

Soybean silage degradability – effects of harvesting stage, inoculant and varieties

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Introduction The soybean silage has more than two times the protein content than others silages species what makes it an interesting alternative to reduce the use of protein concentrate on ration and, in this way, reduce total diet costs (Pereira et al., 2009). The variety and harvesting stage of the forage and inoculant used can affect fermentation in the silo, modifying the final composition and nutrient availability of silage. Diets systems formulations for ruminants are based on knowledge of the degradability and degradation rates of protein fraction. The objective of this work was to determine the dry matter degradability and protein on soybean silage with varieties harvested in different stages of growth.

Materials and Methods The trial was carried out in Ilha Solteira, SP, Brazil (22°22'S, 51°22'W) and the treatments consisted of three factors: varieties (A7002 and conquista); harvesting stages (R6 and R7) and bacterial additives (with or without) with *Pediococcus acidilactici* and *Lactobacillus plantarum* (Kera-Sil) in base of 4g/ton forage. The forage was chopped to a particle size between 3 and 6 mm. The silos used were plastic buckets (15 kg). After 60 days storage silos were sampled, dried and ground (2 mm). Samples of 5g were placed in nylon bags (6.5x13cm) and incubated in the rumen of five steers for 0, 2, 4, 8, 16, 24, 48, 72 and 96 h. The residues were washed, dried and analyzed for dry matter (DM) and crude protein (CP). In addition, analysis for ruminal kinetics parameters (a, b, c, and effective degradability (ED)) were made. These data were used in the Orskov & McDonald (1979) models potential degradation ($PD = a + b(1 - e^{-ct})$) and $ED = a + (b \cdot c / c + k)$.

Results and Discussion It was observed effect of harvesting stage, variety and interaction between stage x variety and variety x inoculant in most of evaluated parameters (Table 1). In Table 2, the R7 stage had higher values of the fractions a, b, c and ED. There was no effect of inoculant for all measured parameters. For varieties, the A7002 had the highest value for a fraction and ED, while the fractions b and c had no difference between varieties. For CP there were detected differences in fraction b and ED, with R7 having the highest value (Table 2). There was no effect of inoculant on CP. The variety A7002 provided the greatest value in fraction a and c, and the lowest in b for CP (Table 2). For the ED of CP, the variety A7002 showed the highest value, in accordance with Bello-Pérez et al. (2008). Favorable results at R7 stage can be due to the higher proportion of grains in the more mature plant. In general the R7 stage and variety A7002 provided better results in all analyzed parameters.

Conclusion Soybeans silage harvested at R7 stage provided more effective degradability of DM and CP. The A7002 variety is more indicated to ensiling. The addition of inoculants does not seem to improve the degradability.

References

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Table 1. General mean, treatments effects and interactions, in the parameters a, b (%), c (% /h) and ED (%) of the dry matter (DM) and crude protein (CP) of the silages

Item (%)	Mean	Effects			Interactions			
		Stage	Inoculant	Variety	ExI	ExV	IxV	ExIxV
DM a	24.04	**	NS	*	NS	**	*	NS
b	37.67	**	NS	NS	NS	**	NS	NS
c	7.02	**	NS	*	NS	NS	NS	NS
ED	45.85	**	NS	**	*	**	**	NS
CP a	62.17	NS	NS	**	NS	NS	NS	NS
b	24.26	**	NS	*	NS	**	NS	NS
c	10.15	NS	NS	NS	NS	NS	NS	NS
ED	77.08	**	NS	**	NS	NS	NS	NS

NS P > 0.05; *P < 0.05; **P < 0.01.

Table 2. Degradation parameters (a, b, c and ED) of dry matter (DM) and crude protein (CP) of soybean silage due to the harvesting stage, inoculant and variety

Item (%)	Stage		Inoculant		Varieties	
	R6	R7	Without	With	A7002	Conquista
DM a	22.90b	25.10a	24.06a	24.10a	25.50a	22.60b
b	36.40b	38.94a	37.61a	37.73a	37.98a	37.37a
c	6.42b	7.63a	6.95a	7.09a	7.37a	6.67a
ED	43.30b	48.40a	45.80a	45.90a	47.90a	43.80b
CP a	62.35a	61.99a	62.89a	61.47a	66.30a	58.04b
b	20.74b	27.78a	23.01a	25.51a	22.36b	26.16a
c	8.39a	11.92a	9.16a	11.15a	10.42a	9.89a
ED	73.42b	80.74a	77.04a	77.12a	79.85a	74.31b