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Improving Forecasts of Cattle on Feed Placements

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Abstract

USDA Cattle on Feed (COF) reports are closely monitored by market participants as they provide important signals regarding future cattle supplies and market conditions. Among the major report components, cattle placements are especially difficult to anticipate. This study evaluates whether detailed feeder cattle marketing information can improve forecasts of cattle placements by distinguishing among auction markets, direct sales, and video auctions and by accounting for the timing of cattle delivery through forward contracts. The results indicate that although aggregate feeder cattle receipts explain much of the variation in placements, accounting for delivery timing improves model performance by better aligning observed transactions with actual feedlot placements. Forward-delivery transactions provide valuable information, although part of their explanatory power overlaps with recurring seasonal placement patterns. Feeder cattle imports from Mexico, existing feedlot inventories, and seasonal production cycles were also found to contribute significantly to placement activity. C*attle marketings are modeled for completeness and are closely linked to federally inspected slaughter activity.*

Key words: auction markets; cattle on feed; cattle placements; direct sales; feeder cattle receipts; video auctions

Introduction

The cattle industry is the largest agricultural commodity sector in the United States, accounting for approximately 22 percent of total agricultural cash receipts in 2024. The United States relies heavily on timely information regarding cattle inventories and feedlot activities (USDA ERS, 2025). The United States Department of Agriculture's (USDA) Cattle on Feed (COF) report is one of the most important sources of information for the U.S. cattle industry. Released monthly by the National Agricultural Statistics Service (NASS), the report provides estimates of cattle inventories in feedlots with capacities of 1,000 head or more, including the number of cattle currently on feed, cattle placements during the previous month, and marketings during the previous month. These estimates provide key insights into future beef supplies and market conditions, making the report an essential tool for price discovery, production planning, resource allocation and risk management throughout the cattle sector.

New information contained in the report often alters expectations regarding future market conditions, affecting live cattle and feeder cattle futures prices, feed demand, and expected cattle feeding profitability. Previous studies have shown that futures markets react rapidly to unexpected information in USDA livestock reports, particularly surprises in placements and marketings (Grunewald et al., 1993). However, accurately forecasting cattle placements remains challenging because, unlike marketings, which are partially observed through slaughter reports, placements arise from numerous decentralized procurement decisions that are not directly

observable before the COF report is released. Although auction markets remain the predominant feeder cattle marketing channel, an increasing share of cattle is marketed through direct sales and video auctions. Many of these transactions have forward-delivery arrangements, in which cattle are sold in one month but delivered to buyers in subsequent months. Consequently, the timing of observed feeder cattle transactions does not always align with the actual feedlot placements.

Given the increasing complexity of cattle procurement systems, additional research is needed to determine whether disaggregated feeder cattle receipt information can improve placement forecasting. Most existing approaches rely on aggregate receipt measures, potentially overlooking valuable information contained in specific marketing channels and delivery arrangements. Accordingly, this study contributes to the cattle market forecasting literature in several ways. First, it evaluates whether feeder cattle receipts disaggregated by auction, direct, and video marketing channels provide additional explanatory information beyond aggregate receipt measures. Second, it examines whether distinguishing between current and forward delivery transactions better aligns observed feeder cattle sales with actual feedlot placements. Third, it develops a complementary model for monthly cattle marketings, another key component of the COF reports.

Literature Review

A substantial body of research has demonstrated that livestock markets respond strongly to new information contained in USDA COF reports. Grunewald et al. (1993) found that live cattle futures react rapidly to unexpected information contained in USDA livestock reports, with most price adjustments occurring within the first trading day following report release. Their results further indicated that placements exert the strongest influence on deferred futures contracts because they provide information about cattle supplies several months into the future, whereas marketings primarily affect nearby contracts. The study also found that industry consensus forecasts outperformed individual analyst forecasts and simple autoregressive models, highlighting the value of aggregated market expectations.

Subsequent research has further emphasized the role of forecast accuracy for market efficiency. Schaefer et al. (2004) found that both industry forecasts and preliminary USDA estimates may contain bias and fail to fully reflect available information. Their results further showed that both anticipated and unanticipated components of COF reports influence futures prices. Similarly, Karali et al. (2018) found that despite the advances in private forecasting accuracy, surprises in COF reports continues to generate significant market responses, indicating that the reports retain substantial informational value.

Researchers have also examined the reliability and revision patterns of USDA COF reports. Mills and Schroeder (2002) reported that while initial estimates exhibit only minor and economically insignificant biases, subsequent revisions display systematic patterns that are not fully anticipated by industry analysts. Moreover, differences between analysts' pre-release forecasts and the initial USDA estimates do not provide reliable information about the direction or magnitude of future revisions. These findings suggest that COF reports continue to provide new information to the market and reinforce the importance of accurate forecasts for production planning, marketing, risk management, and investment decisions.

Because of the importance of COF reports to market participants, considerable research has focused on forecasting report components prior to release. Dhuyvetter and Schroeder (1999) evaluated the forecasting performance of 36 private industry analysts by comparing individual forecasts and composite forecasts, with their autoregressive models using mean squared forecast errors (MSE). The results showed that composite forecasts generally outperformed individual analyst forecasts, while individual analysts were more accurate than their simple autoregressive models. Consistent with Laster et al. (1997), they also found that some analysts issued unusually extreme forecasts, potentially to gain publicity or professional recognition. Among all COF report components, placements were consistently the most difficult to forecast, exhibiting the highest forecast errors, while cattle on feed inventories were forecasted most accurately. This finding was later confirmed by Karali et al. (2018) and Schulz (2024), who also identified placements as the most challenging component to forecast and the largest source of market surprises. These findings highlight the inherent complexity of forecasting cattle placements and underscore the importance of improving placement forecasts for market participants.

Researchers have also explored alternative forecasting approaches. Gallardo et al. (2010) examined prediction markets as a mechanism for forecasting cattle on feed inventories and found that, although they did not consistently outperform private analyst expectations, prediction markets effectively aggregate dispersed information and generate forecasts comparable to those of industry analysts. Similarly, Schaefer et al. (2004) showed that proprietary feedlot information provides additional predictive value beyond publicly available data and improves forecasts of USDA estimates. Together, these studies suggest that integrating multiple sources of information can enhance forecasting performance.

Research on cattle marketings has likewise emphasized the importance of inventory and placement information. Vogel (1992) found that changes in feeding practices, including longer feeding periods and heavier slaughter weights, weakened the relationship between cattle on feed inventories and subsequent marketings, reducing the reliability of traditional forecasting approaches. In response, NASS implemented methodological improvements to enhance estimate accuracy. The study concluded that, although cattle on feed inventories remain an important indicator of future beef supplies and marketings, accurate forecasting requires high-quality data and the ability to account for structural changes in feeding and marketing behavior. These findings underscore the need for forecasting models that adapt to evolving industry practices and improve the prediction of cattle marketings.

While substantial effort has been devoted to improving forecasts of COF reports, much of the forecasting literature has focused on market expectations, survey forecasts, and information aggregation rather than directly modeling the underlying drivers of placements and marketings. Furthermore, relatively little research has investigated whether detailed feeder cattle market activity can be used to improve forecasts of placement and marketing behavior.

Research examining the determinants of cattle placements and marketings suggests that placement decisions are inherently forward-looking and depend on expected profitability. Bullock and Logan (1972) provided one of the earliest economic analyses of cattle feeding decisions, arguing that feedlot operators make placement decisions by comparing the expected value of finished cattle with the purchase cost of feeder cattle and anticipated feeding expenses.

Because these decisions depend on uncertain future prices and costs, placements are highly sensitive to changing market expectations. The authors further emphasized that marketing decisions depend on the profitability of retaining cattle on feed relative to selling them immediately, with cattle weight, feed costs and feed conversion efficiency and expected slaughter cattle prices playing critical roles in determining the optimal marketing date.

Subsequent research has produced mixed evidence regarding the role of expected profitability. Kastens and Schroeder (1994) found that recent realized profits influenced placements more strongly than expected hedegable profits, suggesting that cattle feeders rely heavily on adaptive expectations and recent market outcomes. In contrast, Coffey (2025) reported that favorable expected feeding margins derived from futures market relationships are associated with increased placement activity. Together these findings indicate that feeder cattle placements are influenced by both realized profitability and forward-looking expectations regarding cattle prices, feed costs, financing conditions, and feeding margins.

Despite the importance of expected profitability in explaining placement decisions, accurately forecasting placements remains challenging. Schulz (2024) identified placements as the most difficult component of the COF report to predict, attributing this complexity to biological production cycles, pasture conditions, weather, feed costs, interest rates, and diverse procurement strategies. The study also highlighted the diversity of marketing channels through which cattle move, including auction markets, direct trades, stocker and backgrounding operations, and video auctions, all of which complicate the relationship between feeder cattle market activity and actual feedlot placements.

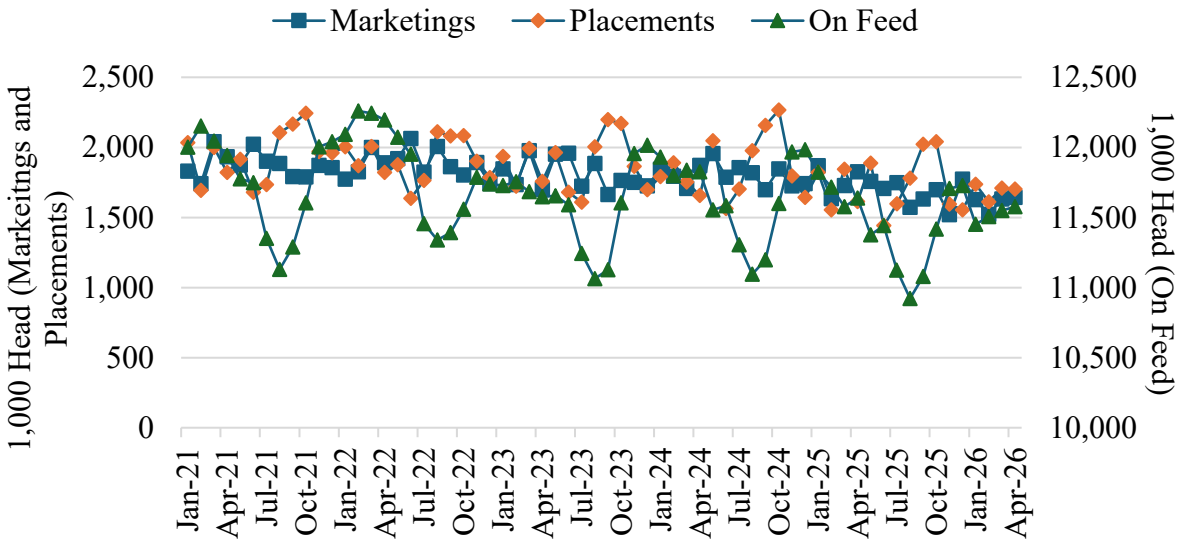
Research on cattle marketings has likewise emphasized the importance of detailed placement information. Norwood and Schroeder (2000) found that combining private placement-weight data with COF data improved forecasts of fed cattle marketings and prices, particularly over short horizons. These findings suggest that disaggregated cattle movement information can enhance forecasting performance and provide support for the use of disaggregated feeder cattle receipt data across marketing channels and delivery arrangements in forecasting attempts. Similarly, Bacon et al. (1992) developed several econometric forecasting models in which current marketings were explained by lagged cattle placements, seasonal factors, and market information. They showed that placements reported four to seven months earlier were significant predictors of current fed cattle marketings, reflecting the biological production cycle of cattle feeding. The study further emphasized that COF data alone explained approximately 84.6% of the variation in fed cattle marketings, while the inclusion of private feedlot information increased explanatory power to nearly 90% and improved forecast accuracy.

Collectively, these studies demonstrate that cattle placement and marketing decisions are influenced by expected profitability, market conditions, biological factors, and production practices, while detailed information on cattle movements can improve forecasting performance. However, despite the increasing diversity of cattle procurement systems, little research has examined whether feeder cattle receipts disaggregated by marketing channel and delivery structure provide additional information for forecasting placements and marketings.

Data

This study utilizes monthly data from COF reports, feeder cattle receipts, slaughter activity, and feeder cattle imports to develop econometric models for cattle placements and marketings in U.S. feedlots. The dataset combines information from multiple USDA reporting systems and industry market data sources to capture feedlot activity, cattle procurement behavior, slaughter trends, and seasonal production patterns. Monthly data on cattle on feed inventories, feeder cattle placements, marketings and other cattle disappearances were obtained from NASS. Historical series were accessed through the Livestock Marketing Information Center (LMIC).

Figure 1 illustrates the monthly trends in cattle placements, marketings, and cattle on feed inventories over the sample period. Pronounced seasonality is evident in placements and cattle on feed inventories, reflecting recurring biological production cycles and management practices within the cattle industry. In particular, placements tend to increase during late summer and fall, coinciding with the seasonal availability of weaned calves entering feedlots, while relatively lower placement levels are observed during the early summer months.



Data Source: NASS

Figure 1. Monthly placements, marketings, and cattle on feed levels, January 2021-April 2026.

Feeder cattle receipt data were obtained from the USDA Agricultural Marketing Service (AMS) and LMIC. These data capture feeder cattle transactions occurring through multiple marketing channels, including auctions, direct sales and video auctions. The direct trade data were compiled from major AMS regional reporting areas, while video auction receipts were aggregated from several national and regional marketing platforms.[4] Among the video auction sources, Superior

[4] Direct trade receipts were compiled from AMS reports covering Colorado, Eastern Corn Belt, Iowa, Missouri, Kansas, Montana, New Mexico, Northwest, Oklahoma, South Dakota, Southeast, Southwest, Texas, and Wyoming–Nebraska. Video auction receipts were compiled from Superior Livestock video auction-Fort warth,TX, Western, Northern, LiveAg, Cattle country, Cattle Drive, Washington, Mid-Atlantic, Ozark, and Joplin auction reports.

Livestock Auction accounted for the largest share of reported receipts, reflecting its dominant role within the U.S. video cattle marketing sector.

To better align feeder cattle transactions with actual feedlot placement decisions, direct negotiated and video auction receipts were further separated into current and forward delivery categories. Current delivery receipts represent cattle expected to be delivered shortly after the transaction occurs, whereas forward delivery receipts represent cattle contracted for delivery in future months. This distinction is particularly important because feeder cattle marketed during one reporting period may not be physically placed into feedlots until a later date. Consequently, contemporaneous feeder cattle transactions do not always correspond directly with USDA placement estimates. Figure 2 illustrates the delivery schedule for cattle marketed through Superior video auction in July 2025. Relatively few were scheduled for immediate delivery, while the majority were contracted for future delivery, primarily during fall months.

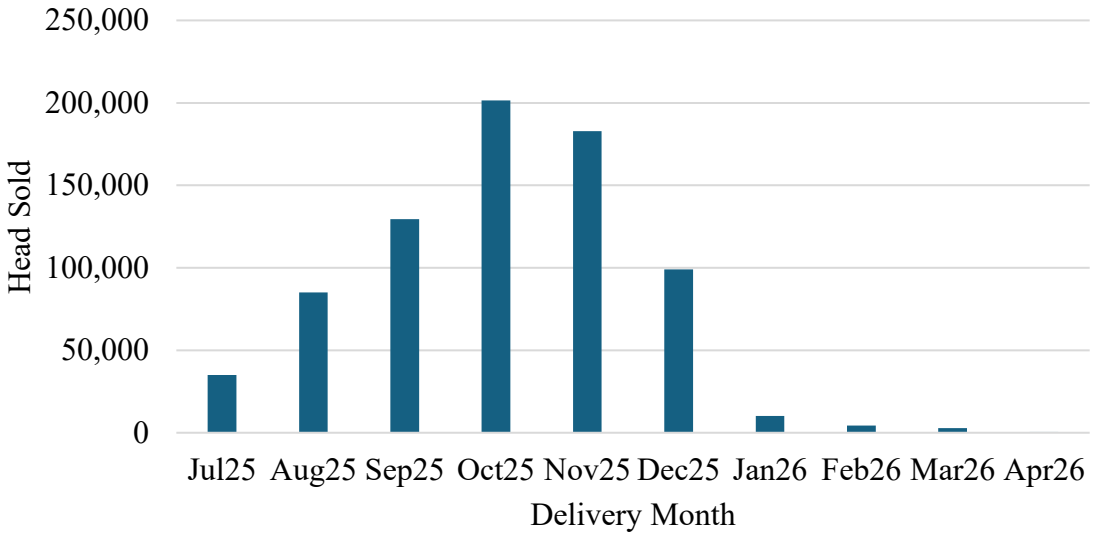


Figure 2. Delivery month of July 2025 large video auctions.

Feeder cattle imports were included in the placement forecasting models because imported cattle represent an important source of feeder cattle available to U.S. feeding operations, with Mexico serving as the primary supplier. Most imported cattle consist of lighter-weight animals destined for stocker, backgrounding, or feedlot operations and therefore may influence subsequent feedlot placements. Feeder cattle import data were obtained from LMIC, reported on a weekly basis, and aggregated to monthly totals to align with the reporting frequency of the USDA Cattle on Feed data.

Federally inspected slaughter data were obtained from USDA Agricultural Marketing Service (AMS) reports and LMIC cattle slaughter datasets. AMS slaughter information was reported on a weekly basis, while LMIC slaughter data were available at a daily frequency. To ensure consistency with the monthly USDA Cattle on Feed reporting framework, both datasets were aggregated to monthly totals prior to analysis.

The dataset consists of 63 monthly observations covering the period from January 2021 through April 2026. This sample period captures recent developments in cattle procurement systems, including increased use of direct trades, video auctions, and forward contracting arrangements. Monthly frequency was selected to maintain consistency with USDA COF reporting intervals and feeder cattle receipts and slaughter reporting schedules.

Methodology

Separate econometric models were estimated for cattle placements and marketings to account for differences in the underlying determinants and observability of these variables. The placement specifications progressively disaggregate feeder cattle receipts by marketing channel and delivery arrangement to examine whether additional procurement details improve model performance.

Placement model specifications

Three alternative specifications were estimated to examine the determinants of monthly USDA cattle placements.

The first specification, referred to as the base model, utilized aggregated feeder cattle receipts as the primary explanatory variable. Total receipts were constructed as the sum of auction receipts, direct current delivery receipts, direct future delivery receipts, video current delivery receipts, and video future delivery receipts. In addition, the model included previous month's cattle on feed inventories, feeder cattle imports from Mexico, and monthly dummy variables to capture seasonal placement patterns.

The base placement model (Model 1) is represented as:

$$Placements_t = \beta_0 + \beta_1\, Total\ Receipts_t + \beta_2\, COF_{t-1} + \beta_3\, Imports_t + \sum_{m=1}^{11} \gamma_m\, Month_m + \varepsilon_t$$

The second specification separates the total feeder cattle receipts into their individual components. Rather than using aggregated receipts, the model separately included: auction, direct and video receipts. The direct and video receipts are measured as the combined total of current and forward delivery transactions. This specification evaluates whether alternative procurement channels differ in their explanatory contribution to monthly cattle placements.

The disaggregated placements model by marketing channels (Model 2) is represented as:

$$Placements_t = \beta_0 + \beta_1 Auction_t + \beta_2 Direct_t + \beta_3 Video_t + \beta_4 COF_{t-1} + \beta_5 Imports_t + \sum_{m=1}^{11} \gamma_m\, Month_m + \varepsilon_t$$

The third specification further refines Model 2 by separating direct sales receipts and video auction receipts into current and forward delivery categories to explicitly account for the delivery timing to better align observed feeder cattle transactions with subsequent feedlot placement decisions.

The fully disaggregated and time adjusted placements model (Model 3) is represented as:

$$\begin{aligned} Placements_t = {} & \beta_0 + \beta_1 Auction_t + \beta_2 DirectCurrent_t + \beta_3 DirectForward_t \\ & + \beta_4 VideoCurrent_t + \beta_5 VideoForward_t + \beta_6 COF_{t-1} + \beta_7 Imports_t \\ & + \sum_{m=1}^{11} \gamma_m \, Month_m + \varepsilon_t \end{aligned}$$

To isolate the explanatory contribution of feeder cattle procurement channel and delivery timing, two additional placement specifications (Model 4 and Model 5) were estimated excluding cattle on feed inventories, feeder cattle imports, and seasonal dummy variables.

The alternative disaggregated model by marketing channel (Model 4) is:

$$Placements_t = \beta_0 + \beta_1 Auction_t + \beta_2 Direct_t + \beta_3 Video_t + \varepsilon_t$$

The alternative disaggregated and time adjusted model (Model 5) is:

$$\begin{aligned} Placements_t = {} & \beta_0 + \beta_1 Auction_t + \beta_2 DirectCurrent_t + \beta_3 DirectForward_t \\ & + \beta_4 VideoCurrent_t + \beta_5 VideoForward_t + \varepsilon_t \end{aligned}$$

These specifications were not intended as the primary empirical models but rather as supplementary analyses designed to evaluate the independent contribution of procurement channel and delivery timing information to explaining variation in cattle placements.

Marketing model specification

A separate econometric model was developed to forecast USDA cattle marketings. Because slaughter activity is closely linked to cattle marketings, federally inspected slaughter was included as the primary explanatory variable. Previous month's cattle on-feed inventories and monthly dummy variables were also included to account for inventory effects and seasonal variation.

The marketing model is represented as:

$$Marketings_t = \beta_0 + \beta_1 Slaughter_t + \beta_2 COF_{t-1} + \sum_{m=1}^{11} \delta_m \, Month_m + \varepsilon_t$$

Model performance was evaluated using adjusted R^2, Root Mean Squared Error (RMSE). These measures were used to compare the relative performance of the alternative model specifications

and assess the extent to which disaggregating feeder cattle receipts by marketing channel and delivery arrangement improved model fit.

All model specifications were subjected to standard diagnostic testing to assess model adequacy and statistical validity. Multicollinearity was evaluated using Variance Inflation Factors (VIFs), heteroskedasticity was assessed using the Breusch–Pagan test and residual-versus-fitted plots and residual normality was evaluated using normal probability (Q-Q) plots and the Shapiro–Wilk test.

Results and Discussion

Overview of placement model specifications

The results indicate that feeder cattle procurement activity contains substantial information regarding monthly USDA cattle placements. Across all specifications, the models explain approximately 90 percent of the variation in placements, highlighting the importance of feeder cattle receipts, lagged feedlot inventories, imports from Mexico, and seasonal factors in explaining placement activity. Although marketing channel alone offers little improvement over aggregate measures, accounting for delivery arrangements enhances model performance and provides additional explanatory value (Table 1).

Model 1 confirms that feeder cattle receipts are strongly associated with cattle placements. However, by aggregating all procurement channels into a single measure, the model assumes that all feeder cattle transactions contain similar placement information regardless of the receipt type or delivery arrangement.

Model 2 separates the receipts according to procurement type. Auction markets provide a strong signal of feedlot procurement activity. In contrast, direct and video receipts are not individually significant, although moderate multicollinearity may obscure their independent effects. Furthermore, the model fit changes little relative to Model 1, suggests that disaggregating receipts by marketing channel alone provides limited additional explanatory power, suggesting that disaggregating receipts by marketing channel alone provides limited additional explanatory value beyond aggregate procurement activity.

Model 3 further distinguishes direct and video transactions by current and forward delivery arrangements and provides the strongest overall performance, with the highest adjusted R^2 and the lowest RMSE. This improvement suggests that delivery timing contains additional explanatory information beyond marketing channel classifications alone. Auction receipts remain significant, while current-delivery video receipts exhibit a strong positive relationship with contemporaneous placements. Although the forward-delivery variables are not individually significant, variance inflation factor diagnostics reveal substantial multicollinearity, particularly between video forward transactions and seasonal variables (Table 2). This suggests that part of their explanatory power overlaps with recurring seasonal procurement patterns rather than indicating a lack of economic importance. Overall, the results demonstrate that incorporating delivery timing provides greater explanatory value than disaggregating receipts by marketing channel alone.

Table 1. Regression results of the cattle placement models.

Model 1		Model 2		Model 3	
Variable	Coefficients	Variable	Coefficients	Variable	Coefficients
Total Receipts	0.427***	Auction	0.430***	Auction	0.437***
		Direct	0.176	Direct current	-0.205
				Direct forward	0.266
		Video	0.135	Video current	3.169***
				Video forward	0.008
COF_{t-1}	0.130***	COF_{t-1}	0.148***	COF_{t-1}	0.113***
Imports	0.980***	Imports	1.162***	Imports	1.139***
Constant (Jan)	-293424.5	Constant (Jan)	-498832.9	Constant (Jan)	
Feb	-22145.58	Feb	-11382.74	Feb	8108.914
Mar	55987.48	Mar	81343.88	Mar	101221.5
Apr	-30031.44	Apr	-21569.53	Apr	3776.75
May	195472.7***	May	249216.5***	May	265185
Jun	-41803.2	Jun	-40175.79	Jun	-32480.59
Jul	67952.85	Jul	10370.97	Jul	103841.3
Aug	370882.8***	Aug	384725.4***	Aug	422722.2***
Sep	457135.5***	Sep	543040.8***	Sep	536819.7***
Oct	311416.2***	Oct	436878.6***	Oct	431737.7**
Nov	-21624.71	Nov	61540.77	Nov	59237.12
Dec	-2011.462	Dec	34771.6	Dec	42908.05
RMSE	63075	RMSE	63169	RMSE	61446
Adj R^2	0.8987	Adj R2	0.8972	Adj R2	0.9105
Overall F-statistic	0.0000	Overall F-statistic	0.0000	Overall F-statistic	0.0000

Note: The significance level is represented as *** p<0.01, ** p<0.05, * p<0.10.

The Marketing channels and delivery timing

Alternative specifications were explored to assess the relative importance of different procurement types. When lagged inventories, imports, and seasonal controls are omitted, direct current, direct forward, and video forward receipts become statistically significant (Table 3). The increase in adjusted R^2 from 0.18 in Model 4 to 0.73 in Model 5 indicates that distinguishing between current and forward delivery arrangements captures economically meaningful information regarding feedlot placements. These results again confirms that some of the information contained in forward transactions is already captured by seasonal and inventory variables in the full specification (Model 3).

Table 2. Variance Inflation Factor (VIF) diagnostics for placement models.

	Model 2			Model 3	
Variable	VIF	1/VIF	Variable	VIF	1/VIF
Auction	5.03	0.1987	Auction	4.70	0.2129
Direct	2.70	0.3704	Direct Current	2.34	0.4271
			Direct Future	3.77	0.2656
Video	8.73	0.1145	Video Current	2.17	0.4612
			Video Future	52.90	0.0189
COF (t−1)	4.17	0.2400	COF (t−1)	4.43	0.2259
Imports	1.46	0.6868	Imports	2.24	0.4473
February	2.95	0.3889	February	3.04	0.3286
March	2.72	0.3670	March	3.68	0.2715
April	3.17	0.3155	April	3.45	0.2896
May	3.80	0.2631	May	6.35	0.1575
June	4.16	0.2406	June	3.72	0.2687
July	11.78	0.0848	July	5.53	0.1810
August	6.85	0.1460	August	9.44	0.1060
September	4.62	0.2164	September	14.74	0.0678
October	3.98	0.2511	October	48.81	0.0205
November	2.78	0.3592	November	28.03	0.0357
December	3.11	0.3220	December	8.92	0.1121
Mean VIF	4.50		Mean VIF	11.57	

Note: VIF values greater than 10 are generally considered indicative of severe multicollinearity.

Table 3. Regression results for alternative models.

	Model 4		Model 5
Variable	Coefficient	Variable	Coefficient
Auction	0.421***	Auction	0.358***
Direct	0.587	Direct Current	1.318***
		Direct Forward	3.158***
Video	-0.007	Video Current	0.977
		Video Forward	1.011***
Constant	1434978***	Constant	1168315***
Adj R2	0.1812	Adj R2	0.7338
RMSE	1.8 e^5	RMSE	1.0 e^5

Note: The significance level is represented as *** p<0.01, ** p<0.05, * p<0.10.

Auction receipts continue to remain a significant determinant of cattle placement. Most notably, direct forward receipts exhibit the largest coefficient, indicating that forward direct transactions provide a particularly strong signal of future feedlot placements. Because direct transactions frequently involve cattle procured specifically for feedlot delivery, they appear to provide an especially informative signal of placement decisions. Video-forward receipts also become

significant, suggesting that forward video contracts contain valuable information regarding planned procurement activity. This finding is economically intuitive as video contracts are commonly used to secure cattle supplies ahead of anticipated placement periods and are frequently concentrated during late summer and fall when feeder cattle availability is highest. Given the growing importance of video auction platforms in facilitating cattle transactions across broad geographic regions, this result highlights the increasing relevance of forward-contracted cattle movements in explaining placement activity.

Overall, these findings demonstrate that while procurement channel distinctions alone add relatively little information beyond aggregate receipts, incorporating delivery timing substantially improves the ability to explain placement behavior. The results support the hypothesis that accounting for delivery timing provides a more accurate representation of procurement activity.

Existing feedlot inventories

Previous month's cattle on feed inventory remained positive and significant determinant across all placement model specifications. This finding suggests persistence in feedlot procurement behavior, whereby feedlots with larger existing inventories continue placing cattle to maintain operational throughput and replace marketed animals. The consistent significance of lagged cattle inventories indicates that existing feedlot conditions provide important information regarding future placement activity. Quantitatively, a 100,000-head increase in lagged feedlot inventories is associated with approximately 13,300-14,800 additional placements in the following month. Economically, this result is consistent with inventory replacement behavior, whereby feedlots replenish marketed cattle to sustain ongoing production and maintain desired inventory levels.

Cattle imports from Mexico

Feeder cattle imports from Mexico exhibit a positive and statistically significant relationship with placements across all model specifications and consistently have the largest estimated coefficient among the continuous explanatory variables. This finding highlights the strong association between cross-border cattle movements and feedlot placement activity which is also economically intuitive as imported feeder cattle represent an important source of cattle entering the U.S. production system, particularly during periods of tight domestic supplies.

However, imports should be interpreted as an indicator of feeder cattle availability rather than a direct measure of contemporaneous feedlot placements. Imported cattle vary in weight, age, and intended use, with lighter-weight animals often entering grazing, stocker, or backgrounding operations before eventual feedlot placement, while heavier cattle may move directly into feeding operations. Because the ultimate destination and timing of placement are not directly observable in publicly available datasets, the estimated relationship may reflect delays associated with cattle movement through different stages of the production system rather than immediate feedlot entry.

Consistent significance of imports across all specifications highlights the important role of Mexican cattle in U.S. feeder cattle supplies. Between 2020 and 2024, Mexico accounted for approximately 62 percent of U.S. cattle imports, making import flows an important determinant of feeder cattle availability and subsequent placement activity. Recent disruptions to cross-border cattle movements, including restrictions associated with New World Screwworm (NWS) detections, further highlight the sensitivity of U.S. feedlot procurement to imported cattle supplies and may influence the reporting of feeder cattle imports (USDA ERS, 2025).

An additional consideration is the potential overlap between feeder cattle imports and feeder cattle receipts, as imported cattle may subsequently be marketed through auction markets, such as the Santa Teresa Livestock Auction, or through direct channels before eventual feedlot placement. Consequently, some imported cattle may be represented in both datasets, making it difficult to fully separate the effects of imports from broader feeder cattle market activity.

Seasonal placement patterns

Several monthly dummy variables, particularly May, August, September, and October, exhibit significantly positive relationship with cattle placements. These patterns are consistent with the biological production cycle of the U.S. cattle industry, in which calf weaning and increased feeder cattle availability during late summer and fall generate seasonal peaks in placement activity. The positive May effect likely reflects cattle exiting winter grazing and backgrounding programs. The persistence of these seasonal effects indicates that procurement variables alone do not fully capture recurring biological and management cycles, supporting the inclusion of monthly controls in placement models.

Overall, the results indicate that feeder cattle procurement data contain substantial information regarding USDA cattle placements and distinguishing between current and forward delivery arrangements provides additional explanatory value by better aligning observed transactions with actual feedlot placements. This finding is consistent with the Bacon et al. (1992) and Norwood and Schroeder (2000) who demonstrated that more detailed placement information can improve model performance. Collectively, these results reinforce the complexity of placement decisions as suggested by Karali et al. (2018) and Schulz (2024) and the value of incorporating detailed feeder cattle procurement information into placement forecasting models.

Overview of the Marketing model

In contrast to placements, cattle marketings are considerably easier to forecast because they occur later in the production cycle and are more directly linked to observable slaughter activity. Table 4 presents the results of the cattle marketing model, where monthly cattle marketings are explained by federally inspected feeder cattle slaughter, previous months cattle on feed inventories, and seasonal dummy variables. The model explains approximately 99.6% of the variation in monthly cattle marketings, indicating exceptional performance.

Table 4. Regression results of the cattle marketing model

Variables	Coefficients
Slaughter	0.891***
COF $_{(t-1)}$	0.013
Constant (Jan)	-206.470
Feb	54.244***
Mar	23.831***
Apr	15.391***
May	53.628***
Jun	20.517***
Jul	-20.189***
Aug	-44.524***
Sep	-55.871***
Oct	-96.614***
Nov	-31.391***
Dec	-5.589
RMSE	8.0379
Adj R^2	0.9956
Overall model fit	0.000

Note: The significance level is represented as *** p<0.01, ** p<0.05, * p<0.10.

Federally inspected slaughter serves as the primary driver of marketings. The coefficient is close to unity, implying a nearly one-for-one relationship between slaughter and marketings. This result is economically intuitive because cattle marketed from feedlots ultimately enter slaughter channels, with small deviations likely reflecting differences in reporting conventions and timing.

Lagged cattle on feed inventories are positive but statistically insignificant once slaughter is included, suggesting that current slaughter activity already captures most of the information relevant to marketings. This result is economically intuitive because slaughter reflects realized marketing decisions, whereas lagged inventories reflect only the potential supply of market-ready cattle. Marketing decisions also depend on factors such as cattle weights, feeding performance, market conditions, and packer demand, meaning that not all cattle on feed are marketed immediately. Several monthly dummy variables remain significant, indicating that recurring seasonal factors influence marketings beyond slaughter activity. Positive coefficients during the first half of the year and negative coefficients during late summer and fall suggest that the relationship between slaughter and reported marketings varies systematically throughout the year. These seasonal effects likely reflect recurring industry practices, processing schedules, and feedlot marketing strategies.

Overall, the results demonstrate that federally inspected slaughter is an exceptionally effective predictor of USDA cattle marketings. Unlike placements, which depend on complex

procurement decisions and delivery arrangements, marketings are closely tied to observable slaughter activity, making them considerably easier to explain and predict.

Variance inflation factor (VIF) diagnostics indicated moderate multicollinearity in Model 2 and severe multicollinearity in Model 3. However, because the primary objective of the study is to compare model performance and evaluate the explanatory contribution of alternative specifications rather than to estimate the independent causal effects of individual regressors, these variables were retained in the final models. The diagnostic results further indicated that the residuals exhibited approximately constant variance and were normally distributed, suggesting that the underlying assumptions of the regression models were reasonably satisfied. Overall, the diagnostic evidence supports the adequacy and robustness of the estimated specifications for the purposes of this study.

Conclusion and Recommendation

Accurate forecasting of COF components is important for producers, feedlot operators, analysts, traders, and policymakers because these variables provide critical information regarding future cattle supplies and market conditions. Given the complexity of feeder cattle procurement and the increasing use of alternative marketing channels and forward contracting, this study examined whether disaggregated feeder cattle receipt data could improve the explanation of monthly cattle placements.

The results indicate that feeder cattle procurement activity contains substantial information regarding subsequent feedlot placements. While aggregate feeder cattle receipts explain a large proportion of placement variation, distinguishing transactions by delivery timing provides additional explanatory value and improves model performance. Commonly used auction receipts consistently emerged as a significant indicator of placement activity, while the results further demonstrate that feeder cattle imports, existing feedlot inventories and seasonal production cycles remain important determinants of monthly placement patterns.

In contrast, cattle marketings are considerably more straightforward to explain. Federally inspected slaughter accounts for nearly all variation in monthly marketings, indicating that realized slaughter activity provides a reliable indicator of feedlot marketing behavior.

This study contributes to the cattle market forecasting literature by demonstrating that publicly available feeder cattle procurement data contain valuable information beyond aggregate receipt measures. The findings show that incorporating delivery timing enhances the ability to explain placement activity and provides a more accurate representation of feeder cattle movements into feedlots.

Future research will extend this framework by incorporating feeder cattle placement-weight distributions. Because placement weights provide information on expected days on feed and the timing of future marketings, their inclusion is expected to further improve the ability to explain and predict cattle placements. In addition, future work will focus on addressing the potential double counting of feeder cattle imports from Mexico in receipt data, which is a limitation of the present study. Developing methods to distinguish imported cattle from subsequent market transactions is expected to provide a clearer measure of procurement activity and further enhance model performance.

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