Crude protein content of forage in intensively managed pastures and silvopastoral systems in Southeast Brazil

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Determining the nutritional value of forage under grazing allows for a more efficient understanding of the system's productive capacity and animal performance. This study evaluated the effects of intensification and integration in animal production systems on the crude protein (CP) content of pastures, from September 2019 to September 2020 at Embrapa Southeast Livestock, São Carlos, SP. Treatments, with two replicates, were: 1) intensively managed and irrigated *Megathyrsus maximus* cv. Tanzânia pasture with a high stocking rate (IHS); 2) intensively managed rainfed *M. maximus* cv. Tanzânia pasture with a high stocking rate (RHS); 3) intensively managed rainfed pasture with a mix of *Urochloa decumbens* cv. Basilisk and *Urochloa brizantha* cv. Marandu pasture, with a moderate stocking rate (RMS); 4) intensively managed silvopastoral system with *U. decumbens* cv. Basilisk pasture and Brazilian native trees with a moderate stocking rate (LFS); and 5) extensively managed degraded pasture with a mix of *U. brizantha* cv. Marandu and *U. decumbens* cv. Basilisk pasture, with a low stocking rate (DP). All pastures were grazed by Nellore steers and submitted to stocking rate adjustments using the "put and take" technique. Grazing was continuous in DP and rotational grazing in IHS, RHS, RMS, and LFS with grazing cycles of 36 days. All pastures, except DP, were corrected with P, K, S and micronutrients. Pastures in IHS and RHS were fertilized with 400 kg N ha^{-1} $year^{-1}$, and RMS and LFS with 200 kg ha^{-1} $year^{-1}$, applied during the rainy season. The IHS system was overseeded with *Avena byzantina* and *Lolium multiflorum* and additionally fertilized with 200 kg N ha^{-1} $year^{-1}$ during the dry season. Two whole forage subsamples of all treatments were collected at intervals of 18 days, being composited according to the seasons of year, at pre-grazing, in systems with rotational stocking and inside isolation cages in DP. After collecting these samples, they were dried in an oven at 65ºC for 72 h, ground to 1 mm in a "Willey" mill and subsequently analyzed for CP in a NIRS. The statistical model considered systems, seasons and the system*season interaction as independent effects (n = 40), and means of the variables were submitted to analysis of variance and comparison by Fisher test at 5%, using the PROC MIXED of SAS. Analysis indicated interaction ($P<0.05$). The highest CP values during the spring, autumn and winter were found in IHS (11.6%, 11.8%, and 13.2%, respectively) and the lowest in RHS (6.7%), DP (6.7%) and RMS (5.7%) in spring; in RHS (6.7%) and DP (6.0%) in autumn; and in LFS (4.3%) and DP (3.0%) in winter. While in the summer, the CP content was higher (13.1%) in LFS, and lower (6.4%) in DP. These results indicate that IHS was able to keep high levels of CP in all seasons due to irrigation, fertilization and overseeding. The rainfed systems tended to present low CP in seasons with higher water deficit. LFS showed high CP in summer, due to shading by trees. DP presented low CP during all the seasons due to its poor management. It was concluded that intensification and integration allow high CP content, depending on the level of intensification and the season of year.

Keywords: feed quality, grazing systems, crude protein.