Contract Maturities, 1972-1987.

Days Around Report Release	Contracts Maturing in One to Two Months In the Future			Contracts Maturing in Four to Five Months In the Future			Contracts Maturing in Seven to Eight Months In the Future		
	Mean Abnormal Return (%)	S.E. of Mean (%)	Cumulative Abnormal Return (%)	Mean Abnormal Return (%)	S.E. of Mean (%)	Cumulative Abnormal Return (%)	Mean Abnormal Return (%)	S.E. of Mean (%)	Cumulative Abnormal Return (%)
Four Days Prior	-0.069	0.236	-0.069	-0.111	0.249	-0.111	-0.398*	0.202	-0.398
Three Days Prior	-0.127	0.305	-0.196	-0.311**	0.144	-0.422	-0.269*	0.146	-0.667
Two Days Prior	0.295	0.302	0.099	-0.006	0.218	-0.428	0.035	0.151	-0.632
One Day Prior	-0.503**	0.206	-0.404	-0.489**	0.193	-0.917	-0.136	0.128	-0.768
Release Day	-0.013	0.143	-0.417	0.059	0.147	-0.858	-0.039	0.132	-0.807
One Day After	-0.318	0.376	-0.735	-0.248	0.248	-1.106	-0.109	0.278	-0.916
Two Days After	-0.365*	0.186	-1.100	-0.119	0.183	-1.225	0.024	0.177	-0.892
Three Days After	-0.014	0.295	-1.114	-0.219	0.190	-1.444	-0.169	0.241	-1.061
Four Days After	0.069	0.384	-1.045	-0.327**	0.144	-1.771	-0.313	0.206	-1.374
Five Days After	0.031	0.204	-1.014	0.142	0.161	-1.629	0.123	0.254	-1.251

was used as the futures price. Lagged futures prices were defined such that during contract month switching (i.e., the day the nearby contract expired and the next contract month became the nearby) all lagged price differences for a given observation were for the same nearby contract month.

The hog cash--futures price VAR model estimates are reported in tables 4 and 5. The models testing for instantaneous and lagged relationships over all periods with no allowance for differences in the price relationships around the quarterly hog and pig reports are in table 4. The lag length on the models was determined to be two days. Thus, the majority of price transmission between hog cash and futures prices occurs rapidly. The Granger F-tests indicated that the futures price discovery leads (or causes) the cash price. The F-test on the futures market equation suggests that the cash price also feeds back and causes the futures price. However, futures price changes appear to exert statistically significant influences on the subsequent cash hog price changes while the cash hog price has a less significant influence on the futures price. The instantaneous t-test indicated that a significant within day price relationship was present between the hog cash and futures prices.

Estimates of equations (9) and (10) were used to test for differences in the cash-futures price relationship following the inventory report releases. The hypothesis was that the futures market exerts more influence on the cash market following the inventory report than at other times. The estimates of the hog cash-futures price relationship, including the slope dummy variable adjustments, are reported in table 5. The only statistically significant slope shifters were for the second day after the release of the report with a single-day lag. The single-day lagged futures price exerts a significantly stronger than normal influence on the cash price the second day after the release of the report. The cash price did not exhibit any different feedback relationship to the futures price after the release dates. This result suggests that the hog futures market exerts more influence on the hog cash market following USDA Hogs and Pigs reports than at other times although the duration of this effect is relatively short. If futures markets are the center of price discovery, and price changes are more dramatic following the report releases, then the impact of futures prices on cash prices would be more detectable during these periods.

The estimated live cattle cash and futures price relationships of equations (7) and (8) are reported in Table 6. Because several cash price observations were missing, the number of useable observations over the seven-year period, after allowing for differencing and lags, was only 737 (as opposed to the roughly 1700 daily futures price quotes available during this period). In effect, one missing cash price creates four missing or omitted observations (two due to the first differencing of the data and two for the two-day lag).

As was the case for hogs, the majority of the price transmission between cattle cash and futures prices occurred within two days. The results indicate that the futures price significantly influences the cash price. As opposed to the hog price relationships, the cash cattle price did not feedback and exert any statistically significant influence on the live cattle futures price. However, there was a significant instantaneous price relationship between the cattle cash and futures prices. These results concur with those of Oellermann and Farris.

Using the same procedure described previously for the hog cash-futures price relationships following the Hogs and Pigs reports, differences in the cattle price relationships following the Cattle on Feed reports were examined.

**Indicates significantly different from zero at the .05 level.

Table 4. Estimated VAR Models and Granger Causality Tests Between Daily Live Hog Futures Prices and Omaha Cash Slaughter Hog Prices, 1972-1987[a].

Independent Variable	Dependent Variable: $Cash_t$ Eqn. (8)	$Cash_t$ Eqn.(8) with Instantaneous	$Futures_t$ Eqn. (7)	$Futures_t$ Eqn. (7) with Instantaneous
Constant	-0.009 (0.013)[b]	-0.021 (0.013)	0.040** (0.013)	0.042** (0.012)
$Cash_t$				0.279** (0.015)
$Cash_{t-1}$	-0.219** (0.016)	-0.207** (0.015)	-0.038* (0.015)	0.023 (0.015)
$Cash_{t-2}$	-0.256** (0.015)	-0.255** (0.014)	-0.003 (0.015)	0.068** (0.014)
$Futures_t$		0.298** (0.016)		
$Futures_{t-1}$	0.357** (0.017)	0.389** (0.016)	-0.108** (0.016)	-0.208** (0.017)
$Futures_{t-2}$	0.171** (0.018)	0.179** (0.017)	-0.027 (0.017)	-0.074** (0.97)
R^2	0.16	0.23	0.02	0.10
RMSE	0.83	0.80	0.81	0.77
Observations	4007	4007	4007	4007
F-test One-Way[c]	238.94**		3.07**	
Probability > F	(.0001)		(.0463)	
t-test Instantaneous[d]		19.04**		19.04**
Probability > t		(.0001)		(.0001)

[a] All prices are in $/cwt.

[b] Standard errors are reported in parentheses.

[c] Significant F-values for the cash (futures) market equation indicates that the futures (cash) market price leads or causes the cash (futures) market price.

[d] Significant t-value indicates that the two variables are determined within the same day.

* Indicates significantly different from zero at the .10 level.

** Indicates significantly different from zero at the .05 level.

Table 5. Estimated VAR Models Testing for Changes in the Daily Live Hog Futures Price and Omaha Cash Slaughter Hog Price Relationship Following Quarterly Hog and Pig Report Releases, 1972-1987[a].

Independent Variable	Dependent Variable: $Cash_t$ Eqn. (10)	$Cash_t$ Eqn. (10) with Instantaneous	$Futures_t$ Eqn. (9)	$Futures_t$ Eqn. (9) with Instantaneous
Constant	-0.009 (0.013)[b]	-0.021 (0.013)	0.040** (0.013)	0.042** (0.012)
$Cash_t$				0.275** (0.015)
$Cash_{t-1}$	-0.218** (0.016)	-0.207** (0.015)	-0.036** (0.015)	0.023 (0.015)
$Cash_{t-2}$	-0.257** (0.015)	-0.255** (0.014)	-0.004 (0.015)	0.066** (0.014)
$Futures_t$		0.295** (0.016)		
$Futures_{t-1}$	0.344** (0.017)	0.381** (0.017)	-0.122** (0.017)	-0.217** (0.017)
$Futures_{t-2}$	0.169** (0.018)	0.178** (0.017)	-0.029* (0.017)	-0.075** (0.017)
$CashRL+2^c_{t-1}$	-0.107 (0.113)	-0.065 (0.109)	-0.144 (0.110)	-0.115 (0.105)
$FutRL+2^d_{t-1}$	0.408** (0.102)	0.266** (0.098)	0.483** (0.099)	0.371** (0.095)
R^2	0.17	0.23	0.02	0.10
RMSE	0.83	0.80	0.80	0.77
Observations	4007	4007	4007	4007

[a] All prices are in $/cwt.

[b] Standard errors are reported in parentheses.

[c] $CashRL+2_{t-1}$ = $Cash_{t-1}$ on the second day after a Hogs and Pigs report release and = 0 otherwise.

[d] $FutRL+2_{t-1}$ = $Futures_{t-1}$ on the second day after a Hogs and Pigs report release and = 0 otherwise.

* Indicates significantly different from zero at the .10 level.

** Indicates significantly different from zero at the .05 level.

Table 6. Estimated VAR Models and Granger Causality Tests Between Daily Live Cattle Futures Prices and Texas Panhandle Direct Cash Slaughter Steer Prices, 1980-1986[a].

Independent Variable	Dependent Variable: $Cash_t$		Dependent Variable: $Futures_t$	
	Eqn. (8)	Eqn.(8) with Instantaneous	Eqn. (7)	Eqn. (7) with Instantaneous
Constant	-0.020 (0.033)[b]	-0.037 (0.026)	0.033 (0.040)	0.048 (0.032)
$Cash_t$				0.726** (0.036)
$Cash_{t-1}$	-0.067 (0.045)	-0.069* (0.036)	0.004 (0.055)	0.052 (0.044)
$Cash_{t-1}$	-0.076* (0.043)	-0.043 (0.035)	-0.067 (0.067)	-0.012 (0.043)
$Futures_t$		0.489** (0.024)		
$Futures_{t-1}$	0.218** (0.038)	0.220** (0.030)	-0.004 (0.046)	-0.162** (0.038)
$Futures_{t-2}$	0.186** (0.038)	0.154** (0.031)	0.065 (0.046)	0.070* (0.038)
R^2	0.08	0.41	0.00	0.36
RMSE	0.89	0.72	1.09	0.87
Observations	737	737	737	737
F-test One-Way[c]	25.20**		0.80	
Probability > F	(.0001)		(.4512)	
t-test Instantaneous[d]		20.07**		20.07**
Probability > t		(.0001)		(.0001)

[a] All prices are in $/cwt.

[b] Standard errors are reported in parentheses.

[c] Significant F-values for the cash (futures) market equation indicates that the futures (cash) market price leads or causes the cash (futures) market price.

[d] Significant t-value indicates that the two variables are determined within the same day.

* Indicates significantly different from zero at the .10 level.

** Indicates significantly different from zero at the .05 level.

None of the days following the quarterly Cattle on Feed reports, up to and including five days after the report release dates, exhibited significantly different lagged futures or cash price slope coefficients. None of the slope dummies were significant (.05 level) neither individually or jointly. Thus, no evidence was detected of the live cattle futures price exerting more influence on the cash slaughter steer price after inventory reports than during other trading days or vice versa.

CONCLUSIONS

Livestock futures markets have often been accused of reacting perversely to market news. This study investigated the reaction of livestock cash and futures prices to the release of the USDA quarterly Hogs and Pigs reports and Cattle on Feed reports. In general, no abnormal returns were found to exist in live hog, live cattle, or feeder cattle futures markets following the quarterly inventory report releases. The failure to detect the presence of significant abnormal returns suggests that the inventory reports do not exert a persistent downward or upward influence on futures prices.

Evidence exists that the market does react to the information in these reports and/or that the reports are of value to these markets. Price variation increased dramatically one day after the report release for live cattle and feeder cattle and for two days following the report release for live hogs, as the market adjusted to the new information. This concurs with Koontz, Hudson, and Purcell's conclusion that the hog market, with no monthly inventory updates, is starved for information relative to the cattle markets.

The relationship between cash and futures prices suggest that the live cattle futures market influences cash cattle prices with no feedback from the cash to the futures market. Thus, the live cattle futures market appears to be independent of short-term price changes at the Texas Panhandle direct cash market. Live hogs, on the other hand, appear to have a strong futures-to-cash price causality in addition to feedback from the cash to the futures market. Thus, the hog futures market appears to use the previous two days' cash hog prices in discovery of the current day's futures price. The hog futures market exerts a stronger influence on the cash market after inventory reports than it does normally whereas, the cattle market does not show a similar phenomenon. The greater influence of the hog futures market on the cash market may be related to the lack of information in the hog market.

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