

Silage from BMR sorghum hybrid fertilized with different nitrogen levels

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Introduction The genetic improvement of sorghum cultivars in Brazil allowed hybrids with BMR characteristic (Brown MidRib), which is characterized by brown central vein with low lignin content, resulting in a feedstuff with higher digestibility (BEAN, MARSALIS, 2012). Nitrogen fertilization plays a key role in the expression of productive potential and quality of the sorghum plants to be ensiled (OLIVEIRA, et al., 2005). It is necessary to determine appropriate levels to express the productive potential of BMR hybrids, avoiding economic losses and environmental impacts due to excessive fertilization. With the aim of evaluating the production and nutritional value of sorghum silage ADV 2499BMR fertilized with different nitrogen levels this experiment was carried out.

Material and methods The experiment was carried at the Núcleo de Pesquisa e Extensão da Cadeia Leiteira (NUPECLE) located at the Federal University of Santa Maria. Seeding were performed on January 27, with no-tillage seeding at a between-row-spacing of 50 cm and density of 140,000 ha⁻¹ plants in experimental plots of 15 m². The hybrid used was ADV 2499 BMR. Basal fertilization was performed according to the Manual of Fertilization and Liming (ROLAS, 2004) for the sorghum crop. The application of N (urea, 46% N) top-dressing, was carried out on the 35th day after sowing, following the treatments: 0, 30, 60, 120, 240 Kg ha⁻¹ of N. The ensiling process was performed on May 8, 2015, when most of the panicle grains were at the pasty to farinaceous stage. The ensiled forage was harvested, chopped average particle size of 2cm then ensiled in mini-silos with six kg of compacted forage, which were store for 60 days. The evaluation biomass productivity expressed in kg of DM ha⁻¹ was performed by cutting two plants per plot, oven dried at 55°C for 72 hours, until constant weight. For DM determination, subsamples were removed and dried in an oven at 105°C for 8 hours. At the silos opening, samples were collected and then analyzed for DM and crude protein (CP) by the Kjeldhal method, according to AOAC (1995). The evaluation of neutral detergent fiber and lignin was carried out according to VAN SOEST (1970). The experimental design was in randomized blocks, with three replications per treatment (nitrogen fertilization). Data were submitted to analysis of variance and linear and quadratic regression models were tested in the statistical program SAS, version 9.2. The graphs were generated in Microsoft Excel, (EXCEL®, 2007).

Results and discussion Nitrogen fertilization levels increased in a quadratic way the DM production of the sorghum hybrid. The equation $Y = 12953 + 17.60N - 0.0676N^2$ ($r^2 = 0.73$) represents the productivity response achieved according to the increase of the nitrogen levels, the maximum productivity (14,099 tons ha⁻¹ of DM) was reached with 130 kg ha⁻¹ of N. Crude protein levels also had quadratic behavior due to nitrogen fertilization (figure 1). However, the

NDF content in silage was linearly increased (figure 1). Similar results from ADF are represented by the equation $Y = 26.48 + 0.0095N$ ($r^2 = 0.87$). The DM content of silages decreased in a quadratic way ($Y = 26.04 - 0.022N + 0.00006N^2$; $r^2 = 0.99$). The content of lignin in the silages was not affected by fertilization, with was on average 4.59%.

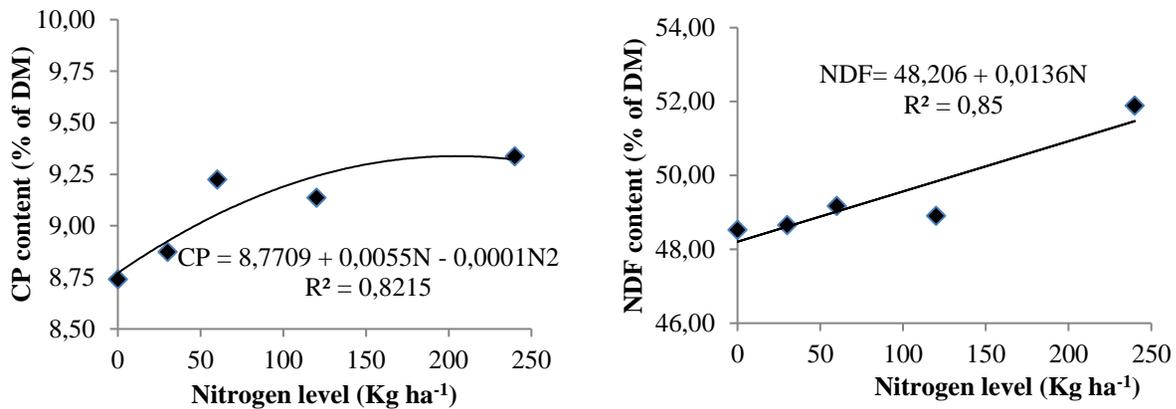


Figure 1. Crude protein (A) and neutral detergent fiber (B) contents of BMR sorghum silages submitted to different levels of nitrogen top-dressing fertilization.

The hybrids demonstrate satisfactory productivity, higher CP, and lower values NDF and ADF than those described by Magalhães et al (2010), who used normal cultivars (without the BMR gene). Nitrogen fertilization has a marked effect on increasing productivity and improving the nutritional value of sorghum silages. However, the increase in NDF fractions due to N fertilization can be correlated with the structural composition of the plant, and may impair on silage quality.

Conclusion Nitrogen top-dressing fertilization increases DM yield of ADV 2499 BMR sorghum, reaching maximum yield with a level of 130 kg ha⁻¹ of N. Due to fertilization, the bromatological quality of silage is affected, with increase of CP, NDF and ADF content in silage.