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Estimation of Linear Heterotic Effects for Lactation Traits in Three Up-grading Trials of Dairy Cattle Raised Under Hot Climatic Conditions

Maher H. Khalil

Department of Animal Production and Breeding, College of Agriculture and Veterinary Medicine, King Saud University, P.O. Box 1482 Buraydah, Al-Qaseem, Saudi Arabia

Three up-grading trials of local cattle (Domiati) with three European breeds (Friesian, Dairy Shorthorn and Jersey) were used to quantify the linear heterotic components of direct (G^I) and maternal (G^M) additive effects, direct (H^I) and maternal (H^M) heterosis, and direct (R^I) and maternal (R^M) recombination loss for milk traits in these trials raised in hot climate conditions. The traits under study were initial 90-day milk yield (M90) 305-day milk yield (M305), duration of lactation length (LP) and 305-day milk yield divided by calving interval (MCI). A total number of 2754, 2050 and 968 normal lactation records were collected in Friesian, shorthorn and Jersey trials, respectively. Data of each crossbreeding trial were analyzed separately using mixed model procedure. In Friesian trial, M305, LP and MCI increased with the increase of the Friesian (F) genes from ½ F to 15/16F. M90, M305 and MCI in Shorthorn trial generally decreased with the increase of Shorthorn (S) genes from ½ S to $^7/_8$ S and increased thereafter (i.e. for 15/16 S). In Jersey trial, M305 decreased with the increase of the Jersey (J) genes from ½ J to $^{15}/_{16}$J , while means of LP in different genetic groups were approximately the same. Cows produced by inter-se mating of Friesian trial (½F ¼ D and $^7/_8$F $^1/_8$D) and shorthorn trial ($^3/_4$S ¼ D and $^7/_8$S $^1/_8$D) had better performance than the other non-interse grades. European breeds (Friesian, Shorthorn and Jersey) always surpassed Domiati breed in their direct (G^I) and maternal (G^M) additive effects for milk production traits. The estimates of H^I for milk production traits were positive and significant ($P<0.001$) and ranged from 6.7 to 13.3% in Friesian trial, 11.7 to 26% in Shorthorn trial and 18.6 to 25.5% in Jersey trial. Percentages of H^M for milk

yield traits were positive and significant ($P<0.01$) and ranged from 6.5 to 14.5%, 5.3 to 15.5% and 5.0 to 9.3% in Friesian, Shorthorn and Jersey trials,respectively. Estimates of R^i and R^M for most milk traits were generally positive.