Bromatological composition of *Crotalaria ochroleuca* **hay with two drying methods of management (turning and no turning) and three storage times**

L. R. Silva[1], C. D. Nath[1], L. C. Santos[1], A. Ventura[1], M. A. Neres[1].
[1]State University of Western Paraná, Marechal Cândido Rondon, Paraná, 85960-000, Brazil, Email: veterinarialurdes@gmail.com

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Introduction: The use of roughage supplementation in the form of hay in the critical periods of pasture production, or even throughout the year, is a viable alternative, not only for greater availability of more affordable implements but also for better weather reliability (Neres and Ames 2015). Nonetheless, forage legumes still have limitations in drying management. The process of turning the legume during field drying may cause leaf fall, which settles on the soil surface and no longer composes the baled material. Hence, losses in the nutritional value of hay are observed the higher is the proportion of stalks in the baled and stored material. *Crotalaria ochroleuca* (Marejea) is an annual legume, with upright shrub growth that has a production potential ranging from 7 to 17 tons per hectare (t/ha^{-1}) of dry matter (Amabile et al., 2000). The big, green mass that is produced by crotalaria is currently being tested for silage production, though its potential for hay production has yet to be evaluated. To this end, a study was conducted to evaluate two drying methods and three storage times on the bromatological composition of *Crotalaria ochroleuca* hay.

Materials and Methods: The experiment was conducted in the experimental area of the Professor Antonio Carlos dos Santos Pessoa Farm, at the Guará line, belonging to the Center for Agricultural Sciences, State University of Western Paraná, whose campus is located in the municipality of Marechal Cândido Rondon - PR. *Crotalaria ochroleuca* was planted in rows, with a spacing of 0.50 m, and 10 kg ha-1 of seeds in a standard planting area. Randomized blocks were employed as the experimental design, with plots subdivided in time and using two drying methods: turning and no turning allocated to the main plots, three storage times (0, 30, and 60 days) composing the subplots, and four repetitions. At the time of cutting, the crotalaria presented 82 days of vegetative growth and production of 16,566.68 Kg MS ha^{-1}. After the crotalaria cut (February), the plants remained in the field for three days. Turning management was performed on the second day at 14:00. After reaching the ideal dry matter for storage, the dehydrated material was collected and stored on pallets in a covered and ventilated barn. In total, 24 bales were stored, with the removal of 8 bales every 30 days for evaluation. Bromatological analyses were performed at the animal nutrition laboratory of the University, where dry matter (DM), crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), lignin, and cellulose content were evaluated. The results were submitted to statistical analysis using the SAEG Variance Analysis System version 9.1, and, for the comparison of means, the Tukey test at 5% significance level.

Results and Discussion: There was no interaction between drying management and storage times (Table 1). Concerning the turning methods, no effects were observed, pointing that crotalaria can be managed with a turning, without loss in its bromatological composition. Turning is an important drying management, as it accelerates dehydration time, and, thus, anticipates storage and avoids exposure to dew and precipitation (Castagnara et al., 2012). Neres et al. (2010), evaluating the number of turns in sun-dried alfalfa hay, found a decrease in CP content from 238.9 g kg-1 to 196.2 g kg-1 with no turning and with two turns, respectively. Regarding storage times (Table 1), there

were changes in DM variables of CP. The DM content was higher than in 30 and 60-day storage. These larger values may be due to reduced air relative humidity in storage conditions because the hay is hygroscopic. The levels of CP, NDF, ADF, lignin, and cellulose (Table 1) did not differ between hay-drying management systems. The CP content was higher than in 60-day storage compared to 30-day storage. Several authors, have observed the increase in CP content with the hay storage time, which may result from microbial activity in the hay or may be explained due to the low oxidation of the total soluble carbohydrates contained in the hay during the storage process (Taffarel et al., 2014). The CP content was high, averaging 191.09 g. The ADF and lignin content was high (622.97 and 195.72 g kg-1, respectively) due to the stem component of crotalaria.

Table 1. Bromatological composition of *Crotalaria ochroleuca* hay submitted to two drying methods of management (turning and no turning) and three storage times

	Turning		Time (days)			Average	SEM	P-value [§]		
	Yes	No	0	30	60			V	T	V*T
DM[1]	873.81a	865.76a	846.62b	888.96a	873.77a	869.78	4.7349	0.2100	0.0003	0.2757
CP[2]	191.82a	190.37a	190.38ab	181.35b	201.55a	191.09	2.7752	0.7683	0.0302	0.6470
NDF[2]	748.05a	745.00a	736.13a	746.07a	757.38a	746.53	4.4375	0.7687	0.0904	0.0665
ADF[2]	626.15a	619.79a	611.03a	645.82a	612.04a	622.97	6.8624	0.6940	0.1411	0.5550
LIG[2]	188.42a	203.02a	211.10a	191.36a	184.70a	195.72	5.7031	0.2037	0.0884	0.2685
CEL[2]	394.61a	389.67a	377.57a	397.25a	401.58a	392.13	5.0233	0.6974	0.1603	0.6870

[1]g kg^{-1}; [2]g kg^{-1} DM. [§]V – Turning effect; T – Effect of storage time; V*T – Effect of interaction between turning and storage times. MS - Dry Matter; CP - Crude Protein; NDF - Neutral detergent fiber; ADF - Acid detergent fiber; LIG - Lignin; CEL - Cellulose. SEM= standard error of the mean. Means followed by lowercase letters in the row differ from each other according to the Tukey test ($P \leq 0.05$).

Conclusions: The *Crotalaria ochroleuca* hay production can be carried out with one turning. The storage of *Crotalaria ochroleuca* hay for up to 60 days, in a covered and ventilated shed, retains the bromatological composition, except for protein, which rises with storage time.

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