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Estimating the Value of Source Verification of Feeder Cattle

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Source-verified (SV) feeder cattle auctions were held in Bloomfield, Iowa, each October, November, and December from 1997–2000. This study compares price data from these SV auctions to traditional auctions at the same location to determine whether a premium exists for SV feeder cattle. Hedonic pricing models were estimated to evaluate the price effects of lot characteristics, market forces, and type of market (SV versus regular sale). The SV cattle were sorted and pooled into large lots. The larger lot size, consistent with early research, earned large price premiums. After accounting for lot size, the SV premium for lighter cattle (< 650/600-pound steers/heifers) was estimated at $1.30/cwt, and was significant. The SV premium over and above lot size was not significant for heavier feeder cattle.

Key Words: auction, cattle, hedonic pricing model, markets, source-verified auction

The U.S. cow-calf sector is a significant part of the agricultural economy. There are over 800,000 farms and ranches with beef cows which produce approximately 30 million beef calves annually [U.S. Department of Agriculture (USDA), 2002a]. Although there are thousands of operations that feed cattle to slaughter weight, over 85% of the cattle are fed in approximately 2,000 feedyards with a one-time capacity of 1,000 head or more (USDA, 2002b). Finally, at the packer level, only four companies process approximately 80% of the cattle in 30 facilities. This funnel of cattle from birth to harvest is further complicated when one considers that nearly 30% of the calves originated on approximately 640,000 operations with fewer than 50 cows, and 60% of the fed cattle were fed by fewer than 260 feedyards.

This industry structure requires combining of feeder cattle from many different origins prior to, or at the feedlot, to produce a relatively uniform year-round supply of cattle in lot sizes which are efficient to transport and manage. Auction markets have traditionally played a significant role in assembling feeder cattle from various sources into a central location to accommodate competing buyers. The challenge to the industry is to effectively communicate the characteristics that may be valuable,

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but often not readily visible to a buyer. These include genetics, vaccination program, previous nutrition, etc.

Because buyers commingle small groups into larger lots to fill trucks and pen space, the market may also inadequately reward sellers who strive to offer high quality feeder cattle. Thus, market signals to the sellers may be unclear concerning the value of their efforts, investments, and management practices. One method of improving communication between the feeder cattle seller and buyer and rewarding quality is through a process known as source verification.

Source verification (SV) has various definitions, but for this discussion, it is defined as the process of identifying the origin and ownership of cattle and the management practices utilized by the producer. Typically, sellers who participate in SV agree to a number of conditions concerning the health, management, handling, and marketing of their cattle. The organizers of an SV program, which may include auction market operators, producer organizations, extension service, or others, set these standards in advance. The animals are individually identified by an ear tag, which allows each animal to be verified back to its farm of origin. In addition to providing the buyer with more information about the animals from an individual seller, SV programs with common management practices make it possible to assemble (or pool) cattle into larger uniform groups from several smaller operators. The larger size lots of uniform weight, type, and managed cattle give buyers more convenience and greater confidence in the cattle purchased, which is expected to increase the price prospective buyers are willing to offer (Miller, 1995).

This study evaluates the Iowa-Missouri Beef Improvement Organization (IMBIO) SV program. The IMBIO program was jointly developed in the mid-1990s by the Bloomfield, Iowa, auction market, area producers, and university extension. The IMBIO SV program consists of clearly defined standards regarding health program, bull standards, cattle management, and marketing procedures to which participating producers must adhere. Required vaccinations are administered by selected veterinarians who participate in the program and who tag the calves with a special IMBIO ear tag. The tag has a unique animal identification number which can be traced back to the individual farm. The tag also has the phone number of the auction market to facilitate the traceback of the tagged animal if a problem arises at the feedlot or the packing plant. The traceback feature creates the source verification this study intends to evaluate.

The cost of the program is approximately $1/head for the tag. The cost of the vaccination and sales commission is the same as it is for producers who are not in the program. The Bloomfield Auction Market serves as the gatekeeper of information by matching the individual tag number on the calf to a particular farm and participating veterinarian. This information is available to all buyers if a question should arise. It also provides credibility and confidence in the program by being readily accessible via a single telephone number. Buyers and sellers are informed in advance about special IMBIO SV sales dates. On such days, only IMBIO SV feeder cattle are sold.

On the day of the IMBIO sale, sellers deliver feeder cattle to the auction market where they are weighed and then sorted by sex, frame size, muscle score, breed/color,

and weight. They are then grouped with other animals based on these variables to obtain truckload (or half load) lot sizes. For example, a sorted lot would weigh 50,000 pounds and contain approximately 90 head of medium-to-large frame #1 black steers weighing 525–575 pounds. Such a lot may combine cattle from 15–20 different farms that received the same health program and bull standards, but the individual animal can be traced back to the farm of origin. Although the sorting process takes all day, it takes only slightly over an hour to sell 2,000 head of cattle in large uniform lots.

The objectives of this study are to determine (*a*) if IMBIO calves receive higher prices than calves sold in regular sales, and (*b*) if higher prices are paid (for what attribute) and whether the results differ by class of feeder cattle. We begin with a brief review of feeder cattle marketing practices and discussion of previous research on factors determining feeder cattle prices. Then data from the IMBIO SV sale in southern Iowa from 1997–2000 are compared with regular sales at the same location to determine if SV results in higher prices compared with traditional sales methods.

Feeder Cattle Marketing

The majority of feeder cattle are sold through auction markets in the United States where assembly occurs. Individual lots of cattle are typically quite small because most cow herds are small. The calves are then sorted by sex, weight, and perhaps frame score, muscling, and color, before they are sold. Buyers, feedlots, stocker operations, or order buyers representing them, buy individual lots at different times throughout the day to assemble a group of uniform cattle from numerous sources.

The assembling or pooling process is not the best of management practices. As Moseley (1993) notes, bunching of cattle from several sources can create a conducive environment for the introduction and spread of diseases and parasites. Buyers generally vaccinate all their animals once they assemble them in their feedlots as an insurance against possible outbreaks, even though some of the animals may already have been vaccinated. Buyers must do this because the animals are bought from commingled lots and have not received standard verifiable treatment.

Numerous programs have been developed to add value to the feeder cattle through certification. The Iowa Green Tag feeder cattle program, initiated in the 1960s and administered through veterinarians, certified that the cattle had received a specified vaccination program. If the feeder cattle were also weaned and started on feed for at least 30 days, they were also designated "pre-conditioned." Auction markets often featured "green-tagged" calves during a regular sale or held a special sale offering only green-tag calves. Meanwhile, the debate over the value of a green-tag calf continues after 30 years (Ensley, 2001). Source verification of individual herds is gaining popularity in feeder cattle management and marketing because it provides standard treatment and greater information about the animal to the buyer.

Direct farm sale of feeder cattle is experiencing increased patronage. This approach is more suited to larger feeder cattle producers because they can offer uniform loads

of healthy feeder cattle. Miller (1995) has estimated premiums ranging from $2 to $6/cwt for direct farm sales. This kind of sale offers larger lot size, and is "source verified" (i.e., feeder cattle are from one farm or producer and the buyer can easily trace cattle to the source).

Other programs have focused more on the lot size issue—often without requiring specific health or management practices. Graded sales aim to assemble like kinds of cattle into uniform groups based on frame size, hair color, sex, and weight from small to mid-sized cow-calf operations. Miller (1997) found that premiums for graded calves sold in larger pens ranged from $4 to $8/cwt. Lichtenwaler (1997) included marketing through graded sales in the management practices which can increase the profitability of feeder cattle operations, and reported graded sales average 2–8 cents/pound over weekly sales (normal auctions). Graded sales offer buyers the convenience of pre-sorted uniform lots, but little additional information. The present study seeks to determine if buyers are willing to pay more for feeder cattle which are sold in large lots and are source verified.

The Pricing Model

The model used in this study is the characteristic (hedonic) feeder cattle pricing model used by Buccola (1980); Schultz and Marsh (1985); Schroeder et al. (1988); Turner, McKissick, and Dykes (1993); and Kansas Cooperative Extension Service (1996), among others. Feeder cattle price is determined by a combination of cattle and lot characteristics, and market forces. Cattle and lot characteristics include health status, frame, breed or color, weight, sex, age, fill, presence or absence of horns, lot size, and uniformity within the lot. Market characteristics include, among others, time of sale, time of year, fed or feeder cattle futures price, spot or futures price of corn, total number of buyers present at an auction, the number of lots offered for sale for a given day, uniformity of lots, location of auction market, and prevailing market conditions on the day of sale. The seller can influence the cattle and lot characteristics, but has little or no influence on the market conditions. For instance, the seller has some control on the breed, sex, weight, age, or color of the animals to be sold, but cannot influence the price of corn or the time of day the cattle will be sold (Turner, McKissick, and Dykes, 1993).

Findings of previous studies involving cattle and lot characteristics suggest steers receive higher prices than heifers, and healthy or weaned animals also receive higher prices. Many non-uniform weights are discounted, while lightweight cattle and feeder cattle without horns bring higher prices. Larger lot sizes have been shown to receive price premiums. Fleshy or fat cattle are discounted in the spring, but are discounted less in the fall. Thin and very thin cattle receive no significant discount compared with the average feeder cattle in the spring, but they are discounted in the fall. Earlier studies found Hereford and Angus breeds received premiums, while Brahmas and some dairy breeds were discounted (Buccola, 1980; Schultz and Marsh, 1985; Schroeder et al., 1988; Turner, McKissick, and Dykes,1993; Parcell, Schroeder, and Hiner, 1995; Kansas Cooperative Extension Service, 1996).

In evaluations of market characteristics, feeder steers sold in the second and third quarters of a sale usually received higher prices than those sold in the first quarter. Heifers sold in the second quarter of the sale received a small premium over those sold in the first quarter, but time of sale did not affect prices of heifers in the third and fourth quarters. Price of corn, a major component of cost of gain, had a negative effect on feeder cattle prices, while steer slaughter prices had a positive impact on feeder cattle prices (Kansas Cooperative Extension Service, 1996; Turner, McKissick, and Dykes, 1993; Buccola, 1980; Schroeder et al., 1988; Schultz and Marsh, 1985).

Turner, McKissick, and Dykes (1993) studied the impact of the reputation of the seller on feeder cattle prices in addition to the market, lot, and cattle characteristics. Current reputation was postulated to depend on past quality. The reputation of the seller was found to be significant only in markets where less information is transferred to the buyers. This finding was consistent with results obtained by Shapiro (1983), who concluded reputation makes sense only in an imperfect information world. Reputation can help buyers estimate quality in the absence of complete information. In the IMBIO program, the ear tags allowing traceback of the animal to farm of origin via a central telephone number may be acting as a proxy for reputation, as no single seller's cattle are treated separately.

The Model

Feeder cattle price (P) is modeled as the dependent variable, and the market forces (MC) and cattle and lot (CL) characteristics are the independent variables. The price model is specified as:

$$P_{it} = \sum_{k} V_{ikt} CL_{ikt} + \sum_{h} Y_{ht} MC_{ht}, \tag{1}$$

where t and i are, respectively, time of sale and lot of cattle; k and h represent traits or characteristics of feeder cattle and market influence. Finally, V and Y represent the value of specific traits and the price impact of the market forces, respectively.

Specifically, the hypothesized regression model is given as follows:

$$\begin{aligned} P = {} & b_0 + b_1 Hd + b_2 HdSq + b_3 Wt + b_4 WtSq + b_5 Futures + b_6 Sex \\ & + b_7 SV + b_8 Corn + b_9 D1 + b_{10} D2 + b_{11} D3 + g, \end{aligned} \tag{2}$$

where the b's are the regression coefficients, and g is the random normally distributed error term. The variables used in equation (2) are defined in table 1.

Separate regressions were run for the complete data, SV, and non-SV data. Additionally, feeder cattle were separated into two weight classes reflecting, in general, weaned (heavier) and non-weaned (lighter) calves, and different regressions were run for them as well. Steers were grouped into those less than or equal to 650 pounds and those over 650 pounds. For heifers, the dividing weight was 600 pounds.

Table 1. Definitions of Variables Used in the Empirical Model

Variable	Definition	Unit/Measurement
P	Price of feeder cattle	$/cwt
Hd	Number of cattle in lot	actual number
Wt	Weight of cattle in pounds	actual weight (300–974 lbs.)
Futures	Closing futures price of feeder cattle on day of sale	$/cwt
Sex	Sex of feeder cattle	1 for steers; 0 for heifers
SV	Source verified	1 if SV; 0 if non-SV
Corn	Spot price of corn	$/bushel
HdSq	Number of cattle squared	actual number
WtSq	Weight of cattle squared	pounds squared
D1	Dummy variable for 1998	1 for 1998; 0 otherwise
D2	Dummy variable for 1999	1 for 1999; 0 otherwise
D3	Dummy variable for 2000	1 for 2000; 0 otherwise

Previous studies have established the impact of selected characteristics on feeder cattle prices. For example, Schroeder et al. (1988), among others, examined large numbers of traits to obtain consistent estimates on the traits and their impact on feeder cattle prices. Based on our objective of determining if a premium is offered on source-verified cattle, some of the variables are made standard in both sets of feeder cattle data. The aim here is to obtain two very similar sets of feeder cattle data, where the only significant difference between the data sets is that one set is source verified (with its associated characteristics) and the other is not. Therefore, all the observations are for medium-to-large framed cattle with a muscle score of one.

Both the IMBIO and non-IMBIO lots were sold in one location, the Bloomfield Auction Market. Sales for the two sets of feeder cattle occurred during the same time of the year—October, November, and December for each of the four years 1997 through 2000. Sales occurred throughout the day for the regular (non-IMBIO) sales. The IMBIO cattle were sorted throughout the day, and were sold in the evening during a relatively short period of time (typically less than two hours). The IMBIO lots offered for sale were sorted to be very uniform in their characteristics, while the non-IMBIO lots, if uniform, were small lots selling one owner at a time. The IMBIO lots had standard verifiable health treatments, while the non-IMBIO lots had various health backgrounds and were generally not verifiable.

All the cattle were evaluated and reported by a trained USDA market reporter to eliminate any biases in the evaluation process. Lots with bulls, fleshy replacement heifers, or dirty or muddy calves as classified by the USDA reporter were removed from the data sets. The percentage of steers to heifers in both sets of feeder cattle was also very similar. Among the IMBIO calves, 61% were steers, and among the non-IMBIO calves, 62% were steers.

Table 2. Summary Statistics for Regular and IMBIO (SV cattle) Feeder Cattle Auction Sales

	Mean		Std. Deviation		Minimum		Maximum	
Variable[a]	Regular	IMBIO	Regular	IMBIO	Regular	IMBIO	Regular	IMBIO
P	84.16	88.21	12.00	12.84	55.00	64.50	128.00	125.00
Wt	557.86	539.74	127.12	113.20	301	304	974	883
Hd	11.26	42.24	12.50	31.84	4	4	124	189
Sex	0.62	0.61						
Corn	1.99	1.99	0.34	0.32	1.49	1.59	2.59	2.53
Futures	78.41	79.15	7.07	7.73	67.47	67.15	91.20	91.20
D1	0.32	0.26						
D2	0.14	0.16						
D3	0.22	0.29						

[a] Refer to table 1 for units of measurement for variables.

The study follows Schroeder et al. (1988) in using closing feeder cattle futures prices, and Schultz and Marsh (1985) in using corn prices as proxy variables to represent changes in the fundamental market forces at the time of the auction. Previous studies have established that weight and lot size are not linearly related to the price of feeder cattle. Thus, following Faminow and Gum (1986), the squares of both weight and lot size (head) were included in the price model. Finally, three dummy variables representing the years 1998, 1999, and 2000 were included in the model. The base year in this study is 1997.

Data

Feeder cattle price data, obtained from the USDA's Agricultural Marketing Service (AMS), were collected for all Bloomfield Auction Market, Bloomfield, Iowa, sales. There were 12 regular auctions in 1997, 13 in 1998, 11 in 1999, and 8 in 2000. Source-verified sales occurred one time each in October, November, and December of each year. There were a total of 3,917 observations (cattle lots) made up of 358 IMBIO SV observations and 3,559 regular auction observations. Weekly average north central Iowa cash corn prices and day-of-sale closing feeder cattle futures prices were collected for each sale date.

The average lot size for the IMBIO SV sales was considerably larger than for the regular sales. The maximum lot size for an SV sale was 189 head, while the largest lot size at a regular sale was 124 head. Minimum lot size used in the analysis was limited to four head because lot sizes of one or two may represent "out" cattle, i.e., animals having a health problem (e.g., lame, sick, bad eye) and which are severely discounted. Table 2 provides a summary of the statistics for the feeder cattle auction sales.

Results

In this study, feeder cattle data from one auction location are analyzed over a four-year period. There are potential within-day, week-to-week, and year-to-year relationships between the variables. Thus, the likelihood of residual heteroskedasticity and autocorrelation is very high. The model was initially estimated by ordinary least squares (OLS). Based on the Durbin-Watson and White tests, significant autocorrelation and heteroskedasticity were found to exist in the model. Schroeder et al. (1988) used data across different market locations and did not detect any significant heteroskedasticity in their model. They also expected any autocorrelation to diminish across days and different market locations. However, in our study, only data from one market location are used, and thus the detection of residual heteroskedasticity and autocorrelation is very plausible. Based on the results of computed correlation coefficients and variance inflation factors (less than five for all traits), multicollinearity was deemed not to be seriously impacting the model. All estimations and tests were carried out using SAS software (SAS Institute, Inc., 1999).

Newey-West (1987) autocorrelation-consistent covariance estimators were used to re-estimate the model in OLS. Following White's heteroskedastic-consistent estimator for use when the nature of the heteroskedasticity is not precisely known, Newey and West devised an estimator to be used when the nature of the autocorrelation is unknown. The Newey-West estimator is also heteroskedasticity consistent (Kennedy, 1998, p. 133). The lag length is computed using the Newey and West (1994) approach.

As observed from table 3, the hypothesized models fit the data very well. The R^2 value for the combined data (M1) across weight classes and sale types was 0.91. Similarly, the regular sale (M2) and IMBIO SV (M3) regressions had R^2 values of 0.91 and 0.93, respectively. All the variables had the expected signs except the weight variable in the heavier cattle model (M5), which had a positive sign instead of the expected negative. The weight squared variable also recorded negative signs instead of the expected positive signs in the lightweight and heavy cattle models (M4 and M5). Most of the hypothesized variables were statistically significant at the 1% level, with a few exceptions noted in the discussion below.

Market Characteristics

Consistent with the findings of Schultz and Marsh (1985), cash corn prices had negative coefficients statistically significant at the 1% level. The exceptions were the IMBIO SV model (M3) where the corn coefficient was negative but not statistically significant, and the heavier cattle model (M5) where corn price was negative and significant at the 10% level.

Feeder cattle futures price had positive significant coefficients in all models except the IMBIO SV model (M3). This result is supported by the earlier work of Schroeder et al. (1988), and also conforms to market expectations. In feeder cattle price estimations, variables such as fed cattle price represent the value of output

Table 3. Estimated Premiums and Discounts Associated with Feeder Cattle and Market Characteristics for Fall 1997, 1998, 1999, and 2000 in Bloomfield Auction Market

	MODEL				
Independent Variable	Combined Data (M1)	Regular Sale (M2)	IMBIO SV Sale (M3)	< 600/650 lb. Heifer/Steer (M4)	> 600/650 lb. Heifer/Steer (M5)
Intercept	125.69***	124.49***	123.40***	103.52***	37.10***
	(7.74)	(8.64)	(18.98)	(8.19)	(12.11)
Hd	0.106***	0.110***	0.063***	0.077***	0.120***
	(0.00975)	(0.0139)	(0.0165)	(0.0116)	(0.0147)
HdSq	!0.00058***	!0.00055***	!0.00037***	!0.00039***	!0.0008***
	(0.000078)	(0.000172)	(0.000107)	(0.000076)	(0.00016)
Wt	!0.123***	!0.120***	!0.093***	!0.0274*	0.104***
	(0.0078)	(0.0087)	(0.0218)	(0.0165)	(0.0213)
WtSq	0.000063***	0.000062***	0.000030	!0.00004***	!0.00008***
	(0.0000062)	(0.0000068)	(0.000019)	(0.000016)	(0.000014)
Futures	0.432***	0.447***	0.231	0.473***	0.262*
	(0.102)	(0.113)	(0.259)	(0.099)	(0.137)
Sex	8.703***	8.739***	8.721***	10.128***	4.421***
	(0.254)	(0.286)	(0.536)	(0.262)	(0.308)
SV	0.284			1.300***	!0.775
	(0.444)			(0.489)	(0.479)
Corn	!14.80***	!15.12***	!9.47	!16.10***	!7.03*
	(2.02)	(2.11)	(6.42)	(1.971)	(3.624)
D1	!12.637***	!12.622***	!11.848***	!12.941***	!9.965***
	(1.176)	(1.256)	(3.271)	(1.144)	(1.819)
D2	!5.905***	!6.466***	1.301	!6.665***	!0.050
	(1.969)	(2.085)	(6.084)	(1.441)	(3.468)
D3	1.716	!1.350	7.804	1.449	5.624
	(2.107)	(2.237)	(6.836)	(2.065)	(3.606)
R^2	0.91	0.91	0.93	0.92	0.91
N	3,917	3,559	358	2,974	943
RMSE	3.59	3.58	3.44	3.41	2.66

Notes: Single, double, and triple asterisks (*) denote statistical significance at the 10%, 5%, and 1% levels, respectively. Numbers in parentheses are standard errors; *N* denotes the total number of observations used in the model estimation; and RMSE represents the standard errors of the regression models.

from feedlots and also replacement to the feedlots; thus its change affects placement demand for feeder cattle. However, Schroeder et al. suggest an intermediate product, such as feeder cattle futures price, can serve as a proxy variable to capture changes in the market forces. Therefore, feeder cattle futures were used in these estimations.[1]

[1] Note that earlier work by Yeboah (1999), done on the same but more limited data (i.e., fall 1997 and 1998) using fed cattle prices instead of feeder cattle futures, showed similar results to those of Schultz and Marsh (1985) who also used fed cattle prices.

Lot and Cattle Characteristics

The results for the cattle and lot characteristics (table 3) were similar to results obtained by Schroeder et al. (1988); Turner, McKissick, and Dykes (1993); and Schultz and Marsh (1985). Average weight had a negative and statistically significant impact on the price of feeder cattle in all cases except for the heavier cattle model (M5), which shows a positive impact on price. Generally, heavier feeder cattle receive lower prices. Schroeder et al. reported some positive impacts by weight on price, as heavier steers and heifers received premiums in the fall. Source-verified lots in this study received lesser weight discounts than did normal sale lots. The number of head per lot had the expected positive impact on feeder cattle prices. Buyers generally prefer larger lot sizes that can fill either a truckload or half a truckload, and they may bid higher for larger lot sizes. Incremental premiums on lot size were lower in the IMBIO SV sales compared to the regular sales, perhaps because all IMBIO lots are "large." As expected, heifers were discounted in relation to steers, with statistical significance at the 1% level. Overall, the magnitude and signs of the coefficients were quite similar to those obtained by Schroeder et al., and by Turner, McKissick, and Dykes, where applicable.

All else equal, prices in 1998 and 1999 were discounted compared with prices in 1997. The dummy variable for 1998 (*D1*) was consistently negative and significant in all the models (table 3). This result is not unexpected, because buyers were more cautious following large feedlot losses on feeder cattle purchased in 1997. Variable *D2* (1999) was also mostly negative, as the caution displayed by the feeder cattle buyers continued through 1999. The feeder cattle price relationships for 2000 (*D3*) were not significantly different from 1997.

Source Verification

The results were mixed as to whether IMBIO SV feeder cattle received a premium over cattle at a regular sale, all else equal. While the SV premium was not significant in the combined model (M1), the premium in lightweight cattle (M4) was $1.30/cwt and statistically significant. In the case of heavyweight cattle (M5), a discount was observed on SV feeder cattle, but it was not statistically significant. The premium measured on the SV variable alone was less than that suggested by Miller (1997) and by Lichtenwaler (1997) after accounting for the other variables influencing price. The IMBIO SV premium was measured relative to non-IMBIO SV cattle, some of which may have been vaccinated and managed similar to IMBIO standards but without certification. The added costs of participating in IMBIO include a $1/head fee for the ear tag and the cost of the vaccination program, which must be administered by an approved veterinarian who will certify the other requirements have been met. Cost for non-IMBIO SV cattle may include the same veterinary treatment as for the IMBIO SV program.

Because the IMBIO program incorporates both SV and larger uniform lot sizes, the value of the program to the customers should include all these effects. After

accounting for market conditions, sex, and average weight, SV and large lot size produced by the IMBIO program resulted in higher selling prices, particularly on lighter weight calves. The value of each additional head in a lot was increased at a decreasing rate, and source verification added as much as $1.30/cwt depending on the weight of the cattle.

This combined value of the IMBIO program is best illustrated by comparing the average lot size in a regular sale (11 head) to a pooled group of 90 head (approximately a 50,000-pound truckload of 550-pound steers). In this example, the producer would have received $5.07/cwt ($27.89/head) more in the 1997 IMBIO SV sale than the same 11 steers in a regular sale, all else equal. Despite the presence of a negative (but not significant) coefficient on SV in heavier cattle, the producer can still benefit from the premium on large lot sizes. A group of 70, 700-pound steers (approximately a 50,000-pound truckload) would bring $2.50/cwt, or $17.50/head, more in the IMBIO sale than 11 head in a regular sale.

Discussion

The results of this analysis indicate feeder cattle sold through the IMBIO SV program received higher prices than calves in regular sales after adjusting for market characteristics. The greatest source of added value was due to larger lot size resulting from the sorted and pooled lots. Measured at the mean lot sizes across all weights, the sorted and pooled cattle, as classes, received $2.33/cwt more than the regular sale cattle. Although the impact of lot size was accounted for directly, we cannot statistically isolate the value placed solely on SV from the value placed on the inclusive IMBIO program, which includes larger uniform lot sizes, vaccination standards, traceback, etc.

Feeder cattle auctions have always assembled cattle from numerous smaller farms into larger lots, but traditionally the buyer did the pooling with little or no information about the cattle other than visual appraisal. However, one may argue that the common health and genetic standards and source verification on each calf produce the confidence in the IMBIO program, thereby creating value for which buyers are willing to pay a premium, particularly on smaller calves. One might hypothesize that the premium is larger and significant on lighter weight calves than heavier calves because of the standardized health program. The heavier non-IMBIO cattle are more likely to be weaned and vaccinated, or at a minimum be better able to withstand a health challenge than newly weaned calves.

Source-verified cattle provide background information and documentation to help the potential buyer better determine the value of the calves. This study suggests buyers place value on background information and confidence in the information presented about the feeder animals. Because quality cannot be ascertained solely on inspection, the issues of reputations of the market and sellers do influence the buyers. As noted by Shapiro (1983), when the quality of a product is difficult to observe prior to purchase, buyers may use the quality of products produced in the past as an indicator of present or future quality.

Over time, sellers can invest in their reputation by producing quality products. In this instance, IMBIO SV reduced the time and investment necessary to establish reputation by documenting valuable information and making it available to the buyers. In IMBIO SV auctions, the reputation of the individual seller is forfeited by commingling the cattle into larger groups, and replaced by the standards and enforcement of the IMBIO program itself.

The study did not take into consideration the breed, weaned, preconditioned, or reputation of owner among other variables shown to influence feeder cattle prices. Perhaps the cleanest way to test for value of these characteristics would be to design a comparison test. Feeder cattle of the same origin, sex, frame, muscle score, health, identical treatment (weaned, preconditioned, etc.), and in comparable lot sizes would be sold on the same day. The only difference would be that one set is SV and the other set is non-SV. One could then effectively eliminate the influence of all other factors except the influence of SV, the factor under investigation. However, such comparisons are very difficult if not impossible in the real world.

The results of this study of one auction market over a period of four years reveal that price premiums are being offered on large lots of cattle and for SV of lighter weight feeder cattle. However, one cannot confidently conclude that the premium is paid solely for SV rather than for the entire IMBIO SV program without taking the above-mentioned factors into consideration. Future studies should also investigate the *cost* of participating in SV versus the *benefit*. Benefit-cost analysis as employed by Buccola (1980) can be used to give farmers an idea of how much they should invest in SV and the anticipated benefits at each level of investment.

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