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Chemical composition and *in situ* dry matter degradation of various organic acid treated whole crop barley silage

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The aim of this study was to evaluate the effect of formic acid or acetic acid on chemical composition and *in situ* dry matter (DM) degradation of whole crop barley silage. The forage (35% DM) was ensiled as untreated (UT) or treated with formic acid (3.4 or 6.8 ml/kg DM; F3 or F6, respectively) or acetic acid (3 or 4 ml/kg DM; A3 or A4, respectively) for 30 days (n=4). Silage extract pH was determined using pH meter (Metrohm 691, Swiss). NH3-N concentration was determined in acidified silage extract (5 ml of the extract + 5 ml of 0.2 N HCl) using distillation method. Crud protein was determined using Kjeldahl method (Kjeltec 2300, Foss Tecator. Sweden). Neutral detergent fiber (NDF) was expressed as the ash free residue after extraction with boiling neutral solutions of sodium lauryl sulfate and EDTA. Four sheep (44±5 kg body weight) fitted with rumen fistulae were used. Bags (10 × 12 cm) were made of polyester cloth with a pore size of 52 µm. About 5 g DM of each sample was placed in each bag, then incubated (n=4) for each time (2, 4, 8, 16, 24, 48, 72 and 96 h). For zero time, bags were washed using cold tap water. The equation of $P=a+b(1-e^{-ct})$ was applied to determine degradation coefficients (a= quickly degradable fraction, b= slowly degradable fraction, c = fractional degradation rate constant). Both additives did not have any significant effect on crude protein content of the silages. These additives caused a significant ($P<0.05$) decrease in pH (UT= 4.07, F3= 3.95, F6= 3.57, A3= 3.96 and A4= 3.83; SEM= 0.037) and increase in NDF content (UT= 553, F3= 585, F6= 640, A3= 650 and A4= 607 g/kg DM; SEM= 9.174). NH3-N concentration (mg/dl) was significantly decreased when formic acid was applied (UT= 9.10, F6= 8.29; SEM= 0.29). Slowly degradation fraction of DM of F6 (0.49±0.03) and A4 (0.51±0.02) was significantly increased compared with UT (0.46±0.03).

Variation in polyphenolic compounds in forages: amount and composition

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Polyphenolic compounds are present in significant amounts in forages and have a potential beneficial effect on human health after their transfer in milk. Little is known on the sources of variability of these compounds in cow's milk but the nature of the forage in the diet is highly probable. To assess this variability, the polyphenolic composition was determined in 8 permanent pastures (Arrhenatheretea and Festuco-Brometea classes), in 4 temporary pastures poorly diversified, both harvested in June 2007 in the same area, and in 4 maize silages. The comparison of chromatographic profiles obtained using liquid chromatography paired with photodiode-array (l= 275nm) did not underline any statistical difference in the number of peaks having a typical phenolic compound spectrum (43±3.6) or in the sum of peak areas. However, peak pattern was very different between forages ($P<0.001$; Wilks' test) and can be related to their botanical composition. All forages taken together, a total of 107 peaks were separated among which some of them were identified. Sixteen peaks were common (such as p-coumaric acid, homorientin, apigenin) to the 3 different types of forage, 30 (such as ferulic acid) were specific of maize silage and 61 (including 3 isomers of chlorogenic acid, chicoric and rosmarinic acids, verbascoside, daidzein, genistein, biochanin A, formononetin, hesperidin, luteolin-7-o glucoside, schaftoside, rutoside and quercetin-3-glucuronide) were specific of permanent or temporary pastures, respectively. Among the 16 common peaks, 5 had a significantly ($P<0.05$) higher content in maize silage than in permanent pastures. In conclusion, even though the peak number and sum of areas were not different, the polyphenolic composition strongly and significantly varied between forages. These differences have to be confirmed now in the corresponding milks.