

GENOTYPE BY ENVIRONMENT INTERACTIONS FOR GROWTH AND STAYABILITY TRAITS IN US RED ANGUS

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Abstract

Genotype by environment interactions (GxE) may reduce accuracy of sire selection. The objectives of this study were to evaluate the presence of GxE by comparing reaction norms of bulls for birth weight, weaning weight, gain and stayability. Environments were defined as nine regions within the United States with similar temperature humidity index. The environmental mean was determined and a weighted regression was used to determine the progeny mean. Reaction norms were calculated by regressing the progeny mean on the environmental mean. A logit model was used to determine the heritability of stayability on the underlying scale.

The heritabilities of BW and WW reaction norms were 0.40 and 0.39, respectively. Heritabilities of stayability were 0.34, 0.18, 0.19, 0.08, 0.09, 0.28, 0.30, 0.31 and 0.40 for regions C, D, G, L, M, N, P, S and U, respectively and 0.18 for the national dataset. The percentages of females that calved at age four, given that they had calved at age two were 56.7, 39.9, 32.9, 51.1, 56.1, 57.0, 51.4, 47.8 and 58.8 for regions C, D, G, L, M, N, P, S and U, respectively and 55.0% for the national dataset. The comparisons of regions illustrate the northern regions are more similar to each other compared to the southern regions and the southern regions are not only different from the northern regions but different from each other.

Reaction norms are heritable and there is sufficient variation for effective selection. Further research is warranted in the proper division of environments and the most economical and effective method to employ reaction norms to end-users.