1:26

Carcass quality in refed cull Friesian cows

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Introduction

Cull cows are an important source of beef in the UK, contributing 25% to all cattle slaughterings (Allen, 1980). The Friesian breed is particularly important in the context of beef production, as the national dairy herd (which is over 85% Friesian) contributes 58% of the home produced beef, 19% of this being derived from cull cows. The carcasses, and meat, from these culls, particularly when in poor condition, have traditionally been regarded as inferior in quality when compared with 'clean' beef (Boccard and Dumont, 1960) and this is reflected in the large price differential between the two types. However, cull cows in good condition at specified weights command a premium over poorer animals. This suggests that some producers may be able to improve financial returns from cattle sales by feeding their cull cows prior to disposal. The ability of cull cows to make liveweight gains, the composition of this gain, and the effects of feeding level on performance and carcass characteristics appear to be quite variable (Wooten et al, 1979; Jones, 1983; Drennan, 1981). Part of this variation is no doubt due to differences in cow condition (body composition) at the beginning of the refeeding period.

This study examined the effects on carcass quality of feeding cows a complete pelleted diet ad libitum for periods of up to 112 days before slaughter.

Materials and Methods

A total of 28 cull Friesian cows, in very thin condition initially, were slaughtered and their carcasses assessed for composition (left half dissected; Williams and Bergstrom, 1976) and retail yield (right half butchered; Pomeroy, Williams, Harries and Ryan, 1974).

Cows were slaughtered and dressed using standard procedures (Brown and Williams, 1980) : 5 cows as an initial group, with no feeding, and 7, 10 and 6 cows following 28, 56 and 112 days on one of two feeds (Table 1). Diet 1 contained 11.8 MJ ME/kg dry matter, and diet 2 10.6 MJME/kg.

Saleable meat was defined as the weight of trimmed and deboned primal cuts, plus lean trim. The high-value cuts were forerib, loin, rump, topside, thick flank, silverside and fillet. Retail Value Index was determined by the method of Harries et al (1976) and was used to rank carcasses according to their commercial value.

Results

The length of time over which cows were fed had a significant effect on most attributes of carcass quality (Table 2). There were no significant effects of diet, and no interactions between time on feed and diet, with the exception of killing-out percentage: Cows fed diet 1 tended to have a higher killing-out percent than those fed diet 2, in part reflecting the differences in carcass fatness brought about by differing energy intakes. Values shown in Table 2 are therefore derived from data pooled over both diets.

Killing-out percentage increased markedly with feeding, reaching a peak of 53.1% after 56 days refeeding, then declining slightly after 112 days. Muscle:bone ratio was also improved with feeding, indicating that gains included muscle tissue as well as fat. The percentage of saleable meat in the side declined slightly as the feeding period progressed beyond 28 days. This was due to a combination of increasing fatness and increasing carcass weight with a concomitant increase in levels of trim required. Interestingly, the proportion of saleable meat in the high-value cuts was not influenced by feeding, with the mean value over all cows being 44.8 $\pm$ 1.6%. Retail Value Index also declined slightly over the feeding period, reflecting the proportional decline in saleable meat content as cows increased in fatness.

Time on feed had a significant ($P< 0.001$) influence on the composition of the saleable meat derived from the cows, and on the levels of trimming required (Table 3). The proportion of lean decreased, and the fat content increased, as the feeding period was extended. In unfed cows the saleable meat contained 10.7% fat while in the animals fed for 112 days this had increased to 15.5%. As expected from the increased fatness of the fed cows, fat trim increased over the feeding period, but from very low levels for subcutaneous fat. Intermuscular fat trim was always greater than subcutaneous fat trim and increased almost two-fold as the feeding period progressed from 0 to 112 days. Bone trim declined slightly over the feeding period, reflecting the increase in carcass weight rather than a decline in bone weight.

Discussion

Feeding cull cows that were initially in very poor condition had a beneficial effect on killing-out percentage, which is seen as an important determinant of commercial value in the live animal auction market. The major improvement occurred over the first 56 days, followed by a small decline at 112 days, possibly due to increased deposition of fat in the intra-abdominal cavity. Muscle:bone ratio also showed an improvement on feeding, indicating an increase in carcass value to the meat trader. Again the biggest improvement had occurred by 56 days.

A large part of the gain in carcass weight was dissectible fat, although the relative proportions of gain occurring as lean or fat changed with time on feed, and this had an effect both on saleable meat content of the carcass, and the composition of that meat. In the first 28 days of refeeding almost all carcass weight gain was lean tissue (ca. 96%), but thereafter rates of lean gain declined dramatically, and fat gain increased to over 80% of the total carcass weight gain. Over the first 56 days of feeding 46% of carcass weight gain was lean, while over the complete 112 days it was 43%, in close agreement with other published results.

Because carcass fatness increased over the feeding period, levels of fat trim also increased, but not in parallel with changes in carcass weight. This was reflected in an increased proportion of fat in the deboned, trimmed saleable meat, which suggests that greater amounts of fat appear acceptable in bigger joints when these are assessed visually.

Despite the increase in fat content of the saleable meat from fed cows the actual proportion of total carcass fat retained within the saleable meat declined from 56 to 44%. In a cow fed for 112 days the saleable meat contained 35 kg of fat, while 44 kg had been removed as trim. In a lean, unfed cow, the comparable figures were 19 and 15 kg respectively.

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Table 1. Numbers of cows slaughtered after periods of ad libitum feeding

	Days on feeding			
	0	28	56	112
Diet 1		3	5	3
Diet 2		4	5	3
Total	5	7	10	6

Table 2. Carcass yield and quality in cull cows fed ad libitum for 0, 28, 56 or 112 days

	Days on feeding				SED	Sig of diff.
	0	28	56	112		
Killing-out %	45.2	47.6	53.1	50.8	1.5	***
Muscle:bone ratio	3.5	3.6	4.1	3.8	0.2	***
% saleable meat (SM)	73.3	73.9	71.4	70.3	0.9	***
% SM in high-value cuts	45.2	44.2	45.4	44.0	0.9	NS
Retail Value Index	69.9	69.9	67.1	65.1	1.3	**

Table 3. Composition of saleable meat (SM) and its trimmings

	Days on feeding				SED	Sig of diff.
	0	28	56	112		
% lean in SM	89.3	90.7	85.0	84.5	1.6	***
% fat in SM	10.7	9.3	15.0	15.5	1.6	***
% SCF trim	1.5	1.1	3.9	4.6	0.8	***
% IMF trim	5.0	4.8	7.7	9.2	0.8	***
% bone trim	19.9	20.2	16.7	16.4	0.9	***