Supplementary feeding on the nutrient balance of lactating dairy cow at contrasting temperature regimes: assessment using Cornell Net Carbohydrate and Protein System (CNCPS) model

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Abstract

Dairy cows often do not receive adequate nutrient supply during their lactation period. This condition can even be worse if the environmental temperature is not in comfortable range which may occur especially in tropical regions. The present research was aimed to simulate the effect of supplementary feeding on nutrient balance of lactating dairy cow at contrasting temperature regimes using Cornell Net Carbohydrate and Protein System (CNCPS) model. Treatments consisted of feeds (R1: Pennisetum purpureum, R2: P. purpureum + concentrate (60:40), R3: P. purpureum + Gliciridia sepium + Leucaena leucocephala (60:20:20), R4: P. purpureum + concentrate + G. sepium + L. leucocephala (60:20:10:10)) and environmental temperatures (T1: 20 oC, T2: 30 oC). The dairy cow inputs in CNCPS were Holstein breed, body weight of 500 kg, feed intake of 15 kg (dry matter basis) per day and produced milk 15 kg/day. Based on the CNCPS model, there were negative balances of metabolisable energy (ME) and metabolisable protein (MP) if a lactating dairy cow fed only by P. purpureum. The ME balance was worse at higher temperature, while the MP balance was remain unchanged. Addition of concentrate mixture (R2) fulfilled the ME and MP requirements as well as other nutrients. Addition of leguminous tree leaves (R3 and R4) improved the nutritional status of the lactating cow model compared to R1, but did not better than R2. It was concluded that supplementary feeding is necessary for improving the nutrient balance of lactating dairy cow, especially when the cow is maintained under uncomfortable environmental temperature.

Keywords: cncps, Supplementation, Temperature, Nutrient Balance