

Growth Potential of ½ Sindi × ½ Montbéliarde Animals Using the Gompertz Growth Curve

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Estimating adult body weight and growth rate through growth curve modeling in young animals is an effective genetic and nutritional strategy. Selecting precocious animals contributes to reducing the intensity of enteric methane emissions and the environmental footprint of meat and milk production. This study aimed to determine the growth parameters of 29 crossbred ½ Sindi × ½ Montbéliarde calves (17 females and 12 males) during the pre-weaning phase, up to 241 days of age. The calves were raised in the Cerrado biome at Embrapa Cerrados (Brasília, DF), a tropical region of Brazil. Growth (body weight vs. age) was modeled using the nonlinear Gompertz function: where Y is body weight (kg) at age (t) (days), A is the asymptotic weight (kg), k is the relative maturation rate, and b is the integration constant of the model. Model fitting using PROC MODEL (SAS) resulted in excellent predictive performance, with a coefficient of determination of 0.902. All estimated parameters were significant ($p < 0.01$), with the following values: (A = 558) kg, (k = 0.0046), and (b = 1.05). The estimated asymptotic weight (A = 558 kg) is consistent with the adult body size expected for this crossbred group. The relative maturation rate (k = 0.0046) is higher than values typically reported for pure Zebu herds, indicating greater biological precocity. Animals with higher (k) values exhibit faster relative growth and reach physiological maturity more rapidly. In conclusion, the Gompertz model was appropriate for describing the growth pattern of the studied population. The high estimated (k) value suggests a superior potential for precocity in this genetic group, which, from a sustainability perspective, implies a shorter production cycle and consequently a reduced lifetime duration of enteric methane emissions per animal. The authors thank FAP DF, CNPq, and the AgroIntegra Innovation Program for their support.

Effect of Lactation Stage on Energy-Corrected Milk (ECM) Yield in Sindi Cows

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Energy-Corrected Milk (ECM) is a more precise indicator of feed efficiency as it standardizes milk yield by adjusting for fat and protein content. Its relevance is further emphasized by its strong association with sustainability, as higher ECM production per unit of feed consumed results in lower methane (CH₄) emission intensity per kilogram of product. This study aimed to evaluate the effect of lactation stage (early, mid, and late) on ECM yield in Sindi cows managed under tropical pastures conditions. A total of 164 records of milk yield and milk composition (fat and protein) from 30 Sindi cows were collected over a two-year period, with an average lactation length of 219 days. ECM was calculated using the equation: $ECM = (0.327 \times \text{milk}) + (12.95 \times \text{fat}) + (7.2 \times \text{protein})$. Lactation stages were classified as early (≤ 50 days), mid (51–135 days), and late (> 136 days). A mixed linear model for repeated measures was fitted, including lactation stage as a fixed effect and cow as a random effect. The early stage showed the highest mean ECM yield (10.24 kg/day), reflecting peak lactation, whereas the late stage had the lowest yield (5.98 kg/day). Least squares means comparisons revealed that the declines in yield from early to late (–4.26 kg/day) and from mid to late (–3.30 kg/day) were highly significant ($p < 0.0001$). No significant difference was observed between the early and mid stages ($p = 0.1626$), indicating good lactation persistency after peak production. These findings confirm the expected physiological decline across lactation and highlight the productive potential and adaptability of the Sindi breed under tropical pasture conditions. The maintenance of similar ECM levels during the early and mid stages, with a marked decline only in the late lactation, suggests the breed's suitability for sustainable milk production under tropical pasture-based systems. Acknowledgments: FAP DF, CNPq, the Brazilian Sindi Breeders Association, the AgroIntegra Innovation Program.