

Trends and Seasonality in Cattle Auction Data from the Southeast



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Abstract

The Southeastern United States plays an important role in the beef cattle supply chain, featuring diverse cow-calf operators that supply an annual calf crop. Since 2010, periods of expansion and contraction have occurred, altering the number of cattle in the national herd, but within the Southeast,

changes have also occurred to the number and size of operations and marketing strategy. In this research, we explore the volume and price of feeder steers, bulls, and heifers from 2010 to 2019 for auctions in North Carolina, South Carolina, and Georgia. Using data from 255,651 auction transactions, we show seasonal patterns in volume and prices and suggest changes to marketing.

INTRODUCTION

The beef cattle sector experiences periods of contraction and expansion, which alter the total number of cattle, supply and demand dynamics, and requires additional management to maintain producer profitability (McBride and Mathews, 2011; Griffith, Burdine, and Anderson, 2017). Depending on production limitations (forage base and weather events such as drought), the supply of feeder cattle can fluctuate considerably across regions in the United States and possibly within geographic regions. These factors contribute to a dynamic and challenging marketing environment for feeder cattle producers. At the same time, understanding seasonal patterns in local feeder cattle marketing can provide insight into supply and demand signals on a smaller scale.

Historically, the Southeast region has supported numerous, small-scale cow-calf operations and played an important role in the beef cattle supply chain, providing an annual calf crop (McBride and Mathews, 2011). In recent years, operations across the U.S. have become more specialized, with a higher proportion of cow-calf operations focusing solely on beef production, without diversifying into other commodities (Gillespie, Whitt, and Davis, 2023). Additionally, there has been a decline in the number of operations that retain animals for stocker operations. (Gillespie, Whitt, and Davis, 2023). Meanwhile, there was evidence suggesting a decline in the overall cattle herd, a reduction in the number of small operations, and a shift toward fewer,

larger operations. (Gilespie, Whitt, Davis, 2023; O'Hara, 2023). These simultaneous changes to operations in the Southeast and broader national cattle markets create a challenging market for small-scale cow-calf operations.

As part of the movement toward more specialization, changes in marketing and production strategies have been observed. In the Southeast in particular, an increased number of cattle have been marketed through online platforms, with premiums for certified natural or other attributes observed (Burdine, Halich, and Lehmkuhler, 2014). At the same time, efforts to educate producers on the timing of calving and weaning cycles to take advantage of forage availability and profitability have been emphasized (Funston et al., 2016). These further complicate a producer's decisions regarding the timing of marketing and strategies used to sell calves and increase prices.

The purpose of this research is to document and explore trends and seasonal patterns in feeder cattle prices and transaction volume in the Southeast from 2010–2019 using data of individual sale transactions from the United States Department of Agriculture Agricultural Marketing Service. This period represents both times of contraction and expansion in the overall domestic cattle herd and focuses on three Southeastern states (North Carolina, South Carolina, and Georgia) to illustrate the seasonality of feeder calves in the Southeast. This subset region of the Southeast features a similar forage base and production characteristics and offers a large enough region for marketing analysis. Emphasis will be placed on observing the differences in price and volume for feeder steers, bulls, and heifers marketed through auctions during this period. Understanding expected seasonal price movements can provide producers with important information needed to make production and marketing adjustments to increase profitability.

BACKGROUND

Prior research has sought to understand feeder cattle price dynamics and determinants using auction data. This literature has used a variety of techniques, including econometric models, to assess how auction prices might change based on various attributes. These assessments have occurred periodically over time and market locations (Buccola, 1980; Schroeder et al., 1988; Martinez et al., 2021). This work can be used to aid producer decision-making by understanding which attributes command a higher price, information that can then be used by a producer to inform management decisions.

A few specific findings relevant to producers making decisions have analyzed price differences for specific cattle attributes or premiums paid for management decisions. For example, findings from analysis of auction data have shown price differentials based on breeds (McCabe et al., 2019). Other research has investigated price differentials for feeder cattle steers versus bulls, which could inform castration decisions before marketing (Martinez, 2020), with more specific details on lots and the premium associated with additional veterinary care or management, such as achieving third-party certification (Williams et al., 2012).

In addition to specific attributes about the animals, other prior research has focused on understanding the timing and seasonality of marketing and its influence on price. Many of the aforementioned studies and others, such as Jones et al. (2023), researched auction prices and have included a way to capture differences in prices across months or seasons. Given the dynamic nature of specific markets and the overall cattle cycle timing, the marketing of cattle to specific months or at a given time to command a higher price can be complicated, and models to capture this decision can be complex (Wang et al., 2001; Tester et al., 2020). Yet, other work has shown opportunities for producers to take advantage of profitable opportunities related to stocker enterprises (Key et al., 2023) or the timing of sale (Seamon et al., 2019).

We seek to add to this literature by focusing on an understudied region for an extended time horizon. The analysis here is summary in nature but focuses on identifying and translating specific trends and patterns for use in decision-making.

DATA

Feeder cattle auction price data was gathered from the United States Department of Agriculture Agricultural Marketing Service for a subset of Southeastern states from 2010–2019. Data on individual transactions from 41 auction reports was compiled from North Carolina (10 reports), South Carolina (8 reports), and Georgia (23 reports). In total, 255,651 transactions were analyzed, covering the sale of 2,132,018 feeder cattle. For each transaction, the following information was available: animal type (steer, bull, heifer), number of animals sold, weight, and average price.

This study focuses on three Southeastern states: North Carolina, South Carolina, and Georgia. The states were selected based on similarity in terms climate conditions, and all have a coastal plain to the East and are boarder to the West by the Appalachian

Mountains. Despite only including three states, the beef cattle industry represented by inventory numbers is an important part of that state's agricultural economy. In 2024, the total cow inventory across these states was estimated to be 352,000 (NC), 148,000 (SC), and 459,000 (GA) (USDA-AMS, 2023). The 2023 January 1 calf inventory for Georgia, South Carolina, and North Carolina was 360,000, 133,000, and 490,000, respectively (USDA-NASS, 2023). The three states total calf crop in 2023 was 983,000 calves.

Despite similarities in terms of the states selected for analysis, different geographic regions occur in each state. For this reason and to simplify analysis, two regions (East and West) were created; Figure 1 shows the geographic dispersion of reporting locations. The Eastern region, denoted with red stars, corresponds to the coastal region, and the Western region, denoted by black stars, corresponds to the Piedmont region. The separation occurs where the topographic inversion happens, the Atlantic Seaboard Fall-Line. The determination of the separate regions is based on a difference in climate, which also corresponds to forage base and topography. Specifically, the determination of the separate regions is based on the USDA plant hardiness zones (USDA-ARS, 2023). Most of the Eastern zone is in Zone 8b, which is limited in terms of available cool season perennial forages. As a result, these operations face additional costs of production to maintain feed during fall and winter months. The Western region falls into Zone 8a, which allows producers the option to use cool season perennials. The availability of cool season perennials provides an option for producers looking to lower input cost inputs for feeding.

For the purposes of analysis, animals were grouped based on weight and further delineated as steers, bulls, or heifers. Weight classes included in this analysis were 4-weight (400-499 lbs.), 5-weight (500-599 lbs.), and 6-weight (600-699 lbs.).

Finally, a total of 238 sales were removed due to a lack of information to be able to accurately place the observation into a region.

RESULTS

The aggregated cattle prices for the study period are shown in Figure 2, which highlights general changes in prices observed from 2010–2019. As expected, the general price movements follow national market prices during this time and are consistent across both the Western region (top) and Eastern region (bottom).

Both regions show a steep increase in market prices in 2014 and 2015. From 2010–2014, the national cattle herd was going through a period of contraction with the lowest national cattle herd numbers observed in 2014 (USDA-ERS, 2023). As expected, low supply led to high observed prices. A similar pricing premium for steers relative to bulls and heifers is observed for both regions in this contractionary period, with feeder steers in both regions commanding a higher price relative to feeder heifers. In the Western region, feeder bulls have a noticeable premium to heifers. Interestingly, the price spread for bulls and heifers in the Eastern region is relatively non-existent until 2014.

As prices increased beginning in 2013, the price spread collapsed for feeder bulls and heifers in the Western region. We observed that the price spread between feeder males and females tightened during periods of sharp price increases and decreases for the study period. During the 2014/2015 price peak, defined price spreads existed between females and males as expected. Post-2015, decreasing prices in both regions brought more consistent price spreads among steers, bulls, and heifers. An interesting point to note is the bull-heifer price spread in the East. Before 2014, bulls and heifers were valued relatively the same; post-2015, heifers are discounted relative to bulls.

During the study period, the national cattle herd numbers contracted (2010–2014) and expanded (2014–2018). The number of annual transactions occurring during the study period for feeder steers, bulls, and heifers is shown in Figure 3 for the Western region (top) and the Eastern region (bottom). Overall, the Western region recorded more transactions than the Eastern region. As expected, the number of transactions is relatively constant until a marked increase in the number of transactions occurs for most feeder cattle groups across both regions in 2014. This corresponds with the start of the expansionary period for the overall U.S. cattle herd. It is interesting to observe an increased number of transactions in 2013 in the Western region for all groups from 2013 compared to 2012.

Finally, starting in 2013, the number of bull transactions increased and grew rapidly in both regions. In the Western region, the number of bull transactions surpassed that of heifer transactions, a change that coincided with the increased market prices and persistent discounts for bulls relative to steers in both regions (see Figure 2). The number of bull transactions persisted through the end of the study period, and with it, a reduced number of steer transactions.

Price seasonality for gender weight classifications by region is illustrated in Figure 4. Lighter-weight cattle brought a premium price relative to heavier cattle and exhibited consistent seasonal patterns for all regions across feeder male and female groups. An annual slump in prices in July can be observed across both regions and for steers, bulls, and heifers. The magnitude of this decline varies and is stronger for male feeder cattle. Consistent seasonal patterns are also observed across regions for steers, bulls, and heifers. Beyond this comparison, seasonal price patterns vary across weight classes and among steers, bulls, and heifers.

For feeder steers, the month with the observed highest price varies by weight with different seasonal price patterns. In general, higher prices are observed in March, August, and November. For 400- to 499-lb steers, the highest price is recorded in March, both for the Western and Eastern regions. For 500- to 599-lb steers, the March and August prices are almost the same, whereas for the 600- to 699-lb steers, there is less seasonality, with higher prices from March through August.

For the lighter-weight steers, prices decline from March to July. From August to December, the prices remain flat, but in the Eastern region, November prices are at a premium to Western November prices. Compared to heavier-weight cattle, the 400- to 499-lb price seasonality shows the most volatility. Between March and July, the price spread between 400- to 499-lb cattle and heavier cattle narrows, but between August and July, the spread widens.

For heavier-weight steers, seasonal price variation is the least volatile for the three weight classes. The highest price month was August, with prices decreasing from August to October, which is the lowest-price month. The price spread between 500- to 599-lb and 600- to 699-lb steers in the Western region starts to narrow from January to July. After July, the price relationship remains stable, and the Eastern price remains consistent from January to June. In July, the price spread narrows, and this relationship remains so through the end of the year.

Feeder bull prices show similar price patterns as steers, but regional differences in magnitude and volatility of prices can be seen comparing Eastern and Western regions. Eastern feeder bulls are priced at a premium to Western feeder bulls at several time points in the year for both lighter-weight classes (400-499 lbs. and 500-599 lbs.) and heavier-weight classes (600-699 lbs.) While the general seasonal price pattern for bulls is similar to steers, there is a wider spread between

lighter and heavier bulls compared to steers. Further, notable differences are visible in the highest-price and lowest-price month based on weight class and region.

Feeder heifer prices display less seasonality than male feeder cattle but mostly follow similar patterns. Feeder heifers in the 400- to 499-lb weight class in the Eastern region maintain higher prices compared to similar-weight cattle in the Western region. The high-price month for 400- to 499-lb heifers in both regions was May, whereas the high-price month for heavier weights (500-599 lbs. and 600-699 lbs.) was August. Across both regions and all weight classes, the low-price month was October.

Regional cattle transaction seasonality is shown in Figure 5 for steers, bulls, and heifers by weight class. Consistently, the Western region markets have more cattle than the Eastern region. As shown in Figure 3, more heifers are marketed across both regions than bulls or steers. In both regions, the seasonal movement is consistent with an increasing number of transactions from January to March, followed by a decreasing number of transactions for most weight classes and groups from March to July. For most weights of steers, bulls, and heifers, July brings fewer transactions compared to other summer months. In general, transaction volume increases in August but then decreases through the fall months and into December.

MANAGEMENT IMPLICATIONS AND CONCLUSIONS

As shown in Figures 2-5, the selected region of the Southeast displays consistent price patterns that follow the major price movements observed in the broader cattle market from 2010–2019. Further, the volume of transactions reflects similar patterns to expansion and contraction observed across the country. Interestingly, some regional differences can be seen in price trends and seasonal patterns of transactions.

First, as shown in Figure 2, during periods of sharp price movements (increases or decreases), expected price premiums or discounts disappear, and spreads between steers, bulls, and heifers are no longer present. Then, over this period, a clear change in the price spread between feeder males and females is observed for the Eastern region. In the expansion period from 2016–2018, a noticeable spread develops between feeder males and females that is not observed prior to 2014. This suggests that when sharp price movements occur, producers are willing to adjust

management strategies and enter different marketing opportunities. An example strategy seems to include not castrating due to the market, which doesn't reflect the value in additional management.

Findings from Figure 3 suggest that, for the Eastern region, a change occurred during the study period in marketing strategy based on the changes in observed transaction volume from marketing steers to marketing bulls. While the source of this decision is unknown, in combination with pricing information for bulls versus steers, there could be an opportunity for understanding producer behavior and risk tolerance.

Finally, seasonality in prices across regions, weights, and groups of cattle, as shown in Figure 4, suggests potential opportunities for understanding local cattle prices to benefit producer decision-making and timing of marketing. This could include timing cattle marketing to take advantage of months with historically higher prices. For some producers, depending on location, consideration of weight at sale, or location of sale depends on the cattle marketed; however, this will likely be limited by forage availability and the seasonality of productivity across regions.

The study period of 2010–2019 represents a time of both expansion and contraction for the U.S. cattle herd. Drought across other cattle-growing regions, changes in cattle marketing strategies, and other factors caused substantial changes to prices and total cattle marketed during this time period. While all markets are connected, specific patterns and factors driving prices in the Southeast are not the same as in other parts of the country. Through this research into transaction-level data for feeder cattle auction sales, this research visualizes and provides a discussion of trends and seasonal patterns for the price and volume of transactions for feeder cattle in a subregion of the Southeast. Future research could focus on conducting this analysis on other subregions of the Southeast or even smaller marketing regions. Given recent changes to the industry due to COVID-19 and additional droughts, updated research from 2020–2024 could present additional findings relevant for Southeastern producers. Finally, load lot marketing and the use of third-party certification have been other strategies for producers to increase prices. Future research into the region could explore these programs in conjunction with historic auction markets.

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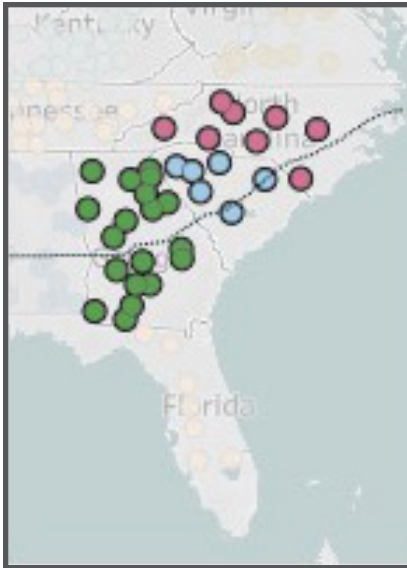


Figure 1. Auction market locations with markets in the Western and Eastern study regions

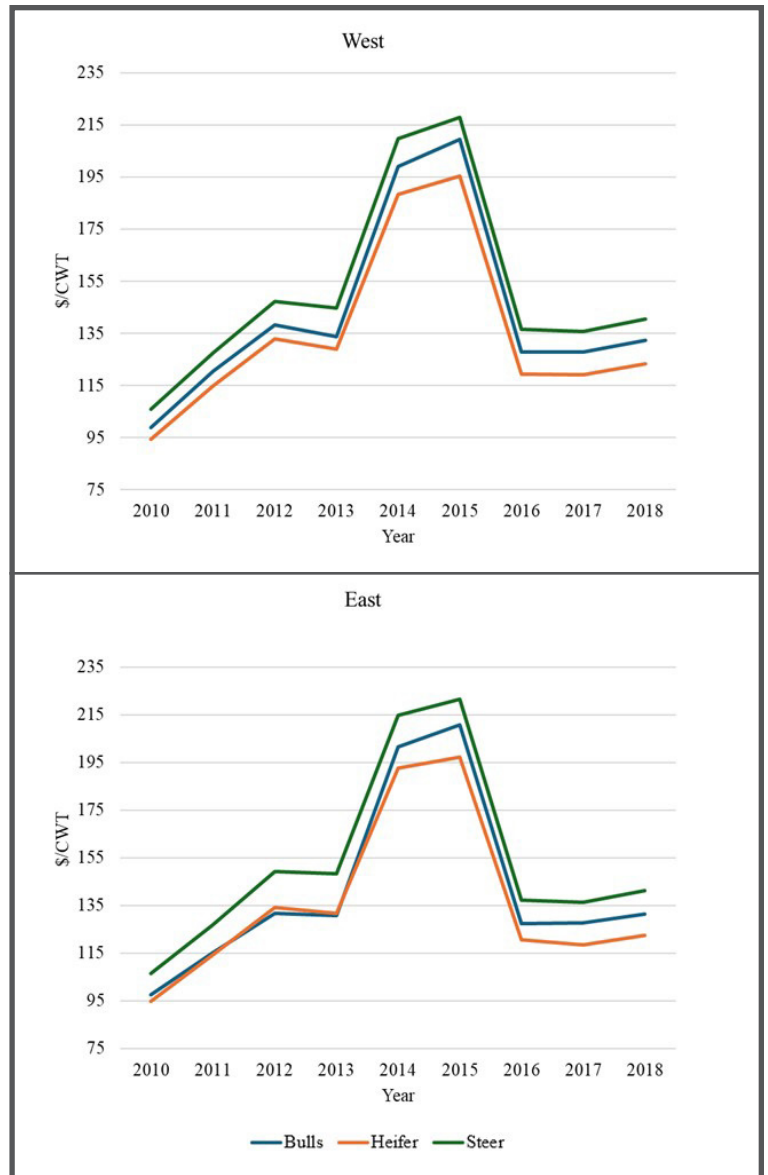


Figure 2. Yearly number of transactions in the West (above) and East (below) by steers, bulls and heifers

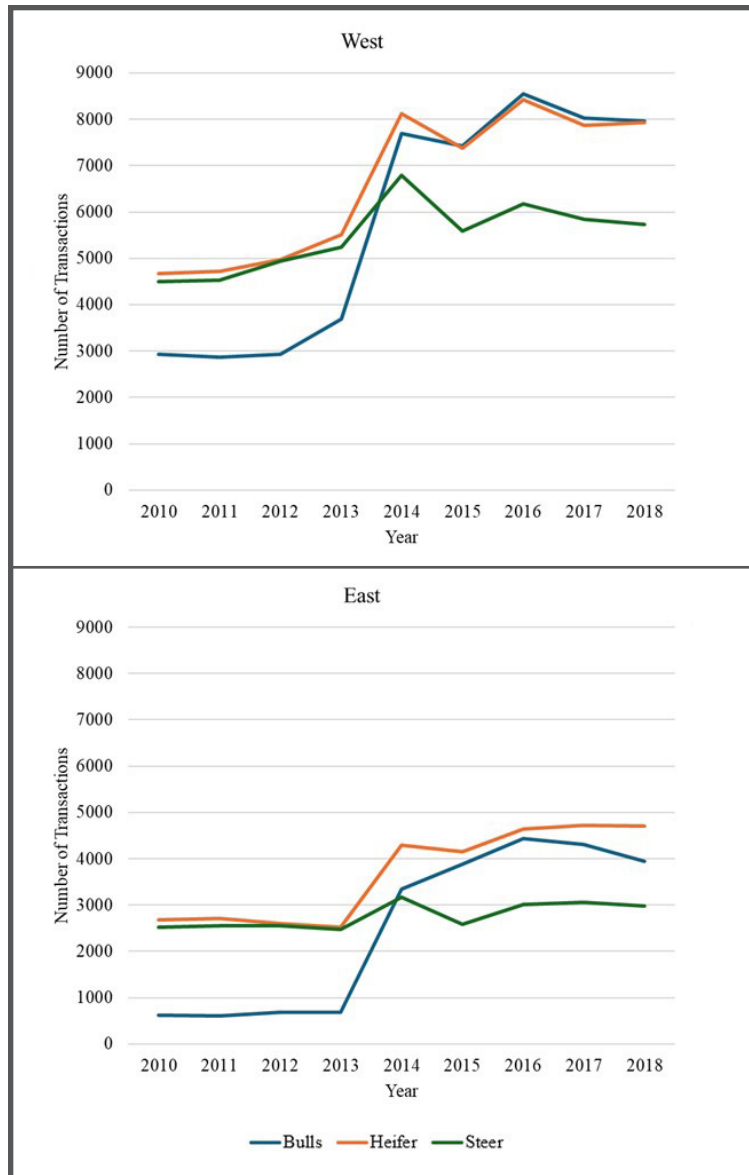


Figure 3. Yearly number of cattle sales transactions in the West (above) and East (below) by steers, bulls, and heifers



Figure 4. Seasonal price patterns for cattle sold in the West (left) and East (right) with steers (row 1), bulls (row 2), and heifers (row 3) by weight (400-499 lbs., 500-599 lbs., 600-699 lbs.)

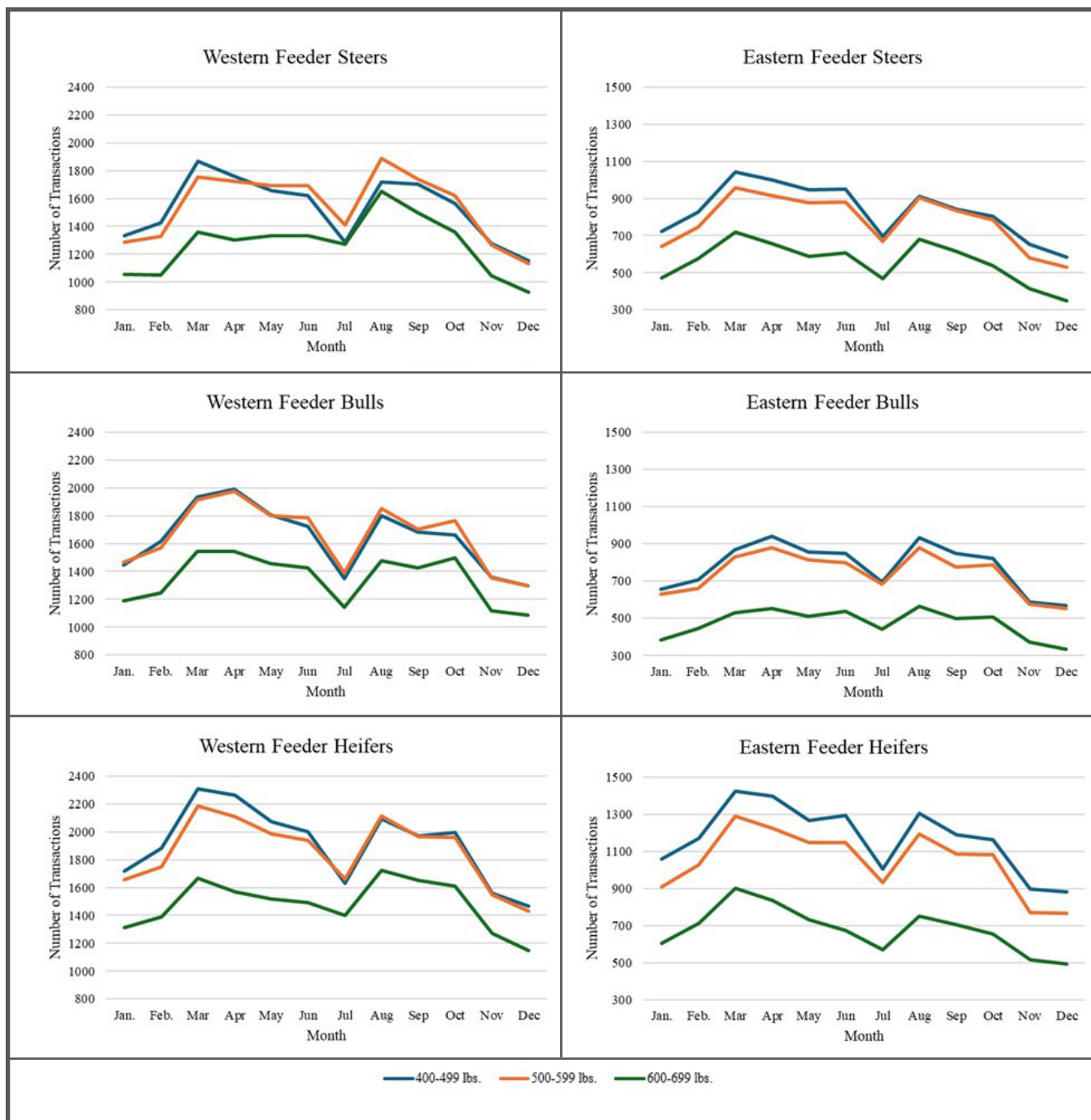


Figure 5. Seasonal transaction volume for cattle sold in the West (left) and East (right) with steers (row 1), bulls (row 2), and heifers (row 3) by weight (400-499 lbs., 500-599 lbs., 600-699 lbs.)