Influence of grass species and sample preparation on ensiling characteristics

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Introduction Laboratory silos are considered a practical method of comparing a number of treatments (O'Kiely, 1993). Cherney et al. (2004) reported that vacuum-sealed polyethylene bags effectively ensiled corn silage samples in the laboratory. Grasses, with their inherently higher buffering capacities and lower sugar levels, generally are more difficult to ensile. Objectives were to evaluate the influence of species and chopping (whole vs. shredded) on pH and volatile fatty acid profile of grasses ensiled in vacuum-sealed polyethylene bags and to assess the suitability of this method as a laboratory ensiling method.

Materials and methods Four replicates of three grass species, orchardgrass (*Dactylis glomerata*, L.), reed canarygrass (*Phalaris arundinacea* L.) and tall fescue (*Festuca arundinaceae* Schreb), first- and second cutting, were ensiled whole or shredded with a chipper-shredder. Forages (500g) were ensiled in polyethylene bags as previously described (Cherney et al., 2004). Lactic acid, acetic acid, propionic, butyric acid were determined on forages at 0, 2, 4, 8, 16, 24, and 30 d post ensiling.

Results There was little or no butyric or propionic acids in the silages, indicating that the silages did not undergo clostridial fermentation. Lactic acid and acetic acids, accounting for most of the total acids, varied by species and harvest date (Table 1). Ensiled forages dropped rapidly in pH and were relatively stable beyond 4 days (Figure 1). Kung and Shaver (2001) indicated that grass silages typically range in pH from 4.3 to 4.7. There were species differences, with orchardgrass pH tending to be lower than reed canarygrass. Shredded orchardgrass and reed canarygrass silages had lower pH than whole silages. Despite species and processing differences, pH of silages tended to be within the typical range, suggesting that vacuum-sealed polyethylene bags are an acceptable method of laboratory ensiling.

Table 1 Mean silage lactic acid (% of total acids), acetic acid (% of total acids), and latic:acetic acid as influenced by forage species and harvest (average of forages ensiled >8 days).

VFA	Lactic	Acetic	Lactic:Acetic
OG1[1]	58.3[b2]	37.3[b]	1.53[ab]
OG2	51.2[c]	45.6[a]	1.21[a]
RC1	70.0[a]	25.8[c]	2.61[c]
RC2	56.9[b]	38.4[b]	1.56[b]
TF1	57.7[bc]	37.0[b]	1.52[ab]
TF2	61.3[b]	34.0[b]	1.79[b]

[1]OG=orchardgrass, RC=reed canarygrass, TF=tall fescue, 1= first harvest, 2 = second harvest.
[2]Means within a column with different superscripts differ ($P < 0.05$).

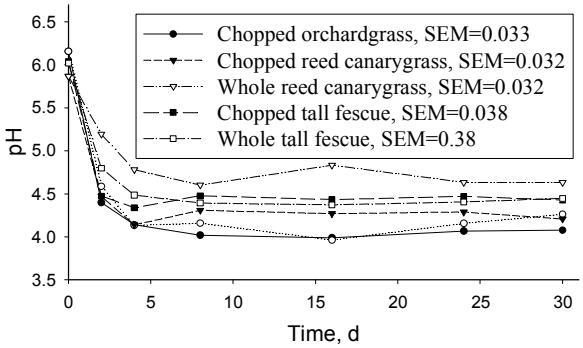

Figure 1 Effect of species and chopping on pH (SEM=standard error of the mean).

Conclusions Despite inherent problems in all small scale silo systems, laboratory silos are an accurate and reliable experimentation unit. Fermentation characteristics suggested that all samples in this study were well ensiled within 8 days of ensiling. We conclude that it is possible to use vacuum-sealed plastic bags to ensile temperate grasses to assess treatment differences.

References

Cherney, D.J.R., J.H. Cherney & W.J. Cox (2004) Fermentation characteristics of corn forage ensiled in mini-silos. *Journal of Dairy Science* (In press).

Kung, L. and R. Shaver (2001) Interpretation and use of silage fermentation analysis reports. *Focus on Forage* 3(13):1-5.

O'Kiely, P. (1993) Influence of a partially neutralised blend of aliphatic organic acids on fermentation, effluent production and aerobic stability of autumn grass silage. *Irish Journal of Agricultural and Food Research* 32:13-26.