

EFFECT OF GENOTYPE AND PASTURE QUALITY ON MILK YIELD IN BEEF CATTLE

H. HEARNshaw^a, P.F. ARTHUR^b, P. WILLIAMSON^a, P. STEPHENSON^a and K. DIBLEY^a

^aNSW Agriculture, Agricultural Research and Advisory Station, Grafton, N.S.W. 2460

^bNSW Agriculture, Agricultural Research Centre, Trangie, N.S.W. 2823

Prewaning growth of calves is influenced primarily by milk yield but also by other genetic and environmental factors. Is milk yield influenced by genotype by environment (GxE) interactions? At Grafton N.S.W., Hereford (HxH), Brahman x Hereford (BxH), Friesian x Hereford (FxH) and Simmental x Hereford (SxH) cows have been evaluated for productivity over their lifetime whilst grazing high, medium or low quality pastures (Hearnshaw 1993). The objective of this study was to determine milk yield from these mature cows and to examine its effect on growth of calves to weaning.

Estimates of milk yield were determined for 305 cow/calf pairs using a weigh-suckle-weigh technique. Each pair had milk yields measured at 3 stages of lactation when calves averaged 49, 150 and 240 days of age. Milk yield was measured at noon and in the evening - both estimates following a 6 hour cow/calf separation. The sum of the differences in calf liveweight before and after suckling at both noon and evening was used as the estimate of the cow's 12 hour milk yield. Traits studied were 12 hour milk yield at early, mid and late lactation; the sum of these 3 milk yields (milk yield index); cow liveweight and body condition (CS), and calf liveweight and growth to weaning. Data were analysed using the GLM procedure of SAS (1990) and models included fixed effects of cow breed, pasture quality, calf sex and sire breed, year of estimation and all interactions. Since 'time by breed by pasture' was not significant in repeated measures analyses for milk yield, only 'milk yield index' results are presented. Simple and partial (adjusted for significant fixed effects) correlations among milk yield index and other maternal and calf traits were computed using data pooled across breed and pasture.

Milk yield index was greatest on high quality pastures and least for low quality pastures. However rankings of genotypes varied between pasture systems indicating that milk yield was affected by GxE (Table 1). Rankings changed from FxH=SxH>BxH=HxH (high quality pastures) to BxH>SxH=HxH with FxH intermediate between BxH and SxH (low quality pastures). Weaning weight and growth of calves followed similar trends for both this and a larger set of data (Heamshaw *et al.* 1994).

Milk yield index was positively correlated with both calf weaning weight and growth (partial r = 0.5 1 and 0.52 respectively). Estimates were similar to other studies (eg Reynolds *et al.* 1978). Correlations with CS or CS change were negative, indicating cows with lower CS or greater change in CS had higher milk yield. Thus management or breeding strategies which increase milk yield within a particular environment will increase calf weights at weaning and overall productivity.

Table 1. Milk yield index (kg) for Hereford and firstcross cows grazing 3 quality pastures

Pasture quality	Cow breed			
	Hereford (H)	Brahman x H	Friesian x H	Simmental x H
High	8.2 ^{aA}	8.6 ^a	12.5 ^b	11.2 ^b
Medium	6.8 ^a	8.9 ^b	9.4 ^b	8.3 ^b
Low	4.0 ^a	6.3 ^c	5.6 ^{bc}	4.4 ^{ab}

^A Means in the same row with different superscripts are significantly different (P<0.05).

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