TRADING BY SPECIFICATION: 
THE EFFECT OF BACKFAT DEPTH ON THE PRICING OF BEEF CATTLE AT AN ABATTOIR

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SUMMARY

Carcasses from 90 British beef breed steers and heifers were boned out into 15 trimmed cuts plus mince, sausage trim, bone and fat waste. There were statistically significant linear regression relationships between the percentage content of most of these carcase components and backfat depth at the 12/13th rib. There was no effect of sex per se on the percentage yield of cuts plus mince. The equations are used in estimating the amount and value of each carcase component. Break even prices can be calculated and used as a basis to develop price schedules for the payment of carcases on specification.

INTRODUCTION

The high negative correlation between fat depth and muscle content which exists in beef carcases was established almost 20 years ago (Charles 1964). Generally, purchasers of cattle when assessing the value of carcases, have not used this information.

One objective of the beef carcase classification trial in Tasmania was to develop a functional price schedule for the purchase of carcases on specification. The effect of breed type, dentition score, sex, carcase weight and backfat depth on the value and yield of all carcase components obtained in an abattoir boning room is being examined for 400-500 carcases. This paper deals with a preliminary analysis of data from 90 young British beef breed cattle.

MATERIALS AND METHOD

The boning room trial is being carried out at Killafaddy abattoir, Launceston, Tasmania.

Animals

Animals of different breed types (British beef, beef x dairy, European and dairy) and age (0, 2, 4 and 6 & 8 permanent incisors) are being boned out in a 4 x 4 factorial design. Within each breed type-age class, cattle with a wide range of fat depth-carcase weight combinations are sampled.

Experimental

Slaughter data collected includes the weight of foreshanks and short-cut tongue, hot carcase weight (tails off, kidney knob and channel fats out), fat depth, age, sex and breed type. Hot fat depth is measured at two sites:

i) between the 12th and 13th rib, 2.5 cm medial to the lateral edge of the longissimus dorsi, and

ii) at the sacral crest, 3.0 cm lateral to the prominence of the dorsal spine of the 2nd and 3rd sacral vertebra.

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Carcasses are chilled for at least 24 hours. Cold measurements of fat depth at the 10th/11th rib (Butterfield 1965) and the cross-sectional area, length and width of the eye muscle are recorded.

The left hand side of each carcass is quartered and boned out by a commercial boner into the following components: (i) 15 trimmed primal cuts, (ii) mince (90% visual lean), (iii) sausage trim, (iv) bone, and (v) fat waste.

Three different methods of estimating carcass composition described by Butterfield (1965), Charles (1977) and Johnson (1979) are being used. They provide estimates of the amount of fat being included with muscle in the yield of cuts plus mince.

Equations will be developed for predicting the yield of each component using a multiple regression technique. Results from 90 British, 0 and 2 tooth beef carcasses have been analysed using simple linear regression and are presented below.

**RESULTS AND DISCUSSION**

There was a significant relationship \( P < 0.01 \) between the percentage yield of primal cuts plus mince and the hot fat depth (Fig. 1).

\[
y = 63.70 - 0.51x \\
\ r = -0.468
\]

Fig. 1. Estimated percentage yield of meat for British beef cattle

For each 2 mm increase in fat depth there is a 1% decline in yield of cuts plus mince.

At several meatworks, it has been observed that an increasing proportion of fat remains on and within the primal cuts after boning as carcass fat depth increases. Inconsistent trimming levels and inclusion of sausage trim in percentage yield during boning trials has resulted in some workers finding no apparent relationship between fat depth and yield of meat.
Differences in the yield of meat from steers and heifers were neither statistically significant nor commercially important, supporting numerous reports in the literature (Everitt and Evans 1970; Hedrick and Krause 1975).

\[ y = 63.5 - 0.48x \] steers
\[ y = 63.9 - 0.54x \] heifers

where \( y \) is yield of cuts plus mince (%) and \( x \) is backfat depth (mm).

However, heifers attract appreciably lower prices per kilogram of carcase weight in Tasmanian auctions, despite the fact that they are usually slaughtered at similar fatness to steers (Horcicka, unpublished data). Demonstration of this similarity in yields between sexes, has resulted in the elimination of price differentiation for carcases purchased by specification at Killafaddy abattoir.

**TABLE 1** Regression equations to predict carcase component percentages (\( y \)) from fat depth (\( x \)) in mm

<table>
<thead>
<tr>
<th>Component</th>
<th>Regression equation</th>
<th>Corelation coefficient</th>
<th>R.S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>% primal cuts</td>
<td>1. ( y = 52.7 - 0.25x )</td>
<td>-0.322</td>
<td>2.32</td>
</tr>
<tr>
<td>% mince</td>
<td>2. ( y = 11.0 - 0.26x )</td>
<td>-0.321</td>
<td>2.42</td>
</tr>
<tr>
<td>% sausage trim</td>
<td>3. ( y = 9.2 + 0.56x )</td>
<td>0.515</td>
<td>2.88</td>
</tr>
<tr>
<td>% bone</td>
<td>4. ( y = 23.9 - 0.30x )</td>
<td>-0.549</td>
<td>1.43</td>
</tr>
<tr>
<td>% fat waste</td>
<td>5. ( y = 3.2 + 0.28x )</td>
<td>0.465</td>
<td>1.67</td>
</tr>
</tbody>
</table>

The equations in Table 1 are used to predict the yield of each component of the carcase. By introducing processing costs and current component prices, the break even price for purchasing specific carcases can be calculated. A continuous schedule for carcases with a range of fat depth-carcase weight combinations can be developed from break even prices.

Separate price schedules are used by the processor for the purchase of local shop cattle and export manufacturing beef. Each market has different carcase specification requirements. Target fat depth and weight ranges, for which premium prices are paid, are set by the purchaser. For each carcase weight class, discounts per millimetre of excess fat reflect changes in break even price.

Trading by specification has been accepted by producers because of the clear relationship between the payment for the animal and the carcase characteristics which influence the processors return. As premium price applies to carcases with a range of fat depths, selection of live animals in the target class is feasible. The small discounting increments for off-type carcases has encouraged adoption of this selling method.

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REFERENCES