Modelling of Lactation Curves Based on Daily Milk Yields of Crossbred Murrah Buffaloes in Polonnaruwa NLDB Farm

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Lactation curve modelling is useful for obtaining complete 305-day lactation yields from incomplete lactation records. The objective of this study was to determine the most suitable lactation model, out of three widely used models, for the crosssbred Murrah buffaloes in the North Central Province and thereby to estimate mature equivalent factors for different parities. A set of 10,563 daily milk yield records were collected from 93 crossbred Murrah buffaloes in a semi intensively managed NLDB farm (Polonnaruwa farm) in DL_1 agro-ecological zone. Three popular mathematical models selected from the literature namely Gaines (GN), Wood (WD), and Brody2 (BD2) were fitted to daily milk yield (dependent) and days-in milk (independent) data using non-linear regression procedure (PROC NLIN) in SAS software, for individual parity groups (1, 2, 3, 4, and >4 parities). The model parameters a, b and c were determined when the convergence criterion was met under the Gauss-Newton iterative procedure. Coefficients of determination (R^2) as well as Mean Square Error (MSE) were used as the selection criteria in selecting the best model. All three models showed reasonable fits to all parities (R^2>0.78), however, WD model fitted early lactation data poorly by overestimating them, which may be partly due to lack of early lactation yield records in the data set. Based on the lowest MSE and highest R^2 values recorded, BD2 model was found to provide the best fits for all parity groups. Subsequently, mature equivalent factors were calculated based on the total 305-day predicted yields obtained from the BD2 model. The mature equivalent factors for the five parity groups were 0.73, 0.86, 1.0, 0.89, 0.77, respectively showing that third parity cows providing the highest yields. According to the results, BD2 model could be recommended as a suitable formula for lactation curve modelling in the present farm and for farms with similar climatic and management systems.

Keywords: Murrah Buffaloes, Lactation Curve, Mathematical Modelling, Milk yield

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