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Changes in Texas Livestock Auction Markets From 1969-2014

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Introduction

Background

Cattle progress through various phases of the livestock production system during their life cycle. The cattle industry is characterized by three production phases which are 1) the cow-calf operation, 2) the stocker / backgrounding operation, and 3) the feeding or finishing operation. Cattle typically change ownership between each of the three phases.

Cattle start this production cycle through the industry at the cow-calf operation stage. Cow-calf operations are characterized by producers that own cows and/or heifers used solely for breeding purposes. Producers in this phase aim to produce an annual calf crop which will be sold shortly after the calves are weaned. Calves will typically be weaned around four hundred (450) pounds when they are around seven months in age. A majority of these calves still have a vast amount of growth that needs to take place before they can start being fed for beef. Some calves do enter the confined feedlot feeding stage immediately after weaning, although it is less common. Cattle not ready to head into the feeding phase progress into the backgrounding, or stocker, phase of the industry next. During the stocker / backgrounding phase, producers typically turn cattle out to graze on wheat or other small grain pastures for fall and winter months, or improved or native forage for spring and summer, whichever is available at the time. Freedom to graze pastures coupled with supplementation of additional minerals and time allow these young calves to develop into healthy animals with a larger frame size. After these cattle have grown into a larger frame size, they enter into the feeding stage of livestock production. Cattle entering

the feedlot will generally weigh around 750 pounds. These cattle will be transitioned through a starter ration and then introduced to a high protein feed. Cattle entering the feeding phase will be in the feedlot for around one hundred eighty (180) days, exiting at around twelve hundred fifty (1250) pounds. Once cattle have reached this weight, they are then sold and transported to the packing house. Cattle progressing through these three phases will more than likely change hands and geographic location between each phase.

Marketing Structure

Cattle transitioning through these three different phases during their life cycle demand a dynamic environment to market the livestock. Auction barns have been the main venue that facilitates the flow of cattle from one production phase into the next phase. Auction barns are generally located in rural towns associated with large livestock production numbers. However in some cases, auction barns are centrally located within a county and are used by producers located across the county. Cow-calf producers bring their calves after weaning to the auction barn, these cattle are then sold separately and dispersed among the buyers at the auction. Cow-calf producers make a profit through the biological process of reproduction by selling their calves after weaning. Calves are purchased and placed into backgrounding operations. Once backgrounding operations have achieved the desired calf weight gain, those producers look to re-sell their cattle. Stocker operators stand to make profit on the weight gain cattle achieve between when they are purchased after weaning and the time they are sold again through the auction barn. Livestock that have been backgrounded appropriately will be sold and begin the final stage of production after being transported to a feed yard.

Changes in Industry

Until lately there were few options beside the auction barn when it came to producers marketing their cattle. Today, producers have different marketing options to consider when it is time to sell their cattle. Larger cattle companies have formed and have representatives across the country. These companies will have a representative visit a producer's operation and serve as the middle man between the producer and the cattle company. Communication between the representative and cattle company is crucial because a majority of the time, the representative is the only one that will visually inspect the cattle before they are purchased.

A more significant change in cattle marketing is the emergence of online video livestock auctions. Companies that run video auctions send a representative out to the producer's operation, video the cattle, and then upload the video for an auction time that is predetermined. Buyers log onto the video auctions and have the ability to purchase the cattle based on the information they gather from the video. These two methods of selling cattle may benefit the producer because they are paid for their cattle without having to transport them to the auction barn. Cattle may exhibit distress from being transported to the auction barn where they are mixed with livestock from a number of different operations from the area. Distress may exhibit a suppressed immune system that may lead to cattle losing many valuable pounds, which for the producer is a cut out of his profit. Cattle that lose weight throughout the auction process may present a chance for the buyer to capitalize on a small amount of compensatory gain, however, there is a chance the cattle will not rebound very quickly from what could be a traumatizing experience. Cattle exposed to a large number of head may lead to illness that hinders the growth of the cattle. This may

cause buyers to favor either of the two options that do not involve the auction barn. Cattle that are bought directly from a producer's operation are often more uniform in appearance, and will also be more uniform genetically. Genetically similar cattle may be desirable by backgrounding and feed lot operations because producers expect there to be less variance among the herd as they start to grow.

Auction markets have been the primary marketing method for cattle buyers and sellers to meet and transact sales. Over time marketing methods have changed and cattle numbers have decreased. Auctions provide the mechanism for markets to function. This study examines changes in the number of auction markets in the state over the last few decades.

Industry Background

Throughout the history of beef cattle production, cattle have been marketed in various ways. From the introduction of cattle to North America well through the 1800s cattle raised across Texas were not sold in auctions scattered across the countryside like today. Back in open range times, prior to fencing, cattle were driven north, utilizing a number of different trails. Cattle were driven from South Texas up the Western Trail to Ogallala, Nebraska, or by way of the Chisholm Trail to Abilene, Kansas. Cattle were sold at the rail head through negotiation with various buyers. Terminal markets were developed with stockyards in major cities with one of the first being in Chicago.

Industrialization led to the rise of terminal markets, located along the rail line, with large stockyards for holding cattle. Cattle could then be driven to these stockyards and sold

at terminal markets where cattle would be loaded unto railcars and transported to slaughterhouses in Chicago and other cities. Invention of the refrigerated rail car turned Swifts packing house in Chicago to the major hub for cattle processing. Cattle were brought in on railcar from terminal markets, slaughtered, and the beef sent all the way to New York via rail with the technology to keep the meat cool while in transit.

Across the nation there are 89.9 million head of cattle, encompassing cattle across the various phases of production. With over 600,000 operations focused on beef production, the average herd size in the United States is about forty cows. Texas boasts the largest herd size of any state with 11.8 million head of cattle. With this vast number of cattle coupled with a relatively small average herd size leaves the industry extremely fragmented with a large amount of variety among producers. A common thread shared by a majority of these producers is the means of marketing their livestock. In Texas, this takes place at one of the ninety-two auction barns across the state.

Producers selling their calves along with any other animals they may be culling, generally start the selling process the days before the day of the sale of their local auction. In some areas where cattle numbers are dense, there may be a number of auction barns within reasonable driving distance for producers. These auction barns have coordinated sale days to give buyers a chance to make as many of the different sales possible. This gives producers located around multiple auction barns the option of when and where they can sell their cattle. Producers may choose to market cattle on Saturdays when auction barns tend to

have a larger number of cattle coming through along with a large number of buyers in hope of receiving a higher price for their cattle than if they were to sell cattle on a week day at an auction located closer to the ranch. When producers determine where they want to market their cattle, they will typically gather the cattle and haul them to the auction barn the day before the sale. Cattle will be accepted at the auction from the day before the auction until just prior to the auction beginning. Upon arrival they are processed and identified with a temporary tag, each tag having a unique lot number, which is used to keep track of ownership and transferring of ownership through the sale. Cattle are penned around or behind the auction barn with access to hay and water until the sale begins.

On the day of the sale buyers, sellers, and others interested in livestock arrive prior to the sale to walk the catwalks above the pens holding the cattle to visually inspect the livestock to be sold. Typically, sale barns will have a small café located inside where many will gather for a home cooked meal, while talking about the weather or the cattle market. Buyers file in and take their seats, with many regular buyers having a specific spot they prefer to sit every week, while all other interested in watching the sale fill in around them. Many producers will show up to watch the sale either to see what their cattle sell for or to get an idea of current market prices. As the auctioneer takes their position upon the block, gates start flying open and cattle are circulated through the barn. Cattle enter one at a time or in groups giving buyers a brief moment to inspect the animal and the bidding begins. In an open out cry fashion the auctioneer starts a mind numbing chatter calling out the current sale price and bids start being placed. Cattle purchased are priced in dollars per pound (or dollars per cwt), and upon exiting the ring they are weighed, and sorted into holding pens

for the new buyer. The process of selling one head is quick; each animal may only be in the sale ring for a brief moment. Auction barns serve as a medium for cattle to be transferred from one party to another. The market collects a commission on sales, usually from three to four percent. Auction barns work well because they are a local source where buyers and sellers can come together making a market. However, technology is constantly being added into every realm of life, with the livestock industry being no exception.

With access to the internet so wide spread, video auctions have become increasingly popular. Representatives from video auction companies come and video cattle to be posted for auction online. Individuals can sell from just about anywhere in the United States and have access to a large pool of buyers. Buyers can tune into these auctions and place bids on cattle, many of which they would have never had an opportunity to purchase without the invention of the video auction. Along with video auctions over the internet, direct sales have become more favorable. Direct sales occur between two private parties with a business relationship intact. Producers with large enough volumes may choose to market their cattle directly to feed yards. For a direct sale the two parties will agree on a price per pound for a specific quantity, usually measured by the truckload. Many producer's herd sizes are not large enough to be able utilize this marketing option. However, the use of direct sales by larger producers and the appealing use of video auctions to producers of all sizes have likely played a role in declining number of cattle sold through conventional auction markets.

Data

Auction facilities are mandated by state regulation to have a vet present at every auction that takes place within the state. This mandate is implemented by the Texas Animal Health Commission who oversees and facilitates the safe commerce of cattle within the state. Through this state organization records have been kept of auction markets in the state, providing us with auction market data per county dating back to 1969. During the late 1980's there was a three year gap in the data. During these years auction markets did not cease to exist, so interpolation of the data from years prior to and years after the void helped complete the data. A great deal of time was spent transferring numbers of auction houses per county from print sources published by the state into excel and arranging data into a workable format to be used by crop reporting district.

Table 1. Descriptive Statistics of the Number of Auction Markets in Texas by Crop Reporting District.

	Dist 1-N	Dist 1-S	Dist 2-N	Dist 2-S	Dist 3	Dist 4	Dist 5-N
Mean	5	5	3	6	15	29	24
Min	4	3	2	2	10	14	18
Median	5	4	3	6	15.5	29	24
Max	7	7	5	9	22	38	30

Table 1 Cont.	**Dist 5-S**	**Dist 6**	**Dist 7**	**Dist 8**	**Dist 9**	**Dist 10-N**	**Dist 10-S**	**State Total**
Mean	10	1	11	23	8	6	3	147
Min	8	1	7	18	4	4	2	92
Median	10	1	10.5	22	8	6	2	153
Max	14	2	15	28	12	8	5	170

Beef cow numbers have been reported by crop reporting district and were available in print until around 2007 when they became available by portable document file (PDF). This data was also input into an Excel spreadsheet, along with cattle price data from the Livestock Marketing Information Center.

Table 2. Descriptive Statistics of Texas Beef Cow Numbers, Cattle Prices, and Auction Market Receipts from 1969-2014

	Beef Cows	Cattle Prices	Auction Receipts	Receipts per Auction
Mean	5536	$57.18	5,863	38,636
Min.	3910	$21.93	3,077	20,791
Median	5463	$61.68	5,847	39,154
Max.	6895	$154.45	7,959	52,362

The Texas Animal Health Commission maintains records of number of head sold through auction markets across the entire state. Taking auction receipts for the state by year and dividing by the total number of auction houses per year, the average receipts per auction per year was calculated.

Trends in Texas Auction Markets

A reduction in number of auction markets was anticipated over the past six and a half decades. Even with cattle inventory numbers on slight down trend over time, an increase in number of cattle sold per auction market was expected, a priori. However, on average, the number of cattle sold per auction market in the state has been on a downward trend since the late 1980's. its hypothesized that fewer cattle per auction market reflect an

increase in number of head marketed via internet auction and the number of head sold through direct sale.

With technology constantly evolving, cattle sold via internet auctions are seemingly becoming more popular. Producers fancy the concept because for them there is little to no headache involved in the process. Producers no longer have to haul cattle to local auctions; the cattle are videoed while on the ranch and weighed on the truck after they have been sold. Video auctions are becoming popular with producers within the stocker/backgrounding phase because producers enjoy the benefits of a large audience of buyers, which many believe guarantees a higher price than they could attain from any other means of marketing their cattle. A number of cattle feeders have started turning to video auctions as a way to procure cattle. Cattle feeders making use of video auctions have reduced the number of cattle that were once purchased out of auction barns. This provides cattle feeders access to larger runs of cattle with potentially far less genetic variation.

Direct sales occurring between a producer and another individual with a need for cattle in the next phase of the livestock production system. This could occur between a cow-calf operation selling directly to a stocker/backgrounding operation, or between stocker/backgrounding operations to the feeding phase of the industry. In some cases, cow-calf operations may able to sell directly to the feeding phase, depending on how long they have retained ownership of their calves. Many times direct sales are arranged months ahead of the actually shipping of the cattle and they are forward priced using futures contract prices. Forward pricing involves a few more barriers because sales are typically conducted by the truckload of cattle. With the average herd size in the United States at about 40 cows many producers do not have the opportunity to take part in this avenue of marketing.

According to the USDA APHIS, NAHMS survey conducted from 2007-2008 only 3.5% of all operations engaged in marketing with forward pricing, up from the 1997 NAHMS survey that reported only 1.5% of all operations engaged in any type of forward pricing. However, larger operations prefer using this form of marketing. In 1997 13.4% of operations with over 300 head forward priced their cattle, while the 2007-2008 survey shows 15.4% of operations with 200 or more head engaged in forward pricing. Of those operations from the 2007-2008 survey using forward pricing, they marketed 68.4% of their calf crop in that manner. Producers may have not chosen to forward price the entire calf crop because if the market goes up they do not capitalize on any gain in prices if already locked into a contract. On the opposite side, they no longer have price risk associated with that percentage of cattle that have been forward priced.

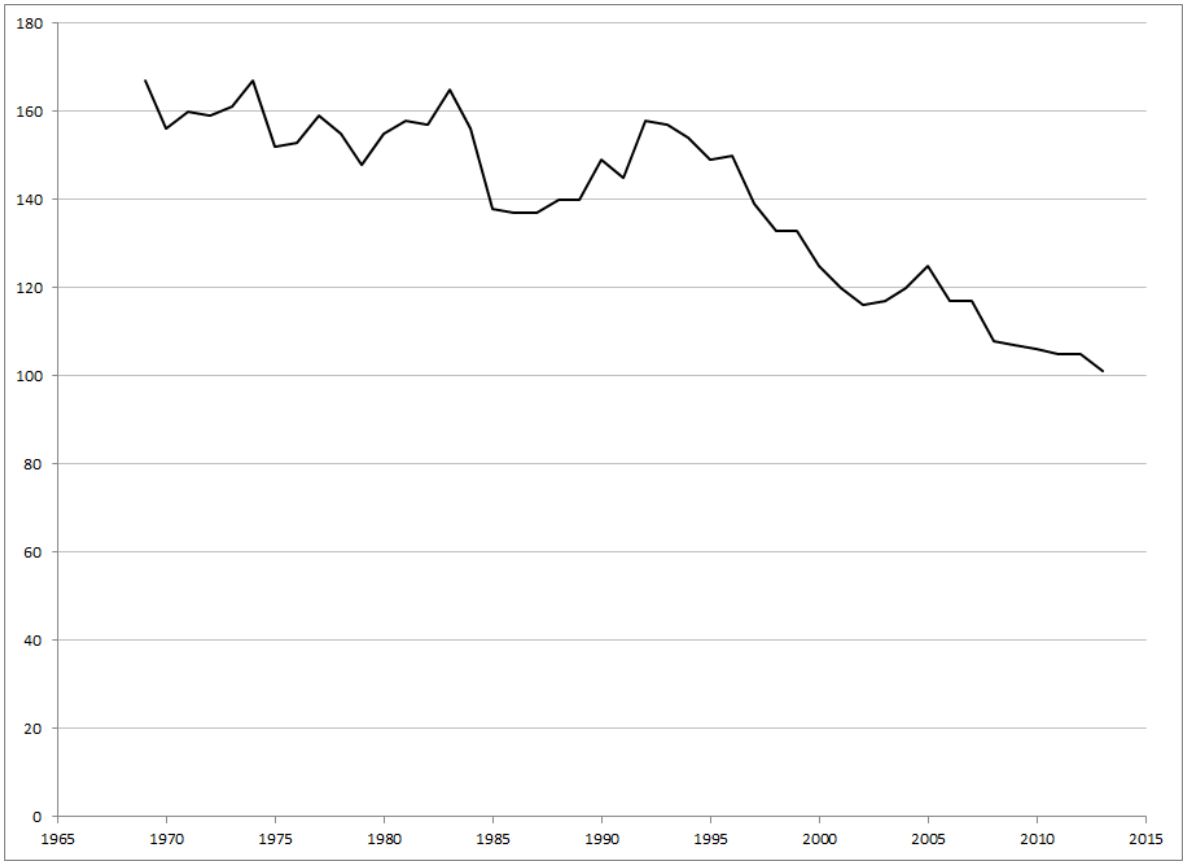

Figure 1. The Total Number of Auction Markets in Texas, 1969-2014

In just over four decades the number of auction markets within the state of Texas has nearly declined by half. The number of markets has declined from 167 in 1969 to 101 auction markets by 2014 (Figure 1). The decline in auction markets across the state could be attributed to a number of factors, such as producers using other means to market their cattle, or just an overall lower number of cattle to be marketed in the state, requiring fewer markets. It is not clear that there are new markets opening or if it is old markets reopening.

Table 3. Number of auction markets by District in Texas for 1969, 1992, and 2014

District	Region Name	1969	1992	2013
1-N	North High Plains	6	7	5
1-S	South High Plains	6	4	3
2-N	North Low Plains	5	2	2
2-S	South Low Plains	9	7	2
3	Cross Timbers	16	16	10
4	Blacklands	33	32	14
5-N	North East Texas	22	25	19
5-S	South East Texas	11	11	8
6	Trans Pecos	1	1	1
7	Edwards Plateau	13	12	8
8	South Central/Coastal Bend	23	23	19
9	Upper Coast	12	10	4
10-N	North South Texas	6	6	4
10-S	South Lower Valley	4	2	2
	Total	167	158	101

Table 3 provides a glance across all regions showing the number of auction markets in 1969, a median year of 1992, and the final year of complete data in 2013. Clearly the losses experienced are spread across most of the regions, however, there are some regions that experienced a greater loss. These regions had more auction markets to begin with, and are centered around areas where beef cattle numbers are also seeing a decrease, which both help lead to larger losses of auction markets in some regions than others.

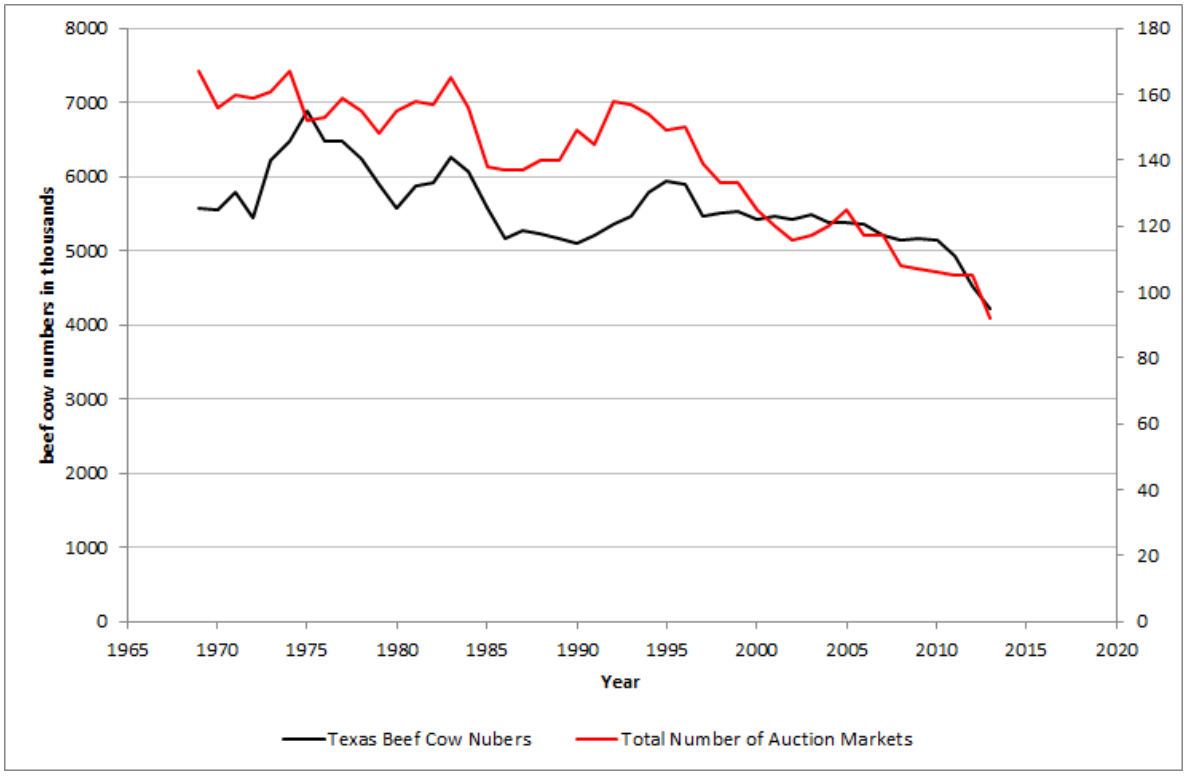

Figure 2. Beef Cow Numbers and Auction Markets 1975-2013

Over the span of time from 1975 to 2013 Texas experienced a steady decline in the number of beef cows in the state (Figure 2). This decline can be attributed to a number of different factors, including drought, adverse economic conditions, and changing land use. Increasing production per cow has led to the same amount of beef production from fewer cows. The decline in beef cow numbers coincides with the observed decline over the same time period of number of auction barns across the state. Lower beef cow inventory numbers has likely played a significant role in the reduction of number of auction markets.

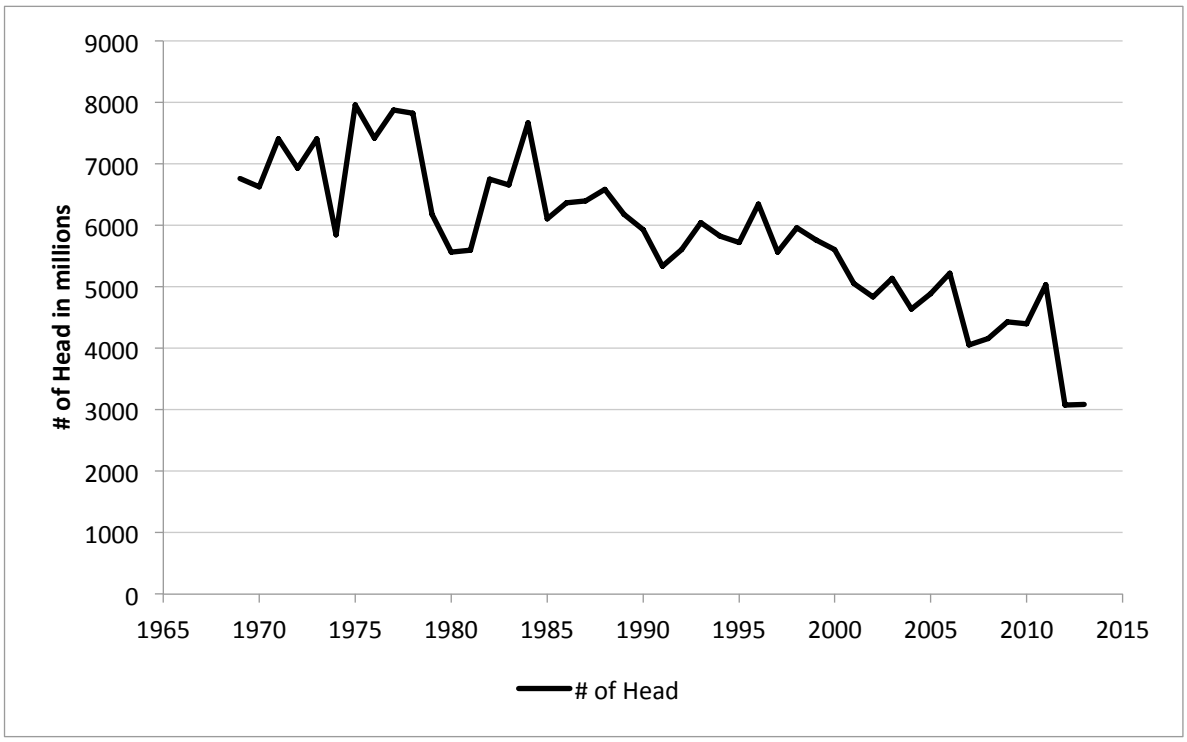

Figure 3. Texas Cattle Auction Receipts

Declining beef cow numbers maybe one of the reasons we see such reduction in auction receipts (Figure 3). This data is provided by the Texas Animal Health Commission, who keeps record of number of head sold at each auction across the state. Other factors such as internet video auctions and direct sales being on the rise could also have impacted the number of total cattle sold through conventional auction barns.

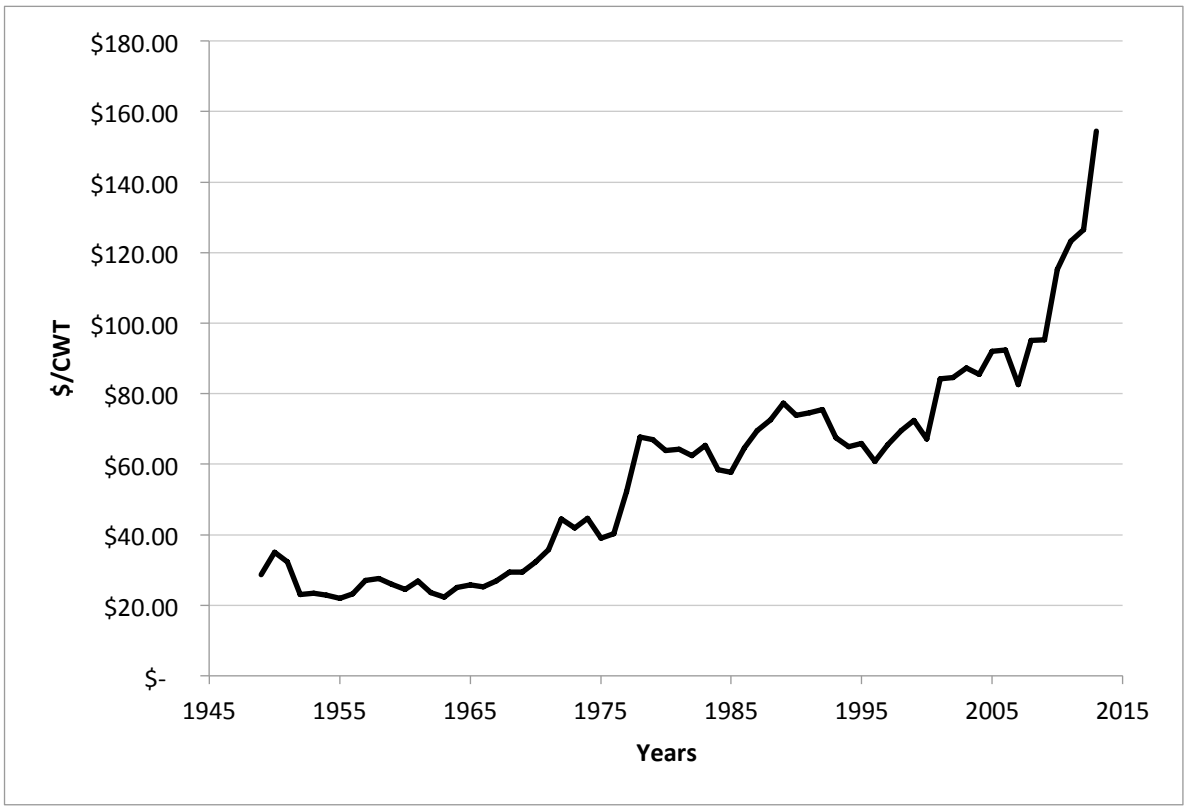

Figure 4. Average Cattle Prices, 1949-2013

Since 1949 nominal cattle prices have increased in the United States. Inventory liquidation has been driven by financial losses, but they have also been influenced by droughts, whether in cow-calf country or in the Corn Belt. The 2010-2013 drought pushed cattle inventories to the lowest level in decades and when coupled with lower corn prices pushed nominal prices to record highs in 2014 and 2015.

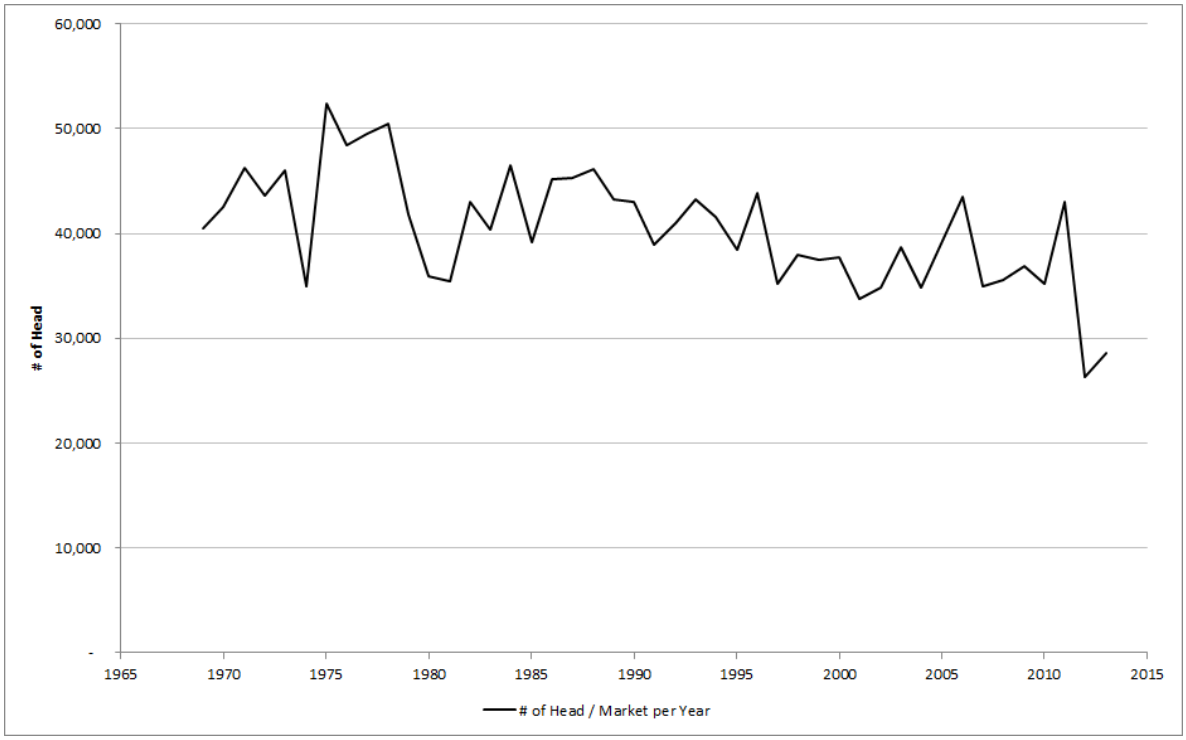

Figure 5. The Number of Head per Auction

With the number of auction barns on the decline over the past forty-five years, the a priori hypothesis was that auction markets would move more cattle. Figure 5 contains the number of head sold through auctions, on average. The average was calculated by dividing the cattle number by the number of auctions. The general trend for the state on average has been for auction barns to run fewer numbers. In a commission based business, auction barns marketing fewer numbers of head likely contributes to markets going out of business. Clearly, fewer markets are selling fewer head of cattle, on average. Other forms of marketing cattle such as video auction and direct sales may attribute a large part in the number of cattle marketed per auction to down from previous years.

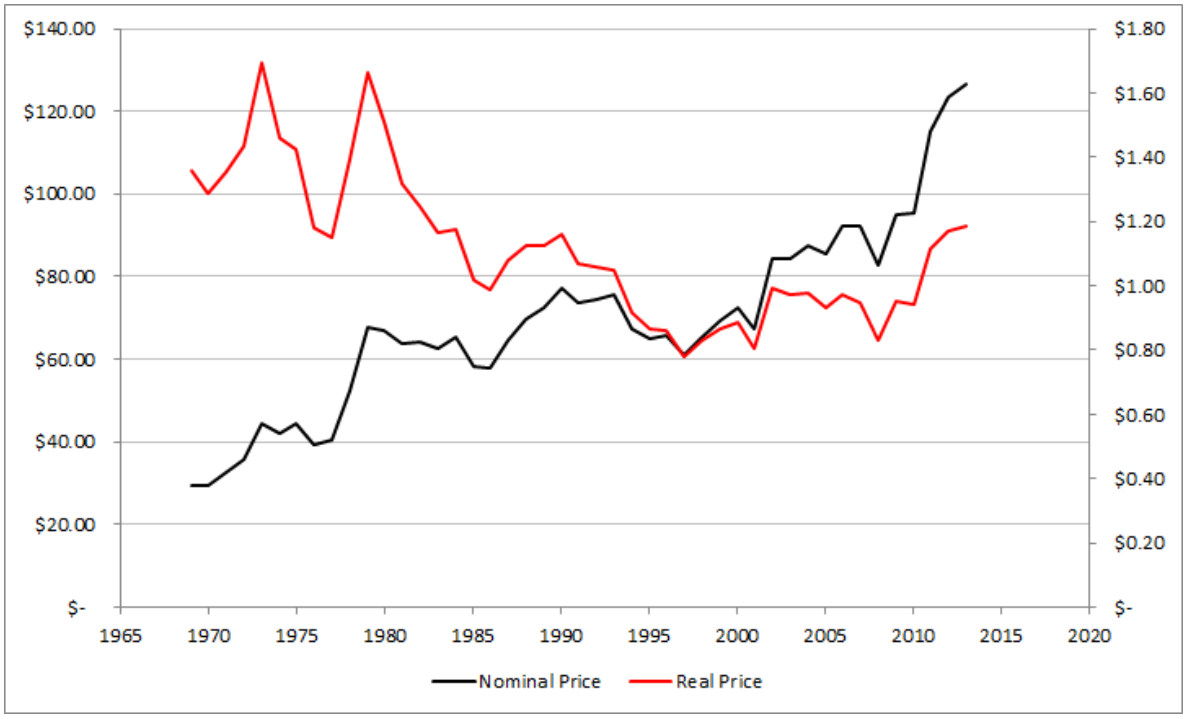

Figure 6. Nominal and Real Implied Revenue per Auction Market

In an attempt to estimate average auction market revenue as a cause of fewer markets, an implied revenue per market was estimated. Looking at implied revenue may indicate why there are fewer remaining auction markets. Using the average number of head sold per auction barn per year with an average price per hundredweight, and assigning a fixed weight per head, allows a rough estimate of revenue per auction market per year. It appears that nominal revenue per auction market has been on an upward trend (Figure 6). However, once taking inflation into account it is evident that, on average, auction barns are making less revenue over time. Real implied revenue was calculated by dividing the nominal revenue by the PPI deflator. Less real revenue per barn could be an indicator of why there are fewer auction markets in existence today than in the last forty-five years. Those auction markets with higher cost of production would cease to exist once revenue fell below variable production costs.

Conclusions

The number of auction markets has declined precipitously over the past forty-five years. Auction markets have declined in most regions of the state. It appears that changes in cattle numbers and how cattle are marketed has fueled this decline. Estimates of real revenue indicate that returns not keeping up with inflation has put further pressure on this market infrastructure. Throughout this dataset the primary focus was on cattle auction markets, for areas such as the Edwards Plateau, where sheep and goat production is higher, sheep and goats numbers could provide additional revenue for auction markets. Future work could look into determining if a reduction in sheep and goat numbers could have been a causative factor for auction markets in higher sheep and goat production areas to lose auction markets. Additional future work could look at areas where high population growth is evident; knowing counties that possibly were heavily impacted by urbanization could point to areas where auction markets may be lost in the future. More specific marketing questions could be formulated and included into the NAHMS survey to develop a more precise consensus on what method producers tend to lean to for marketing their cattle.

A survey of producers could inquire about factors producers may take into consideration in making their decision on marketing their cattle. Are there factors that make some markets better than others? A survey or interviews with market owners may provide more information on strategies successful markets have used to succeed in business when other markets have closed.

A shortcoming in the data is the lack of information on mergers and acquisitions in the industry. Anecdotally, some market owners have bought out others while keeping the physical market in operation. The rate of consolidation in ownership is likely more rapid

than the decline in the number of physical markets. Some markets have participated in their own video or internet auctions or merged with those companies.

The paper has been largely descriptive. Some more sophisticated econometric methods could be employed to evaluate the statistical significance of factors in market decline. Projections could be made to predict future auction market numbers.

In conclusion, observing numerous general trends associated with marketing cattle, it is evident the state is losing auction markets at an alarming rate, with many factors such as, beef cattle numbers, receipts per auction markets, and implied revenue per market contributing to their decline. But it appears that a critical mass of markets serving Texas cattle producers remains.

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