Investigation of Net Feed Efficiency in Dairy Cattle

G. Manafiazar, T. McFadden, L. Goonewardene, E. Okine, and Z. Wang

Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Alberta, T6G2P5, Canada
Email: manafiaz@ualberta.ca

Although feed cost accounts for 40 to 50% of total milk production costs and has increased substantially over the last few years (Garcia, 2009), there is not much research has been conducted to improve feed efficiency through genetic selection. This is mainly due to lack of robust net feed efficiency measures, as well as difficulties and costs associated with individual feed intake record (Kelly et al., 2010). Residual feed intake (RFI) is a robust measure of feed efficiency by which efficient animals have low RFI values and consume less amount of feed without compromising their production level. Research has been conducted at the University of Alberta to: 1) develop a prediction equation to estimate individual phenotypic and breeding values of RFI for the first lactation dairy cows; 2) examine genetic and phenotypic correlations between the predicted RFI with 15 routinely recorded conformation traits to investigate the possibility of these confirmation traits as indicator trait(s) for RFI selection. Individual daily feed intake data of 234 first lactation dairy cows from June 2007 to Oct 2012 at Dairy Unit of the University of Alberta were used in this study. Milk yield, and milk composition data of these animals were obtained from Dairy Herd Improvement (DHI) program and their body weights were measured on the same days as the DHI milk sampled. The records of 15 confirmation traits including overall conformation, mammary system, dairy strength, rump, and feet and legs for these animals were retrieved from Canadian Dairy Network (CDN) data base. A prediction equation was developed (R-square = 0.82) and individual RFI values were estimated (ranged from -2.55 to 2.63 kg DM/day). Estimated heritability of RFI is 0.24, and eight conformation traits have strong (-0.3> and >0.3 with $p < 0.10$) genetic correlations with RFI. The results indicated that the first lactation RFI might be predictable. Although the strong genetic correlation estimates between the RFI and the eight confirmation traits were not significant at 0.05 level due to the limited records used in this study, these confirmation traits might be used as indicator traits for RFI selection in the dairy breeding program. However, further study with more data is highly encouraged.

Implication: Dairy industry may be consider to use the results reported in this study in the dairy genetic improvement program to increase profitability by selecting animals that are genetically superior in energy efficiency.