YOUNG BULL HIND COMPOSITION, ITS PREDICTION USING TOBEC AND MEAT QUALITY

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BACKGROUND

Beef production in Ireland is essentially based on finishing steers and heifers at 18 to 24 months on grass-based diets. However, in many other European countries males are raised as bulls on high concentrate diets and slaughtered at about 12 months of age. There may be advantages in a proportion of the males from the Irish herd being raised in this way for export. As this is a relatively new enterprise for Irish producers, the quality, in particular the meat colour and the carcass composition, is largely unknown.

TOBEC uses electromagnetic scanning technology to predict the amount of lean in a body. The technique has been shown to have high precision in predicting the weight and percentage of lean in steer pistola hinds (Allen and Keane, 1996). The young bulls used in the present experiment were more homogenous in their composition. It was therefore of interest to see if similar precision could be achieved with this technique.

OBJECTIVES

To determine and compare the carcass composition and meat quality of young bulls raised on a high and a medium intensity diet. To determine the precision with which TOBEC could predict carcass composition in a relatively homogenous population.

METHODS

Feeding: Sixteen Friesian young bulls were fed either a high (11.2 MJ/kg DM) or a medium energy (10.6 MJ/kg DM) diet with similar protein (160 g/kg) and mineral/vitamin supplementation *ad libitum* from 3 to 11 months and slaughtered at a live weight of approximately 450 kg. Long roughage (5% feed intake) was offered daily.

Carcass composition and scanning: The hindquarters (3-rib) were chilled for 5 days. The deep round and surface temperatures were recorded prior to scanning using an MQI/TOBEC® boxed beef system. The peak of the scan curve (PMA), the scan length and the area under the curve were recorded. The total length of the hind, the length of the leg and the maximum circumference of the leg were measured with a tape. The hinds were then deboned, cut into primals and defatted.

Meat quality: Ultimate pH of the *Longissimus* muscle (LM) was recorded by probe 4 days after slaughter. After dissection two 2.5cm thick LM steaks were cut. One of these was used to measure drip loss over 6 days and the other was used for colour measurement after 2 hours using a Hunterlab Ultrascan Spectrophotometer. Hunterlab L (lightness), a (redness) and b (yellowness) values were recorded and used to calculate hue angle (arctan(b/a)) and saturation ($(a^2+b^2)^{1/2}$).

RESULTS AND DISCUSSION

The proportion of lean in the carcasses was similar to that found by others (e.g. Martinsson & Olsson, 1993). There were no significant differences in carcass composition between the two groups. Table 1 shows the overall means and standard deviations for composition traits. These indicate that the young bulls were very homogenous in terms of their carcass composition since, for instance, the coefficient of variation for lean% was only 2.7%. This compares with a value of 5.7% for steer hinds which were scanned in a previous study.

Table 2 shows the results of predicting carcass composition from different models using stepwise (forward) regression. Without using TOBEC variables 81% of the variation in lean weight could be explained but only 21% for lean percentage. While TOBEC offered no improvement for the prediction of lean weight it explained considerably more of the variation in lean percentage than did the first model. Using TOBEC variables in combination with weight further improved the prediction of lean weight but not lean percentage. In the final model dimensional measurements made a further contribution in both cases. The final R^2 's compare favourably with those reported previously (Allen and Keane, 1996) despite more homogeneity and the RSD's are lower. TOBEC alone could explain only 18% of the variation in fat% but this was raised to 88% with the inclusion of weight and dimensions with an RSD of 0.8%. No significant model could be found for weight of fat, weight of bone or bone%.

In contrast to carcass composition, feeding level did tend to have an effect on some indicators of meat quality. Eye muscle area, yellowness and saturation were significantly affected by feeding level ($p<0.10$), while pHu and redness approached significance ($p=0.11$). Feeding a high energy diet tended to raise ultimate pH, increase eye muscle area and reduce redness, yellowness and saturation. High pH is generally associated with darker meat, but this was not the case since lightness values were similar though generally higher than is the case with steer beef. The redness values at 2 hours were very low compared to steer beef. This reflects the paler nature of young bull meat but whether the differences in colour between the two groups would hold over a longer blooming period requires further study.

CONCLUSIONS

Feeding young bulls a higher intensity diet resulted in meat with less saturated colour after a 2 hour blooming period and higher ultimate pH. Carcass composition was unaffected but bulls fed the higher intensity diet had larger eye muscles. TOBEC, when combined with weight and dimension variables, proved to be a precise method of predicting carcass composition in a relatively homogenous group of animals.

REFERENCES

Allen, P. and Keane, M.G. (1996). Prediction of beef pistola composition by TOBEC. 47th Annual Meeting of the European Association for Animal Production, 26-29 August 1996, Lillehammer, Norway.

Martinsson, K. & Olsson, I. (1993). The influence of level of feeding and live weight on feed conversion and carcass composition in Friesian bulls. Livestock Production Science, *37*, 53-67.

Table 1: Composition of young bull hinds (Mean ± s.d)

Hind wt (kg)	50.2 ± 2.4
Lean wt (kg)	9.88 ± 0.89
Lean %	68.9 ± 1.9
Fat wt (kg)	5.56 ± 1.05
Fat %	11.1 ± 2.0
Bone wt (kg)	9.98 ± 0.80
Bone %	20.0 ± 1.6

Table 3: Meat quality indicators

	High	Medium	s.e.	p
pHu	6.00	5.72	0.12	0.11
Drip loss %	0.75	0.62	0.22	0.69
Eye muscle area cm^2	87.2	76.1	4.2	0.08
Lightness	41.7	42.1	0.77	0.76
Redness	8.60	11.29	1.11	0.11
Yellowness	7.19	9.05	0.74	0.10
Hue angle	40.1	39.3	0.91	0.52
Saturation	11.2	14.5	1.31	0.10

Table 2: Prediction of hind composition by various models

Model type	Lean wt (kg)			Lean %			Fat %		
	R^2	RSD	d.f.	R^2	RSD	d.f.	R^2	RSD	d.f.
(1) Weight (W) + Dimensions (D)	0.81	0.92	13	0.21	1.73	13		N.S.	
(2) TOBEC (T)	0.78	0.99	13	0.71	1.13	12	0.18	1.84	14
(3) T + W	0.91	0.67	12	0.69	1.17	12	0.82	1.02	10
(4) T + W + D	0.93	0.61	11	0.79	1.02	11	0.88	0.80	11