

THE INFLUENCE OF PROGESTERONE AND NUTRITION ON THE SHEEP EMBRYO

R.A. PARR*, I.A. CUMMING*, R.A.S. LAWSON*, D.J. KERTON* and A.M. HARRIS*

Undernutrition during early pregnancy can cause embryo loss in the ewe (Edey 1966). Cumming *et al.* (1971) found that progesterone levels in peripheral plasma were either elevated or reduced in ewes fed either a 25% or 200% maintenance ration respectively. This paper reports a study of the relationships between embryo growth and survival, progesterone and the ewe's level of nutrition.

Three hundred and sixty mature Merino ewes were randomly allotted to a control group and five treatment groups receiving progesterone at levels of 5, 10, 15, 20 or 25 mg/day as twice daily injections in arachis oil after ovariectomy at Day 4 *post coitus* (p.c.). The animals were further allotted to sub-groups receiving either 25% or 100% of a maintenance ration from Day 1 p.c. until embryo recovery at either Day 11 p.c. or Day 21 p.c. Embryos were assessed for survival and their sizedetermined. Ewes in the control group underwent a sham operation. Ewes with multiple ovulations were discarded from this analysis due to insufficient numbers.

Analysis of the data on embryo survival and size gave only one significant interaction, that of nutrition by progesterone treatment on embryo size at Day 11 p.c. This interaction was largely accounted for within the ewes on a maintenance ration receiving 10 mg/day progesterone. This group had only four embryos (mean size, 1.45 (log x + 1)mm of which three had entered the exponential growth phase. Nutrition did not affect either embryo size or survival at Day 11 or 21 p.c. However, there were significant effects of progesterone treatment on each of these parameters (Table 1, Data analysed by Least Squares Analysis of Variance).

TABLE 1: Embryo survival and size at Day 11 p.c. and Day 21 p.c.

Progesterone (mg/day)	Day 11 p.c.		Day 21 p.c.	
	Survival (%)	Mean size (log x + 1)mm	Survival (%)	Mean size mm
5	74 b(21)*	0.77 b	69 b(21)	6.16 ab
10	76 b(23)	1.10 a	83 ab(25)	6.63 a
15	83 ab(27)	0.78 b	79 ab(17)	5.65 b
20	92 a(24)	0.82 b	90 a(19)	6.31 ab
25	96 a(22)	0.74 b	82 ab(24)	6.26 ab
Nil (Controls)	83 ab(22)	0.65 b	90 a(32)	5.82 b

a,b Values with different superscripts differ significantly ($P < 0.05$).

* Figures in parenthesis are the total number of ewes in a group.

Detailed studies of growth and development of these embryos may identify meaningful treatment effects. While recognizing difficulties involved in the experimental design, the results suggest that nutrition did not have a direct effect upon the embryo. Progesterone treatment lowered embryo survival at the lowest treatment levels. Certainly high levels of progesterone had no detrimental influence on embryo survival.

EDEY, T.N. (1966). *J. Agric. Sci.; Camb.* 67: 287.

CUMMING, I.A., MOLE, B.J., OBST, J., BLOCKEY, M.A. de B, WINFIELD, C.G., GODING, J.R. (1971). *J. Reprod. Fert.* 24: 146.

*Animal Research Institute, Department of Agriculture, Werribee 3030.