Chemical composition of corn silages relocated after different aerobic exposure times

M.S. Souza[1]; R.I.R. Santos[1]; R.C.A. Mendonça[1]; M.V.S.B. Cardoso[2]; A.C.M. Queiroz[1]; W.M. Santos[1]; F.B. Freitas[3], C. Faturi[1], A.C. Rêgo[1]
[1]Federal Rural University of Amazon, Belém, Pará, Brazil. E-mail: melany_souza@hotmail.com; [2]Federal University of Lavras, Lavras/MG; [3]Animal Scientist, Paragominas/PA

Keywords dry matter, recompaction, oxygen

Introduction The use of relocated silages has increased due to the lack of planning regarding the availability of forage in the properties during the dry period. Silage relocation consists of unload, transportation, recompaction and sealing in a new silo, in which silage is inevitably subjected to the action of oxygen. In addition, it is possible to modify the chemical composition of the redoxed silages (Pahlow et al., 2003). The objective of this study was to determine the effect of different air exposure times on the reallocation of corn silages on the chemical composition of these silages.

Materials and methods The corn crop was cultivated on a farm located at 03° 02' 2"South latitude and 47° 20' 18" West longitude. The Pioneer 30F90H corn was harvested with a dry matter of 32.5%. The silages were made in mini experimental silos (plastic buckets with capacity of 15 liters), where 9 kg of forage mass was placed in order to reach a density of 600 kg/m³. After 30 days of ensiling the mini silos were unloading, a sample was taken to determine the chemical composition (Table 1). Subsequently, the silages were exposed to air in the form of piles. (0; 3; 6; 12; 18; 24; 30; 36; 48; 60 hours) plus the control, which were not exposed with 3 (three) repetitions. After exposure, the silages were relocated in the same mini-silos of origin and kept stored for another 30 days until the second opening. Samples were collected at the two openings for further processing and chemical analysis of the silages. Data were submitted to analysis of variance and the averages were compared by means of the Tukey test at the 5% probability level.

Table 1 Chemical composition of corn silage before the relocation

ETA (h)	Dry matter	Ash	Organic matter	Ether extract	Crude protein
0	31.0	3.7	96.3	2.15	6.9
3	30.5	4.0	96.0	2.94	7.1
6	31.5	3.8	96.1	2.53	7.1
12	32.0	3.9	96.1	2.94	7.1
18	31.5	3.9	96.1	2.59	6.8
24	31.4	3.7	96.2	3.12	7.3
30	29.5	3.9	96.1	2.87	7.0
36	30.7	3.9	96.1	3.23	7.1
48	30.9	4.1	95.9	3.41	7.0
60	32.1	4.0	96.0	3.20	7.0
Média	31.1	3.9	96.1	2.90	7.0

ETA: Exposure time to air.

Results and discussion A difference (*P*<0.05) was observed in all evaluated variables (Table 2) except for the crude protein values of the silages. The silages relocated after 60 hours of aerobic exposure presented higher levels (*P*<0.05) of dry matter in relation to the non-relocated silages. Chen and Weinberg (2014) also observed substantial increases in dry matter values, ranging from 35.5% for silages not exposed to 38.9% for silages exposed for 48h, which reported that exposure of the silages to air results in dehydration of the mass and thus reduces the moisture of the silages. The organic matter content was higher (*P*<0.05) in the silages exposed to air for 30 and 36 hours in relation to the silages exposed for 60 hours. Probably, the silages exposed for 60 hours had higher losses of nutrients due to deterioration, thus reducing the content of organic matter and increasing the ash content. The contents of ether extract and crude protein of the silages changed little with the exposure to the air.

Table 2 Chemical composition of corn silages relocated at different exposure times

ETA (h)	Dry matter	Ash	Organic matter	Ether extract	Crude protein
Control	31.2^{b}	4.0^{ab}	96.0^{ab}	3.74^{ab}	7.4
0	32.2^{ab}	3.9^{ab}	96.1^{ab}	3.51^{ab}	7.2
3	31.5^{ab}	3.9^{ab}	96.1^{ab}	3.72^{ab}	7.4
6	31.6^{ab}	3.8^{ab}	96.2^{ab}	3.67^{ab}	7.0
12	33.3^{ab}	4.0^{ab}	96.0^{ab}	3.40^{ab}	7.1
18	33.7^{ab}	3.9^{ab}	96.1^{ab}	4.33^{a}	7.3
24	33.3^{ab}	4.0^{ab}	96.0^{ab}	4.19^{ab}	7.2
30	34.1^{ab}	3.5^{b}	96.5^{a}	3.10^{ab}	6.9
36	32.4^{ab}	3.6^{b}	96.4^{a}	2.89^{ab}	7.4
48	33.2^{ab}	3.8^{ab}	96.1^{ab}	2.62^{b}	7.0
60	35.3^{a}	4.3^{a}	95.7^{b}	2.82^{ab}	7.5

ETA: Exposure time to air; Means followed by different lowercase letters differ by the Tukey test (*P<0.05*).

Conclusion Exposure to air in the relocation modifies the chemical composition of corn silages.

References

Chen Y, Weinberg ZG. 2014. The effect of relocation of whole-crop wheat and corn silages on their quality. J. Dairy Sci. 97: 406-410. http://dx.doi.org/10.3168/jds.2013-7098

Pahlow, G., R.E. Muck, F. Driehuis, S.J.W.H. Oude Elferink, and S.F. Spoelstra. 2003. Microbiology of ensiling. Pages 31-93 in Silage Science and Technology. D. R. Buxton, R. E. Muck, and J. H. Harrison, eds. American Society of Agronomy, Madison, WI.