The Relationship Between Genetic Merit for Yield and Live Weight, Condition Score, and Energy Balance of Spring Calving Holstein Friesian Dairy Cows on Grass Based Systems of Milk Production

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Abstract

The objectives of this study were to estimate the effects of genetic merit for milk yield on energy balance, DM intake (DMI), and fertility for cows managed on three different grass-based feeding systems and to estimate possible interactions between genetic merit and feeding system. Individual animal intake estimates were obtained at pasture on 11 occasions across three grazing seasons. The data set contained 96 first lactation, 96 second lactation, and 72 third lactation cows in 1995, 1996, and 1997, respectively. Half of these cows were of high genetic merit, and half were of medium genetic merit for milk solids production. Genetic effects for the traits of interest were estimated as the contrast between the two genetic groups and by the genetic regression of phenotypic performance on the estimated breeding value for fat and protein yield, based on pedigree index. Significant effects of feeding system were observed on yields, DMI, and energy balance, with no effect on live weight, condition score, or reproductive performance. The interaction between genetic merit and feeding system was not significantly different from zero for any of the traits. Yields, grass DMI, and total DMI were all higher for cows of high genetic merit than for those of medium genetic merit and were positively correlated ($P < 0.001$) with pedigree index. Furthermore, condition score, conception to first and second services, and pregnancy rate were significantly negatively correlated with pedigree index. While at pasture, energy balance was positively ($P < 0.01$) correlated with pedigree index, although the contrast between high genetic merit and medium genetic merit was not significantly different from zero. This positive energy balance was unexpected and was probably due to the lactation stage that intake was measured. Condition score changes and energy balance measures on a small subgroup of the animals, while indoors offered a diet of silage and concentrates (n = 33), demonstrated that high genetic merit had a more negative energy balance than did medium genetic merit. The results clearly illustrate the production potential of high genetic merit cows on grass-based systems. The reduced reproductive performance questions the suitability of high yield for seasonal calving systems.

(***Key Words:*** dairy cows, genetic index, feeding system, energy balance)
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