

Lactation Curves Modeling of Nili Ravi and Nili Ravi crosses in the Intermediate Zone of Sri Lanka

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Lactation curve of an animal can be expressed as a mathematical model that explains the relevant general pattern of milk production throughout the lactation. A study was conducted to find out the best fit model for the lactation curves of Nili Ravi buffaloes and Nili Ravi crosses in the Intermediate Zone of Sri Lanka. Data on daily milk yield from Nili Ravi buffaloes (n=7071 records) and Nili Ravi crosses (n=17640 records) for the period of 2007-2013 were obtained from the National Livestock Development Board farm, Melsiripura located in the Intermediate Zone of Sri Lanka. The mathematical models proposed by Wood, Cobby and Le Du, Exponential, and Parabolic Exponential were fitted using nonlinear regression procedures in SAS 9.0. The best fit model was identified using the highest coefficient of determination (R^2) and the least mean square error (MSE). The estimated R^2 and MSE values of Nili Ravi for the models of Wood, Cobby and Le Du, Exponential and Parabolic exponential were 0.8018 and 0.4451, 0.8006 and 0.4464, 0.7951 and 0.4526, and 0.7975 and 0.4499, respectively. Whereas, for the Nili Ravi crosses the estimated R^2 and MSE values were 0.8243 and 0.4192, 0.8198 and 0.4244, 0.8150 and 0.4301, and 0.8174 and 0.4273, respectively. All four models provided satisfactory fits with high R^2 (>0.75) and low MSE values for both genotypes. With the highest R^2 and lowest MSE values, Wood's model ($Y_t = at^b \exp(-ct)$ where, Y_t is milk yield on t^{th} day of lactation) could be recommended for modeling lactation curves of both genotypes with estimates for a, b and c model parameters being 4.8355, 0.1736, and 0.005, respectively for Nili Ravi buffaloes and 4.1647, 0.2044, and 0.006, respectively for Nili Ravi crosses.

Keywords: Buffaloes, Lactation curve, Modeling, Nili Ravi, Wood's model.