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Estimating the value of "Source Verification" in Iowa feeder cattle markets

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ABSTRACT

Source Verification (SV) as defined by the Chariton Valley Beef project is the collection and documentation of background information that should help potential buyers determine the value of the calves. This study used data from two sources; Bloomfield auction market, Bloomfield Iowa and from Rusell, Appanoose, Winterset and Centerville, Iowa auction markets. On average the SV cattle from the Bloomfield auction market yielded higher prices compared to the non-source verified cattle. Regression estimates for the same data set showed price premiums being offered for SV cattle in 1997 for both steers and heifers. However in 1998, only the heifers showed a premium with the steers being discounted. The premiums ranged from $ 0.96 to $ 2.13 per cwt.. However, cattle were grouped to form larger lot sizes in this auction, and the study could not determine if the premiums were for the SV or the larger lot sizes that has been shown to produce price premiums on its own. The Rusell, Winterset, Appanoose and Centerville auctions did not group feeder cattle into larger lot sizes. However due to insufficient data from these auctions, the question of premiums being offered for SV feeder cattle could not be answered.

CHAPTER 1. INTRODUCTION

Background

Cattle and calves are the top ranked commodity in-terms of cash generation for U.S. farmers. However, they have been experiencing reduced earnings due to recent fall in prices caused in part by cyclic over supply and falling domestic and export demand. In fact, the sales of cattle and calves have declined by $8.2 billion or 21 percent from 1993 to 1998 due to lower prices. Texas leads the nation in cattle and calf receipts with $5.3 billion. Nebraska ($4.1 billion) and Kansas ($4 billion) were the second and third leading producers of cattle (USDA Agriculture Fact Book, 1998). In 1997, there was an estimated 38.7 million-calf crop (dairy and beef calves) in the U.S. Texas led with 5.1 million head, followed by Missouri and Oklahoma with 2.0 million and 1.9 million respectively (USDA, 1998).

The beef industry is a diverse sector organized along the life cycle of the animal. (See Figure 1.1 below.) Feeder cattle producers, who may range in size from a few head to hundreds of head, own breed, and gestate cows to raise the calves. The calves are weaned at between 6 to 8 months of age weighing 400-600 pounds. These calves are typically sold to cattle feedlots or to stocker operations or the original cow owners may retain ownership of the calves.

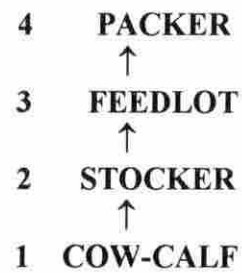


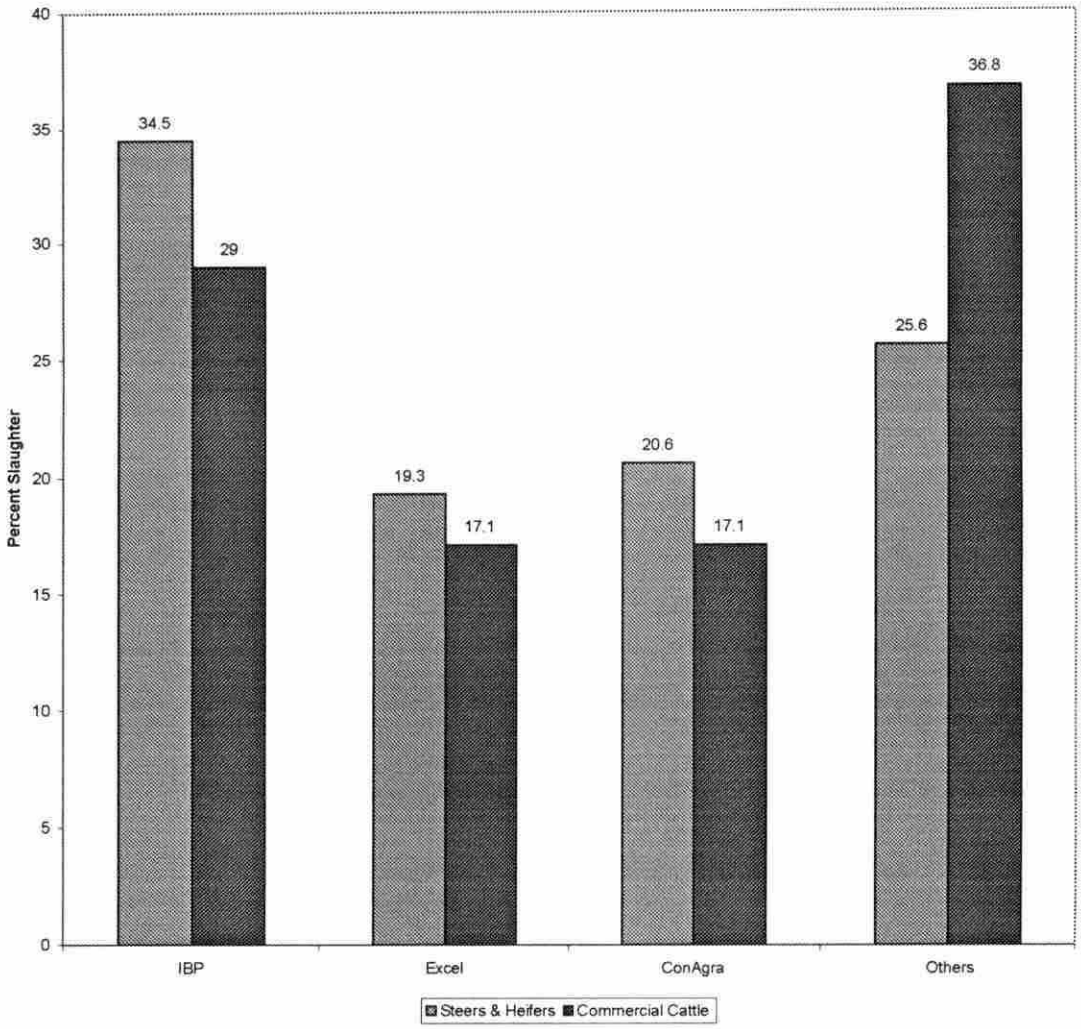
Figure1.1 Pathway followed by feeder cattle, from cow-calf to packer

Figure 1.1 shows the normal pathway of feeder cattle from cow-calf to packer. However, two or more stages may be combined into one operation or some stages may be bypassed.

Stockers are calves purchased from cow-calf systems and grazed on or fed high roughage diets for 4 to 8 months. They are then sold as yearlings at 600-800 pounds or more (Futrell and Shepherd, 1982; Lawrence, 1998). The aim is to utilize cheap feedstuffs while the animal develops frame and size before going to the feedlot for finishing on a high grain ration. Feedlots usually buy the feeder cattle (calves or yearlings) and raise them to slaughter weight, where they are sold to the packers.

There is increased concentration in the beef industry as cattle move from calf, to feeder, to fed, through processing to the final consumer (Lawrence, 1998). While there were more than 700,000 farms with less than 50 beef cow heads, 82% of all fed cattle sold in 1998 were by feedlots with 1000 or more head, and only three firms (IBP, Excel, ConAgra), process 63% of all commercial cattle. (See Figure1.2 and Table 1.1.)

The most common approach to feeder-cattle marketing is through the live-auction market. The live auction market brings the numerous small-scale cow-calf producers and the medium to large fed cattle producers together. Thus, the live-auction market serves as a very important avenue for transferring ownership and assemblying cattle from many small-scale feeder cattle operators to the larger feedlots. Other alternatives in feeder cattle marketing are direct farm sales, graded sales, Tele-sales, Video and Satellite auctions (Miller, 1995).



Source: USDA-Grain Inspection, Packers and Stockyards Administration.

Figure 1.2 U.S. Cattle Slaughter Sector: Company and Share 1995

Table 1.1 Industry Structure: Increased concentration from beef cow to feedlot to processing

U.S. Beef Cow Sector: Operations and Inventory 1998		
Range of herd size	Number of farms	Average lot size
500+	5,635	837
100-499	68,845	177
50-99	104,820	63
1-49	703,300	15
U.S. Beef Feedlot Sector: Operations and Inventory 1998		
Range of marketing per lot	Number of feedlots	Average marketing per lot
16,000+	230	66,491
8,000-15,999	191	16,487
4,000-7,999	308	6,886
1,000-3,999	1346	1,654

Source: USDA-Grain Inspection, Packers and Stockyards Administration.

Live-auction sale

An auction is a market in which an article is offered for sale simultaneously to several prospective buyers, and is sold to the one making the highest bid (Dowell and Bjorka, 1941). Bidding and selling is done in public. Auction markets for livestock have been around for a long time, but according to McCoy and Sarhan (1988), it was not until the 1920s and 1930s that auction marketing really caught on. The auction markets were concentrated in the north central states of the U.S., extending from Kentucky through Iowa, Nebraska, and Oklahoma. There was a general expansion in the number of auctions and the numbers of livestock sold through the 1930s, 1940s and 1950s. The expansion in the numbers of auction markets peaked around 1949, though the volumes of livestock sold continued to increase. In 1985 there were 1590 auction markets in the U.S. (Futrell and Shepherd, 1982).

Live-auction markets are very important in the marketing of feeder cattle. Futrell and Shepherd (1982) report that sixteen percent of packer purchases of cattle for slaughter in 1978 were bought in auctions, while 54 % of calves were bought in auction markets. McCoy and Sarhan (1988) add that auction markets are primarily used though not exclusively for selling feeder livestock and cull animals. While buyers may come from all over the state and even from out of state, the sellers of feeder cattle are usually from the communities in which the auctions are located. Auction markets are the primary marketing channels used to move feeder cattle from the often small, widely dispersed cow-calf operators into the larger uniform loads required by the large feedlots (Futrell and Wisner, 1987). Most auctions sell livestock once in a week, though twice or thrice a week is not uncommon. According to McCoy and Sarhan (1988), winter and fall are the busiest seasons for auction markets due to the nature of livestock production practices, while summer is the least busy.

Live-auction sale (LAS) in its true form is characterized by presenting animals belonging to an individual farmer in a ring before buyers. Total head number can range from one to several. The cattle are typically sorted by sex and weight. An auctioneer describes the cattle (sellers name, weight of cattle, any specifics on age, health prospects e.t.c.) and begins a chant of higher asking price each time a buyer bids. The highest bidder buys the cattle at the final price. The process is repeated for each lot of animals one at a time. The buyers (feedlots, fed cattle producers or stocker operators) usually need a minimum number of feeder cattle (often determined by truck size and transportation efficiency) of specific weight range and specific characteristics (breed, color, sex, age, and frame). In the LAS, they have to buy from different farmers to meet their required lot size. The buyers are guided by the gross-weight of their trucks. In a study to analyze cow-calf pair values, Parcell et al. (1995) states that "Presumably there is an optimal pairs per pen which buyers seek to fill trucks". A Kansas State University (KSU) study in 1996, reported that buyers prefer to buy cattle in truckload lots to minimize the health problems associated with commingling cattle from several different sources. Buying cattle in larger lots reduces the chance cattle will have to be kept overnight before a truckload has been accumulated. Cattle shipped the day they are purchased also tend to have fewer health problems (KSU, 1996).

McCoy and Sarhan (1988) describe an auction market as follows: A livestock owner who wishes to sell her animals through the auction consigns her animals to a specific auction market for a given day. The livestock are penned or marked in a way to maintain the identity of the each individual owner. Livestock may be weighed before the auction, and where present, an electronic scale exhibits the total and average weight, as well as the number of head, on a lighted screen. Animals from each owner are sorted into uniform sizes, grades or

other characteristics as animals are presented into the sale ring. Livestock are usually presented in the order in which they are received. As the animals arrive in the ring, the manager or his representative, provide a starting bid, mainly to speed up the bidding process. Usually, the starting bid is just slightly below what the auctioneer thinks is the true value of animals. From experience, they are able to close in on the price fairly accurately. Livestock is sold to the highest bidder. After the sale, livestock are penned for loading out.

The auction market as described, is a laborious time consuming process but has persisted for years due to the lack of suitable alternatives.

Source Verification

Source Verification (SV) has various definitions but for this discussion it is the process of identifying the origin and ownership of cattle and the management practices they have had. With proper SV, it is possible to assemble like kind of cattle into uniform groups from the many small operators in order get larger lot sizes of uniform weight range and give the buyer confidence in the type of cattle purchased. This is expected to increase the price prospective buyers will be willing to offer (Miller, 1995). Sellers who participate in SV must agree to a number of conditions concerning the management and handling of their cattle prior to sale. Department of Agriculture officials or auction market operators inspect the animals and assign them grades based on United States Department of Agriculture (USDA) feeder cattle standards. The animals are tagged which allow each animal to be identified and verified back to the source. Thus, though cattle are grouped into larger lot sizes, they still maintain their individual identity, and can be traced to the farmer who sold them and they may have similar health history. Buyers are able to buy larger uniform lots of cattle.

Problem statement

Live auction prices of feeder cattle depend on a number of factors. In a KSU (1996) study, sex, weight, lot size, health, uniformity, condition, fill, muscling, frame size, breed, presence of horns, time of sale, market location, feeder cattle and corn futures prices significantly influenced prices of 600 to 899 pound steers and heifers at Kansas auctions. The study reported that larger lot sizes fetched price premiums, while price discounts were observed on small framed, sick, lame or animals with humps. Miller (1995) reports that in a North Carolina graded sale program graded calves sold in larger pens fetched $4 to $ 8/cwt., compared to non-graded cattle.

Moseley (1993) cautioned buyers of feeder-cattle to take the following into consideration when buying feeder cattle:

1. Preconditioned calves usually are less likely to develop diseases.
2. Avoid purchasing sick calves or those exposed to sick cattle.
3. Disease and parasite problems are more apt to occur, and with greater severity, in cattle under 400 pounds.
4. Bunching of cattle from several groups is conducive to the introduction and spread of diseases and parasites.
5. If possible, secure a history of vaccinations and other pertinent information on cattle that are to be purchased.

Knowing the characteristics that buyers look for and those that fetch price premiums or bring price discounts, a feeder-cattle farmer or groups of farmers can manage their herd or can participate in SV to earn price premiums or avoid discounts. With the current low prices in the cattle sector, occasioned by falling demand from overseas and over supply in the

domestic market, every effort should be made to maximize earnings. SV appears to be a good way to maximize earnings as it seems to meet the needs of the buyers, but some questions need to be answered before farmers make significant, often costly changes in their operations. Some of the questions this study hopes to provide answers for are:

1. Are prices paid for cattle in the SV sales in its present form better than prices in a typical LAS?
2. What characteristics of SV sales produce the greatest value and /or net return to the seller?
3. Is it worth the effort, money and time participating in the SV?
4. Can SV be improved upon in its present form?

Objectives

The study aims to provide more information on the feeder-cattle industry and assess the performance of SV sales in Southern Iowa in the late 1990s. However, the main objectives of the study are:

1. To use econometric analysis to determine if SV results in higher prices compared to the normal LAS.
2. To determine if lot size impact prices received and if so is there an optimum lot size.

Organization of the study

This study is organized as follows: Chapter 2 contains a comprehensive review of various studies on the feeder cattle industry, focusing on the marketing of feeder cattle, the role the feeder cattle sector plays in the whole beef cattle industry. Recent studies on the live

auction market of feeder cattle and the advantages offered by source verification will be included in the chapter. A review of a few livestock studies incorporating econometric analysis is also provided in the literature review.

Chapters 3 and 4 present the methodology of the study and the empirical results. This entails description of the empirical models used in the study, description of the data and data source in chapter three. Chapter four describes the results and summary statistics obtained from the different models.

In Chapter 5, the summaries and conclusions of the study are presented. Recommendations are also made for future studies. Discussions of the advantages of source verification approach to feeder cattle production and management are also provided in chapter five. The study ends with a list of references and an appendix describing the Chariton Valley Beef source verified calf project.

CHAPTER 2. LITERATURE REVIEW

Feeder cattle industry

The U.S. can be divided into seven different cattle raising regions. These are the Southeast, Southwest, Northern Plains, Corn Belt and Lake States, Mountain, Pacific, and Northeast (Futrell and Shepherd, 1982). These regions have different climatic, geographic and environmental conditions. The region influences to some extent the type of production system in operation. Climate (through its impact on forage availability) and comparative advantage in feed grain or other crop and animal production opportunities, influences the system practiced in a given area (McCoy and Sarhan, 1988). However, four distinct production systems can be identified within the cattle-raising regions. These are cow-calf-feeder, cow-calf-slaughter, stocker purchase-slaughter sales and stocker purchase-feeder sales systems.

McCoy and Sarhan (1988) describe the cow-calf-feeder as comprising of cow-calf and cow-yearling subsystems. Under cow-calf production subsystems cows are kept for breeding while the calves are sold shortly after being weaned. However, in cow-yearlings subsystems, calves are carried longer into the stocker phase. Forage availability is usually the determining factor as to whether to carry calves to the yearling stage or not. The cow-calf feeder system seems to be the most predominant in the U.S. Boykin et al. (1980) in a study found that approximately 70 % of U.S. cattle producers follow the cow-calf-feeder system.

In the cow-calf-slaughter subsystem as described by McCoy and Sarhan (1988), producers carry calves on range or pasture as stockers. The animals are either sold as slaughter calves or kept a little longer and sold as grass-fed cattle.

In the stocker purchase-slaughter system, stockers are raised in the area where they were produced or are shipped into grazing areas where small grains, stock fields, and other feed sources are available. The cattle are later placed in feedlots for finishing and sold for slaughter. In stocker purchase-feeder system, the operator purchases weaned calves, carries them on range or pasture to the stocker phase, and then sells them to feedlots for finishing (McCoy and Sarhan, 1988).

The feeder cattle can take several routes to the packer or slaughter. A number of factors may influence the route taken to slaughter. The prices of feeder cattle and feed grains, the condition of grazing lands, and the practices of cattle feeders in an area determine the route the feeder animal may take (CME, 1976). The traditional mode of transfer from one system or stage to the other is through auctions. The normal livestock auction is the primary means, but Teleauctions and Video auction are playing important roles in this technological age.

Source Verification

Auction markets are the primary markets for feeder cattle. To maximize earnings some innovations have been introduced in feeder cattle management and marketing. In an industry where margins keep falling and prices follow a cyclical pattern, the need to be innovative takes on an added significance. Source verification and graded sales are but some of the few innovations introduced into the industry. Video auction of feeder cattle is also increasing in popularity in the U.S. Bailey et al. (1991) in a study comparing prices received for feeder cattle in Video and Regional Markets observed that video auction for feeder cattle fetched higher prices than the regional markets. Superior Livestock Auction (SLA), the

largest satellite video cattle auction in the U.S. sold more than 270,000 and 450,000 cattle in 1987 and 1988 respectively. SLA sold 1.25 million head of cattle in 1998 (Lichtie, SLA, Personal Communication 1999).

Source Verification (SV) is the process of identifying the origin and ownership of cattle and the management practices they have had. Source Verification makes it possible to assemble larger head of cattle from different producers but the source of each animal can be verified. Examples of SV include the animals going through specific health regimen conforming to USDA or privately developed standards that can be verified. A few feedlots buy large volumes of feeder cattle from many small-scale cow-calf producers. Feedlots may have to buy from several sources to meet their replacement needs. However, bunching of cattle from several sources may be conducive to the introduction and spread of diseases and parasites (Moseley, 1993). Source verification addresses one of the major concerns of the feeder cattle buyer.

In SV the buyers have confidence in how the animals they are buying have managed. The auctions or the buyers are able to put larger lots together. Marketing cost and time are reduced considerably in SV sales.

Factors influencing feeder cattle prices

Factors influencing feeder cattle price differentials are grouped into cattle and lot and market characteristics. Research identifying the factors that influence feeder cattle prices has focused on the market, cattle and lot characteristics exclusively. The seller can and does influence the cattle and lot characteristics to some extent 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 she is going to sell, but cannot influence the price of corn or the time of day her head will be sold (Turner et al. 1993).

Cattle and lot characteristics

Cattle and lot characteristics include health, frame, breed, weight, color, sex, age, fill of the feeder cattle, the presence or absence of horns, lot size, and uniformity within the lot. The studies found that, steers fetched higher prices than heifers, healthy animals received higher prices as well as weaned animals. Lots of nonuniform weights were discounted while lightweight cattle and feeder cattle without horns did bring higher prices. Larger lot sizes have been shown to receive price premiums. However, the animals in the lot have to be uniform for the premiums to exist. The presence of horns in a lot results in significant discounts. Fleshy or fat cattle are discounted in the spring but experience less discounts in the fall compared to spring. Thin and very thin cattle receive no significant discount compared to the average feeder cattle in the spring but are discounted in the fall. Herefords received premiums, while Brahmans were discounted (KSU, 1996; Schultz and Marsh, 1985; Turner et al. 1993; Buccola, 1980; Parcell et al. 1995; Schroeder et al.1988). Turner et al. (1993) reported that Angus breeds received premiums but Schroeder et al. (1988) reported that Angus were discounted.

Market characteristics

The market characteristics include time of sale, time of year, fed and feeder cattle futures price, corn futures price, total number of buyers present at an auction and the number of lots offered for sale for a given day. Feeder steers sold in the second and third quarters of a

sale received higher prices than those usually sold in the first quarter. Heifers sold in the second quarter 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. Summer sales receive premiums while a positive relationship exists between feeder cattle prices and feeder cattle futures. Price of corn has a negative effect on feeder cattle prices. Slaughter steer price tends to be significant in determining the prices of steers and heifers. According to Schultz and Marsh (1985) it represents the value of output to feedlots, thus changes affect placement demand for feeders (KSU, 1996; Turner et al. 1993; Buccola, 1980; Schroeder et al. 1988; Schultz and Marsh, 1985).

The conclusions presented above, (about the influence of specific feeder cattle characteristics on the price), were extracted across several studies. No single study has been able to capture the effects of all the factors causing the price differentials. The problem comes from the wide array of factors that influence cattle prices. According to Buccola (1980) beef cattle analyst face a daunting task as a host of factors influence the final price. Factors such as grade, variety, breed, color, sex, weight, age differentials have to be taken into consideration. Thus, most analysts focus on a representative steer or heifer defined by an explicit set of characteristics that remains invariant across the data set (Buccola, 1980).

Reputation of seller

Turner et al. (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. Thus, reputation was investigated by assigning dummy variables to sellers who had sold more than a certain number of lots in a given auction. The

reputation of the seller was found to be significant only in markets that transfer less information to the buyers. This was consistent with results obtained by Sahpiro (1983). Shapiro (1983) concluded that reputation makes sense only in an imperfect information world. Reputations can help buyers estimate quality in the absence of complete information (Turner et al. 1993).

Turner et al. (1993) measured reputation of seller in a teleauction. Teleauctions are auctions held over a conference call. Lot description is provided to the prospective buyers who bid via a conference telephone network. The buyers do not get the opportunity to examine the cattle before buying. Thus, reputation may be important. The question is, in a live auction or video auction, is reputation significant? That is yet to be investigated and should be a subject of future study.

Estimation methods

A number of approaches are used in livestock and commodity pricing studies. Regression analysis employing varying specifications has been used. Turner et al. (1993) in their study of reputation selling in feeder cattle teleauctions used an Ordinary Least Square (OLS) model to regress prices on market, lot and cattle characteristics, and the reputations of the seller. Schultz and Marsh (1985) used a quarterly econometric model to study price differences between steers and heifers. However, in analyzing prices, price analysts are increasingly using hedonic models (Parcell et al. 1995).

Hedonic pricing models

Hedonic pricing models consider the demand of a product as a function of its characteristics. A commodity's market price is often viewed as being determined by some combination of implicit (hedonic) prices. Agricultural markets provide many opportunities to value commodities with nontradable attributes, and hedonic pricing approaches have been used to estimate the value of the characteristics for a variety of agricultural products and inputs (Espinosa and Goodwin, 1991; Richards and Jeffrey, 1996).

Hedonic pricing models have wide applications in agricultural and resource economics. Danielson (1986) used a hedonic price model to explain farmland prices. Rich and Moffitt (1982) used a hedonic price model to assess the benefits of pollution control on Massachusetts' Housatonic River. Ro (1997) listed hedonic pricing as one of the approaches to valuing environmental cost. Jabbar (1998) used a hedonic price model to study buyer preferences for sheep and goats in Southern Nigeria. Parcell et al. (1995) used hedonic modeling to analyze cow-calf pair prices. The aim of the study was to determine implicit values of characteristics of individual cow-calf pairs. They regressed prices of cow-calf pairs on cow characteristics, calf characteristics and sale month. Schroeder et al. (1988) regressed market, lot and cattle characteristics on the price of feeder cattle using a hedonic price specification. Bailey et al. (1991) in comparing prices received for feeder cattle in Video and Regional Markets used a model similar to that used by Schroeder et al. (1988), in assessing the factors affecting feeder cattle price differentials.

Hedonic models make use of regression estimates, and different regression models have been fitted depending on the variables involved. Coatney et al. (1996) used a hedonic price model to study feeder cattle price determinants. They used a probit and a Three-stage-

least square model in their analysis. Stanley and Tschirhart, (1991) used a hedonic price model to estimate implicit prices of breakfast cereal characteristics. They used the linear Box-Cox functional form in their modeling. Richards and Jeffrey (1996) also used a Box-Cox specification in their hedonic pricing model, in determining the implicit value to dairy producers of genetic traits for purebred Holstein dairy bulls in Alberta. A hedonic price for a dairy bull may be expressed mathematically by defining the price of a bull's semen as a function of the sum of the values for each of the genetic characteristics. Gillmeister et al. (1996) used a seemingly unrelated regression (SUR) in their hedonic pricing of milk components at the farm level.

Bailey et al. (1991) used a paired t-test to test for significant differences between the seller's net adjusted price (ASNP) at the video auction, and the net price (SNP) that would have been received had the cattle been shipped for current delivery to a regional auction. They also used a paired t-test to determine if the adjusted buyer's net price (ABNP) was significantly different from the estimated net price (BNP) the buyer would have paid had the cattle been purchased at one of the three regional auctions and shipped to the destination specified by the buyer.

Break-even prices

Buccola (1980) used break-even (BE) analysis to investigate the influence of important supply and demand factors on feeder cattle price differentials. BE prices differed for the seller and the buyer, and the different feeder cattle characteristics have varying influence on the break-even price. The seller, though passive in the bidding process, will not sell at a price below her BE price. The seller is guided by cost of inputs and overheads, while

the buyer is guided by the expected slaughter price and cost in feeding to slaughter weight. Thus, BE prices of seller and buyer, define the long-run limits of price bidding. Buccola (1980) calculated the expected per head profits of buyer and seller, setting each to zero and solving for per hundredweight feeder price.

To assess for instance, the impact of a marginal change in weight on BE prices, the BE price equation is differentiated with respect to weight. The signs of the coefficients of the differentials indicates the direction of changes specific characteristics on BE prices. In the absence of specific coefficient values, the change is indeterminate (Buccola, 1980).

Current trends in feeder cattle marketing

Studies have shown that some sales programs mirroring SV do produce price premiums. Graded sales aim to assemble like kind of cattle into uniform groups from small to mid-sized cow-calf operations in order to raise the price prospective buyers are willing to offer (Miller, 1997). Miller reports that premiums for graded calves sold in larger pens ranged from $ 4.00 to $8.00/cwt. Lichtenwalner (1997) includes marketing through graded sales in the management practices that can increase the profitability of feeder cattle operations. Lichtenwalner (1997) reports that graded sales average 2-8 cents /lb over weekly sales (normal auctions).

According to Miller (1995) another type of feeder cattle marketing which has seen increased popularity in recent years is direct farm sales. This approach may be more desirable to larger producers because they are more inclined to offer uniform loads of healthy feeder cattle. The cattle are usually offered in truck load lots and are vaccinated against diseases such as shipping fever complex. Miller (1995) reports that the direct farm sale can

result in premiums ranging from $2.00- $6.00/cwt. This kind of sale offers larger lot size, and are "source verified" (feeder cattle are from one farm or producer and the buyer can easily trace cattle to the source).

Thus SV, which offers larger lot size but from different farms or producers, and conforming to specific or defined standards should offer similar price premiums. However, there have been no studies exploring the potentials of SV. Source Verification, though gaining in popularity is a new concept in feeder cattle management. The focus of this study is to estimate the value of SV to the seller.

CHAPTER 3. METHODOLOGY

Data

Two different sets of data were used in this study. The primary data for the study is fall 1997 and 1998 feeder cattle auction prices and characteristics obtained from the Bloomfield Auction Market, Bloomfield, Iowa. The data were obtained from USDA Agricultural Market Service (AMS) live auction report on feeder cattle. The cattle were evaluated and reported by a trained USDA market reporter. The data were collected for all Bloomfield sales from 1st October to 17th December 1997 and 7th October 1998 to 30th December 1998 respectively. There were 12 normal auctions or non-SV sales in 1997 and 13 in 1998 and three SV auctions each in both years. SV sales occurred once in the months of October, November and December in both years. All the observations were for medium large framed cattle.

The source verified feeder cattle program, also referred to as IMBIO, has certain defined standards to which participating farmers must adhere. A copy of future bull standards for the IMBIO program is presented in Appendix A. Source verified sales occurred on specific days with the buyers and sellers being informed in advance on which dates sales would be SV. Sales are restricted to SV feeder cattle on such days. On the day of the sale, feeder cattle are sorted into larger lot sizes by their sex, weight, frame, breed and color. That is, feeder cattle from different producers are grouped based on the variables mentioned above to obtain larger lot sizes.

Cash corn prices for the periods were obtained from the Commodity section, Iowa Department of Agriculture and Land Stewardship, while spot prices of fed cattle were obtained from the agricultural market report, USDA.

There was no difference in the auctioning process for both normal and SV sales. Each lot of cattle was treated as an observation. Minimum lot size for both years was four, while the maximum was 104 and 157 for 1997 and 1998, respectively. Usually, lot sizes of one or two, meant there was a problem with the animal. Thus, using lot sizes of four and above eliminated the possibility of problem lots being included in the data. Problem animals (sick, horned, dirty, lame) are discounted considerably, and can influence the results significantly. There were 715 lots of steers and 545 lots of heifers in 1997 and 944 steer and 695 heifer lots in 1998. Average weight for steers was 577 Ibs in 1997 and 560 Ibs in 1998. For heifers, average weight for 1997 was 528 Ibs and 520 Ibs in 1998 respectively. Average lot size for the steers and heifers in 1997 was 13.6 and 11.7 and in 1998 was 11.2 and 10.1 respectively. In 1997 there were a total of 109 SV sales observations and 1151 normal sales observations while in 1998 there were a total of 94 SV observations and 1545 normal observations. In 1997 the average lot size for SV observations was 35.9 and 10.6 for the normal sale observations. In 1998, SV sales averaged 42.4 head per lot size, with normal sales averaging 8.8 head per lot respectively.

The second data set is made up of feeder cattle prices and data on physical traits obtained from four Iowa auction markets on five dates; Centerville (December 17, 1998), Winterset (January 23, 1999 and February 13, 1999), Russell (January 18, 1999) and Appanoose (February 4, 1999) auction markets. During the same auction, lots of both SV cattle and non-SV cattle (normal) feeder cattle were sold. The auction starts with the normal

sales in the first and second quarters of the sale, with SV sales occurring in the third quarter and closing with a normal sale in the fourth quarter. Chariton Valley Beef reporters reported the data. These reporters did not report all sales that occurred after the SV cattle were sold. In this set of data, the SV cattle are not grouped to form larger lot sizes but are sold on a per farmer basis (Sellers, 1999). As in the first data set, each lot is treated as an observation. The SV standards were developed by Chariton Valley Beef, a producer organization developed to improve profitability for its members. The farmers have to complete and sign a form agreeing to conform to a set standard on health, management, and documentation. A copy of the forms and standards farmers are expected to conform to is provided in the Appendix B.

There were a total of 306 lots for all five sales with Centerville recording 80, Appanoose 67, Rusell 64, and Winterset 1 and 2 recording 43 and 52 respectively.

Pricing model

The model used in this study is the characteristic (hedonic) feeder cattle pricing model used by Bucccola (1980), Schultz and Marsh (1985), Schroeder et al. (1988), Turner et al. (1993), KSU (1996) among others. Feeder cattle price is determined by a combination of cattle and lot characteristics, and market forces. The model used is specified as given in (1) below. Feeder cattle price is the dependent variable and the market, lot and cattle characteristics are the independent variables.

Lot and cattle characteristics included sex, weight, frame, and breed among others. In this study, the sex was restricted to steers and heifers, while the frame consisted of medium large frame and medium frame. The weight used is the actual average weight of cattle in a lot, with cattle of similar weight going into a lot. Wean is used to represent animals

weaned prior to the time of the sale. Precondition in this study refers to cattle given some special treatments to prepare them for the sale. The treatment includes booster shots, nutrient build-up, special diets rich in vitamins and minerals (see Appendix B for description). Animals given a green tag have been raised conforming to certain specified state standards (see Appendix C for a description of the Greentag requirements). Default color used in the study is black to represent Angus genetics with all other colors Simmental, Charolais, Red or Mix (all other colors and color mixes that cannot be placed into any of the above groups) expected to be discounted from the black. The color of the feeder animal generally indicates the breed, which determines certain characteristics and thus significantly influences the price. See Table 3.1 below for a full description of variables used and their meanings. The price model is;

$$P_{it} = \sum CL_{it} + \sum MC_{mt}, \quad (1)$$

where P refers to feeder cattle price, at time (t) for lot (i), CL refers to cattle and lot characteristics for the (i) lot of cattle at time (t) and MC refers to the market characteristics at time (t) and market influence (m). Different models were fitted for the two sets of data. The Bloomfield data used equation (2) below while equation (3) below was used for the Centerville, Winterset, Russel and Appanoose data (see Table 3.1 for definition of the variables).

Table 3.1 Variables and their definitions used in the empirical model

Variable	Definition	Measurement
P	Price of feeder cattle	($/cwt.)
Hd	Number cattle in a lot	Actual number
Hd-Sq	Number of cattle in lot squared	Actual number
Wt	Weight of cattle in pounds	Actual weight 300-950Ibs
Wt-Sq	Weight of cattle squared	Actual weight squared
Fed	Spot price of Fed cattle	$/cwt.
Corn	Spot price of corn	$/bu.
SV	Source Verified	1 if SV, 0 if non SV
Sex	Sex	1 if Heifer, 0 if steer
Wean	Weaned cattle	1 if cattle weaned, 0 otherwise
Repu	Reputation of Seller noted by market reporter	1 if seller has a good reputation, 0 otherwise
Greentag	Presence or absence of Greentag	1 if Greentagged, 0 otherwise
Precon	Preconditioned cattle	1 if preconditioned, 0 otherwise
Color	Color of feeder cattle	0 if Black, 1 if Mix, Red, Simmental or Charolais

$$\mathbf{P = f\{Hd, Wt, Fed, Sex, SV, Corn, Hd\text{-}Sq, Wt\text{-}Sq\}, \quad (2)}$$

$$\mathbf{P = f\{Hd, Wt, Sex, SV, Fm, Repu, Color, Wean, Precon, Greentag\}. \quad (3)}$$

Equation (2) follows Schultz and Marsh (1985), in using fed cattle prices and corn prices as proxy variables that would represent changes in the fundamental market forces at the time of the auction. Other studies have used closing feeder cattle futures (Schroeder et al. 1988) and corn futures as their proxy variables (Turner et al. 1993). Spot prices of corn and the fed cattle prices were used because they were consistent in all the different markets and years, and was consistent with Schultz and Marsh (1985) and it provides the best fit for the data.

Determination of optimum price

From the regression results and estimates, (4) below can be obtained. Differentiating (4) with respect to Head and solving for the head, one can obtain the optimum head for each model given in (5) below. The optimum lot size was not determined in the second data set.

$$\mathbf{P = \beta_0 + \beta_1 Hd + \beta_2 Wt + \beta_3 Fed + \beta_4 Sex + \beta_5 SV + \beta_6 Corn + \beta_7 Hd\text{-}Sq + \beta_8 Wt\text{-}Sq} \quad \mathbf{(4)}$$

$$\mathbf{Hd = -\beta_1 / 2\beta_7} \quad \mathbf{(5)}$$

CHAPTER 4. EMPIRICAL RESULTS

Data

The results from Bloomfield data is presented first and is followed by the results from the Appanoose, Centerville, Rusell, and Winterset data. The Bloomfield data were examined for fall 1997 and fall 1998. The results for lot and cattle, and market characteristics are presented separately from the results associated with SV. Tables 4.1 to 4.9 contain details of the results of the parameter estimates, the corresponding t-values and the summary statistics about the estimates.

The parameter estimates obtained from OLS estimation for the Bloomfield data appeared reasonable and had the expected coefficient signs. However, the Durbin-Watson values (D-W) were low, suggesting the presence of autocorrelation. The D-W statistics will lie in the range of 0 to 4, with a value near 2 indicating no first-order serial correlation. Positive serial correlation is associated with D-W values below 2 (Pindyck and Rubenfield, 1998; SAS/ETS User's Guide, 1995). The test of significance (p-values) for the Durbin-Watson test for first order autocorrelation in all models were highly significant. Higher order tests were insignificant and eliminated. Hence the models were corrected for first order auto-correlation. The correction for auto correlation improved the R-squares slightly and did not alter the signs of the coefficients, but most importantly, the D-W's were close to 2. A test of the coefficients of autocorrelation on the estimated residuals did indicate that autocorrelation was no longer a problem.

Table 4.1 Estimated premiums and discounts associated with feeder cattle and market characteristics, for fall 1997 and 1998, Steers and Heifers in Bloomfield Auction Market.

Parameter Estimates

(t-values)

Auction Market

Independent var.	Steer 1997	Steer 1998	Heifer 1997	Heifer1998
Intercept	84.83	65.15	106.28	87.27
	(7.86)	(19.01)	(9.98)	(22.32)
Head	0.08	0.09	0.09	0.10
	(5.34)	(8.20)	(5.05)	(6.00)
Weight	-0.05	–0.06	-0.03	-0.03
	(-32.90)	(-72.70)	(-16.83)	(-31.58)
Fed	1.31	0.37	0.68	0.31
	(7.24)	(7.07)	(3.78)	(5.48)
SV	2.14	-0.34	1.53	0.96
	(2.91)	(-0.73)	(2.33)	(1.92)
Corn	-37.07	-6.37	-30.36	-19.87
	(-12.49)	(-4.71)	(-9.92)	(-13.35)
Hd-Sq	-0.00035	-0.00065	-0.00082	-0.00094
	(-1.45)	(-4.52)	(-2.48)	(-3.58)
Wt-Sq	0.000068	0.0000954	-0.0000027	0.000020
	(7.79)	(20.65)	(-0.30)	(3.48)
R-Square	0.84	0.88	0.66	0.69

Table 4.2 Summary statistics for Steers-1997, Bloomfield Auction Market

Variable	N	Mean	Std. Dev	Minimum	Maximum
PT	715	83.94	6.93	67.00	112.00
HEAD	715	13.60	16.54	4.00	104.00
WT	715	576.82	121.27	314.00	941.00
FED	715	67.56	1.24	66.00	70.00
SALE	715	0.07	0.26	0	1.00
CORN	715	2.44	0.07	2.26	2.53

Table 4.3 Summary statistics for Heifers-1997, Bloomfield Auction Market

Variable	N	Mean	Std. Dev	Minimum	Maximum
PT	545	77.69	4.74	59.25	96.00
HEAD	545	11.74	12.87	4.00	102.00
WT	545	527.94	111.63	306.00	945.00
FED	545	67.50	1.22	66.00	70.00
SALE	545	0.10	0.30	0	1.00
CORN	545	2.44	0.07	2.25	2.53

Table 4.4 Summary statistics for Steers-1998, Bloomfield Auction Market

Variable	N	Mean	Std. Dev	Minimum	Maximum
PT	944	77.25	7.89	56.75	101.50
HEAD	944	11.24	16.37	4.00	157.00
WT	944	560.35	133.45	304.00	943.00
FED	944	60.43	1.82	56.50	63.00
SALE	944	0.06	0.23	0	1.00
CORN	944	1.86	0.07	1.74	1.94

Table 4.5 Summary statistics for Heifers-1998, Bloomfield Auction Market

Variable	N	Mean	Std. Dev	Minimum	Maximum
PT	695	70.31	4.64	55.00	84.25
HEAD	695	10.09	13.98	4.00	101.00
WT	695	519.99	122.55	303.00	890.00
FED	695	60.50	1.86	56.50	63.00
SALE	695	0.06	0.23	0	1.00
CORN	695	1.86	0.07	1.76	1.94

Table 4.6 Summary statistics for SV observations 1997, Bloomfield Auction

Variable	N	Mean	Std. Dev	Minimum	Maximum
PT	109	83.18	6.67	68.50	98.00
HEAD	109	35.93	24.86	5.00	104.00
WT	109	530.94	109.66	328.00	819.00
FED	109	66.38	0.49	66.00	67.00
SALE	109	0.51	0.50	0	1.00
CORN	109	2.45	0.05	2.41	2.56

Table 4.7 Summary statistics for non-SV observations 1997, Bloomfield Auction Market

Variable	N	Mean	Std. Dev	Minimum	Maximum
PT	1151	81.05	6.81	59.25	112.00
HEAD	1151	10.60	11.64	4.00	104.00
WT	1151	558.02	120.31	306.00	945.00
FED	1151	67.64	1.23	66.00	70.00
SALE	1151	0.42	0.49	0	1.00
CORN	1151	2.44	0.07	2.26	2.52

Table 4.8 Summary statistics for SV observations 1998, Bloomfield Auction Market

Variable	N	Mean	Std. Dev	Minimum	Maximum
PT	94	75.82	7.51	64.50	93.50
HEAD	94	42.43	30.55	4.00	157.00
WT	94	533.05	15.95	304.00	825.00
FED	94	58.92	1.86	7.00	61.13
SALE	94	0.43	0.50	0	1.00
CORN	94	1.88	0.04	1.82	1.93

Table 4.9 Summary statistics for non- SV observations 1998, Bloomfield Auction Market

Variable	N	Mean	Std. Dev	Minimum	Maximum
PT	1545	74.23	7.53	55.00	101.50
HEAD	1545	8.83	11.44	4.00	105.00
WT	1545	543.86	131.27	303.00	943.00
FED	1545	60.56	1.80	56.50	63.00
SALE	1545	0.42	0.50	0	1.00
CORN	1545	1.86	0.07	1.74	1.94

Market characteristics

The cash corn prices registered negative coefficients in all cases while the fed cattle prices had positive coefficients. They were both highly significant in both years and for both the steer and heifer models. This was consistent with earlier work done by Schultz and Marsh (1985) and also conformed to market expectations (see Table 4.1). However, the coefficients for fall 1997 were higher than that of fall 1998 for both corn and fed cattle prices. In 1997, the model for steers was more responsive than that of heifers for both corn and fed cattle, but in 1998 the results was a mix. Coefficient for fed cattle was slightly higher for steers than that of heifers, but there was a complete reversal in the case of corn.

Fed cattle represent value of output from feedlots and also replacement to the feedlots; thus its change affects placement demand for feeder cattle (Schultz and Marsh, 1985). The coefficient for fed cattle was higher in 1997 for both steers and heifers than 1998. This might be partly explained by the more cautious optimism that existed in the market in 1998 after intense speculative activity in 1997 that burned some feedlots. Feedlots generally lost money from late 1997 through early 1999 (ISU estimated returns, 1999). The average prices in 1997 for both steers and heifers were also higher than that of 1998 steers and heifers. The average prices for SV cattle in 1997 were similarly higher than that of 1998.

The price of corn serves as a proxy for cost of gain in the feedlot (Schultz and Marsh, 1985). Corn is the second largest input after feeder cattle in feedlots and its price directly impacts the profitability of feedlots. The coefficient was negative as expected, and consistent with earlier work done by Schultz and Marsh (1985).

Lot and cattle characteristics

The results for the cattle and lot characteristics were similar to results obtained by KSU (1996), Schroeder et al. (1988), Turner et al. (1993), Buccola (1980) and Schultz and Marsh (1985). The number of head had a positive impact on the feeder cattle prices, with weight having a nonlinear and negative impact on the price of feeder cattle. The heavier cattle sell at lower price per pound. That is, the price declined as the weight increased. The results were similar for both years in the steer and heifer models. However, the optimum lot size varied for the years and for the sexes, with steers recording higher optimum lot sizes than heifers in both years. Fall 1997 steers had the highest optimum head of 110, with the heifers recording 63 head. Fall 1998 steers had an optimum lot size of 70 with the steers recording 55 head. Both weight and lot size had very consistent coefficients. Head squared had negative coefficients in both years and both sexes. This was similar to results obtained by Turner et al. (1993) and Schroeder et al. (1988). Weight squared had positive coefficients in all models except 1997 heifers. Schroeder et al. 1988 also reported similar results for the weight-squared coefficients for the steer and heifer models. Weight squared was significant in all but heifer 1997 model while head squared was insignificant in only 1997 steer's model.

Impact of source verification

Fall 1997 reported significant and positive coefficients for SV with the values of the coefficients being higher in the steer than heifer model. This conforms to generally held belief that, there is a bias against heifers in the market (Schultz and Marsh, 1985). However, fall 1998 steer model had a negative but insignificant coefficient for SV with the heifer model having a positive and barely significant coefficient.

Characteristics for Rusell, Appanoose, Centerville and Winterset

The market characteristics were not considered in the second data set (Rusell Centerville, etc). The impact on feeder cattle prices will be felt equally on SV and non-SV sales as they were compared within the same day and thus face the same market conditions. Weight had a consistently negative coefficient in all the auction markets that make up the second data set. They were all significant except Winterset2. Rusell, Winterset 1 and 2, all had positive and significant coefficients for the number of head. However, Centerville and Appanoose had insignificant coefficients with Centerville having a negative value. The number of head had positive coefficient in all markets except Centerville. However, the coefficient was significant in only Rusell and Winterset 1. All the other variables showed the expected signs for their coefficients though they were mostly insignificant. All the colors were discounted from black cattle as expected. Weaned, pre-conditioned and cattle with Green tag all had the expected positive coefficients. Parameter estimates, their coefficients and the summary statistics for the second data are given in Table 4.10 and 4.11

Appanoose, Centerville and Winterset 1 recorded positive coefficients for SV but none was significant. Meanwhile, Rusell and Winterset 2 had negative coefficients with that of Winterset 2 being very significant.

Table 4.10 Estimated premiums and discounts associated with feeder cattle and market characteristics, for Appanoose, Centerville, Rusell and Winterset Auction Markets.

	Parameter Estimates (t-values) Auction Market				
Independent var.	Appanoose	Centerville	Rusell	Winterset1	Winterset2
Intercept	101.44	101.93	98.67	116.73	80.64
	(15.64)	(35.44)	(28.84)	(12.96)	(38.85)
Head	0.29	-0.154	0.13	0.34	0.13
	(1.34)	(0.27)	(2.32)	(2.25)	(1.32)
Weight	-0.04	–0.05	-0.37	-0.07	-0.00098
	(-3.76)	(-8.94)	(-6.15)	(-4.93)	(-1.06)
Sex	-10.71	-9.84	-4.48	-5.20	-4.00
	(-4.31)	(-11.23)	(-3.63)	(-2.79)	(-2.79)
SV	2.45	1.93	-2.97	1.33	-6.65
	(0.99)	(1.19)	(-1.34)	(0.66)	(-3.0)
Frame	-1.28	-2.28		-2.55	
	(-0.40)	(-1.79)		(1.34)	
Mix	-2.36	-1.78	-0.38	-2.19[c]	
	(-0.86)	(-1.79)	(-0.19)	(-1.11)	
Char		-0.62	-0.84		-0.31
		(-0.44)	(-0.44)		(-0.14)
Red			-1.41		-1.30
			(-0.64)		(-0.94)
Simm			-2.49		-0.94
			(-1.13)		(-0.45)
Precon		0.63			
		(0.62)			
Wean		0.30	2.00		
		(0.82)	(1.12)		
Greentag		1.16			
		(0.31)			
R-Square	0.31	0.79	0.54	0.51	0.30
AdjR-Square	0.24	0.76	0.46	0.43	0.19
F-value	4.48	26.68	7.07	6.18	2.75
DW	1.87	1.94	2.07	2.05	1.84

[c] Color mix was made of all other cattle apart from black.

Table 4.11 Summary statistics for Appanoose, Centerville, Rusell and Winterset Auction Markets

	Appanoose	Centerville	Rusell[a]	Winterset1	Winterset2[b]
Mean price- SV	76.94	74.53	77.17	75.75	74.38
Mean price Non- SV	75.74	72.05	77.18	74.70	78.92
Mean Hd-SV	8.4	16.63	17.00	11.26	22.21
Mean Hd Non-SV	6.78	6.31	12.24	11.88	8.92
Mean Wt –SV	592.50	523.00	573.00	637.11	685.14
Mean Wt –Non SV	555.81	485.73	563.93	609.96	783.71
N	67	80	64	43	52

[a b] Rusell and Winterset2 lots were made of only medium large framed cattle while the others were a combination of both Medium and medium large framed cattle.

CHAPTER 5. CONCLUSION AND RECOMMENDATIONS

Optimum lot size

Steers sold at Bloomfield Auction market recorded higher optimum lot sizes than heifers in both years. The optimum lot sizes were higher in 1997 than 1998, perhaps confirming the earlier observation that there was some caution on the part of feedlots in 1998 compared to 1997. Fall 1997 steers had an optimum lot size of 110 while the heifers reported 63. Fall 1998 steers had an optimum lot size of 70 while the heifers recorded 63. The results of the study were consistent with work done by KSU (1996) and Turner et al. (1993) on the optimum lot sizes. KSU (1996) reported that the largest premiums for steers and heifers are obtained for lot size ranging from 65 to 75 head. Schroeder et al. (1988) reported that the highest premium for lightweight cattle was for lots of 45 to 50 head and for heavier cattle 55 to 65 head. Turner et al. (1993) reported an optimal lot size of 147 and 273 in two Tele-auctions. The optimum head may be related to the optimum truck weight but the exact relation has not been investigated. Studies by Parcell et al. (1995) and KSU (1996) made mention of a truck-load optimum lot size relation, but as mentioned above, the exact relation has not been investigated. This can be the subject of future studies. The approach used in determining the optimum head size can be used to determine the optimum weight if it is an objective or if desired.

Source Verification

From the results of the study presented in Chapter 4, one can conclude generally that SV is associated with price premiums. In the Bloomfield data set, all the cattle were medium

large framed and different models were fitted for steers and heifers. Thus any influence from the frame and sexes were removed. Studies by Turner et al. (1993), Schultz and Marsh, (1985), Schroeder et al. (1988) among others have shown that the frame and sex of feeder cattle do have significant influence on the price of feeder cattle. Fall 1997 steers and heifers, and fall 1998 heifers did show price premiums being offered for SV and pooled cattle with their coefficients being significant. For fall 1998 steers, where a premium was not observed, the coefficient was not significant. However, the actual premium is less than that suggested by Miller (1997) and Lichtenwaler (1997) after accounting for all the variables that influence price.

Source verified cattle are offered with all the background information and documentation that helps the potential buyer to determine the value of the calves. The information is recorded and verifiable. The buyers are offering the premiums for the quality they expect, the background information, and the belief in the information presented about the feeder animals. As the quality cannot be derived solely on inspection, the issue of reputation of the market and sellers do influence the buyers. Shapiro (1983) points out that 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. Sellers must invest in their reputation by producing quality products. In this instance the investment takes the form of the added treatment and documentation. Sellers may find that after they have established their reputation, it may be profitable (in the short-run) to reduce the quality as the adverse effect of quality may come in the longer run (Shapiro, 1983). Since the whole process is based on imperfect information as far as the buyers are concerned, there may be a lot going on beyond this study. Source Verification may only be offering more information to

the buyer or may be really offering a quality product but in any case the reputation effects cannot be discounted. However, in this study, SV was a newly introduced innovative approach to feeder cattle management and marketing, and the reputation of the sellers had not been established. The impact of reputation in LAS of feeder cattle has not been studied, though reputation was found to be significant by Turner et al. (1993) in teleauctions. Thus, one cannot draw conclusions on the expected influence of reputation in estimating the value of SV. However, with SV and its attendant information and the potential to verify and if possible trace back to the source. The producers have lesser incentive to reduce the quality of their cattle. Thus, any potential adverse effect of reputation of owner on selling price is reduced with SV.

Thus, the inconclusive nature of the results may be a result of buyers having no firm belief in the reputation of the sellers and their products or no basis for assessing the reputation of the product being offered. The influence of reputation in feeder cattle marketing should be exhaustively studied.

The results of this study supported by previous studies indicate that larger lot sizes offer price premiums. In the Bloomfield data, the SV feeder cattle were grouped into larger lot sizes. From the summary statistics in Chapter 4, SV cattle had far larger lot sizes than their non-SV counterparts. Thus, one cannot conclude if the average higher prices of the SV is due in part or exclusively to the larger lot sizes.

The study did not take into consideration the breed, color, fill, coat (for dirty, clean or muddy cattle), weaned, preconditioned, reputation of owner among others. All these factors have been shown to influence the final price of feeder cattle (Turner et al. 1993; Schultz and Marsh, 1985; Schroeder et al. 1988; KSU, 1996). Ideally to test for value of characteristic

one should have discriminant as test. Feeder cattle should be of same sex, frame, health, and given the same treatment (weaned, preconditioned, etc), sold on the same day with the only difference being that one set is SV and the other set non-SV. One can then effectively eliminate the influence of all other factors save SV that is the factor under investigation.

Thus the results from the Bloomfield data points to price premiums being offered on SV cattle, though one cannot confidently conclude so without the above mentioned factors being taken into consideration and also removing the influence of grouping into larger lot sizes.

The second data set tried to correct the anomalies identified in the Bloomfield data. For instance, SV cattle were not grouped into larger lot sizes from different owners. The sales occurred on the same day, thus SV and non-SV feeder cattle being under the influence of the same market condition. This also eliminates the possibility of external factors like weather, condition of the market on a given day, or the numbers of buyers present influencing the price. The other factors like weaned, preconditioned, color, breed, reputation of owner, coat, fill, feature, green tag, replacement, boostered, homegrown, that have been shown to influence price, were added to the model to give a better picture.

Insufficient data was a major problem and seriously affected any effective analysis being done. Though it was identified in the first data set that one need to remove the influences of frame and sex, the lack of adequate data could not allow for their being separated. However, when data constraints were not a problem, the differences in frame were accounted for as in Rusell and Winterset 2. Interestingly, they were the two instances when SV cattle were discounted instead of the expected premiums. Though, the color, breed, wean, preconditioned and green tag characteristics were introduced into the model to make it more

representative, the data constraints prevented their effects from being separated. Due to the problem of data constraints, only lots with one head were eliminated from the data set. Thus, lots of two or three head that has problem animals like sick, lame, horned or dirty animals were included. These problem animals can also influence the results as they are usually discounted.

The sales (SV and non-SV) occurred at different times of the day, and as mentioned in Chapter 2 (literature review), the time of sale can significantly influence the price offered for a feeder cattle. Source verified sales occurred in the third quarters of the sale and according to Schroeder et al. (1988), cattle sold in the second and third quarters of the sale received premiums compared to similar cattle sold in the first quarter. Thus, the influence of the time of sale may affect any effective measurement of the gains from SV. Therefore the study could not effectively answer the question; is SV beneficial to the farmer? In addition, non-SV cattle continued to be sold well beyond the end of the SV sale and not all of the data were collected or included in this analysis.

Recommendation

The approaches used in this study can aid future studies. Any study aiming to measure SV or any such hedonic trait can follow the following recommendations.
The cattle should be separated into well-defined groups. That is, cattle of same sex, breed, color, frame, health, weight, and having received the same treatments like preconditioned, weaned, should be put into uniform groupings. The SV cattle (treatment group) should not be grouped into larger lots or should not have any special treatment apart from the effect being measured. The time of sale should be as random as possible or should occur at the same

times to remove the possible influence of time of sale or at a minimum be sure all data are collected. The evaluator should be consistent in recording traits or if more than one, the evaluators should have the same training and try to conform to set standards as much as possible.

Future studies should explore the reputation effects more fully and the need to separate its influence from the treatment being studied.

Future studies should also investigate the cost of participating in SV vis-à-vis the benefits. Break-even analysis as employed by Buccola (1980) and described in Chapter 2 can be used or Benefit-Cost analysis can be employed. This will give farmers an idea how far they should invest in SV and the expected benefits at each level of investment.

In summarizing, the study recommends that the following be researched further or be considered in estimating the value of Source Verification.

1. Cost of participating in Source Verification
2. Optimal head-price relations
3. Optimal head-truck load-price relations
4. Influence of reputation in live auctions or video auctions
5. Consistency in data collection and recording of feeder cattle traits and characteristics
6. Sales of both SV and non-SV cattle should occur on same days and times
7. SV cattle should not be grouped into larger lot sizes

APPENDIX A. FUTURE BULL STANDARDS FOR IMBIO FEEDER SALES

Bull Standards
For Future IMBIO Feeder Sales

Reasons for IMBIO members to set standards for bull selection.

1. For small to mid-sized cow-calf producers to remain competitive they must produce a feeder calf that exceeds industry averages.

2. Feeder calves must have more consistent performance and carcass merit.

3. Members of IMBIO want the IMBIO calves to be known for uniformity, consistency, and high quality, not putting emphasis on breed or color.

Calves entered and sold in future IMBIO sales will be sired by bulls that meet or exceed the following minimum performance and genetic specifications.

Breed	Frame Score Range	Minimum* Weaning EPD	Minimum* Yearling EPD	Minimum** RibEye Area	Maximum** Fat Cover
British					
Angus	5.0 to 7.5	28	51	11"	.45"
Hereford	5.0 to 7.5	28	48	11"	.45"
Red Angus	5.0 to 7.5	21	35	11"	.45"
Shorthorn	5.0 to 7.5	10.5	16.5	11"	.45"
Continental					
Charolais	5.0 to 7.5	9.9	17.9	12"	.35"
Gelbvieh	5.0 to 7.5	3	7	12"	.35"
Limousin	5.0 to 7.5	6	13	12"	.35"
Salers	5.0 to 7.5	6.2	10.5	12"	.35"
Simmental	5.0 to 7.5	31.7	48.8	12"	.35"

*These EPDs will put all bulls in the top 60% of their respective breed for weaning and yearling growth genetics.
**IMBIO requires that bull ultrasound carcass measures be done by a BIF certified ultrasound technician.

Other possible standards to consider would include carcass EPDs for marbling, ribeye area, fat cover and % retail product in the top 60% of their respective breed.

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APPENDIX B. FORM A CVB-SOURCE VERIFIED CALF PROJECT

What is Source **Verification** of calves?

Source verification of calves is the collection and documentation of background information that should help the potential buyer determine the value of those calves. Calves are usually source verified in groups, and group information collected, verified and recorded. The information collected includes:

Genetics: The makeup of the cow herd and the breed of the sires. When possible calves are identified by sire. If possible the sires EPDS, the bloodline within the breed and his herd of origin are included.

Health: The weaning time round of vaccines and boosters are recorded along with products used and dates given. If available, serial numbers of products are included. All vaccinations back to birth may be recorded. Individual and group treatments given and site injection maps may be included.

Origin: If purchased calves are included as source verified, a group should come from a single source, where background information is passed on. There should be a minimum ownership period before purchased calves can be called source verified and some programs may only include home raised calves.

Type: This is just a description of the group of calves including; sex, age range, weight range, breed type and percentage range of dominant breed, colors and number of each color.

Management: This includes the level of ID on the calves; the method and time of dehorning and castration; the health standard (green tag, vet certified or producer certified); brand and date of implants used; pest and parasite control products, dates and methods; creep strategy; feed additives and current ration.

Documentation: Copies of sire pedigrees may document genetics. Lists of sires and their EPDs may be included. Health documentation included copies of PC certificates where available. Veterinarian's write up of the health program may be included. Copies of labels or purchase receipts will be included for producer purchased health products. Other products used may also be documented this way. Copies of producer's records on the calves may be included. Any information not documented as described above will be entered in a form or written up. The producer will sign a form verifying the accuracy of the documentation and written information provided.

Promotion

Since the goal of source verification is to improve selling price, information should be collected well in advance of sale date. Potential buyers should be targeted and sent a summary of calves selling in advance of the sale.

Follow up

Sellers of source verified calves are given a copy of the market report after the sale to compare their price to the average. If the seller is interested and if possible buyers are contacted and asked about the possibility of getting carcass data back on the calves. CVB can help coordinate carcass data collection where desired.

Standards

CVB will be adopting a minimum quality level for Source verification in most of the categories of information recorded. A CVB tag will be adopted for source verified calves. Once the standard becomes known, and the tag starts getting some recognition, we hope "CVB Source Verified will become a term that means higher quality.

Producer name _____ Number verified _____ Auction market _____

Signature _____ Number selling _____ Address _____

Address _____ Heifers _____ Steers _____ Phone _____

Phone number _____ Consulting Veterinarian _____ FAX _____

Cattle origin _____ Phone number _____ Likely Sale Date _____

Cattle Description

Identification

Individual ear tags yes ___ no ___
Green tags _____ to _____
Electronic ID yes ___ no ___
Branded? yes ___ no ___
If yes where? _____

Birth dates From _____ to _____
Individual birth dates available yes ___ no ___
Sale day weight steers _____ heifers _____

Weaning date _____

Castration: Date Method
Dehorn: Date Method _____

Ration last 30 days:
Feedstuff Lbs/head/day
Additives fed _____

Implants Date Product _____
Date Product _____
Date _____ Product _____

Return to: Lucas County Extension, R 5 Box 91, Chariton, IA 50049

Production History

Calf Breed Mix

Breeds	Percentage	Color	Head

Sire information
Bull breeds _____
Bull EPDs available yes ___ no ___
Calves identified by sires yes ___ no ___
Calves identified by sire group yes ___ no ___

Dam information
Cow breeds _____
Calves identified by cow ID yes ___ no ___
Calves identified by cow group yes ___ no ___

***Health Program** (details on back of form)*
Iowa Green tagged yes ___ no
Producer certified yes ___ no
Booster injections yes ___ no
Heifers CHV yes _ no
Treatment history available yes ___ no ___
Site injection map available yes ___ no ___

	Green tag program	Humeston Livestock Auction source verified calf
HISTORY Background	Owned for 60 days	Source verified feeders or home raised
Identification Calves Dams Sires	 Green tag NA NA	 Green Tag; Ind. Id highly recommended Highly recommended Individual Id. Required
Pedigree	NA	Document Individual Pedigree, EPDs, and actual birth weigth is highly recommended and encouraged. List information by Individual Sire Id
Genetic Background	NA	Document dam and sire breed mix
MANAGEMENT Date of birth	NA	Provide window of birthing dates. Individual dates highly recommended
Weaning date	30 days Weaning date is documented	At least 30 days Document the actual weaning date
Implant History	Optional	Document Yes or No Date of implant and Product used is highly recommended
Fly and parasite control	NA	Document products used and date of use is highly recommended
Mineral program	NA	Document products used is highly recommended
Creep Feeds	NA	Document Yes or No Document Creep prod./rations and duration of use is highly recommended
Receiving ration	NA	Document ingredients and additives used
HEALTH PROGRAM Cows and Bulls	 NA	 Document annual health program
Calves	Green tag program (one shot only) Clostridial Group H. somnus, IBR, PI-3 BVD,BRSV, Castrated, Dehorned, Grub/Louse Louse only Document dates, products and mfg.	Green tag program plus Pasteurella Document dates, products, mfg. Company, and serials of lots used If you do not use the green tag program, the veterianarian who supplied the products will have to provide a vaccination certificate or your animal health supplier will need to provide you with an invoice.
APPEARANCE Coat Condition	 NA NA	Cattle need to appear well managed Clean, free of mud and manure Not overly fattened

APPENDIX C. GREENTAG REQUIREMENTS

Calves must be weaned 30 days and owned for 60 days. The 60 days is required for individuals who background calves they purchase.

The vaccine requirements are:

All vaccines must be given in the neck area. The vaccines should be given subcutaneously if permitted on the label. Revaccination is recommended per label instructions. Required vaccines and procedures must be completed a minimum of 3 weeks prior to shipment. Calves must be at least 4 months of age when vaccines are given.

Required vaccinations:

- Clostridial Group (7-way)
- IBR, PI3, BVD, BRSV
- Haemophilus somnus

Required procedures

- Castration
- Dehorning

Other required products

- External parasite treatment

In Iowa: Grub/Lice (Aug 1-Nov 15)

Lice (after Nov. 15)

The above vaccines and procedures meet the minimum Iowa Greentag Preconditioning Program requirements. Some producers and veterinarians may include other vaccines or wormer to their calves.

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