Evaluation of biological forage dehydration accelerator (Bacillus amyloliquefaciens H-57) on alfalfa hay

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Introduction Biological forage dehydration accelerator (*Bacillus amyloliquefaciens*) produces an action on the crop by bacteria that produce protease (subtilisin), acting on high molecular weight proteins, from an intermediate product that generates a triad forming an imidazole group. This protease action generates the rupture of cell walls, making the release of water retained in the cell faster. On stored hay, the product of these bacteria generates an action that changes the permeability of membranes of the fungi, which produce a fungicide action. In the trial we evaluated the effect of the product on the drying rate of the mowed alfalfa, the storage period and the hay quality 40 days after the large square bales (LSB) were made. LSB were made with hay, with moisture levels above the recommended moisture (between 25 and 28% moisture) for alfalfa hay.

Materials and Methods We designed, on alfalfa pasture, 6 plots of 5 hectares (ha) each, distributed in a completely randomized design, 3 plots without additives (control) and 3 plots with additives. Additive treatment consisted of the application of 20 g/tonne (as feed) of HenoSilo ® (*Bacillus amyloliquefaciens* H-57) before mowing. Each plot was sampled every 4 hours during the day (from 0800 to 2000 h) to determine the rate of dehydration until the moisture level was approximately 25%.

When moisture reached 25 to 28%, we prepared four LSB of approximately 500 kg for each treatment, these LSB the temperature was monitored over the 40 days of storage, at this moment temperature was stabilized. At the end of the stabilization period (40 days after the making), samples were taken from each LSB for laboratory analysis by wet chemistry. All laboratory variables obtained were considered as dependents, taking control and additive treatment as classification variables, considering the dry matter (%DM) as covariate. Statistics were carried out in Infostat 2011 using ANOVA considering of time effects, using time-sequence analysis.

Results and discussion The results obtained by field determinations showed that additive treatment resulted in faster rate of dehydration, reaching the moisture (25%) to make the LSB 24 hours before the control treatment. In this trial we observed the major difference in the rate of dehydration until 10 hours from mowing (HFM). Average final values demonstrate that additive treatment, achieves a higher rate until 77 HFM dehydration, 6.5% higher.

The temperature dynamics showed significant differences between treatment at 124, 171.5 and 290.5 hours made. The highest temperature value for the control was found at 290.5 hours, being 84.57°C, for additive treatment, the highest temperature reached at 264 hours being 54.9 °C.

There are significant differences ($p<0.05$) between treatments in variables such as, Acid detergent fiber (ADF) and Acid detergent insoluble nitrogen (ADIN). This shows that the quality could be suitably maintained in hay made with higher moisture content to the optimum,

considering that the ADF for additive treatment is 55.8% lower than the control. ADIN, was 3.16 times higher in the control, maintains consistency with the results of the dynamic temperature of the bales. Crude Protein (%), Ash (%) and Neutral Detergent Fiber (NDF%), does not pose significant differences between treatments.

Table 1 Dehydration rate % Moisture / Hour

	Treatments		
HFM	Control	Additive	p-values
6	0.77	1.54	.0480
10	0.75	1.24	.0297
52	0.97	1.01	.5034
77	0.76	0.81	.0270

Table 2 Quality LSB by treatment 40 days after making.

	Treatment		
Item	Control	Additive	p-values
CP%	26.73	26.39	.9452
NDF%	48.42	42.93	.0641
ADF%	37.41	24.01	.0316
ADIN %	2.37	0.75	.0483
Ash %	11.47	11.13	.7217

Conclusions We observed a higher rate of dehydration in pasture with additive treatment, with the greatest difference at 6 hours mowed. The LSB under additive treatment reached maximum values of temperature increase 54% lower than the control. Also, in the treated LSB the final quality was better than the control, this shows the ADF % (-13.4 percentage points) and the ADIN % (-1.62 percentage points).

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