

ABSTRACT

Genetic parameters for fatty acid composition and feed efficiency traits in Japanese Black cattle.

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We estimated the genetic parameters related to feed intake (FI), feed efficiency traits (including feed conversion ratio (FCR) and residual feed intake (RFI) of digestible crude protein (DCP) and total digestible nutrients (TDN)), beef marbling score (BMS), melting point of fat (MP) and fatty acid composition. Fat and meat (Musculus trapezius) samples were taken from the carcasses of 863 Japanese Black steers derived from 65 sires, for determination of the MP and fatty acid composition of the total lipid in intramuscular adipose tissue. Genetic parameters were estimated using uni- and bivariate animal models. In addition, pedigree information for 4841 animals was used. Heritability estimates for BMS, MP, individual fatty acids, monounsaturated fatty acids (MUFA), the ratio of saturated fatty acids to MUFA (MUS) and the ratio of elongation (ELONG) were generally high. The FI values of TDN and DCP were also high, but FCRs and RFIs of those were low (0.09 to 0.22). Genetic correlation of BMS with MP was -0.34 (favorable) and with C18:1, MUFA, MUS and ELONG values were 0.40, 0.28, 0.29 and 0.37, respectively (favorable). Genetic correlations of MP with C18:1, MUFA, MUS and ELONG were negative (also favorable) and high (-0.85, -0.98, -1.00 (-0.996) and -0.66, respectively). The correlation estimates for feed efficiency traits of DCP were quite similar to those of TDN. Genetic correlations of BMS with FCRs and RFIs of TDN and DCP were all positive (unfavorable; 0.21 to 0.51), and in particular, the correlations with RFIs of those were high. The correlations of C18:1, MUFA, MUS and ELONG with RFIs of TDN and DCP were positive (unfavorable) but low (0.06 to 0.17), whereas the corresponding correlations with FCRs of those were all negative (favorable; -0.38 to -0.10). These results suggest that the quantity and quality of beef fat can be simultaneously improved and that the quality of beef fat (fatty acid composition) can be improved directly or indirectly with MP. Furthermore, selecting MP or fatty acid traits does not significantly affect feed efficiency.

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