THE EFFECT OF *IN UTERO* AND PREWEANING NUTRITION ON GROWTH OF PIEDMONTESE- AND WAGYU-HEREFORD CALVES FROM BIRTH TO WEANING

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This paper outlines the effect of nutrition *in utero* and preweaning on growth of calves to weaning, from a Beef CRC experiment aimed at understanding effects of early life nutrition on subsequent animal growth and the development of muscle and fat. Hereford females were mated to sires of selected lines of Piedmontese (highly muscled) and Wagyu (highly marbled), allocated to replicates of 32 head (balanced for foetus sire breed, dam age and weight) and grazed on either poor (native) or good (improved) pastures at Grafton until calving in 2001. At birth, half of the animals swapped pasture types, while the other half remained on their original pasture type until weaning. This resulted in progeny with 4 nutritional treatments from conception to weaning (high nutrition *in utero* and to weaning (HH), low nutrition *in utero*, high nutrition to weaning (LH), high nutrition *in utero*, low nutrition to weaning (HL), and low nutrition *in utero* and to weaning (LL)), 2 breeds (Piedmontese x Hereford (PxH) and Wagyu x Hereford (WxH)) and 2 sexes (heifers and steers).

From 256 progeny weaned, 80 heifers and 80 steers were selected as 'core' animals to continue through future stages of the experiment. The core animals were selected to best represent the extremes of birth weight and pre-weaning growth (30% variation in birth weight between high and low *in utero* nutrition, and 50% variation in preweaning growth rate between high and low preweaning nutrition). Data for the 160 core animals were analysed using Linear Mixed Models (REML) in Genstat, with significance accepted at $P<0.05$. Average birth weight, weaning weight and birth to weaning average daily gain (ADG) for the steers in each genotype x nutrition treatment group are presented in Table 1. Heifer growth (not shown) was similar to that of the steers. Birth weight, weaning weight and birth to weaning ADG differed with genotype and nutrition ($P<0.001$); birth weight was the only variable that differed with sex ($P<0.001$).

Table 1. Birth weight (kg), weaning weight (kg) and birth to weaning ADG (g) for 80 selected steers (HH - high nutrition *in utero* and preweaning, LH - low nutrition *in utero*, high nutrition preweaning, HL - high nutrition *in utero*, low nutrition preweaning, LL - low nutrition *in utero* and preweaning).

Genotype		HH	LH	HL	LL	s.e.d
PXH	Birth weight	43.1	32.2	41.1	30.7	1.45
	Weaning weight	246	220	160	153	12.3
	Birth-wean ADG	942	856	591	552	46.5
WXH	Birth weight	37.6	28.4	36.5	26.5	1.45
	Weaning weight	241	224	161	138	12.3
	Birth-wean ADG	958	872	565	515	46.5

The level of nutrition from birth to weaning had a greater effect on the growth of the animals to weaning than did the level of nutrition *in utero*. The difference in liveweight between HH and LL animals at weaning was greatest, with the order of weaning liveweight being HH>LH>HL>LL. Birth to weaning ADGs followed the same trend. Ultrasound scanning of fat and muscle at weaning showed body composition differences such that steers and PxH had significantly lower rib and rump fat depths, and significantly higher eye muscle area (EMA), than heifers and WxH, respectively, while WxH had significantly higher intramuscular fat (IMF%) than PxH. The breed x nutrition interaction was close to significance ($P=0.069$) for EMA and rib fat; on high preweaning nutrition, the PxH animals tended to have higher EMA and lower rib fat than WxH animals, whereas on low preweaning nutrition, there was no sire-breed effect. After weaning, the steers and heifers went to Glen Innes to grow out on improved temperate pastures prior to feedlotting, and slaughter for carcase data.

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