Recent Changes in Beef Grades: Issues and Analysis of the Yield Grade Requirement

Wayne D. Purcell and Kenneth E. Nelson

The recent change in beef grades has stimulated discussion and opposition. Changes designed to improve the efficiency of the beef-marketing system are being opposed by groups who adopt a micro perspective. The move to required yield grading continues to draw opposition. Analysis of original data from 118 beef carcasses and data from published studies indicates trimming procedures on fabricated cuts are important determinants of the change in cutability across yield grades. Research designed to investigate the implications of different trimming procedures is needed to clarify the applicability of yield grades.

Key words: applicability, cutability, trimming procedures, value differences, yield grades.

Grades and grading are an integral part of the beef-marketing system. Much has been written on such subjects as the economic function of grades, what constitutes an effective set of grading standards, and the role that grades have played in the changing structure of the beef industry. Particular attention has always been paid to proposed revisions in either grade standards or grading procedures. In the 1960s there were two important sets of proposed changes. First came the dual grading system proposal of 1962 and then the change in marbling requirements and the introduction of separate yield grades in 1965.

The period 1965–73 was free of major change. On 10 September 1974, a series of significant changes in beef grade standards was proposed by the U.S. Department of Agriculture. They were elimination of conformation as a factor in determining quality grade, initiation of a “flat-line” marbling requirement for the Prime, Choice, Good, and Standard grades that eliminated the requirement for increased marbling during A maturity (nine to thirty months of age), and initiation of required yield grading for all carcasses that are quality graded.

A ninety-day period for comments followed the September 10 announcement. The comments were evaluated, and in early March 1975 the USDA announced the new standards and procedures would go into effect on April 15. On April 11, however, a coalition of independent packers and consumer advocate groups secured a court injunction and blocked enactment of the proposed changes. The injunction was set aside in response to a USDA appeal in November 1975. On 13 January 1976, the USDA announced the new standards would go into effect on February 23. Efforts to secure a second court injunction were denied and the new procedures were instigated. In early March, however, court actions were continuing in an attempt to have all or part of the new procedures discontinued.

The purpose of this paper is two-fold. First, attention is drawn to the reasons for the opposition to the changes in beef grades. Second, the informational base underlying the move to required yield grading is examined. The results of a detailed cutability analysis of 118 beef carcasses are reported as a contribution to the literature that establishes the quantitative relationship between yield grades and changes in carcass cutability.1

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1 Cutability is used to describe the percentage estimated by the following ratio: (weight of lean, retail cuts from a beef carcass) / (cold carcass weight).
The Competing Factions and a Changing Environment

Reaction to the proposed changes was and is affected by the internal dimensions of the beef marketing system. The USDA promotes change that would facilitate attainment of traditional objectives such as increases in pricing efficiency, more accurate identification of product value, and increases in overall production efficiency. Realization of these objectives could improve efficiency of the beef-marketing system as a whole. But decision makers at any one stage in the system operate from a somewhat different perspective. The manager of an individual firm tends to focus on short-run implications of change and to worry first about firm interests and not the needs of the system as a whole. Changes in grades and grading procedures are likely to be opposed if the changes appear to threaten the competitive position of the firm or require change in procedure internal to the firm.

Such opposition to change in the grading standards is not new. The dual grading proposal of 1962 eliminated conformation as a variable in determining quality grade and introduced a "dual" grade to measure carcass cutability (Grange 1972). Producer groups objected to the elimination of conformation, and a compromise position was adopted by the USDA in its 1965 announcement (Grange 1975). Conformation was reinstated as a factor in determining quality grade. Yield grades, measuring cutability differences, were introduced as separate grades.

A new faction became active in opposition to the 10 September 1974 proposal. Consumer advocate groups opposed the proposed changes in marbling requirements. They contended that the "flat-line" approach to marbling requirements would mean a significant reduction in quality of product with no assurance of a concurrent reduction in price; that is, consumers would be forced to pay Choice prices for Good grade beef. Working with a group of independent packers who opposed required yield grading, the consumer groups helped secure the original court injunction.

A significant body of literature largely invalidates the contentions of the consumer groups with regard to the suggested decrease in quality. Available research results that test the relationship between marbling and overall eating quality reveal a positive but very small correlation (Dunsing, Jeremiah et al., Parrish et al.). In the Federal Register, the Agricultural Marketing Service, USDA, having reviewed the literature, concluded "... that in beef from cattle up to about 30 months of age (A maturity) changes in maturity have no significant effect on beef palatability" (Peterson, p. 11,536).

Several producer groups took the other side and applauded the proposed changes. Among the potential benefits mentioned were decreased slaughter weights due to the flat-line marbling requirement, improved grain conversion rates given anticipated 15 to 30 pound reductions in fed cattle slaughter weights that eliminate gain at the end of the feeding period when conversion rates (and the marginal cost of production) are relatively high, and increased pricing efficiency as a result of the required yield grading that identifies value differences due to variations in cutability within the Choice or other quality grade and brings these value differences into the pricing process. Earlier economic analyses have supported the positive position taken by these producer groups (Nelson and Van Arsdall, Purcell).

The provision calling for required yield grading continues to draw adamant opposition from beef packers. Most observers, including USDA officials, agree this is the part of the proposed changes that is most important from an economic viewpoint and the change most likely to precipitate long-run adjustments.

The message to be gleaned from the events of the period from 10 September 1974 through early 1976 is clear: change in the beef-grading standards, even change that has solid theoretical support, is likely to be opposed unless all groups that feel they will be affected are convinced of the merits of the proposed change. Attention therefore shifts to the adequacy of the informational base that supports the changes. The remainder of this analysis examines the informational base underlying the move to required yield grading.

The Change to Required Yield Grading

The theoretical and empirical support for the use of a mechanism to measure differences in carcass cutability is impressive. Differences in cutability within the Choice (or other) quality grade are well documented (Dinkel et al.; Epley et al.; Henrickson and Monroe; Stringer et al.). Such differences in cutability
Table 1. Distribution of Carcasses Used in Developing the Murphey Equation by Grade and Class

<table>
<thead>
<tr>
<th>Grade</th>
<th>Class</th>
<th>Steers (No. of Head)</th>
<th>Heifers (No. of Head)</th>
<th>Cows (No. of Grade)</th>
<th>Total by Grade (No. of Head)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime</td>
<td></td>
<td>19</td>
<td>4</td>
<td>—</td>
<td>23</td>
</tr>
<tr>
<td>Choice</td>
<td></td>
<td>19</td>
<td>23</td>
<td>—</td>
<td>42</td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td>23</td>
<td>13</td>
<td>—</td>
<td>36</td>
</tr>
<tr>
<td>Standard</td>
<td></td>
<td>14</td>
<td>4</td>
<td>—</td>
<td>18</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>20</td>
</tr>
<tr>
<td>Utility</td>
<td></td>
<td>8</td>
<td>—</td>
<td>11</td>
<td>19</td>
</tr>
<tr>
<td>Cutter</td>
<td></td>
<td>—</td>
<td>—</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Canner</td>
<td></td>
<td>—</td>
<td>—</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Murphey et al.

cause significant variation in carcass value. The adoption and use of a mechanism such as yield grading seems imperative if these value differences are to be brought into price negotiations and provide for price premiums or discounts.

Yield grading appears to be consistent with the commonly stated theoretical goals of grading. Breimyer notes that one of the objectives of grading is to provide a vehicle for sending signals up and down the production-distribution lines (p. 6). The principal objective of an ideal standard should be to aid the consumer in telling the producer what she or he considers desirable by setting up a chain of information between consumer and producer (Kohls, p. 287). Marketing economists discuss the issue under the label of "pricing efficiency." For yield grades to significantly improve the level of pricing efficiency, it would appear that at least two requirements must be met. First, yield grades must be broadly used. It is difficult to generate consistent and identifiable price signals when part of the carcasses are yield graded and the remaining carcasses are priced using other criteria of value. But a second requirement, one that must be met before widespread adoption could be expected, is that of applicability under industry operating conditions.

Development of Yield Grades

Examination of the literature reveals the base for the USDA's yield grade standards was developed in a paper by Murphey and associates in 1960. The distribution of the carcass data used in estimating the parameters of the Murphey equation is presented in table 1 by classes and grades.

When the yield grades were officially introduced in 1965, five yield grades were identified. According to the standards, a beef carcass typical of a yield grade will cut out 2.3% more lean, semiboneless retail cuts from the round, loin, rib, and chuck than a carcass of the next lower (higher number) yield grade (Murphey et al.). For the entire carcass, however, the reported difference in lean retail cuts is 4.6% of carcass weight per yield grade (USDA 1968). Estimates of percentage differences in yield of lean cuts for the total carcass are published monthly in the USDA's Livestock, Meat and Wool Market News with accompanying estimates of value differences between yield grades.

Research on Cutability

The research reported in this paper, hereafter referred to as the Purcell-Nelson study, details cutout tests conducted on 118 beef carcasses in a commercial breaking plant. A total of 83 of the 118 carcasses were graded Choice or better (four graded Prime) and the remaining thirty-five were graded Good. The distribution of the 118 carcasses by yield grade groupings is shown in table 2.

All carcasses were broken to the same set of boneless retail cuts, a set of cuts contained in the USDA's Institutional Meat Purchase (IMP) Series 100 specifications (USDA 1970).

Table 2. Distribution of the 118 Steer Carcasses Analyzed by Yield Grade Groupings

<table>
<thead>
<tr>
<th>Yield Grade Grouping</th>
<th>No. of Carcasses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0-1.9</td>
<td>3</td>
</tr>
<tr>
<td>2.0-2.9</td>
<td>16</td>
</tr>
<tr>
<td>3.0-3.9</td>
<td>59</td>
</tr>
<tr>
<td>4.0-4.9</td>
<td>31</td>
</tr>
<tr>
<td>5.0-5.9</td>
<td>9</td>
</tr>
</tbody>
</table>
Table 3. Fat Limitations on Wholesale and Fabricated Cuts of Fresh Beef

<table>
<thead>
<tr>
<th>Maximum Average Thickness of Surface Fat (inches)</th>
<th>Related Maximum Thickness at Any One Point (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1.25</td>
</tr>
<tr>
<td>0.75</td>
<td>1.0</td>
</tr>
<tr>
<td>0.5</td>
<td>0.75</td>
</tr>
<tr>
<td>0.25</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Source: USDA 1970.

Consistent with the breaker's normal procedure, each cut was trimmed to the dual requirements of a maximum fat cover of 0.75 inch at any point and an average fat cover of no more than 0.5 inch. These "fat cover tolerances" are slightly below the middle of the USDA's IMP Series 100 specifications as reproduced in table 3. The only control exercised by the research team was control over the pace of activity to insure each lean cut, piece of bone, and scrap of fat could be accurately weighed and identified with the correct carcass. The regular crew did the breaking via a conventional on-the-table breaking procedure.2

Equations (1) through (6) are estimated "cutability equations" from the generated data for selected dependent variables. In general, the explanatory variables—the variables that were used in the Murphey cutability equation—exhibit estimated parameters that are statistically significant. However, the coefficient of determination ($R^2$) for each equation is lower than a priori expectations, suggesting sources of variability not accounted for in the equations influence the yield of lean cuts. Standard errors for the estimated coefficients are shown in parentheses:

(1) $PT7PCW = 78.0116 - 0.0057HCWT - 1.0000BFTHKNS - 0.3387KHP + 0.218REA, R^2 = 0.287; (0.0879)$

(2) $PT7PCW = 46.8921 - 0.0092HCWT - 1.3102BFTHKNS - 0.2763KHP + 0.4003REA, R^2 = 0.410; (0.0926)$

(3) $PT4PCW = 68.6375 - 0.0113HCWT - 1.402BFTHKNS - 0.7791KHP + 0.2940REA, R^2 = 0.428; (0.1045)$

(4) $PT4PCW = 43.5117 - 0.0098HCWT - 1.2340BFTHKNS - 0.2882KHP + 0.3808REA, R^2 = 0.408; (0.0924)$

(5) $PT3PCW = 9.9971 + 0.0045HCWT + 0.3958BFTHKNS + 0.4289KHP + 0.0012REA, R^2 = 0.210; (0.0672)$

(6) $PT3PCW = 3.3803 + 0.0006HCWT + 0.0762BFTHKNS + 0.0119KHP + 0.0195REA, R^2 = 0.035. (0.0232)$

The variable names used in the analysis are $PT7PCW =$ lean cuts from seven primals as percentage of cold carcass weight; $PT7PCW =$ lean cuts from seven primals as percentage of cold carcass weight, lean trim included; $PT4PCW =$ lean cuts from four major primals as percentage of cold carcass weight; $PT4PCW =$ lean cuts from four major primals as percentage of cold carcass weight, lean trim included; $PT3PCW =$ lean cuts from three minor primals as percentage of cold carcass weight, lean trim included; $HCWT =$ hot carcass weight (pounds); $BFTHKNS =$ back fat thickness (inches); $KHP =$ kidney, heart fat as percentage of carcass weight (%); and $REA =$ ribeye area (square inches).

Equations (7) through (12) are estimated functional relationships with cutability as the dependent variable and yield grade ($YG$), to the nearest 0.1, as the single explanatory variable. The estimates of the slope coefficients are highly significant, but estimates of $R^2$ are relatively low. The estimated parameters for

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2 More detail on research design and analytical procedure is available from the authors.

3 The lean trim was both 50-50 trim (50% lean) and 75-85 trim (75-85% lean).

4 The four major primals are the loin, rib, round, and chuck.

5 The three minor "primals" are the brisket, plate, and flank.
the yield grade variable indicate the change in cutout of lean boneless retail cuts per yield grade. The -0.81 to -1.15 range for all equations except equations (11) and (12), which deal with the three minor "primals," is revealing. Equation (7) provides an estimate of the relationship between lean cuts from the total carcass, including lean trim, and yield grade. Examination of the implicit ratio of the estimated parameter to the standard error indicates the estimate is highly significant. However, at a level of -0.8069 the change in cutability per yield grade would be less than the 4.6% reported by the USDA (1968). Equation (9), employing lean cuts plus trim from the four major primals, indicates the change in cutout from the four major primals would be 1.1457% per yield grade. Equations (8) and (10) give estimates of the slope coefficients between those of equations (7) and (9):

(7) \[ PT7PCW = 78.5163 - 0.8069YG, \]
\[ R^2 = 0.264; \]
\[ R^2 = 0.413; \]
\[ R^2 = 0.340; \]
\[ R^2 = 0.088; \]
and

(12) \[ P3PCW = 4.1623 - 0.0299YG, \]
\[ R^2 = 0.008. \]

Among the initial hypotheses that evolved from the results of the analysis is one that involves the nature of the data set. The Murphey equation was estimated from data on cattle ranging in class and quality from Canner and Cutter cows to Prime steers. Other analysts have suggested the USDA formulation would not necessarily be expected to "fit" a more homogeneous data set (Kauffman et al., Stringer et al.).

The lack of homogeneity does not appear to be sufficient as an explanation of the unexpected results, however. Examination of the literature reveals analyses conducted on more homogeneous groups of cattle that estimated differences in cutout between yield grades well above the estimates generated by the Purcell-Nelson study (Dinkel et al., Henrickson and Monroe, Stringer et al., U.S. Meat Animal Research Center).

A second and possibly more productive hypothesis rests in the implications of the thickness of fat cover allowed in the cutout tests. Figure 1 demonstrates, via the slope of estimated functions, the change in total carcass cutout per yield grade and the associated maximum allowable fat cover based on data from several studies. If the maximum fat cover allowed at any one point is 0.5 inch or less, the slope of the estimated function is negative and is 3.0 or more in absolute value. Each function is labeled by the maximum fat cover at any one point allowed in the study and by the name of the major author(s). The notation "CC" is used to denote the research conducted at the U.S. Meat Animal Research Center, Clay Center, Nebraska (U.S. Meat Animal Research Center). The notation "USDA" refers to the implicit functional relationship consistent with the USDA's announced differences in cutability across yield grades (USDA 1968). The other studies are, by major author, Dinkel, Henrickson, and Stringer and the Purcell-Nelson analysis.

The alternative studies underlying the information shown in figure 1 were also analyzed via the following model:

(15) \[ R_i = \beta_0 + \beta_1 D_1i + \beta_2 D_2i + \beta_3 D_3i + \beta_4 D_4i + \beta_5 Y_i + \beta_6 (D_1i Y_i) + \beta_7 (D_2i Y_i) + \beta_8 (D_3i Y_i) + \beta_9 (D_4i Y_i) + e_i, \]

where \( i \) = \( i \)th weighted observation; \( R_i \) = lean retail cuts as percentage of carcass weight for \( i \)th weighted observation; \( Y_i \) = yield grade of \( i \)th weighted observation; \( D_1i=1 \) if \( i \) is from the Stringer data, 0 otherwise; \( D_2i=1 \) if \( i \) is from the Henrickson data, 0 otherwise; \( D_3i=1 \) if \( i \) is from the Dinkel data, 0 otherwise; \( D_4i=1 \) if \( i \) is from the Purcell-Nelson data, 0 otherwise; \( e_i \) = error; \( \beta_0 \) = intercept for the Clay Center data; \( \beta_1 \) through \( \beta_4 \) = coefficients for intercept dummies for the Stringer, Henrickson, Dinkel, and Purcell-Nelson studies, respectively; \( \beta_5 \) = slope coefficient for the Clay Center data; and \( \beta_6 \) through \( \beta_9 \) = coefficients for slope dummies for the Stringer, Henrickson, Dinkel, and Purcell-Nelson studies, respectively.

Equation (15) thus incorporates both intercept and slope dummies for the five sets of
Figure 1. Estimated regressions for cutability on yield grade using mean observations from five different studies compared to the USDA relationship.

Data graphed in Figure 1. With the Clay Center results established arbitrarily as a standard, the least squares estimates of the parameters in equation (15) provide numerical estimates of the differences in intercepts and slopes of the cutability equations across the five studies (U.S. Meat Animal Research Center). The function was estimated from a data set consisting of mean percentage of retail cuts as related to mean yield grades for all studies except the Purcell-Nelson study, where individual observations were used. Each mean was weighted by multiplying by the square root of the number of observations in the respective study. The results of the weighted least squares fit of the functional relationship are shown in Table 4.

Several cautions are in order in evaluating Table 4. First, the apparent level of quantitative measurement can be misleading. The data used in estimating the function do not justify accuracy to the extent implied by showing re-
results to several significant digits. In both the Dinkel and Henrickson studies, yield grades were not shown. Consequently, yield grades were calculated using reported measurements on carcass weights, backfat thickness, and area of the ribeye. The kidney and heart fat data were not reported and were estimated by the authors from marbling scores and quality grades as suggested by US DA standards.

Second, the total number of carcasses analyzed differed across the studies. There were forty-two mean observations from a total of 1,123 head in the Clay Center data (U.S. Meat Animal Research Center). In the Henrickson data, at the other extreme, a total of six means with six observations per mean were available. The observations were weighted to ensure statistical soundness of the estimation procedure, but the range of the various measures in the data sets could have been affected by the number of observations.

The results in table 4, therefore, should be treated as approximations of how the different studies would have compared if such comparisons had been designed into the studies. The studies had other, if somewhat related, objectives and generated data on carcass cutability as part of the analyses.

Table 5 records the “net” intercepts and slopes derived from equation (15) for each study along with the maximum allowable fat cover used in the respective studies. The USDA guidelines, which call for a change of 4.6% in actual product per yield grade, are based on a maximum fat cover of 0.5 inch at any one point on the cuts from the chuck, round, loin, and rib, 0.25 inch elsewhere. No attempt was made to test directly whether the net parameters recorded in table 5 are significantly different from each other. Examination of the t-statistics in table 4 indicates whether the estimates from the different studies are significantly different from those based on the Clay Center data.

The functions in figure 1 and the results shown in tables 4 and 5 support the hypothesis that the allowable fat cover will influence relationships between cutability and yield grade. Given the physical characteristics of the beef carcass, the results are not surprising. The better carcasses (yield grade 1’s and 2’s) often have a fat cover that exceeds 0.75 inch at only a few points. Retail cuts from these carcasses receive little trimming and may carry a fat cover less than 0.75 inch (and the related 0.5 average cover). Conversely, the cuts from low cutability carcasses (yield grade 4’s and 5’s) are often trimmed back to meet the requirement of 0.75 inch cover at any one point and carry the maximum allowable fat cover. The cuts from the 4’s and 5’s thus carry a fat cover that is weighed with the cut and included in the weight of the “lean retail cuts.” The result is an increase in the weight of cuts from the 4’s and 5’s relative to the cuts from the 1’s and 2’s. The slope of the linear cutability function is decreased as a result.

The level of fat cover allowed also is a factor in the second surprising result of the

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**Table 4. Regression of Retail Cuts as Percentage of Carcass Weight on Yield Grade**

<table>
<thead>
<tr>
<th>Parameter ($\beta$)</th>
<th>Estimated $\beta$</th>
<th>t-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$</td>
<td>81.176</td>
<td></td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>9.732</td>
<td>5.327</td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>-15.997</td>
<td>-14.895</td>
</tr>
<tr>
<td>$\beta_3$</td>
<td>-7.353</td>
<td>-10.519</td>
</tr>
<tr>
<td>$\beta_4$</td>
<td>-2.660</td>
<td>-4.471</td>
</tr>
<tr>
<td>$\beta_5$</td>
<td>-4.568</td>
<td>-32.169</td>
</tr>
<tr>
<td>$\beta_6$</td>
<td>-2.295</td>
<td>-4.314</td>
</tr>
<tr>
<td>$\beta_7$</td>
<td>0.243</td>
<td>0.897</td>
</tr>
<tr>
<td>$\beta_8$</td>
<td>0.811</td>
<td>5.651</td>
</tr>
<tr>
<td>$\beta_9$</td>
<td>3.761</td>
<td>21.248</td>
</tr>
</tbody>
</table>

F-value for regression = 1809.224

R$^2$ = 0.975

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**Table 5. Net Intercept and Slope Estimates For Five Studies**

<table>
<thead>
<tr>
<th>Study</th>
<th>Maximum Fat Cover Allowed at Any One Point on Retail Cuts (inches)</th>
<th>Net Estimated Regression Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Intercept</td>
</tr>
<tr>
<td>CC</td>
<td>0.30</td>
<td>81.176</td>
</tr>
<tr>
<td>Henrickson</td>
<td>0</td>
<td>65.179</td>
</tr>
<tr>
<td>Dinkel</td>
<td>0.30</td>
<td>73.823</td>
</tr>
<tr>
<td>Stringer</td>
<td>0.39</td>
<td>90.908</td>
</tr>
<tr>
<td>Purcell-Nelson</td>
<td>0.75</td>
<td>78.516</td>
</tr>
</tbody>
</table>

Source: derived from table 4.
analysis—the low $R^2$'s. The smaller the fat cover allowed, the more homogeneous will be the resulting set of measurements (weights) on the lean retail cuts. For given sample sizes, a regression equation will "fit" the more homogeneous data better and the $R^2$ statistic will be larger.

The Research Needs

The results reported herein are not presented as the final answer. They constitute a beginning in terms of motivating more research on cutability. Many research efforts on cutability exist in the available literature. Some of the more recent efforts have been directed toward developing a cutability relationship incorporating variables not included in the USDA equation. The recent effort by Kauffman and his colleagues incorporated marbling score into a cutability equation. Whatever the purpose, the analyses that have been conducted are characterized by two important similarities. First, in an effort to exercise experimental control, most tests have been conducted under conditions approaching "laboratory control." Second, trim has been very close ranging from complete removal of all surface and intermuscular fat to leaving no more than 0.5 inch of surface fat at any one point. Many of the experiments have allowed a fat cover at any one point of 1 centimeter (0.39 inch) or less.

Interaction with industry personnel suggests the allowable fat cover on retail cuts varies across producing firms and by type of buying institution. A fat cover of up to 0.75 inch at any one point is reportedly commonplace in the rapidly increasing boxed-beef method of distribution. Given variability in cutting practices, cutability equations developed from experiments with the allowable fat cover held constant will have limited applicability to industry decision makers. Fat cover at any one point moves up to 0.75 inch. Given the direct relationship between the magnitude of the slope coefficient and value differences between yield grades, this area merits further investigation.

A related phenomenon also appears to need further investigation. As the allowable fat cover changes, the per carcass yield of edible fat varies. The trim from a carcass is usually divided into categories such as 50-50 trim (50% lean) and 75-85 trim (at least 75% lean) and brought into estimates of value differences by yield grades. But the edible fat is ignored in the value estimates. During periods when the slaughter mix includes a relatively high percentage of cows and nonfed animals, the edible fat trimmed from fed beef carcasses becomes valuable as an input to ground beef. During 1975, with relatively high levels of cow and nonfed slaughter, yield grade 4 carcasses periodically traded at price levels above yield grade 2 carcasses of comparable weight and quality grade.

Summary and Conclusions

The move to required yield grading offers significant potential as a means of increasing pricing efficiency in the beef-marketing system. However, it is also one of the changes that continues to attract vigorous opposition. Much of the opposition emerges from the packers who express concern over increased costs of grading. Perhaps more important is the varying interpretation of the applicability of current yield grade standards under industry operating conditions.

Analysis of the data from cutability tests on 118 beef carcasses suggests the applicability of current yield grades may in fact be limited to rather specific industry practices. Fat cover on the retail cuts from the 118 carcasses was allowed to range up to 0.75 inch at any one point, the normal practice for the breaking plant in which the tests were conducted and well within the tolerances in the USDA's IMP Series 100. When alternative measures of cutability were regressed on yield grade estimates of the slope parameter were negative but 1.15 or less in absolute value. This compares with a value of 4.6 reported by the USDA as the expected change per yield grade in percent of lean retail cuts from the total carcass. Other studies with relative close fat cover tolerances, 0.5 inch or less at any one
If the move to required yield grading is to facilitate increased pricing efficiency in the beef-marketing system, the yield grade standards must meet the dual requirements of broad use and applicability. Given the results of this analysis, it would appear that meeting these requirements will require several developments.

First, additional research to clarify the relationship between fat cover tolerances and the change in cutout of retail cuts per yield grade must be completed. Varying and controlled levels of fat cover tolerances should be designed into the research to provide direct estimates of the influence of fat cover on functional relationships between cutout and yield grade. If possible, the research should be conducted in the same industry environment in which the yield grades must be used.

Second, and related, more information should be disseminated on what the industry operator can reasonably expect when using yield grades to buy or sell in his operating environment. Continued publication of a 4.6% change in cutout of retail cuts per yield grade damages the credibility of the grades to the entrepreneur who argues he never realizes this type of differential. Acknowledging the 4.6% differential will hold only for "closely trimmed cuts" leaves modification and adaptation of this norm to the individual entrepreneur. The result can be an array of interpretations that does little to move the industry toward the standardized pricing base needed for increased pricing efficiency.

Third, it appears that an attempt to modify the yield grade standards to include the value of edible fat is needed. Theoretically, the yield grade 2 carcass is more valuable than the yield grade 4 carcass of comparable weight and quality grade. During 1975 the increased ratio of cow and nonfed slaughter to fed slaughter bolstered the value of edible fat trimmed from the fed carcasses. This helped precipitate prices for the yield grade 4 carcass that periodically moved above prices for the yield grade 2's and 3's. Either incorporation of the value of edible fat into estimates of value differences across yield grades or explanations of the somewhat atypical price relationships would boost credibility and support applicability of the yield grades.

References


Peterson, E. L. "Grades of Carcass Beef; Slaughter Cattle." USDA AMS. Federal Register, pp. 11,535-47.


