the value of third-party certification claims *at Iowa's feeder cattle auctions*

The majority of U.S. feeder cattle

are sold through auction markets. While auctions are very efficient at bringing buyers and sellers together for price discovery, signaling the value of cattle at auctions framework is often a challenge. This is particularly true for unobservable traits such as vaccinations and previous management of the cattle. The root of the problem is that buyers cannot assess the quality of cattle at a low cost, and sellers have incentive to overstate the condition of their animals.

Third party programs, such as state-sanctioned green or gold tag preconditioning programs, or similar private company programs, have potential to mitigate this problem provided that buyers trust the integrity of programs and procedures. Previous research has reported what preconditioning is worth to buyers due to better performance and grade, and has found premiums in some markets for preconditioning. However, the studies have not evaluated the value placed on the source of the claims made in terms of third party versus sellers themselves.

After taking into account the cattle and sale characteristics and market conditions, we considered the following categories for the amount and source of vaccination and weaning claims,

- Category 1: Calves with certified vaccination claims and weaned at least 30 days.
- Category 2: Calves with uncertified claims (the seller's word) of vaccinations and at least 30 days weaning
- Category 3: Calves with vaccinations but without a 30 days weaning claim (either no date mentioned or mentioned that weaned less than 30 days).
- Category 4: Calves with vaccination claims but not weaned.

A calf certified by Iowa's green and gold tag programs.

- Category 5: Calves with weaning claims but not vaccinated.
- Category 6: Calves neither weaned nor vaccinated, or no claim made.

We emphasize the vaccinations and at least 30 days weaning are requirements of preconditioning. The other requirements such as dehorning, castration, etc can be considered as part of good management practices. Note that calves in categories 1 and 2 satisfy both vaccinations and at least 30 days requirements. Calves in the remaining categories fail to satisfy either requirement or both. In Iowa green tag preconditioning program, vaccinations (done by a veterinarian) are not enough to get a preconditioning certificate, calves must be weaned at least 30 days in order to be considered as preconditioned. At that time, the veterinarian signs the certificate.

Data and Methods

Data were collected at 105 sales that took place in nine auction markets located in southern,

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southwestern, southeastern and western Iowa from October 20, 2005 to February 24, 2006. There were 20 preconditioned, 5 featured, and 80 special sales. Four data recorders worked with USDA market reporters to record detailed visual, physical, and announced information characteristics about each lot of cattle as they were sold. These data are the same information that buyers at the auction would observe. Market conditions for the day of the sale including daily live cattle futures prices and cash corn prices were included in the econometric analysis. In total, sale information from 20,051 lots was analyzed. The median lot size is 5 head. Lots are 52% steers, 69% black and black mixed, and 4% yearling. Lots with calves are 41% certified vaccinated and weaned, 24% uncertified vaccinated and weaned, 22% vaccinated but not weaned, 4% weaned but not vaccinated, and 9% neither vaccinated and nor weaned.

The data were analyzed using a linear regression model where the price received by a lot of feeder cattle is a function of a set explanatory variables or characteristics, which are listed in Table 1. This type of modeling, called hedonic pricing models, is commonly used in the literature studying the valuation of feeder cattle. The resulting coefficients are the dollar change in price due to a one unit change in the variable holding all other factors constant. It also indicates if the variable is statistically significant.

Estimations and Results

The estimation results are reported in Table 1. The model has an adjusted $R^2 = 0.71$, indicating that it explains 71% of the variation in price, and is close to the value reported in previous literature. All variables are significant with p-values less than 0.0001 except monthly factor for December which is not significant with p-value of 0.19. There is a strong seasonal pattern to feeder cattle prices, and December not being significant could be due to exceptional weather conditions in December 2005. It was extremely cold early in the month, later it got warmer, which made pens muddy.

Figure 1. As with previous research, this analysis found that prices are higher for larger groups of animals. As the figure shows, the prices increase at a decreasing rate with a maximum of $12.90/cwt at 78 head or about a truck load.

The parameter estimates are consistent with the previous literature. They are premiums/discounts per cwt relative to the base lot of cattle sold. The base lot is defined as heifer, dehorned, non black, not fleshy, healthy and clean calves without vaccination and weaning claims. The model treats each factor independently and thus the coefficients can be added for various factors as shown in the example below.

Prices increase for larger groups of cattle but it increases at a decreasing rate and this premium reaches a maximum at 78 head or about a truck load (Figure 1). Premiums also increase with the size of the sale, but at a decreasing rate suggesting that larger sales attract more buyers.

As expected, steers and bulls bring more than heifers, and hide color, horns, and appearance and condition impact price. As expected price decreases at a declining rate as weight increases. Figure 2 shows the

Table 1 . Statistically Estimated Premiums and Discounts at Iowa Feeder Cattle Auctions for Specific Cattle and Market Attributes, 2005-2006

Dependent Variable: Average Lot Price / cwt	R^2 = 0.71
Number of Observations: 20,051 lots	
Explanatory Variables	**Estimates ($/cwt.) ***
Intercept	124.98
Weight	-0.17
Weight Squared	0.000059
Yearling (Base: Calves)	5.95
Heifer	Base
Steer	8.71
Bull	2.51
Black and Black Mixed (Base: Non-Black)	3.06
Horns (Base: No Horns)	-1.70
Fleshy (Base: Not Fleshy)	-2.41
Healthy and Clean	Base
Sick but Not Dirty	-9.36
Healthy but Dirty	-1.18
Sick and Dirty	-12.40
Lot Size	0.33
Lot Size Squared	-0.00211
Sale Size (in thousand head)	2.54
Sale Size Squared (in thousand head)	-0.00028
Live Cattle Futures	0.72
Corn Prices (in cents)	-0.05
Monthly Variable for October	Base
Monthly Variable for November	1.55
Monthly Variable for December	0.46
Monthly Variable for January	3.39
Monthly Variable for February	6.61
Certified Vaccinated and Weaned at least 30 days	6.15
Uncertified Vaccinated and Weaned at least 30 days	3.40
Vaccinated and Weaned Other (no date, or less than 30 days)	3.14
Vaccinated but Not Weaned	2.42
Weaned but Not Vaccinated	1.70
Not Vaccinated and Not Weaned	Base

* All significant with p-value < 0.0001 except monthly time dummy for December which is not significant with p-value 0.19. P-values are based on chi-square statistics with one degree of freedom and using heteroscedasticity robust standard errors.

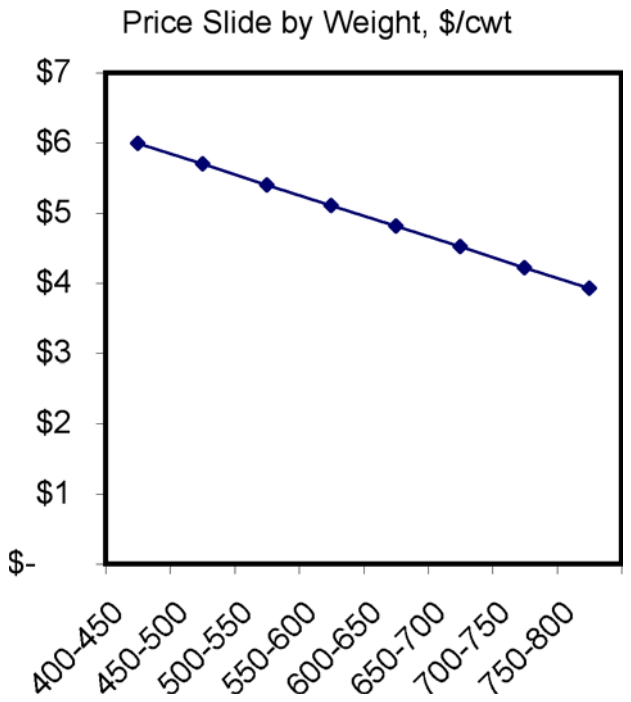

Figure 2. Between 400-450 pounds, the slide is approximatley $6/cwt and between 750-800 pounds, it is closer to $4 /cwt.

price slide at different weight ranges. Between 400-450 pounds the slide is approximatley $6/cwt and between 750-800 pounds, it is closer to $4 /cwt.

Live cattle futures have a positive relationship with feeder cattle price; $1 increase in live cattle futures led to a $0.72 increase in feeder prices. Corn price has a negative relationship; a penny increase in corn led to a nickel decrease in feeder cattle prices.

Seasonally, feeder cattle prices increase after October. As mentioned, the December coefficient was not significant and is expected to fall more in line between the November and January values in a normal year.

Certification Value

After accounting for the basic cattle, sale and market variables, here is what was found regarding the value of the amount and source of vaccinations and weaning information to buyers. Recall that the base is calves without vaccination and weaning claims

Category 1: Calves with certified vaccination claims and weaned at least 30 days have a premium of $6.15/cwt over the base. These calves are mostly Iowa Green Tag Preconditioned, but also include Iowa Gold Tag (nearly 10%) or other similar private programs (5%).

Category 2: Calves with uncertified claims (the seller's word) of vaccinations and at least 30 days weaning received $3.40/cwt more than the base. The relative premium between this category and the first category is $2.75/cwt, which is statistically significant (p-value < 0.0001).

Category 3: Calves with vaccinations but without 30 days weaning claim (either no date mentioned or mentioned that weaned less than 30 days) received $3.14/cwt more than the base. This premium is statically different than the first category (with p-value 0.0001) but not different from the second category (with p-value 0.22).

Category 4: Calves with only vaccination claims received $2.42 more than the base.

Category 5: Calves with only weaning claims received $1.70 more than the base. The premiums in fourth and fifth categories are statistically different than each other at the 5% level of significance. They are also different from the premiums in the first, second, and third categories at the 1% level of significance.

In summary, more practices and information receive a higher premium than less, and third-party certification is worth more than seller's claim.

We convert these per cwt premiums to per head benefits in a 500 lbs calf example as follows. Comparing category 1 to 2, this is a $13.75/head benefit to a third party certification program over the producer buying the vaccine and doing the same work and making the claim himself ($2.75/cwt x 5 cwt = $13.75). This benefit exceeds the additional marketing costs (tags, commission, etc) due to participating to third party programs, which additional marketing costs (tags, commission, etc)

due to participating to third party programs, which is reported as $5/head at maximum in the literature. Even though the premium for category 2 is slightly higher than the premium for category 3, they are not statistically different from each other, therefore, similar per head benefit for calf in category 1 can be expected over calf in category 3.

Finally, a calf in category 1 is worth $18.65/head and $22.25/head more, respectively than a category 4 (vaccinated but not weaned) and category 5 (weaned but not vaccinated) calves.

Fall Calf Marketing Decisions

How can producers use these results to receive more net dollars from their calf crop? Consider the decision of whether to sell at weaning or to vaccinate and wean 45 days. For this example assume that calves are black, steers, dehorned, healthy and clean. The lot size and sale size is all the same in either case. The calves can be sold at weaning on November 1, 2005 with a pay-weight of 500 pounds right off the cow without vaccinating.

Alternatively, the producer could precondition the calves for 45 days and sell on December 15, 2005 with a third party certification of vaccination and weaning. The preconditioning option targets a pay-weight gain of 100 lbs in 45 days period (2.22 ADG). Because the average fleshy cattle weigh 651 lbs in November in our data set as opposed to 600 lbs calf in this example, we assume calves do not look fleshy after preconditioning. There is $6.15/cwt premium for certified vaccinated and weaned calves.

The December 15 quote for June live cattle futures and corn prices are unknown on November 1. We initially assume the same live cattle price and corn price for December 15 as it was on November 1. Later, we report the impact of changes in these prices on the profit. The coefficients of monthly effects indicate that December calves are discounted $1.09/cwt to November (normally December would be higher).

Putting these data under both scenarios into the estimated regression equation in Table 1 result in the following price differences.

For this example assume that similar 500 pound steer calves are selling for $130/cwt in November right off the cow with no vaccination. The only things that change are the weight, date, and preconditioning, all other variables, including cattle futures and corn prices are held constant. The difference between November ($1.55) and December ($.46) in this project is -$1.09 and the premium on certified vaccinated and weaned is $6.15. The price slide between 500 and 600 pounds can be observed in the market, but in our example is -$10.51 calculated as $(600 \times -.17 + 600^2 \times .000059 = -80.76) - (500 \times -.17 + 500^2 \times .000059 = -70.25)$. Thus, the price difference between the 500-pound calf in November and the 600-pound calf in mid-December is $6.15-1.09-10.51 = $-5.45/cwt and the expected selling price for the 600 pound preconditioned steer is $124.55/cwt.

A veterinarian tags a preconditioned calf.

Using these estimated prices, the gross revenue per head for the calf at the two different weights are: 500*$130= $650 versus 600*$124.55 = $747.30 for selling at weaning and after preconditioning, respectively. This gross difference of $97.30 must be compared to the expected preconditioning cost listed below:

Feed cost:	$28.35
Death loss @1%:	6.50
Treatment cost 20%@$20:	4.00
Vaccination:	11.00
Interest expense:	7.00
Labor:	5.00
Total:	**$61.85**

Subtracting the preconditioning cost from the gross value difference leaves a $35.45/head return (to facilities and management) advantage to preconditioning in our example. Individual producer's costs may vary.

One risk is that the feeder cattle price level can change during the preconditioning period. From Table 1 we see that a $1/cwt change in live cattle futures resulted in a $.72/cwt change in the feeder cattle price. Likewise, a one cent change in corn price resulted in a .05/cwt change in feeder cattle prices. The $35/head advantage to preconditioning is approximately $5.83/cwt on a 600-pound calf. Thus, live cattle futures would have to decrease over $8/cwt or corn prices would have to increase $1.17/bu in 45 days to eliminate this gain. Some combination of higher corn or lower cattle futures would also wipe out the $35/head gain, but you can see it is a relatively safe investment.

Conclusion

We found that third party certification (TPC) of preconditioning claims (certified vaccination and at least 30 days weaning claims) receives a significantly (both in statistical and economic sense) higher premium than similar uncertified claims. The difference exceeds the unit participation cost of TPC on average. This shows that the third party certification in preconditioning claims is supported in the market. It also shows that significant value can be lost if information is not trusted and/or not delivered to the market, even if all work is really done. The estimated premiums for certified vaccinations and weaning claims are found to be higher compared to early studies but consistent with the most recent ones. This may indicate that the reputation of these programs improved over time.

The explanatory variables in Table 1 take into account the main aspects of feeder cattle marketing decisions, therefore, the estimated regression equation should have practical value to producers as they can evaluate alternative production and marketing strategies by plugging the relevant data. We provide an example for a typical scenario.

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