

Degradability and digestibility of different corn grain densities at two maturity stages

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Introduction The chemical characteristics of corn make it one of the most widely used forage for dairy cattle in Brazil (Pereira et al., 2004), mainly due to its high production of grains, which provide high-energy diets. In Brazil, the corn kernels are mainly of hard texture (flint), while in the United States they are mostly of soft texture (dent) (Correa et al., 2002). According to Ribas et al. (2007) vitreousness or texture of the grain of corn is associated with the physical structure of the endosperm and starch degradation in the rumen. Correa et al. (2002), found a correlation coefficient of 0.87 ($P < 0.001$) between density and vitreousness, suggesting that the density can be a useful tool to compare vitreousness of corn. The aim of this study was to evaluate the ruminal degradation and *in vitro* digestibility of corn grain with different densities, in two harvesting points, in Brazilian and American hybrids.

Materials and Methods The study was conducted at the Experimental Station of the ABC Foundation, at the city of Castro, Paraná, Brazil, harvest 2011/2012. At point of silage (average 33.5% DM of plant and 57.5% DM of grain) were evaluated 11 Brazilian corn hybrids (FórmulaTL, P30F53H, DKB330, P32R22H, DKB240PRO, P30R50H, AG8041YG, AS1572YG, SG6030YG, P1630H and CD397YG). At the point of harvest of grains (average 90.1% DM grain), in addition to the 11 Brazilian hybrids were imported grains of four American hybrids (P1184HR, Gold B, Croplan 3390VT3 and 2520VT3). The analyzes were performed with three replicates per hybrid. The density of the grain was determined in a laboratory using the pycnometer. Samples were pre-dried in a forced ventilation oven air (60 °C) for 72 hours and ground in a Wiley type knife mill, sieve 1 mm. The *in vitro* digestibility of dry matter (DIV72), was estimated by the methodology proposed by Tilley and Terry (1963), which simulates the rumen degradation (48h) and intestinal digestion (24h), totaling 72 hours. For the evaluation of ruminal degradation (DEG24), the material remained in the equipment incubated for 24 hours. Statistical analysis was performed using SAS 9.3. Data were analyzed by Pearson's correlation coefficient at 5% level of probability.

Results and Discussion The density of the kernels of Brazilian corn hybrids ranged from 1.181 to 1.309 g cm⁻³ (mean 1.226 g cm⁻³) and the American hybrids from 1.047 to 1.188 g cm⁻³ (mean 1.114 g cm⁻³). Similar results were obtained by Correa et al. (2002), with the higher density for Brazilian hybrids (1.268 g cm⁻³) and lower for American hybrids (1.201 g cm⁻³).

Both at the point of silage as at the point of harvest of grain, there was no correlation of grain density with ruminal degradability (DEG24) and *in vitro* digestibility (DIV72), as in Figures 1 and 2. These results differ from Correa et al. (2002) who found a high correlation between density of corn grain and starch ruminal degradability. According to Pereira et al. (2004), the effect of the grain texture is more remarkable when the dry matter of the grains is greater than 65%, ie, after the point of silage. In the present work, even at the point of harvest of grain was not checked further degradation or digestibility for hybrids of lower density.

Conclusions American hybrids have lower density compared to the Brazilian hybrids. There was no correlation of density with degradability and digestibility of grain both in point of silage as the point of harvest of grain.

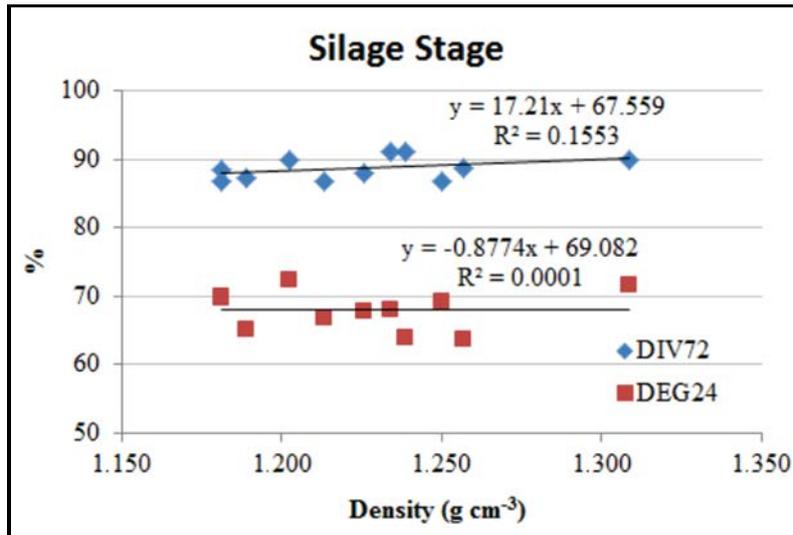


Figure 1 DIV72, DEG24 of the kernel at point of silage. DIV72: *In vitro* digestibility 72h. DEG24: Degradability 24h.

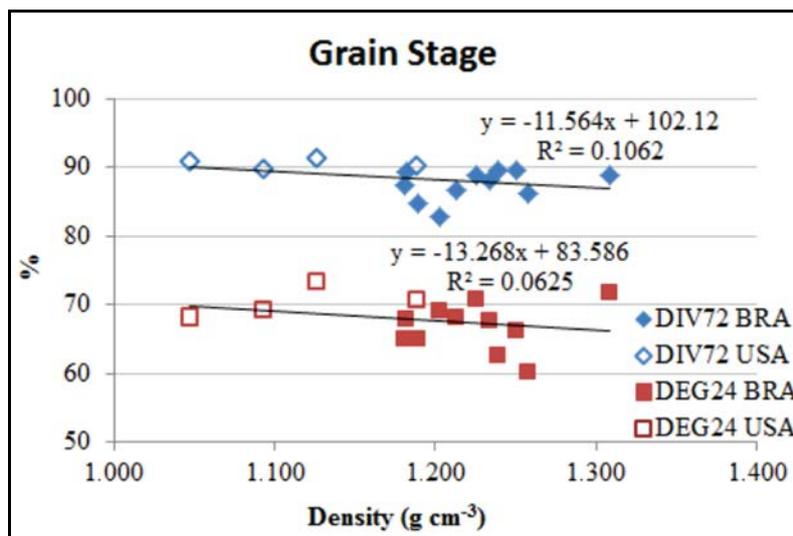


Figure 2 DIV72, DEG24 of the kernel at point of harvest. DIV72 BRA: *In vitro* digestibility Brazilian hybrids 72h. DIV72 USA: *In vitro* digestibility American hybrids 72h. DEG24 BRA: Degradability Brazilian hybrids 24h. DEG24 USA: Degradability American hybrids 24h.

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