SEXUAL DIMORPHISM OF CIRCULATING GROWTH HORMONE (GH), INSULIN-LIKE GROWTH FACTOR-I (IGF-I) AND COMPOSITION IN CROSS-BRED LAMBS

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Consumer preferences for lamb meat require production of large, lean carcasses. Growth rates of entire males (rams) are higher than those of entire females (ewes) (Thatcher et al. 1991). Carcasses from ewe lambs contain more fat than carcasses of similar size from ram lambs (Lee et al. 1990). Castrate males (wethers) have intermediate growth and composition characteristics. Correct management of ram lambs enables production of carcasses which meet market criteria, but ewe lambs do not normally meet these specifications.

The somatotropic axis has a major role in control of growth and body composition, and is sexually dimorphic. Davis et al. (1977) found higher mean and baseline GH concentrations and greater amplitude of GH pulses in ram lambs compared to wethers, but these results were confounded by age effects. Circulating IGF-I levels are higher in rams than in ewes from one month of age (Medrano and Bradford 1991). We hypothesised that sexual dimorphism in the plasma levels of GH and IGF-I in growing lambs are associated with differences in rate and composition of growth.

Plasma GH and IGF-I concentrations were measured at 23 weeks of age in rapidly growing cross-bred lambs, given ad libitum access to pasture. Lambs were slaughtered three weeks later, and weights of carcass, viscera, gut components, m.semitendinosus (ST) and internal fat depots (IFD = perirenal + abdominal + mesenteric) recorded. IFD is presented as a percentage of empty body weight (EBW) at slaughter. Data was analysed by GLM. Mean plasma GH and IGF-I concentrations and liveweight at slaughter were analysed with respect to sex, litter size and ewe nutrition. ST and IFD were analysed with sex as the model factor. Adjusted means (± SD) are presented.

	Ewes	Wethers	Rams
Number of animals	9	7	7
Mean GH at 23 weeks (ng mL^{-1})	1.33 ± 0.60	2.05 ± 0.67	2.89 ± 0.48
Mean IGF-I at 23 weeks (ng mL^{-1})	149.6 ± 31.8 ^{a}	234.8 ± 38.6 ^{ab}	310.4 ± 35.0 ^{b}
Internal fat depots (% EBW)	6.58 ± 0.39 ^{a}	5.59 ± 0.44 ^{ab}	4.94 ± 0.44 ^{b}
M.semitendinosus weight (g)	102.3 ± 3.9 ^{a}	124.4 ± 4.5 ^{b}	122.2 ± 4.9 ^{b}
Liveweight at slaughter (kg)	40.48 ± 1.85 ^{a}	48.99 ± 2.24 ^{b}	54.43 ± 2.03 ^{b}

^{a,b} Means within rows with different subscripts differ ($P<0.05$)

Lighter final liveweights and greater IFD in ewes confirmed typical sex differences in rate and composition of growth. Mean GH concentrations tended to be higher in rams than in ewes ($P<0.1$), and mean IGF-I concentration was greater in rams than in ewes ($P<0.05$). Differences in mean circulating concentrations of GH and IGF-I were strongly associated with differences in growth and composition (correlation values are presented across all animals). IFD was negatively correlated with mean GH ($R^2adj = 23.1\%$, $P<0.018$). ST weight was positively correlated with mean IGF-I concentration ($R^2adj = 33.1\%$, $P<0.003$). The growth-promoting role of IGF-I was reflected in a high correlation between liveweight at slaughter and mean IGF-I ($R^2adj = 49.0\%$, $P<0.001$). In conclusion, this study has demonstrated the strong association between the hormones of the somatotropic axis and sexual dimorphism of growth.

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