Relation between losses and corn silage technologies

I.Q. Carvalho[1], A.V.I. Bueno[2], C.C. Jobim[3], J.P. Oliveira[4]

[1]*Fundação ABC, Castro, Paraná 84165-700, Brazil, Email: igor@fundacaoabc.org*
[2]*State University of Maringá, Maringá, Paraná 87020-900, Brazil, Email: antonio.iank.bueno@gmail.com*
[3]*State University of Maringá, Maringá, Paraná 87020-900, Brazil, Email: ccjobim@uem.br*
[4]*State University of Maringá, Maringá, Paraná 87020-900, Brazil, Email: janaina.prieto@hotmail.com*

Introduction Corn cultivation for silage is one of the most productive in terms of digestible energy per area due to its high mass production and nutritional quality. A frequent concern of producers and technicians are the losses in quantity and quality during the usage of the silage. The losses, in turn, depend on the decisions made towards management and practices before, during and after ensiling. This study was carried out with the aim of identifying the main factors related to the ensiling process that affect physical losses in corn silages.

Materials and Methods From March to July 2011, 95 properties from eight cities in the region of Campos Gerais, Paraná were visited and 108 silos used in animal feeding were evaluated. During the visits, the following data were collected: the kind of silo (trench or surface), the color of the tarp used to cover the silo (black, white, black and white, black and gray), the tarp cover (dirt, no cover, others) and the form of removing the silage (manually with fork, tractor with scoop, silage extractor with milling cutter, silage block cutter).
Regarding the silage, information related to the harvesting (own or outsourced), forage type (self-propelled or by tractor) were collected.
The evaluations concerning the silages were: presence of effluents, deteriorated layer below the tarp and silage disposal. The assessments on the silage mass losses were made visually, with four reference points (absent, low, medium, high). The specific mass (EM) of the silage was determined according to the methodology proposed by D'Amours and Savoie (2005).

Results and Discussion The losses were most frequent on the silage disposal (97%), followed by the deteriorated layer (33%) and effluent (27%). Silage disposal was affected by the type of machine used in the harvest (Table 1). The deteriorated layer beneath the tarp was affected by the type of silo, tarp cover and form of removing the silage (Table 2). On the other hand effluent losses were not affected by the ensiling technology.

Table 1 Losses by silage disposal depending on the type of machine used in harvesting.

Variable	Absent	Low	Medium	High
		% Silos		
		Type of Machine		
Self-propelled	3.4	33.9	42.4	20.3
By Tractor	2.0	55.1	38.8	4.1

Considering silage disposal, the self-propelled harvesting had high losses, five times higher than by tractor. This might have occurred because self-propelled machines produce large volume of mass collected per hour, exceeding the capacity of compression, favoring deterioration

caused by microorganisms in some parts of the silo, increasing losses by disposal, as noted by D'amous and Savoie (2005).

Table 2 Losses through deteriorated layer below the tarp depending on the type of silo, tarp cover and silage removal.

Variable	Absent	Low	Medium	High
		% Silos		
		Type of Silo		
Trench	70.37	18.52	9.88	1.23
Surface	55.56	18.52	11.11	14.81
		Tarp Covers		
Dirt	71.74	16.3	9.78	2.17
Others	12.5	50	25	12.5
No Cover	62.5	12.5	0	25
		Silage Removal		
Block	0	100	0	0
Silage extractor	60	26.67	13.33	0
Fork	70.15	19.4	7.46	2.99
Scoop	66.67	4.17	16.67	12.5

The trench type silos were 14 times lower in losses through deteriorated layer classified as "high" in relation to surface silos. The highest losses in the surface silos are connected to the lower specific mass compared to the trench silos (Bolsen et al. 2,012) which in this study were of 659 to 695 kg/m^3, respectively. The tarp cover with dirt reduced the occurrence of such losses. The results obtained in this study corroborate with Amaral et al. (2012), who observed lower losses when using dirt or sugarcane bagasse on the top of the tarp. The removal of the silage with the tractor scoop increased frequency of silos with high losses through the deteriorated layer. The irregular revolving of the silage in the panel of the silo caused by the scoop allows oxygen to penetrate deep into the silage, facilitating deterioration (Holmes, 2009).

Conclusion There were physical losses of silage in all silos evaluated, more frequently to silage disposal, followed by deteriorated layer and effluent. Silage collected with self-propelled machines had higher rate of losses through silage disposal. Surface silos without tarp cover with silage removed with a scoop showed higher incidences of losses through deteriorated layer.

References

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