

Carcass Trends in Beef Cattle Shown at the Clarksville Better Beef Show

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Acknowledgments

If someone would have told me that I would be conducting a master's project on beef cattle 10 years ago I would have told them that they were crazy. When I began my college career in 1999 I had never stepped foot on a farm and didn't know the difference between a bull and a steer. Once I made the decision to travel the agriculture path I met many benevolent folks along the way willing to teach me.

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Abstract

When most beef producers in Tennessee think about making improvements to their operations, many will think of weaning weights, yearling weights, and lighter birth weights. While all of these aspects are very important, perhaps the most valuable improvements would be made to beef carcass merit. The problem is that carcass merit information is not made available to the cow/calf producer from the meat packers in conventional marketing methods.

The data from the Clarksville Better Beef Show, held annually in Clarksville, TN, were used in this study. Carcass merit data from 724 animals were collected from 2003-2008 and analyzed to examine trends over those six years. The characteristics studied were ribeye area, dressing percentage, hot carcass weight (HCW), rib fat, quality grade, and yield grade. The majority of this data was collected from the Tyson meat packing facility in Joslin IL. The remainder of the data was collected at local processing plants.

Over the six years the data shows that carcass merit components trended towards less desirable carcasses. There were significant ($P < 0.05$) regression results for ribeye, HCW, and yield grade over time, however the R^2 values were very low. While the data showed a high amount of variability they did reflect industry trends.

To gain information on carcass merit of their cattle, producers should consider consigning cattle to programs that will allow them to receive this data in order to make better management decisions for their operations.

Introduction

As more beef carcass information becomes available to the industry, many cow/calf producers seem to become further removed from this facet of the industry. Many cow/calf producers in Tennessee have never seen a beef carcass and most don't understand the concept of neither carcass merit or the impact it may have on the beef industry. Each year, decisions are made regarding selection of breeding stock to potentially improve carcass merit. In dealing with Master Beef Producer (MBP) programs in several Tennessee counties, it is obvious that many producers have no concept of the importance of carcass merit. Although the MBP group represents a small sample, it is still alarming. Therefore producers are somewhat 'reaching for straws' when it comes to breeding stock selection to improve carcass characteristics. Over the last six years, overall carcass quality may have declined in relation to industry standards (National Beef Grid Definitions 2009). For cow/calf producers to maximize potential profits they must know what they have, know how it fits into the market place, and understand how to make improvements. Producers must also keep in mind that the market place has changed over the past several years in favor of niche marketing, which will place value on beef carcasses otherwise considered undesirable.

Beef carcass merit or carcass data is perhaps the most important information for making solid improvements in beef carcass with regard to consumer satisfaction. Beef producers rarely make improvements to their operations by reviewing carcass data. Improving beef operations is one of the most difficult tasks producers face. This task is especially difficult when we consider that producers rarely know how their product performs at the consumer level. In the past, improvement decisions were made mostly through visual observations rather than using any real management tool. More recently, a tool called EPD (Estimated Progeny Difference) has aided producers in management decisions. EPD's can be described as the potential of an animal to pass certain characteristics on to their offspring (Hansen et al. 2006). For example, a producer may wish to increase rib eye size or percent

retail product in their calf crop for a given year. Selecting a bull with a rib eye area (REA) EPD that is higher than the current bull being used should increase rib eye area, or percent retail product, in offspring.

While EPD's have made management decisions such as improving carcass characteristics more efficient, nothing can replace actual carcass data. Carcass data involves collecting information about the animal at the time of harvest. Information such as rib eye size, fat thickness, marbling score, quality grade, yield grade, and kidney, pelvic and heart fat is collected and used to determine carcass merit. Large scale meat packing houses base the value of beef on this information. The problem with this system is that many producers never discover how their calves perform based on carcass merit. Perhaps it is the independent nature of the beef industry or maybe the lack of a clear communication pathway from the packer to the producer that makes sharing carcass data difficult. Whatever the reason, carcass data would provide producers with another tool to make improvements in their herds and subsequently improve profitability. There is a large difference in dollar value between top end carcasses and bottom end carcasses (Smith 2007).

The process of gaining carcass data is not an easy task and is virtually impossible unless one engages in a program like the Tennessee Beef Evaluation or contracts a firm like The Beef Connection. Both entities will provide feed lot performance information and carcass data on each calf entered. The downside to these programs is various fees as well as some market risk. Some producers have also found that local steer shows provide adequate carcass information for their operation.

Over the course of the past several years carcass merit of many cattle coming from middle Tennessee has declined. This could be due to many factors, but issues such as lack of hybrid vigor (from cross breeding) and consistently choosing bulls with low birth weight EPDs could be factors.

Niche marketing of beef has become popular in recent years. Some of this has been done via specialty marketing programs, while others rely on direct sales from the farm. The intriguing aspect of this trend is that a carcass that doesn't meet the standard quality and yield (Choice, Yield Grade 3) can still be sold for a premium based on the niche marketing. This trend magnifies the importance of carcass merit for animals a producer is marketing. Consumer's desire consistency and a lack thereof may result in lost sales and reduced customer base.

No matter how producers market calves, they must have some understanding of what carcass characteristics they are producing to maximize profit potential (Haag 2009).

Objectives

The objective of this study is to examine carcass data from the Clarksville Better Beef Show (2003 to 2008) to determine if carcass merit is declining.

Literature Review

What is Carcass Merit?

Carcass Merit includes all of the factors taken into consideration when placing a grade or value on a carcass. Carcass merit is determined by the yield grade and quality grade of a carcass.

Yield Grade

Yield Grade refers to the amount of beef product that will come from a carcass. Yield Grade is defined as the combined yield of closely trimmed (1/2 inch fat or less), boneless retail cuts from major wholesale cuts that include: sirloin, round, short loin, ribs and chuck (USDA 1997).

Four characteristics are considered in determining yield grade (USDA 1997):

1. External fat thickness over the 12th and 13th rib (Back Fat) measured in 1/10 inch.
2. Percent kidney, pelvic and heart fat (KPH) given as a percent of body weight.
3. Ribeye size is determined as the area in square inches of the ribeye muscle at the 12th rib.
4. Hot carcass weight (HCW) which is the weight of the carcass after all the head, feet, tail and intestines are removed. This is also referred to as the rail weight or hanging weight as well because the carcass will be hanging on a rail (Wagner and Osborne 1997).

Quality Grade

Quality Grade is a term used to describe the potential eating experience of a piece of beef. More specifically, quality grade refers to the tenderness, juiciness and flavor of the cooked product (Tatum 1996). There are two factors that affect quality grade determination, maturity and marbling.

Maturity

Maturity class represents the physiological age of the animal with letters (A through E) assigned to each class:

A maturity <30 months
B maturity 30-42 months
C maturity 42-72 months
D maturity 72-96 months
E maturity 96 < months

Maturity class is determined by using the following indicators: ossification of cartilage, color and texture of ribeye muscle on the beef carcass (Hale et al. no date)

Marbling

Marbling is determined by estimating the amount of intramuscular fat in the muscle. Marbling scores range from “abundant to “practically devoid” (Table 1, Hale et al. no date). Generally, the greater the marbling score, the better the quality grade. Together marbling and maturity are used to determine the quality grade of a beef carcass. USDA (1997) illustrates the relationship between marbling and maturity in determining the quality grade (Figure 1). As degrees of marbling increase the quality grade increases as well. As the maturity class moves past class A, the carcass value usually decreases.

Determining Carcass Merit

Ultrasound

Carcass data can also be obtained by using ultrasound technology to scan and predict carcass traits in live animals, either breeding or finished cattle (Drake 2004). This process must be done by a trained individual and is especially useful on breeding stock that will not go to slaughter. Rincker (2006)

used methods to evaluate carcass traits and found that ultrasound was the most effective at visual assessment of carcass traits as compared to genetic markers and Estimated Progeny Differences (EPDs).

Genetic Tests

Genetic tests are possibly the newest option available to beef producers to determine information on their animals, including carcass merit. These genetic tests locate the potential for change on the gene pairings of the animal.

“While not actually carcass data, new technology using the principles of DNA analysis is identifying the genes that may be important in controlling carcass traits. For example, this technology will not measure the degree of marbling or the corresponding quality grade, but instead it might determine the presence or absence of genes that control marbling” (Drake 2004).

While genetic tests are useful in combination with tools such as EPDs, they are not 100% dependable for carcass characteristic prediction. It is important to note that carcass merit is a complex trait and is affected by many genes; therefore it is difficult to find specific DNA markers for all of the genes involved (Eenennaam 2007). As more research is done on genetic testing, this tool will become more important and more common in predicting beef carcass merit.

Estimated Progeny Differences

For several years now EPDs have been utilized in the beef industry. Though this tool has many flaws, it has proven to be very useful. Recently, EPDs have expanded to include carcass traits to aid producers with selection for carcass quality. EPDs associated with carcass quality include carcass weight EPD, ribeye area EPD, marbling EPD, fat thickness over the 12th and 13th rib EPD, and percent retail product EPDs (Crouch 1997). Carcass EPDs are expressed at a constant slaughter age endpoint, usually around 480 days of age. The data for these EPDs come from slaughter of steer and heifer progeny, ultrasound scan data from yearling bulls, and heifer progeny (Greiner 2002). It is important to note that

EPDs are compared to breed average when no other animals are being compared. In other words when looking at Carcass Weight EPDs of Bull A by himself one would compare it to the breed average. When looking at Bull A vs. Bull B one would compare the EPD's of the two.

Carcass Weight

Carcass weight EPD measures the difference in HCW (hot carcass weight) of the offspring of sires at 480 days old compared to breed average (Crouch 1997). For example, if Bull A has a carcass weight EPD of +10 and Bull B has a Carcass Weight EPD of 0, then you would expect Bull B to sire calves having a 10 lb lighter HCW than calves from Bull A.

Ribeye Area EPD

Ribeye area is expressed in square inches and refers to the rib eye area between the 12th and 13th rib location. Ribeye area is an objective assessment of muscling and an indicator of total muscle in the carcass or live animal (Greiner 2002). For example, Bull A has a ribeye area EPD of +0.50in² and Bull B has a ribeye area EPD of +0.75in² you would expect for the offspring of Bull B to have a ribeye area that is 0.25in² larger than that of the offspring of Bull A.

Marbling/Intramuscular Fat

Marbling EPDs are expressed as an increase or decrease in potential marbling scores. Marbling is the intramuscular fat that flavors the meat. The marbling EPD describes the potential for the marbling trait to be passed from sire to his offspring. EPDs that are generated from ultrasound data actually reflect the intramuscular fat content in the muscle. Marbling score and percent intramuscular fat are directly related to one another; therefore selection for high intramuscular fat would result in higher marbling scores.

Fat Thickness

The measurement of fat thickness, like the ribeye measurement, is taken between the 12th and 13th rib. This fat is located between the muscles and the hide and is often called external fat, rib fat or

back fat. Fat thickness is used in calculating the yield grade. As fat thickness increases, yield grade increases making the carcass less desirable. While external fat is considered to be a waste of product, some external fat protects the meat from chilling too quickly in the cooler and improves flavor (Drake 2004).

Percent Retail Product

Percent retail product EPDs predict differences among animals in the yield of closely trimmed retail cuts from the carcass and are expressed on a percentage basis. The same characteristics used in calculating the USDA yield grade equation (carcass weight, ribeye area, fat thickness and %KPH) are used in determining percent retail product. Sires that have higher percent retail product EPDs are expected to produce progeny with higher cutability and more desirable yield grades (Greiner 2002).

Niche Marketing of Beef

Niche marketing of beef has been around many years. Over the last several years the “Buy Local” trend has added to the demand for niche beef. Niche beef can include, but is not limited to, lean beef, all natural beef, organic beef, grass fed beef, miniature breed beef or simply beef marketed directly from the farm. Consumers that prefer these alternative beef Choices sometimes find it difficult to find the product that they want (Fanatico 2006). Niche marketing has allowed producers to market cattle that do not typically fit into standard marketing situations, thus enhancing sustainability and profitability.

Current Carcass Trends

The typical carcass that the major meat packers desire is a carcass with a yield grade 3 and a quality grade of mid Choice to low Choice. The base price on beef carcasses are derived from carcasses with the following characteristics; HCW between 575lb – 999lbs, yield grade of 3, Choice grade and

under 30 months of age (National Beef Grid Definitions 2009). These statistics for base carcass pricing have remained constant over many years. While the base determinate has remained consistent, the statistics from the feedlots have not. Randy Blach, executive vice president of Cattle-Fax (in Rasby 2007) summarized recent carcass trends by saying the following: average weight put on in the feedyard increased 166lbs from 1980 to 2006; average weight in fed cattle increased 180lbs from 1985 to 2006; carcass weights have increased 150lbs over the last 25 year;, 30 to 40% of cattle in 2006 were yield grade four and in spite of all the increases in days on feed and carcass weights, the quality grades are falling. The trends from the feedlots are fairly alarming. Possibly the lack of performance information sent back to the cow/calf producer is contributing to these trends. While the tools that are in place are helpful, nothing replaces carcass merit data. Everything starts with the cow/calf producer and this too is where the improvements should begin (Crouch 1997).

Materials and Methods

Animals

During the last six years, over 700 steers have entered in the Clarksville Better Beef Show (held every May in Clarksville, Tennessee). One aspect of the show is carcass merit, commonly referred to as “The Carcass Show”. Having this many animals each year produces a wealth of carcass data that can be useful in determining trends in local beef. Like any other show, there are some full-blooded animals from their respective breeds and some cross bred or commercial breed animals. This is similar to what one would expect at a feed lot.

For the purpose of this project, data from the 2003 – 2008 Clarksville Better Beef shows have been examined. Each year, around the first weekend in December, the steers were brought into the Kentucky-Tennessee Livestock Center in Guthrie, KY for the initial weigh-in. Steers weighed from 550 lbs to 800 lbs. Over the next 155 days, the steers were fed a ration at the owner’s discretion. The goal was to have the steers at finishing weight by the 1st of May (when the show was held). The average weight of the animal was approximately 1230 lbs.

After the show, the steers were harvested at the Tyson plant in Joslin, IL (or one of the local processing plants near Montgomery County, TN) depending on who purchased the steers. Animals purchased by Tyson were immediately transported to the Tyson plant (Joslin IL). Animals going to the local facilities were transported that evening or early the next morning. Upon arrival to the processing plant the animals were harvested and processed according to standard protocol.

Data Collection

The data collection team was headed by Montgomery County Extension agent, John Bartee. Mr. Bartee has over 30 years experience working with beef grading including being a former grader for the state of Tennessee. The team headed to the Tyson plant in Joslin IL the morning after the steer show to collect the carcass data. Annually, more than half of all the steers entered in the Clarksville Better Beef Show were processed at the Tyson plant. This is unique because large scale packers rarely allow civilians access to their grading floor. With the help of Lee Denzer from Black Hawk University, the team was allowed full access to record the grades assigned by the USDA grader. Beginning in 2007, instrument grading, a fairly new concept in the beef industry, was used. Industry professionals speculate that these instruments will replace human grading in the near future.

Carcass data was collected from the local facilities over the two days following the show. Grades were assigned by Mr. Bartee, since these facilities are not served by a USDA grader.

The data collected each year included: calf ID number, yield grade, hot carcass weight, dressing percentage, rib fat, kidney, pelvic and heart fat and average daily gain. The data were processed and sorted in a Microsoft (MS) Excel spreadsheet.

Data Analysis

To look for trends over time, MS Excel was used to conduct simple linear regression analyses with time as the independent variable and rib eye area, hot carcass weight, dressing percentage and yield grade as the dependent variables. Each dependent variable was analyzed separately. Years were assigned values of 0, 1, 2 etc., to simplify interpretation of the results. Correlation coefficients among all

measured characteristics were also calculated using MS Excel. To look at trends in quality grade, linear and polynomial regression was conducted in MS Excel with year as the independent variable and percent of animals in either Choice or Select grades as the dependent variables.

Results and Discussion

Ribeye Size

Over the last six years, mean ribeye size generally decreased by about 2 in², from a mean of 13.2 in² in 2003 to a mean of 12.0 in² in 2008 (Table 2, Figure 2). However, the mean in 2006 was also 13.2 in², so there were exceptions. Because ribeye size is an indicator of an animal's muscling ability, a smaller ribeye would translate into smaller carcasses and perhaps a higher yield grade.

Regression analysis over time showed that there was a significant ($P=0.00001$) negative relationship between ribeye area and year (Table 3). However, R^2 value (0.0263) was very low, indicating that, although significant, this relationship was weak and there may have been other factors that influenced ribeye area.

Ribeye was negatively correlated ($P<0.01$) with year ($r=-0.16$), yield grade ($r=-0.46$), and rib fat ($r=-0.20$; Table 4). It was positively correlated ($P<0.01$) with HCW ($r=0.40$), as would be expected.

HCW

Over the last six years, the mean HCW has decreased from 792 lbs in 2003 to 753 lbs in 2008 (Table 2, Figure 3). The mean did decrease each year with the exception of 2008 in which there was a mean increase of 4 lbs. Though there were decreases in HCW from 2003 to 2007, the weights were still within acceptable industry standards for HCW.

Regression analysis over time showed that there was a significant ($P=0.00002$) negative relationship between HCW and year (Table 3). However the R^2 value (0.0255) was very low, indicating that, although significant, this relationship was weak and there were many other factors that influenced HCW.

HCW was negatively correlated ($P < 0.01$) with year ($r = -0.16$; Table 4). It was positively correlated ($P < 0.01$) with yield grade ($r = 0.30$), rib fat ($r = 0.35$) and ribeye ($r = 0.40$; Table 4) as expected as well.

Dressing Percentage

Dressing percentage has generally decreased over the last six years, although there was an increase from the previous year in 2005 and 2008 (Table 2, Figure 4). In 2003 the average dressing percentage was 63.8% while in 2008 the average was 62.2% (Table 2). In 2005 there was an increase to 63% and in 2008 there was an increase to 62.2%. Again the dressing percentage means for each year were close to industry standards (Springer et al. 2009).

Regression analysis over time did not show that there was a significant ($P = 0.49$; Table 3) relationship between dressing percentage and year.

Dressing percentage was not significantly correlated with any of the other factors reported for this project.

Rib Fat

Rib fat mean remained fairly consistent over the six years with slight declines in 2005, 2006 and 2007 (Table 2, Figure 5). The means for the amount of rib fat were not out of the ordinary for any of the six years represented.

The regression analysis over time showed that there was no significant ($P = 0.6227$) relationship between rib fat and year (Table 3). Rib fat was positively correlated ($P < 0.01$) with yield grade ($r = 0.80$) and HCW ($r = 0.35$; Table 4). It was negatively correlated ($P < 0.01$) with ribeye ($r = -0.16$; Table 4).

Yield Grade

Over the last six years, yield grade has increased with the exception of 2005 (Table 2, Figure 6). While there was a numerical increase in yield grade means, there was no increase in actual yield grade. Yield grades are only given in whole numbers and are not rounded up, but are instead always rounded down to the nearest whole number (Parish et al. 2009). Therefore mean yield grades remained constant (at yield grade 2) over the six year project.

Regression analysis over time showed that there was a significant ($P=0.03906$) positive relationship between yield grade and year (Table 3). However, the R^2 value (0.0058) was very low, again indicating that, although significant, many other factors influenced yield grade.

Yield grade was negatively correlated ($P<0.01$) with ribeye area ($r=-0.46$; Table 4). It was positively correlated ($P<0.01$) with HCW ($r=0.30$), rib fat ($r=0.80$) and ADG ($r=0.17$; Table 4).

Quality Grade

Quality grade remained fairly constant over the six year project as well. Choice and Select is where the majority of the carcasses graded. Choice and Select carcasses made up over 90% of all the carcasses studied with the majority of those grading Choice (Figure 7).

Regression analysis over time showed that was no significant relationship between percent of animals with a grade of Choice and year, and between percent of animals with a grade of Select and year for either linear regression (not shown) or curvilinear regression (Figure 8). Figure 8 show that the Choice curve and Select curve mirror one another. The number of Choice grades increases as Select grades decrease.

Discussion

Overall, the carcass merit from the Clarksville Better Beef Show remained consistent from 2003 to 2008. There were some negative trends in carcass traits, like higher yield grades, and lower dressing percentages. The trend that was troubling, was the decrease in ribeye size over time. Over the past several years there has been a shift toward specific EPDs when selecting for herd sires that could be causing decreased muscling ability, or perhaps it could be a breed issue that could be corrected by introducing a new breed into breeding programs. Observation over the next several years will determine whether these trends continue.

Conclusion

According to trends in data over the past six years, carcass merit of the cattle at the Clarksville Better Beef Show is generally declining. Regression analysis showed significant negative slopes, though R^2 values were very low, indicating that there was much unexplained variability in the carcass characteristics studied. There are many factors that may explain these declines. One could speculate that cattle in this study had lower carcass merit over time due to genetic short comings. Many cow/calf producers have been selecting bulls with low birth weight EPDs. While this is an acceptable strategy for first calf heifers, older cows should probably be bred to bulls with more aggressive EPDs to encourage ultimate growth potential. In addition, cattle in this study were not on the same ration or in the same environment. To better examine carcass merit data, experiments with more cattle and more controlled finishing environments would be required. While the carcass data collected over the last six years may prove to be a very valuable teaching tool, the linear regression models do not show any strong trends in data over time.

Many studies have been done on carcass information related to various feed rations and feeding programs. There are companies that provide producers with carcass data, but the private nature of the beef industry has not allowed this information to be shared with the public.

Tables and Figures

Table 1. The quality grade of beef is based on marbling scores (from Hale no date). Previously the marbling score is not reported, but with new instrument grading the marbling score is now recorded.

Grade	Marbling Score
Prime +*	Abundant ^{00-100**}
Prime °*	Moderately Abundant ^{00-100**}
Prime -*	Slightly Abundant ^{00-100**}
Choice +*	Moderate ^{00-100**}
Choice °*	Modest ^{00-100**}
Choice -*	Small ^{00-100**}
Select +*	Slight ^{50-100**}
Select -*	Slight ^{00-49**}
Standard +*	Traces ^{34-100**}
Standard °*	Practically Devoid ^{67-100**} to Traces ^{00-33**}
Standard -*	Practically Devoid ^{00-66**}

*represents quality grade. + is high range, o is mid range and - is low range

**is the corresponding marbling score.

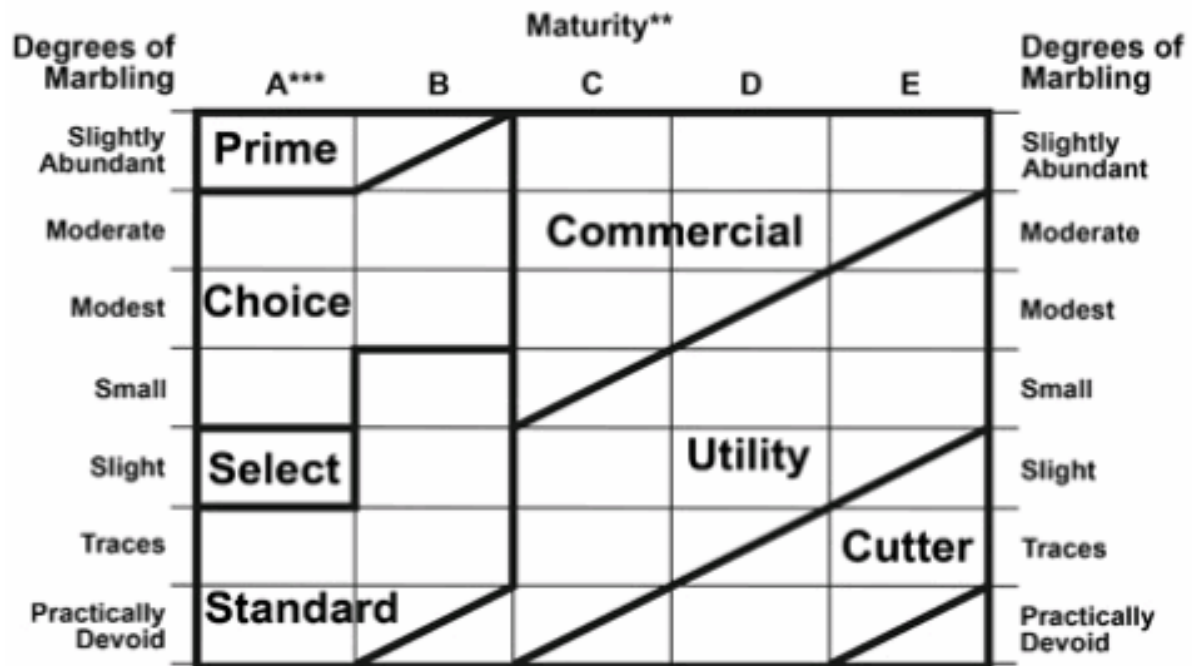


Figure 1. Relationship between Marbling, Maturity and Carcass Grade* (from USDA 1997)

*Assumes that firmness of lean is comparably developed with the degree of marbling and that the carcass is not a "dark cutter."

** Maturity increases from left to right (A through E)

*** The A maturity portion of the figure is the only portion available to bullock carcasses

Table 2. Mean and Standard Error carcass yield grade, hot carcass weight (HCW), dressing percentage, rib fat, ribeye area, kidney, pelvic and heart fat (KPH), and average daily gain (ADG) for steers in the Clarksville Better Beef Show in 2003 to 2008.

Year	Yield Grade		HCW		Dress %		Rib Fat		Ribeye	
	Mean	Std Error	Mean (lbs)	Std Error	Mean	Std Error	Mean (in.)	Std Error	Mean (in ²)	Std Error
2003	2.3	0.09	792	6.7	63.8%	0.2%	0.50	0.021	13.2 in ²	0.15
2004	2.5	0.08	768	7.3	62.7%	0.1%	0.50	0.025	12.6 in ²	0.12
2005	2.2	0.07	762	7.5	63.0%	0.2%	0.41	0.016	12.7 in ²	0.15
2006	2.3	0.07	758	6.4	62.3%	0.2%	0.47	0.016	13.2 in ²	0.15
2007	2.3	0.06	749	6.9	62.1%	0.2%	0.46	0.013	12.7 in ²	0.13
2008	2.6	0.02	753	6.6	62.2%	0.2%	0.51	0.017	12.0 in ²	0.13

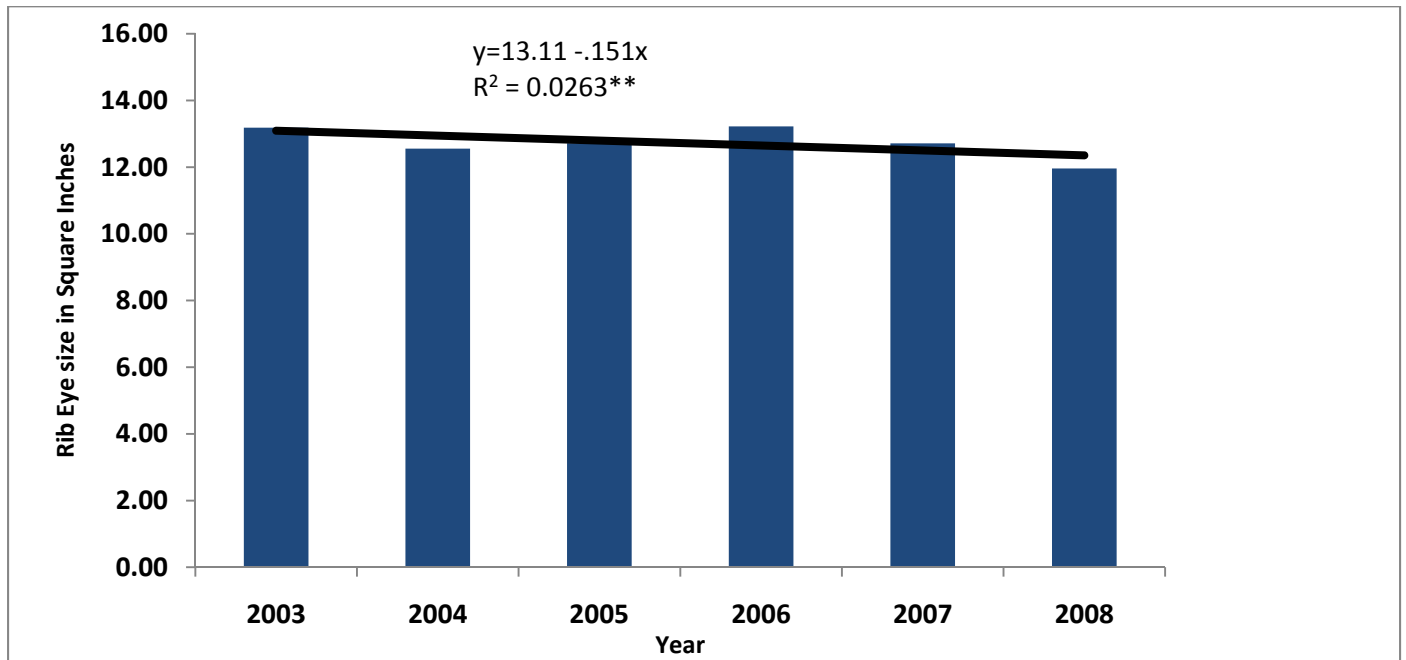


Figure 2. Mean ribeye size by year of steers in the Clarksville Better Beef Show, 2003-2008.
 **Significant at P<0.01

Table 3. Summary of regression analyses with time as the independent variable and ribeye area, hot carcass weight (HCW), dressing percentage, yield grade, average daily gain (ADG) and rib fat as the dependent variables.

Carcass Trait	Slope Coefficients	Y Intercept	R Square	Significance F
Ribeye Area	-0.151	13.11	0.0263	0.00001
HCW	-7.299	781.64	0.0255	0.00002
Dressing %	-0.002	0.63	0.0006	0.48759
Yield Grade	0.037	2.27	0.0058	0.03906
Rib Fat	0.002	0.47	0.0003	0.6227

Table 4. Table 4 shows the correlation between the various carcass factors.

*Indicates that the correlation coefficient is significant at the .05 level.

**Indicates that the correlation coefficient is significant at the .01 level.

	<i>Year</i>	<i>Yield Grade</i>	<i>HCW</i>	<i>Dress %</i>	<i>Rib Fat</i>	<i>Rib Eye</i>
Yield Grade	0.08*					
HCW	-0.16**	0.30**				
Dress %	-0.03	0.03	-0.04			
Rib Fat	0.02	0.80**	0.35**	-0.03		
Rib Eye	-0.16**	-0.46**	0.40**	-0.09*	-0.16**	
ADG	-0.10**	0.17**	0.36**	0.01	0.20**	0.11**

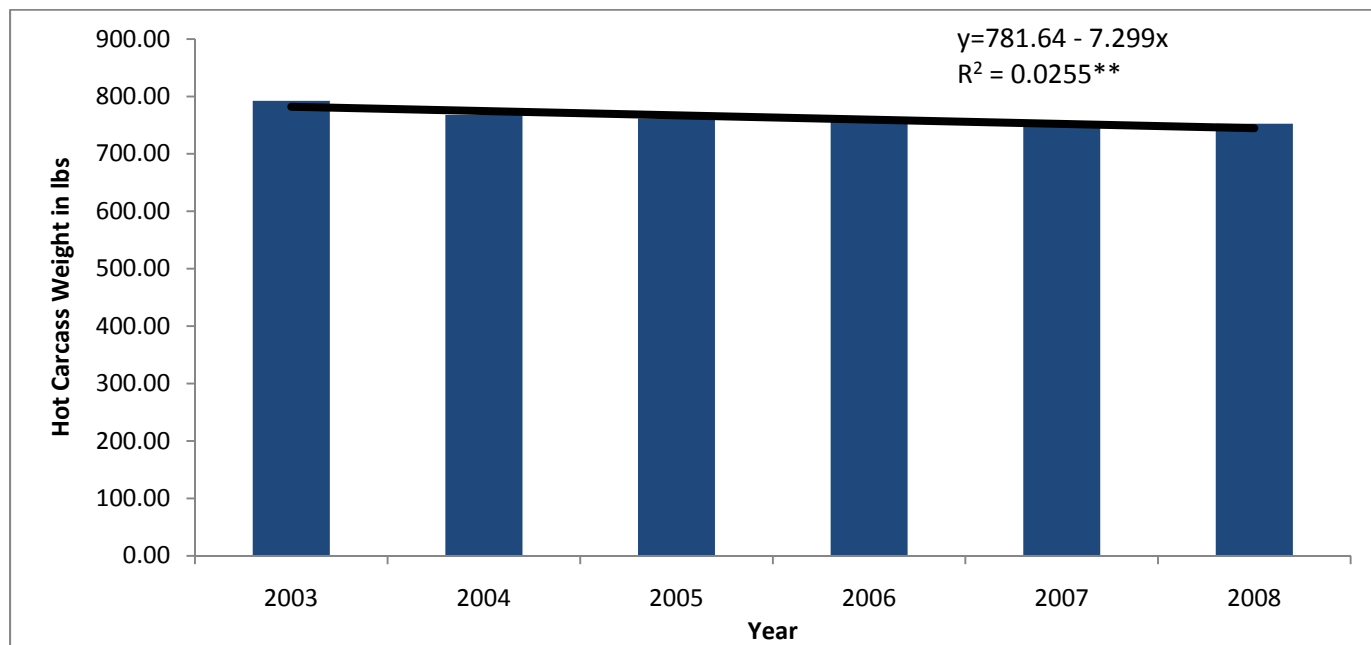


Figure 3. Mean hot carcass weight by year of steers in the Clarksville Better Beef Show, 2003-2008

**Significant at P<0.01

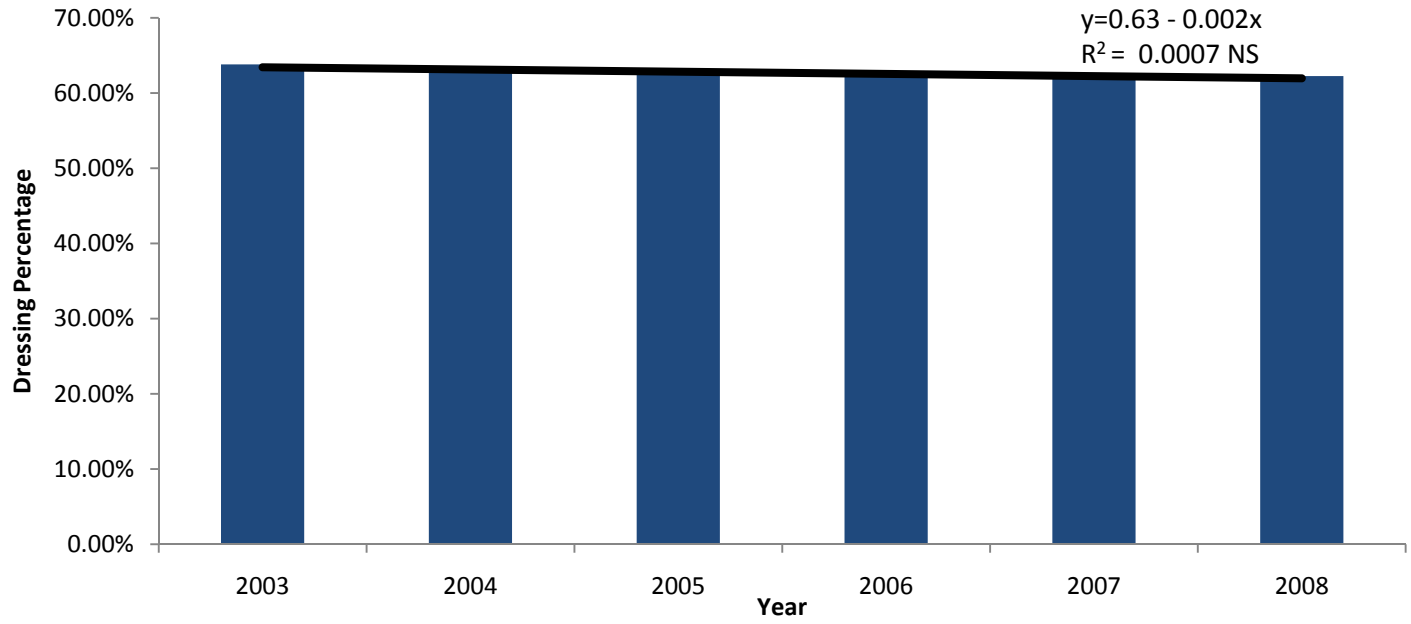


Figure 4. Mean dressing percentage by year of steers shown at the Clarksville Better Beef Show, 2003-2008.

NS-Not significant at $P \leq 0.05$

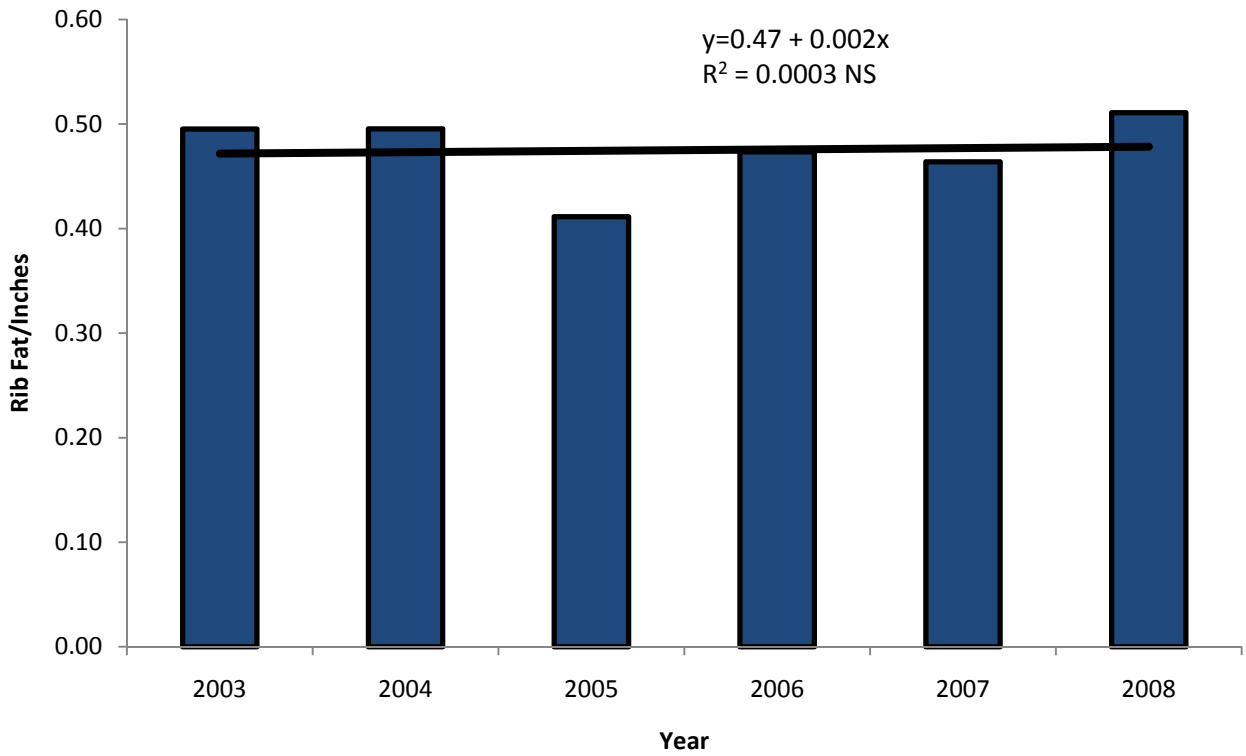


Figure 5. Mean rib fat by year of steers in the Clarksville Better Beef Show, 2003-2008

NS-Not significant at $P \leq 0.05$

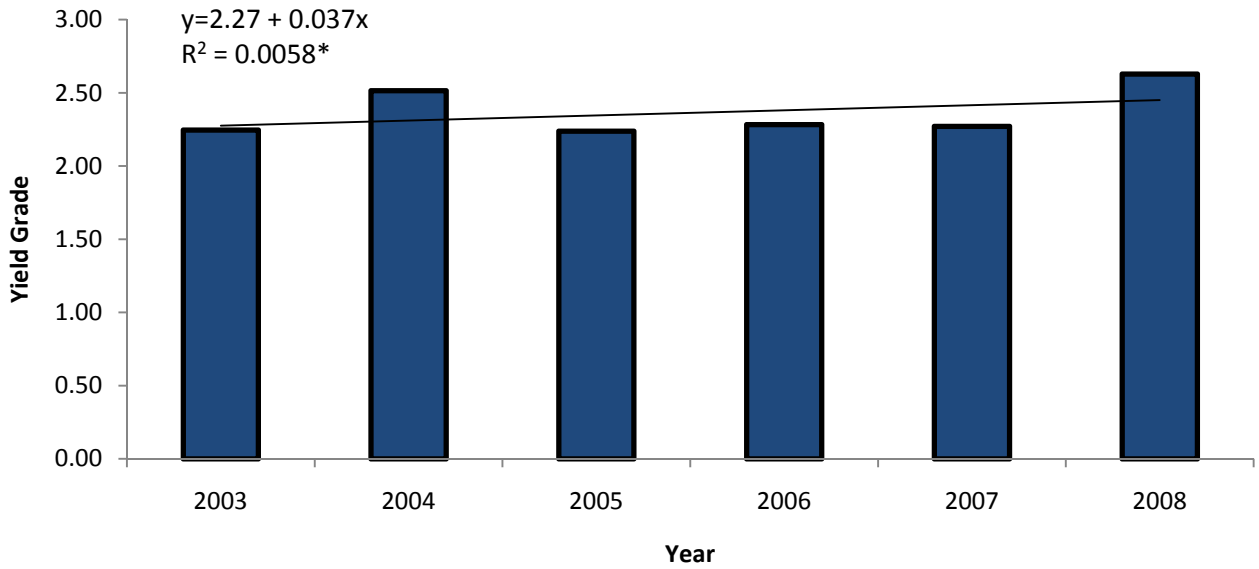


Figure 6. Mean yield grades by year of steers in the Clarksville Better Beef Show, 2003-2008.
 *Significant at P<0.05

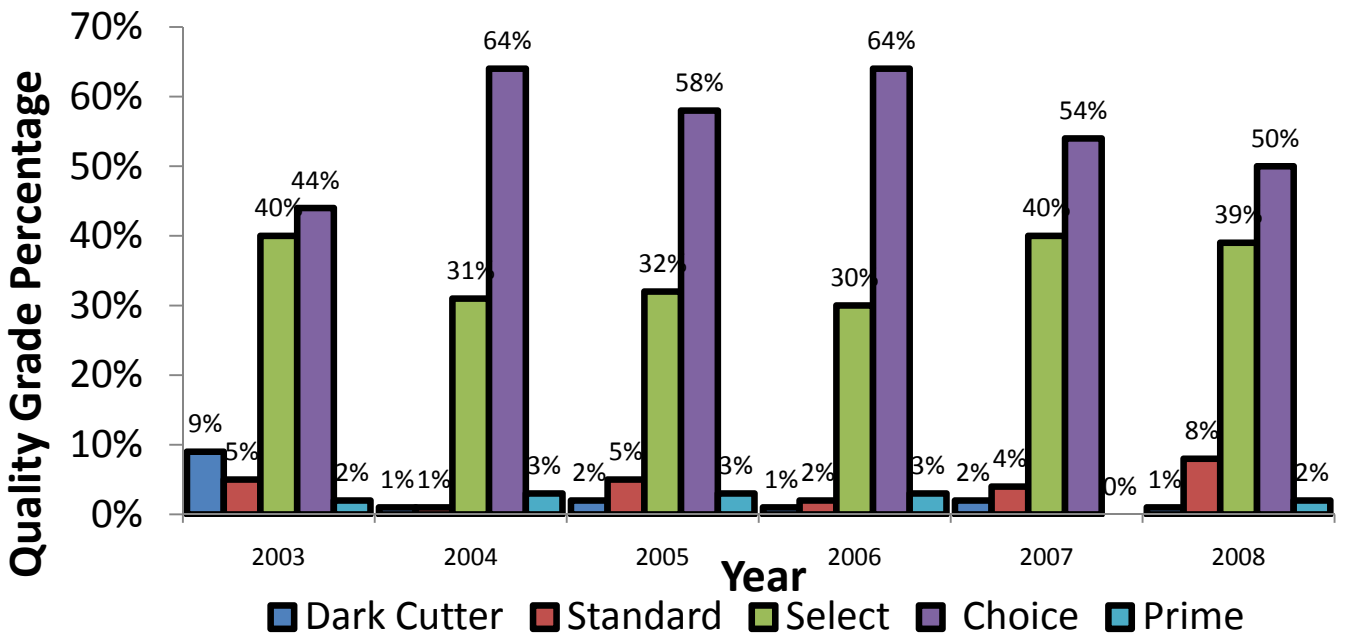


Figure 7. Quality Grade by year of steers shown at the Clarksville Better Beef Show, 2003-2008.

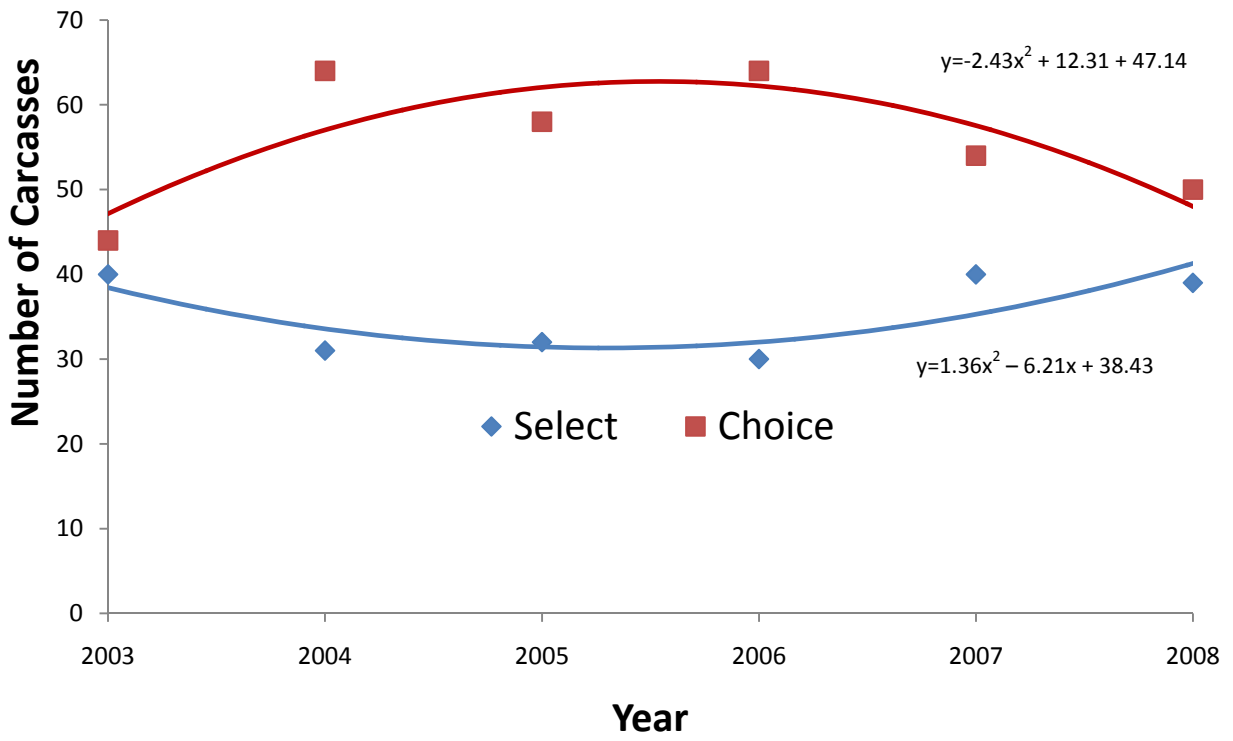


Figure 8. Number of Choice and Select quality grades by year of steers shown at the Clarksville Better Beef Show, 2003-2008

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