

Joint analysis of beef growth and carcass quality traits through calculation of co-variance components and correlations

H.R. Mirzaei¹, A.P. Verbyla² and W.S. Pitchford³

¹Department of Animal Science, Zabol University, Mofatteh St., Zabol, Iran

²BiometricsSA, The University of Adelaide, Waite Campus, Glen Osmond SA, Australia

³Animal Science, University of Adelaide, Roseworthy SA, Australia

Corresponding author: H.R. Mirzaei

E-mail: president@imamreza.ac.ir / h.mirzaei9@gmail.com

Genet. Mol. Res. 10 (1): 433-447 (2011)

Received October 15, 2010

Accepted January 26, 2011

Published March 15, 2011

DOI 10.4238/vol10-1gmr1108

ABSTRACT. A joint growth-carcass model using random regression was used to estimate the (co)variance components of beef cattle body weights and carcass quality traits and correlations between them. During a four-year period (1994-1997) of the Australian “southern crossbreeding project”, mature Hereford cows (N = 581) were mated to 97 sires of Jersey, Wagyu, Angus, Hereford, South Devon, Limousin, and Belgian Blue breeds, resulting in 1141 calves. Data included 13 (for steers) and 8 (for heifers) body weight measurements approximately every 50 days from birth until slaughter and four carcass quality traits: hot standard carcass weight, rump fat depth, rib eye muscle area, and intramuscular fat content. The mixed model included fixed effects of sex, sire breed, age (linear, quadratic and cubic), and their interactions between sex and sire breed with age. Random effects were sire, dam, management (birth location, year, post-weaning groups), and permanent environmental effects, and their interactions with linear, quadratic and cubic growth, when possible. Phenotypic, sire and dam correlations between body weights and hot standard carcass weight and rib eye muscle area were

positive and moderate to high from birth to feedlot period. Management variation accounted for the largest proportion of total variation in both growth and carcass traits. Management correlations between carcass traits were high, except between rump fat depth and intramuscular fat ($r = 0.26$). Management correlations between body weight and carcass traits during the pre-weaning period were positive except for intramuscular fat. The correlations were low from birth to weaning, then increased dramatically and were high during the feedlot period.

Key words: Crossbred cattle; Growth; Carcass traits; Correlations; Random regression