Body composition explains only part of the intake difference between high and low efficiency Angus steers

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Angus steers from parents selected for high net feed efficiency (NFE; 'HE steers') were as heavy and grew as fast during feedlot finishing as steers from parents selected for low NFE ('LE steers'), yet ate significantly less and consequently were more efficient (Richardson *et al.* 1998). The HE steers had significantly less subcutaneous rib and rump fat thickness at the start and end of the 114 d test period. This implies that body composition might be important in explaining differences in feed efficiency that accompany selection for NFE.

At the end of the test period the steers were slaughtered, minced and their protein (as N x 6.25), fat (soxhlet extraction) and energy (protein 23.6 MJ/kg; fat 39.3 MJ/kg) contents determined. The chemical composition of hide and bones was calculated from published values. No results for the tail, head, lower leg and hooves are included. The initial chemical composition of each animal was calculated using its initial liveweight and assuming that its chemical composition was the same as at the end of the test. Heat production (HP) was calculated as the difference between ME intake (MEI) and energy retained in tissue gain (ER). Maintenance energy expenditure was estimated as HP less energy expended in tissue gain calculated as (tissue mass x energy content/k_f or k_p) where $k_f = 0.75$, and $k_p = 0.2$ (rather than the textbook value of 0.45 derived from rats).

There was a trend for LE steers to be fatter at the start and end of the test. The gains in protein and fat were similar for HE and LE steers, and as a result, ER was similar. The difference in ER (0.03 GJ) represented 5% of the difference in MEI (0.64 GJ). There were no differences in protein mass maintained over the test period but estimated maintenance costs were 9.5% higher for LE steers. Divergence selection for NFE has produced small changes in fatness in steers but these results suggest that they account for only a small fraction of the observed differences in MEI and feed efficiency. Rather the differences are due to higher HP likely to be associated with differences in feed intake, tissue turnover and activity.

Richardson, E.C., Herd, R.M., Archer, J.A., Woodgate, R.T. and Arthur, P.F. (1998). High net feed efficient steers eat less for the same feedlot performance. *Animal Production in Australia* **22**, 213–16.

Table 1 Chemical composition and energy balance for high and low NFE Angus steers over a 114 day test (values are means ± SE).

Trait	High efficiency	Low efficiency	Significance
Start test liveweight (kg)	284.00 ± 7.00	293.00 ± 7.00	ns
Start test chemical fat (kg)	61.90 ± 3.20	69.50 ± 2.20	P=0.05
Start test chemical protein (kg)	32.80 ± 0.90	32.40 ± 0.70	ns
End test liveweight (kg)	423.00 ± 6.00	428.00 ± 8.00	ns
End test chemical fat (kg)	92.50 ± 4.10	101.80 ± 2.90	P<0.1
End test chemical protein (kg)	49.10 ± 1.20	47.40 ± 0.50	ns
ME Intake (GJ)	12.10 ± 0.20	12.80 ± 0.30	P<0.05
Energy Retained (GJ)	1.59 ± 0.08	1.62 ± 0.06	ns
Heat production (GJ)	10.50 ± 0.20	11.20 ± 0.30	P=0.1
Estimated maintenance costs (GJ)	7.01 ± 0.33	7.68 ± 0.39	P<0.2