

The objective of this study was to evaluate the in situ NDF digestibility of corn stover treated at ambient temperature with a solution of sodium hydroxide and ethanol co-solvent. The treatment process is patented by Cellulose Sciences International (CSI) of Madison, WI. Digestion kinetics were evaluated in situ for untreated corn stover, corn stover treated with CaOH at 70 g kg⁻¹, corn stover treated by the CSI process and untreated soyhulls. All materials were ground through a 2 mm screen in a Wiley mill and 0.5 g was sealed into Ankom F57 bags. Bags were placed in the rumens of 2 fistulated cows for 0h, 12h, 24h, 30h, 36h, 42h, 48h, 96h, 120h, and 240 h in reverse order. Bags were then washed, dried and contents analyzed for residual NDF. The 240h time point was used as the estimate of indigestible NDF (iNDF). The rate of digestion of potentially digestible NDF (pdNDF) was determined from the slope of the natural log of the pdNDF residue verses time. The fraction of iNDF and the rate of pdNDF degradation between forages were compared by ANOVA (PROC Mixed, SAS, v 9.3) as a randomized design with cows as replicates. Least square treatment means were compared by PDIF. The digestion rate of pdNDF (kd,) of CSI-treated corn stover (5.36%/h) was higher than CaOH-treated stover (2.27%/h, $P < 0.01$), and untreated corn stover (1.76%/h, $P < 0.001$). The kd of soyhulls (4.93%/h) was similar CSI-treated stover ($P = 0.56$). The iNDF proportions in CSI-treated stover and soyhulls, were similar (2.8 and 3.6% of NDF, respectively, $P = 0.26$). The CSI-treated stover had lower iNDF than CaOH-treated stover or untreated stover (2.8, 27.3 and 35.1% of NDF, respectively, $P < 0.0001$). Results indicate that the CSI-treatment process improved rate and extent of digestion of corn stover to a greater degree than the CaOH treatment process. The CSI treatment process appears to convert corn stover into a source of highly digestible fiber with digestion characteristics similar to soyhulls.

Key Words: in situ, NDF, NaOH

W174 Effects of different source additive and wilt condition on the pH value, aerobic stability, and carbohydrate and protein fractions of alfalfa silage. Lian Tao¹, He Zhou², Nai-feng Zhang¹, Bing-wen Si¹, Yan Tu¹, Tao Ma¹, and Qi-yu Diao*¹, ¹Feed Research Institute, Chinese Academy of Agricultural Sciences, Key Laboratory of Feed Biotechnology of the Ministry of Agriculture, Beijing, China, ²Institute of Grassland Science, College of Animal Science and Technology, China Agricultural University, Beijing, China.

To improve alfalfa silage quality and reduce additive cost, the potential of applying the fermented juice of epiphytic lactobacillus (FJEL) as an additive was evaluated. The experiment was designed as a 5 × 3 2-factor (wilt condition and additive) test. The second cut alfalfa at the budding stage was harvested, exposed to sunlight for 0 (20.04% DM; type 1), 5.2 (34.15% DM; type 2) or 8.5 h (54.58% DM; type 3). Alfalfa stuff were harvested in the next morning, exposed to sunlight and then natural rainfall for 1 h (33.20%DM; type 4) or 3 h (24.58% DM; type 5) before cutting. Alfalfa forage of each type was cut to 1–2 cm, then treated with distilled water (control), FJEL, or commercial lactobacillus product (CLP) at 10 ml/kg fresh weight (FW). The FJEL was made from alfalfa juice that was anaerobically stored for 2 d. The treated forages (approximately 500 g) were ensiled in vacuum-sealed polyethylene bags for 45 d, with 3 replicates for each treatment. The statistical significance of the effects of additive, wilt condition, and additive × wilt condition on silage quality were analyzed using a repeated measures one-way ANOVA. The application of FJEL decreased ($P < 0.01$) the pH value (4.44 vs. 4.93 or 4.66) and volatile fatty acid (VFA; 38.32 vs.49.55 or 44.82) content and increased ($P < 0.01$) the concentrations of lactic acid (LA; 68.99 vs.51.84 or 63.29) compared with those of the control and CLP treatment. However, the FJEL treatment had the lower ($P <$

0.01) aerobic stability (254 vs. 274 h), soluble fiber (148.89 vs. 154.85 g/kg DM), available NDF (145.39 vs. 154.25 g/kg DM), rapidly rumen degradable CP (59.91 vs. 62.33 g/kg DM) than CLP treatment. A higher pH and lower LA, sugar, starch and soluble fiber contents were found in the rain treatments compared with those of the no-rain treatments ($P < 0.01$). In conclusion, the application of FJEL could improve silage quality compared with the control; in addition, its effect as a fermentation stimulant may be comparable to or even better than CLP.

Key Words: alfalfa silage, wilt condition, epiphytic lactic acid bacteria

W175 Yield and nutritive value for ruminants of organic winter cereals–bard vetch intercrops. Alexey Diaz^{1,4}, María Dolores Carro², Carlos Palacios³, Cristina Saro¹, Iván Mateos¹, María Luisa Tejido⁴, and María José Ranilla*^{1,4}, ¹Animal Production Department, University of León, León Spain, ²Agriculture Production Department, Technical University of Madrid, Madrid, Spain, ³Construction and Agronomy Department, University of Salamanca, Salamanca, Spain, ⁴IGM (CSIC-ULE), Finca Marzanas s/n, Grulleros, León, Spain.

Organic livestock in the European Union must be fed with organic feed, and forage should be at least 60% of the diet of herbivorous animals. However, the productivity of crops in organic farming is frequently lower than that in conventional farming, and organic cultivation of winter cereals often reduces forage CP content. Intercropping of winter cereals with legumes can provide both higher forage yield and quality compared with winter cereal monocultures, but the results may differ with cultivation conditions. The objective of this study was to investigate the potential of winter oats and barley intercropping with bard vetch (*Vicia articulata*) to enhance forage yield and quality as compared with cereals as a monoculture. The experiment was carried out in the province of Zamora (Spain) in 2014, as a randomized complete block design with 4 replications. Whole-plant DM yield was determined in June and chemical composition and in vitro DM digestibility (IVDMD) of harvested forages were analyzed. In addition, samples (500 mg) of each forage were incubated with 50 mL of buffered sheep rumen fluid at 39°C for 24 h and VFA production was measured. Intercropping with bard vetch increased ($P < 0.05$) forage yield by 25 and 18% for oats and barley, respectively, compared with monoculture. Intercropping also increased CP contents ($P < 0.05$; mean values 629 vs. 949 g/kg DM), and decreased ($P < 0.05$) NDF and ADF contents. The IVDMD was also higher ($P < 0.01$) for intercrops than for cereal monocultures. The presence of bard vetch in the cultures increased total VFA production ($P < 0.001$) by 27 and 15% for oats and barley, respectively. This was due to an increase in the production of acetate, propionate and butyrate ($P < 0.05$), but no effects ($P > 0.05$) of intercropping were detected for the acetate:propionate ratio or the molar proportions of individual VFA. The results indicate that forage yield and quality of oats and barley can be enhanced by intercropping with bard vetch under the cultivation conditions of this study. These results should be confirmed in multi-year studies before drawing up guidelines for organic farmers.

Key Words: organic cultivation, cereal, legume intercropping

W176 Comparison of total tract neutral detergent fiber digestibility of different varieties of barley silage selected on the basis of in vitro NDF degradability. Natalie G. Preston*^{1,2}, Jayakrishnan Nair¹, Peiqiang Yu¹, David A. Christensen¹, John J. McKinnon¹, and Timothy A. McAllister², ¹University of Saskatchewan, Saskatoon,