

Marketing Channels Compete for U.S. Stocker Cattle

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This study investigates the underlying reasons for a producer's choice of marketing channels for stocker cattle in the United States. In addition to traditional public auctions, private sales, video auctions, and Internet auctions have been recently used in the marketing of stocker cattle. Findings show that while the number of marketing options may have increased in recent years, only relatively large producers can actually take advantage of these options. The marketing options for smaller producers are still limited due to their relative size. Also, the number of cattle marketed privately and through video and Internet auctions is found to be positively correlated with herd size. In addition, the New Institutional Economics (NIE) provides insights into how herd size influences the choice of marketing channels.

Key Words: internet sales, livestock, marketing channels, New Institutional Economics, transaction costs

The number of marketing outlets available through which farmers can market stocker cattle has increased in recent years. As Schmitz, Schmitz, and Moss (2002) point out in their study of the marketing of stocker cattle in Florida, there are now at least four outlets available: public auctions, private sales, video auctions, and Internet auctions (Internet sales). In this analysis, we focus on the marketing of stocker cattle in the United States. While the number of marketing options has increased, the marketing choices available for smaller producers are still limited due to their relative size. There are economies of scale in marketing stocker cattle.

The marketing channels for stocker cattle in the top 15 U.S. cow-calf producing states are briefly described below. Based on personal interviews with cattle marketing experts, there are four major outlets through which stocker cattle are marketed:

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traditional public auctions, private sales, video auctions, and Internet auctions. However, in aggregate, over 50% of stocker cattle continue to be marketed through traditional public auctions. A theoretical model is then developed to explain a producer's choice of various marketing channels using transaction costs analysis, along the lines of the New Institutional Economics (NIE) (Williamson, 1975, 1979, 1985, 1998). Our statistical analysis supports the hypothesis that public auctions are less popular in states with cowherd sizes equal to or greater than 500 head, which is consistent with the NIE transaction costs framework.

What is somewhat surprising is that Internet sales are not used extensively in marketing stocker cattle. In many states, the percentage of stocker cattle marketed through Internet sales is less than 5%. We provide reasons why this is the case within the NIE framework.

Stocker Marketing Channels by State

The breakdown of stocker cattle marketed through local/public livestock auctions,¹ video auctions, Internet auctions, and private sales² in the United States for the top 15 beef cow producing states is detailed in table 1. The largest beef cow producing state is Texas, with over five million head, followed by Missouri and Oklahoma. Of the top 15 cow-calf producing states, Wyoming is ranked 15th with a total of 825,000 head. The top 15 states produce roughly 72% of all beef cattle in the United States.

To obtain a breakdown of the marketing mechanisms used for stocker cattle in the United States, we interviewed at least two livestock marketing experts in each of the top 15 beef cow producing states—one from the state Cattlemen's Association or one from the state's Stock Growers Association, and one from a state academic institution, including cooperative extension.

Each expert was asked to estimate the share of stocker cattle marketed in each state using each marketing channel (local livestock auctions, private sales, video auctions, and the Internet). Public auctions are the most common marketing outlet, followed by private sales, video sales, and finally Internet sales (table 1).³ When weighted by

¹ Public sales also include individual producers' calf sales, whereby their entire calf crops are marketed through public auctions. However, these sales represent a small percentage of total public auction sales. Often, the volume of sales is sufficient to market outside a public auction channel through private and other mechanisms. Moreover, public auctions do not necessarily imply herd sizes of less than 100 head.

² Many private sales are not direct from producer to buyer. Often, order buyers perform the function of an intermediary, bringing the buyer and seller together.

³ Telephone interviews were conducted in early 2002. The experts were given four marketing outlets and asked the percentage of stockers marketed through each. The average of the two estimates (one from the state's Cattlemen's Association or state's Stock Growers Association, and one from a state academic institution, including cooperative extension) for each state was used in this analysis. Some of the individuals interviewed wished to remain anonymous. Those who did not are acknowledged here: (a) J. Brinkmeyer, Iowa Cattlemen's Association, and Daryl Strohbehn, Extension Beef Specialist, Iowa State University; (b) Tonya Ness, South Dakota Cattlemen's Association, and Scott Bosse, University of South Dakota; (c) Jim Magana, Wyoming Stock Growers Association, and Dale Menkauf, University of Wyoming; (d) Chris Buechle, Missouri Cattlemen's Association, and Vern Pierce, University of Missouri; and (e) Steve McKinley, Oklahoma Cattlemen's Association, and Clem Ward, Oklahoma State University. This listing does not imply that these individuals are the only experts in the respective states having expertise in the marketing of stocker cattle.

Table 1. Marketing Mechanism and Herd Size for Stocker Cattle by State

Top 15 Cow-Calf Producing States	Herd Size ^a (000 head)	Marketing Mechanism			
		Local Auctions (%)	Video Auctions (%)	Internet Sales (%)	Private Sales (%)
1 Texas	5,465	61.00	16.50	9.00	13.50
2 Missouri	2,070	72.50	4.00	4.00	19.50
3 Oklahoma	1,950	60.00	9.00	3.50	27.50
4 Nebraska	1,910	60.00	5.00	4.50	30.50
5 South Dakota	1,809	72.50	5.00	2.50	20.00
6 Montana	1,531	12.50	15.00	5.00	67.50
7 Kansas ^b	1,524	55.00	15.00	10.00	20.00
8 Kentucky	1,060	88.00	1.50	3.00	7.50
9 Tennessee	1,035	77.50	11.50	0.00	11.00
10 North Dakota	1,002	72.50	8.80	3.80	15.00
11 Iowa	985	72.00	2.00	1.50	24.50
12 Florida ^c	975	55.30	19.80	7.30	17.70
13 Arkansas	929	82.50	4.00	1.00	12.50
14 Colorado	840	47.50	24.50	3.00	25.00
15 Wyoming	825	30.00	30.00	5.00	35.00
Weighted by No. of Beef Operations:					
Average		65.80	10.50	5.00	18.70
(Std. Deviation)		(25.769)	(12.319)	(6.160)	(18.987)
Weighted by No. of Calves Marketed:					
Average		60.80	11.40	5.10	22.70
(Std. Deviation)		(6.907)	(2.834)	(1.162)	(5.553)

Source: Authors' interviews, with marketing mechanism percentages based on averages of experts' opinions.

^a Herd size as of January 2001 (taken from "Livestock, Dairy, and Poultry Summary," *Florida Agricultural Statistics*).

^b The Kansas Livestock Association did not respond.

^c Results taken from a more detailed survey conducted in Florida (Schmitz, Schmitz, and Moss, 2002).

the number of cow-calf operations, roughly 66% of the stocker cattle are marketed through local public auctions, 19% are sold privately, 11% are sold through video auctions, and 5% are marketed through Internet sales. When weighted by the number of calves marketed, the respective percentages are 61%, 23%, 11%, and 5%.⁴ However, there are significant differences among states with respect to the use of marketing channels. For example, in Montana, 67.5% of the stockers are marketed privately, while in South Dakota, 72.5% are marketed through public auctions.

⁴ In personal conversation with John Van Dyke (USDA/Agricultural Marketing Service), he estimates that for the entire United States, roughly 50% to 55% of stocker cattle are marketed through public auctions, 30% through private sales (direct sales), 15% through video auctions, and less than 5% by Internet sales. These rankings, by marketing channel, are consistent with our rankings, even though the actual percentages differ slightly—in part because we focused only on 15 states, whereas Van Dyke's assessment included the entire nation. (Note: Our analysis is for stocker cattle actually sold, not for all calves, since we have no provision for retained ownership.)

Supply and Demand of Marketing Services for Stocker Cattle

Marketing mechanisms and their selection by producers are modeled below. Figure 1 presents the demand for and supply of marketing services in the stocker cattle market before the emergence of video and Internet auctions (for simplicity, we exclude private sales).⁵ Figure 1(a) depicts the demand for marketing services by large producers, D_L^A , at local livestock auctions, and figure 1(b) presents the demand curve for small producers, D_S^A . Horizontally adding the demand curve for large and small producers yields the total demand curve for marketing services of stocker cattle facing the local livestock auction houses, D_T^A , shown in figure 1(c). The intersection of the supply curve for marketing services by local livestock auctions (S^A) with the total demand curve for these services gives an equilibrium price of p^A (the per unit price of marketing services). At this price, q_L^A , large producers sell cattle through local livestock facilities, and at q_S^A , small producers sell cattle through local livestock facilities.

Figure 2 presents the stocker cattle market after the introduction of video and Internet auctions. Figure 2(a) depicts the demand from large producers for cattle marketing services through video and Internet auctions, D_L^V . The location and slope of this demand curve is dependent on transaction costs, which include transportation costs. To examine the implications of the location and slope of the demand curve for marketing services, consider the demand curve for marketing services for cattle sold through video and Internet auctions for small producers, D_S^V , depicted in figure 2(b). The demand curve for services through video and Internet auctions is much lower for small producers because, for these producers, cattle marketed through video and Internet auctions entail significant costs over public auctions. Specifically, smaller lots would be offered a lower price due to the diseconomies associated with shipping less than truckload lots if these auction houses allowed small lots to be listed at all.

Alternatively, joining with other producers to offer truckload lots could be costly. In most cases, the total supply of marketing services offered through video and Internet auctions [S^V in figure 2(c)] and the demand for such services through those auctions [D_T^V in figure 2(c)] will generate a price above the choke point (the point at which demand becomes zero) for the participation of smaller producers in these auctions. Thus, only larger producers will market cattle through video and Internet auctions, offering quantity q_L^V at price p^V , where p^V is the price for marketing services offered by video and Internet auctions.

The introduction of video and Internet auctions reduces the demand for cattle marketed through live auctions. As shown in figure 3(a), the use of video and Internet auctions causes the demand for marketing services through local livestock auctions to shift inward from D_L^A to D_L^M for large producers, shifting the total demand for

⁵ One reviewer raised the point concerning the extent to which video and Internet sales compete with public auctions or with private sales or both. The reviewer suggested private sales are more at risk for a loss of market share as a result of electronic marketing. While this is an interesting area of inquiry, we do not explore this issue.

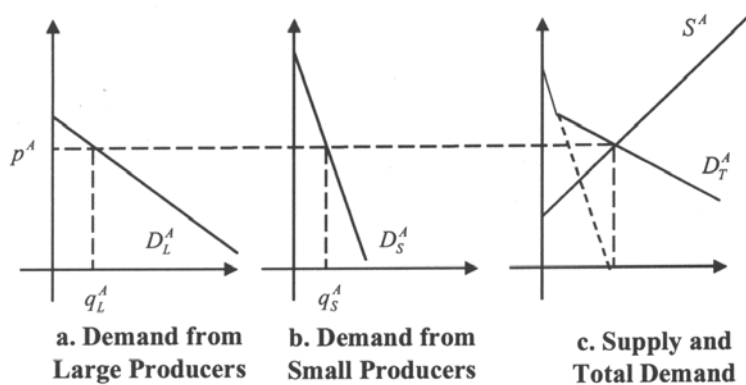


Figure 1. Supply and demand for marketing services for stocker cattle through local auctions prior to video and internet auctions

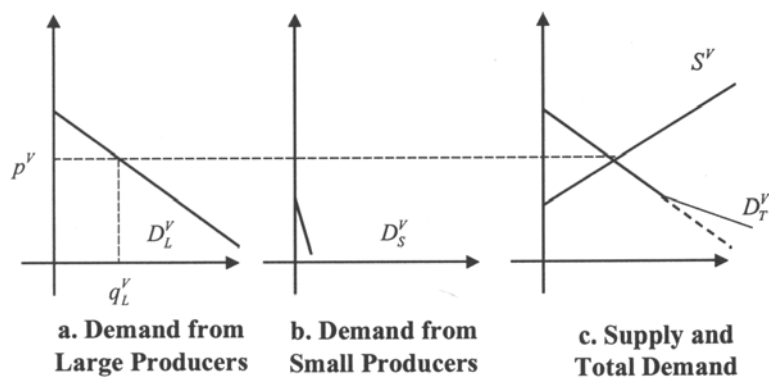


Figure 2. Supply and demand for marketing services for stocker cattle through video and internet auctions

marketing services in figure 3(c) from D_I^A to D_I^M . Given that the supply curve for marketing services is held constant at S^A , the corresponding price falls from p^A to p^M . Larger producers still market cattle through local livestock auctions (the quantity of stocker and feeder cattle sold by large producers through local livestock auctions falls from q_L^A to q_L^M), but these cattle represent “odd lots” cattle that do not fit the truckload lots for whatever reason. Further, the reduction in commissions causes the quantity of cattle marketed by smaller producers through local auction facilities to increase from q_S^A to q_S^M . However, this increase may be short-lived as auction facilities continue to close.

In the preceding analysis, the supply of services was modeled as upward sloping. Given this assumption, the transaction costs of selling cattle through public auctions fall as more and more producers sell through other marketing channels. Whether or not this is actually the case is an empirical question and is not dealt with here. Clearly, we could adapt the model to employ perfectly elastic or perfectly inelastic supply curves in order to adjust for different margins related to different types of auctions. Some may argue that the supply curve for marketing services is perfectly elastic (at least in the long run). If the supply of marketing services were perfectly elastic, there would be no long-run change in the quantity of marketing services demanded by small producers (q_S^M , q_S^A). At the same time, a perfectly elastic supply of marketing services means the price of marketing services in the local livestock auctions will not fall. Hence, the larger producers will market even fewer cattle through public auctions (as they shift to video or Internet auctions or private sales because of reduced transaction costs).

We now introduce the effect of scale economies that can reduce transaction costs. Figure 4 presents the marginal cost of production for two groups of producers. MC_0 is the marginal cost of production for smaller producers (producers with small cowherds), while MC_1 is the marginal cost of production for larger producers. We assume that larger producers obtain economies of scale in production, and therefore their marginal cost curve lies to the right of the marginal cost curve of the smaller producers (assuming a U-shaped, long-run cost curve). Next, it is assumed that \tilde{p} is the value of stocker cattle sold to backgrounders and/or feedlots.

Smaller producers incur a transaction cost of t_0 for sales through local auction houses. The final price realized by these smaller producers is $p_0 = \tilde{p} - t_0$. Per unit transaction costs for larger producers are lower than per unit transaction costs for small producers (Bailey, Peterson, and Brorsen, 1991). Larger producers incur a lower transaction cost (t_1), and receive a higher final realized price (p_1) for their cattle because they can take advantage of lower transaction costs offered by markets which are non-public in nature.

This scenario implies two distinct advantages to size. The first advantage is the typical increased returns to scale. If the prices were, in fact, the same for smaller and larger producers, the economic rent to larger producers (p_0cd in figure 4) is greater than the economic rent for smaller producers (p_0ab). The second advantage is a decrease in transaction costs. When larger producers market a portion of their cattle through alternative market outlets with lower transaction costs, the rents to larger

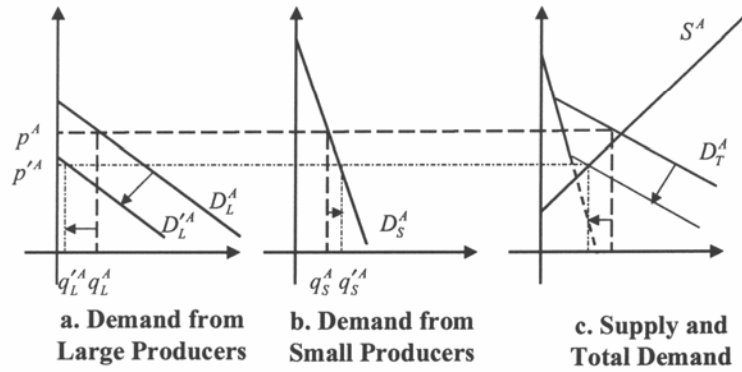


Figure 3. Supply and demand for marketing services for local livestock auctions after video and internet auctions

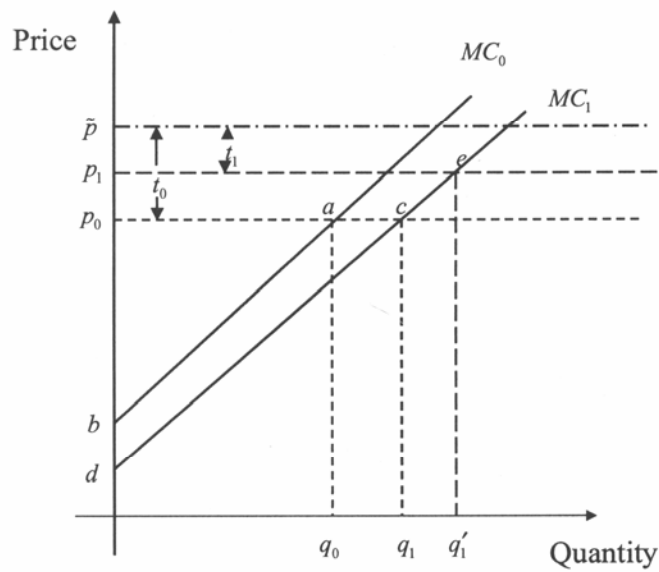


Figure 4. Reduced transaction costs and economic rents at the farm level

producers increase to p_1ed . Hence, the increased rents due to reduced transaction costs become p_1ecp_0 .

In addition to the direct transaction costs, the alternative marketing mechanisms for stocker cattle have associated indirect transaction costs such as quality differentiation and reputation effects (taking advantage of positive reputation effects is not confined to private sales). The theoretical analysis above can easily be adapted to include these indirect transaction costs. Our discussion of direct transaction costs suggests larger farmers have a significant advantage in marketing stocker cattle because they can access several markets, including video and Internet auctions with lower direct transaction costs. Smaller producers generally can only access public auctions.

When one adds indirect transaction costs, there also may be savings for large producers who can market outside of public auctions. In this case, the transaction costs savings t_0 in figure 4 contains two positive components. On the other hand, there is a possibility that the savings in direct transaction costs by going outside of public auctions is opposite in sign to the savings in indirect transaction costs. This possibility can be incorporated into figure 4 by viewing t_0 as the net savings in transaction costs (both direct and indirect). For example, Bailey, Peterson, and Brorsen (1991) compared prices received for cattle sold through video auctions with prices received for cattle in three large, traditional regional auctions. They argue that the most obvious difference affecting prices is in transaction costs (transportation, shrink, and commissions). Cattle sold through video auctions do not need to be shipped to a central location as they do for regional auctions, saving on both trucking costs and shrink.

One final issue involves the indirect transaction costs associated with auctions themselves. One conjecture from auction theory (Milgrom, 1989) is that the existence of different types of livestock auctions expands the number of potential buyers over what is available from other existing marketing mechanisms. However, McPherson (1956) found local livestock auctions in Florida yielded lower prices than other mechanisms. Price differences were also found to exist in a study by Hamm, Purcell, and Hudson (1985), where prices received through video auction sales exceeded those from traditional auctions. Again, Bailey, Peterson, and Brorsen (1991) reported price differences when they compared cattle marketed through video to traditional regional markets.

McPherson attributes his result to limited supplies and higher variability in the number of quality cattle offered at local livestock auctions. If a particular type of livestock auction is characterized as having small numbers of cattle or if the number of cattle offered at a given sale is highly uncertain, then buyers will not rely on these sales. As the number of buyers declines, consistent with auction theory, the pricing efficiency and expected price both decline. McPherson concludes larger auctions yield higher prices and are more efficient at price discovery. These findings are also consistent with more recent results documented by Troxel et al. (2002).⁶

⁶ As pointed out by a reviewer, the cause for price differences found by McPherson and others may not be attributed to the small supply effects on cost, but rather to the smaller supply effects on prices paid, which is dependent on the number of buyers and sellers. In this context, prices paid are more important for many producers than are direct marketing costs.

Producers maximize profits by choosing the mechanisms that yield the highest net price. This net price is determined by direct transaction costs (e.g., commissions and transportation costs) and indirect transaction costs [e.g., the effect of increased numbers of bidders as developed by Milgrom (1989) and Hobbs (1997)]. As depicted in figure 4, this net price received by small producers is p_0 , while the net price received by large producers is p_1 . The indirect transaction costs determine the market price \tilde{p} . The price received by large producers is then determined by lower direct transaction costs t_1 , and the net price received by smaller producers is determined by the larger direct transaction cost t_0 . As described by Koontz and Ward (1993), electronic marketing yields lower indirect transaction costs, resulting in a higher observed market price (\tilde{p}). Koontz and Ward also point out that for sheep producers using electronic markets, selling price is reported to be an important factor affecting their choice of marketing outlets. The market price in each marketing mechanism is influenced more by indirect transaction costs than by direct transaction costs. However, direct transaction costs also affect farmers' incomes.

Herd Size and the Choice of Market Outlets: An Empirical Model

A minimum number of animals are required for producers of stocker cattle to be able to access video and Internet market channel options. Due to transportation costs and other considerations, 100 calf-size lots of the same sex are usually required. This leads to our hypothesis that as herd size increases, the greater will be the use of marketing channels other than live auctions. Figure 5 shows the distribution of cowherd size and the percentage of cattle marketed for the 15 states under study. Montana markets only 12.5% of its stocker cattle through local livestock auctions, while North Dakota farmers market 72.5% of their stockers through the public auction (table 1). In Montana, 51% of the cattle are from herds of 500 or greater head, whereas only 24.4% of the cattle in North Dakota are from large herds.⁷ Consequently, the difference in the choice of marketing channels can be attributed, at least in part, to differences in herd size. The relationship between the choice of marketing channels and herd size is demonstrated by the correlation coefficients in table 2. The correlation between herd size and the share of private sales is negative, indicating that as the number of beef operations increases, the share of private sales declines.

In order to formally test the relationship between cowherd size and choice of marketing outlet, we regress the share of cattle sold in each marketing mechanism on the share of cattle in cowherd sizes of 500 or greater in each state.⁸ This model takes the following form:

⁷ A reviewer noted the predominance of private sales in Montana may be partially attributed to other factors unique to Western states. For example, cattle producers are less geographically concentrated in the West, contributing to greater distances between livestock auctions. This increased distance between markets also makes private sales more attractive.

⁸ The USDA keeps track of producer size by breaking producers up into several categories. Two of the categories used by the USDA are ranches with between 500 and 1,000 head, and ranches with more than 1,000 head. Therefore, based on USDA data, our definition of a large cowherd size, for the purposes of this analysis, includes the aggregate of both categories.

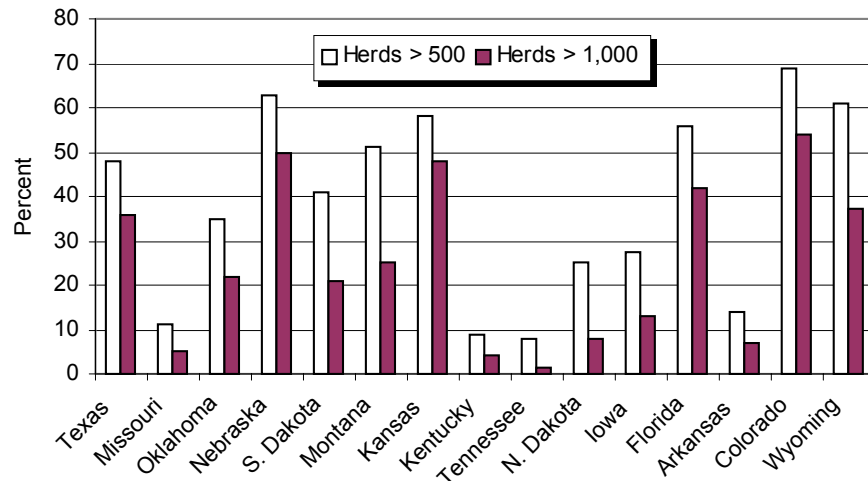


Figure 5. Distribution of herd size and stocker cattle marketed by state

$$(1) \quad Y_{ij} = \alpha_{ij} + \beta_{ij} S_j + e_{ij},$$

where Y_{ij} is the proportion of stocker cattle in state j sold through marketing channel i , α_{ij} is the constant associated with market i in state j , S_j represents the share of producers in state j with a cowherd size of 500 or greater, β_{ij} is the slope associated with market i in state j , and e_{ij} is a random error term. Performing ordinary least squares, one for each marketing channel i , yields estimates as follows:

$$(2) \quad \hat{Y}_i = \hat{\alpha}_i + \hat{\beta}_i S,$$

where $\hat{\alpha}_i$ is the constant associated with marketing channel i , $\hat{\beta}_i$ is the slope associated with marketing channel i , and S is the average share of producers with cowherd sizes of 500 or greater.⁹

The ordinary least squares results for each of these four regressions are reported in table 3 (all 15 states are used in the estimation). The regression results based on relative numbers of cattle operations are presented in the first numeric column, while the second column presents the results when the data have been weighted by the number of calves marketed in each state. Weighted least squares analysis was chosen so that the regression results would reflect the marketing decisions at the producer level. Two alternative weighting methods are used in order to account for differences in the relative cattle numbers in each state. In the first method, the states are weighted

⁹ We recognize that the dependent variable is limited between zero and one, but given the small sample size, the relative gain in efficiency from a limited dependent variable technique is dubious.

Table 2. Simple Correlation Coefficients: Market Shares and Herd Size

Variable	Marketing Mechanism				Herd Size	
	Local Auctions	Video Auctions	Internet Sales	Private Sales	No. of Beef Operations	No. of Beef Cattle
Local Auctions	1.000	! 0.713***	! 0.419	! 0.874***	0.261	! 0.034
Video Auctions		1.000	0.438	0.305	! 0.120	! 0.012
E-Commerce			1.000	0.124	0.317	0.496
Private Sales				1.000	! 0.349	! 0.042
Beef Operations					1.000	0.880***
Beef Cattle						1.000

Source: Authors' computations from table 1.

*** Denotes statistical significance at the 0.01 level of confidence.

Table 3. Regression Results: Effect of Herd Size on Choice of Marketing Mechanism, All 15 States Under Study (% of cattle in herds \$ 500)

Description	Weighted by No. of Beef Operations		Weighted by No. of Calves Marketed	
	Coefficient	Std. Error	Coefficient	Std. Error
Sold Using Local Auctions:				
Constant	0.843***	0.049	0.851***	0.088
Share of Herds \$ 500 Head	! 0.542***	0.125	! 0.608***	0.198
R^2		0.560		0.375
Sold Using Video Auctions:				
Constant	0.027	0.027	0.019	0.037
Share of Herds \$ 500 Head	0.228***	0.069	0.236**	0.084
R^2		0.418		0.327
Sold Using Internet Sales:				
Constant	0.010	0.013	0.017	0.016
Share of Herds \$ 500 Head	0.118***	0.034	0.085**	0.037
R^2		0.442		0.239
Sold Using Private Contract:				
Constant	0.120***	0.052	0.112	0.085
Share of Herds \$ 500 Head	0.196	0.133	0.287	0.194
R^2		0.077		0.078

Source: Authors' computations.

Notes: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels of confidence, respectively.

by number of beef operations. This method disregards differences in herd size and implicitly places a disproportional emphasis on smaller herds. In the second method, the states are weighted by calf numbers. This method places more emphasis on larger operations. The results are fairly consistent regardless of the weighting.

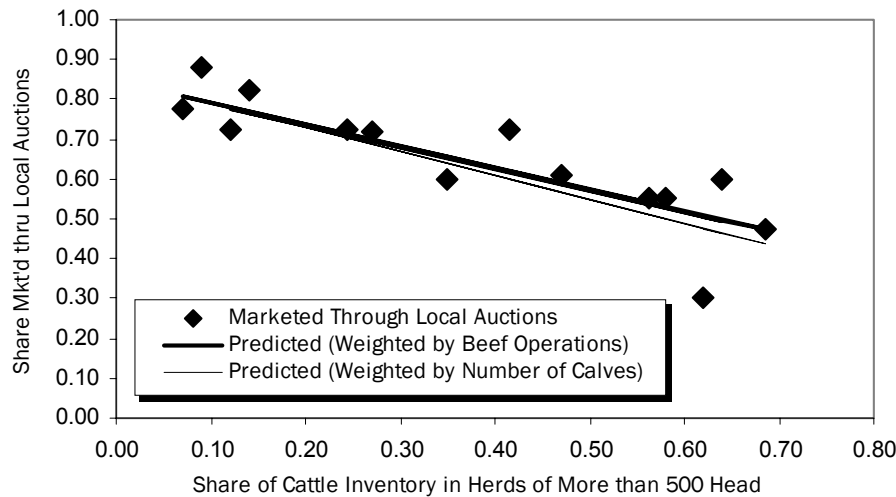


Figure 6. Herd size and the share of stocker cattle marketed through local auctions

Based on the regression results, the share of cattle marketed through local livestock auctions decreases as the share of large herds in a particular state increases (table 3). These results support the conjecture that owners of larger herds prefer truckload-marketing outlets. The empirical relationship between herd size and share of stocker cattle marketed through local auction houses is presented graphically in figure 6. This relationship appears to be fairly robust, with the possible exception of a single outlier (Montana).¹⁰

The results also indicate that the share of cattle marketed through video and Internet auctions increases as herd size increases. While both results are statistically significant, the estimated parameter for video auctions is roughly three times larger than for Internet auctions. This finding supports the preference of producers for video auctions over Internet auctions. However, a time series is needed to determine if this preference is stable, or whether farmers will increase their use of Internet auctions over time.

Table 3 also reports the results of the effect of herd size on the share of private sales. Unlike the results for the other marketing mechanisms, the relationship between herd size and the share of cattle marketed by private sales is not statistically significant at the 0.10 confidence level. Two possible explanations can be suggested for this lack of significance. The first explanation is purely statistical. Specifically, the prevalence of private sales in Montana negatively impacts the statistical relationship, which is somewhat counterintuitive since Montana has both the largest herd size and level of private sales observed in the sample. The Cook's *D*-statistic for Montana is

¹⁰ To examine the influence of Montana, we applied Cook's test (Cook, 1977, 1979). The Cook's *D*-statistic for the regression on the share of cattle marketed through public auctions for Montana was 0.181, distributed $F_{1,14}$. Thus, the hypothesis that Montana has a detrimental effect on the regression results is rejected.

0.169 when the sample is weighted by the number of beef operations, and is 0.534 when the sample is weighted by the number of stockers marketed. Another potential explanation for the statistically insignificant relationship between herd size and private sales is that, unlike video and Internet auctions, private sales entail a fairly diverse group of marketing relationships which vary across herd size. At one extreme, private sales occur through truckload sales by large producers based on reputation. At the other extreme, private sales can also represent a small-scale transaction between neighboring producers. Historically, these small, direct producer-to-producer sales probably represent the majority of the sales observed by Williams and Stout (1964) that dominated the stocker cattle market in the 1950s. Undoubtedly, these small producer-to-producer sales have become less important through time, but the existence of these types of transactions introduces additional noise to the regression results.

Table 4 presents the regression results, excluding Montana. Despite the Cook's *D*-statistic, once Montana is excluded from the data, the above specification yields a positive coefficient on herd size which is statistically significant at the 0.10 level of confidence.

Transaction Costs and the New Institutional Economics (NIE)

The theory developed earlier focused on the role of transaction costs in the choice of market selection. As shown above, the larger the herd, the greater is the tendency for farmers to market cattle privately and through Internet and video mechanisms. In this context, transaction costs play a major role. For example, in order for a producer to be able to participate in video or Internet auctions, 100 calf-size lots of the same sex are usually desired because efficient transportation of cattle requires the number of calves be large enough to completely fill a large truck. Thus, even though marketing outside of public auctions may reduce marketing costs, these markets are not available to small producers.

D. Gale Johnson (1989), in his study on the efficiency of the U.S. cattle industry, predicts that the level of beef production and consumption in the United States at the turn of the century will be determined by the beef producers in reducing their production costs, and the ability of processors and merchandisers to reduce their costs. Hence, the relative competitiveness of the beef sector is dependent in part on the technical efficiency of its marketing mechanisms, recognizing that, for live cattle, marketing costs are a relatively small portion of total industry costs (i.e., production, marketing, processing, and distribution costs).

Economic efficiency is contingent upon transaction costs. The NIE distinguishes between direct and indirect transaction costs (Williamson, 1975, 1979, 1985, 1998). Direct costs include transportation costs and commission charges, while indirect costs include quality and reputation effects. As we have argued, transaction costs are important in the selection by producers of a marketing channel for selling stocker cattle. The NIE provides a framework for separating those factors determining the market price versus additional factors impacting the net producer price.

Table 4. Regression Results: Effect of Herd Size on Choice of Marketing Mechanism, Excluding Montana (% of cattle in herds \$ 500)

Description	Weighted by No. of Beef Operations		Weighted by No. of Calves Marketed	
	Coefficient	Std. Error	Coefficient	Std. Error
Sold Using Local Auctions:				
Constant	0.838***	0.031	0.843***	0.045
Share of Herds \$ 500 Head	! 0.493***	0.079	! 0.506***	0.103
\bar{R}^2	0.744		0.638	
Sold Using Video Auctions:				
Constant	0.027	0.028	0.020	0.039
Share of Herds \$ 500 Head	0.228***	0.072	0.233**	0.089
\bar{R}^2	0.407		0.311	
Sold Using Internet Sales:				
Constant	0.009	0.014	0.017	0.017
Share of Herds \$ 500 Head	0.120***	0.035	0.088**	0.039
\bar{R}^2	0.453		0.244	
Sold Using Private Contract:				
Constant	0.126***	0.035	0.121**	0.041
Share of Herds \$ 500 Head	0.145	0.089	0.185*	0.093
\bar{R}^2	0.113		0.185	

Source: Authors' computations.

Notes: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels of confidence, respectively.

In a study applying the transaction costs paradigm to slaughter cattle markets in the United Kingdom, Hobbs (1997, p. 1083) states, "Transaction cost economics, unlike traditional neoclassical theory, recognizes that commercial activity does not occur in a frictionless environment." (Note that part of this friction entails the cost of information associated with determining a price for the good.) She develops a list of transaction cost variables, divided into three parts: information costs, negotiation costs, and monitoring costs.

Hobbs looks at slaughter cattle markets in the United Kingdom, which are different than the markets for stocker cattle in the United States. However, several transaction costs developed in Hobbs' work are relevant for our purposes. In terms of information costs, price uncertainty, auction price information costs, and direct-sale price information costs apply to the choice of marketing channel for stocker cattle in the United States. Negotiation costs include auction transportation costs, auction transportation effort, direct sale transportation effort, sales commissions, speed of payment, the risk of non-sale at auction, unequal bargaining power in private sales from small producers to large buyers, frequency of auction sales, time spent at the auction, and adequate number of buyers at the auction. Monitoring costs include shrinkage losses, carcass damage, and quality information uncertainty.

The differences in direct marketing (transaction) costs associated with each market outlet are primarily the result of differences in transportation costs and commission charges. One of the largest direct marketing costs associated with local livestock

auctions is the cost of transportation. When producers market cattle through a local livestock auction, they transport cattle to the auction facility. Cattle are then unloaded, sold, and reloaded for shipment to some final destination. Stockers purchased are moved from the auction facility to the purchaser's facility. These transportation costs can be much higher than under private sales where cattle move directly from seller to buyer with only one load-and-unload transaction.

The actual freight charge may be a minor part of the shipping cost. As cattle are shipped and sorted, they lose weight (suffer shrinkage) and have a higher probability of disease (Nyamusika et al., 1994). Pollreis et al. (1986) note feedlot operators often perceive cattle sold through traditional auctions as being "severely stressed and breaking with disease immediately upon or soon after arrival" at the feedlot. Also, as pointed out by Pate and Crockett (2002), cattle bought directly from farmers tend to have fewer health problems than cattle sold at regional auctions. When sold via video or Internet auctions in truckload lots, cattle are only moved once, eliminating one source of shrinkage and minimizing the exposure to disease. Hence, *ceteris paribus*, cattle marketed through video or Internet auctions as truckload lots should earn a higher price.

The differences in commissions charged in different marketing outlets demonstrate the advantages to marketing by truckload lots. Cattle marketed through video or Internet auctions receive a better price if the lot weights are approximately 48,000 pounds.¹¹ Cattle are delivered from the producer's ranch and trucked directly to the buyer's facilities. A pen of cattle sold through a video auction in Florida can be loaded onto a truck from the farm and shipped directly to a feedlot hundreds of miles away (e.g., the Texas Panhandle), thus avoiding many of the commission charges associated with public auctions. Commissions charged by video or Internet auctions are lower than commissions charged when selling stocker cattle through traditional public auctions, at least in Florida (Schmitz, Schmitz, and Moss, 2002).¹²

Video auctions typically charge a catalogue fee. For example, the Superior Livestock Auction of Denver, Colorado, and Dallas, Texas, charges a \$2 per head fee for video advertising. If the cattle are actually sold, this fee is credited against a 2% sales commission. Superior Livestock Auction charges a 1.5% commission without a catalogue fee for Internet sales. In contrast, Florida's Ocala Livestock Auction, for example, charges 4% commission per head. This finding is consistent with Bailey, Peterson, and Brorsen (1991) who found that the net prices paid by buyers, and received by sellers, in video auctions exceeded the prices paid in live cattle auctions.

We do not perform a detailed assessment of the indirect transaction costs associated with marketing feeder cattle. It may well be, for example, that private sales have larger indirect costs than public auctions. However, even though indirect

¹¹ As indicated by one reviewer, Superior Livestock Auction (the nation's largest video auction house) does not limit the number of animals sold in a lot, but lots of 48,000 pounds are recommended to minimize shipping costs. This weight is equivalent to roughly 100 stocker cattle.

¹² Within traditional local auction houses, commissions vary significantly by region. For example, at the Ocala Livestock Auction in Ocala, Florida, the commission is 4% per head. However, other auction facilities have sliding scales depending on the number of cattle sold.

costs may be higher for a particular marketing outlet, they may not outweigh the savings in direct costs from using this marketing channel. A complete examination of price discovery and related efficiencies in the marketing of stocker cattle requires a knowledge of the indirect transaction costs associated with each marketing outlet. This also must be linked to price discovery through the Chicago futures market.

Conclusions

Significant differences exist in the use of stocker cattle marketing outlets in the United States. States with relatively large cowherd sizes generally use non-public auctions in the marketing of stocker cattle, including private sales. Using the transaction cost approach from the New Institutional Economics, we present arguments why this is the case. However, the focus here has been largely on direct transaction costs. More work is needed on indirect costs by marketing outlet to determine the degree to which current marketing arrangements for stocker cattle are efficient. For example, even though the direct transaction costs are greater for public auctions versus video sales, the associated indirect costs may tip the scale in favor of either public auctions or video sales. Direct transaction costs alone are insufficient to determine the efficiency of various marketing channels.

One interesting observation is the small role played by Internet sales in the marketing of stocker cattle. In order for Internet sales to grow, this channel must compete with video and private sales, given that producers with relatively smaller herds tend to market their cattle through public auctions. Internet sales are at a disadvantage to private sales and video auctions because a certain level of technological competency is required in order to participate in an Internet auction. Not all U.S. farmers actively use computer technology for their farm businesses. Moreover, the slow speed of dial-up internet connections used by most producers makes the use of Internet auctions technologically infeasible in many instances due to a disruption in service and/or the extensive delay from the time a bid is sent to the time it takes to reach the auction site, be processed, and the results sent back to the producer.

Reputation effects may impact prices received for stocker cattle. However, it is unclear which marketing mechanism will generate the greatest benefit from a positive reputation effect (recognizing that cattle ranchers and order buyers may have negative reputation effects as well). A rancher with a positive reputation effect will realize a higher price across all marketing channels, and thus is not confined to the private sales market. But the relative impact of this reputation effect through the various marketing channels is beyond the scope of the current study and is left to future research.

The much larger prevalence of video auctions as opposed to Internet auctions may be attributed to the fact that the technology required to participate in video auctions is less expensive and has been proven over time.¹³ However, quality uncertainty

¹³ In Tennessee, 20% of stockers were marketed in 2001 using video auctions, but this percentage is expected to increase. Efforts are being made to group cattle so that minimum sized lots can be achieved, and sold through video. This objective has been facilitated through various institutions, including the Giles County Alliance.

remains an important issue for both video and Internet auctions, due to the limited amount of information available in video clips employed in both types of auctions. This may be one explanation for the relatively slow rate of adoption of these marketing channels when compared to the traditional live cattle auction. Nevertheless, Bailey, Peterson, and Brorsen (1991) argue that additional information, not available in traditional auctions, may be available in video auctions (e.g., vaccination records, place of origin, and current feed regimen). This information could be used to improve animal health and feed lot efficiency.

There are additional factors which explain the relatively low percentage of cattle sold through Internet auctions. These include several types of indirect transaction costs, such as: (a) slow and unreliable Internet connections cause unacceptable delays between the time the producer submits a bid and the time the results are received; (b) the relatively low level of computer literacy among cattle producers; (c) minimum herd size lots are needed; (d) the uncertainty in the degree of security involved with a given transaction; (e) uncertainty in the ability to actually collect payment; (f) the quality and reputation of the cattle sold by sellers in many cases are unknown to buyers; and (g) if there are not a large number of buyers and sellers involved in an Internet auction, the price discovery mechanism will not be efficient and producers would receive a lower price than they would through other marketing channels.

References

- Bailey, D. V., M. C. Peterson, and B. W. Brorsen. (1991). "A comparison of video cattle auction and regional market prices." *American Journal of Agricultural Economics* 73, 465–475.
- Cook, R. D. (1977). "Detection of influential observations in linear regression." *Technometrics* 19, 15–18.
- . (1979). "Influential observations in linear regression." *Journal of the American Statistical Association* 74(365), 169–174.
- Hamm, S. R., W. D. Purcell, and M. A. Hudson. (1985). "A framework for analyzing the impact of anonymous bidding on prices and competition in a computerized auction." *North Central Journal of Agricultural Economics* 7, 109–117.
- Hobbs, J. E. (1997). "Measuring the importance of transaction costs in cattle marketing." *American Journal of Agricultural Economics* 79, 1083–1095.
- Johnson, D. G. (1989, October 25). "Competitive position of beef in the U.S. meat sector." In D. G. Johnson, J. M. Connor, T. Josling, A. Schmitz, and G. E. Schuh (eds.), *Beef in a Competitive World: Final Report of the NCA Beef Industry Concentration/Integration Task Force* (Chapter III). Report prepared for the National Cattlemen's Association Executive Committee, Englewood, CO.
- Koontz, S. R., and C. E. Ward. (1993). "Electronic market use by Oklahoma lamb producers." *Journal of Agricultural and Resource Economics* 18(1), 70–85.
- McPherson, W. K. (1956). "How well do auctions discover the price of cattle." *Journal of Farm Economics* 37, 30–43.

- Milgrom, P. (1989). "Auctions and bidding: A primer." *Journal of Economic Perspectives* 3, 3–22.
- Nyamusika, N., T. H. Spreen, O. Rae, and C. B. Moss. (1994). "A bioeconomic model of bovine respiratory disease complex." *Review of Agricultural Economics* 16, 39–53.
- Pate, F. M., and J. R. Crockett. (2002). "Value of preconditioning beef calves." Bulletin No. 799 (EDIS document AN042), Department of Animal Sciences, University of Florida, Gainesville. Online. Available at <http://edis.ifas.ufl.edu/AN042>.
- Pollreis, J. P., T. Jordan, D. T. Bechtol, and R. N. Ballinger. (1986). "Arrival procedures for incoming feedyard cattle." *Animal Health and Nutrition* 67, 23–27.
- Schmitz, T. G., A. Schmitz, and C. B. Moss. (2002, February 10). "The potential role of E-commerce in Florida's cattle market: Theory and application." Paper presented at the CARD Symposium on E-Commerce in Agriculture, San Diego, CA.
- Troxel, T. R., M. S. Gadberry, S. Cline, J. Foley, G. Ford, D. Urell, and R. Wiedower. (2002). "Factors affecting the selling price of feeder cattle sold at Arkansas livestock auctions." Working paper, University of Arkansas Cooperative Extension Service, Little Rock.
- Williams, W. F., and T. T. Stout. (1964). *Economics of the Livestock-Meat Industry*. New York: The Macmillan Company.
- Williamson, O. E. (1975). *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: The Free Press.
- . (1979). "Transaction-cost economics: The governance of contractual relationships." *Journal of Law and Economics* 22(2), 233–261.
- . (1985). *The Economic Institutions of Capitalism*. New York: The Free Press.
- . (1998). "The institutions of governance." *American Economics Review* 88, 75–79.