Relationship between organ weight, carcass lean, net feed intake and gross feed conversion efficiency in composite sire line sheep

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Net feed intake (NFI) and gross feed conversion ratio (FCR) are commonly used to identify animals that are more efficient at converting feed into meat. NFI has been shown to be moderately heritable and negatively correlated with carcass lean in cattle (Herd and Bishop 2000). Visceral organs make a substantial contribution to whole animal energy expenditure (Baldwin *et al.* 1985). In particular, the gastrointestinal tract (GIT) and liver account for 40–50% of whole–body cardiac output, protein synthesis and heat production (Davis *et al.* 1981; Webster 1981). This preliminary study examined the hypothesis that variation in the efficiency of energy utilisation in growing sheep, and therefore NFI and FCR, may be explained by differences in organ size and carcass lean.

Eleven ram lambs of a composite sire line,11 months old, 41.8 kg mean liveweight, were individually fed a concentrate–based diet (metabolizable energy 12 MJ/kg DM; crude protein 16% DM). Twice weekly body weight and total dry matter intake (TDMI) were measured for 41 d. After 41 d, animals were slaughtered and individual organ weights were recorded. Total organ mass was calculated as the sum of the empty GIT, liver, pancreas, spleen, heart and lungs. Carcasses were boned out into lean, fat and bone to the retail level. NFI calculation was based on the difference between actual feed consumed and the feed consumption predicted from the animals' calculated requirements for maintenance and growth.

Differences were observed between animals for visceral organ weights, NFI, FCR, ADG and TDMI (Table 1) but there were no significant correlations between total organ mass, nor individual organ weights, with NFI or FCR. ADG was highly correlated with FCR (r = –0.668, $P<0.05$) and with TDMI (r = 0.821, $P<0.001$), but it was not significantly correlated with NFI. NFI was negatively correlated with bone–out lean tissue mass (r = –0.614, $P<0.05$).

We conclude that variation in carcass lean but not total and individual organ mass was related to differences in NFI between these animals. These results are consistent with those from work with beef cattle, but should be confirmed with larger numbers of animals.

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Table 1 Mean (± SD) results of ram lambs for ADG, TDMI, NFI, FCR, and selected organ weights.

ADG (g/d)	TDMI (kg)	NFI	FCR[1]	Total organ mass (g)	Liver mass (g)	Total GIT (g)	Bone–out carcass lean (kg)
484	80.2	–0.419	4.09	6794	1085	4123	18.17
(81)	(9.9)	(0.18)	(0.46)	(604)	(143)	(450)	(1.8)

[1]kg DM/kg gain