EWE FATNESS INFLUENCES FETAL FATNESS BUT NOT FETAL **WEIGHT**

D.M. McNEILL[A], *R.W. KELLY*[B], *and I.H. WILLIAMS*[A]

[A]Faculty of Agriculture (Animal Science), The University of Western Australia, Nedlands, WA 6009
[B]Sheep Industries Branch, Dept of Agriculture, South Perth, W.A. 6151

Maternal fatness during pregnancy is thought to influence fetal size because fatter ewes generally produce bigger lambs than leaner ewes (Rattray *et al.* 1980; Robinson and McDonald 1989). In most of the previous studies designed to investigate the effect of ewe fatness on fetal growth, manipulation of maternal fat has often taken place in the first half of pregnancy when the placenta is actively growing. So manipulations to maternal fatness might also have caused changes in placental size. We tested the hypothesis that fat and lean ewes produce a fetus of the same weight provided they have placentas of a similar size.

Nutrition was manipulated so that, at mating, ewes were in either a medium (score 2.9, liveweight = 46.6 kg) or lean (score 2.0, liveweight = 40.6 kg) body condition. They were maintained at this fatness difference until slaughter at day 146 when fetal, placental and maternal tissue weights were recorded. Placental weight was defined as the total weight of placentomes. The fetus and empty-body of the ewe were later ground and subsampled for chemical analysis.

Both groups of ewes had placentas of a similar size and produced fetuses of a similar weight (Table 1). However, the fetuses in the leaner ewes had 20% less fat/kg of fat free body weight (ffbwt). Fetal fatness was correlated with ewe fatness ($R = 0.69$, $P < 0.01$) as described by the equation (± se): $Y = 26.9(\pm 7.56)X + 20.10(\pm 1.92)$, where Y = fat content of the fetus (g/kg ffbwt) and X = fat content of the ewe (kg of fat/kg of fat free empty body weight).

Table 1. Fetal and placental weights and fetal composition (adjusted for fetal sex) and ewe fatness in the medium or lean ewes at day 146 of pregnancy

Fatness group	Medium n = 7	Lean n = 9	Pooled se (n = 7)	
Ewe fatness (kg fat in empty body)	9.56	4.77	0.96	***
Placental weight (g)	502	434	38.3	ns
Fetal weight (g)	4382	4408	204.6	ns
fat (g)	126	103	7.8	*
fat (g/kg ffbwt)A	30	24	1.3	**
protein (g)	654	658	30.2	ns
water (g)	3403	3469	163.7	ns

[A]g of fat per kg of fat free body weight.
***P ≤ 0.001, ** P ≤ 0.01, * P ≤ 0.05, ns not different.

Why do fetuses of lean ewes have less fat than those of fatter ewes when both fetuses are the same size at birth? More glucose might be absorbed by the maternal tissues of lean ewes because, as we have demonstrated earlier (McNeil1 *et al.* 1991), lean ewes are more sensitive to insulin than fat ewes. If more glucose is absorbed by maternal tissues less is available for the fetus and, since glucose is the major precursor of fat in the fetus (Vernon *et al.* 1981), it follows that lean ewes would produce a fetus with less fat. If fat reserves aid survival, fat lambs may survive better than lean lambs particularly in cold conditions.

This work was supported by the Wool Research and Development Corporation.

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