CAUSES OF REJECTION OF BEEF CARCASSES PREPARED FOR THE JAPANESE MARKET

GAVIN M. BROWNE
Livestock and Meat Authority of Queensland, PO Box 201, Brisbane North Quay, Qld 4002.

SUMMARY
Eight abattoirs were surveyed to identify the causes of rejection of carcasses prepared for the Japanese grassfed and grainfed markets.

Forty-two per cent of grassfed, and 8% of grainfed carcasses were unacceptable for 1 or more reasons. The principal causes for rejection were inappropriate carcass weight (18% grassfed, 6% grainfed), inappropriate fat cover (7%, 1%), unacceptable subcutaneous fat colour (4%, 0%), bruising (11%, 1%), poor butt shape (7%, 0%) and dressing damage (3%, 0%).

Rejection levels varied among genotypes, seasons and nutrition classes. There were, however, significant interactions among these factors.

Grainfed carcasses had significantly lighter muscle colour and subcutaneous fat colour than did the grassfed carcasses. There was little difference in marbling scores.

Keywords: beef, Japanese, grassfed, grainfed.

INTRODUCTION
The Japanese beef market is of increasing importance to the Australian industry. In 1990, 200000 tonnes of beef and veal were exported to Japan, representing 27% of total beef and veal exports. Exports are predicted to reach 299 000 t by 1995-96 (Harris et al. 1990).

It is becoming increasingly clear that Australia will have to alter its approach to beef marketing under the new Japanese trading system. Whereas previously Australian companies dealt with the Japanese Livestock Industry Promotion Corporation (LIPC), they will now be trading on a day-to-day basis with both established clients and new clients. They will have more opportunity to market their product than under the previous quota system and consequently exporters’ brands and product reputation will become more important. It is expected that Japanese buyers will place greater emphasis on consistent product quality, including uniformity of carcasses, a bright red meat colour and a white fat cover (Lange 1991).

In response to the changes anticipated from the liberalised Japanese market, a survey of 8 Queensland abattoirs was conducted to quantify the causes of rejection of carcasses prepared for the Japanese market.

MATERIALS AND METHODS
Survey sample
Data were collected from 14002 carcasses, slaughtered at 6 southern and 2 central Queensland abattoirs. The southern abattoirs provided 56% of the sample. Only those carcasses sold on a weight-at-works basis, and prepared for either the Japanese grassfed, or grainfed markets, were included in the survey. All abattoirs were visited on 1 occasion each season (January-March, April-May, June-September and October-December). Generally 2 kill days were surveyed per visit, sometimes 3.

Pre-slaughter information
Details concerning genotype (British, < half Brahman, > half Brahman), nutritional history (grass unknown details, crop finished, improved pasture, native pasture, short-fed grain 70-120 days, high quality grainfed > 120 days), transport to abattoir, distance travelled, mode of transport and expectations of market suitability of carcasses were obtained from producers whose cattle were included in the survey.

Carcass measurements
Carcass weight, P8 fat depth, dentition, muscle score and bruise scores were obtained from the AUS-MEAT feedback information. In addition to these measurements, assessments were made of subcutaneous (hot and chilled) and intermuscular (chilled) fat colour, musclecolour and marbling.

Subcutaneous fat colour was assessed using the W.A. Dept of Agriculture colour chips which score fat colour on a scale of 1 to 6 (increasing yellowness).

Chiller assessment data were collected for those carcasses which had proved acceptable the previous day on the slaughter floor. AUS-MEAT Chiller Assessment Scheme standards were used to assess intermuscular fat colour (grainfed carcasses only), muscle colour and marbling. All 3 assessments were
made at, or adjacent to, the cut surface of M. longissimus thoracis et lumborum. Fat colour was scored on a scale of 0 (polar white) to 10 (creamy yellow) whilst muscle colour was scored on a scale of 1-9 (increasing darkness). Marbling was assessed using a scale of 1-12 (increasing marbling).

Carcass suitability

Carcass suitability was determined by the abattoir grader, positioned at the scales on the slaughter floor. Although the same criteria were evaluated at all abattoirs, their ranges varied.

Carcass specifications for the Japanese grassfed and grainfed markets respectively, were: sex (steer or heifer; steer or heifer), dentition (steers, O-8 teeth, heifers, O-7 teeth; steers, O-8 teeth, heifers, O-7 teeth), P8 fat depth (10-22 mm; 15-32 mm), hot standard carcass weight (285-400 kg; 270-340 kg), butt shape (A, B, C; A, B, C), fat colour (no yellow; white only), marbling (not required; modest), eye muscle area (not specified; > 55 cm²), fat distribution (even; even), bruising (nil; nil) and muscle colour (bright red; bright cherry red).

Statistical analysis

The influence of breed, season and nutrition on rejection levels was analysed using the least squares method for unequal subclass numbers. Pairwise comparisons between levels within significant main effects were tested using the protected least significant difference procedure.

RESULTS AND DISCUSSION

The results of the survey on rejection levels are shown in Table 1. Forty-two per cent of grassfed carcasses and 8% of grainfed carcasses were rejected. There was, however, considerable variation in rejection rates between abattoirs.

Table 1. Reasons for rejection of grassfed and grainfed carcasses prepared for the Japanese market

<table>
<thead>
<tr>
<th>Reason for rejection</th>
<th>Grassfed (%)</th>
<th>Grainfed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>Fat cover</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Fat colour</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Bruising</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Butt shape</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Dressing damage</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>8</td>
</tr>
</tbody>
</table>

A Some carcasses were rejected for more than 1 reason.

Inappropriate carcass weight (mostly underweight) was the major cause of rejection in each of the markets investigated. Eighteen per cent of grassfed carcasses and 6% of grainfed carcasses proved unacceptable because of their weight. The magnitude of the problem is surprising given that weight is a factor over which producers have a high degree of control. Solutions could include more extensive use of scales on-property or improvement in subjective weight assessment skills.

Inappropriate fat cover was responsible for the rejection of 7% and 1% of grassfed and grainfed carcasses respectively. Although it may be more difficult to control this factor, the producer has the potential to do so. The majority of carcasses rejected due to inappropriate fat cover were underfinished.

Whilst not a problem in relation to grainfed carcasses, excessively yellow subcutaneous fat caused 4% of grassfed carcasses to be rejected. There has been limited research into the yellow fat problem and an active research effort is needed to quantify the mechanism of genetic and nutritional causes of yellow fat.

Bruising, an ongoing industry problem, further highlighted by the survey, caused the rejection of 11% and 1% of grassfed and grainfed carcasses respectively. An effective and equitable bruise penalty system needs to be implemented to provide a monetary incentive to help overcome the problem.

Poor butt shape/conformation caused 7% of grassfed carcasses to be rejected. It was not of concern in grainfed carcasses.

Rejection due to dressing damage, whilst not a major concern (3% of grassfed carcasses), is unacceptable. Closer attention needs to be paid at abattoirs to employee skills, dressing technique and equipment.
The proportion of unacceptable carcasses varied among genotypes, seasons and nutrition classes. There were however significant interactions among the 3 factors.

In this study, British breeds were the most suitable for the Japanese market, with 77% being acceptable. This proportion was significantly higher ($P < 0.05$) than both the less than half Brahman (67%), and more than half Brahman (58%) groups. The difference between the 2 Brahman groups was also significant ($P < 0.05$).

Except for the season January-March, during which significantly more carcasses were acceptable ($P < 0.05$), there was little seasonal variation overall. The period January-March was characterised by very dry weather and a short supply of cattle.

The high quality grainfed carcasses were the most acceptable of the nutrition classes with an acceptance rate of 97%. However this rate was not significantly different from that of the short-fed, grass (unknown details) or crop finished groups with acceptance rates of 64%, 65% and 66% respectively. The acceptability of the native pasture group was significantly less (59%) than all other groups except for the improved pasture group which had the lowest acceptability rate of 54%.

Grainfed carcasses had significantly lighter muscle colour (1.6 v. 3.4) and subcutaneous fat colour (1.4 v. 2.7) than did the grassfed carcasses. Surprisingly, there was little difference in marbling between the grainfed and grassfed carcasses with mean scores of 2.3 and 2.2 respectively.

ACKNOWLEDGMENTS
This project was financed by the MRC. My thanks are also extended to the 8 participating abattoirs and Ms Vivienne Doogan (Qld Dept of Primary Industries) for statistical analysis.

REFERENCES