IGF-I, IGF-II AND IGFBP-3 IN GROWING LAMBS: EFFECTS OF GENDER, NUTRITION AND ONTOGENY.

K.L. GATFORD, A.R. EGAN, P.C. OWENS*, K.J. QUINN*, P.E. WALTON*, P.A. GRANT*,** and B.J. HOSKING

Circulating concentrations of IGF-I and IGFBP-3 are sexually dimorphic before puberty in growing lambs fed ad libitum. The ontogeny of the IGFs and IGFBP-3 pre-weaning has not previously been reported in ruminants. We have investigated changes in plasma concentrations of IGF-I, IGF-II and IGFBP-3 in ram and ewe lambs from 1 d old to 99 d old, and the role of nutrition in producing sexually dimorphic levels of IGF-I and IGFBP-3 post-weaning. Plasma samples were taken from ram and ewe lambs 12-36 hours after birth, and at mean ages of 16, 34, 62 and 99 days. Lambs were run with ewes at pasture until weaning (62 d old). After weaning, rams were paired with ewes by age and litter size, and animals transferred to metabolism crates. Paired lambs were offered the same amount of feed per unit liveweight from weaning until slaughter at 109 d. IGFs were seperated from circulating binding proteins using HPLC chromatography of acidified plasma. IGF-I, IGF-II and IGFBP-3 were measured by radio-immunoassay.

Growth rates of lambs were sexually dimorphic before weaning (rams: 369±31 $g.d^{-1}$, ewes: 282±3 $g.d^{-1}$, $P<0.001$), but not during pair-feeding (rams: 58±11 $g.d^{-1}$, ewes: 74±11 $g.d^{-1}$, $P<0.001$). Circulating concentrations of IGF-I, IGF-II and IGFBP-3 at each age are presented.

Sampling age		Plasma IGF-I ($ng.mL^{-1}$)	Plasma IGF-II ($NG.ML^{-1}$)	Plasma IGFBP-3 ($NG.ML^{-1}$)
12-36 h	rams	154 ± 10	406 ± 25	2091 ± 103
	ewes	188 ± 11	407 ± 26	2376 ± 108
16 d	rams	500 ± 22[a]	297 ± 10	2553 ± 226
	ewes	337 ± 26[b]	268 ± 12	1975 ± 273
34 d	rams	556 ± 32[a]	322 ± 20	2001 ± 166[a]
	ewes	301 ± 33[b]	314 ± 21	2172 ± 174[b]
62d	rams	528 ± 34[a]	347 ± 18	2354 ± 128a
	ewes	266 ± 36[b]	343 ± 17	1456 ± 135[b]
99 d	rams	249 ± 51	453 ± 33	1154 ± 122
	ewes	137 ± 54	342 ± 35	1057 ± 128

NB: Values with different superscripts within a row are different at the $P < 0.05$ level.

Plasma concentrations of IGF-I, IGF-II and IGFBP-3 did not differ between sexes 12-36 h after birth. IGF-I but not IGF-II was higher in rams than ewes in subsequent pre-weaning samples. Plasma IGFBP-3 was higher in rams than ewes at 34 and 62 days of age. After weaning (99 d), plasma IGF-I and IGFBP-3 did not differ between sexes. but IGF-II tended to be higher in rams than ewes ($P = 0.054$). Given the marked reduction in lamb growth rate, we hypothesise that nutritional restriction prevented stimulation of IGF-I and IGFBP-3 synthesis by growth hormone and therefore removed gender differences in circulating IGF-I and IGFBP-3 post-weaning.

Department of Agriculture, University of Melbourne, Parkville, Victoria 3052 *CRC for Tissue Growth and Repair and CSIRO Division of Human Nutrition, Adelaide, South Australia 5000 **Department of Obstetrics and Gyanecology, University of Adelaide, South Australia 5000