The implications for *measurement of real differences* between genotypes are apparent. Where a G x E exists, the observed difference will be directly related to the size of genetic differences between genotypes, *and* to the *level of environment*. The greater the range of the "test" environment, the greater the change of detecting a G x E. Similarly, the more variable the production environment, or the genotypes, the greater is the importance of G x E. Unless one has a prior knowledge that a G x E does not exist, it will be important to cover the range of environments that will be experienced in practice, when defining differences between genotypes. A corollary is that a better understanding of the reasons for G x E will be possible if the environmental variables can be defined and monitored. A research program at Grafton, NSW, has revealed dramatic changes in rankings of different crosses of cattle in different years (weaners), pasture systems (breeders) or locations (steers).

When selecting individual replacements in the presence of G x E, the phenotypic expression of the trait can be expected to vary with level of environment. Within environments E_1 or E_3 this will mean that the selection differential for the trait will be apparently affected by environmental variation, while expression of the trait between environments may be governed by different sets of genes. There is a need to understand exactly how the selection criteria used relate to the breeding objectives for the particular environment. For example: genetic improvement for a particular trait in a favourable environment may arise from greater or better utilisation of available factors, while in an unfavourable environment the ability to withstand stresses may assume greater importance.

* * * *

A GENOTYPE X SEASON INTERACTION IN POST WEANING GAIN IN CROSSBRED STEERS

J.M. Thompson[1], and R. Barlow[2]

[1] Department of Agriculture, Poultry Research Station, Seven Hills

[2] Department of Animal Breeding and Genetics, University College, Dublin, Ireland

A genotype x environment interaction occurs when there is a change in the relative performance of genotypes with variation in environment. In extreme situations a reversal in the ranking of the genotypes can occur, whereas in less extreme situations only the magnitude of the differences may change.

In the Grafton crossbreeding experiment (Barlow and O'Neill (*pers. comm.*)) it is reported that the magnitude of genotype differences for late preweaning growth changed between years. In years where growth rate was below average, the Brahman x Hereford calves (B x H) grew faster than Friesian x Hereford (F x H), Simmental x Hereford (S x H) and straightbred Hereford (H x H) calves, whereas in the more favourable years, the differences changed with all crossbred calves growing faster than the H x H calves. Results indicated that the B x H cross was less sensitive to variation in the environment than the S x H and F x H crosses which showed greater increases in production with more favourable environments.

A similar result in terms of changes in the magnitude of genotype differences with season have been observed for post weaning gain in crossbred steers. A total of 104 crossbred and straightbred steers from the Grafton Crossbreeding Project were grown out on pasture at Maitland and groups of steers slaughtered over a wide weight range. Over 4 years a seasonal pattern of growth was observed, such that during the autumn and winter periods, the steers grew more slowly than in the spring and summer periods.

Results showed that during the slow growing period the B x H steers grew faster than the S x H and F x H steers which grew faster than the H x H steers. In the fast growing period the genotype differences changed with the S x H, F x H and H x H steers growing faster, or as fast as, the B x H steers. As indicated for late preweaning growth in crossbred calves, the postweaning growth of B x H steers was less sensitive to changes in season than the other genotypes.

The nature of the genotype x environmental interactions reported in both crossbred calves and steers support the proposal by Frisch (1976) that *Bos indicus* cattle are less susceptible to environmental constraints than *Bos taurus* cattle, although the potential production level of the *Bos taurus* cattle, free of environmental constraints, is higher.

REFERENCES

FRISCH, J.E., (1976) A Model of reasons of breed differences in growth in cattle in the tropics. *Proceedings of Australian Society of Animal Production* 11: 85

* * * *

CROSSBREEDING EFFECTS ON ANOESTRUS AND PREGNANCY RATE IN BEEF COWS

J.H.L. Morgan, S.R. Baud, D.W. McKeown and L.J. Cummins
Pastoral Research Institute, Department of Agriculture, Hamilton, Vic.

Long post-partum anoestrous intervals (PPAI) are undesirable because they result in reduced pregnancy rates and extended calving periods. Delayed oestrus is of critical importance in young cows, particularly 2 year olds because they tend to have longer PPAI than older cows; and also the calving pattern of young cows largely determines the subsequent calving pattern of the herd.

From 1970 to 1973, Hereford (H) and Friesian (F) cows were inseminated tc H, F, Charolais (C) and Brahman (B) sires. The 323 female progeny were first inseminated at either 15 or 27 months of age. After calving, the F1 cows were grazed with a sterilized bull equipped with a chinball harness and inseminated during August and September of each year. Non-pregnant cows were retained and inseminated in the following year. The PPAI and pregnancy rates reported here are derived from lactating cows only. The total number of observations were 190 (2-3 year olds) and 354 (4-7 year olds).