

**ADDITIVE AND NON-ADDITIVE DIFFERENCES IN
THE POSTWEANING PERFORMANCE OF DEVON,
HEREFORD AND RECIPROCAL CROSS
STEERS AND HEIFERS**

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Foreword

All material presented in this thesis is original and was completed by the author whilst in receipt of the Devon-Hereford Bicentennial Research Program Studentship, and under the supervision of Drs. Keith Hammond and John Thompson.

I certify that the substance of this thesis has not already been submitted for any degree and is not being currently submitted for any other degree.

I certify that to the best of my knowledge any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

D.J. JOHNSTON

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Summary

The postweaning growth and carcass characters of steers and the maternal performance of heifers from a complete two-breed diallel of the Devon and Hereford breeds were examined under Australian temperate grazing conditions. The aim of the project was to estimate additive and non-additive between breed differences for direct and maternal effects.

The experiment reported here forms part of a large, long-term crossbreeding trial initiated in 1983 by the Devon Cattle Breeders' Society of Australia. Phase 1 of the trial evaluated the preweaning performance of Devon, Hereford and reciprocal cross calves generated from the complete diallel design and reported by Gyles (1987). This project reports Phase 2 of the trial which has examined growth postweaning in two different nutritional environments and carcass characteristics of 110 steers. Also the maternal performance (calf growth, milk and suckling and grazing behaviour) of 112 heifers was examined. The steers and heifers consisted of four breedtypes produced from the base mating of Devon and Hereford females to 15 Devon and 14 Hereford sires.

Heterosis for slaughter weight was 5.0 % (18.5 ± 6.7 kg) and 3.9 % (14.4 ± 4.9 kg) for postweaning growth. No significant differences were observed between the straightbreds, or between the reciprocal crosses for slaughter weight. Although within the low nutrition environment during periods of slow and fast growth the Devons and the Herefords performed differently. The growth rate of the steers differed in the two

environments, however heterosis for slaughter weight was of the same magnitude in both environments.

The carcass results showed significant heterosis for hot carcass weight (13.6 ± 4.2 kg); however, this effect was removed with adjustment for differences in slaughter weight. Heterosis for eye muscle area and carcass fatness, measured as the weight of kidney and channel fat and fat depth at nine sites, was not significant. Breed additive differences occurred for some carcass traits, with the Devon carcasses having more kidney and channel fat (0.62 ± 0.25 kg) than the Herefords at a constant hot carcass weight. Additive differences were also observed for the partitioning of fat within the subcutaneous depot. No significant maternal additive differences occurred between the reciprocal crosses for any of the carcass traits measured.

Devon-Hereford reciprocal cross heifers grew 7.3 % (0.04 ± 0.1 kg/day) faster post weaning and were heavier than the straightbreds at joining. The preweaning environment (pasture) had a significant effect on the heifers' postweaning growth to joining. As dams, the crossbred heifers produced on average 1.1 ± 0.5 kg/day (32 %) more milk than the straightbred Devon and Herefords, over four observations during the first lactation, with the milk of the four breedtypes being of similar composition. The crossbred heifers suckled their calves on average 3.4 ± 1.8 (19 %) min/daytime observation longer and weaned heavier calves than the straightbreds. However, the weaning weights of the Red Angus sired calves from the four heifer breedtypes exhibited a sire \times breedtype of

dam interaction and this affected the estimate of maternal heterosis for weaning weight.

Differences between the performance of the Devon \times Hereford and Hereford \times Devon reciprocal cross heifers and their calves were generally small and non-significant for the traits studied.

The performance of the straightbred Devon and Hereford heifers was similar for most traits; however, some important differences were observed. Although similar in daily milk yield, the Devon heifers had higher percentage milk protein (0.24 ± 0.15 %) than the Herefords. The Devon dams suckled their calves more times per day (0.6 ± 0.4) than the Herefords, however total suckling time per daytime did not differ between the breeds.

The results from this study show that the Devon-Hereford reciprocal cross steer produced a heavier carcass that had a similar weight of kidney and channel fat, depth of subcutaneous fat and eye muscle area to the straightbred Devon and Hereford. The widely differing postweaning environments used did not alter the relative performance of the breedtypes. Devon-Hereford reciprocal cross heifers produced substantially more milk per day but of similar composition to the straightbred Devon and Herefords and this could lead to the observed extra weaning weight of calves from the crossbred dams.

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