FEEDING CATTLE AT ABATTOIRS: THE EFFECT ON CARCASS ATTRIBUTES AND MUSCLE pH

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SUMMARY

The effect on carcass attributes and muscle pH of feeding cattle at an abattoir was studied. Four groups of 38 Hereford and Brahman crossbred bullocks of mean initial liveweight 476 kg were transported 410 km by road and rail to an abattoir in north Queensland. Groups A, B, C and D were fed 0, 0, 3 and 10 kg legume/grass hay/hd/24 h, respectively until 27 h before slaughter, but offered water until an hour before slaughter. During the 48 h feeding period groups C and D ate a total of c. 5.5 and c. 10 kg DM/hd. Group A was slaughtered on day 4 and groups B, C and D on day 6, or 3 and 5 d after mustering. Their mean carcass weights were 259, 252, 254 and 256 kg, respectively ($P = 0.055$). Group A had a higher ($P < 0.05$) dressing percentage than group B (54.6 v. 53.1%) but not groups C and D. Feeding treatment did not affect mean bruise score or muscle pH. The incidence of heads and tongues condemned due to contamination by rumen ingesta decreased with increasing resting time and feed intake.

INTRODUCTION

At abattoirs, cattle may be offered feed while resting after a long journey, when the resting period will exceed one day or the expected day of slaughter is deferred. They are either grazed in holding paddocks or fed hay in yards, with the quantity and quality of the pasture and hay varying greatly. While a resting period usually results in a reduction in muscle pH values in beef carcasses (Shorthose et al. 1972; Wythes et al. 1982b), it increases the time from mustering to slaughter and thus potential losses in carcass weight (Carr et al. 1971; Kirton et al. 1972; Wythes et al. 1981; Holmes et al. 1982). Little is known on whether or not feeding can counter losses in carcass weight, although Holmes et al. (1982) suggested it may be worthwhile.

Any advantages due to feeding may be offset during dressing procedures by an increase in the incidence of burst paunches, with contamination of carcass tissues by rumen ingesta causing additional trimming. This reduces the weight and value of the carcass. Contamination of heads and tongues with ingesta can result in condemnation, if additional washing is not satisfactory. There is also the problem of disposing of greater quantities of ingesta.

In this experiment, we studied the effects of feeding, including the level of feeding, on the carcass weight, other carcass attributes and muscle pH of bullocks in north Queensland, in May 1982. The incidences of burst paunches and condemnations of carcasses, heads and tongues due to contamination were recorded.

MATERIALS AND METHODS

The 105 Hereford and 47 Brahman crossbred (approx. 25-50% Brahman content) bullocks were 4-6 years old, had a mean initial liveweight of 475.6 ± 3.14 kg (± SE) and had been grazing native pastures at "Wandovale" near Charters Towers.

Seven days before the experiment commenced, the experimental bullocks were drafted from a larger group, walked 21 km to a set of yards and held overnight, with water available. Next morning they were weighed between 0900 and 1130 h and

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TABLE 1 Effect of feeding bullocks between arrival at the abattoir and slaughter on carcass attributes and muscle pH

Group	Feeding level kg/hd/d	Time from muster to slaughter d	Gross hot carcass weight kg	Dress %	Muscle pH	Carcasses with pH ⩾ 6.0 %
A	Ø	3	258.7[a†]	54.6[a]	5.70	5
B	Ø	5	251.8[b]	53.1[b]	5.71	11
C	3	5	253.9[ab]	53.5[ab]	5.63	Ø
D	10	5	255.5[ab]	53.9[ab]	5.70	8
SE of difference			2.53	Ø.55	Ø.Ø39	

† For carcass weight only, means with a common superscript vary at P = 0.055, other means with a common superscript vary significantly at P < 0.05

Wythes et al. 1983). These losses can 'be due to a change in the hydration status and/or catabolism of 'body tissues. Hydration status -may 'be the-more important factor, since Wythes et al. (1983) recorded a significant reduction in the muscle water content of cattle on water for 26 to 74 h after a 27 h deprivation period. They postulated that this was due either to an initial over-hydration of muscle tissues after a period of dehydration or to the failure to maintain "normal" water contents. It is probable that the same response occurred in this experiment. Except for an hour at the railhead, our bullocks were without water for 33 h between mustering and arrival at the abattoir and then offered water for 32 h (group A) and 80 h (group B) before slaughter.

Although the differences in mean carcass weight between groups B, C and D were not significant, our results suggest that feeding was advantageous. There was a strong trend for carcass weight to increase with an increase in the level of feeding, presumably reflecting a reduction in tissue catabolism resulting from feeding, since hydration changes were likely to 'be similar. The few reports on the effect of feeding cattle before slaughter are equivocal. Carr et al. (1971) reported that cattle fasted for 3 d had 3.5% lighter carcasses than those which continued on a full feedlot ration, while Holmes et al. (1982) reported a saving in carcass weight when a group of bullocks were fed for 4.5 d during an industrial dispute. On the other hand in the recent study by Wythes et al. (1983), feeding 5 kg hay/hd/d for 2 d did not reduce the loss in carcass weight.

The feeding of hay ad libitum, as for group D, was clearly wasteful. It is not known to what extent appetite was limited by the unfamiliar surroundings at the abattoir and/or the stresses associated with feed deprivation and extra handling. These factors may have acted singularly or in combination.

Another important finding of this study was the decrease in the incidences of heads and tongues condemned with increasing feed intake. It is possible that the greater ratios of solid material to water in the rumens of the fed bullocks -may give a consistency that largely counters the spillage of ingesta. While the additional 2 d resting period for the unfed group B almost halved the percentage of heads condemned, this is not sufficient reason to delay slaughter. These results are contrary to the general opinions of many processors and further investigation is essential, particularly as there are no comparative studies or information on the overall incidences for cattle.

Neither feeding nor allowing bullocks access to water until an hour before slaughter resulted in burst Paunches during dressing procedures. This finding

immediately returned to pasture. Using this liveweight, the bullocks were allocated by stratified randomisation, within genotype and horn status, to four groups of 38. After reyarding at 1500 h on day 1, the bullocks were drafted into treatment groups and held overnight without water. Next morning at 0930 h, they were transported 270 km by road to the nearest railhead, rested for 1 h with access to water and at 1700 h railed 140 km to an abattoir.

On arrival (day 3, 0130 h), groups A, B, C and D were held in separate large yards and from 0900 h were fed 0, 0, 3 and 10 kg hay/W/24 h until 27 h before slaughter. The hay was mixed verano sty10 (Stylosanthes hamata cv. Verano)/pangola grass (Digitaria decumbens), with mean values of 5.80 MJ metabolizable energy/kg DM, 0.95% N on a DM basis and 91.1% DM. The hay bales were placed on the ground against a fence of each yard and the string ties removed. The uneaten hay was collected and weighed at the end of the 48 h feeding period. All groups were offered water until an hour before slaughter. Group A was slaughtered on day 4 and groups B, C and D on day 6, from 1200 h onwards.

At slaughter, we weighed the untrimmed sides of each carcass to obtain individual gross hot carcass weights. Dressing percentages were calculated using these carcass weights and initial liveweights. A single scorer assessed the bruising of each carcass using the method of Anderson and Horder (1979). We recorded the number of heads (all groups) and tongues (group B, C and D) condemned because of ingesta contamination, as well as the number of paunches which burst during dressing procedures and carcasses trimmed due to ingesta contamination. Twenty-three hours after slaughter, we measured the pH of M. longissimus dorsi (LD) of all carcass sides at the temperature of the meat (c. 1Ø°C), with a Townson meat pH meter and combination electrode. The thickness of fat over the 13th rib was measured on all sides.

The data for liveweight, carcass and muscle properties were analysed by standard analysis of variance procedures, with carcass weight being adjusted for differences in initial liveweight. Pairwise comparisons on the means of significant treatment effects were tested by the Student's t-test.

RESULTS

Between arrival at the abattoir and the end of the 48 h feeding period, group C ate a total of c. 5.5 kg DM/hd and group D ate c. 10 kg DM/hd.

The results for carcass and muscle properties are presented in Table 1. The effect of treatment on carcass weight approached significance (P = 0.055). When slaughter was delayed by 2 d, the mean carcass weight of the unfed bullocks decreased by 6.9 kg. Losses for bullocks fed 3 and 10 kg hay were 4.8 and 3.2 kg, respectively. Treatment did not affect significantly the mean pH of the LD muscle or mean bruise score, with the mean score for all bullocks being 9.0 points. The mean fat thickness of all carcasses was 4.5 mm.

No paunches burst during dressing procedures obviating the need to trim carcasses because of ingesta contamination. Thirteen, 8, 5 and 3% of heads were condemned in treatments A, B, C and D, and 24, 5 and 0% tongues in treatments B, C and D. Tongues were not available from treatment A.

DISCUSSION

Our findings indicate that substantial losses in carcass weight can occur when cattle are held for 2 d at an abattoir. The loss of 2.7% for our unfed bullocks (group A v B) was of the same order as other reports of 2.3 to 3.0% over 2 d for unfed cattle with water available (Carr et al. 1971; Kirton et al. 1972;

agrees with the other reports for cattle after both short and long journeys (Wythes et al. 1982a; Wythes et al. 1983).

Contrary to most other reports (Shorthose et al. 1972; Wythes et al. 1982b), resting groups B, C and D for 2 d longer than group A did not significantly reduce the mean pH values of LD muscle. Wythes et al. (1983) also found no reduction over a similar resting period. The failure of feeding to lower mean pH values, suggests that the extra source of carbohydrate did not replenish muscle glycogen concentrations sufficiently to lower mean pH values. McVeigh and Tarrant (unpub. data, cited Tarrant and Sherington 1980) stated that inadequate feeding greatly reduces or eliminates the capacity for muscle glycogen repletition in cattle following stress, while Howard and Lawrie (1956) and Carr et al. (1973) found that starvation alone did not affect pH values in steers.

In conclusion, the results of this preliminary study suggest that feeding hay can reduce losses in carcass weight when cattle are held for several days at an abattoir before slaughter. Certainly on this occasion, feeding reduced the percentages of heads and tongues condemned due to contamination by rumen ingesta. However, before recommendations can be made to industry, further research is necessary on the potential savings in carcass weight and likely problems in processing carcasses resulting from feeding cattle at abattoirs.

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