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**K****Reliability of U.S.D.A. Beef Carcass Yield  
Grades in Reflecting Differences in Retail Yields****S**

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Summary

Retail cut-out and U.S.D.A. yield grade data were obtained on 1,121 carcasses of steers from Hereford and Angus dams mated artificially to Hereford, Angus, Jersey, Limousin, South Devon, Simmental and Charolais bulls. Calves were weaned when approximately 215 days old, conditioned 28 days, fed an average of 218 days after weaning before being slaughtered in a commercial slaughter plant. Carcass cooler data were obtained and the right side of each carcass was cut into closely trimmed, essentially boneless retail cuts at the KSU food service building.

Beef yield grades do reflect definite differences in retail yields. Statistical tests indicated less than one chance in 1,000 that such differences occurred by chance and that the yield grade differences were real.

The average difference in retail product percentage between yield grades was 4.6 percent. The average difference in fat trim percentage was 5.6 percent. For 700-pound carcasses, that's a difference of 39.2 pounds of waste fat, or 32.2 pounds of retail product. The difference in bone percentage would account for the other 7 pounds.

Introduction

Three years of retail cut-out data and U.S.D.A. yield grade data from the U.S. Meat Animal Research Center's "cattle germ plasm evaluation project" were studied to assess how reliably yield grades reflect differences in carcass retail yields. Dr. Keith Gregory, director of the U.S. Meat Animal Research Center (MARC) at Clay Center, Nebr., initiated the project. Kansas State University and the Standardization Branch, A.M.S., U.S.D.A. are cooperating.

Experimental Procedure

The MARC-KSU research involved 1,121 steer carcasses ranging from U.S.D.A. Standard through Prime. The carcasses were from the same steers described in the article on quality grades just preceding this one.

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Appreciation is extended to Miss Jean Riggs and Mr. Garland Lewis, Housing and Food Service, Kansas State University for their cooperation in allowing the use of the food service meat cutting facilities for this project.

Steers were transported to a commercial slaughter plant for slaughter and after a 24-hour chill, the carcasses were evaluated for U.S.D.A. quality grades and yield grades by representatives of MARC, KSU and the Standardization Branch, A.M.S., U.S.D.A.

The right side of each carcass was transported to the food service building at KSU for detailed cut-out evaluation. All wholesale cuts as well as the kidney knob were weighed individually. The round, loin, rib and chuck were cut into roasts and steaks, lean trim for ground beef, bone, and fat trim, and each component weighed separately. All cuts were made boneless except the short loin strip and rib roast. All steaks and roasts were trimmed to a maximum fat thickness of 0.3 inch, the common fat covering on retail cuts in supermarkets. The lean trim from each wholesale cut was trimmed to contain 25 percent fat.

Cutability percentage represented the roast and steak meat plus lean trim from the round, loin, rib and chuck divided by carcass side weight. Retail product percentage represented the total roast and steak meat plus lean trim divided by carcass side weight.

### Results and Discussion

Percentages of cutability, retail product and fat trim are shown in table 27.1. Statistical tests of the tabulated data indicated less than one chance in 1,000 that such differences occurred by chance, and that the yield grade differences were real.

The usefulness of yield grading was exemplified by comparing the distinct difference in percentages of retail product and cutability for the different yield grades. The differences in percentages of retail product between yield grades were not exact (range of 3.9% to 5.3%), apparently because the yield grades are not perfectly accurate and probably because our cutting and trimming procedures were not perfectly consistent. Nevertheless, yield grades distinctly reflected cut-out differences. If one were to compare a Choice 700-pound, yield grade 2 carcass and a Choice 700-pound, yield grade 4 carcass, there was 9.8 percent difference (70.1 versus 60.3 percent) in retail product. That equals 68.6 pounds difference. At \$1.25 per pound of retail product, that's a distinct difference of \$85.75 between yield grades 2 and 4. That doesn't include feed wastage in producing the yield grade 4 carcass nor the extra labor in cutting the carcass into retail cuts.

The difference in percentage of fat trim was approximately 5.6 percent between yield grades. The reason that this difference exceeds the difference in retail product (approximately 4.6 percent) is because of the difference in bone percentage between yield grades; yield grade 1 carcasses have a greater proportion of bone than yield grade 5 carcasses do.

Comparing actual cutability percentages in our study with predicted cutability by the U.S.D.A. yield grade equation reveals that as yield grade regresses from 1 to 5, the spread between actual and predicted yield widens (1.4, 2.2, 3.4, 4.1 and 4.3 percent, respectively). That is explained by the fact that the U.S.D.A. original work trimmed cuts to 0.5 inch of fat

covering while our procedure trimmed to 0.3 inch of fat. Therefore, as the yield grades regressed from 1 to 5, the proportion of trimmable fat increased in our study compared with the original U.S.D.A. work.

If the excess fat is not removed from retail cuts, obviously the actual differences in retail cut-out between yield grades will not be reflected. It doesn't matter whether the carcass is partially or totally fabricated by the packing plant, the wholesaler, or the retailer, the retail cut-out differences are definitely there.

Table 27.1 Retail product, fat trim and cutability percentages of 1,121 steer carcasses, and U.S.D.A. predicted cutability percentages for the five yield grades.

No. of carcasses	Average yield grade	MARC-KSU retail product, %*	MARC-KSU fat trim, %*	MARC-KSU cutability, %*	U.S.D.A. cutability, %**
161	1.7	75.0	10.7	51.6	53.0
441	2.6	70.1	16.4	48.8	51.0
442	3.5	64.8	22.6	45.5	48.9
91	4.4	60.3	28.0	42.7	46.8
6	5.5	56.4	32.6	40.0	44.3

\*Each retail product, fat trim and cutability percentage differed significantly ( $P < .001$ ) for the five yield grades.

\*\*Cutability percentage predicted by the U.S.D.A. yield grade equation.