

OVARIAN ACTIVITY IN HEIFERS AT 30 MONTHS OF AGE FOLLOWING HIGH OR LOW GROWTH *IN UTERO* AND FROM BIRTH TO WEANING

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The pool of primordial follicles destined for future ova in a females' reproductive life are formed well before birth (Erickson 1966) and thus may be affected by the *in utero* environment. Initial numbers of such follicles are very high and may not be a limiting factor in many cases. However, early development of the ovary could affect age at puberty, successful fertilisation and post-partum anoestrus, all of which impact on lifetime reproductive output. Potential for the ovary to produce antral follicles is also important for donors for superovulation or harvesting of oocytes in IVM, IVF and ET programs. Here we report some observations on ovarian activity in heifers potentially compromised by growth restriction *in utero* and/or between birth and weaning.

Hereford cows (n=360) were bred to either Piedmontese or Wagyu bulls and given high or low nutritional treatments during pregnancy and between birth and weaning (Cafe *et al.* 2006), resulting in "growth treatments" of the progeny. Heifer progeny (n=81) were selected to form groups with about a 30% difference in mean birth weight (27.3 v. 35.9 kg) coupled with divergence (501 v. 806 g/d) in growth from birth to weaning (Greenwood *et al.* 2006). Ovaries were collected from the heifers when slaughtered at around 30 months of age. Ovarian activity status was assessed by the presence of developing follicles and *corpora lutea* (CL). The data were analysed using Genstat 8 (2005) with fixed effects of sire-genotype, *in utero* growth and postnatal growth. Interactions were not significant.

The parameters analysed included number and proportion of small (2-4 mm) and medium (5-9 mm) sized follicles and their total volume (number x size), proportion of ovaries with large follicles (>9 mm) and CL, and ovarian weights. There were no significant differences due to sire-breed for any parameter. There were significant differences due to prenatal growth (Table 1) in mean ovarian weight (16.6 g low v 19.4 g high, P=0.017) and in mean size of large follicles (14.0 mm low v 16.7 mm high, P=0.053). Effects of growth after birth favoured high growth, but were non-significant and generally of lesser magnitude than for growth *in utero*.

Table 1. Selected ovarian parameters at slaughter of 30 month-old heifers following divergent growth *in utero* and from birth to weaning (values are predicted means and s.e.d.)

Variable	<i>In utero</i> growth		Birth to weaning growth		s.e.d.
	Low	High	Low	High	
Number of heifers	40	41	40	41	-
Liveweight of heifers	594	655	612	637	11.7
Number of small follicles (2-4 mm)	34.8	36.8	38.1	33.5	4.8
Number of medium follicles (5-9 mm)	7.5	8.0	7.7	7.8	1.3
Mean size of large follicles (mm)	14.0	16.7	15.9	14.8	1.2
Weights of ovaries (g)	16.6	19.4	17.7	18.3	1.2

While overall trends tended to favour the high growth groups (Table 1), differences in the size distribution of follicle populations were not significant. Differences in ovarian weight due to prenatal growth were significant, however, and these parameters were found by Murasawa *et al.* (2005) to be correlated. Hence, there is some suggestion from the present study of compromise due to growth restriction *in utero*. However, from these measurements of ovarian parameters at 30 months of age we could not determine if there were differences in age at puberty due to growth early in life, nor can we speculate on the likely fertility of the heifers if mated.

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