

NATIONAL BEEF QUALITY AUDIT: CARCASS CHARACTERIZATION OF U.S. BEEF SUPPLY FOR 1991 VERSUS 1995

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Story in Brief

Commercial beef packing plants representing greater than 70% of the U.S. Federally Inspected Slaughter were audited from April through November, 1995 to assess and characterize U.S. beef carcass traits, and to compare these results with those of the 1991 National Beef Quality Audit (NBQA), in order to consider any improvements in the factors affecting value of slaughter cattle and their carcasses. Complete yield and quality grade data, breed-type, sex class and the incidence of dark cutters and blood splash were collected from 10% of all carcasses moving along the grading chain during the applicable time-period for the particular plant being audited. Mean USDA yield grade decreased numerically and was influenced by a decrease in mean adjusted fat thickness and hot carcass weight. Over 79% of the carcasses possessed a yield grade between 2.0 and 3.9. Similarly, USDA quality grade traits revealed a slight decrease in mean marbling score and mean quality grade. Percentage of steer carcasses increased 6.9%, while heifer and bullock carcasses decreased 6.2% and 0.7%, respectively. The majority of the carcasses were considered to be from native breed types (English, Continental European and their crosses) and appeared to increase 3% since 1991 causing a reduction in the percentage of *Bos indicus* and Dairy type breeds. Since 1991, incidence of dark cutters decreased 2.3% while incidence of blood splash increased 0.3%. These results indicate that improvements have been made in areas of cutability and the incidence of dark cutters since 1991.

(Key Words: Beef, Quality, Carcass Traits.)

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Introduction

Recently, concerns regarding quality defects of U.S. beef slaughter animals have increasingly gained popularity within the industry. Realizing that improvements in quality defects cannot occur until the problems are identified resulted in efforts to summarize and correct quality problems. The 1991 National Beef Quality Audit served as a blue-print for the industry, revealing the present status of beef relative to quality defects, lost opportunities as a result of those defects and providing targets for future improvements in quality. As a result of recommendations made for improving quality defects, a sequel audit was conducted in 1995 to continue monitoring quality defects, as well as evaluate any progress since 1991. A primary objective of this audit was to quantify, numerically and monetarily, the incidence of quality defects in U.S. slaughter cattle by determining factors affecting the value of slaughter cattle in terms of value of their carcasses. This was accomplished by characterizing the current beef carcass supply in the United States.

Materials and Methods

Carcasses from 27 commercial beef packing plants representing over 70% of the U.S. Federally Inspected Slaughter were audited from April through November, 1995. Entire USDA yield and quality grade data, breed type, sex class and incidence of dark cutters and ecchymosis (blood splash) were collected on 10% of the carcasses moving along the grading chain for the applicable time period in which the plants were audited, yielding a sample size of 11,799 carcasses. USDA yield grade data included fat thickness, ribeye area, kidney, pelvic and heart fat percentage and hot carcass weight. USDA quality grade data consisted of USDA maturity score (skeletal and lean maturities), and USDA marbling score.

Data collection teams consisted of highly trained personnel from Oklahoma State University, Colorado State University and Texas A&M University, with each university assigned to nine beef processing plants across geographic and demographic regions of the United States. Nine of the 27 plants were audited twice -- once in the Spring and once in the Fall. Variation due to seasonality for all plants was accounted for by spacing the data collection throughout the time span for the entire audit.

Following data collection, data were analyzed to determine factors affecting value of slaughter cattle. Frequencies of each type and combinations of defects were determined.

Results and Discussion

Yield and Quality Grade Traits. USDA yield and quality grade traits are listed in Table 1. Mean yield grade for 1995 decreased 0.3 yield grade and was due to a simultaneous decrease in mean adjusted fat thickness as well as a slight decrease in mean hot carcass weight. This is further exemplified by the increased frequency of carcasses possessing a yield grade below 2.9 for 1995, however the majority of carcasses possessed a yield grade from 2.0 to 3.9 for both years (Figure 1). Carcasses with a ribeye area between 11.0 in² and 13.9 in² comprised 69% of the population. For ribeye areas out of this range, the tendency was to be greater than 13.9 in² (21.7%) rather than below 11.0 in² (9.3%). Carcass weight means (Table 1) and distributions (Figure 2) were similar for both years. The majority of carcasses were between 600 and 849 lb for both years (1991 = 79.5%; 1995 = 81.2%). Slightly higher frequencies were seen for the 1995 data when weights less than 700 lb were noted. Correspondingly, slightly higher frequencies of carcasses over 800 lb were noted for the 1991 data. This is illustrated in the mean carcass weight values for both years.

Mean maturity scores represented young, A-maturity animals and tended to be slightly younger than cattle from the 1991 audit (Table 1). Ninety-five percent of the 1995 population was within "A" overall maturity; a 2% improvement from 1991. Percentage of carcasses within the B-maturity group decreased from 6.7% (1991) to 4.3% (1995) while C-maturity or older carcasses remained relatively constant from 1991 to 1995 (0.4% and 0.7% respectively). The distribution of marbling scores for 1995 revealed that 83.5% of the carcasses had either Slight (minimum for U.S. Select) or Small (minimum for U.S. Choice) amounts of marbling; an increase from 1991 (73.6%). However, the individual marbling scores for 1995 were not consistent with the increase in combined marbling scores. Carcasses with Slight marbling have increased dramatically, nevertheless, those with Small marbling have decreased. In 1991, 36.5% of the carcasses had Slight amount of marbling, compared to 46.9% in 1995. Carcasses with Small marbling decreased from 37.1% (1991) to 36.6% (1995).

It is interesting to note that the mean overall maturity was with the "A" maturity group, and the mean marbling score was at least Small, the minimum for U.S. Choice. Yet the mean quality grade was Select. This is due to the presence of dark cutters and/or B-maturity or older carcasses, which both could have a negative effect on final quality grade. It is possible for carcasses to possess at least Small marbling, yet not receive at least Choice quality grade, due to other factors affecting overall palatability (e.g. - advanced maturity). Furthermore, the presence of these factors explains the inconsistency of percentage marbling and quality grade distribution. Recall that carcasses with

Small amounts of marbling decreased from 1991 to 1995, yet percentage of carcasses grading low Choice remained constant (Figure 3). This is partially explained by the decrease in B-maturity carcasses and dark cutters for 1995.

The 2.4% decrease in B-maturity carcasses is also an asset to the industry in that the USDA Standardization Branch is considering a quality grade change recommendation by the National Cattlemen's Association (NCA) which removes all B-maturity carcasses with Small or Slight marbling from U.S. Choice and Select quality grades, respectively. This grade change would affect approximately 3.3% of all steers and heifers, resulting in a quality grade of U.S. Standard for 940,324 carcasses annually (1.6% with small marbling; 1.7% with Slight marbling).

Sex-class, Breed type, Dark Cutters, Blood Splash. Percentage distribution for gender, breed type, dark cutters and blood splash are presented in Table 2. Carcasses from steers have increased 6.9% since 1991 with heifer carcasses decreasing 6.2%. Carcasses yielded from native breeds (Continental European and their crosses) increased slightly over 3% at the expense of both Dairy and *Bos indicus* type breeds. Improvement in the incidence of dark cutters was observed with a 2.3% reduction of occurrence. Presence of blood splash in the *Longissimus dorsi* muscle was slightly elevated (increase of 0.3%) from 1991.

Implications

Results of this survey indicate that the U.S. beef industry for 1995 has improved by producing higher yielding carcasses with less external fat than those from 1991. Moreover, improvements in incidence of dark cutters and the presence of B-maturity carcasses have occurred, however, methods to improve conditions affecting the presence of blood splash should be investigated.

Literature Cited

- NCA. 1995. Final Report of the National Beef Quality Audit -- 1995.
- NCA. 1992. Final Report of the National Beef Quality Audit -- 1991.
- Lorenzen, C.L. et al. 1993. J. Anim. Sci. 71: 1495.

Table 1. Means for USDA Yield and Quality Grade traits stratified by year of audit.

Trait	1991	1995
Carcass weight, lb	759.9	747.9
Adjusted fat thickness, in	.59	.47
REA, in ²	12.9	12.8
KPH, %	2.0	2.1
Yield Grade	3.2	2.8
Lean maturity ^a	A ⁶³	A ⁵⁴
Skeletal maturity ^a	A ⁷⁵	A ⁶³
Overall maturity ^a	A ⁶⁹	A ⁶⁰
Marbling score ^b	Small ²⁴	Small ⁰⁶
Quality Grade	Select ⁸⁶	Select ⁷⁹

a Maturity: A⁰⁰ - A⁹⁹ = 9-30 months approximate chronological age at time of slaughter.

b Marbling score: "Small" amount of marbling, the minimum amount required for U.S. Choice.

Table 2. Percentage distribution of carcass sex-class, breed type and incidence of dark cutters and blood splash.

Trait	%	
	1991	1995
Sex-class		
Steer	61.1	68.0
Heifer	37.8	31.6
Bullock	1.1	.4
Breed type		
Native ^a	85.4	88.7
<i>Bos indicus</i>	7.3	6.5
Dairy	7.3	4.8
Dark cutters ^b	5.0	2.7
Blood splash	.7	1.0

^a Native breed type includes English and Continental European breeds and their crosses.

^b Carcasses with lean color severe enough to reduce overall USDA Quality grade at least one-third of a grade.