Evaluation of the physical and nutritional quality of whole plant corn silages in the Southeast of Salta province, Argentina

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Introduction Most of the cattle farms in northwestern Argentina are changing towards intensive production systems. In this way, the dietary inclusion of whole plant corn silage (WCS) is an essential tool to achieve this goal. When silage gets an adequate compaction, promotes lactic fermentation and fast stabilization of the silage and the nutritional quality of the crop lasts in time (Bragachini et al., 2008). The smallest particle size favors compression and provides a larger surface area for contact with microorganisms (Silva et al., 2013). This study was carried out with the purpose of evaluating the effect of different densities and particle sizes in the quality of drive over pile corn silages in the southeast of Salta province, Argentina.

Materials and methods Throughout the year 2015, 21 WCS were collected samples from different drive over pile silos (DOPS) in cattle farms selected at random. All of them were considered for both, quality and particle size determinations. Density was determined using the methodology proposed by (Muck and Holmes, 2000). The particle size distribution was determined by Penn State Particle Separator (PSPS) system according methodology proposed by (Heinrichs, 2013). The chemical composition parameters were the following: dry matter (DM, conventional dry oven at 60°C for 72 hours), crude protein (CP, by Kjeldahl method) according to (Thiex et al., 2002), neutral detergent fiber (NDF) and acid detergent fiber (ADF) by ANKOM method according to (Mertens and Fahey, 1994), in vitro dry matter digestibility (IVDMD) estimated through the production of gas according to (Theodorou et al., 1994), and silage pH (acidity, peachmeter PCE-PH22). Data were analyzed using Infostat software (Di Rienzo et al., 2001).

Results and discussion Dry matter density value are shown in table 1, with means values below the optimal of 165 kg/m^3 proposed by (Bragachini et al., 2008). Table 1 shows highs percentages of particles in the upper and intermediate sieve, which means an average particle size greater than the optimum (Heinrichs, 2013) . This decreases the density achieved along the silage making process. These high values of long fiber are not required by livestock (Gallardo, 2013). The nutritional quality values are shown in table 2, indicate a dry matter content near to the optimum (Bragachini et al., 2008), and an average pH value that shows a right fermentative process. The average CP value shows a silage making progress around the optimal phenological stage.

Table 1 Particle size distribution of drive-over pile silages sampled in 21 livestock farms in the southeast of Salta, Argentina (n= 21)

Particle size and density	Mean	Minimum	Maximum	SD
DM density, kg/m^3	118.27	29.90	248.77	40.81
Upper , %	17.19	3.46	46.04	11.31
Middle , %	69.21	45.18	82.69	10.26
Lower , %	10.59	7.80	16.55	2.03
Bottom , %	3.00	0.78	5.14	1.37

Table 2 Nutritional quality of 21 drive-over pile silages sampled in 21 livestock farms in the southeast of Salta, Argentina (n= 21)

Corn silage	Mean	Minimum	Maximum	SD
DM	33,83	27,5	42,3	4,99
pH	3,60	3,3	3,9	0,14
CP (%)	6,5	4,3	8,1	0,96
NDF (%)	50,63	41,4	58,4	5,17
ADF (%)	26,38	20,8	36,5	4,22
IVDMD (%)	68,4	60,5	72,7	3,29

Conclusions Based on this survey, the dry matter density value and the particle size distribution achieved during the drive over pile silage making process, must be improve. However, nutritional quality values are within the range established as normal for this type of forage.

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