



# Beef Carcass Quality and Value over Time

Clement E. Ward

Professor and Extension Economist

Deborah L. Vanoverbeke

Assistant Professor

The fourth National Quality Beef Audit (NBQA) was completed in 2006 (Smith et al.). Each audit provides a snapshot of the quality of beef being produced by the U.S beef industry. Comparisons of the quality assessments over time raise questions in light of industry efforts to improve beef quality and consistency and thereby improve beef demand. For the past three decades, beef has been losing market share to poultry. (More on trends in meat consumption and prices can be found in OSU Extension Fact Sheet AGEC-603, *Twenty-Five Year Meat Consumption and Price Trends* at: <http://pods.dasnr.okstate.edu/docushare/dsweb/HomePage>). Beef quality and consumer satisfaction are important to the beef industry successfully reversing the long-run decline in beef demand.

This Extension Fact Sheet reports on the four beef quality audits, especially comparing findings over the four time periods (1991, 1995, 2000, and 2005). Major quality issues are identified from the most recent audit. A grid calculator uses the beef quality data to determine progress – or lack of progress – in improving the value of beef produced in the U.S. The extent of value loss by not reaching beef quality goals is identified.

## Beef Demand

Demand for beef is defined as the amount of beef consumers will purchase at a given price. This concept is known as the law of demand. In essence, one way to increase consumption of beef is to lower the price. While true, quality contributes to consumers' decisions to buy or not buy beef. An improvement in beef quality can shift demand to a higher plane, benefiting both producers (higher prices) and consumers (more satisfaction).

One measure developed to monitor beef demand is the beef demand index (Purcell 1998a, 1998b). Figure 1 shows the index from 1980 through 2006 for Choice grade beef. Beef demand dropped continuously from 1980 to 1998. Then it appeared the industry turned the corner on declining demand and the index rose for five of the next six years. However, it declined in 2005 and 2006, again raising concerns about whether or not efforts to reverse the declining trend have been effective.

## Leading Quality Issues for Various Groups

A strong argument can be made that quality and consumers' impressions of quality are a contributing factor to the decline in demand, and maybe for the possible turnaround. One component of the NBQA conducted in 2005 was a series of surveys regarding the top ten greatest quality challenges. Those surveyed were cattlemen (seedstock, cow-calf, stocker, and feedlot managers), packers, and beef distributors (purveyors, restaurateurs, and supermarket operators).

Oklahoma Cooperative Extension Fact Sheets are also available on our website at: <http://osufacts.okstate.edu>

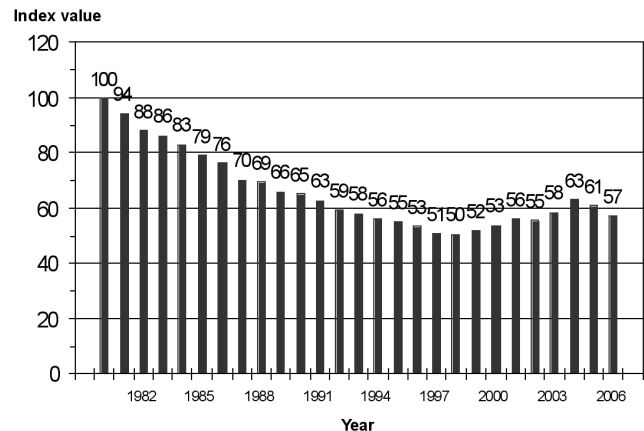


Figure 1. Retail Choice beef demand index, 1980 to 2006. (Base=1980=100)

The leading quality challenges by the four producer groups were:

- Insufficient marbling and low quality grades
- Lack of cattle uniformity
- Inadequate beef tenderness
- High yield grades (too many YG 4-5s)
- Low cutability
- Excessive carcass weights

All of these quality concerns adversely affect carcass value. As the industry continues moving toward value-based marketing and use of grid pricing, packers discount carcasses which grade below Choice and have insufficient marbling. Increasingly, carcasses are being tested for tenderness, especially for some brand or marketing programs. Tough beef adversely affects consumer satisfaction and ultimately beef demand. Similarly, inconsistent quality is a distinct turnoff to consumers and adversely affects beef demand. Carcasses which yield grade 4 or 5 also are heavily discounted, as are carcasses that are too heavy. Thus, all the leading quality concerns by producers negatively affect the value of beef carcasses and hinder efforts to regain beef demand.

Packers' top quality challenges were:

- Reduced grade and tenderness due to implant use
- Lack of uniformity in live cattle
- Excessive carcass weights
- High yield grades (too many YG 4-5s)
- Presence of bruised carcasses
- Hide damage due to hot-iron branding.

Four of the six quality concerns of packers corresponded with those identified by producers. Packers also identified two issues that affect the value of carcasses and byproducts; bruises and hide damage.

Concerns of consumers, as identified by beef distributors, were:

- Presence of E. coli 0157:H7 bacteria (one cause of food borne illnesses)
- Hormone residues
- Desire for “natural” products
- Antibiotic residues
- Desire for traceback
- Concerns about animal welfare.

Special concerns of consumers did not match the quality concerns of producers and packers. Five of the six concerns relate in one way or another to food safety, not beef quality characteristics. The final one relates to concern for animals themselves in the production process.

## Quality Grade, Yield Grade, and Carcass Size

A major objective of the NBQA was to inventory the quality of beef in meatpacking coolers at a given point in time. These periodic inventories serve as benchmarks for comparison purposes. In this section, we compare three important carcass attributes for the four quality audits which have been conducted. For the most recent audit, data were collected twice (2005 and 2006) from 16 packing plants for 9,475 carcasses. Also in the most recent audit, ideal quality attributes were determined from interviews with industry representatives.

### Quality Grade

Figure 2 shows only a modest gain in quality improvement as indicated by the percentage of Choice and Prime carcasses in beef coolers. Generally, quality in the 1995 audit declined relative to 1991, but then increased in each of the two subsequent audits (2000 and 2005). Note, our comparison here does not attempt to account for any changes in quality grade composition from the official grade change in 1997. The percentage of Prime carcasses was highest in 2005 (3.0 percent) as was the percentage of Choice carcasses (54.3 percent).

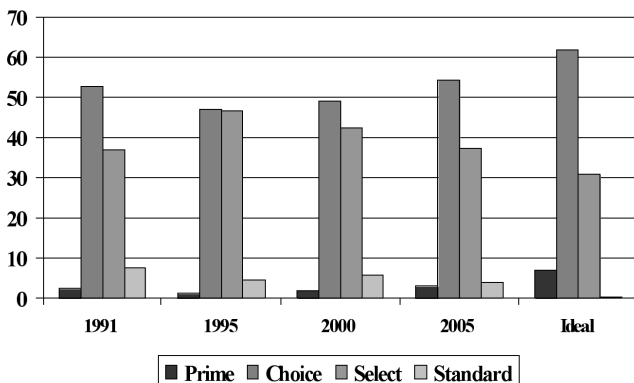


Figure 2. Percent of carcasses by grade for each NBQA and the ideal mix of carcass grades from the 2005 audit.

Beginning with the 1995 audit, industry representatives were asked to identify what they considered to be the “ideal” composition of quality grades for the industry. The only change in the ideal composition over the 1995, 2000, and 2005 audits was a small increase in the percentage of Choice grade carcasses and an equal decrease in the percentage of Select carcasses. Comparing carcasses across quality grades in the 2005 with the “ideal” noted for 2005, the percentage of Prime and Choice grade carcasses both fell markedly short of the ideal, which was 7 percent and 62 percent, respectively.

At the other end of the spectrum, the percentage of Standard grade or lower carcasses declined from 8.1 percent in 1991 to 5.4 percent in 2005. But again, there were considerably more lower-valued carcasses in coolers than the ideal would indicate. Producers need to work harder to eliminate the lowest quality carcasses from the beef available to consumers. Large price discounts for lower valued and less desirable carcasses may seem unfair to some producers. However, those large discounts are simply an economic incentive (or disincentive) not to produce and market lower quality cattle. Typically, packers discount Select and Standard carcasses \$10 to 20/cwt., a seemingly large incentive not to raise lower-grading, lesser quality cattle.

The NBQAs show quality at points in time. Another indicator that beef quality is not improving significantly is to consider the percentage of cattle by grades for an extended period. Figure 3 shows the percentage of heifers and steers graded in U.S. packing plants by U.S. Department of Agriculture (USDA) graders for three grade categories from 1998 to 2006. The percentage of Prime and Choice cattle appear to be stable or declining very slightly while the percentage of Select cattle is steady to increasing very slightly. These nearly indistinguishable changes indicate little gain is being made in improving beef quality.

### Yield Grade

A similar summary for yield grades over the four NBQAs is shown in Figure 4. Improvement in yield grade was found between 1991 and 1995 but that gain moderated in the more recent two audits. The percentage of yield grade 1 carcasses increased in all four audits, from 10.0 percent in 1991 to a high of 16.5 percent in 2005. In fact, the percentage of leanest carcasses exceeded the ideal of 13.9 percent. The percentage of yield grade 2 carcasses remained about the same for three of the four audits, excluding the 1995 audit. However, the 36.3 percent in 2005 was far below the 52.5 percent considered ideal.

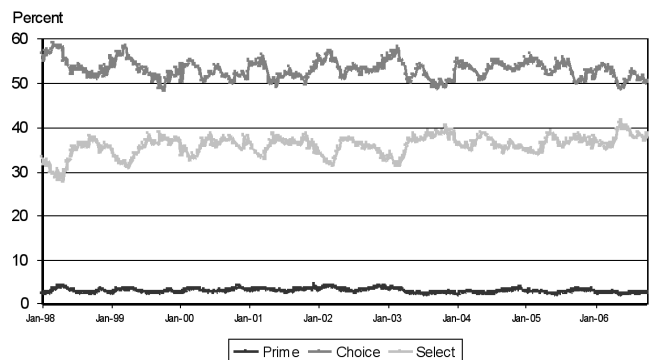
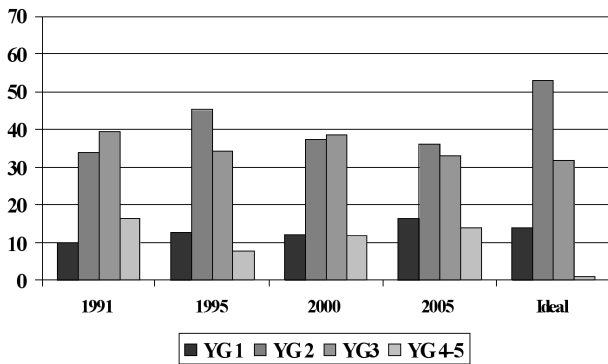


Figure 3. Distribution of heifer and steer carcasses quality graded weekly by USDA, 1996 to 2006.



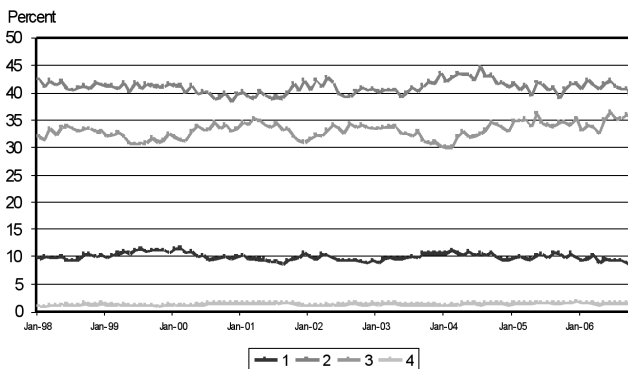
**Figure 4. Percent of carcasses by yield grade for each NBQA and the ideal mix of carcass grades from the 2005 audit.**

Yield grade 3 carcasses are often considered the “par” or target carcass in grids. The percentage of yield grade 3 carcasses declined slightly between the first and last audit (from 39.6 percent to 33.1 percent) and was close to the ideal (32.2 percent). The decline in yield grade 3 carcasses is not bad in itself, since the decline was a result in part of more yield grade 1 and 2 carcasses. However, the percentage of yield grade 4 and 5 carcasses, which indicate over-finished or overly fat carcasses, did not change much over the 14-year period. The percentage of yield grade 4 and 5 carcasses in 1991 was 16.5 percent and in 2005, 14.1 percent. Both percentages were markedly above the ideal of 1.4 percent. As with lower quality grades, producers need to work harder to eliminate lower valued carcasses from total beef production. Again, large price discounts for lower valued and less desirable carcasses may be criticized by some producers. However, large discounts send an economic signal not to produce and market lower quality cattle. Discounts for yield grades 4 and 5 carcasses are typically \$10 to 20/cwt., also a significant incentive not to raise cattle with high yield grades.

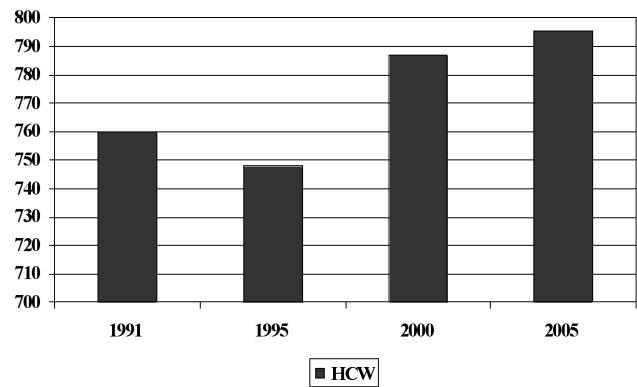
Figure 5 shows the percentage of heifers and steers yield graded for four yield grades. As with quality grade, little significant change has occurred during the past several years. All lines show no strong upward or downward trend. Again, one can conclude the industry has made only modest gains in producing leaner, higher yielding cattle.

### Carcass Size

Figure 6 shows average carcass weight for carcasses examined in the four audits. Packers typically prefer carcasses



**Figure 5. Distribution of heifer and steer carcasses yield graded weekly by USDA, 1996 to 2006.**



**Figure 6. Average hot carcass weight (HCW) for each NBQA.**

weighing about 600 to 900 pounds. Packers frequently discount both lighter and heavier carcasses. Sometimes the upper weight might be 950 pounds or more before being discounted. Figure 6 shows that average carcass weight dropped in 1995 from 1991 but has since increased sharply. Average carcass weight in the 1995 audit was 748 pounds, then increased to 787 pounds in 2000 and increased further to 796 pounds in 2005. As indicated by producers and packers, concerns exist that carcasses are too large. Some retail cuts from larger carcasses are too large for restaurant specifications and very large carcasses tax the equipment limits in packing plants.

### Carcass Value over Time

The distribution of quality grades and yield grades from the four NBQAs were converted to an economic value by using a grid calculator, explained in extension facts AGEC-577, *Grid Pricing Calculator* (<http://pods.dasnr.okstate.edu/docushare/dsweb/HomePage>). The Excel spreadsheet can be downloaded from <http://agecon.okstate.edu/pricing/publications.asp>.

Average prices and grid premiums and discounts were chosen at a point in time (first week of October 2006) and applied consistently to the four sets of carcass data. The date chosen affects the level of prices but not necessarily the relationship between prices. Three hypothetical grids were used. The “average grid” used average premiums and discounts for quality and yield grades reported by USDA for a given week. The “quality grid” used higher reported premiums for upper quality grades and average discounts for lower quality grades, with average premiums and discounts for yield grades. The “yield grid” used higher reported premiums for better yield grades and average discounts for poorer yield grades, with average premiums and discounts for quality grades.

Table 1 shows the net grid price, premium sum, discount sum, and gross revenue from the three grids for the four NBQA years along with the ideal consist of carcasses from the 2005 audit. In general, the quality grid resulted in slightly higher prices and gross revenues than the yield grid, which in turn was just slightly higher than the average grid. For all three grids, the sum of discounts far exceeds the sum of premiums. Premiums and discounts were smallest for the average grid. Premiums tended to be highest with the quality grid.

The pattern of changes in value across years is similar for the three grids. Net prices increased from 1991 to 1995 but gross revenue fell (recall that average carcass weight declined from the 1991 to the 1995 audit). Since then, net

**Table 1. Estimated net grid prices, premiums and discounts, and total value of carcasses based on the four NBQAs and the 2005 ideal composition of carcasses with alternative grids.**

Average Grid				
Year (\$/cwt)	Net Price (\$/cwt)	Premium Sum (\$/cwt)	Discount Sum (\$)	Gross Value
1991	138.71	1.23	7.29	1054.08
1995	139.63	1.24	6.38	1044.33
2000	139.28	1.32	6.80	1096.16
2005	139.82	1.56	6.50	1112.72
Ideal	143.94	2.23	3.06	1145.44

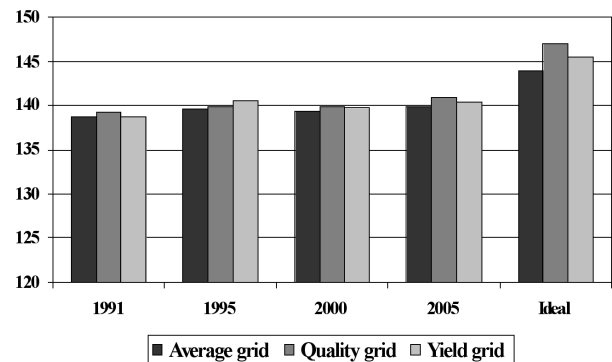
Quality Grid				
Year (\$/cwt)	Net Price (\$/cwt)	Premium Sum (\$/cwt)	Discount Sum (\$)	Gross Value
1991	139.24	2.84	8.37	1058.10
1995	139.88	2.28	7.17	1046.18
2000	139.90	2.89	7.75	1101.04
2005	140.92	3.45	7.30	1121.46
Ideal	147.05	5.52	3.24	1170.25

Yield Grid				
Year (\$/cwt)	Net Price (\$/cwt)	Premium Sum (\$/cwt)	Discount Sum (\$)	Gross Value
1991	138.72	2.28	8.32	1054.17
1995	140.50	2.60	6.87	1050.77
2000	139.76	2.53	7.53	1099.94
2005	140.35	2.97	7.39	1116.94
Ideal	145.42	3.78	3.13	1157.26

prices increased modestly for each audit with the quality grid, but declined from 1995 to 2000 and then increased from 2000 to 2005 with the average and yield grids. Gross revenue increased from 1995 to 2000 and again to 2005 in large part due to heavier carcasses.

Figure 7 shows net grid prices per cwt. for each of the three grids and for each of the audit years along with the 2005 ideal. Across years, one may detect a very slight gain in price, but quite far from the price associated with the ideal carcass mix of grades and yield grades. Price differences compared with the ideal across the three grids ranged from \$4.12/cwt. using the average grid to \$6.13/cwt. for the quality grid. While the differences were less for the average grid than the quality grid, recall the average grid net price was also \$3.09/cwt. less than for the quality grid. These differences represent a *large cost* to the industry of *not* reaching the ideal distribution of carcasses. Given average weights in the 2005 audit, lost revenue per head ranged from \$32.72 to \$48.79. As Table 1 verifies, most of this lost revenue to the industry comes because lower valued and less desired carcasses result in larger total discounts.



**Figure 7. Estimated value of carcasses (net grid price) with alternative grids for each NBQA and the ideal mix of carcasses for the 2005 audit.**

## Summary and Conclusions

The periodic National Beef Quality Audits have generated considerable useful information on the status of beef quality in the U.S. The fourth audit was completed in 2006. As with previous audits, it identifies some improvements in certain categories. However, as quality and yield grades measure beef quality, progress can be described as slow. Overall, the most recent audit found the inventory of carcasses in packing plant coolers to be quite far from that considered ideal based on interviews with persons in various positions in the beef industry.

An OSU grid calculator enabled assessing the value of the carcass mix from the four quality audits. Carcasses were valued based on representative market prices and carcass premiums and discounts for alternative grids. Results show carcass values associated with carcasses in the most recent audit were well below those for the ideal mix of quality and yield grade carcasses. Producers need to focus on removing lower valued and less demanded cattle from the industry.

Since the advent of price grids, economists have argued that producers need to know the quality of animals they produce and understand the grids they may target. Use of the grid calculator may illustrate the importance of reducing the number of lower valued, less demanded, higher discounted carcasses. There is a need for and strong incentive to improve cattle quality. That quality improvement will contribute importantly and likely translate into increased beef demand, thereby increasing returns for Oklahoma cattle producers.

## References

- Purcell, Wayne D. *A Primer on Beef Demand*. Research Institute on Livestock Pricing, Research Bulletin 2-98, Virginia Tech University, April 1998a.
- Purcell, Wayne D. *Measures of Changes in Demand for Beef, Pork, and Chicken, 1975-1998*. Research Institute on Livestock Pricing, Research Bulletin 3-98, Virginia Tech University, October 1998b.
- Smith, Gary C., J.W. Savell, J.B. Morgan, and T.E. Lawrence. *Final Report of the National Beef Quality Audit – 2005: A New Benchmark for the U.S. Beef Industry*.

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, gender, age, religion, disability, or status as a veteran in any of its policies, practices, or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert E. Whitson, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 20 cents per copy. 0907