Aerobic stability of elephantgrass silage with different proportions of cotton processing residue

A. P. Andrade[1], D. G. Quadros[2], D. S. Soares[2], R. B. Cardoso[2], O. Fernandes Júnior[2], A. M. Sá[2]
[1] State University of *Southwest of Bahia, Department of Animal Science, Itapetinga, Bahia, Brazil, [2] Bahia State University, Animal Science Research Center, Barreiras, Bahia, Brazil*
Email: uneb_neppa@yahoo.com.br,

Introduction At the silo opening, the anaerobic environment, one with the responsibility of forage conservation, became aerobic. In this event, microorganisms, dormant in the oxygen absence grow faster, promoting intense metabolic activity, emitting heat and consuming nutrients, increasing losses of dry matter (DM) and decreasing the nutritive value of forage (Siqueira et al., 2005). Losses after opening depend on silo management, however the extension of deterioration of forage is linked to the aerobic stability of silage (Nussio et al., 2002). Bahia is the second largest producer of cotton in Brazil, resulting in the availability of huge amount of residue. The objective of this work was to evaluate the aerobic stability of elephantgrass silage with different proportions of cotton processing residue.

Materials and Methods The experiment was conducted at the Bahia State University, Barreiras, BA, Brazil (12° 09' 10" S 44° 59' 24" W). Elephantgrass with 60 days of regrowth, with 20 % of DM, was cut in average particle sizes of 3 mm, and then it was stored exclusively or with 5, 10, 15, and 20% of cotton processing residue (fresh basis). There were 25 plastic buckets used as experimental silos sized of 0.02 m^3 containing 4 kg of sand at the bottom, 4 of them for each treatment following a completely random design. The grass and the residue were mixed according to the treatment and compacted using feet, reaching the density of 340 kg/m^3. After 50 days the silos were opened and a sample of 500g was placed in a polypropylene box. Temperatures were measured using a digital thermometer at different times post-opening (0, 3^{rd}, 15^{th}, 24^{th}, 48^{th}, 72^{th}, 96^{th}, 120^{th} hour). The pH was determined by the Silva and Queiroz (2002) methodology at 0, 48^{th}, and 96^{th} hour post-opening. Data was analyzed by orthogonal polynomials.

Results and discussion The aerobic stability was affected by increasing cotton residue. The exclusive elephantgrass silage increased the temperature linearly through the time reaching 93.2 ^{o}F, almost the same with 5 % cotton residue (Figure 1). On the other hand, storing elephantgrass with 10, 15, and 20 % of residue resulted in better stability post-opening. The results obtained in this work agree with the Andrade et al. (2010), when adding 5 and 10 % of soybean hulls to elephantgrass silage. The break of stability occurred just in the treatment control, at the 96^{th} post-opening. The low levels of temperature at the 16^{th} hour post-opening in all silages (Figure 1) probably in relation to lower environment temperatures during the first night. The pH of exclusive elephantgrass silage and with 5 % cotton residue began with lower pH until the 48^{th} hour post-opening, however after that they had a great increase, proportionally higher when compared to 10, 15, and 20 % residue, which showed more stability through the same time post-opening (Figure 1). As a consequence of undesirable microorganisms growth, it had soluble carbohydrates utilization, nitrogen compounds, and vitamins of silages, resulting in the decreasing of the nutritive value (Siqueira et al., 2005).

Conclusion The inclusion of 10, 15 and 20 % cotton residue increased aerobic stability of elephantgrass silage.

References

Andrade, A. P., D. G. Quadros, P. H. S. Silva, J. A. M. Araújo, J. A. R. Almeida and L. I. J Santos. 2010. Estabilidade aeróbia da silagem de capim elefante com diferentes proporções de casquinha de soja de fubá de milho. Cd-Rom of Proc. Reunião Soc. Bras. Zootec., SBZ, Salvador, BA.

Nussio, L. G., S. F. Paziani and C. M. B. Nussio. 2002. Ensilagem de capins tropicais. Pages 60-99 in Proc. Reunião Soc. Bras. Zootec., SBZ, Recife, PE.

Silva, D. J. and A. C. Queiroz. 2002. Análise de Alimentos: métodos químicos e biológicos. 3th ed. UFV, Viçosa, MG.

Siqueira, G. R., T. F. Bernardes and R. A. Reis. 2005. Instabilidade aeróbia de silagens: efeitos e possibilidades de prevenção. Pages 25-60 in Proc. Simp. Volum. Prod. Rumin., 2nd. UNESP, Jaboticabal, SP.

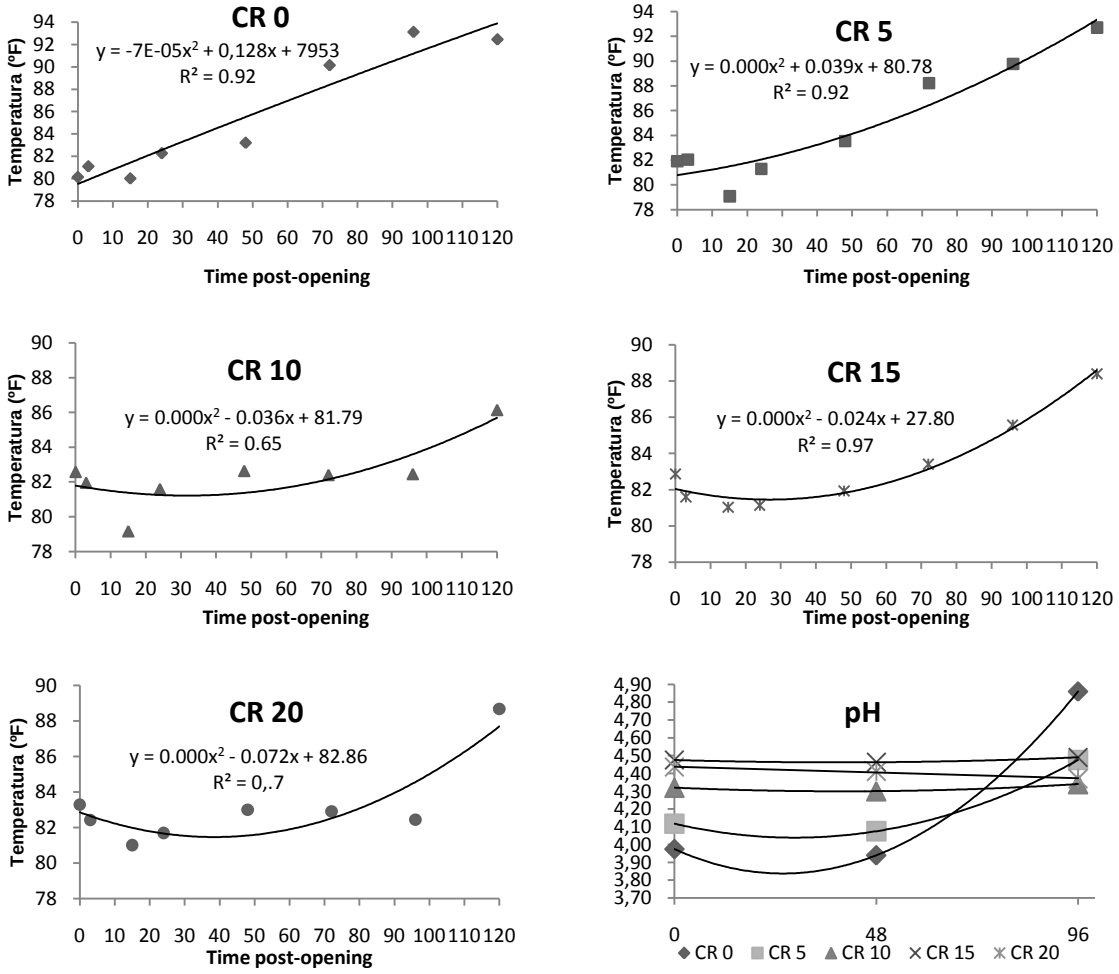

Figure 1. Aerobic stability of elephantgrass silage with different proportion (0. 5. 10. 15. and 20 %) of cotton residue (CR).