

Called versus Calculated Yield Grades

A.S. Leaflet R1730

Darrell Busby, ISU extension field beef specialist,
and Dan Loy, professor of animal science

Summary

An evaluation of carcass data collected over a two year period from southwest Iowa steer tests and 4-H carcass shows was conducted to compare USDA yield grades called by the Federal grader to yield grades calculated by actual carcass measurements. A regression equation was developed to predict called yield grade from carcass measurements. A comparison of the generated equation with the USDA equation used in calculating yield grades suggest that USDA graders accurately predict preliminary yield grades based on fat thickness, but may not have adequate time at line speeds to fully account for adjustments in ribeye size relative to carcass weight.

Introduction

The practice of marketing beef cattle on the basis of value is growing in Iowa and the U.S. Commonly called grid marketing, this process pays the producer on the basis of the individual quality and yield grade of each animal. The USDA yield grade is based on an equation that considers external fat thickness, ribeye area, the percentage of kidney, heart and pelvic fat and hot carcass weight. Meat scientists are trained to estimate yield grade quickly by establishing a preliminary yield grade based on external fat thickness (FT), which is then adjusted for internal fat (KHP) and ribeye area (REA) relative to carcass size (HCW). The USDA graders assigned to commercial packing plants must accomplish this and evaluate the factors used to determine quality grade at chain speeds of 300 to 400 per hour. That gives the grader 10-12 seconds to evaluate each carcass. As more cattle feeders pay for the collection of complete carcass data that allows for the calculation of yield grade, they notice differences between the called yield grades made by the Federal grader and the calculated yield grade. Some grids pay yield grade premiums and discounts on the basis of a calculated yield grades. Most use the yield grade called by the USDA grader. Are the differences between the called and calculated yield grades based purely on rounding error and normal statistical variation, or are there consistent differences that producers can capitalize on in their marketing programs? This study is an attempt to begin to answer these questions.

Methods

Over the past two years over 2,500 head of cattle have been marketed from southwest Iowa steer tests and Iowa 4-H carcass shows where full carcass data have been

collected. Also collected was the yield grade that was called by the Federal grader. This data set is somewhat biased from the average animal slaughtered in that the cattle tended to be marketed at a much leaner endpoint. Based on the called yield grades these cattle were 19% yield grade 1, 58% yield grade 2, 22% yield grade 3 and 1% yield grade 4 and 5. The cattle in this data set had a quality grade of 70% USDA Choice, however. Simple distributions comparing calculated and called yield grades were computed. Also a regression of yield grade factors HCW, FT, REA and KHP fat against the called yield grade was conducted using the regression procedure of SAS.

Results and Discussion

Figure 1 shows the distribution of yield grades called by the USDA grader and the calculated yield grades. Of the yield grade 1s called by the grader approximately 75% were calculated as yield grade 1 or better, and 25% were calculated yield grade 2. Of the grader called yield grade 2s the majority (74%) were calculated as yield grade 2. The remaining 26% were nearly equally distributed among calculated yield grade 1 and 3. Of the yield grade 3s that were called, however, only 61% were calculated to be yield grade 3s. Thirty seven percent of the yield grade 3s called by the grader were calculated to be yield grade 2. Only 2% were calculated to be yield grade 4s. Very few of the cattle in this data set were called yield grade 4. Of those that were called yield grade 4, over 70% were also calculated to be yield grade 4.

A regression equation was generated using the yield grade factors to predict the called yield grade. The equation is as follows:

$$\text{Called YG} = 2.46 + 2.49 (\text{Fat thickness}) - .13 (\text{REA}) + .0002 (\text{HCW}) + .115 (\text{KHP}).$$

This equation had an R² of .52.

For comparison the USDA Yield Grade equation is as follows:

$$\text{YG} = 2.5 + 2.5 (\text{FT}) - .32 (\text{REA}) + .0038 (\text{HCW}) + .2 (\text{KHP}).$$

Notice that the intercept (2.46) is nearly identical to the intercept (2.50) of the USDA equation. Also the multiplier for fat thickness 2.49 is essentially the same as the USDA equation (2.50). This suggests that the USDA grader is predicting the preliminary yield grade with very high accuracy at line speeds of 10-12 seconds per carcass. The adjustment factors for ribeye area are approximately 1/3 of the adjustment in the USDA equation (-.13 vs. -.32). The

adjustment for carcass weight is less than 10% of the USDA equation (.0002 vs. .0038). The adjustment for KHP fat is approximately 1/2 of the USDA equation (.11 vs. .20). These data suggest that the USDA grader accurately predicts preliminary yield grade (PYG) on the basis of fat thickness, but may not have adequate time to fully account for adjustments in ribeye size relative to carcass weight.

(large ribeyes in relation to carcass weight) may benefit from marketing cattle into a grid where calculated yield grade determines carcass value. Producers with cattle of average muscling may benefit from selling cattle into a grid market that uses the yield grades called by the Federal grader.

Implications

Within the limitation of the type of cattle evaluated in this data set (lean, Iowa raised and fed calves), producers with cattle that are heavier muscled

Acknowledgments

Appreciation is expressed to Matt Gardner for his assistance in compilation and summary of this data.

Figure 1. Distribution of Called and Calculated Yield Grades

