The Effect of USDA *Cattle on Feed* Reports on Feeder Cattle Futures Prices

by

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Abstract

Unanticipated information in USDA *Cattle on Feed* reports is the difference between actual reported values and pre-release estimates. Feeder cattle futures prices respond to unanticipated information even after accounting for live cattle price response indicating these reports convey information relevant to the feeder cattle market beyond that reflected in the live cattle market.

Key words: feeder cattle, efficient markets, Cattle on Feed, unanticipated information.

Introduction

The need for U.S. Department of Agriculture (USDA) production and marketing reports is often questioned by some producer groups and those interested in eliminating unnecessary government spending. Opponents of USDA reports suggest that information from private sources is superior to that contained in these reports. If USDA reports provide new information to the market, they serve an important role in price discovery. In an efficient market, prices reflect all available information (Fama) and prices should change as new information becomes available and old information should not affect prices. Additionally, prices should react quickly as new information becomes available.

If feeder cattle futures markets are efficient, the impact of information in the USDA *Cattle on Feed (COF)* report will depend on the extent that this information was unanticipated. A measure of the unanticipated information contained in the report is the difference between analysts' pre-release estimates and the actual reported values. This analysis uses Bridge (formerly Knight-Ridder) survey data of market analysts' pre-release estimates of cattle on feed, placements, and marketings as anticipated information. Unanticipated information is the difference between these estimates and the actual values in the *COF* report. Because the demand for feeder cattle is derived from the demand for live cattle, it is possible that unanticipated information from the *COF* report is actually discovered in the feeder cattle market via price changes in the live cattle futures market. However, unanticipated information in the *COF* report may have an effect on the feeder

cattle market beyond the indirect effects from live cattle futures. This study tests whether unanticipated information in monthly *COF* reports affect feeder cattle futures prices beyond those changes caused by live cattle futures price changes. To the extent they do, this provides additional evidence of the value of these reports to the cattle industry.

Review of Previous Literature

Numerous studies have found that USDA reports provide information that affect agricultural commodity prices. Sumner and Mueller and Fackler found that variability of corn and soybean price changes after the release of USDA crop forecast reports were generally greater than prior to the report release. Hoffman considered price movements before and after the release of major livestock reports and concluded that the reports provide information in assessing supply conditions in the cattle and hog markets. He considered the impact on Choice steer prices but did not examine the impact on feeder cattle prices. Schroeder, Blair, and Mintert used event study methodology to test for persistent biases in price changes for live hogs, live cattle, and feeder cattle around the release of inventory reports. They found few significant abnormal returns following the quarterly inventory reports suggesting the reports were not biased. The variability of returns increased around the release of reports suggesting the reports do provide new information to the market. Miller concluded that hog futures prices responded to sow farrowing information in the USDA *Hogs and Pigs* report.

Several studies have examined the impact of unanticipated information on commodity

prices. Barnhart examined the effects of unanticipated information in macroeconomic reports on commodity prices. He concluded that the unanticipated information pertaining to money supply, the Federal Reserve discount rate, manufacturers' orders of durable goods, and housing starts caused significant changes in commodity prices. Colling and Irwin studied the impact of unanticipated information in the *Hogs and Pigs* report on live hogs futures prices. They concluded that anticipated information had no effect on prices changes, but unanticipated information resulted in significant futures price responses. Grunewald, McNulty, and Biere considered the effect of unanticipated information in *COF* reports on live cattle futures prices. They concluded that futures prices responded significantly and quickly to unanticipated marketings and placement information.

Method

Unanticipated information is the difference between anticipated and actual information. Anticipated information is defined as Bridge pre-release estimates of the information contained in the *COF* report. This report is released several days prior to the release of the actual report. Actual information refers to actual values released in the *COF* report.

The *COF* report contains USDA's 7-state estimates of cattle on feed at the beginning of the month (COF^a), cattle placed on feed during the previous month (PLC^a), and cattle marketed during the previous month (MKT^a). The pre-release estimates include an average of several industry analysts' expectations of these same variables denoted as COF^e, PLC^e, and MKT^e. If the feeder cattle futures market is efficient, the price change

from the day of the report to the following day should be partially explained by

(1) $$DFCC = \beta_0 + \beta_1 (COF^a - COF^e) + \beta_2 (PLC^a - PLC^e) + \beta_3 (MKT^a - MKT^e) + \varepsilon$$

where *DFCC* is the day-to-day difference in the feeder cattle futures price and ε is a residual. Based on the efficient market hypothesis that markets respond to new information, the null hypotheses are H_0: β_1, β_2, and $\beta_3 \neq 0$. If the market responds quickly to unanticipated information in the *COF* report then day-to-day price changes several days following the report release should not be related to the unanticipated information. It is hypothesized that β_1 and β_2 will be negative as these values indicate a larger supply of cattle and hence a lower demand for feeder cattle to place into feedlots. Similarly, it is hypothesized that β_3 will be positive as larger than expected marketings would indicate stronger demand for feeder cattle to replace marketed cattle.

Since feeder cattle demand is derived from fed cattle demand, and live cattle futures respond to *COF* reports (Grunewald, McNulty and Biere), the entire feeder cattle price response to *COF* reports could be due to live cattle futures price changes. However, feeder cattle prices would be expected to react to unanticipated information in the reports relevant to feeder cattle demand not induced by changes in live cattle futures. For example, greater than expected marketings suggest increased demand for feeder cattle to fill feedyards. Thus, marketings are expected to influence feeder cattle prices beyond the impact from live cattle futures. By including live cattle price changes as an explanatory variable in equation (1) we can determine if the feeder cattle futures market responds to

COF reports beyond any response that may come through the live cattle futures market. Modifying equation (1) to reflect live cattle price responses gives

$$(2) \qquad DFCC = \beta_0 + \beta_1 (COF^a - COF^e) + \beta_2 (PLC^a - PLC^e) + \beta_3 (MKT^a - MKT^e) + \beta_4 (DLCC) + \beta_5 (DLCCL1) + \varepsilon$$

where *DLCC* is the day-to-day price change in nearby live cattle futures and *DLCCL1* is a one day lag of this price change. The relevant live cattle contract should be one that is deferred far enough to coincide with when feeder cattle will be marketed as fed cattle. Kastens and Schroeder found that feeder cattle placements were more closely related to current live cattle futures prices than deferred contract prices. Thus, the nearby live cattle contract was used in equation (2)[1]. If the live cattle futures market response to unanticipated information in the *COF* reports is all that is relevant to the feeder cattle market, then β_1, β_2, and β_3 will all be zero. However, if the feeder cattle futures market responds to unanticipated information differently than the live cattle market, then some or all of these parameters will be different from zero with the same sign expectations as in (1). Positive signs are expected on both β_4 and β_5 as price changes in feeder cattle are expected to be positively related to live cattle price changes.

Data and Estimation Procedures

USDA 7-state *COF* reports containing estimates of the number of cattle on feed as of the first of the month, placements for the previous month, and marketings for the previous

[1] Alternative live cattle futures contracts were tried with little effect on the results.

month were collected from January 1980 through December 1995 (192 observations). Bridge pre-release estimates of these reports were obtained for this same time period; however, reports for 17 months during this time period were missing giving 175 total observations.[2] Table 1 includes descriptive statistics of the *COF* report and pre-release estimates data as well as differences between actual and estimated values.

To use the pre-release estimates as proxies for expected information they need to be efficient forecasts of actual information. This means they should be unbiased estimates. The pre-release estimates for cattle on feed were tested for unbiasedness according to

$$(3) \qquad COF^a = \beta_0 + \beta_1(COF^e) + \varepsilon.$$

Similar equations were used to test for unbiasedness in the placements and marketings estimates. These equations were estimated using SUR and used to test the hypothesis H_0: $\beta_0 = 0$, and $\beta_1 = 1$. Unbiasedness in cattle on feed was rejected, but we failed to reject unbiasedness for placements and marketings. Others have further tested pre-release estimates for efficiency by comparing them against an alternative forecast (Grunewald, McNulty, and Biere and Colling and Irwin). In both of these studies the alternative forecast was based on an autoregressive model and the estimates were efficient. This test for efficiency of the estimates was not performed here.

Daily feeder cattle futures closing prices from the Chicago Mercantile Exchange were

[2] Prior to October of 1983, pre-release estimates associated with quarterly *COF* reports did not estimate 7-state values. Thus, 16 of the 17 missing months were because the estimates were not reported.

collected for the first three days following the release of a *COF* report (Bridge CD-ROM). Prices were collected for the nearby and first three deferred contracts. Daily feeder cattle price differences were calculated for each of the four contracts and are referred to as *DFCCi* (*i*=1,2,3,4). Live cattle futures price closes were collected for the nearby contract associated with each of the feeder cattle contracts. Daily price changes for each of the live cattle futures contracts were calculated and are referred to as *DLCC*.

Cattle futures prices are not allowed to move more than $1.50 per hundredweight from the previous day's closing price. Whenever the day-to-day price changes by $1.50, up or down, it is referred to as a limit move. Table 2 shows the number of limit moves that occurred between the first, second, and third days following the *COF* report for each of the feeder cattle contracts considered. On the first day following a *COF* report the feeder cattle futures market moved the limit approximately 10% of the time.

Results and Discussion

Maximum likelihood estimation of a two-limit Tobit model was used to estimate equations (1) and (2) for the first three trading days following a *COF* report. This estimation approach was used because OLS estimates will be biased towards zero because price moves are limited. The natural logarithms of all variables were used so that changes were based on relative values and to reduce any heteroscedasticity. The estimated parameters of equations (1) and (2) for all four feeder cattle futures contracts on the first day after the *COF* report are given in table 3. Based on the model estimated the parameter coefficients

are interpreted as elasticities of rates of change.

For all contracts, parameter estimates for unanticipated information for placements and marketings are significantly different from zero and have the anticipated signs using equation (1). The responses to both placements and marketings information are similar across all contracts with the nearby contract responding slightly more. The unanticipated information component of cattle on feed is never significant. This is consistent with Grunewald, McNulty and Biere who found that live cattle futures did not respond to unanticipated cattle on feed estimates.

When contemporaneous and lagged live cattle futures market price changes are included, equation (2), unanticipated information pertaining to marketings is still significant for all contracts, but placements is only significant for two of the four contracts. As expected, the live cattle futures price change is positive and highly significant in all cases. The single-day lagged live cattle futures price change was significant for several contracts indicating feeder cattle futures prices respond to changes in yesterday's and today's live cattle market. In all cases, the estimated coefficients are smaller in magnitude with equation (2) compared to equation (1). This indicates that much of the unanticipated information contained in the *COF* report is reflected in feeder cattle futures prices through the live cattle market. However, the fact that information pertaining to marketings, and in some cases placements, is still significant indicates the feeder cattle market responds to information in the *COF* report differently than the live cattle market. This suggests that

the derived demand for feeder cattle is affected by fed cattle marketings.

The estimated parameters for equations (1) and (2) for all four feeder cattle futures contracts on the second day after the *COF* report are given in table 4. None of the variables from equation (1) were significantly different from zero indicating, on average, the entire market response to new information was completed in one day. Additionally, with the exception of placements in the third deferred contract (*DFCC4*), the only significant variables in equation (2) were those pertaining to live cattle futures price changes. Equations (1) and (2) were also estimated for day three following the release of *COF* report and no variables pertaining to unanticipated information were significant.

Conclusions

An efficient market responds to new information. The livestock industry estimates values for cattle on feed, placements, and marketings prior to USDA releasing their monthly 7-state *Cattle on Feed (COF)* report. Therefore, deviations in USDA's actual reported values from industry pre-release estimates represents unanticipated information. The feeder cattle futures market responds to unanticipated information in the *COF* report pertaining to placements and marketings but not to surprises in cattle on feed numbers.

The feeder cattle futures market responds quickly to unanticipated information contained in the *COF* report with essentially no significant responses to this new information beyond the first trading day following the report release. For the most part, the nearby and first three deferred feeder cattle futures contracts react in similar ways to

unanticipated information. Contemporaneous and lagged live cattle futures price changes were significant in explaining price changes in the feeder cattle market.

Given that the demand for feeder cattle is derived from that of live cattle it is likely that new information that affects both the live and feeder cattle markets may be discovered through the live cattle market. Some of the response to unanticipated information in the feeder cattle futures market is discovered through the live cattle futures market. However, the feeder cattle market responds to unanticipated information beyond what is discovered through the live cattle market. The implication of this is that *COF* reports have value to the feeder cattle market in addition to the value they provide to the live cattle market. Therefore, any attempts to place an economic value on these reports need to consider both markets.

Table 1. Monthly *Cattle on Feed* Report and Bridge Pre-Release Estimate Summary Statistics, 1980-1995.

Variable	N	Mean	Std Dev	Minimum	Maximum
			(thousand head)		
COF^{a}	175	7727.86	746.12	6137	9367
COF^{e}	175	7687.1	738.18	6086	9345
$COF^{(a-e)}$	175	40.77	145.26	-438	510
$COF^{ABS(a-e)}$	175	114.38	98.06	1	510
PLC^{a}	175	1684.31	367.56	1073	2779
PLC^{e}	175	1671.34	356.66	1113	2747
$PLC^{(a-e)}$	175	12.97	105	-339	312
$PLC^{ABS(a-e)}$	175	82.15	66.37	1	339
MKT^{a}	175	1581.67	116.31	1295	1884
MKT^{e}	175	1586.66	113.36	1264	1869
$MKT^{(a-e)}$	175	-4.98	46.98	-136	112
$MKT^{ABS(a-e)}$	175	36.55	29.81	0	136

COF = Cattle on feed, PLC = Placements, MKT = Marketings, ^{a} = Actual reported values, ^{e} = Pre-release estimates, $^{(a-e)}$ = Actual less estimate, $^{ABS(a-e)}$ = Absolute value of actual less estimate

Table 2. Limit Price Moves Following Monthly *Cattle on Feed* Report Releases, 1980-1995.

		Feeder Cattle Futures Contract			
		DFCC1	*DFCC2*	*DFCC3*	*DFCC4*
Day after report	Price move	Number of limit moves (175 days total)			
Day 1	+$1.50	4	8	9	5
	-$1.50	14	11	10	8
Day 2	+$1.50	2	2	2	1
	-$1.50	1	4	2	1
Day 3	+$1.50	2	3	3	3
	-$1.50	3	4	4	2

Table 3. Day 1 Response of Feeder Cattle Futures Price to Unanticipated Information in the Monthly *Cattle on Feed* Report and Live Cattle Futures Price Changes, 1980-1995.

	DFCC1	*DFCC2*	*DFCC3*	*DFCC4*
Equation 1:				
Intercept	0.0002	0.0005	0.0005	0.0005
	(0.0008)	(0.0009)	(0.0009)	(0.0008)
$(COF^{a} - COF^{e})$	0.0083	-0.0228	-0.0073	-0.0103
	(0.0734)	(0.0765)	(0.0736)	(0.0662)
$(PLC^{a} - PLC^{e})$	-0.0726*	-0.0585*	-0.0602*	-0.0533*
	(0.0211)	(0.0220)	(0.0212)	(0.0190)
$(MKT^{a} - MKT^{e})$	0.1111*	0.1113*	0.1020*	0.0968*
	(0.0304)	(0.0316)	(0.0302)	(0.0272)
Equation 2:				
Intercept	-0.0008	-0.0007	-0.0004	-0.0006
	(0.0004)	(0.0005)	(0.0005)	(0.0004)
$(COF^{a} - COF^{e})$	0.0264	-0.0043	-0.0254	0.0024
	(0.0366)	(0.0401)	(0.0385)	(0.0341)
$(PLC^{a} - PLC^{e})$	-0.0235*	-0.0050	-0.0111	-0.0224*
	(0.0107)	(0.0119)	(0.0113)	(0.0099)

(MKT^a - MKT^e)	0.0311*	0.0358*	0.0370*	0.0437*
	(0.0156)	(0.0170)	(0.0162)	(0.0143)
(DLCC)	0.8716*	1.0136*	1.0322*	0.9826*
	(0.0417)	(0.0530)	(0.0537)	(0.0478)
(DLCCL1)	0.0401	0.2021*	0.1479	0.1661*
	(0.0702)	(0.0889)	(0.0899)	(0.0792)

[a] Standard errors in parentheses.
[b] Asterisk indicates significance at $\alpha = 0.05$ level.

Table 4. Day 2 Response of Feeder Cattle Futures Price to Unanticipated Information in the Monthly *Cattle on Feed* Report and Live Cattle Futures Price Changes, 1980-1995.

	DFCC1	*DFCC2*	*DFCC3*	*DFCC4*
Equation 1:				
Intercept	-0.0002	-0.0002	-0.0003	-0.0003
	(0.0006)	(0.0006)	(0.0006)	(0.0006)
(COF^a - COF^e)	-0.0358	-0.0164	-0.0101	-0.0448
	(0.0588)	(0.0535)	(0.0511)	(0.0479)
(PLC^a - PLC^e)	0.0130	0.0158	0.0185	0.0306*
	(0.0156)	(0.0153)	(0.0146)	(0.0137)
(MKT^a - MKT^e)	-0.0169	-0.0220	-0.0124	-0.0146
	(0.0227)	(0.0218)	(0.0208)	(0.0195)
Equation 2:				
Intercept	-0.0002	0.0000	-0.0001	-0.0001
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
(COF^a - COF^e)	0.0135	0.0338	0.0164	-0.0125
	(0.0334)	(0.0303)	(0.0307)	(0.0303)
(PLC^a - PLC^e)	0.0092	0.0063	0.0130	0.0174*
	(0.0098)	(0.0089)	(0.0090)	(0.0088)
(MKT^a - MKT^e)	-0.0041	0.0053	0.0105	0.0073
	(0.0140)	(0.0127)	(0.0129)	(0.0126)
(DLCC)	0.7581*	0.8895*	0.9132*	0.9091*
	(0.0451)	(0.0490)	(0.0547)	(0.0578)
(DLCCL1)	0.0465	0.0855*	0.1784*	0.1285*
	(0.0358)	(0.0349)	(0.0379)	(0.0394)

[a] Standard errors in parentheses.
[b] Asterisk indicates significance at $\alpha = 0.05$ level.

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